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# Surveying Job Vacancies in Local Labor Markets: A How-To Manual, prepared for the US Department of Labor

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# **SURVEYING JOB VACANCIES IN LOCAL LABOR MARKETS: A HOW-TO MANUAL**

*prepared by the University of Wisconsin-Milwaukee Employment and Training Institute  
December 1998*

## **Summary**

This manual on how to conduct job vacancy surveys was prepared under contract with the Employment and Training Administration of the United States Department of Labor (#X-6752-8-00-80-60) so that state and local policy makers can benefit from the experience of the Milwaukee project and previous job openings surveys conducted in the United States and other countries.

The University of Wisconsin-Milwaukee Employment and Training Institute has conducted job vacancy surveys twice annually since May 1993 for use in program planning, training and policy analysis. The surveys grew out of the interest of local governments and schools in job availability data at the local level. The surveys are funded by the local governmental partners (the City of Milwaukee, Milwaukee Area Technical College, Milwaukee Public Schools, Private Industry Council of Milwaukee County, and University of Wisconsin-Milwaukee), the Helen Bader Foundation, Milwaukee Foundation and U.S. Department of Housing and Urban Development. The University's Institute for Survey and Policy Research assists in drawing the sample, data entry and telephone follow-up. Operational uses of survey results by the governmental partners require detail on occupations, job location, skill requirements and identification of "difficult to fill" jobs within the four-county metropolitan area.

Job vacancy survey design, sampling, methodology, weighting, survey administration, data verification and data analyses issues are described in detail in this manual. Uses of job openings data to assess spatial and skills mismatches within subareas of the labor market and to target training and transportation strategies for workers are also described.

## **What We Have Learned from Prior Job Vacancy Studies**

1. Most countries which have used job vacancies as an economic indicator do not survey establishments but instead analyze job openings listed with the public employment service. However, employer utilization of the public employment service varies widely. Even in countries where listings with employment service are mandatory, coverage may not be complete. National vacancy surveys using a sample of establishments have been conducted in the United States, Australia, United Kingdom, The Netherlands, South Africa, Canada and New Zealand.
2. Vacancy surveys should be kept simple and designed to reduce the reporting burden on the employer as much as possible. Many large firms already prepare weekly job listing sheets which provide detail on the number of full-time and part-time openings by occupation.

Adding survey questions on job turnover, duration of vacancies, etc. (which require action by payroll or other departments in the establishment) may reduce response rates, particularly for large establishments and companies with high turnover of workers.

3. Annual or occasional (rather than monthly or quarterly) administration of vacancy surveys may provide sufficient data for program and policy concerns at the local level. Less frequent surveying may help improve response rates.
4. Use of existing vacancy surveys and definitions can avoid time consuming survey design work and field testing. The Job Opening Pilot Program (JOPP) and the Employment and Training Institute (ETI) surveys used the vacancies portion of the Job Openings and Labor Turnover Survey (JOLTS) and definitions, which are recommended here. Questions can be added or deleted, but it is recommended that the design remain simple and straightforward.
5. While survey requests for openings data for an entire month or bi-weekly pay period may yield interesting information, they will require considerably more effort to complete than a request for a listing of job openings on a specific day. Vacancy survey data on "difficult-to-fill" positions, prerequisite skill training, rate of pay, and full- or part-time status of openings can help policy makers assess labor shortages by sector and identify occupations with high turnover (e.g., entry-level jobs in the retail and service sectors).
6. The experience of the ETI, JOPP, ETJO (Employee Turnover Job Openings), and SOLD (Australian Survey of Labour Demand) surveys suggests that a combination of mail and telephone contacts may be most effective. Smaller companies are more likely to respond via telephone as they seldom have openings and may feel it is not important to return the survey unless they have openings to report. Smaller companies may view the mail survey as a nuisance, but may not mind a short telephone survey. On the other hand, larger companies respond at higher levels via mail and are more difficult to contact by phone. Stand-alone mail surveys are not recommended due to low response rates and the likelihood of non-response bias.
7. In a stratified sample, cells which have low sample size and/or response rates may result in high weights and error levels, suggesting the need to draw a larger sample and/or solicit higher response rates through mail and phone follow-up. Sample selection methodology and response rates will impact on the weights used and related error rates, particularly for smaller establishments where openings are less likely to occur.
8. A comparison of the ES-202 file which is a common source for Department of Labor establishment surveys and GENESYS (a commercially available yellow pages listings file) was conducted to determine the coverage of both files as a source for the survey sample population. The yellow pages telephone-based listing was found to include considerably more listings, particularly for smaller companies. The yellow pages file is also much more likely to have a correct address and telephone number, particularly for multi-site and franchise establishments. A yellow pages database (InfoUSA, formerly ABI) is currently used by the Employment and Training Administration and state employment service as a source of employer information for job seekers. The cost of the yellow pages database

may be offset by the time and effort required to clean up the address file and locate phone numbers omitted in the ES-202 file. For those states which do not provide the ES-202 file to researchers, the yellow pages file is recommended.

9. A letter from the parties cooperating in a local survey detailing the purpose of the survey may enhance response rates via mail and at the same time provide the promise of confidentiality. Correspondence to employers should avoid reference to the public employment service since some establishments may not want their positions listed with the public employment service and consequently may not respond if there is a suspicion that this may occur.
  
11. Involvement of local governments and educational institutions in the development of job openings survey projects can improve the level of employer cooperation with the survey and the subsequent uses of the data for public policy, establishing priorities for education and training programs, and counseling job seekers. In Milwaukee the survey request is accompanied by a letter from the president of the technical college, chancellor of the university, mayor of Milwaukee, executive director of the private industry council, and president of the major local foundation supporting the research.

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## I. The Purposes of Vacancy Surveys

Vacancy statistics have been collected by dozens of industrialized nations since at least the 1950s when skilled labor shortages and low unemployment rates prompted use of vacancy data to provide an economic indicator, address the labor exchange function, provide analyses of labor market conditions, and identify and forecast occupational shortages. Since the 1940s and 1950s there has been interest in using vacancy data to examine structural as well as frictional unemployment and as a measure of full employment comparing unemployment numbers and openings to a gauge of economic well being. At local levels the public employment service sought data on job openings as a tool to more effectively target training efforts for unemployed and under-employed workers, as demand for skilled positions increased and unskilled employment decreased. During the 1980s scholars stressed the importance of collecting and analyzing vacancy data to compare the number of unemployed and underemployed workers to openings (Riemer, 1988; Abraham, 1983; Levitan and Gallo, 1989; Holzer 1989). More recently, employer vacancy surveys have been used to assess geographic and skills mismatches (Holzer 1996). The combination of demand information available through establishment vacancy surveys combined with supply data household surveys can provide policy makers, employers and educators with analyses more suited to solving the employment needs of those seeking work or expected to work in the context of job openings locations and the skill levels required. The purpose of the survey, of course, drives the design and geographic coverage.

Vacancy data are commonly used as economic indicators at the national level. The three sources of data typically used to measure vacancies are public employment service job listings, want ad listings and establishment surveys. Use of job listings filed with local and state employment service offices is common but problematic, particularly in countries where such listings are not mandatory. Many companies do not list with the public employment service, particularly in urban areas where alternative placement sources are more readily available. Employment service listings also tend to retain job openings and may not be purged until well after a position has been filled, with no point in time measure possible beyond the opening or closing date of the listing. The number of internal hires and professional positions not recruited through employment service may tend to skew occupational demand as well.

Counts of want ad listings are often used at the local, state and national level to provide an inexpensive economic indicator and to identify vacancy trends, job shortages and occupational supply and demand. Want ads have some obvious limitations: the job location and number of openings are often not specified, some companies do not recruit through want ads, the positions shown may not be available for immediate hire, and some vacancies may not be listed. Despite these limitations, want ads are commonly used as a barometer of employment demand. The Conference Board uses the want ads index as an economic indicator at the national level and it has been found to be a useful indicator of vacancies (Abraham, 1987). In Australia a monthly Skilled Vacancy Survey index is based on a count of vacancies for skilled occupations listed in want ads of major metropolitan newspapers.

Establishment surveys of vacancies used to assess job gaps and skills shortages are typically conducted in local labor markets where public policies and training interventions can consider supply and demand mismatches. These local "applied" uses often require analyses at

an occupational level by industrial sector. Other applied uses cited for locally administered vacancy surveys include:

- Identification of occupational skill shortages and high demand jobs for use in assessing technical education priorities at the post-secondary school level and planning employment initiatives for unemployed job seekers.
- Public policy discussions on job gaps, skills mismatches, and spatial mismatches at an occupational level.
- Background data to assist teachers, students and career counselors in career planning and curriculum development.

Interest in a vacancy survey in the Milwaukee area was initially driven by the City of Milwaukee Fair Housing and Employment Commission's concern about the number of jobs compared to job seekers in central city neighborhoods of Milwaukee. (This interest paralleled the focus of 1940s full employment measures in the United Kingdom, Canada and the United States.) Previous local attempts to estimate openings relied upon a count of employment service job listings and used a multiplier to estimate jobs not listed. The Milwaukee Area Technical College expressed a willingness to participate in a pilot project, with an interest in using the results to improve its instructional offerings, identify emerging occupations and target high demand occupations. The Private Industry Council of Milwaukee County has used the survey results to determine training areas for its subcontractors.

The Milwaukee Public Schools' interest in job openings data was for counseling students about the labor market and career education. In cooperation with the Private Industry Council's Milwaukee Career Center and Milwaukee Area Technical College, the Employment and Training Institute designed a series of booklets and curriculum guides to present information on the labor market for students and new entrants into the labor market. A booklet on high demand jobs for skilled workers highlights the jobs and pay rates for careers requiring one to two years of post-secondary education and a second booklet profiles careers requiring four or more years of college. Both combine vacancy data detailing high demand occupations, hourly rates of pay and location of jobs with occupational outlook information, position descriptions and training programs at the postsecondary level. Booklets are distributed to students through the career education program, school-to-work coordinators and high school counselors.

On a policy level the zipcode location of job openings has helped focus local and state policy discussions on the geographic mismatch between job seekers in the central city where openings are limited and job availability in the outlying areas where demand has remained high and unemployment is at the 2 to 3 percent level. Recent debates over welfare reform initiatives have used vacancy survey data to focus discussion on skill level and geographic mismatches facing new entrants into the labor force. Transportation policies for mass transit and welfare reform initiatives have been modified and targeted to geographic areas where demand is high for full-time positions. Job training programs for welfare employment initiatives have used vacancy data to identify occupations where short-term training could be offered for welfare recipients entering the labor force.

## II. Background on Job Openings Surveys in the United States

Over the past fifty years the United States has conducted a series of pilot projects, experiments and feasibility studies related to vacancy surveys and job openings. (For a discussion of the period 1940-1978, see Appendix IV.) The United States Department of Labor (USDOL) conducted pilot projects to test the feasibility of collecting job vacancy data as early as World War II and the Korean War. In 1956 the USDOL Bureau of Labor Statistics conducted a feasibility project which found that employer records on vacancies were unreliable and that many employers were unable to report the number of vacancies.

In the mid-1960s, when unemployment rates were very low and the number of job vacancies may have equaled the number of unemployed persons, a common view among academics and policy makers was that vacancies beyond normal turnover were the result of the unemployed not knowing how to find available jobs, with job seekers mainly needing mechanisms to link up with the companies advertising vacancies (Abraham, 1983). However, perceived "skill shortages" in higher skilled occupations were being reported at the same time that lesser skilled workers in manufacturing remained unemployed.

This renewed interest in job vacancy surveys prompted another pilot project to assess the feasibility of conducting vacancy surveys and to examine the use of vacancy statistics in other countries. By 1965 the **Experimental Job Vacancy Program** included sixteen cities. The purpose of the program was not only to test the feasibility of gathering vacancy estimates by occupation but also to examine the usefulness of the results for improving the labor exchange function, identifying occupational training needs and informing economic policy analysis. This experiment was subsequently expanded nationally.

In the period 1969-1973 the Bureau of Labor Statistics (BLS) established the **JOLTS (Job Openings and Labor Turnover Survey)**, a state administered survey that collected data primarily in the manufacturing sector. Throughout the 1970s, Wisconsin and Minnesota continued to collect job vacancy data despite federal lapses in support of the program. The JOLTS regularly surveyed manufacturing establishments to obtain data on long-term and short-term job openings, new hires and separation rates. The survey did not collect data on full-time/part-time status, wages or benefits, but provided valuable economic indicators to gauge local labor market trends. However, funding for this joint federal and state effort was discontinued by the federal government. The JOLTS survey was last administered in December 1981.

In 1979-80, the BLS **Job Openings Pilot Program (JOPP)** conducted pilot programs in four states to assess the feasibility of collecting data nationally. A series of three surveys over six quarters collected data on vacancies (quarterly) and labor turnover (monthly) to test the feasibility of collecting establishment data using a variety of methods. Examinations of sampling size and measurement error led to recommendations on sample size and estimates of costs. (See Appendix V for a detailed discussion.) A subsequent recommendation was made that such surveys were possible but too expensive to administer. The program found that telephone interviewing was effective with establishments with less than fifty employees while mailing to specific individuals was recommended for larger establishments. Use of job openings data at



the occupational level was associated with very high sampling error, and the program recommended that much larger samples be used to provide reliable estimates.

In 1991 the BLS embarked on another similar pilot project, the **Employee Turnover Job Openings (ETJO)** experiment, driven by a renewed interest in identifying occupational labor shortages and determining where hard to fill openings were occurring (BLS, 1991). Driven primarily by a Congressional directive to "...develop a methodology to annually identify national labor shortages" and secondarily by immigration policy concerns related to occupational demand, ETJO was designed to assess the use of computer-assisted telephone interviewing (CATI) techniques and the Occupational Employment Statistics (OES) survey to conduct vacancy surveys. Once again this pilot project found that vacancy surveys with occupational detail could be conducted at a national level but even if only conducted annually would be very expensive.

### **III. Vacancy Surveys in Other Countries**

National vacancy surveys using a sample of establishments have been successfully conducted in Australia, United Kingdom, The Netherlands, South Africa, Canada and New Zealand. (See Appendix VI.)

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#### **A. Australia**

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The Australian Bureau of Labor Statistics has conducted the Quarterly Survey of Job Vacancies and Overtime (JVO) since 1983. This telephone survey is used to estimate vacancies at the state and national level. The vacancy estimates are used as a major economic indicator and for forecasting. While the JVO performs similarly to Australia's want ads index as an economic indicator, it provides data by industry and state using a far superior methodology. Employer participation is mandatory and the response rate is 99 percent. The survey is simple and asks for only four numbers (i.e., total number of employees, paid overtime hours, number of employees paid overtime, and number of job vacancies). Survey forms are mailed out prior to the phone survey. Response time varies by size of establishment from 7 minutes for establishments with less than 5 employees to 19 minutes for establishments with more than 20 employees. The sample size is designed to have a relative standard error of 25 percent or less at the state level and 10 percent or less at the national level.

(See [www.treasury.gov.au/Publications/EconomicRoundup/1998Winter/Default.asp](http://www.treasury.gov.au/Publications/EconomicRoundup/1998Winter/Default.asp))

The sample is stratified by size, industry, state and private/public establishments. All establishments with 100 or more employees are surveyed along with a sample of establishments with less than 100 employees. Turnaround time is six weeks after the survey date and statistics provided include estimates of vacancies, job vacancy rates and overtime levels.

In 1991 Australia conducted a study to determine the feasibility of collecting job vacancy data by occupational category with particular emphasis on difficult-to-fill vacancies. The Survey of Labour Demand (SOLD) study found that a mail-out survey was feasible, reporting that the mail survey is "less expensive and provides better results than a telephone collection. The telephone methodology is satisfactory for seeking data at aggregate level on vacancies but it is doubted that it would be sufficiently robust to give reliable data at a dissected level." The

SOLD study concluded that because the JVO survey asks only four questions it could be conducted by phone, but that adding more questions would not be feasible for a phone survey. The SOLD survey, however, is no longer in operation and vacancy occupational data are now collected for skilled occupations using the want ad based skilled vacancy survey. (See [www.deetya.gov.au/aed/svs/svshome.htm](http://www.deetya.gov.au/aed/svs/svshome.htm))

## **B. United Kingdom**

"Skilled Needs in Britain" is published annually ([www.open.gov.uk/dfee/skneeds](http://www.open.gov.uk/dfee/skneeds)) detailing skill needs and training. Based on a survey of 4,000 employers with 25 or more employees, results are provided by sector size and region, detailing hard-to-fill vacancies, participation in training programs and occupations in high demand. Listings with the public employment service are also reported monthly on placements and vacancies.

## **C. The Netherlands**

Quarterly establishment surveys have been conducted since 1980 in the Netherlands to gather data on vacancies, new vacancies, filled vacancies and level of education by industry and establishment size. Survey results are used as an economic indicator and for counseling new labor force entrants. ~~Public employment service listings and want ads are also used to examine vacancies. However, in the Netherlands companies are not required to list jobs with the employment service.~~

## **D. South Africa**

A manpower survey is conducted annually covering the number of workers in fixed occupational categories and detailing the number of vacancies in each occupation. In 1994, 8,810 firms were involved in the survey.

(See [www.css.gov.za/wwwsrch/releases/labour/yr1994/p0201.htm](http://www.css.gov.za/wwwsrch/releases/labour/yr1994/p0201.htm))

## **E. Canada, New Zealand**

Canada and New Zealand have conducted job vacancy surveys to identify skills shortages for immigration policies. Canada abandoned its survey in 1978 and New Zealand in 1989.

## **IV. Employment and Training Institute/ISPR Survey**

The design of the University of Wisconsin-Milwaukee Employment and Training Institute (ETI) job openings survey draws upon the experience of JOLTS, JOPP and the more recent Department of Labor survey of Employee Turnover Job Openings (ETJO). The ETI survey include data on full-time and part-time employment, the location of employment, wage rates, availability of fringe benefits, education and training requirements, and employer-identified hard-to-fill openings.

Information on the job titles of openings is particularly important to determine occupational needs of employers and availability of entry-level positions which may offer steps

for promotions within companies. The location of employment is essential not only for the value it may have for descriptive purposes but also because companies often have sub-units throughout the state or region for which hiring and wage reporting is included. Job site data provide a check to ensure that metropolitan employment trends are based on openings in the specified four-county area rather than a reflection of broader geographic units covered by the establishment's administrative office. Data on minimum levels of education and special training required for vacancies provide benchmarks from which to gauge possible training and placement efforts. Fringe benefit availability is examined as an important determinant of adequate employment and family-supporting jobs.

For this survey the Employment and Training Institute works with the University's Institute for Survey and Policy Research (ISPR, formerly the Social Science Research Facility) to draw a representative sample of employers from the covered employment ES-202 file for the Milwaukee four-county metropolitan area. The methodology incorporates a stratified sample by size of company and Standard Industrial Classification (SIC). Respondents are asked to complete the information based on actual openings in a specified week (e.g., the week of October 19, 1998).

