

Flexible labor: restructuring the American work force

Trends in employment, occupations, output, and input provide evidence that firms have increased their purchases of services relative to directly hiring labor

Angela Clinton

Many businesses are redefining the structure of their firms by moving toward flexible staffing. In these firms, persons who formerly were hired directly are being replaced with purchases of services. Such market-mediated arrangements could include outsourcing or contracting out of various functions, utilizing temporary workers, or even leasing an entire work force to meet all labor needs. To the extent that this is happening, some employment that, in the past, was counted in the industry of the business site is now being counted in the services industry. The result distorts time series and can lead to faulty analysis about job trends in an industry. This has been of particular concern in the manufacturing industries.

Much research has been done to explain the shift from direct hires of permanent workers to contingent workers. Flexible work arrangements have been used as a means to meet fluctuations in demand for the firm's product, to supplement staff due to absences from work, and to reduce labor costs.¹ Some studies indicate that firms purchase services to avoid unionism.² Other studies cite increased competition and profit maximization as factors that lead to increased use of flexible staffing arrangements.³ Still others show that more companies are taking advantage of greater economies of scale achieved by service firms or the specialized skills they offer.⁴

This article focuses on business services and engineering and management services, two industry groups that provide flexible labor services and have been adding employees more

rapidly than the overall U.S. nonfarm economy.⁵ (See table 1.) Occupational employment and output of these service industries, as well as inputs of business services and engineering and management services to the production process of other industries, will be analyzed to see whether their trends provide information that might be of value in future research regarding the causal factors in the shift toward market-mediated work arrangements.

Employment trends

Employment in business services has grown by an astounding 6.9 percent annually since 1972 and by 5.8 percent per year since 1988.⁶ Although jobs in engineering and management services expanded at about half that pace, 3.1 percent, this was still twice as fast as in all industries combined. In fact, of the nearly 14.3 million jobs added to the economy from 1988 to 1996, more than 22 percent were in the business services and engineering and management industry groups. Table 2 shows employment levels and growth rates for the total nonfarm economy, these major industry groups, and their component industries. Nearly all of the industries in business and engineering and management services have experienced employment gains that were stronger than that of the total U.S. economy.

Employment in business services. Business services is composed of eight industries; four of these account for more than 85 percent of total

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Table 1. Employment growth in business services and engineering and management services as a percent of the total nonfarm economy, 1972-96

Industry group	Percent of employment			Percent of job growth	
	1972	1988	1996	1972- 88	1988- 96
Business services	2.0	4.4	6.1	10.0	18.3
Personnel supply ....	.3	1.3	2.2	3.6	9.1
Engineering and management	(¹)	2.1	2.4	(¹)	4.3

¹ Series not available.

employment in this major group. (See chart 1.) Employment in each of the business services industries grew more rapidly than that of the total nonfarm economy, with the exception of advertising. Expanding at more than 5 times the pace of the total economy since 1972, personnel supply services (11.4 percent) and computer services (10.7 percent) achieved the strongest average annual growth rates in business services. (See chart 2 and table 2.)

Personnel supply services employed 2.6 million workers at the close of 1996 and is the largest employer in business services. Help supply services, which includes temporary help and the staff of employee leasing establishments, accounts for nearly 90 percent of the employment in personnel supply services, as well as for virtually all of the employment growth.⁷ This was the most rapidly expanding industry in both business services and engineering and management services between 1972 and 1996.

Growth in computer services was spurred on by new and changing technology.⁸ Although it grew more rapidly prior to 1988, employment in this business services industry increased at a rate second only to personnel supply services between 1972 and 1996.

Three computer services industries—computer programming, prepackaged software, and miscellaneous computer services, which includes computer services that are not classified elsewhere by the Standard Industrial Classification system, such as computer consulting—account for about three-fourths of this growth over the 1988-96 period and expanded their share of employment from 42 percent to 56 percent of all industries in computer services. In fact, employment in each of these three computer services industries grew by more than 10 percent annually over the 1988-96 period, while employment in computer integrated systems design and in information retrieval services grew about half this pace. The latter industry, which includes services to access the internet, expanded in 1995 with an astounding 18.5-percent employment increase over the prior year, followed by a 20.2-percent in-

crease the next year.⁹ By the close of 1996, there were more than 1.2 million employees working in the computer services industries.

Miscellaneous business services establishments, which provide services such as guards, security systems, news syndication, and photofinishing, contributed almost 60,000 jobs per year to nonfarm payrolls since 1988. Since 1972, two other business services industries—services to buildings and mailing, reproduction, and stenographic services—added to worker totals at more than twice the rate of the nonfarm economy. However, since 1988, the average number of jobs added per year was 15,000 in services to buildings and 11,000 in mailing, reproduction, and stenographic services.

Employment in engineering and management. Engineering and management services employed about 2.9 million people, in four industries, at the close of 1996. (See chart 3.) Employment in this major industry group has grown at a pace about 2 times that for all nonfarm establishments since 1988. And, like business services, employment trends vary by industry.

Management and public relations services stands out in terms of its rate of employment growth and the number of jobs added per year. This industry accounted for nearly 60 percent of all the jobs added by engineering and management services since 1988, and expanded at over 4 times the rate of the nonfarm economy. (See chart 4.) Three component industries—management services (SIC 8741), management consulting services (SIC 8742), and business consulting, not elsewhere classified (SIC 8748)—accounted for 90 percent of employment growth in management and public relations.

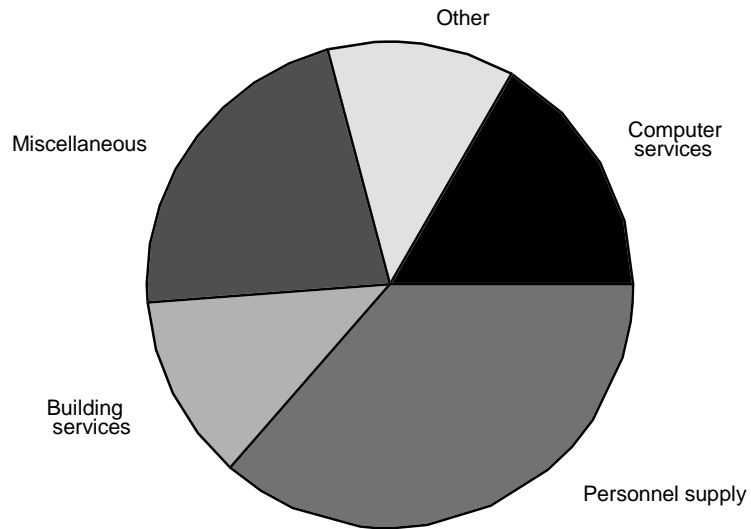
Engineering and architectural services, as well as accounting, auditing, and bookkeeping services added jobs at about twice the pace of the economy between 1972 and 1996. However, the rapid growth occurred during the early years of this period and, since 1988, employment growth in these industries has slowed to about the same rate as that for all nonfarm establishments.

Employment in business services and engineering and management services grew more rapidly than that of the total nonfarm economy. Logically, one might expect that industries which purchase services rather than hire employees would be losing workers in those occupations that are employed intensively by the service industries. And, conversely, the proportion of all workers in occupations employed intensively in the service industries would be rising in those industries. The next section closely examines these industries by analyzing occupational trends.

Occupational employment trends

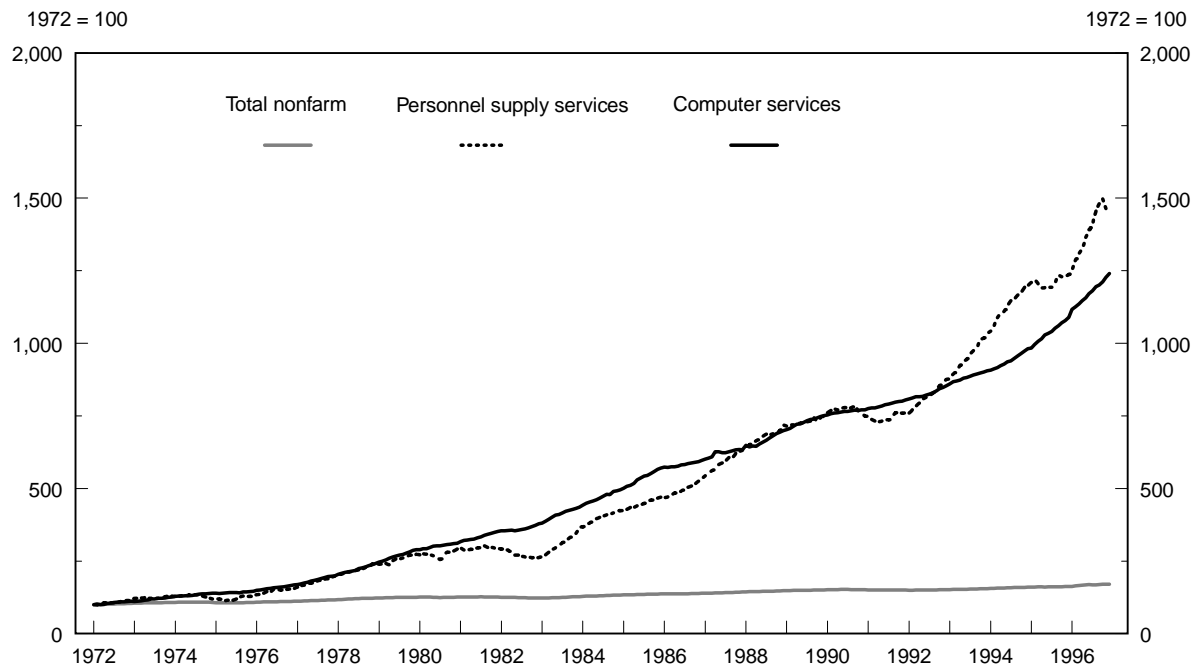
Occupational shifts became apparent in business services and engineering and management services as employment growth

