Outsourcing—Stains on the White Collar?

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Introduction

The debate on outsourcing of US white-collar jobs to low-wage developing countries has picked up remarkable momentum in the last year or so. In September 2002, New Jersey State Senator Shirley Turner tabled a bill to prevent the outsourcing of a New Jersey Department of Human Services contract to ultimately Mumbai, India;[1] other states like Connecticut, Maryland, Missouri, Wisconsin, and the latest Michigan are allegedly exploring similar legislation.[2] *Business Week* on February 3, 2003, ran a cover story titled "The New Global Job Shift," focusing on outsourcing of US service–industry jobs particularly to India. The issue hit Washington in June 2003 with the visit of the Indian trade minister, Arun Jaitley,[3] and with the House Small Business Committee hearing on June 18 titled "The Globalization of White-Collar Jobs: Can America Lose These Jobs and Still Prosper?" The Committee heard testimony from members of Congress, the Bush Administration, and representatives from businesses and organized labor. Following the hearing, Committee Chairman Don Manzullo (R-IL) issued a statement declaring that:

> "US manufacturers contract with engineers from India who send their drawings to workers in Poland who in turn ship their finished products back to America for incorporation into "American" products. Radiologists in India interpret CT scans for US hospitals. Computer technicians in Ghana process New York City parking tickets…. The US economy is growing and creating jobs, but Americans are not

[1] Senate Bill No. 1349, originally introduced on March 21, 2002. The issue arose after Senator Turner learned of efund (cq), a company from Scottsdale, Arizona, which received a contract worth over $300,000 a month to process information for New Jersey welfare recipients regarding their use of electronic cards as debit cards in supermarkets, banks, and retail stores. Since March 6, 2003, the bill has been held in the Senate State Government Committee. See Senator Turner's press statement of March 6, 2003, available at http://www.njsendems.com/Releases/03/March/Assembly%20State%20Govt%20Comm%20Holds%20Turner%20Bill%20to%20Keep%20Jobs%20on%20US%20Soil,%203-6-03.htm (accessed on November 9, 2003).

[2] *Inside U.S. Trade*. June 20, 2003, p. 7; and *Detroit News*, "Bill Bans State From Overseas Contracts," August 10, 2003.

[3] The state-level political backlash in the United States against outsourcing to India had attracted significant media attention in India--see, for instance, *HindustanTimes*, "Anti-outsourcing bills not a backlash on Indian cos," June 12, 2003; and *The Hindu*, "BPO backlash unlikely to affect India," June 25, 2003

filling them. These jobs have been moved overseas where foreigners will work for a lot less."[4]

In August 2003, the General Accounting Office, acting on letters from members of Congress, initiated an official study of the impact of outsourcing on the US economy, which is expected to be released in the Spring of 2004. On October 20, another House Small Business Committee hearing entitled "The Offshoring of High Skilled Jobs" explored the trends of continued high skilled–job losses in America. Recently, in January 2004, the US Senate passed an omnibus appropriations bill with a provision that restricts US government contractors in the Departments of Transportation and the Treasury from outsourcing work offshore[5]--a measure the Indian Prime Minister Atal Behari Vajpayee subsequently called "unfair" and would contest in meetings with US trade officials.[6] Several additional bills related to offshore outsourcing are currently pending in both the US House of Representatives and the US Senate.[7]

The media and consultants have assisted the debate with reports filled with anecdotal evidence of US businesses laying off US workers and outsourcing work to foreign countries, while projecting future American job losses in the millions. One study by Forrester Research, which has been particularly frequently quoted in the media and also at the House hearings, projects that 3.3 million US services jobs and $136.4 billion in wages will have moved offshore by 2015.[8]

However, the services sector, outsourcing, white-collar workers, services jobs, and offshoring are all difficult notions to define, so taking stock of facts available at the end of 2003 may improve our understanding and correctly focus concerns. This paper focuses on occupations deemed at risk of moving offshore and on private services trade and spells out what the latest available data covering the economic slowdown (and recovery) since the end of 2000 tell us about the state of the post-bubble US labor market.

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[4] See Don Manzullo's press release, June 18, 2003, at http://www.house.gov/smbiz/press/108th/2003/030618a.html

[5] See *Infoworld*, "India outsourcers nonplussed by U.S. Senate restrictions," at http://www.infoworld.com/article/04/01/26/HNindiarestrict_1.html. The measure is due to expire in September 2004.

[6] See *Financial Times*, "India Takes Outsourcing Protest to Washington," January 29, 2004, at http://news.ft.com/servlet/ContentServer?pagename=FT.com/StoryFT/FullStory&c=StoryFT&cid=1073281409090&p=1012571727169.

[7] Some bills regard restrictions on H1-B and L-1 visas, while another, sponsored by Democratic presidential candidate John Kerry, aim at forcing call centre operators to identify themselves and their location. See *Hindustan Times*, "US Senate's Outsourcing Ban is Just the Tip of the Iceberg," January 24, 2004, at http://www.hindustantimes.com/news/181_546901,001300460000.htm

[8] See "3.3 Million US Services Jobs To Go Offshore," by John C. McCarthy, Forrester Research, TechStrategy™ Research Brief, November 11, 2002. See also *BusinessWeek* cover story on February 3, 2003, "The New Global Job Shift"; Deloitte Research, 2003, "The Cusp of a Revolution: How Offshoring will Transform the Financial Services Industry"; Evaluserve, 2003, "The Impact of Global Sourcing on the US Economy, 2003-2010"; *Financial Times*, IT Review, "Looking for Savings on Distant Horizons," July 2, 2003; *New York Times*, "IBM. Explores Shift of White-Collar Jobs Overseas," July 22, 2003; BBC Online, Goldman Sachs Shifts to India, July 25, 2003, at http://news.bbc.co.uk/go/pr/fr/-/2/hi/business/3096551.stm; *The Economist*, "The New Geography of the IT Industry," July 17, 2003; *BusinessWeek*, Commentary, "Outsourcing Jobs: Is It Bad?" August 25, 2003; Gartner Research, "Gartner Says One Out of 10 Jobs in U.S. IT Vendors and IT Service Providers to Move Offshore by End of 2004," Press Release, July 29, 2003; and McKinsey Global Institute, "Offshoring: Is It a Win-Win Game?" McKinsey & Company, August 2003.

Job Losses, White-Collar Occupations, and Service-Sector Jobs: A Look at the Most Recent Available Data

Data Sources, Methodologies, and Definitions

Most official labor data in the United States come from the Bureau of Labor Statistics' three major survey programs: (1) the Occupational Employment Statistics (OES) program, which gathers survey data on wages and employment from approximately 400,000 US establishments annually;[9] (2) the Current Employment Statistics (CES), a survey statistics of payroll records, which covers over 300,000 businesses on a monthly basis; and (3) the Current Population Survey (CPS), which gathers information on the labor-force status of approximately 60,000 households on a monthly basis.[10] As such, the scope of the official survey data collection is substantially larger and subsequently likely to be more reliable than any other source of labor-market information in the United States. Therefore this paper will rely upon it exclusively.[11]

There are three principal methodologies for presenting official statistical information on jobs in the United States. One is based on occupations, one on geography, and one on economic sectors (industries). The data can be organized by occupation, by geographic region, by industry, or by more than one criteria--i.e., a particular occupation in a given area or industry. For example, the term *US textile production employment* would refer to all employees in the industries of the total US economy that produce textiles, irrespective of occupational category or geographic area.[12] *Californian textile production employment* would, along the same lines, refer to all employees in the industries of the economy that produce textiles in California. Similarly, the term *US engineering jobs* would refer to the occupational category *engineer*, regardless of the industry or geographic area in which the job is located.[13] However, once harder-to-define notions with no single broadly accepted definition, such as *manufacturing employment*, *service-sector jobs*, *blue-collar, or white-collar jobs*, are presented, there is a clear risk that different authors may use the same label for different underlying data. Adding to the confusion may be situations where categories may seem incompatible but in fact are not. An example would be white-collar occupations in the manufacturing sector, where whichever definition of *white-collar occupations* one were to choose, such jobs would

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[9] This annual total means that each US business can expect to be surveyed about every third year. See the BLS OES program overview at http://www.bls.gov/oes/oes_emp.htm#overview (accessed November 30, 2003).