In order to improve initial response rates and to minimize the employer effort required, ~~the ETI survey uses a one-page form limited to data on vacancies and new hires only. The one page form has been achieved by asking companies to simply list job titles for which there are~~ current openings and using University staff to code and categorize occupational listings. Establishments are provided return mail envelopes addressed to the University.

The sample population is stratified by size and type of company using the following criteria to ensure an adequate response rate and over-sampling of large employers, government and education institutions.

1. 100 percent sample of employers with 250 or more employees.
2. 100 percent sample of local government and education institutions.
3. A 10 to 12 percent sample of the balance of corporations.
4. Temporary help agencies and estates are excluded.

The mail response rate for the survey is typically 20 to 25 percent. In order to increase the response rate and to test whether non-respondents differ in any way from respondents, Employment and Training Institute staff attempt to contact approximately 2,000 of the non-respondents by phone to solicit their response to the survey. Phone contacts are attempted for all non-respondent companies with over 250 employees and for a sample of the balance of non-respondent companies. The initial mail respondents for the May 1993 survey were compared to a randomly selected population of non-respondents who were solicited by phone. The two groups were analyzed to test for differences in reported job openings. Only a few of the stratified cells showed any difference and analysis of the overall sample showed no statistical

difference in the two populations. A test for differences in means was conducted for number of job openings with no significant difference evident between groups.

Results for the sample population are weighted by size, type of industry and response rate to project the total number and type of jobs available in the metro area. Response rates for questions concerning hourly wages and qualifications are lower than for data on type of job openings due in part to missing data attributable to jobs where salary is based on commission. As a result, two additional weighting formulas are applied to adjust for missing data. The three weights used to project full-time and part-time openings are: 1) the total population responding to the survey, 2) the population detailing wage rates, and 3) the population completing questions on fringe benefits and job requirements. The use of these different weighting formulas permits more reliable estimates but results in slightly different totals across tables for both full-time and part-time openings.

The combination of non-response rates and low job opening rates for some cells results in extremely high weights for a small number of cells which could distort findings on the number and types of jobs open. A test is conducted on each weighting cell by both type of company and size, and those responses more than one standard deviation above expected are excluded from the analysis. (The resulting weighting methodology was tested by using the sample data to project overall employment for the SMSA and comparing these projections with published May 1992 ES-202 employment total. Estimates of employment based on weighting of survey respondents' reported current employment levels fell within 10 percent of the actual reported levels for the metropolitan area, lending confidence to the weighting procedure used.)

After survey results are tabulated and weighted by size and type of industry and by response rate to project the total number and types of jobs available in the metropolitan area, a fifty-page report is prepared for the government partners summarizing the findings. Analysis is provided in the following areas:

- profile of job openings in the metropolitan Milwaukee area
- skill level requirements for job openings
- wage rates by job qualifications
- difficult-to-fill vacancies
- availability of fringe benefits
- location of job openings
- shortage of jobs in the central city Milwaukee neighborhoods
- the job gap between available vacancies and job seekers and others expected to work.

A 4-6 page summary paper identifies key findings, along with listings of occupations with labor shortages. The summary is distributed to government officials, educators, community agencies and resident organizations in the Milwaukee area and is posted on the Internet.

(See [www.uwm.edu/Dept/ETI](http://www.uwm.edu/Dept/ETI))

## V. Job Vacancy Survey Instrument and Technical Approach

To assist state and local planners in developing job vacancy surveys for their local labor markets, information is provided on survey design, sampling, methodology, weighting, survey administration, data verification and data analyses.

### A. Questionnaire Design

Current and past surveys of job openings often consist simply of a count of vacancies combined with additional questions about the establishment's workforce. In the JOLTS, JOPP, ETJO and SOLD surveys, labor turnover questions are also examined at the occupational level. In Australia the number of employees, overtime hours and employees working overtime are examined. Increasing the level of detail requested may place a burden on employers and reduce response rates.

The design of the ETI survey was driven by the interests of the participating governmental partners as well as a desire to keep the survey as simple as possible. The resulting one-page form was field-tested and has been used with minor modification since 1993. Surveys are conducted each May and October to assess openings for immediate hire as of the 4th Monday of the month. (See Appendix I for the cover letter and survey instrument used in Milwaukee.)

#### *Data Requested on Employment and Training Institute Survey*

##### *Company Level Data*

- *Total number of people employed in metropolitan area*
- *Number of jobs open for immediate hire*

##### *By Job Title*

- *Job title*
- *Number of full-time openings*
- *Number of part-time openings*
- *Hourly rate or Monthly pay*
- *Zipcode of place of work*
- *Is job difficult to fill? [check if yes]*
- *Does job require prior experience? [check if yes]*
- *Does job include health insurance? [check is yes]*
- *Does job include pension? [check if yes]*
- *Prior level of education or training required*

The instructions for completing the survey are brief and include a definition of "job openings" and a note to include only those openings available for work sites within the four-county labor market. The total number of employees in the establishment is requested as a check that multi-site companies are answering appropriately. Data on the zipcode of the

worksite for each job opening is used to assess the demand for workers in subareas of the labor market and serves as a further check on multi-site establishments' responses.

Recent surveys conducted by the Employment and Training Institute show that 20 to 30 percent of establishments have openings at a given point in time, with the likelihood of having openings increasing with the size of the company. Because many establishments are small (where less than 10 percent report openings), most vacancy surveys can be completed rapidly (by mail or phone) when there are no openings. Expanding the number of questions to include data which require companies to examine their wage and hour records increases the time and effort required of employers and may reduce response rates (both for the 20 to 30 percent of establishments with openings and the 70 to 80 percent of establishments with no openings). While large companies may be willing to provide job listings and data on current openings (which are often detailed on their weekly job listing sheets), they may be unwilling to retrieve data for other questions (which require additional human resource staff retrieval time or which require involvement of other company staff outside the personnel office).

The job titles are used to track emerging occupations and to identify high demand fields while not requiring employers to classify their jobs into standardized occupational groups or codes. The number of full-time and part-time openings and zip code location provide the basis for constructing the overall estimate of openings for the metropolitan area. ~~The job site zip code data are completed by almost all respondents who report openings, although occasionally employers in businesses like building security and home health care services report openings for the entire area (rather than by zip code location) due to the daily movement of employees.~~

The remaining questions are unlikely to receive a complete response from all establishments with openings, and weights need to be adjusted accordingly. Hourly wage and salary data are often omitted with reasons including "depends," "commission" or "varies." When pay ranges are provided, the lower end of the hourly wage or salary is used, and salaries are converted to an hourly rate. Similarly, questions on fringe benefits are often missing or ambiguous (e.g., "varies," "depends" and "401K"). In some cases health insurance and pension benefits are available 3-6 months after employment (coded as "yes"). Establishment comments regarding "Prior Level of Education or Training Required" are recorded verbatim to aid in identifying the level of education or occupation-specific training required.

Employers are asked to indicate which jobs open for immediate hire are "difficult to fill" positions. Although the term "difficult to fill" is not defined, this category is helpful in identifying occupations with shortages as well as indicating the general level of satisfaction of employers with the available pool of entry-level workers.

Large companies with many openings often are willing to mail or fax job listings with FTE's (full-time equivalents) or the number of full-time and part-time openings and the job location but may be unwilling to answer questions not on their job listing sheets. In the health field, for example, hospital mergers have resulted in centralized hiring for hospitals, nursing homes and other health care facilities. These establishments report a high volume of openings on their weekly job posting sheets which offer a sufficient level of detail to substitute for the data requested on the ETI survey form. Access to job postings via fax and the internet is also

increasing but the limited level of detail on number of openings and location of worksites makes electronic postings only occasionally usable.

*Timeline for ETI Fall 1998 Survey*

- |                    |  |
|--------------------|--|
| <i>Sept. 2</i>     | <i>Draw sample and begin address corrections.</i>  |
| <i>Sept. 9</i>     | <i>Submit printing orders for envelopes.</i>   |
| <i>Sept. 14</i>    | <i>Send employer letter and listing of establishments to mail services for address correction.</i> |
| <i>Sept. 17-30</i> | <i>Correct addresses flagged by mailing software.</i>  |
| <i>Oct. 5</i>      | <i>Address surveys.</i>  |
| <i>Oct. 8</i>      | <i>Fold survey for insertion into windowed envelope.</i>   |
| <i>Oct. 12</i>     | <i>Deliver surveys to mail services bulk mail section.</i>   |
| <i>Oct. 14</i>     | <i>Mail surveys.</i>   |
| <i>Oct. 19</i>     | <i>Survey day</i>  |
| <i>Oct. 21-27</i>  | <i>Initial coding of returned surveys.</i>   |
|                    | <i>Verify addresses and telephone numbers of undelivered mail.</i>                                 |
| <i>Oct. 28</i>     | <i>Begin calling population with undelivered mail.</i>   |
| <i>Oct. 29</i>     | <i>Begin calling sample of non-respondents.</i>  |
| <i>Oct. 30</i>     | <i>Begin data entry of completed surveys.</i>  |
| <i>Nov. 6</i>      | <i>Conclude calling of non-respondents.</i>  |
| <i>Nov. 9</i>      | <i>Begin coding of job titles and proofing of entered data.</i>                                    |
| <i>Nov. 20</i>     | <i>Complete coding of job titles and proofing of entered data.</i>                                 |
| <i>Nov. 23</i>     | <i>Begin analysis of data and preparation of job openings report.</i>                              |
| <i>Dec. 15</i>     | <i>Scheduled completion date for job openings report</i>   |

## B. Vacancy Definitions

Four examples of job vacancy definitions from past and current survey efforts are shown below. The JOLTS, ETJO and ETI surveys all ask that vacancies be counted for a specific date while the Australian JVO survey requests data for the pay period preceding or following a specific date.

### **Employment and Training Institute Survey, University of Wisconsin-Milwaukee**

LIST ALL JOBS OPEN FOR IMMEDIATE HIRE AS OF MAY 18, 1998 LOCATED IN MILWAUKEE, OZAUKEE, WASHINGTON OR WAUKESHA COUNTIES

- Include job openings for full- and part-time employees; and temporary employees including temp services.
- Exclude job openings for consultants, outside contractors and their employees.

### **JOLTS (Job Openings and Labor Turnover Survey), U.S. Department of Labor**

Current Job Openings: A job that is immediately available for filling and for which the firm is actively trying to find or recruit someone from outside the firm (i.e., a "new" worker - not a company employee).

"Actively trying to find or recruit" was defined as: Efforts to fill the job opening through such means as orders listed with public or private employment agencies and school placement offices; "help wanted" advertising (newspaper, posted notice, etc.); recruitment program; interview and selection of applicants.

Employers were further instructed to:

- Include openings for all positions and classifications whether full-time, part-time, permanent, or temporary. Also include orders with employment agencies and notifications to unions.
- Exclude jobs to be filled by recall, transfer, promotion, demotion, or return from paid or unpaid leave.

### **ETJO (Employee Turnover Job Openings), U.S. Department of Labor**

Total Job Openings: The number of jobs as of the pay period including the 12th of June for which the unit was prepared to schedule to start either immediately or during the next pay period and for which your unit has been actively trying to find or recruit new workers from outside the unit.

- Including: all full-time, part-time, permanent, or temporary positions.
- Excluding: jobs to be filled by recall, promotion, demotion, or return from paid or unpaid leave; job openings for which "new" workers were already hired and scheduled to start work later; and job openings that have starting dates other than the immediate or next pay period.



### **JVO (Quarterly Survey of Job Vacancies and Overtime, Australian Bureau of Labour Statistics)**

**Job Vacancy:** A job available for immediate filling on the survey date and for which recruitment action has been taken. Recruitment action includes efforts to fill vacancies by advertising, by factory notices, by notifying public or private employment agencies or trade unions, and by contacting or interviewing applicants already registered with the organisation, etc.

**Include:**

- Vacancies for all employees. That is, managerial, full-time, part-time, permanent, temporary and seasonal employees, adults, juniors, trainees, apprentices, cadets, etc.

**Exclude:**

- Vacancies of less than one day's duration
- Vacancies to be filled by persons already hired, or by promotion or transfer of existing employees
- Vacancies to be filled by employees returning from paid or unpaid leave or after industrial dispute(s)
- Vacancies not available for immediate filling on the survey date
- Vacancies for work to be carried out under contract
- Vacancies unavailable in Australia
- Vacancies for which no effort is being made to fill the position
- Vacancies available only to persons already employed by the organisation, Government Department or Authorities
- Vacancies where a person has been appointed, but has not yet taken up duty (e.g., where provisional promotion or acceptance of appointment has occurred)

### **C. Printing, Mailing and Postage Issues**

Regardless of whether the job openings survey is conducted via phone, mail or a combination of both, it is advisable to mail out an introductory letter describing the purpose of the survey, including a copy of the survey form and providing a written commitment that survey responses of individual companies will be held in strict confidence and that no data will be released which identifies individual firms. Sponsorship of the survey by a partnership of local education, job training and government institutions with an interest in improving the delivery of training targeted to employer needs may increase the likelihood of response. A letter prepared on University of Wisconsin-Milwaukee letterhead signed by all partners has been used in the Milwaukee area survey. Using the local Private Industry Council or human resource board may also be appropriate. However, using Job Service stationery, for example, would not be advisable if employers have the impression that their responses may be listed in the employment service's job bank.

Whatever source is used to identify establishments to be surveyed, there are likely to be inaccuracies in addresses which will result in mail being undeliverable. Most bulk mail and presort services will scan addresses to flag those marked as undeliverable. Corrections can then

be made to the file prior to mailing, thereby reducing mailing and handling problems. Whenever possible, addresses should be corrected prior to the initial mailing. For large establishments it is also advisable to add the name of a human resource person to the mailing address. Unfortunately, the ES-202 file provided to researchers in Wisconsin does not include the name of a contact person and "Attention: Human Resources" is used instead. Vendors who provide mailing lists often include a contact person at each establishment.

When utilizing mailed survey forms with the expectation of a mail response, a return envelope with postage guaranteed should be included. The establishment's name and address must appear on the survey form so that the survey results can be associated with the appropriate SIC code and size of employer. An accession number included on the survey form can be used to retain data on survey respondents. A windowed mailing envelope may be used if the establishment's address and accession number are printed on the back of the survey form. This simple technique allows machine stuffing of the survey (along with a cover letter to employers and a return envelope).

Mailing and printing costs will, of course, vary. When using bulk mail, it is advisable to request the "Forwarding Service Requested" option which forwards mail for up to twelve months and returns mail after that date with the new address and reason for non-delivery marked on the returned envelope. ~~All undelivered surveys should be examined to identify correctable addresses, followed by phone calling to determine which establishments are no longer operating in the metropolitan area.~~ Typically, 5 percent of surveys are returned as "F.O.E." (forwarding order expired) or "undeliverable" even after extensive address clean-up, and of these one-third are no longer in business.

#### **D. Address Correction Problems**

Both the ES-202 files and GENESYS files (see discussion in Appendix II) were examined for address problems. Mailing correction software was used to flag records with incorrect addresses and correct zipcode and address suffixes where possible. In the ES-202 file for the four-county Milwaukee area, 35,546 records were checked for proper addresses: 12,416 (or 35 percent) required corrections by the mailing software and 4,942 records (14 percent) were identified as incorrect and requiring manual look-up. Using the GENESYS phone-book-based file, 51,483 records were checked: 10 percent were corrected by the mailing software and 3 percent were identified as incorrect and requiring manual look-up. Multi-site addresses are often a problem in the ES-202 file where establishments list addresses which indicate the company site location but do not provide a proper mailing address (with incorrect zipcodes the most common error). Because the state does not mail unemployment compensation material to these multi-site units, the addresses remain uncorrected in the state ES-202 file.

Because the unemployment compensation function is the primary use for the ES-202 file, many companies substitute their payroll or accounting office for their main company address. In some cases the address given is a payroll processing unit that may be out of state. Smaller companies often provide their bookkeepers' address and phone number, but with no indication that this is not the company address. (The only clue that the address and phone number may

be incorrect is the use of a second line of the address with "Attn:..." When telephone follow-up calls are made, an initial verification of the correct establishment name can eliminate any confusion. However, when the survey is mailed to the bookkeeper or payroll unit, staff rarely forward the survey to the human resources office or company owner or the survey is forwarded well after the due date for responses.

For large establishments it is advisable to direct the survey to an individual in the human resources department while for smaller establishments the owner would be the appropriate contact. The ES-202 file does not list a contact person in the version researchers receive and consequently all mail is directed to "Human Resources" except for those companies with 250 or more employees which are called prior to mailing to obtain the name of an appropriate contact person. The GENESYS file lists a contact person; however, for larger establishments the contact is the Chief Executive Officer.

#### **E. Suggestions for Handling Undelivered Mail**

The post office will return mail it has not delivered for several possible reasons. These include:

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- ~~Forwarding order expired. (The post office may supply the new address but still return it or they may return it with no new address.)~~
  - Attempted not known/Addressee unknown.
  - Moved, left no address/Not deliverable as addressed/Not forwardable/No forwarding order on file.
  - No such number
  - Insufficient address
  - No receptacle
  - No suite number

Once undelivered mail has been sorted into the above categories, a search for correct addresses and phone numbers should be conducted. The phone number is needed since it is unlikely that a timely response would be received if the survey were mailed out a second time. Follow-up surveys are conducted by phone or faxed to companies with more than ten openings (after an initial phone contact). Several sources may be used in the search for a correct address and phone number.

1. Review of the business white pages
2. Review of directories of business pages that list for the 'greater' [metro] area

3. Review of the yellow pages if the type of business is known
4. Use of computerized telephone listings
5. Calls to directory assistance.

#### **F. Telephone Contact Problems**

For purposes of telephone follow-up the ES-202 file needs considerable correction prior to follow-up survey phone calling. Typically, 20 to 25 percent of phone numbers are missing in the file or listed for an area code outside the metropolitan area. Multi-sites often fall into this category because address listings of sites are the company's primary interest, not phone contacts. Locating addresses in the white and yellow pages can also be a challenge where multi-sites are identified in the ES-202 file by a FIPS code or store number and municipality code but do not show a local street address or phone, making it necessary to look up the FIPS code and then identify the location within each municipality. For fast food chains and other establishments with more than one location in a municipality and no local street address specified, one of the establishments in the municipality is randomly selected for the follow-up survey.