Chart 1. Employment distribution in business services, 1996 annual averages



NOTE: "Other" includes advertising services, consumer credit and collection, mailing and related services, and miscellaneous equipment rental.

Chart 2. Employment index of total nonfarm, personnel supply, and computer services, 1972 to 1996



in the two industry groups outpaced that of the total nonfarm economy.¹⁰

Occupational trends in business services. Approximately one-fifth of all wage and salary workers in the economy were employed in administrative support occupations, including clerical, in 1995. While employment in this occupational group increased at a rate slightly below that of all wage and salary workers, business services hired about 1 in every 4 new administrative support workers and increased its share of these employees from 5 percent in 1983 to about 9 percent or 2.1 million in 1995. (See table 3.) Personnel supply establishments employed nearly half of the workers in administrative support occupations within this industry group.

Similar trends are evident in the helpers, laborers, and material movers, hand (helpers) occupational group, which accounted for about 4 percent of all wage and salary workers in 1995. Business services hired about 44 percent of all new helpers since 1983 and more than doubled its share of these workers to nearly 11 percent. More than three-fourths of these helpers in business services were employed by personnel supply establishments toward the end of the period.

Employment of cleaning and building services occupations,

except private household workers (cleaners), increased at about the same rate as that for all wage and salary workers from 1983 to 1995. However, half of the net employment gains were in business services, which increased its portion of cleaners by 7 percentage points over this time. More than 90 percent of the cleaners in business services were employed through establishments which provide services to dwellings and other buildings.

The dependence of business on personnel supply firms for lower skilled workers such as administrative support workers and helpers is demonstrated by Katharine G. Abraham who found that firms rely more heavily on temporary help supply workers in occupations such as office and clerical workers, for which firm-specific skills are generally not required.¹¹

Two highly skilled occupational groups, computer engineers, scientists, and systems analysts (systems analysts) and computer programmers, had strong gains in wage and salary employment growth from 1983 to 1995. Employment of systems analysts increased by 34 percent and that of programmers increased by almost 300 percent over the same period. Business services accounted for more than 1 in 3 systems analysts and more than 8 in 10 programmers added since 1983. In 1995, about 80 percent of the systems analysts and pro-

Table 2. Employment levels and growth in the total nonfarm economy, business services, and engineering and management services, 1972-96

Industry	Employment (thousands)			Average annual growth			
	1972	1988	1996	1972-96		1988-96	
				Number	Percent	Number	Percent
Total nonfarm	73,675	105,209	119,523	1,910	2.1	1,789	1.6
Business services	1,491	4,638	7,254	240	6.9	327	5.8
Advertising	122	229	242	5	3.0	2	.7
Credit and collection	76	93	127	2	2.2	4	4.0
Mailing and related services	82	208	297	9	5.6	11	4.6
Services to buildings	336	780	897	23	4.2	15	1.8
Miscellaneous equipment rental	(¹)	180	238	(¹)	(¹)	7	3.6
Personnel supply	214	1,350	2,646	101	11.4	162	9.0
Help supply	(¹)	1,126	2,341	(¹)	(¹)	152	9.8
Computer services	107	673	1,208	46	10.7	67	7.6
Miscellaneous business services	(¹)	1,125	1,600	(¹)	(¹)	59	4.5
Engineering and management	(¹)	2,230	2,846	(¹)	(¹)	77	3.1
Engineering and architectural	339	730	839	21	3.9	14	1.8
Accounting	204	500	566	15	4.4	8	1.6
Research, development, and testing	(¹)	492	569	(¹)	(¹)	10	1.8
Management and public relations	(¹)	508	873	(¹)	(¹)	46	7.1

¹ Not available.

NOTE: Employment levels and average annual numbers for growth are in thousands. Average annual number growth is the difference between the beginning and

the end of the period divided by the number of years.

$$\text{Average annual percent growth} = \frac{\sum_i^n \left(\frac{x_{i+1}}{x_i} - 1 \right)}{n - i} * 100$$

Chart 3. Employment distribution in engineering and management services, 1996 annual averages

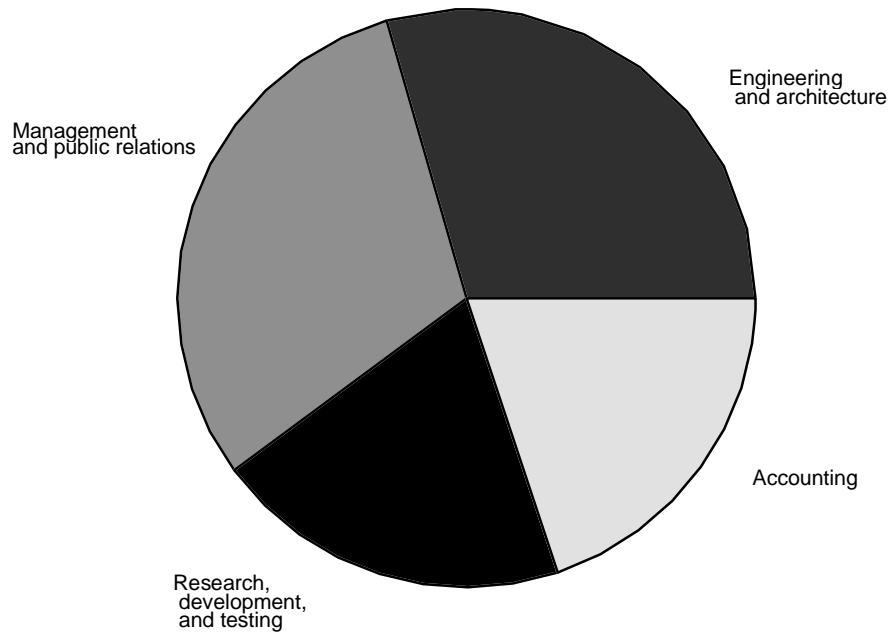


Chart 4. Employment indexes for total nonfarm and management and public relations services, 1988-96