[10] The Census Bureau conducts the CPS survey for the Bureau of Labor Statistics.

[11] There exist, however, significant discrepancies between the different surveys. For instance, for the widely publicized discrepancy in employment growth figures between the CES and CPS, see Nardone et al. (2003).

[12] These would be SIC categories 22 (Textile Mills Products) and 23 (Apparel and Other Finished Products Made From Fabrics and Similar Materials), or using the new NAICS classification, NAICS 313 (Textile Mills), 314 (Textile Product Mills), and 315 (Apparel Manufacturing).

[13] Engineers are included in the Standard Occupational Classification (SOC) major category 17-0000 "Architecture and Engineering Occupations" as 17 different individual occupational categories for different types of engineers, SOC categories 17-2011 to 17-2171.

exist in abundance in the traditional *blue-collar* manufacturing industry. Unfortunately, the offshore outsourcing debate, with its numerous concepts, is particularly prone to these types of problems.

The above-mentioned Forrester Research report on offshoring of US jobs is but one very frequently quoted such example. It states that 3.3 million US service-industry jobs will move abroad as a result of outsourcing by 2015. The report provides a detailed breakdown of US jobs expected to move overseas into what are nine major occupational categories from the Standard Occupational Classification (SOC) system utilized by the Bureau of Labor Statistics, namely:

1. 11-0000 *Management Occupations*;
2. 13-0000 *Business and Financial Operations Occupations*;
3. 15-0000 *Computer and Mathematical Occupations*;
4. 17-0000 *Architecture and Engineering Occupations*;
5. 19-0000 *Life, Physical, and Social Science Occupations*;
6. 23-0000 *Legal Occupations*;
7. 27-0000 *Arts, Design, Entertainment, Sports, and Media Occupations*;
8. 41-0000 *Sales and Related Occupations*;
9. 43-0000 *Office and Administrative Support Occupations*.

Based on Forrester Research's proprietary knowledge, these categories are taken to represent the occupational categories threatened with job losses arising from offshore outsourcing.[14] This paper will label them *occupational categories threatened by offshore outsourcing*.

Without questioning the assumptions Forrester uses to generate its projected numbers, there are nevertheless several methodological risks. Because the data-organizing principle here is occupational category, variations in these nine *occupational categories threatened by offshore outsourcing* will be generated by developments affecting the total economy--such as the business cycle--not just technological changes affecting US services industries. To see why this point is crucial, one needs to look at detailed occupational category-by-industry data published in raw form by the Bureau of Labor Statistics.[15]

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[14] By inference, 13 other major SOC occupation categories were considered not to be at risk of losing jobs to outsourcing. These are the following: 21-0000 Community and Social Services Occupations; 25-0000 Education, Training, and Library Occupations; 29-0000 Healthcare Practitioners and Technical Occupations; 31-0000 Healthcare Support Occupations; 33-0000 Protective Service Occupations; 35-0000 Food Preparation and Serving Related Occupations; 37-0000 Building and Grounds Cleaning and Maintenance Occupations; 39-0000 Personal Care and Service Occupations; 45-0000 Farming, Fishing, and Forestry Occupations; 47-0000 Construction and Extraction Occupations; 49-0000 Installation, Maintenance, and Repair Occupations; 51-0000 Production Occupations; and 53-0000 Transportation and Material Moving Occupations

[15] Available at http://www.bls.gov/oes/oes_dl.htm. All data are rounded off to nearest 10 and excludes the self-employed. The OES survey defines employment as the number of workers who can be classified as full-time or part-time employees, including workers on paid vacations or other types of leave; workers on unpaid short-term absences; salaried officers, executives, and staff members of incorporated firms; employees temporarily assigned to other units; and employees for whom the reporting unit is their permanent duty station regardless of whether that unit prepares their paycheck. Three direct OES data sources are utilized throughout this paper: (1) Table A in the BLS annual press release, which provides national employment and wage data from the OES survey by major occupational category; (2) Table 1 in

The Big Picture For The Whole Economy

Table 1 summarizes developments from 2000 to 2002 in the nine categories by major sector of the economy:

Table 1: Developments in the US Job Market 2000-2002 [1]

Period	2000	2001	2002	2000	2001	2002	2000-02	2000-02	2000-02
	Number of Employed			Percentage of Total Employment			Absolute Decline/ Increase	Percentage Decline/ Increase	Percentage Share of Total Decline
Column	1	2	3	4	5	6	7	8	9
All Occupations	129,738,980	127,980,410	127,523,740	100%	100%	100%	-2,215,240	-1.71%	100%
- of which Forrester Research's nine Occupational Categories	57,796,400	56,906,750	56,659,760	44.55%	44.47%	44.43%	-1,136,640	-1.97%	51.31%
- of which: Primary and Construction Sectors[2]	1,722,550	1,708,750	1,626,660	2.98%	3.00%	2.87%	-95,890	-5.57%	8.44%
Manufacturing Sectors[3]	5,926,200	5,541,910	4,421,860	10.25%	9.74%	7.80%	-1,504,340	-25.38%	132.35%
Services Sectors[4]	45,154,990	44,539,590	45,422,660	78.13%	78.27%	80.17%	267,670	0.59%	-23.55%
Government Sector[5]	4,988,240	5,112,660	5,073,550	8.63%	8.98%	8.95%	85,310	1.71%	-7.51%

Source: Bureau of Labor Statistics, Annual Occupational Employment and Wage Estimates

[1] Due to the presence of unestimated sectors in individual occupational categories, the sum of jobs in primary, manufacturing, services and government may not add up the total economy-wide estimate for the same occupational category. In other words, the sectoral coverage of each occupation is incomplete, but this is only a minor issue that does not significantly affect the results

[2] Defined here as SIC categories 07-17 in 2000 and 2001, and NAICS 1133-2131 and 2361-2389 in 2002

[3] Defined here as SIC categories 20-39 in 2000 and 2001, and NAICS 3111-3399 in 2002

[4] Defined here as SIC categories 40-89 in 2000 and 2001, and NAICS 2211-2213 and 4231-8139 in 2002

[5] Government employment is an OES designated value, estimated by the BLS based on OMB input

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the BLS annual press release, which provides national employment and wage data from the OES survey by detailed occupational category; and (3) OES survey data by detailed occupational category and by economic sector or state. Due to "holes" in the data matrices from estimates of occupations that are not shown separately, a simple summation of, for instance, national data from relevant occupational subcategories (table 1) into a major occupational category will not necessarily yield the same value as the major occupational category found in table A. The same is true for summations of data across economic sectors, as the sum of employment in a given occupational category in all sectors of the economy will not necessarily equal the nationwide estimate of this same occupational category. However, as discrepancies are minor, this issue does not present relevant obstacles to interpretation of the data for the purposes of this paper.