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~~Companies where there is a non-working number or a disconnected number should be looked up again and if not found, put into the dead category of "no longer in business."~~

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#### **G. Response Data**

The response rate for mailed surveys is usually 22 to 25 percent, with smaller establishments having lower response rates than larger firms. A random sample of half of the non-respondents is drawn for telephone follow-up interviews. There is typically a 50 percent plus response rate on the telephone interviews, with larger companies having lower rates of response. Firms with 250 or more employees are much more likely to respond by mail than through calling, with a 40 percent mail response rate compared to an 20 percent response rate on follow-up calling. Establishments with fewer than 5 employees typically have an 20 percent response by mail and a 50 percent response rate by phone, and companies with 5 to 250 employees typically show a 25 percent mail response rate and a 60 percent telephone response rate.

#### **H. Surveying by Phone, Mail or Both**

Use of mail surveys in conjunction with follow-up telephone surveys has proven to be a cost-effective and timely way to collect survey data. Mail responses are, of course, the least expensive method of obtaining responses. Because an introductory letter and survey form should be mailed to all sampled establishments regardless of whether a mail or telephone survey method is used, the cost of adding a return mailer with guaranteed postage is minimal, as only returned

pieces are charged at a rate of \$0.32. The disadvantage of using the mail method is that if employers with no openings assume that their responses are not wanted.

The sample size will also influence the choice of surveying method and the timeliness of survey responses. The longer the calling takes and the greater the length of time elapsed between the contact with the establishment and the survey week designated for openings, the more difficult it may be to retrieve accurate data on vacancies. A combination of methods might also be considered where "calling only" would be done for certain sizes of establishments and mail plus phone follow-up for the balance, so that calling during the first week would be done for the "call only" population and then in Week 2 for mail non-respondents.

### **I. Suggestions for Follow-Up Telephone Calling**

Companies are asked to respond to the survey within one week of the fourth Monday of the month, and three days after the due date calling begins. After the first week of returned surveys, the responses are matched using the establishment's survey accession number attached to the original sample population file. A random sample of companies that did not respond and did not have mail returned by the post office is generated for telephone interviewing. Follow-up calls to these companies are completed within one and a half weeks of the due date for the survey. Because the date of vacancies for hire that is specified on the survey is one week prior to the due date, it is important that the telephone calls are made as soon as possible. Otherwise the accuracy of the survey will decrease.

A script is provided which should be followed by all telephone interviewers. It may be necessary at times to offer additional information, particularly to large companies, about the purpose of the survey or to suggest that they fax a job list. The most experienced interviewers are assigned to these more difficult companies. Otherwise, the script provides the interviewer with an appropriate outline for making the calls and following up questions.

### Sample Script for Follow-Up Calls

"Hello. My name is \_\_\_\_\_ and I'm calling from UWM. Two weeks ago we sent a survey to your office asking whether you had any jobs open for immediate hire as of Monday, October 19th? All company names and responses are confidential.

"Did you have any job openings two weeks ago on October 19th?"

IF NO: "Could I find out about how many people are employed at your company?"  
[LIST NUMBER OF EMPLOYEES ON COMPUTER PRINTOUT.]

IF YES: "How many openings did you have?"

IF LESS THAN 10 OPENINGS: "I just have a few questions about your job openings." [GO THROUGH THE SURVEY QUESTIONS FOR EACH JOB OPENING. ALSO, BE SURE TO RECORD THE NUMBER OF THE COMPANY ON THE TOP OF THE JOB SURVEY FORM.]

IF 10 OR MORE OPENINGS, "Do you have the UWM survey requesting brief information on each of the jobs available?"

YES: "Could you please complete it and return it to us." [Did you have a problem completing any of the questions?] Our fax number is \_\_\_\_\_.

NO: "I can send you another copy of the survey. What is your name and address, or fax number?"

"Thank you very much for your cooperation."

#### Calling Codes:

AM - answering machine [Don't leave message]

B - busy

CB - call back

DC - disconnected phone

DK - doesn't know whether any openings

FAX - fax machine

NA - no answer

NP - (changed to) non-published number

RR - refused to respond

WN - wrong number

[Background information on the survey ONLY IF ASKED: "We conduct this survey for the City of Milwaukee, Milwaukee Area Technical College, Milwaukee Public Schools and Private Industry Council of Milwaukee County to help prepare workers for jobs available. For example, MATC uses the employer information to help determine whether to expand technical training in areas where companies need workers."]

Each interviewer receives a call listing that provides the name, address, zipcode, phone number, and size of company. Next to each listing is a place for codes and comments to be made about each call. A code is entered for each attempt made.

AM = answering machine  
B = busy  
CB = call back  
DC = disconnected phone  
DK = doesn't know the answer  
FAX = fax machine  
NA = no answer  
RR = refused to respond  
WN = wrong number

Sometimes a company requests that the survey and cover letter be faxed to them. If this is done, an interviewer should note "sent fax" on the call list as well as enter the fax number and contact person's name. If a survey is faxed, the accession number of the business is written on the form so it can be identified when returned. Details are also noted on the call list if specific follow up information is given. For example, if a name and/or time is offered for call back information, this is noted next to the "CB" code. ~~If an alternative number is offered for later contact, this is also written on the call sheet by the interviewer. If a different interviewer follows up or finishes another's list, he/she can determine from the codes what needs to be done next.~~ The codes are later used to determine non-responses, dead companies, and responses.

If a response is received, the interviewer writes down the number of employees and the number of openings for the firm on the call list. A one-page survey form is completed only if the company had job openings on the specified date.

### **Troubleshooting**

- Many **smaller establishments** with fewer than 5 employees are difficult to contact due their reliance on answering machines and voice mail. Smaller establishments often use the owner's home or an unstaffed office as their base of operation and workers are often out of the office during the day. Calling after normal working hours is advisable for the smaller establishments.
- The most difficult companies to obtain a phone response from are the **large companies with 250 or more employees**. These large establishments usually have very active human resources departments which are not always able (or willing) to take time to answer a survey. The HR departments in larger establishments are increasingly using voice mail to manage all incoming calls so that in some cases it is not possible to make direct contact. Leaving messages does not generally result in a call back but in some cases this is the only option. Consequently, it is increasingly difficult to reach a human resource person in these firms and after numerous calls, the survey interviewer often can only reach the voice mail of the staff identified as appropriate to answer the survey. It is best to offer to fax a large business another copy of the survey and cover letter since

their job opening listings tend to be numerous and detailed. It is also a good idea to ask if the company can fax back their job listings. Normally, the rule for interviewers is to make two calls per company in attempting to obtain a response. However, this is not true for the larger companies with 250 or more workers, where companies are called 5 or 6 times in attempts to make contact.

- There are often several companies listed among the large employers that are actually **multi-site locations** of one corporation. These multi-site operations can be treated as one response if a main human resources office can respond for all sites. If this approach is used, all sites should be identified with the umbrella name on the call lists so that the multi-sites are not called twice and to avoid duplicated entries of job vacancies. Given their size, these companies usually have job listings sheets that can be faxed or returned by mail and may not be asked to complete the survey form.
- Large establishments also pose a problem when **more than one unit coordinates hiring**. Professional, clerical and shop floor positions may each have separate human resource staffs, necessitating two or more calls to obtain complete data on openings in the company.
- ~~If a long distance phone number is listed on the call sheet, a search is made for a local number before the follow-up call is attempted. If no local number can be found, the long distance number is called and establishment staff are asked if they are currently operating a local facility or if not, what happened to the local site (did it move or close down completely). If there is still a local office, a contact name in human resources is identified to call. These responses are noted on the call list for later coding.~~
- Respondents will sometimes say they have **already answered the survey** by phone or by mail. If so, the interviewer apologizes for the confusion and thanks them for their time. It is possible that the establishment's mailed response was returned but had not been recorded when the call list was generated or companies may be on more than one list under different names. Even when it is suspected that the respondent is merely avoiding the survey solicitation, it is normally best not to push further for a survey response.

## J. Using Internet Listings of Job Vacancies

It is especially important to obtain information from large employers in the region when conducting job vacancy surveys. As noted, however, it can be difficult to reach an HR person in a large company who is willing or able to take the time to respond to a survey. One way around this obstacle is to use the World Wide Web, or Internet, to obtain the necessary job openings data for the company. Some commercial establishment data sources contain websites for companies, which can make the search for websites much easier.

Most company websites will not have the level of detail necessary for use in a vacancy survey. (Of 37 Milwaukee area companies whose websites were checked, five had what



appeared to be usable vacancy listings.) Establishment website employment listings should be examined carefully to determine whether the information provided is adequate. Particularly useful are listings for companies which include multi-site establishments. Website listings usually identify job titles, worksite location, education and training requirements, and availability of fringe benefits. The data most often omitted from website listings are the number of openings for each job posted, the rate of pay, and whether the position is considered "difficult to fill." If the pay rate is missing, listings can still be used with the pay rate response omitted. For companies that do not detail the number of openings, it can be assumed that there is at least one opening for each position listed (or at least two openings where the plural is used). These assumptions may, however, result in an undercount of the currently available job openings in a region. In the case of retail and service jobs (like clerks for a chain of department stores or delivery company employees), it may not be appropriate to assume only two openings for a listing that reads "Store Clerks" or "Warehouse Workers." It is probable that numerous positions are available and the undercount may be too high if only two openings are assumed to exist. In many cases the company must be contacted for further detail about the openings listed.

Website job listings tend to be incomplete for many companies. Often, only positions for skilled employees are listed and vacancies in areas like maintenance or office support (i.e. clerical assistants) are excluded. In some cases the website is used only as a recruiting tool for more difficult to fill positions. All listings should be reviewed thoroughly to be reasonably certain that employment postings are inclusive of all types of jobs available at the company. Also, the heading and/or introduction for the employment webpage should be reviewed for indications whether listings are only for full-time or professional positions and not an all-inclusive job vacancy listing for the company. The Internet may be used for job vacancy information in a survey if the company has verified the accuracy of using such a listing and the information posted has been scrutinized to assess its completeness.

## **K. Data Entry and Coding**

The initial mail response in the first week after the survey is mailed accounts for most (75 - 80 percent) of the total returned surveys. Each survey is sorted by whether or not the establishment had openings. The unique accession number assigned to each survey is immediately entered and matched with the sample list to determine the remaining population targeted for telephone follow-up. Surveys with openings are then forwarded to the data entry staff. As telephone calling begins and mail returns continue, the sub-sample designated for calling is amended daily to avoid unnecessary follow-up calls, and returned surveys continue to be forwarded for data entry.

As calling concludes, verification of data entry begins and each job listing is assigned an occupational code. In the initial design of the Milwaukee area survey, U.S. Decennial Census Occupation codes were chosen to allow comparison with the 1990 Equal Employment Opportunities Commission census file used to drive affirmative action planning and related 1990 demographic reports. There are 511 occupational classifications in 13 major groupings (see Appendix III) using the 1980 Standard Occupational Classification (SOC) codes as the base. In

some cases SOC codes are collapsed. However, in most cases the same single listing as found in the SOC codes is used.

Assigning the census occupational code to job listings based on company job titles rather than requiring the employer to determine the code decreases the burden on employers but makes classification difficult for some occupations. The SOC manual is used to look up job titles not found in the abridged U.S. Census listing. Emerging occupations are categorized into codes with the closest match. Hourly rates of pay, education/training pre-requisites and the SIC code of the company are used to improve the code assignments. For example, a "manager" of a fast food franchise earning just above minimum wage would be properly put into the classification of "supervisors, food preparation and service occupations" rather than "managers, food serving and lodging establishments." Similarly, a lower paid "personal banking manager" would be classified as "securities and financial services sales occupation" and not the "financial managers" classification under the executive and management group.

Coding job titles into occupational classifications permits the analysis of high demand and difficult-to-fill vacancies as well as providing background data for career education materials on job availability and rates of pay. Emerging occupations particularly in the medical and computer fields are used by the local technical college to get a better picture of the type of jobs employers are reporting compared to occupational training programs at the college. In all cases the confidentiality of individual establishments is protected. Information on individual companies is never shared nor are data or combinations of variables which would allow identification of job openings for an individual employer.

Once occupational codes are assigned, variables are created which classify occupations by level of education/training and experience required as detailed on the survey form. These include jobs requiring 1) a four-year college degree or more, 2) community college degree or diploma, 3) certification or licensing, 4) high school completion, 5) a commercial driver's license or driver's license (CDL/DL), or 5) prior occupational experience. These categories allow analysis of demand based on the type of education, training or experience required as well as identification of entry-level jobs with no education or training requirements.

After variable coding has been completed, the file of openings is examined for internal consistency and accuracy. The assignment of census occupational codes is re-examined by a sorting of codes in rank order, sorting by salary, and then a sorting by education variables to make certain appropriate coding decisions have been made. The number of openings per establishment is also examined by reported size of employer to identify three types of errors: 1) some employers mistakenly report the job titles of their employees rather than of their vacancies; 2) some establishments report vacancies for sites outside of the four-county labor market; 3) some multi-site establishments (e.g., financial institutions) report employment for all locations on one form instead of on each of the multi-site forms. The establishment size reported in the sample file is used together with the number of employees listed on the survey form to check on the accuracy of both entries. The ES-202 file consistently has errors on the size of employment, and it is critical for weighting purposes that large establishments with many opening are weighted with like-sized establishments and types of businesses. Data on the number of openings and size of company reported on the returned survey form are matched with

the original ES-202 sample file to identify reporting inconsistencies and to make corrections where appropriate.

#### **L. Identifying Dead Companies**

For establishments with undelivered mail surveys or disconnected telephone numbers, every effort is made to determine whether that establishment in fact is no longer in business. Both the yellow and white pages are checked and size of the establishment considered to obtain an alternate address or phone number. Where none can be found, the establishment is considered to be no longer in business and is recorded as an establishment with no job openings.

#### **M. Sample Selection**

A detailed discussion of statistical methods used in establishment surveys can be found in Statistical Policy Working Papers prepared by the Office of Management and Budget's Federal Committee on Statistical Methodology. Paper #15 on the "Measurement of Quality in Establishment Survey" profiles current practices used in federal agencies related to survey quality. ~~Sample design estimation, survey methods, operations and measurement error are discussed and provide an excellent resource for practitioners. Working Paper #17 on "Survey Coverage" provides guidance on how to assess and improve coverage taking advantage of current practices used by federal agencies. These and other papers can be found on the Internet. (See [www.bts.gov/fcsm/methodology](http://www.bts.gov/fcsm/methodology).)~~

The sampling methodology used for establishment surveys conducted by the Department of Labor is detailed in the "Bureau of Labor Statistics (BLS) Handbook of Methods." The Occupational Employment Statistics (OES) survey uses the ES-202 files together with supplementary data for non-covered establishments. All establishments with 250 or more employees are sampled and those establishments with 5 to 250 employees, according to USDOL, "are sampled with probability proportional to the size class within each three-digit industry. Establishments employing four or fewer employees (i.e., size class 1 establishments) are not sampled. Instead, the employment for these establishments are accounted for by assigning a larger sampling weight to establishments employing five to nine employees." ([www.bls.gov/opub/hom/homhome.htm](http://www.bls.gov/opub/hom/homhome.htm).) Response rates are typically over 75 percent for the OES survey.

The Job Openings Pilot Project conducted in 1979 also used the ES-202 file but drew its sample based on all establishments in the ES-202 file including those with no employees as of the first quarter. It could then capture seasonal employment in smaller establishments (e.g., landscaping, construction) which might have openings in other quarters than the first quarter when there are typically seasonal downturns.

Including these smaller establishments in the sample may increase the number of surveys considerably. While these smaller establishments make up a relatively small share of total employment, they may account for over half of the establishments listed in the ES-202 file. (See

County Business Patterns for an approximation of the number of companies in the ES-202 file by size and SIC code.) These smaller firms are less likely to have openings than the larger establishments but still account for 10 to 20 percent of all vacancies due to the large number of establishments in the group.

When results are needed for planning purposes at an occupational level in local labor markets, error rates need to be considered in determining a sample size. When the sample-to-universe ratio and response rates result in large weights, the standard error may be so high as to eliminate the usefulness of the cell. For example, in the Job Openings Pilot Project some cells had weights in excess of 500 for smaller establishments with less than 50 employees. If some respondents had more than one opening, the openings would be multiplied against these large weights. Given that only 10 to 20 percent of respondents in the smallest firms have openings, a cell could easily have one establishment in an industrial sector and size category accounting for the total occupational estimate for the cell. For a complete discussion of estimation and weighting issues in the JOPP study, see Appendix V.

Even if the error rate is within an acceptable level, the weight times the number of reported openings may result in estimates unrealistic for an industrial sector of the local labor market. The decision to go with a large sample in the Milwaukee survey was based in part on the goal that weights be kept as small as possible to avoid any concern that one or two cells might be distorting the estimates. The Employment and Training Institute's experience with detailed occupational data in the 1990 U.S. Census Public Use Microdata Samples (PUMS) files highlights the standard errors which may result from using weighted sample data at the occupational level. The computerized PUMS files, available for geographic areas of 100,000 or more, allow detailed analysis of census data using all responses on the survey of housing and population. They provide a housing and person record, each of which are given a weight which can be used to estimate the population being considered. Weights in many occupational cells resulted in unacceptably high error rates. In addition, some records had high weights which when combined with a small number of records per cell resulted in higher error rates. For example, three respondents with a combined weight of 150 had a standard error of  $\pm 64$  (or 43 percent). The average weight for Milwaukee area PUMS records was 33, with 94 percent of all weights below 50.

## **N. Weighting**

In order to estimate the number of openings for the total population, weights need to be constructed that are sensitive to establishment size and type of industry. Stratification by one-digit SIC and 10 levels of employee size ranges results in 100 cells. For each cell the total population divided by the sample results in the original weight for the cell. For example, if there were 4,100 retail establishments with 1 to 4 employees and a sample population of 500, the original weight would be 8.2.

Adjustments for those establishments which do not respond increases the weight by applying the non-response adjustment factor in each cell against the sampling weight of the corresponding cell. So that if 177 establishments out of 500 establishments responded (35.4

percent) and the original weight is 8.2, then the adjusted weight would be 23.2 for retail establishments of 1 to 4 employees.

The resulting weights are then be examined for extreme values which typically would result from cells with low response rates. These rates when multiplied against total full-time and part-time openings for a cell could distort findings on the number and types of jobs which are estimated to be vacant. A Chi-square test is conducted on each weighting cell by both size of establishment and one-digit SIC code; those responses more than one standard deviation above expected are excluded from the analysis.

The resulting weight for the cell is then attached to each occupational record in the cell and multiplied against the number of full-time openings and part-time openings to derive an estimate of full-time and part-time vacancies which is the primary measure for analysis. Each record in each cell then has a weight and estimate corresponding to that cell, excluding outliers found using the Chi-square test. These estimates are summed to obtain higher level estimates. For example, full-time and part-time retail openings are the result of summing all weighted full-time and part-time openings across all employment classes for retail.