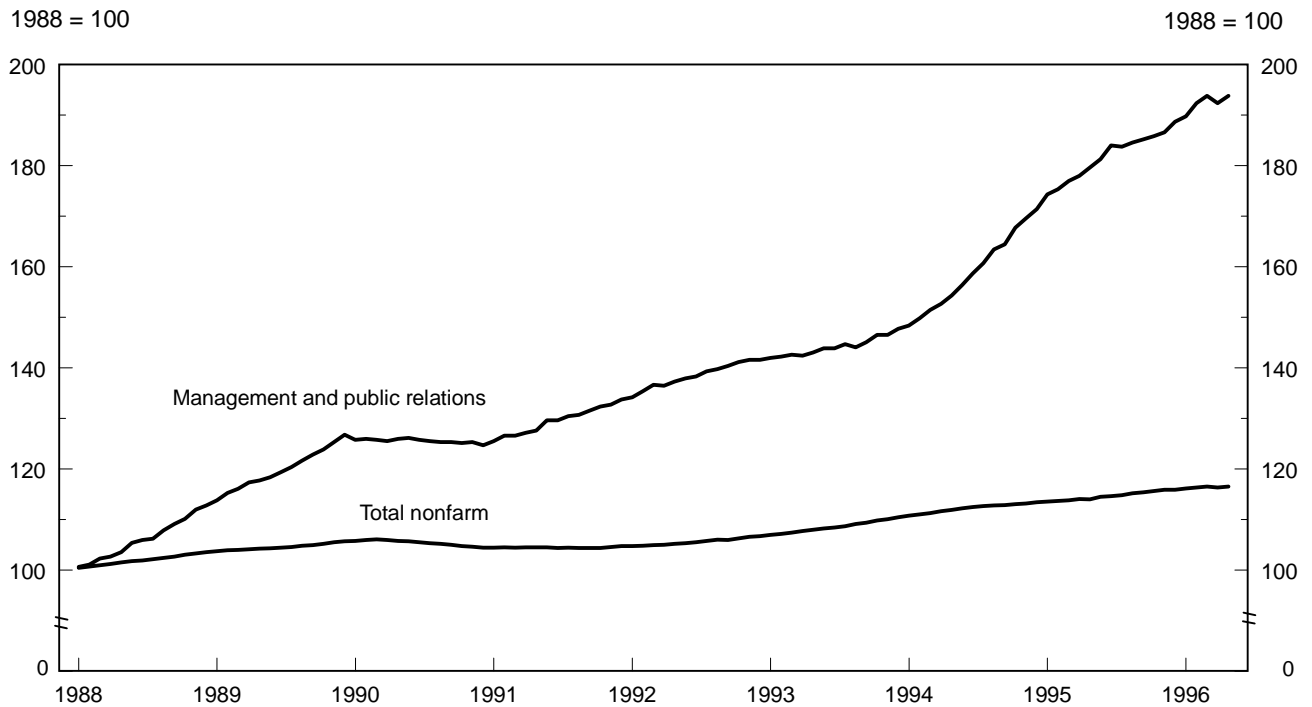


Table 3. Percent of workers in various business-support occupations, employed in business services industry, 1983 and 1995

Occupational group	1995 employment	Percent	
		1983	1995
Administrative support, including clerical	2,135,266	5	9
Communications equipment operators	62,607	13	19
Computer operators and peripheral equipment operators	66,258	15	23
Mail clerks and messengers	56,333	16	22
Records processing occupations	300,274	4	9
Secretaries	321,587	5	10
Typists and word processors	154,453	11	24
Helpers, laborers, and material movers, hand	525,082	4	11
Cleaning and building services occupations	801,476	17	24
Computer engineers, scientists, and systems analysts	233,558	18	29
Computer programmers	212,946	24	40

NOTE: Data are for wage and salary workers only.

grammers in business services worked in the computer services industry.

While occupational evidence shows that business services added proportionately more workers in occupations key to personnel supply services, computer and data processing services, and services to buildings, occupational data for key occupations in other business services industries—artists and commercial artists, bill and account collectors, and photographers and camera operators—do not exhibit this transition.

Occupational trends in engineering and management services. Nearly 3 percent of all wage and salary workers were employed in managerial and administrative occupations (managers) in 1995, up from 2 percent in 1983. (See table 4.) Employment of managers in the engineering and management industry grew at more than 3 times the rate of all wage and salary managers, expanding by about 6.5 percent per year from 1983 to 1995. About two-thirds of the managers in the engineering and management industry were specifically in management and public relations businesses at the end of this period.

Engineering and management services employed about 18 percent of all engineers in 1995, with nearly all of these workers in two component industries—engineering and architectural services (74 percent) and research, development, and testing services (25 percent). The engineering and management industries increased their share of engineers by 5 percentage points since 1983. In fact, the increase of 70,000 engineers in

engineering and management services more than compensated for a net loss of 6,000 engineers in other industries. Similar trends are evident for engineering and science technicians and technologists, with engineering and management services accounting for 4 out of every 5 new engineering positions.

Industry shifts in occupational employment

While occupational data show that business services and engineering and management services increased their use of several key occupations more rapidly than did all industries combined, the data also can be used to show which industries may be giving up these occupations. Shift-share analysis will be utilized to examine changing employment trends by industry group.¹²

This application of the shift-share technique breaks industry employment into three components—national wage and salary share, occupational mix, and occupational share. Table 5 shows wage and salary employment change in each industry division along with the division's shift-share components.¹³ The national share shows what employment would have been had the industry grown at the rate of all industries combined. Employment in an industry is growing more rapidly than the national average when wage and salary employment change is greater than the corresponding national share. Business services, for example, would have increased by only one-fifth of the actual employment gain from 1983 to 1995.

The occupational mix shows how industry employment was affected by the overall change in occupations, relative to the average change for all occupations. A negative occupational mix implies an industry with higher concentrations of declining occupations. The occupational mix statistics in table 5 show that the goods-producing industries, along with transportation and public utilities, government, and engineering and management services, had relatively more workers employed in occupations that were decreasing across all industries. Most of the service-producing industries, including business services, had higher concentrations of expanding occupations. However, the occupational mix effects were quite small when compared to total wage and salary employment change in the corresponding industry.

Table 4. Percent of various professional and managerial occupations employed in the engineering and management services industry, 1983 and 1995

Occupational group	1995 employment	Percent	
		1983	1995
Managerial and administrative	210,783	2	3
Engineers	232,058	13	18
Engineering and science technicians	126,821	9	14

Table 5. Components of change in wage and salary employment by industry groups, 1983–95

[Numbers in thousands]

Industry division	Wage and salary employment change	Components		
		National share	Occupational mix	Occupational share
Business services	4,420	961	51	3,408
Engineering and management services	606	382	-36	260
Agriculture	277	480	4	-207
Mining	-372	275	-1	-646
Construction	1,211	1,139	-37	109
Manufacturing ¹	38	5,318	-146	-5,134
Industrial machinery and equipment	7	592	-9	-576
Electronic and other electrical equipment, Instruments and related products	-233	777	-46	-964
Transportation equipment	54	499	-25	-420
Transportation and public utilities	1,207	1,431	-19	-205
Wholesale trade	1,128	1,525	4	-400
Retail trade	5,585	4,498	61	1,026
Finance, insurance, and real estate ¹	1,364	1,577	50	-263
Depository and nondepository institutions	192	663	13	-484
Services, except business services and engineering and management	9,736	6,793	52	2,892
Health services	3,231	2,049	22	1,160
Government	1,535	2,357	-3	-819

¹ Includes other industries not shown separately.

The occupational share component shows industry employment change due to the difference between an industry's occupational changes and the growth or decline of those occupations across all industries. Positive occupational shares indicate that the industry had larger concentrations of occupations that were increasing more rapidly than the corresponding national occupational levels. Changes in the number of administrative support workers in business services best illustrates this point. The growth of occupational share in business services (3,408 workers) resulted, in part, from a 124-percent increase in the number of administrative support workers in business services, compared with only a 26-percent increase for those workers across all industries, along with a high concentration of those workers.

The rapid rise in employment for both business services and engineering and management services coincides with a greater share of the occupations they employ. More than three-fourths of employment change in business and 43 percent of job growth in engineering and management services represent increasing occupational shares. Three other industry groups—construction, retail trade, and services, excluding business services and engineering and management services—had relatively small increases in employment that were related to their occupational shares, while the remaining industries had negative shares. Manufacturing stands out, with the largest negative impact due to occupational share. In other words, employment in occupational groups in manufacturing was not rising as rapidly or was falling more rapidly than the

corresponding national averages.

Share indexes based on occupational ratios for the different occupations and industries may identify occupations that have had a negative impact on employment and, therefore, explain which industries may be replacing employees with the purchase of services.¹⁴ Table 6 shows share indexes for selected occupational groups and industries. Share indexes greater than 1 indicate an occupational group growing faster in the selected industry than the national average for that occupation, while those less than 1 are growing at a slower rate than average.

Occupational shifts like those of cleaning and building services workers are exactly what one would expect when businesses subcontract for the services that those workers perform. Business services, which includes services to buildings and other dwellings, increased its number of cleaners more rapidly than the national average from 1983 to 1995. Every other industry group had share indexes less than 1, indicating that their change in wage and salary cleaning personnel was below the average for all industries.

Occupational employment in business services was growing more rapidly in 5 of the 8 specific occupational groups as well as the "all other" category. The greatest strengths for this industry were in the lower skilled occupations—administrative support, cleaning, and helpers—in which all or nearly all other industries had slower than average growth.

Engineering and management services had better than average growth in all but two of the occupations studied and

tended to show stronger performance in the higher skilled occupations.

Results are mixed in the other industries shown in table 6. Nearly all of the divisions added lower skilled occupations at slower rates than the national average, while the trends were mixed in the higher skilled occupations. Services, excluding business services and engineering and management, appeared to be the anomaly and had stronger than average growth in most of the occupational groups. Nevertheless, its share index was substantially lower than business services for 7 of the 9 occupational groups, and was lower than that for engineering and management services for managerial and computer occupations.