In 2002, the BLS introduced the new NAICS industrial classification system instead of the SIC system. This has led to very significant redefinitions of industrial categories. The impact is present even at the meta-category level of primary, manufacturing, and services utilized in this paper. Generally, NAICS leads to a slight transfer of manufacturing industries into the services sector, which does introduce some downward bias in the 2002 manufacturing estimates. However, this bias should not be overestimated. In the 1997 Census, the SIC classification of manufacturing covered 17,557,008 employees, while the NAICS manufacturing classification the same year covered only 16,888,016 employees, a decrease of less than 4 percent. As such, the introduction of NAICS in 2002 is unlikely to significantly distort the results in this paper. For additional information see, the Census Bureau at http://www.census.gov/epcd/ec97brdg/ (accessed November 30, 2003).

First, a downturn in employment from 2000 to 2002 is evident, with overall employment declining by 2.2 million or 1.71 percent (top panel, columns 7 and 8). Employment in the *occupational categories threatened by offshore outsourcing* identified by Forrester declined by 1.97 percent, suggesting that offshore outsourcing of previously US-located jobs may already be aggravating the job situation. However, studying the sectoral breakdown of these categories nuances this forthright conclusion. As can be seen in columns 4, 5, and 6 in table 1, a vast majority (roughly 80 percent) of people working in *occupational categories threatened by offshore outsourcing* do so in the services sector and only approximately 10 percent in the manufacturing sector. Yet, in column 9 it becomes evident that the decline in employment in threatened categories has occurred disproportionally in the manufacturing sector. In fact more jobs in the categories in question were lost in the manufacturing sector than were lost in the total economy (as both the services sector and the government recorded slight increases in employment), despite the fact that manufacturing accounts for only 10 percent of total employment at the start of the period. The threatened occupations in the manufacturing sector have seen a sizeable 25.4 percent decline in the total number of jobs, much steeper than the 1.71 percent for the economy as a whole, while those in the services sector have in fact experienced a marginal increase in employment over the period.[16]

Even conservatively allowing for the switch in data categorization systems to NAICS in 2002 (see footnote 14) to account for a 4 to 5 percent decline in manufacturing employment in the 2002 data, table 1 still reveals a roughly 20 percent decline in employment in *occupational categories threatened by offshore outsourcing* in the US manufacturing sector in only two years. This is a significantly larger decline in employment than CES data disclose for the entire manufacturing sector during the similar period from December 2000–December 2002, during which total manufacturing employment declined from 17.2 million to 15.0 million--*only* a 12.6 percent decline.

In conclusion for national trends, it would seem that *occupational categories threatened by offshore outsourcing* have already been hit hard in the US manufacturing sector.[17] But it is important to recall that these data show only that these types of jobs have been lost in the US manufacturing sector, *not* that they have migrated overseas.

In fact, the rise in service-sector employment in these categories over the period may well indicate that many US manufacturers have outsourced parts of the tasks handled by staff in the concerned occupational categories to *US-based* service-sector companies.[18] Nonetheless, these data are yet another testament to the current hard times

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[16] This finding of very large white-collar job losses in the manufacturing sector is in line with the findings of Lori Kletzer (2001), who in her study of US workers displaced by imports concludes that: "The risks of job loss have clearly changed in manufacturing, spreading throughout the sector from production workers to nonproduction workers. This change puts more-educated workers at greater risk of job loss by the late 1990s than they were in the 1980s" (Kletzer 2001, 30)

[17] It is worth remembering that these occupational data are from the end of 2002, while more recent CES data show that from December 2002 to October 2003, employment in the total manufacturing sector continued to decline by 3.2 percent, or roughly 500,000 jobs. Thus continued declines in *occupational categories threatened by offshore outsourcing* after the end of 2002 to the present should not be ruled out.

[18] This is sometimes referred to as "on-shoring" of jobs. Of course, this may also be occurring in service-sector companies, i.e., that some service-sector companies outsource some tasks to other service-sector companies. These would be intra–service sector transactions that one would not pick up in the breakdown of the economy into just four major sectors used here; these may assist in explaining why the services sector has not experienced a significant decline in employment since 2000.

for US manufacturing and amply illustrate that any discussion of white-collar job losses in the United States cannot be separated from the situation in the manufacturing sector.

Detailed Picture for Occupational Categories Threatened by Offshore Outsourcing

Table 2 provides a detailed sectoral look at individual *occupational categories threatened by offshore outsourcing.*

Table 2: Developments in Individual Occupational Categories Threatened by Offshoring 2000-2002

	Total Category Absolute Decline (Increase) in Employment	Total Category Percentage Decline in Employment	Total Category share of Overall Decline	Absolute decline/Increase in Employment [1]				Percentage Decline/Increase in Employment				Industry Share of Decline/Increase			
				Primary Industries	Manufacturing Industries	Services Industries	Government	Primary Industries	Manufacturing Industries	Services Industries	Government	Primary Industries	Manufacturing Industries	Services Industries	Government
Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1: Architecture and Engineering Occupations	-164,360	-5.6%	14.5%	-16,280	-209,790	19,230	2,630	-13.9%	-20.5%	1.7%	0.9%	9.9%	127.6%	-11.7%	-1.6%
2: Arts, Design, Entertainment, Sports, and Media Occupations	-9,740	-0.6%	0.9%	-450	-178,180	163,420	2,860	-7.2%	-70.2%	13.6%	5.7%	4.6%	1829.4%	-1677.8%	-29.4%
3: Business and Financial Operations Occupations	152,850	3.3%	-13.4%	6,960	-122,100	183,660	51,790	4.2%	-25.0%	5.7%	6.9%	4.6%	-79.9%	120.2%	33.9%
4: Computer and Mathematical Occupations	-160,190	-5.5%	14.1%	60	-85,640	-106,350	26,410	0.3%	-24.3%	-4.5%	14.9%	0.0%	53.5%	66.4%	-16.5%
5: Legal Occupations	43,940	4.9%	-3.9%	-160	-4,230	26,290	14,560	-4.2%	-49.5%	4.2%	5.9%	-0.4%	-9.6%	59.8%	33.1%
6: Life, Physical, and Social Science Occupations	39,960	3.8%	-3.5%	-240	-39,340	49,780	20,520	-1.2%	-20.6%	8.5%	8.4%	-0.6%	-98.4%	124.6%	51.4%
7: Management Occupations	-690,220	-8.9%	60.7%	-57,480	-284,970	-358,880	11,110	-10.9%	-25.1%	-6.4%	2.0%	8.3%	41.3%	52.0%	-1.6%
8: Office and Administrative Support Occupations	-181,570	-0.8%	16.0%	-35,550	-456,120	378,590	-79,580	-4.9%	-23.6%	2.1%	-3.0%	19.6%	251.2%	-208.5%	43.8%
9: Sales and Related Occupations	-167,310	-1.2%	14.7%	7,250	-123,970	-88,070	35,010	5.6%	-22.9%	-0.7%	62.6%	-4.3%	74.1%	52.6%	-20.9%

Source: Annual Bureau of Labor Statistics, Occupational Employment and Wage Estimates

1 Due to the presence of unestimated sectors in individual occupational categories, the sum of jobs in primary, manufacturing, services and government may not add up the total economy-wide estimate for the same occupational category. In other words, the sectoral coverage of each occupation is incomplete, but this is only a very minor issue that does not significantly affect the results.

Some distinct trends are visible in table 2:

1) As seen in column 11, the government sector has been hiring in all occupations during the period, with the exception of “office and administrative support occupations”;
2) The manufacturing industries have lost jobs in all occupational categories;
3) Overall job losses in threatened occupational categories were heavily concentrated in management occupations, which experienced 60.7 percent of all job losses and an 8.9 percent decline in total employment (line 7, columns 2 and 3);
4) Architects and engineers saw a 5.6 percent decline in total employment, with more jobs lost in the manufacturing sector than in the economy as a whole (line 1, columns 2 and 13), while job losses among computer and mathematical employees were split between manufacturing and services industries (line 4, columns 13 and 14);
5) The three (out of a total of nine) occupational categories of *business and financial operations; legal;* and *life, physical, and social science* added jobs between 2000 and 2002.