In some cases establishments provide data on the number of openings but not on hourly wage or salary. All available wage data is converted to hourly wage rates using 2,040 work hours per year for annual and monthly salaries. The lower end of a range is used when salary depends on qualifications and experience. However, some employers enter "base salary plus commission", "commission", "depends" or do not respond. In these cases separate weights are constructed for those who respond with wage data using the same methodology as above and substituting the number of respondents with wage data for the number responding to adjust for non-response on the wage variable by increasing weights for each cell accordingly.

Similarly, some establishments do not provide usable data on fringe benefits, difficult-to-fill status or experience questions, and non-response to these questions needs to be factored into a separate weight for cells where responses to these variables are missing. The most common cases where this happens are where large establishments provide the number of vacancies and FTE's for occupations using their weekly posting sheets rather than filling out the survey questions completely.

As a result of the missing data, three weights are provided for each full-time and part-time occupational listing resulting in six possible weighted estimates.

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College of Letters and Science  
Institute for Survey and Policy Research

**UWM**

®

Dear Employer:

Our institutions of higher education, local government and private industry have joined together in a cooperative project to survey businesses in the metropolitan area. We are asking you to assist us in this effort to improve our understanding of local labor market needs.

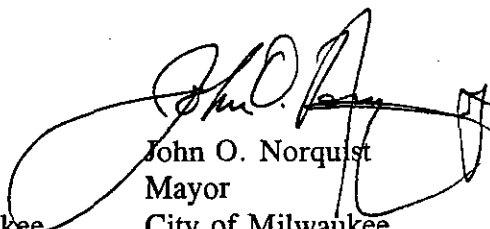
Semi-annually, we are surveying all employers with 250 or more employees and a random sample of employers with less than 250 workers. The survey requests very brief data on your total workforce and detailed information only for those occupations in which you have current job openings. The data will be summarized to identify the number and types of jobs available in the metropolitan area. Questionnaire responses of individual companies will be held in strict confidence and no data will be released which identifies individual firms.

If you have any questions or need assistance, please call the University of Wisconsin-Milwaukee Institute for Survey and Policy Research at (414) 229-5313. Thank you very much for your time and cooperation.

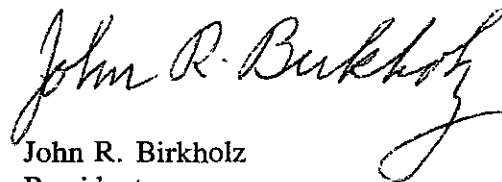
Sincerely yours,



Nancy L. Zimpher  
Chancellor  
University of Wisconsin-Milwaukee



John O. Norquist  
Mayor  
City of Milwaukee



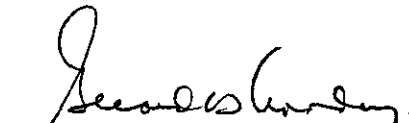
John R. Birkholz  
President  
Milwaukee Area Technical College



Alan S. Brown  
Superintendent  
Milwaukee Public Schools



Daniel J. Bader  
President  
Helen Bader Foundation, Inc.



Gerard A. Randall, Jr.  
Chief Operating Officer  
Private Industry Council  
of Milwaukee County





## APPENDIX II

### Databases Available for Sampling Establishments

#### Background on the ES-202 File

Each state is required to maintain a computerized file of employers required to pay unemployment compensation detailing the number of employees in the second week of the quarter. Employers covered by the state unemployment compensation law include:

1. Employers who employed at least one individual (full or part-time and not necessarily the same person) on at least one day in each of 20 or more calendar weeks in either that year and the preceding calendar year.
2. Employers who paid wages for employment which totaled \$1,500 or more during any calendar quarter in either that year and the preceding calendar year.
3. Any employer who is subject to the Federal Unemployment Tax Act on its total payroll in all states subject retroactively to its first Wisconsin payroll of a calendar year.
4. A non-profit organization (only those described in Sec. 501(c)(3) IRS Code) with at least 4 employees on at least one day in each of 20 or more calendar weeks in either that year and the preceding calendar year.
5. Agricultural employers who (a) paid cash wages for agricultural labor which totaled \$20,000 or more during any calendar quarter in either that year and the preceding calendar year, or (b) employed as many as 10 individuals in some agricultural labor for some portion of a day in each of 20 or more calendar weeks in either that year and the preceding calendar year.
6. Any employers of any individual(s) in domestic service who paid cash wages of \$1,000 or more during any calendar quarter in either that year and the preceding calendar year.
7. All government units.
8. Any other employer who has elected coverage on otherwise excluded employment.

Employers not covered by the U.C. law include railroads, entrepreneurs who have no covered employees, farmers and agricultural enterprises with less than 10 employees, domestics, church workers and those working for family corporations with pay.

For each establishment a four-digit SIC code, name, address and telephone are listed together with a letter code (A-J) identifying the number of employees by range. Because the primary purpose of the data file from the employer perspective is the calculation of unemployment compensation payments, the telephone number and addresses are in some cases

the accountant/bookkeeper/payroll business which processes payroll for the company and as a result the contact listed may be in another state. Companies with more than one site are asked to report the address and type of business for each location. While cooperation of multi-site firms has increased over time, reporting is less than perfect, and addresses for multi-site locations are often not from the official mailing list. FIPS codes for county and municipality are included for each site.

Use of the ES-202 file for sampling in a local labor market requires use of these FIPS codes to identify each county within the geographic area in order to establish the total number of establishments by size and SIC code. Those establishments without a local address or without a valid postal address should be cleaned prior to mailing. The most commonly listed out-of-state addresses are for large payroll processing services which are unlikely to complete job vacancy surveys or to forward them on to the local establishment site in a timely manner (if at all). Using standard bulk mail address checking software, undeliverable addresses can be flagged for re-addressing. The size of companies as listed in the ES-202 file is subject to error when multi-site establishments list vacancies for other locations or list total company vacancies for all sites throughout the metro area or even outside of the metro area. For this reason the question on "number of employees" is included on the survey.

### **Experience Using the ES-202 File for Sampling**

The initial mail responses in Milwaukee metro job openings surveys are usually 20 to 25 percent. Even with extensive address checking, 5 to 7 percent of surveys are returned as undeliverable due primarily to expiration of post office forwarding orders or addressee unknown. The phone number and address for these establishments are looked up in business white pages and yellow pages and follow-up calling done on those found. Of those undeliverables returned, one-third were placed in the classification of no longer in business since a newer listing could not be found or the most current telephone number was disconnected or no longer in service. Another one-third were contacted by phone and completed the survey. The balance did not answer after repeated calling.

### **Other Sources of Establishments Lists**

For those researchers who do not have access to a state ES-202 file, establishment lists can be obtained from a number of companies which provide detail on the type of business, location and size. Prices for these lists vary widely as do the number of establishments included for a specific geographic area. For the purpose of assessing the relative coverage of both sources the listings of one vendor, GENESYS Sampling Systems, were compared with establishments in the ES-202 file for the Milwaukee metropolitan area. (For a complete description of the enhanced yellow pages frame used by GENESYS, see their web page at <http://www.m-s-g.com>.)

Multiple listings were taken out of the GENESYS and ES-202 file, as were government and education units. In an over-enthusiastic approach to listing government multi-site locations many units listed all of their departments or individual school sites although government and education hiring is typically done centrally. (Government hiring is further complicated by union or civil service policies on transfers and internal promotion which make it difficult to identify

openings for immediate hire at the unit level.) For this analysis churches, which are not included in the ES-202 file, were excluded from the GENESYS file and estate trusts were excluded from the ES-202 file. (Currently, there are almost 2,000 individual estates listed in the metro Milwaukee ES-202 file, typically paying wages to health care staff to attend to homebound elderly.)

When examined by size of company, type of business and location, the telephone directory based file had considerably more listings than the ES-202 file. Central city establishments are less likely to be included in the ES-202 file. The number of establishments located in the central city Milwaukee Community Development Block Grant (CDBG) neighborhoods and listed in the ES-202 file made up only 57 percent of the number listed in the phone-based file. In the remainder of Milwaukee County, ES-202 listings made up 70 percent of the number of companies listed in the phone-based file. In the suburban areas of Waukesha, Ozaukee and Washington Counties, ES-202 listings made up 82 percent of companies listed in the GENESYS file. Smaller establishments were much less likely to be listed in the ES-202 file, particularly those with no employees or those with no covered employees. Beauty shops and individual/family services were particularly under-represented with only 20 percent of CDBG beauty shops and 41 percent of shops in outlying areas listed in the ES-202 file when compared to telephone book listings. Real estate, insurance agents and eating/drinking establishments were also much more likely to be under-represented in the ES-202 file.

**Milwaukee Metropolitan Area Establishments by Location**

	Central City (CDBG)	Remainder of Milwaukee County	Outlying 3 Counties
Number in ES-202	3,219	15,288	16,792
Number in GENESYS	5,604	21,858	20,495
<b>% of Establishments in ES-202 Compared to GENESYS by Number of Employees</b>			
Less than 5	38%	51%	59%
5 - 9	55%	68%	80%
10 - 19	76%	82%	93%
20 - 49	76%	86%	99%
50 - 99	80%	83%	98%
100- 249	93%	84%	89%
250 - 499	100%	106%	131%
500 - 999	180%	89%	136%
1000 or more	180%	120%	125%
<b>TOTAL</b>	<b>57%</b>	<b>70%</b>	<b>82%</b>

MILWAUKEE METROPOLITAN ESTABLISHMENT LISTINGS  
 BY SIC AND GEOGRAPHIC SUB AREAS WITHIN THE FOUR COUNTY AREA

GENESYS BUSINESS YELLOW PAGE BASED LISTINGS	MILWAUKEE CENTRAL CITY ZIPCODES										MILWAUKEE COUNTY		OZAUKEE
	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CENTRAL	NON-	WASHINGTON
											CITY	CENTRAL	WAUKESHA
SIC	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	CENTRAL	COUNTIES
2000 TO 4000	101	9	4	37	22	83	25	47	23	3399	351	1233	1815
5200 TO 6000	372	87	132	211	153	256	188	159	85	11157	1643	5294	4220
7000 TO 9000	319	81	155	297	296	386	307	250	253	19057	2344	9533	7180
ELSE	223	41	47	179	109	229	170	170	98	14344	1266	5798	7280
ALL	1015	218	338	724	580	954	690	626	459	47957	5604	21858	20495

ES-202 ESTABLISHMENT LISTINGS	MILWAUKEE CENTRAL CITY ZIPCODES										MILWAUKEE COUNTY		OZAUKEE
	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	NON-	WASHINGTON
											CITY	CENTRAL	WAUKESHA
SIC	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	CENTRAL	COUNTIES
2000 TO 4000	85	7	6	38	22	90	30	48	22	3235	348	1126	1761
5200 TO 6000	168	35	54	100	88	108	101	93	51	6551	797	3157	2597
7000 TO 9000	152	29	59	184	135	189	135	134	119	11880	1133	5953	4794
ELSE	168	27	27	143	81	156	110	138	91	13633	941	5052	7640
ALL	573	98	146	465	326	543	376	413	283	35299	3219	15288	16792

DIFFERENCE	MILWAUKEE CENTRAL CITY ZIPCODES										MILWAUKEE COUNTY		OZAUKEE
	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	NON-	WASHINGTON
											CITY	CENTRAL	WAUKESHA
SIC	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	CENTRAL	COUNTIES
2000 TO 4000	16	2	-2	-1	0	-7	-5	-1	1	164	3	107	54
5200 TO 6000	204	52	78	111	65	148	87	66	34	4606	846	2137	1623
7000 TO 9000	167	52	96	113	161	197	172	116	134	7177	1211	3580	2386
ELSE	55	14	20	36	28	73	60	32	7	711	325	746	-360
ALL	442	120	192	259	254	411	314	213	176	12658	2385	6570	3703

PERCENT ES202 OF GENESYS	MILWAUKEE CENTRAL CITY ZIPCODES										MILWAUKEE COUNTY		OZAUKEE
	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	NON-	WASHINGTON
											CITY	CENTRAL	WAUKESHA
SIC	53204	53205	53206	53208	53210	53212	53216	53218	53233	ALL	CITY	CENTRAL	COUNTIES
2000 TO 4000	84%	78%	150%	103%	100%	108%	120%	102%	96%	95%	99%	91%	97%
5200 TO 6000	45%	40%	41%	47%	58%	42%	54%	58%	60%	59%	49%	60%	62%
7000 TO 9000	48%	36%	38%	62%	46%	49%	44%	54%	47%	62%	48%	62%	67%
ELSE	75%	66%	57%	80%	74%	68%	65%	81%	93%	95%	74%	87%	105%
ALL	56%	45%	43%	64%	56%	57%	54%	66%	62%	74%	57%	70%	82%

The ES-202 file was more likely to list larger companies with 250 or more employees than the GENESYS. However, each file had cells in which there are more establishments listed than the other.

#### **D. Matching the GENESYS and ES-202 Files**

Prior to matching, both files were geocoded using TIGER files enhanced with City of Milwaukee property files and U.S. Postal Service street listings to fill in gaps in the TIGER file. A series of matching programs used the geocode, company name, trade name and telephone number to establish valid matches as follows:

1. Geocode and first ten letters of company name or trade name
2. First four letters of company or trade name plus first eight letters of the address,
3. First four letters of company or trade name and phone number.

The matching of the ES-202 and GENESYS files by establishment showed that, particularly for large companies, there were establishments listed in both files with direct matches. For those Milwaukee County companies listed in the ES-202 file, 67 percent were also found in the GENESYS file. For establishments with over 250 employees, 71 percent matched with the GENESYS files and appeared to have approximately the same size classification. Smaller firms listed in the ES-202 file were much less likely to match with firms in the GENESYS files; 54 percent of those with less than 5 employees matched compared with 75 percent of establishments with 5 or more employees matching.

When the matching logic was reversed and the GENESYS file was used as the base, 44 percent matched overall and 60 percent of companies with 250 or more employees successfully matched with the ES-202 file for Milwaukee County. Because there were considerably more smaller companies in the GENESYS file, a much lower match rate was shown with 34 percent of companies with 1 to 4 employees matching, 49 percent of companies with 5 to 9 employees matching and 55 percent of those with 10 or more employees matching. A random sample of establishments in each file not matching on the name, addresses/phone combinations used in the computer match were further examined manually for both files and for establishments with 250 or more employees, checking for spelling and other variations which may have caused a mismatch. After the manual search in computer records, establishments were further examined using the most recent edition of the business white and yellow pages.

A manual search was made for the sample of the GENESYS listing which did not match with listings in the ES-202 computer file to identify establishments which may have had spelling or address differences which caused the non-match. The visual search found 13 percent of the sample to be in the ES-202 file. Non-matches were further examined to verify that the address was in the most recent business listings to attempt to assess which of the group might have gone out of business. An additional 34 percent of the sample, not matching with the ES-202 file, were found in the business listings. The remaining 53 percent were called to verify address and phone number. Of these 33 percent were found to be in business at the same number, 12 percent were no longer in business or the line was disconnected, 7 percent had no answer or an answering machine, and for 2 percent a correct local listing could not be found.

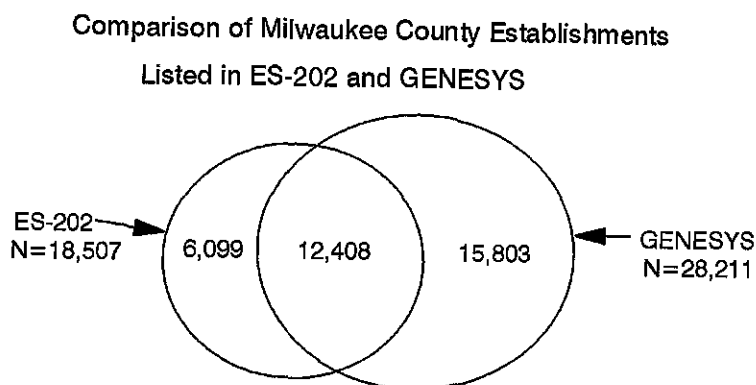
Similarly, a sample of ES-202 records was examined to first look up computer records to identify matches missed because of variations of spelling or address and in the Business White and Business to Business Yellow Pages to assess whether or not an establishment may be out of business. On visual examination of the GENESYS file, 20 percent of the sample was found to actually be listed but under a slightly different listing causing a non-match. An additional 17 percent were found to be in the business listings. The remaining 63 percent were called to determine whether or not the establishment was still in business. However, fewer than two-thirds of the remaining population had local phone numbers listed even after checking local listings. Of those with local numbers, 16 percent were still in business, 5 percent were a disconnected or wrong number, and 7 percent had no answer or an answering machine. The remaining 35 percent of sampled establishments could not be found in the white or yellow pages.

**Comparison of Establishments Not Matching in the ES-202 and GENESYS Files**

	ES-202 Listings Not in GENESYS*	GENESYS Listings Not in ES-202**
Found in other file after manual look-up	20%	13%
Found in business telephone listings	17%	34%
Called and verified establishment active	16%	33%
Called and establishment no longer in business/ disconnected/moved out of state	5%	12%
Called and no answer	7%	7%
Correct local phone listing could not be found	35%	2%
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>

\*From a sample of the 6,099 establishments in ES-202 file and not in GENESYS.

\*\*From a sample of the 15,803 establishments in GENESYS and not in ES-202.



## APPENDIX III

### Occupational Classifications: 1990 Census

This list presents the occupational classifications developed for the 1990 Census of Population and Housing from the 1980 Standard Occupational Classification; "n.e.c." is the abbreviation for not elsewhere classified.

#### MANAGERIAL AND PROFESSIONAL SPECIALTY OCCUPATIONS

##### Executive, Administrative, and Managerial Occupations

- 003 Legislators
- 004 Chief executives and general administrators, public administration
- 005 Administrators and officials, public administration
- 006 Administrators, protective services
- 007 Financial managers
- 008 Personnel and labor relations managers
- 009 Purchasing managers
- 013 Managers, marketing, advertising, and public relations
- 014 Administrators, education and related fields
- 015 Managers, medicine and health
- 016 Postmasters and mail superintendents
- 017 Managers, food serving and lodging establishments
- 019 Funeral directors (pt)
- 021 Managers, service organizations, n.e.c.
- 022 Managers and administrators, n.e.c.

##### Management Related Occupations

- 023 Accountants and auditors
- 024 Underwriters
- 025 Other financial officers
- 026 Management analysts
- 027 Personnel, training, and labor relations specialists
- 028 Purchasing agents and buyers, farm products
- 029 Buyers, wholesale and retail trade except farm products
- 033 Purchasing agents and buyers, n.e.c.
- 034 Business and promotion agents
- 035 Construction inspectors
- 036 Inspectors and compliance officers, except construction
- 037 Management related occupations, n.e.c.