Industry output

Industry output trends reflect employment growth, especially in business services and engineering and management ser-

vices. Output increased at a more rapid pace in these industries than it did for all industries. (See table 7.) Real industry output for the total economy grew, on average, 2.4 percent annually from 1972 to 1994; over the same period, business services and engineering and management services grew more quickly.¹⁵

Business services output. Averaging 5.8 percent annually, the rate of change for output in the business services industry group was more than twice that for the total economy. The more rapid advances occurred in the late 1970's and late 1980's. Four industry groups were responsible for the strong output growth in this major group: computer services, personnel supply services, services to buildings, and miscellaneous business services combined with consumer credit and collection services and mailing, reproduction, and stenographic services.

Output in computer services, with annual increases of 11

Table 6. Wage and salary employment share indexes by industry division and occupational group, 1983-95

Occupation	Administrative support, including clerical	Cleaning and building services occupations	Computer engineers, scientists, and systems analysts	Computer programmers	Engineering and science technicians	Engineers	Helpers, laborers, and material movers	Managerial and administrative	All other occupations
Business services	1.78	1.43	1.60	1.62	1.06	1.39	2.52	1.83	1.88
Engineering and management services	1.10	.64	1.68	1.25	1.48	1.36	1.00	1.51	1.03
Agriculture	1.29	.83	.15	.28	.52	1.96	.71	1.07	.89
Mining .....	.45	.54	.24	.46	.75	.53	.46	.45	.48
Construction	1.06	.48	.62	.55	1.33	.75	.97	1.36	1.00
Manufacturing ¹ .....	.75	.59	1.01	.66	.93	.89	.80	.81	.78
Industrial machinery and equipment .....	.69	.54	1.40	.58	.82	.78	.91	.84	.78
Electronic and other electrical equipment, instruments and related products .....	.66	.50	1.34	.57	.96	.86	.67	.80	.69
Transportation equipment .....	.70	.53	.87	.72	.84	.98	.94	.77	.81
Transportation and public utilities .....	.91	.89	.82	.70	.82	.84	1.15	.99	.98
Wholesale trade .....	.90	.75	.68	.63	1.16	1.56	.95	.89	.97
Retail trade .....	.94	.88	1.66	1.27	1.17	1.24	.96	.75	1.11
Finance, insurance, and real estate ¹ .....	.93	.91	.82	.98	.80	1.13	.62	1.03	1.00
Depository and nondepository institutions .....	.82	.63	.66	.71	.70	1.26	.56	.74	1.02
Services, except business services and engineering and management ..	1.16	.98	1.03	.83	1.80	1.37	1.40	1.22	1.07
Health services	1.22	.85	1.16	1.07	1.02	1.30	.95	1.27	1.12
Government .....	.89	.97	.65	.76	.98	1.01	.91	.98	.92

¹ Includes other industries not shown separately.

NOTE: An occupational share index greater than 1 represents faster than av-

erage occupational growth; a value less than 1 represents slower than average growth.

Table 7. Output growth in business services and engineering and management services, 1972–94

[In million of 1987 dollars]

Industry	1972 output	1994 output	Percent annual growth
All industries	\$5,615,793	\$9,443,929	2.4
Business services	82,663	283,160	5.8
Advertising services	13,095	14,763	.5
Services to buildings	8,945	18,019	3.2
Miscellaneous equipment rental and leasing	14,652	16,585	.6
Personnel supply services	5,616	41,661	9.5
Computer and data processing services	8,943	88,628	11.0
Miscellaneous business services, consumer credit and collection services, and mailing and related services	31,413	103,502	5.6
Engineering and management services	88,470	202,822	3.8
Engineering and architectural services	23,043	64,625	4.8
Accounting, auditing, and other services	31,246	36,753	.8
Research and testing services	16,504	39,139	4.0
Management and public relations ..	17,678	62,305	5.9

percent, was the most rapidly growing industry in business services from 1972 through 1994. While changes in output indicate that more computer services were being purchased, output growth has slowed over time.¹⁶

Personnel supply services, which has help supply services as its major component industry, follows computer services in terms of output growth, with an average 9.5-percent annual rate of expansion. This industry differs slightly from computer services, in that the 1980s was the period of the most rapid growth, averaging 14 percent per year with an astounding 45-percent increase from 1982 to 1983—the first year of recovery from the 1982 recession. Demand for employee leasing services and alternative work arrangements helped spur output as firms responded to the Employee Retirement Income Security Act of 1974 (ERISA) and the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA).¹⁷

Three combined industries—miscellaneous business services, consumer credit and collection services, and mailing, reproduction, and stenographic services—experienced continuous gains in output since 1972, except during recessionary periods. And, these industries tended to expand more rapidly than the total U.S. economy.

Services to buildings also had faster output expansion than the overall economy, 3.2 percent annually from 1972 through 1994. This industry, like miscellaneous business services, enjoyed its strongest performance during the 1980s, yet was weaker than the overall economy in the 1990s.

Output trends of five business services industries—computer

services, personnel supply services, miscellaneous business services, consumer credit and collection, and mailing and related services—indicate expanded use of those services because their output grew more rapidly than the U.S. economy throughout the study period. Output trends of services to buildings are less clear due to recent weakness.

Engineering and management services output. Real output of the engineering and management services industries also grew faster than that of the overall economy, averaging 3.8 percent per year from 1972 to 1994. The greatest gains occurred during the first half of this period. Three industries helped boost output: management and public relations services, engineering and architectural services, and research and testing services.

Management and public relations services exhibited the strongest output trend, averaging 5.9 percent annually. Annual changes in output varied widely in this industry, from declines of as much as 12 percent to increases of up to 27 percent. (See chart 5.)

The output trend in engineering and architectural services was quite strong during the 1970s, while its performance was more similar to that of the total economy during the 1980–94 period. (See chart 6.) Output in this industry expanded at more than 5 times the pace of that in the construction sector, an industry often associated with engineering services.

Research and testing services experienced erratic changes in real output, but managed to average 4-percent annual growth from 1972 to 1994.

Output grew faster than total U.S. output in two industries within engineering and management services—management and public relations services and research, development, and testing. These differences indicate increasing reliance on producers of these services, while output trends in engineering and architectural services are less clear due to recent slowing.

Logically, one would expect output to increase faster in the services industries if firms are procuring these services instead of directly hiring staff to perform the work. Likewise, the percent of these services as inputs to production should be increasing in industries that utilize these services in place of employees.

Inputs to production

As output of business services and engineering and management services expanded faster than that of the whole economy, so too did the use of these services as inputs to production for all industries. In an employer survey, Katharine Abraham found that more than half of all respondents contracted for at least one type of business or administrative support service.¹⁸ Over the 1977–93 period, U.S. firms from nearly all industrial divisions increased their consumption of these services

Chart 5. Percent change in real output in management and public relations services, 1972-1994