Tables 1 and 2 combine to yield a varied picture of job losses in the *occupational categories threatened by offshore outsourcing*. As already noted, job losses have disproportionally hit manufacturing, and management is particularly hard hit among occupations. Both factors would suggest that the job situation in 2000–02 was still predominantly driven by economic fundamentals and events unrelated to the reported surge in outsourcing of jobs overseas as a result of technological innovations in the

services sector. The data on the other hand also indicate that severe competition and cost-cutting pressure in the manufacturing sector have led this sector to embrace outsourcing (though not necessarily offshore) of staff in the *occupational categories threatened by offshore outsourcing.* Furthermore, both architects/engineers and computer specialists/mathematicians saw substantial declines in employment from 2000 to 2002. This situation of architects/engineers seems closely related to the general problems in the manufacturing sector. That computer specialists/mathematicians, who until 2000 had experienced an unprecedented Y2K and dot-com boom, have seen limited job losses--in relation to total job loss--seems likely to be related to offshore outsourcing, although the true extent cannot be discerned from these macro data.[19]

A Detailed Look at Management Occupations

Given the very large share of the overall decline in *management occupations*, a detailed look at this category is in order (table 3).

Table 3: Employment Developments in Management Occupation Sub-categories 2000-02

SOC Code	Occupational Management Category	Employment		Change in Employment	Share of Total Management Employment in 2002	Share of Change in Employment 2000-02 (Total Employment Change is the Denominator)
		2000	2002			
11-1011	Chief executives	519,890	452,400	-13%	6.9%	11.6%
11-1021	General and operations managers	2,221,590	1,998,350	-10%	30.6%	38.4%
11-1031	Legislators	52,750	64,650	23%	1.0%	-2.0%
11-2011	Advertising and promotions managers	93,420	81,090	-13%	1.2%	2.1%
11-2021	Marketing managers	202,100	192,080	-5%	2.9%	1.7%
11-2022	Sales managers	344,180	328,060	-5%	5.0%	2.8%
11-2031	Public relations managers	68,000	62,640	-8%	1.0%	0.9%
11-3011	Administrative services managers	344,440	306,370	-11%	4.7%	6.5%
11-3021	Computer and information systems managers	283,480	264,790	-7%	4.1%	3.2%
11-3031	Financial managers	622,890	563,020	-10%	8.6%	10.3%
11-3040	Human resources managers	224,970	193,360	-14%	3.0%	5.4%
11-3051	Industrial production managers	205,370	173,960	-15%	2.7%	5.4%
11-3061	Purchasing managers	126,030	105,010	-17%	1.6%	3.6%
11-3071	Transportation, storage, and distribution managers	116,680	107,400	-8%	1.6%	1.6%
11-9011	Farm, ranch, and other agricultural managers	5,370	5,630	5%	0.1%	0.0%
11-9021	Construction managers	229,200	208,360	-9%	3.2%	3.6%
11-9031	Education administrators, preschool and child care center/program	49,460	52,700	7%	0.8%	-0.6%
11-9032	Education administrators, elementary and secondary school	196,390	204,340	4%	3.1%	-1.4%
11-9033	Education administrators, postsecondary	92,280	96,910	5%	1.5%	-0.8%
11-9041	Engineering managers	242,280	205,390	-15%	3.1%	6.3%
11-9051	Food service managers	282,290	249,710	-12%	3.8%	5.6%
11-9061	Funeral directors	26,110	21,740	-17%	0.3%	0.8%
11-9071	Gaming managers	3,720	3,760	1%	0.1%	0.0%
11-9081	Lodging managers	31,890	31,170	-2%	0.5%	0.1%
11-9111	Medical and health services managers	230,410	228,290	-1%	3.5%	0.4%
11-9121	Natural sciences managers	38,870	42,470	9%	0.6%	-0.6%
11-9131	Postmasters and mail superintendents	26,850	26,470	-1%	0.4%	0.1%
11-9141	Property, real estate, and community association managers	145,340	156,290	8%	2.4%	-1.9%
11-9151	Social and community service managers	93,460	111,480	19%	1.7%	-3.1%
	Total				100%	100%

Source: Bureau of Labor Statistics, table 1, National employment and wage data from the Occupational Employment Statistics survey by occupation, annual release

There are large differences between employment developments in individual sub-categories of management occupations, but the sizeable decline among chief executives (12 percent of the total decline) seems to indicate that fluctuations in management positions (and likely also other *occupational categories threatened by offshore*

[19] It is important to recall that the data utilized for this discussion yield no insights into whether or not the US job market in the occupations in question are better or worse off presently than at a similar time relative to earlier recessions. Unfortunately, no occupational data are available for such comparisons, but other studies seem to suggest that indeed the current recovery has seen significantly less job generation than prior post-recession recoveries. See, for instance, Groshen and Potter (2003).

outsourcing) are more influenced by cyclical developments than offshore outsourcing. Bankruptcies, which would seem to be required for the chief executive position[20] to be eliminated, are high in recessions. Many companies, particularly small and medium-sized, go bust, causing a large decline in management (and other white-collar) jobs. On the other hand, offshore outsourcing of the chief executive (or top management in general) does not seem to be immediately possible.

Constant US Job Creation and Destruction—State-Level Variations, Too

The remarkable *job turnover (or churn)* in the United States (i.e., the constant creation and destruction of jobs in the US economy) is characteristic of the flexible US labor market. This factor may serve to put some of the very large job loss numbers-- frequently in the millions--often used in the offshore outsourcing debate into perspective. Figure 1 shows the gross number of jobs gained and lost in the United States from 1992Q3 to the most recent data from 2003Q2.

Figure 1: US Job Turnover Q3 1992-Q2 2003 (in 000s)

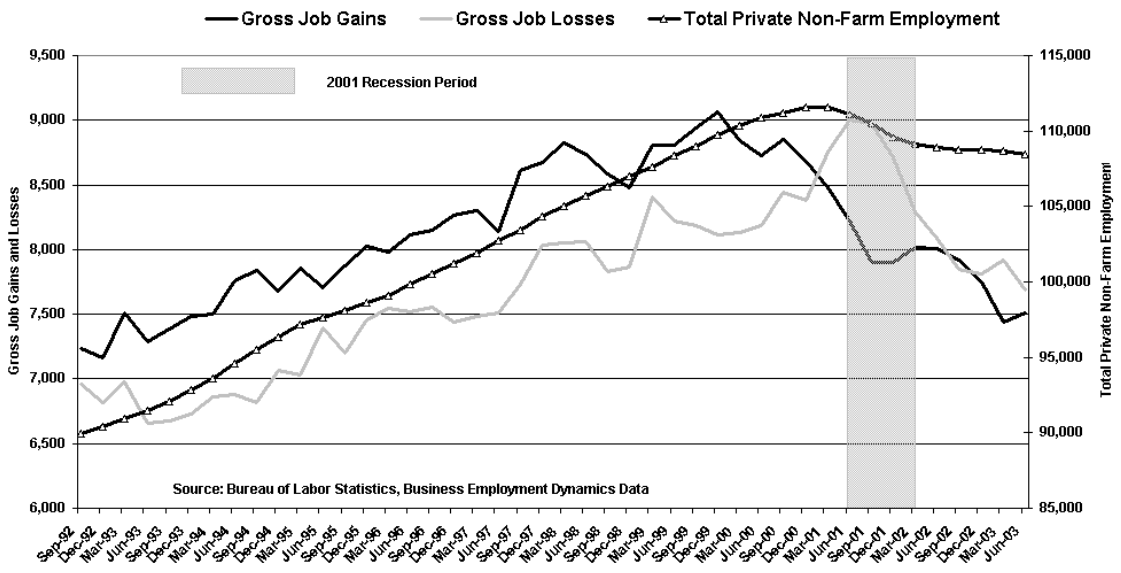

Figure 1 shows that between 7 and 8 percent of all private jobs in the United States are lost every quarter and that even during the late-1990s boom years, between 7 million and 8 million jobs were lost every quarter in the United States while even more were created. What figure 1 also shows is that gross job gains in 2003Q1 were at an all-time relative