##### Professional Specialty Occupations

##### Engineers, Architects, and Surveyors

- 043 Architects
- 044 Aerospace engineers
- 045 Metallurgical and materials engineers
- 046 Mining engineers
- 047 Petroleum engineers
- 048 Chemical engineers
- 049 Nuclear engineers
- 053 Civil engineers
- 054 Agricultural engineers
- 055 Electrical and electronic engineers
- 056 Industrial engineers
- 057 Mechanical engineers
- 058 Marine and naval architects
- 059 Engineers, n.e.c.
- 063 Surveyors and mapping scientists

##### Mathematical and Computer Scientists

- 064 Computer systems analysts and scientists
- 065 Operations and systems researchers and analysts
- 066 Actuaries
- 067 Statisticians
- 068 Mathematical scientists, n.e.c.

##### Natural Scientists

- 069 Physicists and astronomers
- 073 Chemists, except biochemists
- 074 Atmospheric and space scientists
- 075 Geologists and geodesists
- 076 Physical scientists, n.e.c.
- 077 Agricultural and food scientists
- 078 Biological and life scientists
- 079 Forestry and conservation scientists
- 083 Medical scientists

##### Health Diagnosing Occupations

- 084 Physicians
- 085 Dentists
- 086 Veterinarians
- 087 Optometrists
- 088 Podiatrists
- 089 Health diagnosing practitioners, n.e.c.

##### Health Assessment and Treating Occupations

- 095 Registered nurses
- 096 Pharmacists
- 097 Dieticians

##### Therapists and Physicians' Assistants

- 098 Respiratory therapists
- 099 Occupational therapists
- 103 Physical therapists
- 104 Speech therapists
- 105 Therapists, n.e.c.
- 106 Physicians' assistants

##### Teachers, Postsecondary

- 113 Earth, environmental, and marine science teachers
- 114 Biological science teachers
- 115 Chemistry teachers
- 116 Physics teachers
- 117 Natural science teachers
- 118 Psychology teachers
- 119 Economics teachers
- 123 History teachers
- 124 Political science teachers
- 125 Sociology teachers
- 126 Social science teachers, n.e.c.
- 127 Engineering teachers
- 128 Mathematical science teachers
- 129 Computer science teachers
- 133 Medical science teachers
- 134 Health specialties teachers
- 135 Business, commerce, and marketing teachers
- 136 Agriculture and forestry teachers
- 137 Art, drama, and music teachers
- 138 Physical education teachers
- 139 Education teachers
- 143 English teachers
- 144 Foreign language teachers
- 145 Law teachers
- 146 Social work teachers
- 147 Theology teachers
- 148 Trade and industrial teachers
- 149 Home economics teachers
- 153 Teachers, postsecondary, n.e.c.
- 154 Postsecondary teachers, subject not specified



**Teachers, Except Postsecondary**  
155 Teachers, prekindergarten and kindergarten  
156 Teachers, elementary school  
157 Teachers, secondary school  
158 Teachers, special education  
159 Teachers, n.e.c.

163 Counselors, educational and vocational  
164 Librarians  
165 Archivists and curators

**Social Scientists and Urban Planners**  
166 Economists  
167 Psychologists  
168 Sociologists  
169 Social scientists, n.e.c.  
173 Urban planners

**Social, Recreation, and Religious Workers**  
174 Social workers  
175 Recreation workers  
176 Clergy  
177 Religious workers, n.e.c.

**Lawyers and Judges**  
178 Lawyers  
179 Judges

**Writers, Artists, Entertainers, and Athletes**  
183 Authors  
184 Technical writers  
185 Designers  
186 Musicians and composers  
187 Actors and directors  
188 Painters, sculptors, craft-artists, and artist printmakers  
189 Photographers  
193 Dancers  
194 Artists, performers, and related workers, n.e.c.  
195 Editors and reporters  
197 Public relations specialists  
198 Announcers  
199 Athletes

## TECHNICAL, SALES, AND ADMINISTRATIVE SUPPORT OCCUPATIONS

### Technicians and Related Support Occupations

**Health Technologists and Technicians**  
203 Clinical laboratory technologists and technicians  
204 Dental hygienists  
205 Health record technologists and technicians  
206 Radiologic technicians  
207 Licensed practical nurses  
208 Health technologists and technicians

**Engineering and Related Technologists and Technicians**  
213 Electrical and electronic technicians  
214 Industrial engineering technicians  
215 Mechanical engineering technicians  
216 Engineering technicians, n.e.c.  
217 Drafting occupations  
218 Surveying and mapping technicians

**Science Technicians**  
223 Biological technicians  
224 Chemical technicians  
225 Science technicians, n.e.c.

**Technicians; Except Health, Engineering, and Science**  
226 Airplane pilots and navigators

227 Air traffic controllers  
228 Broadcast equipment operators  
229 Computer programmers  
233 Tool programmers, numerical control  
234 Legal assistants  
235 Technicians, n.e.c.

### Sales Occupations

243 Supervisors and proprietors, sales occupations

**Sales Representatives, Finance and Business Services**  
253 Insurance sales occupations  
254 Real estate sales occupations  
255 Securities and financial services sales occupations  
256 Advertising and related sales occupations  
257 Sales occupations, other business services

### Sales Representatives, Commodities Except Retail

258 Sales engineers  
259 Sales representatives, mining, manufacturing, and wholesales

### Sales Workers, Retail and Personal Services

263 Sales workers, motor vehicles and boats  
264 Sales workers, apparel  
265 Sales workers, shoes  
266 Sales workers, furniture and home furnishings  
267 Sales workers; radio, TV, hi-fi, and appliances  
268 Sales workers, hardware and building supplies  
269 Sales workers, parts  
274 Sales workers, other commodities  
275 Sales counter clerks  
276 Cashiers  
277 Street and door-to-door sales workers  
278 News vendors

### Sales Related Occupations

283 Demonstrators, promoters and models, sales  
284 Auctioneers  
285 Sales support occupations, n.e.c.

### Administrative Support Occupations, Including Clerical

#### Supervisors, Administrative Support Occupations

303 Supervisors, general office  
304 Supervisors, computer equipment operators  
305 Supervisors, financial records processing  
306 Chief communications operators  
307 Supervisors; distribution, scheduling, and adjusting clerks

#### Computer Equipment Operators

308 Computer operators  
309 Peripheral equipment operators

#### Secretaries, Stenographers, and Typists

313 Secretaries  
314 Stenographers  
315 Typists

#### Information Clerks

316 Interviewers  
317 Hotel clerks  
318 Transportation ticket and reservation agents  
319 Receptionists  
323 Information clerks, n.e.c.

#### Records Processing Occupations, Except Financial

325 Classified-ad clerks  
326 Correspondence clerks  
327 Order clerks  
328 Personnel clerks, except payroll and timekeeping

- 329 Library clerks
- 335 File clerks
- 336 Records clerks

**Financial Records Processing Occupations**

- 337 Bookkeepers, accounting, and auditing clerks
- 338 Payroll and timekeeping clerks
- 339 Billing clerks
- 343 Cost and rate clerks
- 344 Billing, posting, and calculating machine operators

**Duplicating, Mail and Other Office Machine Operators**

- 345 Duplicating machine operators
- 346 Mail preparing and paper handling machine operators
- 347 Office machine operators, n.e.c.

**Communications Equipment Operators**

- 348 Telephone operators
- 353 Communications equipment operators, n.e.c.

**Mail and Message Distributing Occupations**

- 354 Postal clerks, exc. mail carriers
- 355 Mail carriers, postal service
- 356 Mail clerks, exc. postal service
- 357 Messengers

**Material Recording, Scheduling, and Distributing Clerks**

- 359 Dispatchers
- 363 Production coordinators
- 364 Traffic, shipping, and receiving clerks
- 365 Stock and inventory clerks
- 366 Meter readers
- 368 Weighers, measurers, checkers and samplers
- 373 Expeditors
- 374 Material recording, scheduling, and distributing clerks

**Adjusters and Investigators**

- 375 Insurance adjusters, examiners, and investigators
- 376 investigators and adjusters, except insurance
- 377 Eligibility clerks, social welfare
- 378 Bill and account collectors

**Miscellaneous Administrative Support Occupations**

- 379 General office clerks
- 383 Bank tellers
- 384 Proofreaders
- 385 Data-entry keyers
- 386 Statistical clerks
- 387 Teachers' aides
- 389 Administrative support occupations, n.e.c.

**SERVICE OCCUPATIONS**

**Private Household Occupations**

- 403 Launderers and ironers
- 404 Cooks, private household
- 405 Housekeepers and butlers
- 406 Child care workers, private household
- 407 Private household cleaners and servants

**Protective Service Occupations**

**Supervisors, Protective Service Occupations**

- 413 Supervisors, firefighting and fire prevention occupations
- 414 Supervisors, police and detectives
- 415 Supervisors, guards

**Firefighting and Fire Prevention Occupations**

- 416 Fire inspection and fire prevention occupations
- 417 Firefighting occupations

**Police and Detectives**

- 418 Police and detectives, public service
- 423 Sheriffs, bailiffs, and other law enforcement officers
- 424 Correctional institution officers

**Guards**

- 425 Crossing guards
- 426 Guards and police, exc. public service
- 427 Protective service occupations, n.e.c.

**Service Occupations, Except Protective and Household**

**Food Preparation and Service Occupations**

- 433 Supervisors, food preparation and service occupations
- 434 Bartenders
- 435 Waiters and waitresses
- 436 Cooks
- 438 Food counter, fountain and related occupations
- 439 Kitchen workers, food preparation
- 443 Waiters'/waitresses' assistants
- 444 Miscellaneous food preparation occupations

**Health Service Occupations**

- 445 Dental assistants
- 446 Health aides, except nursing
- 447 Nursing aides, orderlies, and attendants

**Cleaning and Building Service Occupations, except Household**

- 448 Supervisors, cleaning and building service workers
- 449 Maids and housemen
- 453 Janitors and cleaners
- 454 Elevator operators
- 455 Pest control occupations

**Personal Service Occupations**

- 456 Supervisors, personal service occupations
- 457 Barbers
- 458 Hairdressers and cosmetologists
- 459 Attendants, amusement and recreation facilities
- 461 Guides
- 462 Ushers
- 463 Public transportation attendants
- 464 Baggage porters and bellhops
- 465 Welfare service aides
- 466 Family child care providers
- 467 Early childhood teacher's assistants
- 468 Child care workers, n.e.c.
- 469 Personal service occupations

**FARMING, FORESTRY, AND FISHING OCCUPATIONS**

**Farm Operators and Managers**

- 473 Farmers, except horticulture
- 474 Horticultural specialty farmers
- 475 Managers, farms, except horticultural
- 476 Managers, horticultural specialty farms

**Farm Occupations, Except Managerial**

- 477 Supervisors, farm workers
- 479 Farm workers
- 483 Marine life cultivation workers
- 484 Nursery workers

**Related Agricultural Occupations**

- 485 Supervisors, related agricultural occupations
- 486 Groundskeepers and gardeners, except farm
- 487 Animal caretakers, except farm
- 488 Graders and sorters, agricultural products
- 489 Inspectors, agricultural products

**Forestry and Logging Occupations**

- 494 Supervisors, forestry, and logging workers
- 495 Forestry workers, except logging
- 496 Timber cutting and logging occupations

**Fishers, Hunters, and Trappers**

- 497 Captains and other officers, fishing vessels
- 498 Fishers
- 499 Hunters and trappers

**PRECISION PRODUCTION, CRAFT, AND REPAIR OCCUPATIONS****Mechanics and Repairers Supervisors**

- 503 Supervisors, mechanics and repairers

**Mechanics and Repairers, Except Supervisors****Vehicle and Mobile Equipment Mechanics and Repairers**

- 505 Automobile mechanics, except apprentices
- 506 Automobile mechanics apprentices
- 507 Bus, truck, and stationary engine mechanics
- 508 Aircraft engine mechanics
- 509 Small engine repairers
- 514 Automobile body and related repairers
- 515 Aircraft mechanics, exe. engine
- 516 Heavy equipment mechanics
- 517 Farm equipment mechanics

- 518 Industrial machinery repairers
- 519 Machinery maintenance occupations

**Electrical and Electronic Equipment Repairers**

- 523 Electronic repairers, communications and industrial equipment
- 525 Data processing equipment repairers
- 526 Household appliance and power tool repairers
- 527 Telephone line installers and repairers
- 529 Telephone installers and repairers
- 533 Miscellaneous electrical and electronic equipment repairers
  
- 534 Heating, air conditioning, and refrigeration mechanics

**Miscellaneous Mechanics and Repairers**

- 535 Camera, watch, and musical instrument repairers
- 536 Locksmiths and safe repairers
- 538 Office machine repairers
- 539 Mechanical controls and valve repairers
- 543 Elevator installers and repairers
- 544 Millwrights
- 547 Specified mechanics and repairers, n.e.c.
- 549 Not specified mechanics and repairers

**Construction Trades****Supervisors, Construction Occupations**

- 553 Supervisors; brickmasons, stonemasons, and tile setters
- 554 Supervisors; carpenters and related workers
- 555 Supervisors; electricians and power transmission installers
- 556 Supervisors; painters, paperhangers, and plasterers
- 557 Supervisors; plumbers, pipefitters, and steamfitters
- 558 Supervisors; construction, n.e.c.

**Construction Trades, Except Supervisors**

- 563 Brickmasons and stonemasons, except apprentices
- 564 Brickmason and stonemason apprentices
- 565 Tile setters, hard and soft
- 566 Carpet installers
- 567 Carpenters, except apprentices
- 569 Carpenters apprentices
- 573 Drywall installers

- 575 Electricians, except apprentices
- 576 Electrician apprentices
- 577 Electrical power installers and repairers
- 579 Painters, construction and maintenance
- 583 Paperhangers
- 584 Plasterers
- 585 Plumbers, pipefitters, and steamfitters, except apprentices
- 587 Plumber, pipefitter and steamfitter apprentices
- 588 Concrete and terrazzo finishers
- 589 Glaziers
- 593 Insulation workers
- 594 Paving, surfacing, and tamping equipment operators
- 595 Roofers
- 596 Sheetmetal duct installers
- 597 Structural metal workers
- 598 Drillers, earth
- 599 Construction trades, n.e.c.

**Extractive Occupations**

- 613 Supervisors, extractive occupations
- 614 Drillers, oil well
- 615 Explosives workers
- 616 Mining machine operators
- 617 Mining occupations, n.e.c.

**Precision Production Occupations**

- 628 Supervisors, production occupations

**Precision Metal Working Occupations**

- 634 Tool and die makers, except apprentices
- 635 Tool and die maker apprentices
- 636 Precision assemblers, metal
- 637 Machinists, except apprentices
- 639 Machinist apprentices
- 643 Boilermakers
- 644 Precision grinders, filers, and tool sharpeners
- 645 Patternmakers and model makers, metal
- 646 Lay-out workers
- 647 Precious stones and metals workers (jewelers)
- 649 Engravers, metal
- 653 Sheet metal workers, except apprentices
- 654 Sheet metal worker apprentices
- 655 Miscellaneous precision metal workers

**Precision Woodworking Occupations**

- 656 Patternmakers and model makers, wood
- 657 Cabinet makers and bench carpenters
- 658 Furniture and wood finishers
- 659 Miscellaneous precision woodworkers

**Precision Textile, Apparel, and Furnishings Machine Workers**

- 666 Dressmakers
- 667 Tailors
- 668 Upholsterers
- 669 Shoe repairers
- 674 Miscellaneous precision apparel and fabric workers

**Precision Workers, Assorted Materials**

- 675 Hand molders and shapers, except jewelers
- 676 Patternmakers, lay-out worker, and cutters
- 677 Optical goods workers
- 678 Dental laboratory and medical appliance technicians
- 679 Bookbinders
- 683 Electrical and electronic equipment assemblers
- 684 Miscellaneous precision workers, n.e.c.

**Precision Food Production Occupations**

- 686 Butchers and meat cutters
- 687 Bakers

688 Food batchmakers

**Precision Inspectors, Testers and Related Workers**

689 Inspectors, testers, and graders

693 Adjusters and calibrators

**Plant and System Operators**

694 Water and sewage treatment plant operators

695 Power plant operators

696 Stationary engineers

699 Miscellaneous plant and system operators

**OPERATORS, FABRICATORS, AND LABORERS**

**Machine Operators, Assemblers, and Inspectors**

**Machine Operators and Tenders, Except Precision**

**Metalworking and Plastic Working Machine Operators**

703 Lathe and turning machine set-up operators

704 Lathe and turning machine operators

705 Milling and planing machine operators

706 Punching and stamping press machine operators

707 Rolling machine operators

708 Drilling and boring machine operators

709 Grinding, abrading, buffing, and polishing machine operators

713 Forging machine operators

714 Numerical control machine operators

715 Miscellaneous metal, plastic, stone, and glass working machine operators

717 Fabricating machine operators, n.e.c.

**Metal and Plastic Processing Machine Operators**

719 Molding and casting machine operators

723 Metal plating machine operators

724 Heat treating equipment operators

725 Miscellaneous metal and plastic processing machine operators

**Woodworking Machine Operators**

726 Wood lathe, routing, and planing machine operators

727 Sawing machine operators

728 Shaping and joining machine operators

729 Nailing and tacking machine operators

733 Miscellaneous woodworking machine operators

**Print Machine Operators**

734 Printing press operators

735 Photoengravers and lithographers

736 Typesetters and compositors

737 Miscellaneous printing machine operators

**Textile, Apparel, and Furnishings Machine Operators**

738 Winding and twisting machine operators

739 Knitting, looping, taping, and weaving machine operators

743 Textile cutting machine operators

744 Textile sewing machine operators

745 Shoe machine operators

747 Pressing machine operators

748 Laundering and dry cleaning machine operators

749 Miscellaneous textile machine operators

**Machine Operators, Assorted Materials**

753 Cementing and gluing machine operators

754 Packaging and filling machine operators

755 Extruding and forming machine operators

756 Mixing and blending machine operators

757 Separating, filtering, and clarifying machine operators

758 Compressing and compacting machine operators

759 Painting and paint spraying machine operators

763 Roasting and baking machine operators, food

764 Washing, cleaning, and pickling machine operators

765 Folding machine operators

766 Furnace, kiln, and oven operators, exe. food

768 Crushing and grinding machine operators

769 Slicing and cutting machine operators

773 Motion picture projectionists

774 Photographic process machine operators

777 Miscellaneous machine operators, n.e.c.

779 Machine operators, not specified

**Fabricators, Assemblers, and Hand Working Occupations**

783 Welders and cutters

784 Solderers and brazers

785 Assemblers

786 Hand cutting and trimming occupations

787 Hand molding, casting, and forming occupations

789 Hand painting, coating, and decorating occupations

793 Hand engraving and printing occupations

795 Miscellaneous hand working occupations

**Production Inspectors, Testers, Samplers, and Weighers**

796 Production inspectors, checkers, and examiners

797 Production testers

798 Production samplers and weighers

799 Graders and sorters, exe. agricultural

**Transportation and Material Moving Occupations**

**Motor Vehicle Operators**

803 Supervisors, motor vehicle operators

804 Truck drivers

806 Driver-sales workers

808 Bus drivers

809 Taxicab drivers and chauffeurs

813 Parking lot attendants

814 Motor transportation occupations, n.e.c.

**Rail Transportation Occupations**

823 Railroad conductors and yardmasters

824 Locomotive operating occupations

825 Railroad brake, signal, and switch operators

826 Rail vehicle operators, n.e.c.

**Water Transportation Occupations**

828 Ship captains and mates, except fishing boats

829 Sailors and deckhands

833 Marine engineers

834 Bridge, lock, and lighthouse tenders

**Material Moving Equipment Operators**

843 Supervisors, material moving equipment operators

844 Operating engineers

845 Longshore equipment operators

848 Hoist and winch operators

849 Crane and tower operators

853 Excavating and loading machine operators

855 Grader, dozer, and scraper operators

856 Industrial truck and tractor equipment operators

859 Miscellaneous material moving equipment operators

864 Supervisors, handlers, equipment cleaners, and laborers, n.e.c.

865 Helpers, mechanics and repairers

**Helpers, Construction and Extractive Occupations**

866 Helpers, construction trades

867 Helpers, surveyor

868 Helpers, extractive occupations

869 Construction laborers

874 Production helpers

**Freight, Stock, and Material Handlers**

875 Garbage collectors

876 Stevedores

877 Stock handlers and baggers

878 Machine feeders and offbearers

883 Freight, stock, and material handlers, n.e.c.

885 Garage and service station related occupations

887 Vehicle washers and equipment cleaners

888 Hand packers and packagers

889 Laborers, except construction

**MILITARY OCCUPATIONS**

903 Commissioned Officers and Warrant Officers

904 Non-commissioned Officers and Other Enlisted Personnel

905 Military occupation, rank not specified

## APPENDIX IV

Excerpted from Harry Frummerman, "Job Vacancy Statistics" chap. in National Commission on Employment and Unemployment Statistics, **Concepts and Data Needs. Counting the Labor Force Appendix Volume 1** (Washington, D.C.: U.S. Government Printing Office, 1979).