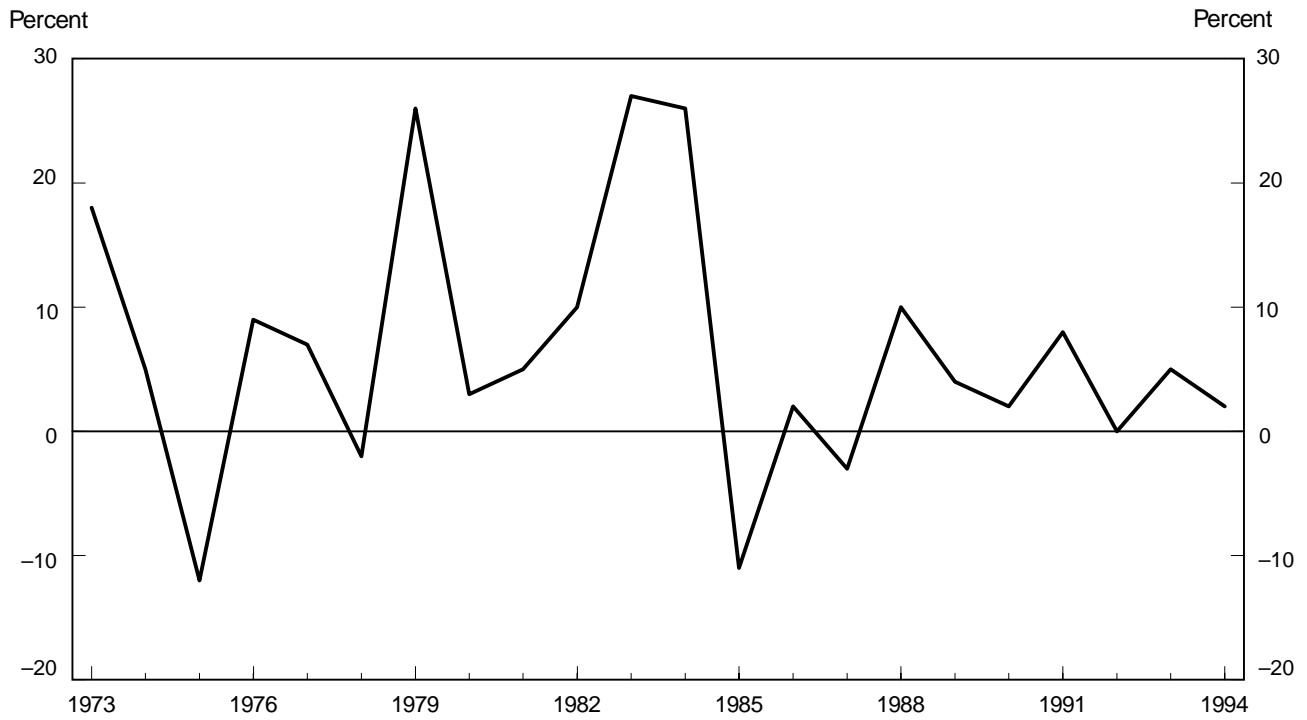
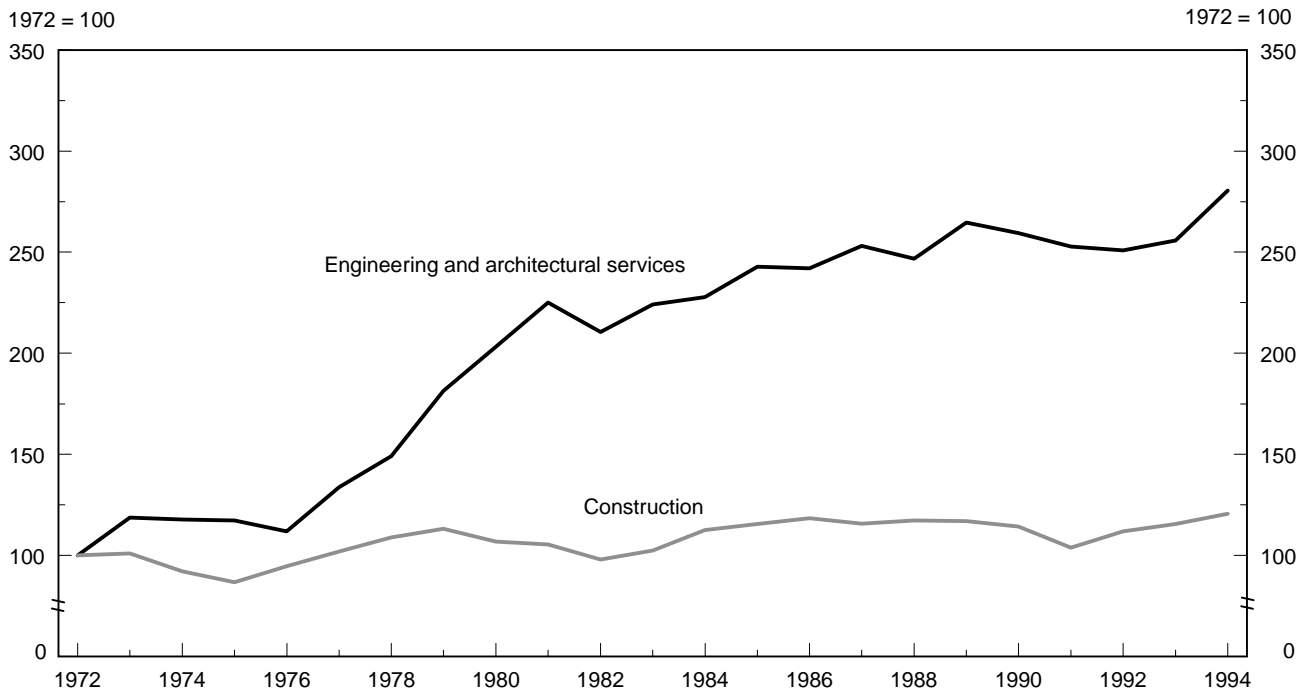


Chart 6. Indexes of real output in engineering and architectural services and construction, 1972-1994



as a percent of all production inputs and as a percent of value added, which includes compensation of employees, indirect business tax and nontax liability, and other value added, except intermediate commodity inputs.¹⁹

Trends in Federal contract actions illustrate the growing dependence on business services and engineering and management services as inputs to production. The U.S. Government is the largest purchaser of goods and services in the world. The total number of contract actions increased by more than a third since 1989, while the total dollar value of contracts was up only slightly. Business services and engineering and management services, combined, accounted for nearly 30 percent of the 446,121 contract actions and captured nearly 31 percent of total contract dollars in 1995, up from 25 percent and 23 percent, respectively, in 1989. (See table 8.) Thus, at least one major purchaser of goods and services, the U.S. Government, relies heavily on contracting arrangements, and that use is growing.

Business services inputs to production. In 1993, inputs of business services accounted for 6.5 percent of value added for all industries, up more than 2 percentage points from 1977. (See table 9.) In other words, inputs of these services were expanding more rapidly than total value added, which includes employee compensation. The largest consumer of business services in 1993 was the services division, and business services were utilized more intensively, relative to value added, by this division than by any other industry division. Nevertheless, finance, insurance, and real estate; transportation and public utilities; and government had more than doubled their use of business services inputs relative to value added from 1977 to 1993. Business services inputs to depository and nondepository institutions, holding, and investment offices rose to nearly 60 percent of value added by 1993, with computer services accounting for about half of those inputs.

Seven of the eight business services were used more intensively across all industries over this period: personnel supply

services, computer services, miscellaneous business services, consumer credit and collection services, mailing and related services, advertising services, and services to buildings.

Personnel supply services inputs as a percent of value added to all industries expanded by a factor of 4 from 1977 to 1993. All of the major industry divisions and nearly every industry within each division increased their use of personnel supply as a percent of value added over this time frame. In her 1988 study, Abraham found that 77 percent of respondents in a survey of firms utilized workers from temporary help agencies.²⁰ The largest relative increase took place in finance, insurance, and real estate, with an eightfold increase of personnel supply services as a percent of value added.

Total inputs of computer services as a percent of value added increased for most of the industrial divisions from 1977 to 1993. The finance, insurance, and real estate industries exhibited the greatest increase in intensive use of these inputs over this time. In fact, computer services inputs represented more than 18 percent of value added in the finance industries.

All of the major divisions except agriculture increased their relative dependence on miscellaneous business services, consumer credit reporting and collection services, and mailing and related services; this was especially true of the finance and insurance industries, which increased these service inputs by 6 times and 9 times the 1977 percentages of value added, respectively.

Input trends for advertising services vary across industries. Since 1977 manufacturing reduced its dependence on advertising inputs relative to value added, while retail trade increased its relative use of this service only slightly. By contrast, transportation and public utilities and finance, insurance, and real estate industries doubled their use of advertising services relative to value added over the same period.

The use of services to buildings inputs as a percentage of value added increased only slightly from 1977 to 1993. In addition, relative utilization of this service expanded more rapidly in finance, insurance, and real estate industries than in

Table 8. Federal procurement actions and dollars for selected industries, 1989-95

Year	Total actions (thousands)	Business services	Engineering and management	Total dollars (million)	Business services	Engineering and management
		Percent of total actions			Percent of total dollars	
1989	326	7.4	17.5	168,695	3.6	19.2
1990	368	7.6	17.4	171,301	3.8	19.7
1991	438	7.8	16.6	189,602	4.2	20.0
1992	502	7.2	16.3	177,786	5.0	22.6
1993	445	8.4	18.7	178,367	5.1	24.1
1994	430	9.5	19.2	174,688	5.5	24.9
1995	446	9.7	19.8	180,852	5.8	25.1

SOURCE: Federal Procurement Report, issues 1989-95 (Washington, U.S. General Services Administration).

Table 9. Business services and engineering management inputs to production for major industry divisions as a percent of value added, 1977 and 1993

Industry division	1977		1993	
	Business services	Engineering and management services	Business services	Engineering and management services
All industries	4.4	2.1	6.5	2.8
Agriculture	1.2	1.6	.7	.5
Mining .....	.7	.5	.7	.7
Construction	2.3	8.6	2.8	13.4
Manufacturing ¹	5.2	1.3	5.5	1.5
Industrial machinery and equipment	3.4	.3	3.1	.8
Electronic and other electrical equipment, Instruments and related products	5.9	.2	5.1	1.1
Transportation equipment	5.5	.2	6.9	.9
Transportation and public utilities	1.8	.9	3.6	1.5
Wholesale trade	10.2	2.1	9.2	1.5
Retail trade	8.2	1.6	9.9	1.8
Finance, insurance, and real estate ¹	2.8	.9	7.8	2.4
Depository and nondepository institutions, holding, and investment offices	8.5	.2	59.8	20.0
Services	8.3	5.2	11.6	5.3
Health services	4.3	.1	10.1	1.5
Government .....	.1	.2	.3	.6

¹ Includes other industries not shown separately.

all other industrial sectors.