[20] SOC category 11-1011 chief executives are defined as those who *"Determine and formulate policies and provide the overall direction of companies or private and public sector organizations within the guidelines set up by a board of directors or similar governing body. Plan, direct, or coordinate operational activities at the highest level of management with the help of subordinate executives and staff managers."* It should be noted that chief executives can also come from the government sector. The general increase in government employment from 2000 to 2002 would thus, if anything, indicate a private-sector decline even bigger than the overall decline.

low at only 6.9 percent of the total labor force.[21] *Yet, 7 million to 8 million job losses and a generally larger number of job gains every quarter in the United States do make a projected 3.3 million job loss over 15 years seem less dramatic.*

Keeping this *churn* in mind and probing employment data with state-level details is another way to reveal the fact that *occupational categories threatened by offshore outsourcing* are constantly evolving regionally within the United States as employment opportunities change in different states. Table 4 provides the top-three job-gaining and losing states in the United States from 2000 to 2002 in absolute numbers of jobs gained and lost.

Table 4: US Regional Differences in Job Creation and Destruction in Occupational Categories Threatened by Offshore Outsourcing 2000-2002

Occupational Category	Top-3 Job Gaining and Losing States	Number of Jobs Gained and Lost in Occupational Category	Occupational Category	Top-3 Job Gaining and Losing States	Number of Jobs Gained and Lost in Occupational Category
Architecture and Engineering Occupations	Colorado	3,660	Life, Physical, and Social Science Occupations	California	5,300
	New Jersey	2,770		Wisconsin	4,360
	Oregon	2,640		North Carolina	3,070
	California	-13,060		Missouri	-2,150
	Texas	-13,160		Ohio	-2,560
	Michigan	-15,780		New York	-2,810
Arts, Design, Entertainment, Sports, and Media Occupations	California	8,090	Management Occupations	Puerto Rico	1,340
	Georgia	2,730		Idaho	740
	Florida	2,520		Montana	520
	Indiana	-2,290		California	-44,990
	Texas	-2,660		Ohio	-46,520
	Minnesota	-4,280		Texas	-55,440
Business and Financial Operations Occupations	California	22,980	Office and Administrative Support Occupations	California	31,850
	Ohio	9,280		Missouri	13,360
	Minnesota	8,490		Texas	11,010
	Massachusetts	-6,570		Ohio	-20,760
	New York	-8,680		Illinois	-23,250
	Texas	-12,500		New York	-34,830
Computer and Mathematical Occupations	New Jersey	9,790	Sales and Related Occupations	Texas	40,750
	Maryland	5,940		California	13,150
	Virginia	3,590		Nevada	6,410
	Massachusetts	-9,720		Wisconsin	-10,780
	Texas	-14,660		Michigan	-15,660
	California	-43,990		Ohio	-20,290
Legal Occupations	Georgia	5,330			
	Florida	4,250			
	Ohio	3,460			
	Colorado	-1,670			
	New York	-2,480			
	California	-6,090			

Source: Bureau of Labor Statistics, State Occupational Employment and Wage Estimates 2000 and 2002, Avalable at http://www.bls.gov/oes/oes_dl.htm

This time a nuanced assessment based on regional differences emerges. Big dislocations are evident between states, and big changes are occurring within states. While Ohio lost 20,000 jobs in *sales and related occupations* between 2000 and 2002, Texas gained

[21] With the data from 2003Q2 it is now possible to directly compare the current gross job turnover with similar the period following the 1990-91 recession. 1992Q3 is six quarters after the end of the 1990-91 recession in March 1991, while 2003Q2 is six quarters after then end of the 2001 recession in November 2001. Comparing quarterly gross employment gain rates (share of total private non-farm employment), one finds that in 1992Q3 it was 8.1 percent, while in 2003Q2 it was only 7.0 percent – in other words, there is clearly less job creation now than after the 1990-91 recession. However, there are also relatively less job losses as in 1992Q3 the rate was 7.8 percent, while in 2003Q2 is was only 7.3 percent. A picture of a less dynamic US labor market in 2003, as compared to the similar period after the previous recession seems to emerge. All data available at the BLS web-site at http://www.bls.gov/bdm/home.htm#data. For international comparisons of gross job turnover (job gains and losses), see, for instance, OECD (1995, 1995) and Davis, Haltiwanger and Schuh (1996).

41,000.[22] On the other hand, Texas lost 55,000 jobs in *management occupations,* while other states gained a limited number of managerial positions. California was the largest job loser in *computer and mathematical occupations* and *legal occupations* but the largest job gainer in *business and financial operations occupations* and *arts, design, entertainment, sports, and media occupations.* Are *computer and mathematical occupations* going offshore? Not so in New Jersey, which added nearly 10,000 such jobs in 2000–02, but definitely so, if you're from California, which lost 44,000 of these positions.

In conclusion, state-level differences once again illustrate the need to distinguish between *outsourcing* of non-core tasks from US companies and US job losses due to *offshore outsourcing.* What table 4 and figure 1 show is the constant creative destruction of jobs in America, with some states gaining jobs, as others are losing them. *Architecture and engineering* jobs lost in Michigan through outsourcing may well have ended up in Colorado.[23] In other words, a US job lost to outsourcing somewhere may be another US job gained elsewhere, rather than inevitably moved offshore to a foreign country.

Wages, Skills, and Technology in Occupations Threatened by Offshore Outsourcing

It was described earlier how two-thirds of job losses experienced in 2000–02 in *occupational categories threatened by offshore outsourcing* occurred in management occupations. Noticeably, these would have been well-paid positions thus lost for the US labor force, but *fortunately* as can be seen in table 5, this pattern of actually experienced job losses in America is different from the pattern of job loss Forrester projected relating to offshore outsourcing in the US economy until 2015.

Table 5: Share of Projected By Forrester US Jobs Moving Offshore by Occupational Category, 2000-2015

	2000	2005	2010	2015
Management Occupations	0%	6%	7%	9%
Business and Financial Operations Occupations	11%	10%	10%	10%
Computer and Mathematical Occupations	26%	19%	17%	14%
Architecture and Engineering Occupations	3%	5%	5%	6%
Life, Physical, and Social Science Occupations	0%	1%	1%	1%
Legal Occupations	2%	2%	2%	2%
Arts, Design, Entertainment, Sports, and Media Occupations	1%	1%	1%	1%
Sales and Related Occupations	4%	5%	6%	7%
Office and Administrative Support Occupations	53%	50%	50%	50%

Source: Forrester Research TechStrategy™ Research Brief November 11, 2002, 3.3 Million US Services Jobs To Go Offshore, by John C. McCarthy, p. 4.

Management positions are *only* projected to account for 9 percent of total jobs lost in 2015 rather than the 60.7 percent experienced in 2000–02.