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### Executive Summary

*Job vacancies* are the stock of unfilled job openings for which firms are actively trying to recruit new workers. The *job vacancy rate* is computed by dividing the number of job vacancies by the sum of employment and vacancies and multiplying the quotient by 100. Detailed information on the supply of labor has been available for more than three decades. There has not been, except for the period 1969-73, a continuous and comprehensive statistical series on the unmet demand for labor, or job vacancies, despite the value that such data would have for economic research and for operational purposes. Job vacancy data can contribute to business cycle analysis, they can also help to determine whether the prescription for high unemployment should be more spending (insufficient aggregate demand) or job training and employment counseling (structural unemployment). Job vacancy data can also be used to improve the way in which labor markets function by pinpointing emerging labor shortages.

Job vacancy data were collected in major metropolitan areas during World War II and the Korean conflict; thereafter most of these programs were discontinued. Since then, the strongest impetus for undertaking a national job vacancy data collection program came from the report of the President's Committee to Appraise Employment and Unemployment Statistics (Gordon Committee) in September 1962. Thereupon BLS undertook a research program on the conceptual and definitional problems of collecting job vacancy data and initiated pilot feasibility studies. Further developmental work was conducted in state employment security agencies, by universities and by private research organizations. The 1968 amendments to the Manpower Development and Training Act mandated a regular job vacancy data collection program on a national scale. BLS initiated a job vacancy program in 1969 as an addition to its program of collecting labor turnover data from employers by mail questionnaire, rather than as a separate and independent survey, in order to launch the program more quickly and at the lowest possible cost. This new "Job Opening-Labor Turnover" (JOLT) program was conducted through December 1973, when the job vacancy part of JOLT was discontinued. Since then there has been no national program for the collection of job vacancy data.

Before any new program is undertaken, both conceptual and technical problems remain to be solved. The BLS definition of a job vacancy was designed to be symmetrical with the definition of unemployment in the Census Bureau's Current Population Survey. This concept of job vacancy, however, has caused some disagreements, and has been subjected to varying interpretations. There are also difficult problems of design in devising a sample for job vacancy data collection. In the JOLT program, sample design was never wholly satisfactory, particularly for nonmanufacturing industries, and for this reason BLS did not validate most of the data for this sector.

The job vacancy program under JOLT was criticized by some in the academic community on the grounds that there had been insufficient preparatory analysis and testing to give the program a firm foundation. The most severe and the most persistent criticism of job vacancy programs, however, has come from the labor movement, which opposed the JOLT program and is currently against any new job vacancy program. This opposition is based on the arguments that the data could be misused to minimize the seriousness of unemployment and that trying to use job vacancy data simultaneously for job placement and for economic analysis would serve neither well, and that accurate job vacancy data could not be collected.

A BLS study in the 1960's of foreign job vacancy statistical programs, together with some supplementary data, showed that no country surveyed could provide insight for a data collection program based on surveying a sample of establishments, because administrative statistics which gave only an incomplete count were used almost exclusively for this purpose. The recent Canadian experience with collection of job vacancy statistics is more directly applicable to the development of a future job vacancy program in the United States. The Canadian Job Vacancy Survey program apparently has been more successful in handling some technical problems of making job vacancy surveys than was JOLT, but the administrative arrangements in Canada which have contributed to this better performance are not readily transferable to the United States. Furthermore, pressures to reduce survey costs apparently are moving Canada to combine job vacancy data with labor turnover data collection. Another possibility being considered in Canada, using administrative statistics for this purpose, may be indicative of the course a future job vacancy program could take in this country. Canadian experience so far does not show extensive analytical or operational uses of job vacancy data.

Possible alternatives for job vacancy statistics, such existing government programs as labor turnover statistics, occupational employment information or Job Banks; or data collected from newspaper want-ads or from private employment agencies do have some of the same operational uses as would job vacancy data, but are only a partial substitute. New statistical programs now being developed by state Employment Service agencies, however, such as Employment Service Potential, and the "New Hires" program, are promising for operational applications.

For the development of a future job vacancy program, preliminary basic research needs would include reexamination of basic concepts; rethinking of the job vacancy definition; reexamination of collection methodologies, particularly of administrative statistics as alternatives for field surveys; and reevaluation both of the JOLT period and of foreign experience, particularly that of Canada.

Costs of a future job vacancy program cannot be estimated in the absence of the specifics, but current "ball-park" figures range from \$15 to \$25 million annually.

The following conclusions come from the analysis of the theoretical and operational aspects of job vacancy statistics and from the evaluation of the experience with job vacancy collection programs:

1. Job vacancy statistics would serve important analytic and policy needs. Job vacancy data have unique characteristics. There are no other data series that are a fully satisfactory alternative for analytic purposes.
2. An exploratory job vacancy data collection program should be undertaken which, if successful, should become a full-scale and continuing national job vacancy data collection program.
3. A full-scale and continuing job vacancy data collection program, if undertaken, essentially should serve analytical and policy needs, and should have the design characteristics that would ensure the most workable organizational framework and operating plan.

Such a job vacancy program should be a wholly federal program; the Bureau of Labor Statistics should have exclusive and full authority and full responsibility for the conduct of this program, and should be funded directly for this purpose; the program should be conducted independently of other data collection programs; the program should have the fullest possible industrial coverage; the program should be designed to obtain national data only, so that the data have the greatest degree of reliability, within cost and time constraints; and the program should be designed, however, to provide the necessary detail so that the job vacancy data can be matched with data from the Current Population Survey.

## **Introduction**

The unutilized supply of labor is measured by the unemployment count and the unemployment rate. For the unmet demand for labor the equivalents are the count of job vacancies and the job vacancy rate. The U.S. Department of Labor has defined these terms as follows: "Job vacancies are the stock of unfilled jobs openings for which firms are actively trying to recruit new workers as of [a given date]. The job vacancy rate is computed by dividing the number of job vacancies by the sum of employment and vacancies and multiplying the quotient by 100."<sup>1</sup>

Detailed information on the supply of labor has been available for more than three decades. There has not been, except for 1969-73, a continuous and comprehensive statistical series on the unmet demand for labor, or job vacancies, despite the interest in such information expressed by the Congress, many government agencies, and by analysts in academic circles and research institutions. (The U.S. Employment Service (ES) has shown lack of interest in job vacancy data because the Bureau of Labor Statistics (BLS) has refused to allow such data to be used for referrals and job placement, in order to honor its pledge that the data would be kept confidential.) A closer examination is warranted therefore of the need for a continuing, nationwide program of gathering, analyzing and disseminating data on job vacancies, and its feasibility, applications, and potential costs.

In developing a comprehensive program of measuring unemployment and employment, in analyzing their trends and interrelationships, and in formulating a general theory of the operations of the labor market, an indispensable element would be a continuous and detailed statistical series which would measure job vacancies. In recent years of high unemployment, analysts and policy makers have asked how much of it is due to frictional and structural factors,



as opposed to insufficient aggregate demand, because stimulating the economy will not necessarily reduce unemployment due to frictional or structural factors. Satisfactory answers to these questions require the collection and analysis of data on job vacancies. Job vacancy data could also be applied to improve the efficiency of labor markets. Frictional unemployment -- temporary unemployment of workers in between jobs -- might be reduced by providing current information on job openings to job seekers. By pinpointing where job opportunities are best, structural unemployment -- the mismatch of worker skills and demand for labor -- could be lessened by helping to create job training and employment counseling programs.

## **Background**

During World War II, and again during the Korean conflict, job vacancy data classified by occupation and industry were collected in the major metropolitan areas by the state employment security agencies to identify and alleviate manpower shortages. Although most of these programs were discontinued when hostilities ended, some 15 state agencies did collect limited data on job vacancies during the 1950's and 1960's. Some economists continued to stress the need for more complete information on labor demand. Arthur F. Burns, Chairman of the Council of Economic Advisers in the mid-1950's, was a strong supporter of the collection of job vacancy data, to help economic analysts make a more precise diagnosis of the nature of unemployment. He declared that the Employment Act of 1946 required continuous, carefully compiled and comprehensive statistics on job vacancies.

In 1956, at Burns' request, BLS studied the feasibility of collecting job vacancy data and concluded that employers did not keep records of vacancies comparable to their payroll records, and therefore "it would be impractical to initiate a mail collection of vacancy data."<sup>2</sup> Interest in job vacancies continued, nevertheless. At hearings before the Joint Economic Committee's Subcommittee on Economic Statistics in late 1961, expert witnesses put a high priority on the need for obtaining job vacancy data. The strongest impetus, however, for initiating national collection of job vacancy data was provided by the Gordon Committee in September 1962, which declared: "It is doubtful that any suggestion for the improvement of knowledge about the Nation's labor markets was more frequently voiced to this Committee than that calling for job vacancy statistics."<sup>3</sup> The Gordon Committee recommended that the government undertake a program of research in conceptual and definitional problems and mechanisms for collection and survey design, looking toward the possible development of a national system of job vacancy data.

In 1963 and 1964, an investigation of the problems involved in the collection of job vacancy data, sponsored by the University of Illinois, found that acceptable data on current job vacancies, as well as those on anticipated job vacancies, could be obtained by interviews, and that "such information possesses a degree of accuracy high enough to be useful for labor market and economic analysis."<sup>4</sup> Late in 1964, the National Industrial Conference Board (now The Conference Board), a private research organization, undertook an exploratory job vacancy measurement program in the Rochester, N.Y., labor market. This study found that employers had, and would provide, occupational data on job vacancies with a level of accuracy that would make the figures meaningful.<sup>5</sup>

Following through on the Gordon Committee's recommendation, in 1964 the Department of Labor began a "modest research program which included research on conceptual and definitional problems, pilot feasibility studies in the Chicago and Buffalo areas, and a survey of the nature and uses of job vacancy statistics being collected in foreign countries."<sup>6</sup> As part of this program, the Illinois Bureau of Employment Security conducted two job vacancy data collection surveys in 1964. From the findings of these studies, the investigators concluded that periodic surveys of job vacancies should be conducted.

At the request of the Secretary of Labor, in early 1965, the National Bureau of Economic Research convened a conference of academic experts, federal and state officials, labor union representatives, and private research organization specialists to review and analyze the theoretical and operational problems of measuring and interpreting job vacancy statistics, and to evaluate the experience with such measurements here and abroad. In his opening statement to this conference, Arthur F. Burns reiterated the importance of job vacancy measurements by calling the unavailability of these data "the most serious gap in our entire scheme of economic intelligence."<sup>7</sup> The publication the next year of the book, **The Measurement and Interpretation of Job Vacancies**, incorporating the research findings and discussions presented at this conference, helped to disseminate more widely in academic circles and government agencies the then current assessments of the analytical and operational potentialities of job vacancy measurements, and to stimulate further investigations and analyses.

Meanwhile the U.S. Department of Labor, by April 1965, had launched a more comprehensive experimental job vacancy collection program in 16 Standard Metropolitan Statistical Areas (SMSA's) with what was reported as favorable employer response.<sup>8</sup>

BLS research efforts during 1966 were directed at fashioning a new approach to the collection of job vacancy data -- the integration of the collection and analysis of job vacancy information with the existing federal-state cooperative mail collection labor-turnover program. Findings of pilot surveys conducted in Maryland and Connecticut showed that this appeared to be feasible. In 1967 and 1968 BLS undertook additional pilot studies to test this collection technique and again reported favorable results. After the 1968 amendments to the Manpower Development and Training Act (MDTA) instructed the Secretary of Labor to collect job opportunities data, BLS undertook a national program for regular collection of job vacancy data, as an addition to the existing labor turnover program. It was believed that joint collection would speed up launching the program and minimize costs. Monthly data on the number of job vacancies initially were to be obtained from a total of 50 Standard Metropolitan Statistical Areas (SMSA's), limited in 24 of these areas to manufacturing and mining industries, but covering all nonagricultural industries in the other 26 areas, with quarterly data on vacancies by occupation and by wage rate in 17 of these areas. Subsequently the monthly survey was expanded to include all nonagricultural job vacancies in 29 SMSA'S, with data by occupation and wage rate collected quarterly in 20 of these and annually in the remaining 9 SMSA'S.

This decision to undertake a full-scale program of collecting job vacancy data was questioned at the time by some government and academic spokesmen, and organized labor strongly opposed it. The opponents argued that insufficient research and analysis had gone into the conceptual, definitional and operational problems involved, and that expansion beyond the pilot stage could

not be justified. These dissenters urged instead that the government merely continue its exploration of the theoretical and operational aspects of job vacancy measurement.

This new "Job Opening-Labor Turnover" (JOLT) program went ahead, nevertheless, with the first national monthly job vacancy figures being published for April 1969. Job vacancy data from the JOLT program were published monthly thereafter through December 1973, when the job vacancy portion of the JOLT program was discontinued.

An evaluation of the JOLT program is of prime importance in arriving at a decision on whether another job vacancy collection program should be undertaken now. In announcing the termination of JOLT, the Commissioner of Labor Statistics stated:

*The job vacancy program, as presently constituted, is not meeting the needs of the Manpower Administration or the state employment security agencies, our cooperating partners in the program, since the data cannot be used for direct placement. In addition, the current program does not appear to meet the needs of economic analysts because the data cannot be matched with the components of the employment and unemployment surveys.<sup>9</sup>*

Local Employment Service offices wanted specific job vacancy data for direct job placement activities by company name, plant location, and occupation. BLS and state employment security research offices, however, had given a pledge of confidentiality to the employers who supplied the data, and therefore provided only summary information which was not very useful for operating purposes. The lack of detail and the uneven quality of the data that were collected gave them only limited value for research purposes. The basic questions about end-uses of job vacancy data therefore remain unanswered. Whether job vacancy data of an acceptable quality can be collected has not been fully determined either. Answers to these questions are central to a decision on whether another job vacancy statistics program should be undertaken now.

Since the discontinuation of JOLT there has been no national program for the collection of job vacancy data, although comparable data are still collected and published by the Wisconsin and Minnesota state employment security agencies. Currently, other sources of job vacancy data are the local Job Banks, operated by almost all of the state employment security agencies, which provide daily listings of job openings for many labor market areas; The Conference Board, which publishes a monthly index of help-wanted advertising; and private employment agencies which have some current data on job vacancies.

## **Measurement of Job Vacancies**

### **Problems of Concept and Definition**

The BLS Definition. The official definition of job vacancies by the U.S. Department of Labor (as given above) lays down the three basic stipulations for an employment opportunity to be reported as a job vacancy: (1) It must be unoccupied; (2) it must be immediately available; and (3) it must be the object of an active search for a new worker from outside the firm. These criteria in the definition of job vacancies were designed to provide maximum comparability with the definition of unemployment, consistent with other uses of the data.<sup>10</sup>

The definition of unemployment, to which that of a job vacancy is to be symmetrical, is that used in the monthly Current Population Survey (CPS):

*Unemployed persons comprise all persons who did not work during the survey week, who made specific efforts to find a job within the past 4 weeks, and who were available for work during the survey week (except for temporary illness). Also included as unemployed are those who did not work at all, were available for work, and (a) were waiting to be called back to a job from which they had been laid off; or (b) were waiting to report to a new wage or salary job within 30 days.*

This concept of a job vacancy is subject to varying interpretations and has caused some disagreements. The major points at issue include the following:

1. The condition that the job opening must be unoccupied eliminates from the count those in which the search by employers for workers needed to fill jobs on a normal turnover basis is undertaken before those jobs are actually vacated—a large part of total accessions. When employers are recruiting in anticipation of turnover and expansion, it is often difficult to determine whether the recruiting activity is in connection with a filled or an unfilled job. It has been noted that "the importance of hiring in anticipation of turnover, on a forecasting basis, is that such recruiting may increase when labor markets become tight...."<sup>11</sup> Such increased activity is not reflected in job vacancy data collected on the basis of currently unoccupied openings.

2. The condition that the job vacancy count be limited to those immediately available provides symmetry with the definition of unemployment, which requires that an unemployed person be available for work during the survey week. This requirement, however, eliminated from the count any job vacancy with a future starting date, that is, "one for which an employer is willing to hire a worker as of the survey reference date, even though the worker will not normally begin work until a later time."<sup>12</sup> Job vacancies with future starting dates were found in the Rochester, N.Y., job vacancies study to be typical of education, where teachers are hired in advance of the September starting date of the new school year. Vacancies with future starting dates were found also in this study in manufacturing, construction, public utilities and transportation, and a high proportion of these were considered to be due probably to seasonal influences. Inclusion of future job vacancies in the count would require, for proper interpretation, identification of seasonal patterns in each situation.