The analysis of inputs to production shows that firms increased their dependence on business services across most of the industries. Although not always the largest consumer of these services, finance, insurance, and real estate increased its use of the various business services relative to value added more than did any other industry division.

Engineering and management inputs to production. Engineering and management services, accounting for 2.1 percent of total value added in 1977, increased its share to 2.8 percent in 1993. Although services consumed the greatest amount of engineering and management services inputs, construction, which was the second largest consumer, utilized these inputs more intensively than all other industries, 13.4 percent of value added in 1993. (See table 9.) Total industry inputs of three services in this major group increased as a percent of value added: engineering and architectural services, management services, and research and development.

Engineering and architectural services were used more intensively in nearly all of the major industry divisions from 1977 to 1993. At the end of this period, engineering and architectural inputs amounted to 12.3 percent of value added in construction, up from 7.7 percent in 1977.

Use of management services as inputs to total production nearly doubled as a percentage of value added from

1977 to 1993, and nearly all industry divisions saw this ratio rise for these services. Finance, insurance, and real estate, which consumes over one-fifth of all management services inputs, more than tripled its use of these services as a percent of value added over this period. Increased demand was mainly in the finance and insurance sectors.

Inputs of research and development increased slightly as a share of value added from 1977 to 1993, and more intensive use was apparent in most of the major divisions. In terms of value added, the services division increased its share of research and development proportionately more than the other industrial divisions.

Thus, use of the professional services in engineering and management services increased relative to value added by most of the industrial sectors. The construction industry exhibited the strongest gains in use of engineering and architectural services, while finance, insurance, and real estate demonstrated similar increases in management and public relations services. Although changing usage was less intense, services showed signs of heightened use of research and development services.

Analogous to the rapidly expanding employment and output trends in business services and engineering and management services, more intensive use of these services as inputs to the production process shows that firms increasingly are purchasing services instead of directly employing labor.

Who's hiring contingent workers?

Trends in employment, occupations, output, and input can shed light on the shift toward contingent workers and away from direct hire of permanent workers. Four industries within business services experienced positive changes in all four of these factors: personnel supply services, computer services, mailing and related services, and services to buildings. (See exhibit 1.) Positive trends in all four factors also occurred in engineering and architectural services (for which occupational data most strongly suggest substitution), management and public relations services, and research, development, and testing services.

Data on occupations and inputs to production indicate which industries may be purchasing services in place of hiring workers directly. (See exhibit 2.) All industries, except the services division, have reduced their direct employment of at least half of the five key business services occupations. In fact, growth in all of the key business services occupations for wholesale trade; finance, insurance, and real estate; and government were slower than the national average (share indexes less than 1). Results from the occupational information are not quite as strong for the engineering and management occupations. Only mining, manufacturing, transportation and public utilities, and government reduced their demand below the U.S. average for at least 2 of the 3 occupations key to engineering and management services.

Input trends suggest that 7 of the 10 divisions increased their

use of business services inputs relative to value added from 1977 to 1993. Two industry divisions stand out—services and finance, insurance, and real estate. The services division, which was the largest user of business services, inputs to production at the end of this period, had increased its use of business services, relative to value added, by 3.5 percentage points. Following services in terms of total business services inputs to production, finance, insurance, and real estate increased its usage, relative to value added, by more than 5 percentage points. Although the manufacturing division used the third greatest amount of business services inputs, it increased its use of these services, relative to value added, by only 0.3 percentage points.

Eight industry divisions increased inputs of engineering and management services. The construction division used about two-thirds of all engineering and architectural services inputs in 1993, and increased its use of these services by 4.6 percentage points of value added since 1977. The services division utilized the largest share of management and public relations inputs. However, while services used these inputs more intensively relative to value added than any other industry division, there was little change in intensity since 1977. Finance, insurance, and real estate, which used the second greatest amount of management and public relations inputs, nearly tripled its use relative to value added. The services division also was the largest user of all research, development, and testing inputs, purchasing about half of them, and services increased their usage, as a percent of value added, more than the other industry divisions.

Exhibit 1. Evidence of substitution of service for direct labor

Industry	Employment ¹	Occupations ²	Output ³	Production ⁴
Business services:				
Advertising services	Yes	No	No	Yes
Consumer credit and reporting	Yes	No	Yes	Yes
Mailing and related services	Yes	Yes	Yes	Yes
Services to buildings	Yes	Yes	Yes	Yes
Miscellaneous equipment rental and leasing	Yes	–	No	No
Personnel supply services	Yes	Yes	Yes	Yes
Computer services	Yes	Yes	Yes	Yes
Miscellaneous business services	Yes	–	Yes	Yes
Engineering and management services:				
Engineering and architectural services	Yes	Yes	Yes	Yes
Accounting services	Yes	–	No	No
Research, development, and testing services	Yes	Yes	Yes	Yes
Management and public relations services	Yes	Yes	Yes	Yes

¹ Employment grew faster than in all industries for time spans analyzed.

² The given services employed a greater percentage of key occupations over the time spans analyzed.

³ Output grew faster in the given services than in all industries.

⁴ Inputs to production of the given services grew as a percent of value added.

NOTE: Dash indicates that sufficient data were not available to draw a conclusion.

Exhibit 2. Evidence of industries that could be purchasing services over direct hires

Industry	Occupation ¹		Inputs ²	
	Business service	Engineering and management	Business service	Engineering and management
Agriculture	Yes	No	No	No
Mining	Yes	Yes	Unchanged	Yes
Construction	Yes	No	Yes	Yes
Manufacturing	Yes	Yes	Yes	Yes
Transportation and public utilities	Yes	Yes	Yes	Yes
Wholesale trade	Yes	No	No	No
Retail trade	Yes	No	Yes	Yes
Finance, insurance, and real estate	Yes	No	Yes	Yes
Services ³	No	No	Yes	Yes
Government	Yes	Yes	Yes	Yes

¹ A "yes" in this column indicates that at least half of key occupations had share indexes less than 1.

² A "yes" in this column indicates that the service input as a percent of value

added increased from 1977 to 1995.

³ Excludes business services and engineering and management services in occupation columns.

TRENDS IN THE FOUR FACTORS explored in this article—employment, occupations, output, and input—provide evidence that firms increased their purchases of services relative

to directly hiring labor. Further research is needed to explore the causal factors behind the shift toward market-mediated work arrangements. □

Footnotes

¹ See for example: Katharine G. Abraham, "Restructuring the Employment Relationship: The Growth of Market-Mediated Work Arrangements," in Katharine G. Abraham and Robert B. McKersie, eds., *New Developments in the Labor Market: Toward a new Institutional paradigm* (Cambridge, MA, The MIT Press, 1990); Katharine G. Abraham, *Flexible staffing arrangements and employers' short-term adjustment strategies*, NBER Working Paper No. 2617 (Cambridge, MA, National Bureau of Economic Research, June 1988); Katharine G. Abraham and Susan K. Taylor, "Firms' use of outside contractors: Theory and Evidence," *Journal of Labor Economics*, July 1996, pp. 394-424; Richard S. Belous, *The Contingent Economy: The Growth of the Temporary, Part-Time and Subcontracted Workforce*, (Washington, National Planning Association, 1989); Sharon R. Cohany, "Workers in alternative employment arrangements," *Monthly Labor Review*, October 1996, pp. 31-45; Susan N. Houseman, "New institute survey on flexible staffing arrangements," *Employment Research* (W.E. Upjohn Institute), Spring 1997, pp. 1-4; Garth Mangum, Donald Mayall, and Kristin Nelson, "The temporary help industry: a response to the dual internal labor market," *Industrial and Labor Relations Review*, (Cornell University), July 1985, pp. 599-611; and Lewis M. Segal and Daniel G. Sullivan, "The temporary labor force," *Economic Perspectives* (Federal Reserve Bank of Chicago), March/April 1995, pp. 2-19;

² See Abraham, *Flexible staffing arrangements*; Belous, *The Contingent Economy*; and Thomas A. Kochan, Harry C. Katz, and Robert B. McKersie, *The Transformation of American Industrial Relations* (Basic Books, 1986).

³ See Belous, *The Contingent Economy*; Cohany, "Workers in alternative employment arrangements"; Audrey Freedman, *Human Resources Outlook 1992*, Report No. 985 (Washington, The Conference Board); and Mangum and others, "The temporary help industry."