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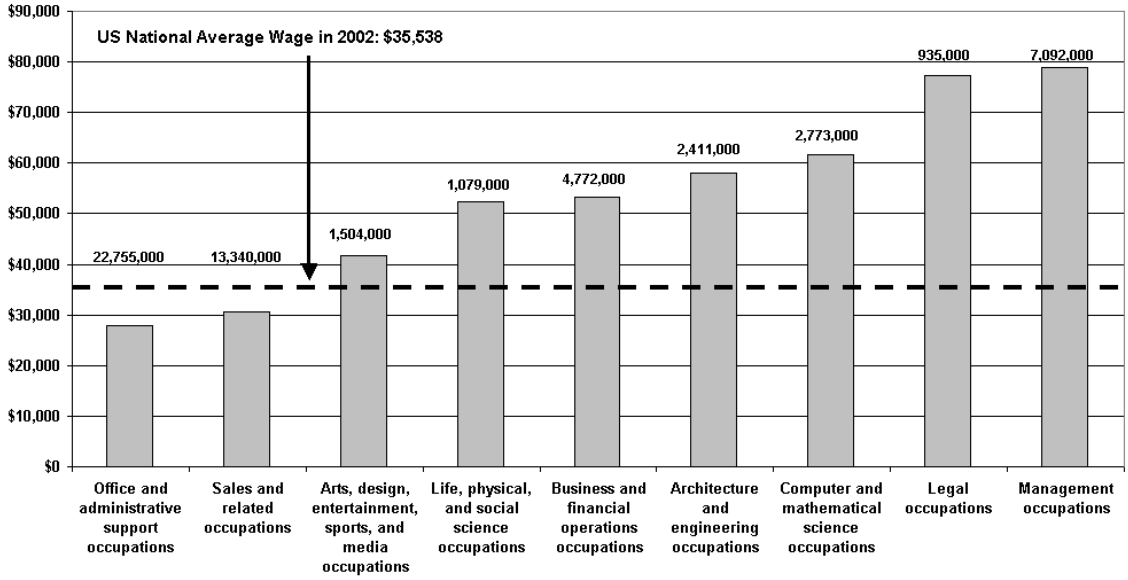
[22] Larger states, such as California, Texas, New York and Florida, will by virtue of their relative size tend to occupy the extreme positions in terms of absolute numbers. Presenting table 4 as relative percentage changes instead significantly changes the top/bottom three states.

[23] This is sometimes referred to as "on-shoring" of jobs.

While this difference need not imply anything other than that forces other than outsourcing predominantly determined the weakening US job market in these occupations in 2000–02, it does point to the important issue of just what type of jobs are these "services or white-collar jobs"? Are they $80,000-a-year software engineers in Silicon Valley[24] or $15,000-a-year cashiers at a burger restaurant?[25]

Looking at the 2002 average wages of *occupational categories threatened by offshore outsourcing* reveals that there are indeed large differences between individual categories, but that *most jobs projected to be lost are below the US average wage*.

Figure 2: Average Wage and Employment, by Major Occupational Category, 2002[1]



[1] US National Average Wage calculated as the weighted average of all major occupational categories. Employment numbers rounded at nearest thousands.
Source: Bureau of Labor Statistics, Table A, National employment and wage data from the Occupational Employment Statistics survey by occupation, 2002.

Figure 2 shows the two largest *occupational categories threatened by offshore outsourcing* measured by the number of jobs--*office and administrative support occupations* and *sales and related occupations*--had an average wage below the US national average;[26] these two categories represented almost two-thirds (64 percent) of total US employment in all *occupational categories threatened by offshore outsourcing* in 2002.

[24] The occupational category "15-1031 Computer Software Engineers, Applications" in NAICS category "511200 Software Publishers" in 2002 had an average annual income of $78,790.
[25] The occupational category "41-2011 Cashiers" in NAICS category "722200 Limited-Service Eating Places" in 2002 had an average annual wage of $14,650.
[26] This number is depends on the level of data detail at which the average is taken. Due to the large size of the two individual categories with averages below the national average, a relatively large number of jobs in these occupations are in industries with an average wage above the national minimum, but these are then "averaged down" by individual industries with average wages in these occupations below the national minimum. If instead one were to look at each occupation in each industry (i.e., add an extra level of detail rather than just look at occupations across the whole economy), the number of people employed in occupations threatened by offshore outsourcing in industries paying below the national minimum wage would drop to 55 percent.

Returning to table 5, Forrester Research furthermore forecasts that 57 percent of job losses in the United States occurring in *occupational categories threatened by offshore outsourcing* until 2015 will be in these two categories. In other words, *the majority of jobs forecast to be lost pay less than the US average wage*. These are not the software engineers from Silicon Valley. On the other hand, almost 10 million people work in high-paying business, financial, architecture, engineering, computer, and mathematical occupations projected to account for 30 percent of total job losses until 2015--and these occupations did account for 30 percent of the actual job loss from 2000 to 2002![27]

As alluded to above, these predictions by Forrester--if one believes them-- are in some ways almost comforting, as they indicate that the otherwise dire picture from 2000–02, where the majority of job losses in *occupational categories threatened by offshore outsourcing* occurred in the very high-paying *management occupations*, is not going to be repeated in the years ahead.

If most of the jobs at risk of offshore outsourcing in the United States are low-paying jobs, the medium-term counterfactual to potential offshore outsourcing of such jobs might be elimination through technological automation. For example, the increased use and sophistication of automated responses in phone inquiries represents an obvious example of companies attempting to cut costs by resorting to the cheapest labor of all, namely computers, rather than perhaps outsourcing such services to a call-center in India--much of what can technically be outsourced today will in the end most likely be automated.[28] Of course, this will not immediately provide a new job for a person laid off from a US-based business, but it must serve as a notice to US policymakers that limiting US businesses' (or governments') use of cost-efficient foreign labor will likely not result in many US jobs retained but rather a doubling of efforts by these businesses (or government agencies) to automate tasks, ultimately perhaps resulting in at least the same number of job destructions. Another way of saying it is that preventing cost-cutting in businesses and government through offshore outsourcing may not save many US jobs because it will not remove the need for businesses to cut costs, so it will not stop technological innovation. But it will increase costs to US businesses, consumers, and taxpayers, which may cause additional jobs to be lost.

A Detailed Look at IT Occupations in the United States

IT Occupations--Definitions and Job Developments

So far this paper has utilized relatively broad occupational categories to describe developments in the US labor market since 2000. However, to assess a broad aggregate category such as IT occupations, it is important to utilize the maximum degree of detail possible to highlight potential conflicting trends within an aggregate occupational category.

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[27] However, not in the uniform detailed manner foreseen by Forrester. Instead, business and financial occupations increased from 2000 to 2002, while the remaining decreased relatively more than projected.

[28] See line 17 in table 6 for the development in employment for US telephone operators. This group saw a steep decline in employment from 2001 to 2002.

No single widely accepted occupational category exists for IT. This paper will use the aggregate definition from *Digital Economy 2002*,[29] which includes 29 particular SOC occupational categories.

As mentioned earlier, occupations related to IT are likely to have been particularly expanded by the high-tech boom during the late 1990s. As such, it may be somewhat misrepresentative to look only at the *bust period* of 2000–02. Instead, valuable information may be gained by expanding the time horizon to also include 1999, the first year in which detailed occupational data using the SOC classification system is available. Table 6 shows recent developments from 1999 to 2002.