Data on future vacancies are useful for business forecasting, for labor market analysis, and for the planning of training programs. Should future job vacancies as well as current job vacancies therefore be collected? Would future job vacancies data be accurate? Would employers exaggerate or underestimate future job vacancies? These questions remain unanswered.

3. The condition that the job vacancy count include only those jobs which are the object of active search by the employer provides symmetry with the unemployment count which includes only those persons who make specific efforts to find a job during the preceding 4 weeks. It eliminates such vague responses by employers as that they are not recruiting, but would, nevertheless, be amenable to additional hirings. At the same time, this requirement also

eliminates job vacancies for which there has been no active searching because employers are discouraged by the absence of qualified applicants.

The further condition that the employer's active search must be for a new worker from outside the firm bars job openings that are filled by promotion or transfer within a company. This restriction has resulted in questions being asked about both the meaning and uses of job vacancies as so defined by those who believe that the operations of internal labor markets are at least as significant as those of the external markets for making job openings available and filling them. John T. Dunlop, for one, has asserted that relatively few job openings, so-called "port of entry" jobs, are filled from the outside, with the rest filled internally. If this interpretation is correct, a count of job vacancies based on outside recruitment would be of questionable value.

4. Because of the emphasis on the immediate job opportunity, the definitions of job vacancies and unemployment are not fully symmetrical. Openings to be filled by recalling laid off workers would not be included as job vacancies, but laid off persons waiting to be recalled (and not working elsewhere) would be classified as unemployed. Similarly, a job for which a person had been hired with a future starting date would not be defined as vacant, but the person waiting to report to that job would be classified as unemployed.

**Other Problems of Concept, Definition and Interpretation.** Other problems of concept, definition and interpretation of job vacancies include:

1. The usefulness of job vacancy data for analytical and operational purposes is greatly enhanced if detailed occupational characteristics are obtained. Present systems of job classification, however, are not wholly suitable for converting shop job titles into standard nomenclature. The Dictionary of Occupational Titles (DOT) and the Census of Population's occupational classifications are not fully compatible; the conversion tables do not bridge the gap entirely. Whether the Standard Occupational Classification (SOC) system will be more satisfactory remains to be determined.

2. Should part-time as well as full-time job openings be included in the total job vacancy count? Should temporary as well as permanent job vacancies be counted? Where do you draw the line to exclude occasional jobs (for example, baby-sitting) or jobs of brief duration (for example, yard cleaning)?

3. Should the counting of an employment opportunity as a job vacancy be conditional on its carrying a prevailing wage rate, as the labor unions have argued? Or, should all job vacancies be counted, but separated into those with going wage rates and those with wage rates below prevailing norms? Or, should the count cover only vacancies that equal or exceed a stated minimum entry wage? Should job vacancies be differentiated by other terms of employment such as hours of work, and working conditions? Should job vacancies be differentiated by educational or experience requirements?

4. Should job vacancies originating from strikes or lockouts be counted?

5. Should we try to obtain data on job vacancies by duration? If so, how long should a job have to be vacant before it is classified as "hard-to-fill"? For operational convenience the Department of Labor surveys defined any vacancy existing 30 days or longer as "hard-to-fill." Because the average time needed to fill a vacancy varies from one occupation to another, should the definition of "hard-to-fill" vary accordingly?

Data on the duration of job vacancies would be useful in evaluating labor shortages. A long average duration of job vacancies may indicate either real shortages or inefficient operation of the labor market, but it may also reflect such factors as low wages, poor working conditions, undesirable plant locations, and unrealistic hiring specifications. Should all "hard-to-fill" job vacancies therefore be counted? If not, which ones?

6. What is the minimum time that should elapse before a job opening is counted as a "job vacancy"? In the JOLT program, a job opening must have been vacant for at least 1 full day before being counted as a job vacancy. This restriction was intended to eliminate job openings, particularly for unskilled work, which can be filled almost instantaneously, and to avoid an artificial inflation of the job vacancy count.

Labor union representatives and others have maintained that the 1-day rule for counting job vacancies is not symmetrical with the 1-week out-of-work rule for counting unemployment. These critics argue that this rule would overstate job vacancies and hence could be used to minimize the seriousness of unemployment at a given time. An analysis of the concept by BLS in 1966 showed, however, that 85 to 90 percent of the vacancies listed in the reports examined had been unoccupied for 1 week or longer.

7. Should job vacancy data relate to the same dates as the unemployment statistics? Under the JOLT program, employers were asked to list the number of job vacancies immediately available as of the last business day of the month, because the data were reported on the same form used to collect labor turnover data, which were obtained as of the end of the month. The CPS, however, counts unemployment as of the week containing the 12th day of the month. It would be feasible, of course, to count job vacancies as of any given day if the data were collected independently.

8. Should a survey count the stock of job vacancies as of a given time, or should it measure the flow of vacancies over a given time period? The JOLT program used the stock concept in order to be symmetrical with the unemployment count. The stock concept is useful if job vacancy information is to be used for job placement, but it is less satisfactory than the flow concept for economic research. Furthermore, using the flow concept would enhance the value of job vacancy data for the planning of training and counseling programs. Collecting job vacancies as a flow would require estimates of future vacancies and future quits and layoffs. The undertaking of such a program would be conditional on the solution of new conceptual and definitional problems, and the ability of respondents to make reasonable forecasts.

### **Sample Design**

Because a canvass of the universe of employers is impractical, it is necessary to use a sampling procedure, which entails the solution of difficult design problems. The JOLT experience is

instructive: The original intent was to develop a probability sample based on the labor turnover sample of approximately 40,000 manufacturing establishments, but to get valid job vacancy data, the sample for manufacturing industries had to be expanded and a new sample for nonmanufacturing industries had to be devised. At the end of 1969, an effort was made to solicit reports from the two-thirds of the some 100,000 establishments in the Current Employment Survey (CES) sample which were in the scope of the JOLT program, but the response was insufficient. Starting in 1970, many of the state employment security agencies began soliciting firms which were not in the CES sample, but with very mixed results. By January 1973, however, the JOLT sample included 90,000 establishments. Even after this expansion, however, many states did not have adequate samples for several nonmanufacturing categories, especially construction, trade and government. Satisfactory sample size was never reached for all industries in the scope of the JOLT program in any state.

Difficulties of sample maintenance necessitated that the state employment security agencies continually attempt to expand their JOLT sample in an effort to achieve representatives. By January 1972 many states had exhausted their list of potential respondents and, instead of having probability samples, the samples were essentially those firms within the universe which were willing to cooperate. As a result, traditional statistical techniques could not be used to evaluate the quality of the JOLT sample; the determination whether a sample was valid often rested primarily on judgmental factors.

Job vacancy data for manufacturing industries in most of the 50 SMSA's in the JOLT program were validated by BLS based upon criteria that were not strictly statistical. The regional BLS offices evaluated the behavior of the job vacancy statistics themselves to determine whether the sample data could be weighted up to the universe. The state agencies, in cooperation with BLS, evaluated the quality of the sample and, based on their judgment, the sample was or was not validated. In nonmanufacturing industries, where experience had been extremely spotty, BLS generally did not accept the job vacancy sample as being sufficiently large or detailed enough to be considered for validation. By December 1973, at the end of the JOLT program, there was not one SMSA in which all series of job vacancies for nonmanufacturing industries had been validated. Many state agencies, however, had their samples for such nonmanufacturing industries as finance, insurance, real estate and banking validated by BLS. But BLS rejected other requests for validation of samples in nonmanufacturing industries because the samples were not of the probability type and benchmarked data were not available. Such difficulties with validation of basic job vacancy data ruled out the possibility of obtaining comprehensive occupational job vacancy information.

Although the JOLT experience is not encouraging, nevertheless any future job vacancy data collection program should attempt to obtain industrial, occupational and geographical coverage which will permit matching job vacancies with the corresponding characteristics of the unemployed. If these objectives are to be achieved, the following considerations and problems will have to be taken into account:

**Occupational Detail.** Here, the problems are determining the level of refinement in obtaining job vacancy data by job titles; matching respondents' lists with standardized job titles and standardized job descriptions; and training staff to code job titles accurately. During the JOLT

period, occupational data were collected in only 29 areas. This limited program did not meet either analytical or operational needs. Obtaining comprehensive, detailed and statistically reliable occupational data would require a large sample and involve high costs.

Even if acceptable data on job vacancies by occupation were obtained, their value would depend on a satisfactory system of coding occupational titles and job descriptions. The U.S. Department of Labor's **Dictionary of Occupational Titles (DOT)** is designed largely for Employment Service operations, and is not wholly suitable for analytical uses. The Census Bureau's occupational classification system can be more readily applied to analysis, but it cannot easily be linked with the DOT system. Conversion tables prepared to bridge the two classification systems have not solved all of the problems. The BLS Occupational Employment Surveys (OES) follow another occupational classification system with some 400 occupations listed. A Standard Occupational Classification System has recently been developed for use by all government agencies. Already there are reports that it is not fully suitable for the analysis of occupational job vacancies and for coordination of these data with the occupational classification of the unemployed.

**Geographic Detail.** During the JOLT period, details on job vacancy data were provided for some of the Standard Metropolitan Statistical Areas (SMSA's). At the end of the JOLT program about 50 SMSA's were being surveyed but it proved difficult to obtain job vacancy data of publishable quality for small areas with low number of job vacancies. Theoretically, publishable data could be obtained for all 243 SMSA'S, and even for the non-SMSA areas, but the costs of expanded geographical coverage would have to be weighed against the value of the additional detail. The level of industry detail desired would also be a factor in this determination.

**Industrial Detail.** Establishments covered by state unemployment insurance (UI) laws are already classified according to the Standard Industrial Classification. Classifying job vacancy data by industry, therefore, would not seem to present any special problem. There are, however, practical problems: the slow pace of the state UI agencies in updating the industrial classification of covered firms and in classifying new firms by SIC.

Job vacancy data collection programs, either of the experimental types of the 1960's or of the JOLT period, were most successful in manufacturing. 'Surveying nonmanufacturing industries was more difficult and more costly; these firms are smaller and more widely dispersed geographically. Although there may not be any conceptual, definitional, operational, or analytical obstacles that would make impossible broad industrial coverage, nevertheless a number of industries are "problem areas."

The concepts and definitions of job vacancies that apply to the private sector are not readily transferred to the public sector. For example, the existence of job vacancies in a government agency may simply reflect the difference between actual employment levels and the employment ceiling imposed by a legislative body or a budgetary authority. Agencies may have a large number of such "vacancies" which they have no intentions of filling; at the same time, they might fill other "vacant" jobs if funds were to become available. Even if funds are obtained, agencies might or might not be actively recruiting, and even if they were, the jobs might or might not be available immediately. Weeks or months might elapse between hiring and actual



placement. Assuming that these conceptual and definitional problems could be surmounted, if the JOLT experience is a guide, it would probably be difficult, sometimes impossible, to obtain data on job vacancies in governmental agencies because of the lack of interest and cooperation by government officials.

The small size of the average construction company, the geographic dispersion of construction, the widespread use of subcontractors, the lack or incompleteness of employment records by most builders, the high business mortality rate, the short time that each craft worker generally spends on a construction job, and the intermittency of construction work because of weather, and delays due to material shortages, equipment breakdowns and other such factors, all make for difficulties in collecting job vacancy data in the construction industry. Union hiring halls could be an alternate source of job vacancy data for some crafts, but a job vacancy data collection program geared to reports from employers might not be compatible with such a procedure.

A study of the feasibility of collecting agricultural job vacancy data made by the Kansas State Employment Security Agency during the JOLT period showed that while it was possible to collect job vacancy data for farms, caution had to be used in evaluating the results obtained from those with less than 200 acres. Presently, too few data are available for judging the general feasibility of collecting such data. Another possible way of collecting data on seasonal job vacancies in agriculture would be to use Employment Service data on such job placements.

To round out the job vacancy count, it has been suggested that such other kinds of job vacancies be included as those in domestic service, those for commission salesmen, stevedoring, temporary and part-time work, and casual work. Whether these counts should be attempted would depend on finding satisfactory answers to such questions as whether such inclusions would result in any significant addition to the total count of job vacancies; whether such data could be counted accurately (avoiding overcounting of job vacancies for commission salesmen, for example); and whether the value of the additional detail would justify the high costs.

A feasibility study of collecting job vacancy data from private household employers by the New York State Department of Labor in 1973 showed that valid data could be collected on a continuing basis from private household employers. There was, however, a problem of nonresponse from "zero vacancy" employers, and the problems of collecting and editing such occupational employment data seemed to outweigh the benefits of having such information.<sup>13</sup>

## **Survey Methods**

**Data Collection.** In the JOLT program, job vacancy data were collected monthly on a shuttle-type mail schedule -- a modification of the labor-turnover form used by BLS for a number of years. The labor turnover program was selected as the vehicle for collecting job vacancy data in part because of the obvious relationship between the two concepts, but also because of the feasibility studies in Maryland and Connecticut in 1966 which showed that over 90 percent of the labor turnover respondents could and would voluntarily cooperate in reporting job vacancies.

Job vacancy data can also be collected by field investigators, and by telephone. Field investigation may yield more complete and more accurate data, but its slowness and cost generally precludes its use in such survey work.

On the relative merits of different data collection methods Myers and Creamer, in their job vacancy study of the Rochester area, concluded:

*In our judgment, the collection of data by interview and on-the-spot transcription is much more effective than collection through the mail. This is particularly true during the introductory stage of a new survey. Once the value of the survey is recognized by the respondent and there is a full understanding of the data requested, the balance of advantage probably shifts to the use of collection by mail, since at this point relative costs must enter into the decision.<sup>14</sup>*

They found that collection of job vacancy data by personal interview initially had several advantages. A fixed appointment with an interviewer had a "disciplinary effect" on a respondent who, despite good intentions, might procrastinate. A knowledgeable interviewer could answer questions concerning interpretation of definitions and their application in special cases. They also found that a personal interview was more likely to obtain a response from an uninterested employer than a mail questionnaire. Furthermore, an uninterested employer, in their view, was less likely to give a casual, off-the-cuff response to an interviewer than in answer to a mail questionnaire. A personal interview might elicit a *bona fide* response, they believed, where an employer was unwilling to commit himself to paper.

The response rate is crucial in deciding which collection instrument should be used. In BLS experimental mail surveys of job vacancy data in the 1960's, there were large variations in response rates. In one such survey, the response rate ranged from 97.8 percent in Portland, 93.9 percent in Milwaukee, 93.8 percent in Los Angeles, and 92.7 percent in Birmingham down to 64.5 percent in Chicago and 60.2 percent in Providence; the median was 86.4 percent.<sup>15</sup> In a 1969 survey, during the JOLT period, BLS reported that nonrespondent firms amounted to 10 percent of the sample in manufacturing.

It has been suggested that one reason for nonresponse or underreporting of job vacancies might be some employers' unwillingness to accept referrals from the Employment Service. Hence, federal laws requiring the public posting of job openings by companies holding federal contracts or otherwise subject to federal regulations could well determine employer cooperation in a job vacancy program. If such employers are not listing all of their job openings with the Employment Service, they might fear being exposed by revealing a larger number of openings in a job vacancy collection program, even if the data were furnished on a confidential basis.

In analyzing the extent and variations of nonresponse, consideration must be given to the care with which a particular survey and survey community are prepared, the technical competence of the survey staff, the reaction of respondents to the survey organization and its objectives, and the survey method.

Establishing the best point of contact in the firm was a source of continuing difficulty during the JOLT period. How can the most knowledgeable official be identified? Should there be a single

point of contact, on the assumption that large employers either have central hiring points where complete records are kept or prefer to assemble these data themselves to eliminate duplication? Or, is hiring, in fact, decentralized in large companies, especially multiplant firms, or in retailing? For these reasons, collecting job vacancy data from multiunit firms was a trouble spot during the JOLT period.

One special problem of data collection, especially if done by mail, is possible lack of interest by respondents in reporting "zero" job vacancies month after month. Substantial nonresponse for this reason could endanger the validity of the sample. Collecting job vacancy data on the labor-turnover shuttle form is believed to have reduced the number of such nonresponses in the JOLT program, because the job vacancy question was one of a number of questions, so employers did not have to make only a single "zero" entry month after month on a questionnaire limited to job vacancy data.

"Zero" vacancy reporting was nevertheless a continuing problem under the JOLT program. In the effort to minimize employer nonresponse because of "zero vacancy discouragement," followups were made by telephone contacts and personal visits. Still, a high proportion of firms continued to report "zero" vacancies, and this complicated the problem of maintaining the sample because of the lack of month-to-month continuity.

**Data Processing.** Job vacancy data obtained from a sample of employers must be edited, coded, and classified. Editing involves reviewing the schedules for "reasonableness" and for internal consistency, and is aimed at eliminating omissions, errors of transcription, and inconsistencies with earlier reports. The accuracy and completeness of editing depends upon proper instructions and procedures, thorough staff training, and proper supervision and review. A problem in the processing of job vacancy schedules is that of ensuring the accuracy of both industrial and occupational coding. A study by the Wisconsin agency during the JOLT period found that 85 percent of the occupationally coded data were sufficiently valid for planning purposes.

**Evaluation of Data.** To insure the accuracy of job vacancy data, it is necessary to evaluate the accuracy of reporting by employers and the quality and consistency of internal procedures-sample design, editing, coding, and analysis. During the JOLT period the regional offices of BLS reviewed the internal procedures of the state agencies for sample adequacy, follow-up procedures, and estimating techniques. Fairly soon after the JOLT program had gotten under way, BLS found that in 29 areas the manufacturing sample seemed adequate, the data seemed to be well edited, and the estimates were properly prepared. In the nonmanufacturing industries, however, not one area was found to meet these tests -- weaknesses which continued throughout the JOLT experience.

Job vacancy data are subject to several kinds of errors on the part of respondents. Response errors can be accidental or willful. Accidental response errors can arise from misunderstanding of the definition or the specific questions, or simply inattention or distraction. Such willful errors as understatement (for reasons cited above), or the response that the employer has no vacancies (the "zero vacancy" situation discussed above), or overstatement of the number of job vacancies, have been cited by those who are critical of the value of job vacancy information. While not ruling out with certainty that willful errors were important, Myers and Creamer did

not think that they actually were so in their studies.<sup>16</sup> They pointed out that purposeful response errors can be minimized by skillful and tactful personal interviews.

Another source of response error, lack of information or faulty recall on the part of the respondent, very often results from poor or no recordkeeping. In fact, a 1956 job vacancy feasibility study concluded that job vacancy data could not be collected by mail because a high proportion of employers did not keep record of job vacancies.<sup>17</sup> Pilot studies by BLS in the 1960's, however, showed that mail collection of job vacancy data was feasible, because of better record keeping by employers. The current job vacancy collection programs in Wisconsin and Minnesota do not appear to be having any difficulty with employer records. Those programs, however, are limited to manufacturing establishments, and the favorable experience might not necessarily be duplicated in a job vacancy data collection program that extended to all nonmanufacturing industries as well.