⁴ See Abraham, "Restructuring the Employment Relationship"; Abraham and Taylor, "Firm's use of outside contractors"; Cohany, "Workers in alternative employment"; Mangum and others, "The temporary help industry"; and Segal and Sullivan "The temporary labor force."

⁵ *Standard Industrial Classification Manual, 1987* (Executive Office of the President, Office of Management and Budget, 1987). Industries are grouped according to standard industrial classification codes (SIC). Services is composed of all 2-digit industries from 70 through 89. Business services, major group 73, is composed of eight basic industries: Advertising (SIC 731); credit reporting and collection (SIC 732); mailing, reproduction, and stenographic services (SIC 733); services to buildings (SIC 734); miscellaneous equipment rental and leasing (SIC 735); personnel supply services (SIC 736); computer and data processing services (SIC 737); and miscellaneous business services (SIC 738). Engineering and management services, major group 87, is composed of four basic industries: engineering and architectural services (SIC 871); accounting, auditing, and bookkeeping services (SIC 872); research and testing services (SIC 873); and management and public relations services (SIC 874).

⁶ Employment data used in this article are from the Current Employment Statistics program, Bureau of Labor Statistics. Not all of the services industries selected for this study have employment history back to 1972 because of industry reclassification, but all have at least 1988 forward. Trends are reviewed using all available years of data from 1972 through 1996. For example, the Engineering and management services time series begins in 1988, but two of the component industries have data at earlier dates.

⁷ There are two component industries in personnel supply services: employment agencies and help supply services, which is composed of two basic types of staffing services, temporary help and employee leasing services. Temporary help establishments provide their employees to clients on a temporary basis. Employees of the temporary help firm may work at multiple client sites and are generally not restricted to one client. Employee leasing establishments lease their employees to meet all or part of their clients' staffing needs. Leased workers typically perform their duties for one client only.

⁸ Computer services is composed of nine component industries. While the series for computer services (SIC 737) is available from 1972 forward, these nine components were not broken out until 1988. Also, see William C.

Goodman, "Software and engineering industries: threatened by technological change?" *Monthly Labor Review*, August 1996, pp. 37-45.

⁹ For more information about the information retrieval industry, see Laura Freeman, "Job creation and the emerging home computer market," *Monthly Labor Review*, August 1996, pp. 46-56.

¹⁰ From the 1994 BLS Occupational employment matrix, occupations were selected for review if at least 5 percent of all workers in that occupation were employed in a business service or engineering and management services industry, except for occupations in personnel supply services, in which 3 percent was set as a minimum. Based on these selections, occupational employment trends from *The National Industry—Occupation Employment 1983-1995 Time Series* produced by BLS were analyzed. These changes should be interpreted with caution as changes in occupational and industry classification systems, as well as improvements in the occupational surveys, may give misleading impressions.

¹¹ Abraham, *Flexible staffing arrangements*. Results of this study were based on a survey of 799 firms and a 55-percent usable response rate.

¹² For examples of regional employment analysis using the shift-share analysis technique, see: Philip L. Rones, "An analysis of regional employment growth, 1973-85," *Monthly Labor Review*, July 1986, pp. 3-14; and William G. Deming, "A decade of economic change and population shifts in U.S. regions," *Monthly Labor Review*, November 1996, pp. 3-13.

¹³ The components of employment change for industries is defined as follows:

$$\begin{aligned} \Delta E_i^{83,95} &= E_i^{83} ((E_n^{95} / E_n^{83}) - 1) \text{ (National share)} \\ &+ \sum_o E_o^{83} ((E_{on}^{95} / E_{on}^{83}) - (E_n^{95} / E_n^{83})) \text{ (Occupational mix)} \\ &+ \sum_o E_o^{83} ((E_o^{95} / E_o^{83}) - (E_{on}^{95} / E_{on}^{83})) \text{ (Occupational share)} \end{aligned}$$

where E_i is total employment in industry division i ,
 E_o is employment for occupation o for each industry division,
 E_{on} is total national employment for occupation o ,
 E_n is total national employment.

Occupational employment data for this analysis are from *The National Industry—Occupation Employment 1983-1995 Time Series*.

¹⁴ The share index is defined as follows:

$$S = (E_{oi}^{95} / E_{oi}^{83}) / (E_{on}^{95} / E_{on}^{83})$$

Where E_{oi}^t is employment in occupation o in industry i for year t ,
 E_{on}^t is employment in occupation o in all industries for year t .

¹⁵ Values of output are from BLS input-output tables from the Office of Employment Projections.

¹⁶ Two articles may help explain this recent slowing. William C. Goodman, "Software, engineering industries" and Jacqueline Warnke, "Computer manufacturing: change and competition," *Monthly Labor Review*, August 1996, pp. 18-29.

¹⁷ The Employee Retirement Income Security Act (ERISA) determines minimum standards for pensions, such as participation requirements and employee rights. For additional information on ERISA, see *A Guide to the Employee Retirement Income Security Act of 1974, as Amended by the Retirement Equity Act of 1984, and the Tax Reform Act of 1986* (U.S. Department of Labor, Pension and Welfare Benefits Administration, May 1988). Section 414(n) of the Tax Equity and Fiscal Responsibility Act (TEFRA) requires employers to treat all workers who are providing services on a long-term basis as "leased" employees and to count those leased workers as employees when applying coverage tests for pension and other benefits purposes unless such employees are covered by a qualifying plan through the leasing firm. For analyses of TEFRA, see: L.E. Irish and Richard M. Lent, "TEFRA Brings Sweeping Changes to Pension Plans," *Legal Times*, Sept. 27, 1982; and Leon E. Irish and others, "Tax Act Makes Important Changes in Benefit Area," *Legal Times*, July 23, 1984.

¹⁸ Abraham, "Restructuring the Employment Relationship."

¹⁹ Value added is defined by the Bureau of Economic Analysis as gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). See *Benchmark Input-Output Accounts of the United States, 1987* (U.S. Department of Commerce, Bureau of Economic Analysis, November 1994).

²⁰ Abraham, *Flexible staffing arrangements*.

Employment levels and growth in the total nonfarm economy, business services, and engineering and management services, 1972-96

Industry	Employment (thousands)			Average annual growth			
	1972	1988	1996	1972-96		1988-96	
				Number	Percent	Number	Percent
Total nonfarm	73,675	105,209	119,523	1,910	2.1	1,789	1.6
Business services	1,491	4,638	7,254	240	6.9	327	5.8
Advertising	122	229	242	5	3.0	2	0.7
Credit and collection	76	93	127	2	2.2	4	4.0
Mailing and related services	82	208	297	9	5.6	11	4.6
Services to buildings	336	780	897	23	4.2	15	1.8
Miscellaneous equipment rental	(¹)	180	238	(¹)	(¹)	7	3.6
Personnel supply	214	1,350	2,646	101	11.4	162	9.0
Help supply	(¹)	1,126	2,341	(¹)	(¹)	152	9.8
Computer services	107	673	1,208	46	10.7	67	7.6
Miscellaneous business services	(¹)	1,125	1,600	(¹)	(¹)	59	4.5
Engineering and management	(¹)	2,230	2846	(¹)	(¹)	77	3.1
Engineering and architectural	339	730	839	21	3.9	14	1.8
Accounting	204	500	566	15	4.4	8	1.6
Research, development, and testing ..	(¹)	492	569	(¹)	(¹)	10	1.8
Management and public relations	(¹)	508	873	(¹)	(¹)	46	7.1

¹ Not available.

NOTE: Employment levels and average annual numbers for growth are in thousands.

Average annual number growth is the difference between the beginning and the end of the period divided by the number of years.

$$\text{Average annual percent growth} = \frac{\sum_i^n \left(\frac{x_{i+1}}{x_i} - 1 \right)}{n - i} * 100$$

Table 3. Percent of workers in various business-support occupations, employed in business services industry, 1983 and 1995

**Percent of workers in various business-
support occupations, employed in business
services industry, 1983 and 1995**

Occupational group	1995 employment	Percent	
		1983	1995
Administrative support, including clerical	2,135,266	5	9
Communications equipment operators	62,607	13	19
Computer operators and peripheral equipment operators	66,258	15	23
Mail clerks and messengers	56,333	16	22
Records processing occupations	300,274	4	9
Secretaries	321,587	5	10
Typists and word processors	154,453	11	24
Helpers, laborers, and material movers, hand	525,082	4	11
Cleaning and building services occupations	801,476	17	24
Computer engineers, scientists, and systems analysts	233,558	18	29
Computer programmers	212,946	24	40

NOTE: Data are for wage and salary workers only.