Table 6: US IT Occupations 1999-2002

	SOC Occupational Category	Absolute Change in Employment					1999-2002 percentage Change	Share of 1999-2002 Change in Employment[1]	2002 Employment	2002 Wages
		Annual			Period					
		1999-2000	2000-2001	2001-2002	2000-2002	1999-2002				
		1	2	3	4	5	6	7	8	9
	Non-production Occupations									
1	Computer and information systems managers	2,660	-16,160	-2,530	-18,690	-16,030	-6%	6%	264,790	90,440
2	Engineering managers	-5,930	-27,500	-9,390	-36,890	-42,820	-17%	16%	205,390	95,750
3	Computer and information scientists, research	-480	-180	-1,210	-1,390	-1,870	-7%	1%	24,410	80,510
4	**Computer programmers**	**2,130**	**-29,150**	**-44,260**	**-73,410**	**-71,280**	**-13%**	**26%**	**457,320**	**63,690**
5	**Computer software engineers, applications**	**87,040**	**-12,980**	**-4,900**	**-17,880**	**69,160**	**24%**	**-25%**	**356,760**	**73,800**
6	**Computer software engineers, systems software**	**55,580**	**-3,090**	**-6,480**	**-9,570**	**46,010**	**22%**	**-17%**	**255,040**	**75,840**
7	Computer support specialists	59,730	-29,340	-14,670	-44,010	15,720	3%	-6%	478,560	42,320
8	Computer systems analysts	35,090	-15,040	19,490	4,450	39,540	9%	-14%	467,750	64,890
9	Database administrators	6,540	-3,750	-2,160	-5,910	630	1%	0%	102,090	59,080
10	Network and computer systems administrators	29,360	-6,210	4,730	-1,480	27,880	14%	-10%	232,560	57,620
11	Network systems and data communications analysts	20,890	6,840	7,400	14,240	35,130	36%	-13%	133,460	61,390
12	Computer hardware engineers	3,260	3,910	-410	3,500	6,760	11%	-2%	67,180	76,150
13	Electrical engineers	13,190	-11,090	-5,130	-16,220	-3,030	-2%	1%	146,180	70,480
14	Electronics engineers, except computer	16,860	-480	2,810	2,330	19,190	18%	-7%	126,020	71,600
15	Electrical and electronic engineering technicians	2,410	-23,760	-25,850	-49,610	-47,200	-19%	17%	194,960	44,210
16	Switchboard operators, including answering service	-5,470	-15,450	-760	-16,210	-21,680	-9%	8%	226,890	21,970
17	**Telephone operators**	**1,330**	**-5,350**	**-11,080**	**-5,730**	**-4,400**	**-9%**	**2%**	**46,420**	**29,340**
18	Billing and posting clerks and machine operators	-59,370	-11,420	10,380	-1,040	-60,410	-11%	22%	491,000	27,120
19	**Computer operators**	**-12,040**	**-8,470**	**-5,350**	**-13,820**	**-25,860**	**-13%**	**9%**	**172,640**	**31,640**
20	**Data entry keyers**	**-61,500**	**-53,750**	**-28,000**	**-81,750**	**-143,250**	**-28%**	**52%**	**376,970**	**23,190**
21	Computer, automated teller, and office machine repairers	12,300	1,420	-8,430	-7,010	5,290	4%	-2%	135,380	34,810
22	Telecommunications equipment installers and repairers, except line install	19,770	18,190	-14,980	3,210	22,980	13%	-8%	195,680	45,550
23	Electrical and electronics repairers, commercial and industrial equipment	10,230	-3,990	4,550	560	10,790	15%	-4%	82,320	40,760
24	Electrical power-line installers and repairers	-2,890	2,920	-3,080	-160	-3,050	-3%	1%	96,040	47,170
25	Telecommunications line installers and repairers	9,490	-240	-12,080	-12,320	-2,830	-2%	1%	156,160	39,560
	Production Occupations									
1	Electrical and electronic equipment assemblers	-20,280	-64,650	-35,470	-100,120	-120,400	-31%	***44%***	***267,030***	***24,640***
2	Electromechanical equipment assemblers	2,720	-8,620	-6,430	-15,050	-12,330	-18%	***4%***	***57,500***	***26,510***
3	Semiconductor processors	24,890	-15,930	-7,440	-23,370	1,520	4%	***-1%***	***43,630***	***29,140***
	Total	247,510	-322,620	-200,730	-523,350	-275,840	-4%	100%	5,860,130	NA
1	**Production Occupations**	**7,330**	**-89,200**	**-49,340**	**-138,540**	**-131,210**	**-26%**	**48%**	**368,160**	NA
2	**Non-Production Occupations**	**240,180**	**-233,420**	**-151,390**	**-384,810**	**-144,630**	**-3%**	**52%**	**5,491,970**	NA

[1] The total absolute decline in employment among all categories is the denominator

Source: Department of Commerce, annual Occupational Employment Survey Data

In table 6, several distinct trends are visible:

1) The difference between the 2000–02 and 1999–2002 periods illustrated in columns 4 and 5 is very big indeed, clearly illustrating in column 1 the boom until 2000 and the following bust in IT employment in columns 2-4. Immediately this draws attention to the question of *sustainable US IT employment*.

[29] See Department of Commerce (2002). It needs to be stressed that other papers have used a different definition of IT related occupations, and thus may get differing results. See, for instance, Bardhan and Kroll (2003).

2) The decline in IT employment is heavily concentrated in production occupations (panel 2), which account for almost half of the total decline, despite only accounting for little over 6 percent of total IT employment at the end of the period. As production occupation employment is heavily concentrated in the manufacturing sector, the trend from the economy at large is repeated in IT production employment;
3) The decline in IT employment is concentrated in several individual occupational categories (column 7). *Data Entry Keyers*[30] alone account for 52 percent of the total decline in employment; *electrical and electronic equipment assemblers*[31] account for 44 percent of the total decline in employment;
4) IT managers have suffered significant job losses, consistent with the trend seen in the overall economy (top line).

The data in table 6 are estimates of the number of positions in given occupations in the United States but says nothing about the characteristics or origin of the person who fulfills it. This is important to realize when discussing "the number of IT US jobs lost." If the definition of a "US job" is one that it is held by a US citizen/permanent resident, then fluctuations in the number of temporary foreign workers in the United States must be taken into account. Data from the Department of Homeland Security's US Citizenship and Immigration Services reveal that from 2000 to 2002, the number of foreign beneficiaries of the temporary US H1-B work permit in *computer related occupations* declined from 148,000 in 2000 to only 75,000 in 2002.[32] As such a net of almost 75,000 foreign computer-related workers stopped working in the United States from 2000 to 2002. The precise occupation of these foreign H1-B beneficiaries cannot be discerned, but with Indian computer-related occupational H1-B beneficiaries declining from 103,000 in 2000 to 47,000 in 2002, is it possible to speculate that perhaps some of the 70,000 US (located) jobs in computer programming lost over the period were not held by US citizens (voters)? Such potential laying-off of foreign computer-related workers in the United States would alleviate the adverse job effects felt by US citizens.

Evolution in IT Occupations and Skills, 1999–2002

Much has been written about the recent loss of jobs among computer programmers in the United States, and how this is related to offshore outsourcing of software coding.[33] In

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[30] SOC Category 43-9021 is defined as: *Operate data entry device, such as keyboard or photo composing perforator. Duties may include verifying data and preparing materials for printing. Exclude "Word Processors and Typists" (43-9022).*

[31] SOC Category 51-2021 is defined as*: Assemble or modify electrical or electronic equipment, such as computers, test equipment telemetering systems, electric motors, and batteries.*

[32] All data refer to federal government fiscal years. See *2002 Yearbook of Immigration Statistics*, table 33; *2000 Statistical Yearbook of the Immigration and Naturalization Service*, tables 44 and 45. The number of foreign computer-related H1-B beneficiaries peaked in 2001 with 191,000 beneficiaries. See *2001 Statistical Yearbook of the Immigration and Naturalization Service*, table 44. The data for 2000 is the sum of initial and continuing H1-B beneficiaries. All data available at http://uscis.gov/graphics/shared/aboutus/statistics/Nonimms.htm.