Table 4. Percent of various professional and managerial occupations employed in the engineering and management services industry, 1983 and 1995

Occupational group	1995 employment		Percent	
	1983	1995	1983	1995
Managerial and administrative	210,783		2	3
Engineers	232,058		13	18
Engineering and science technicians	126,821		9	14

Employment growth in business services and engineering and management services as a percent of the total nonfarm economy, 1972-96

Industry group	Percent of employment			Percent of job growth	
	1972	1988	1996	1972- 88	1988- 96
Business services	2.0	4.4	6.1	10.0	18.3
Personnel supply .....	.3	1.3	2.2	3.6	9.1
Engineering and management	(¹)	2.1	2.4	(¹)	4.3

¹ Series not available.

**Components of change in wage and salary employment by industry groups,
1983-95**

[Numbers in thousands]

Industry division	Wage and salary employment change	National share	Components	
			Occupational mix	Occupational share
Business services	4,420	961	51	3,408
Engineering and management services	606	382	-36	260
Agriculture	277	480	4	-207
Mining	-372	275	-1	-646
Construction	1,211	1,139	-37	109
Manufacturing ¹	38	5,318	-146	-5134
Industrial machinery and equipment	7	592	-9	-576
Electronic and other electrical equipment, Instruments and related products	-233	777	-46	-964
Transportation equipment	54	499	-25	-420
Transportation and public utilities	1,207	1,431	-19	-205
Wholesale trade	1,128	1,525	4	-400
Retail trade	5,585	4,498	61	1,026
Finance, insurance, and real estate ¹	1,364	1,577	50	-263
Depository and nondepository institutions	192	663	13	-484
Services, except business services and engineering and management	9,736	6,793	52	2,892
Health services	3,231	2,049	22	1,160
Government	1,535	2,357	-3	-819

¹ Includes other industries not shown separately.

Table 6. Wage and salary employment share indexes by industry division and occupational group, 1983-95

Occupation	Administrative support, including analysts	Cleaning and building services	Computer engineers, scientists, and technicians	Computer programmers	Engineering and science	Engineers	Helpers, laborers, and material movers, hand	Managerial and Administrative	all other occupation
Business services	1.78	1.43	1.60	1.62	1.06	1.39	2.52	1.83	1.88
Engineering and management services	1.10	.64	1.68	1.25	1.48	1.36	1.00	1.51	1.03
Agriculture	1.29	.83	.15	.28	.52	1.96	.71	1.07	.89
Mining .....	.45	.54	.24	.46	.75	.53	.46	.45	.48
Construction	1.06	.48	.62	.55	1.33	.75	.97	1.36	1.00
Manufacturing ¹ .....	.75	.59	1.01	.66	.93	.89	.80	.81	.78
Industrial machinery and equipment .....	.69	.54	1.40	.58	.82	.78	.91	.84	.78
Electronic and other electrical equipment, Instruments and related products .....	.66	.50	1.34	.57	.96	.86	.67	.80	.69
Transportation equipment .....	.70	.53	.87	.72	.84	.98	.94	.77	.81
Transportation and public utilities .....	.91	.89	.82	.70	.82	.84	1.15	.99	.98
Wholesale trade .....	.90	.75	.68	.63	1.16	1.56	.95	.89	.97
Retail trade .....	.94	.88	1.66	1.27	1.17	1.24	.96	.75	1.11
Finance, insurance, and real estate ¹ .....	.93	.91	.82	.98	.80	1.13	.62	1.03	1.00
Depository and nondepository institutions .....	.82	.63	.66	.71	.70	1.26	.56	.74	1.02
Services, except business services and engineering and management	1.16	.98	1.03	.83	1.80	1.37	1.40	1.22	1.07
Health services	1.22	.85	1.16	1.07	1.02	1.30	.95	1.27	1.12
Government .....	.89	.97	.65	.76	.98	1.01	.91	.98	.92

¹ Includes other industries not shown separately.

NOTE: An occupational share index greater than 1 represents faster than average occupational growth; a value less than 1 represents slower than average growth.

Table 7. Output growth in business services and engineering and management services, 1972-94

[In million of 1987 dollars]

Industry	1972 output	1994 output	Percent annual growth
Business services	82,663	283,160	5.8
Advertising services	13,095	14,763	.5
Services to buildings	8,945	18,019	3.2
Miscellaneous equipment rental and leasing	14,652	16,585	.6
Personnel supply services	5,616	41,661	9.5
Computer and data processing services	8,943	88,628	11.0
Miscellaneous business services, consumer credit and collection services, and mailing and related services	31,413	103,502	5.6
Engineering and management services	88,470	202,822	3.8
Engineering and architectural services	23,043	64,625	4.8
Accounting, auditing, and other services	31,246	36,753	.8
Research and testing services	16,504	39,139	4.0
Management and public relations	17,678	62,305	5.9

Table 8. Federal procurement actions and dollars for selected industries, 1989-95

Year	Total actions (thousands)	Percent of total actions		Total dollars (milions)	Percent of total dollars	
		Business services	Engineering and management		Business Services	Engineering and management
1989	326	7.4	17.5	168,695	3.6	19.2
1990	368	7.6	17.4	171,301	3.8	19.7
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1993	445	8.4	18.7	178,367	5.1	24.1
1994	430	9.5	19.2	174,688	5.5	24.9
1995	446	9.7	19.8	180,852	5.8	25.1

SOURCE: Federal Procurement Report, issues 1989-95 (Washington, U.S. General Services Administration).

**Business services and engineering management inputs to production
for major industry divisions as a percent of value added, 1977 and 1993**

Industry division	1977		1993	
	Business services	Engineering and management services	Business services	Engineering and management services
All industries	4.4	2.1	6.5	2.8
Agriculture	1.2	1.6	.7	.5
Mining .....	.7	.5	.7	.7
Construction	2.3	8.6	2.8	13.4
Manufacturing ¹	5.2	1.3	5.5	1.5
Industrial machinery and equipment	3.4	.3	3.1	.8
Electronic and other electrical equipment, instruments and related products	5.9	.2	5.1	1.1
Transportation equipment	5.5	.2	6.9	.9
Transportation and public utilities	1.8	.9	3.6	1.5
Wholesale trade	10.2	2.1	9.2	1.5
Retail trade	8.2	1.6	9.9	1.8
Finance, insurance, and real estate ¹	2.8	.9	7.8	2.4
Depository and nondepository institutions, holding, and investment offices	8.5	.2	59.8	20.0
Services	8.3	5.2	11.6	5.3
Health services	4.3	.1	10.1	1.5
Government .....	.1	.2	.3	.6

¹ Includes other industries not shown separately.

Exhibit 1. Evidence of substitution of service for direct labor

Industry	Employment ¹	Occupations ²	Output ³	production ⁴
Business services				
Advertising services	Yes	No	No	Yes
Consumer credit and reporting	Yes	No	Yes	Yes
Mailing and related services	Yes	Yes	Yes	Yes
Services to buildings	Yes	Yes	Yes	Yes
Miscellaneous equipment rental and leasing	Yes	–	No	No
Personnel supply services	Yes	Yes	Yes	Yes
Computer services	Yes	Yes	Yes	Yes
Miscellaneous business services	Yes	–	Yes	Yes
Engineering and management services				
Engineering and architectural services	Yes	Yes	Yes	Yes
Accounting services	Yes	–	No	No
Research, development, and testing services	Yes	Yes	Yes	Yes
Management and public relations services	Yes	Yes	Yes	Yes

¹Employment grew faster than all industries for time spans analyzed.

²The given services employed a greater percentage of key occupations over the time spans analyzed.

³Output grew faster in the given services than in all industries.

⁴Inputs to production of the given services grew as a percent of value added.

NOTE: Dash indicates that sufficient data were not available to draw a conclusion.

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**Exhibit 2. Evidence of industries that could be purchasing services
over direct hires**

Industry services	Occupation¹		Inputs²		Business
	Business services	Engineering and management	Engineering and management		
Agriculture	Yes	Yes	No	No	No
Mining	Yes	Yes	Yes	Unchanged	Yes
Construction	Yes	Yes	No	Yes	Yes
Manufacturing	Yes	Yes	Yes	Yes	Yes
Transportation and public utilities	Yes	Yes	Yes	Yes	Yes
Wholesale trade	Yes	Yes	No	No	No
Retail trade	Yes	Yes	No	Yes	Yes
Finance, insurance, and real estate	Yes	Yes	No	Yes	Yes
Services ³	No	No	No	Yes	Yes
Government	Yes	Yes	Yes	Yes	Yes

¹ A "yes" in this column indicates that at least half of key occupations had share indexes less than 1.

² A "yes" in this column indicates that the service input as a percent of value added increased from 1977 to 1995.

³ Exclude business services and engineering and management services in occupation columns.