[33] See, for instance, *BusinessWeek* cover story *The New Global Job Shift*, February 3, 2003; testimony by Ron Hira before the House Committee of Small Business, June 18, 2003; CNN.com, "Tech Jobs Leave US for India, Russia," July 14, 2003; CNN.com, "US Tech Workers Training Their Replacements," August 11, 2003.

table 6 (line 4, column 5), it is evident that this is a real trend, as *computer programmers*[34] have lost more than 70,000 jobs since 1999. However, what is also clear in table 6 is that when looking over the whole 1999–2002 period (this is one area where it yields crucial information to add 1999 to the 2000–2002 data), other higher-paid and more advanced software programming occupations (lines 5 and 6, column 5) have posted double-digit percentage increases--*computer software engineers, applications*[35] adds almost 70,000 jobs and *computer software engineers, Systems Software*[36] adds almost 50,000 jobs. On net, there are somewhat fewer jobs from 2000 to 2002, but this may well be related to the IT bubble peaking in 2000 after a dramatic increase in 1999–2000 rather than a surge in offshore outsourcing of their tasks since 2000.

Computer programmers engaged in relatively simple tasks (when compared to other software occupations) have seen a sustained job loss since the end of 1999, while more advanced software occupations have increased their employment since the beginning of 1999. This is an indication that indeed *low-skilled tasks* within the software sector may be migrating out of the United States, but *higher-skilled tasks* remain. Such a trend of technological destruction of US IT jobs, where increasingly standardized tasks are either automated or offshore outsourced, may also be present in other IT occupations (column 6). For instance, employment among *telephone operators*[37] in 2002 alone saw a decline of almost 20 percent; *switchboard operators, including answering services,*[38]declined 8 percent; and as seen earlier, employment among *data entry keyers* declined by 28 percent over the period.

But, on the other hand, higher-skilled IT occupations at the engineering level generally posted employment increases from 1999 to 2002, indicating that such jobs will continue to expand in the United States.

In one important respect, *computer programmers* differ from *telephone operators, switchboard operators, including answering services, and data entry keyers*: In 2002, computer programmers at $63,690 made more than twice the annual average salary of the latter three categories. This is clear evidence that jobs are being lost in highly paid IT occupations and may indicate that computer programmers have suffered from an adverse technologically induced employment shock, whereby tasks they traditionally have

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[34] SOC Category 15-1021 is defined as*: Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language. Develop and write computer programs to store, locate, and retrieve specific documents, data, and information. May program web sites.*

[35] SOC Category 15-1031 is defined as*: Develop, create, and modify general computer applications software or specialized utility programs. Analyze user needs and develop software solutions. Design software or customize software for client use with the aim of optimizing operational efficiency. May analyze and design databases within an application area, working individually or coordinating database development as part of a team. Exclude "Computer Hardware Engineers" (17-2061).*

[36] SOC Category is 15-1032 defined as*: Research, design, develop, and test operating systems-level software, compilers, and network distribution software for medical, industrial, military, communications, aerospace, business, scientific, and general computing applications. Set operational specifications and formulate and analyze software requirements. Apply principles and techniques of computer science, engineering, and mathematical analysis.*

[37] SOC Category 43-2021 is defined as*: Provide information by accessing alphabetical and geographical directories. Assist customers with special billing requests, such as charges to a third party and credits or refunds for incorrectly dialed numbers or bad connections. May handle emergency calls and assist children or people with physical disabilities to make telephone calls.*

[38] SOC Category 43-2011is defined as: *Operate telephone business systems equipment or switchboards to relay incoming, outgoing, and interoffice calls. May supply information to callers and record messages.*

performed for very high wages are now standardized and automated and sent offshore by companies to cut costs.

In conclusion, some specific high-tech occupations have suffered significant job losses in recent years. The trend is concentrated in relatively low-skilled (and low-wage) IT occupations or dominated by economy-wide trends (management and manufacturing employment declining). The economic impact of this development should not be overstated. That more than 70,000 US computer programmers have lost their jobs since 1999 does *not* condemn the US economy to imminent collapse. This number is at most a commentary on the state of the technology cycle in the US, rather than the state of the overall US economy. Table 6 (column 9) shows that, excluding management occupations, of the 12 IT occupations that earned more than $50,000 in 2002, 75 percent increased their employment from 1999 to 2002. IT jobs earning more than $50,000 expanded by 184,000 from 1999 to 2002, of which computer software engineers earning approximately $75,000-a-year accounted for 115,000 jobs.

Conclusion

This paper has presented several facts, some of which may be novel to some:

- The vast majority of the jobs lost in the post-bubble US economy from 2000 to 2002 in *occupational categories threatened by offshore outsourcing* has occurred in the manufacturing sector. This indicates that discussions of white-collar job losses cannot be separated from economic problems in the manufacturing sector.
- Most jobs lost have been in high-paying *management positions*, a different occupational category from the projections most frequently cited.
- Jobs have been lost non-uniformly across different states with some gaining and others losing jobs, suggesting that no singular nationwide trend other than the regular business cycle is occurring
- The US economy every quarter generates many more jobs than are projected to be lost to offshore outsourcing over the next decades.
- The majority of US jobs, projected by the most widely quoted industry report on the issue, to be lost in *occupational categories threatened by offshore outsourcing* pays less than the US average wage, suggesting that many of these jobs may face medium-term elimination through technological change, regardless of whether they are outsourced to offshore locations or not.
- Some IT occupations have declined, but the declines are concentrated in low-skilled IT occupations, and in occupations where economy-wide trends dominate (managers and manufacturing). This mitigates the overall macroeconomic impact to the US economy of such job losses.
- More than 70,000 computer programmers have lost their jobs since 1999, but more than 115,000 higher paid computer software engineers have gotten jobs since 1999.
- High-paying IT occupations have generally expanded since 1999.

These facts offer a different and more nuanced view from the perception of a US white-collar labor market besieged by offshore outsourcing occurring as a result of

technological changes in the services sector. Instead, fluctuations in white-collar employment seem dominated by the general business cycle. However, due to the lack of data from earlier business cycles, any comparative statements with job developments in earlier periods cannot be made.

References:

Bardhan, A., and Kroll, C. 2003. *The New Wave of Outsourcing.* Fisher Center Research Reports, University of California, Berkeley.

Davis, Steven J., John C. Haltiwanger, and Scott Schuh. 1996. *Job Creation and Destruction.* Cambridge, MA: MIT Press.

Groshen E. L., and Potter S. 2003. Has Structural Change Contributed to a Jobless Recovery? *Current Issues in Economics and Finance* 9, no. 8 (August). New York: New York Federal Reserve Bank.

Kletzer, Lori G. 2001. *Job Loss from Imports: Measuring the Costs.* Washington: Institute for International Economics.

McKinsey Global Institute, *Offshoring: Is It a Win-Win Game?*, McKinsey & Company August 2003

Nardone, T., M. Bowler, J. Kropf, K. Kirkland, and S. Wetrogan. 2003. Examining the Discrepancy in Employment Growth between the CPS and the CES. Paper presented to the Federal Economic Statistics Advisory Committee, October 17.

OECD (Organization for Economic Cooperation and Development). 1994. Job Gains and Losses in Firms. *OECD Employment Outlook* 1994, chapter 3. Available at http://www.oecd.org/dataoecd/4/4/2409971.pdf .

OECD (Organization for Economic Cooperation and Development). 1995. Job Gains and Losses: Recent Literature and Trends. The OECD Jobs Study: Working Paper Series No. 1. Available at http://www.oecd.org/dataoecd/23/20/2508531.pdf .