Accuracy of response can be tested by such methods as conducting response analysis surveys and checking the consistency of current data with previous data or data from other sources. A 1966 response analysis survey by BLS showed that, although most employers understood job vacancy concepts and reported accurately, the total number of vacancies was understated by 4 percent. Another 1966 survey found a 12 percent understatement.

In February 1970, response analysis surveys of manufacturing industries were conducted by the Arizona, Illinois, Oklahoma, Oregon and Utah agencies. In these studies, interviewers visited a randomly selected sample to check on the quality of the submitted reports. The findings showed that employers understood the questions, were willing to provide the information, and reported accurately in 9 out of 10 cases. Underreporting far exceeded over-reporting, but amounted to only about 2 percent of all job vacancies reported. This low rate was attributed both to collection of job vacancy data in conjunction with labor-turnover data and to limiting the surveys to manufacturing establishments. Based on these findings, the job vacancy data for manufacturing industries were found to be reasonably accurate. When BLS compared job vacancy estimated for several months with data, from the Baltimore Job Bank program, it found that Job Bank openings averaged a little over 40 percent of the job vacancy figure, ranging from about 35 percent to 50 percent. This was considered to be consistent with expectations based on earlier experimental programs.

While there was some underreporting of job vacancies, there is no evidence of over-reporting during the JOLT period, or in the Myers and Creamer study in Rochester. Labor unions, however, have expressed strong misgivings on this score. They have objected to the inclusion of job vacancies at "substandard" wages, arguing that it would exaggerate the total count significantly. A counterargument favors counting all job vacancies, pointing to the parallel between the inclusion of "substandard" job vacancies and the inclusion in the unemployment count of workers who would work only if they got higher wages than those prevailing in available jobs for which they are qualified. A 1969 BLS survey of 12 of the 17 SMSA's in which data on wages were being collected under the JOLT program showed that the number of jobs offered at less than the prevailing wage rate ranged from 5 to 10 percent.

To attempt to exclude such job vacancies would require occupational detail for all job vacancies and the determination of the "substandard" wage cutoff for each occupation. If this proves to be impossible, one proposed solution is to assume a certain percentage of substandard job vacancies, and adjust the total figure by this factor.

**Coordination.** In the federal-state cooperative programs of labor market data collection, the division of responsibility (apart from financing) has been that BLS, the federal agency, is responsible for sample design, questionnaire design, evaluation, analysis and publication; and the state agencies for operations -- collecting the data, editing, coding, and assembling. In such a new and large-scale program as JOLT, a substantial coordination effort therefore was necessary to insure uniformity of data collection procedures and of data processing. Another difficult problem of coordination came from the divided responsibility for the JOLT program at the federal level between BLS and the Manpower Administration.

A future job vacancies data collection program could follow this pattern. But an attractive alternative would be a federal program centralized in one agency, such as BLS or Census, for example, that would greatly minimize, if not almost eliminate, the need for coordination with state agencies.

### **Uses of Job Vacancy Data**

Analytical and policy applications of job vacancy data include analyzing and forecasting business cycle trends; evaluating the "expansionist" and "structuralist" arguments about the causes of high rates of unemployment and inflationary pressures; measuring the efficiency of labor markets; and assessing measures designed to reduce frictional and structural unemployment.

### **Business Cycle Analysis**

Cycles in the stock of job vacancies would be expected to have a close positive relationship to business cycles. When business is slack, there is little demand for additional workers and available jobs can be filled quickly. When business is good, there is need for more workers and more difficulty in filling vacant jobs. Thus the number of job vacancies at any one time will conform positively to employment cycles and inversely to unemployment cycles, with certain exceptions. In a tight labor market job vacancies can go up without any obvious ceiling, while unemployment, once reduced to frictional levels, cannot decline much further. Conversely, in very slack labor markets, when job vacancies cannot decline any more, unemployment can still go up. These differences also affect the amplitude of cyclical fluctuations. Job vacancies and unemployment would be expected to behave similarly with respect to cyclical timing, leading turns in general business activity at business cycle peaks and lagging slightly at troughs. In the absence of a job vacancy time series, however, these relationships cannot be tested. If such time series were to become available, the data would augment key time series now used for business cycle analysis. Comparative analyses could lead to a better understanding of the components of the total of job vacancies at various stages of the cycle: What proportion of job vacancies is attributable to business cycle changes? to structural factors? to "friction" in the labor market?

### **Analysis of Causes of Unemployment**

One of the most controversial aspects of analyzing job vacancy data concerns the relationship of job vacancies to unemployment, and the policy questions that arise from these relationships. The focus of this controversy was the position taken by Arthur F. Burns on this relationship, as shown in the following statement:

*... if the number of job vacancies equaled the number of unemployed, there would then be sufficient employment opportunities to permit, in principle, a job for all who are able, willing, and seeking work. This line of reasoning leads at once to a basic criterion of full employment, namely, equality between the number of jobs seeking men and the number of men seeking jobs*  
...<sup>18</sup>

Burns considered this equality as a "... necessary but not sufficient condition of full employment. The other two conditions are: first, that the equality hold at prevailing wages; second, that the labor market is so organized that practically all of the unemployed could obtain a job after a brief search or after obtaining some special "training."<sup>19</sup> Thus, Burns did not claim that job vacancy and unemployment aggregates, by themselves, provided all the criteria for "full" employment.

This juxtaposition of job vacancies and unemployment as the determinant of whether "full employment" exists subjected Burns to very strong criticism from organized labor, and also from some in academic circles. Burns' critics pointed out that this model represented only one of the many standpoints from which the job vacancy-unemployment relationship could be analyzed. It did not, for example, permit explicit distinction between long-term and short-term forces in the economy. It did not concern itself with an evaluation of the behavior of wages and its interaction with the vacancy-unemployment relationship. Furthermore, in its aggregative form this model did not explicitly deal with changes in contributing factors, such as union practices, labor force characteristics, technology and industrial organization, and the relative importance of industries and regions -- all of which might affect and be affected by structural imbalances, and aggregative imbalance, or both. Critics of his position also pointed out that it did not take into account job vacancies which could never be filled, perhaps because the skills required were not available in the existing labor force, or because jobless workers lacked marketable skills, which made them unemployable.

Even if the equality of job vacancies and unemployment were accepted as an analytical measure, dissenters pointed out that it need not be accepted as a guideline for policy decisions. One academic critic, for example, stated that the equality of job vacancies and unemployment had no simple relationship to the adequacy of aggregate demand. He argued that there was no basis for assuming that job vacancies are excess demand, that they can be used systematically as a measure of market maladjustment, or that the equality of vacancies and unemployment signals the adequacy of aggregate demand.<sup>20</sup>

### **Measuring the Efficiency of Labor Markets**

Trends in job vacancies, especially if classified by occupation, could throw light on the ability of our economy to adjust to changes in labor demand. Job vacancy data can be applied more directly to the measurement of the efficiency of labor markets. Are labor shortages developing? If so, are they due to geographical imbalances between job openings and job seekers? Are these

imbalances on a skill level, or on an occupational basis? Together with other labor market information, job vacancy data could be used in such analysis, and could contribute to the formulation of policies that would help to minimize frictional unemployment and reduce structural joblessness. Job vacancy data on an occupational basis, and with sufficient locality detail, would also be a frame of reference for the evaluation of job matching, and for the design of job training programs. Job vacancy data could also throw additional light on demand-supply conditions in the labor market in relation to changing wage levels.

Job vacancy data should dovetail with related labor market indicators. A good fit would indicate the validity of the job vacancy data; conversely, if the job vacancy statistics were found to be valid, they could be used in turn to test the validity of other labor market series. Thus, the trend of employment and unemployment could be related to the trend of new hires, quits, layoffs, and job vacancies. In an analytical test in 1969, BLS did find statistically significant relationships between job vacancies and unemployment, new hires, quits and layoffs. Job vacancy data also should bear a close relationship to labor turnover. Analysis of the movement of the components of the labor turnover series and of job vacancy series would also contribute to the validation of job vacancy data. In turn, analysis of job vacancies together with data on labor turnover would suggest what proportion of the job vacancies at any time represent the typical turnover experience of an industry. The construction industry, for example, generally would be expected to have a higher rate of job vacancies than an industry characterized by more stable employment, such as banking.

### **Operational Uses**

The following operational uses of job vacancies data have been proposed from time to time:

1. Aid the Employment Service in direct job placement by matching unemployed and under employed workers with identified job vacancies.
2. Indicate the training and counseling needs of prime sponsors (primarily units of state or local government) under the Comprehensive Employment and Training Act (CETA) programs, the Work Incentive (WIN) program and other such government programs.
3. Point to the direction that vocational training courses and apprenticeship training programs should follow.
4. Contribute to improved counseling on where the best job opportunities are for workers and new entrants to the labor market.
5. Aid the Employment Service in job development activities by identifying expanding occupations, industries and areas.
6. Aid business and industry in formulating more effective recruiting policies. This would be especially valuable to firms which are expanding or relocating.
7. Stimulate firms to improve their manpower planning.

8. Facilitate worker mobility by making more effective programs designed to assist in the geographic transfer of workers.
9. Help to develop more effective programs to deal with plant closures.
10. Make more serviceable the labor-market attachment test by the Employment Service for unemployment insurance applicants.
11. Help to implement the alien employment certification requirement of the Immigration and Nationality Act.
12. Help to assure the migrant and seasonal workers equal access to available job opportunities.
13. Contribute to the assessment of the effectiveness of the Employment Service in penetrating occupations, industries and geographical areas.
14. Help to implement the Resource Allocation Formula for funding of state Employment Service agencies.
15. Help labor organizations to evaluate the demand for the services of their members and to develop their policies on training, apprenticeship and collective bargaining.

Many of these suggested operational uses of job vacancy data, however, remain mere possibilities in the absence of detailed and continuing job vacancy data.

The most obvious, but in some respects most controversial operational use of job vacancy data -- that of direct job placement -- did not materialize during the JOLT period. The job vacancy data were generally not available to Employment Service offices quickly enough for direct placement purposes, and they did not identify employers and plant locations. This problem might have been solved but for the objection of BLS to such use of job vacancy data. BLS took the position that if the job vacancies in the data gathering sample were filled by pinpointed placement activity, the sample would cease to be representative of the universe. Furthermore, BLS maintained that using the data for direct job placement would violate the pledge of confidentiality given as a condition of obtaining these data from employers, and this breach of confidence could jeopardize all other BLS data collection programs. This conflict between the BLS interest and that of the Employment Service could not be resolved during the JOLT period and was an important factor leading to the discontinuation of the job vacancy program.

Job counseling and training programs could benefit from job vacancy data and even more so if such data were available for future, as well as current job vacancies. The concept of future vacancies, however, does not fit into the design of a job vacancy program intended to be symmetrical with a monthly unemployment count.

The other possible operational uses of job vacancies are subsidiary and, in themselves, not of such overriding importance as to justify a job vacancy program. Another factor to be taken into account is the availability of other sources of information and whether they can serve these



operating needs. In the last few years, for example, there has been considerable development of labor market indicators derived from operating statistics of the Employment Service and from other related BLS programs, as well as from nongovernmental sources. These include the Occupational Information Program (OIS) of the Employment and Training Administration (ETA), and the associated Occupational Employment Statistics (OES) program of BLS; as well as the "new hires" program, and the Employment Service Potential (ESP) program, the Job Bank (the computerized job matching program of the Employment Service), newspaper "help-wanted" advertisements, and job listings of private employment agencies....

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1. U.S. Department of Labor, "Job Vacancies, Hires, Quits and Layoffs in Manufacturing: July 1972" (press release, August 31, 1972), p. 2.
2. President's Committee to Appraise Employment and Unemployment Statistics (popularly known as the Gordon Committee, after its chairman). *Measuring Employment and Unemployment* (1972), pp. 200, 278-279.
3. *Ibid.*, p. 199.
4. National Bureau of Economic Research, *The Measurement and Interpretation of Job Vacancies* (a Conference Report) (1966), p. 459.
5. John C. Myers and Daniel Creamer, *Measuring Job Vacancies, A Feasibility study in the Rochester, N.Y. Area* (New York: The Conference Board, 1967).
6. Irvin F. O. Wingard, "Experimental Job Vacancy Survey Program of the United States Department of Labor," in National Bureau of Economic Research, *op. cit.*, p. 350 ff.
7. National Bureau of Economic Research, *op. cit.*, p. 23.
8. *Job Vacancy Statistics*, Hearings before the Subcommittee on Economic Statistics of the Joint Economic Committee, 89th Cong., 2d sess. (Washington: Government Printing Office, 1966), p. 11.
9. Julius Shiskin, Commissioner of Labor Statistics, Memorandum to Paul Krueger, Office of Management and Budget, December 7, 1973.
10. Raymond A. Konstant and Irvin F.O. Wingard, "Analysis and Use of Job Vacancy Statistics: Part I," *Monthly Labor Review*, August 1968, p. 23.
11. Meyers and Creamer, *op. cit.*, p. 123.
12. *Ibid.*, p. 51.
13. New York State Department of Labor, Division of Research and Statistics, *Collecting Job Vacancy Data from Private Household Employers: A Feasibility Study*, (Labor Research Report 1973-13, June 1973).

14. Myers and Creamer, *op. cit.*, p. 136.
15. From unpublished reports on the Experimental Job Vacancy Program, 1966.
16. Myers and Creamer, *op. cit.*, p. 136.
17. President's Committee, *op. cit.*, pp. 200, 278-279.
18. Arthur E. Burns, "Economics and Our Public Policy of Full Employment," Morgan Guaranty Survey, July 1963, p. 11.
19. *Ibid.*, p. 15.
20. Myron L. Joseph, "Job Vacancy Measurement," *Journal of Human Resources*, Fall 1966, pp. 59-80.

## APPENDIX V

Excerpted from Lois Plunkert, **Job Openings Pilot Program: Final Report** (Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics, Office of Employment Structure and Trends, March 1981).

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[from "Chapter VII. Estimates from Pilot Survey Data"]

Standard Error. There are two types of errors possible in an estimate based on a sample survey--sampling and nonsampling. Sampling errors occur because observations are made only on a sample, not on the entire population. Nonsampling errors can be attributed to many sources, e.g., inability to obtain information about all cases in the sample, definitional difficulties, differences in the interpretation of questions, inability or unwillingness to provide correct information by respondents, mistakes in recording or coding the data obtained, and other errors of collection, response, coverage, and estimation for missing data. Nonsampling errors also occur in complete censuses. The accuracy of a survey result is determined by the joint effects of sampling and nonsampling errors....

The standard error or sampling error presented in the tables is a measure of the variation among the estimates from all possible samples. A random group method of variance estimation was used. As derived, the estimated standard errors include part of the effect of the nonsampling errors.

Sampling errors in these tables are given in absolute terms. That is, sampling errors are in terms of the number of job openings. The sampling estimate and an estimate of its standard error can be used to construct interval estimates with a prescribed confidence that the interval includes the average result of all possible samples. To illustrate, if all possible samples were surveyed under essentially the same conditions, and a estimate and its estimated standard error were calculated from each sample, then:

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average value of all possible samples.
2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard error above the estimate could include the average value of all possible samples.
3. Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate would include the average value of all possible samples.

For example, the estimated number of job openings in manufacturing in Massachusetts in March 1979 was 22,108 with a standard error 1,727. An approximate 95 percent confidence interval (i.e., plus or minus 2 standard errors) is from 20,381 to 23,835.

The standard errors for cells in which small units are concentrated are generally quite high since 1) small establishments had infrequent job openings and 2) these establishments had large weights. Often the openings in the smallest of these cells (such as the smaller detailed occupations) were reported on just two or three schedules.

Relative error. The ratio of the standard error to the estimate, or the relative error, is especially useful in judging the reliability of estimates. Generally, the relative error decreases as 1) response rate increases, 2) the percent of the universe in the sample increases, and 3) the number of job openings increases. Hence, the relative error were lower overall in Massachusetts and Utah where the response rates were the highest and a greater percent of the universe was in the sample.

The relative error is also lower when reported data are similar among establishments. Certain industries, such as construction and some service industries, have extreme fluxuations among reporting units because hiring often occurs in spurts. This results in very high relative errors in these industries.

The delineation of an "acceptable" relative error depends on what use is being made of the data. If one wants to get a "feel" for the general level of job openings at a point in time, an estimate with a relative error of 20 percent or more could be useful information. On the other hand, if the estimates are to be used in comparison with other statistics of a similar magnitude, a much smaller relative error might be required....

It should be emphasized that relative errors for most of the detailed estimates are quire high and therefore these estimates should be used with caution. The emphasis in the pilots was to provide data needed to develop a full-scale survey, not to produce estimates. The large relative errors indicate that the sample must be much larger in order to provide publishable estimates.

[from "Chapter VIII. Implications for National Sample Design"]

One major objective of the Job Openings Survey Pilot Test was to determine how large a sample is necessary in order to produce reliable job opening statistics. This section of the report discusses the reliability of job opening statistics as measured in the pilot test and, based on the pilot test results, the reliability criteria for a national job openings survey is explained. A number of assumptions are then made in order to propose a sample size for a national survey.

#### A. Establishing the Reliability Guidelines

The first step in determining a required sample size is to establish reliability guidelines. The sample size necessary for the survey is very sensitive to any change in the desired reliability criteria. Careful consideration should be given to the reliability level stated, and to determine the impact it may have on proposed uses of the data. The sample size developed later in this section assumes that a relative standard error (RSE) of less than 10 percent will be adequate for estimates of the number of job openings by occupational division by State. (The 10 percent RSE will not apply in those instances where the occupational division has fewer than 500 vacancies.)

Using this as a reliability guideline, the pilot test experiences will be reviewed and implications for a full-scale survey will be discussed.

The estimates and the standard errors from the JOS March 1979 pilot test results can be used to illustrate the type of accuracy which will be achieved given the reliability guidelines. It should be noted that the 10 percent RSE criteria has not been achieved with the sample used in the JOS pilot test. In fact, in Florida in March 1979, the RSE for the total number of job openings was 14%, with major occupational division RSE's ranging from 11% to 81% with a median of 40%. Massachusetts' RSE's were somewhat lower; 5% on total, 10-100% on occupational division; with a median of 28%. However, using the 10% criteria for a full-scale survey, we would expect the State total estimates to have considerably better than 10% RSE's (probably in the range of 1-3%) based on JOS pilot data. The estimates by size class for the State total could have estimates considerably more reliable than 10% with the exception of the smallest size classes (0-3, 4-9) which should have approximately 10% RSE's. In more detailed occupational groups the RSE will depend more on the number of job openings -- if there is a substantial number of openings, say 500 or more, then there should be a RSE of 10% or less.

If this is considered adequate accuracy for estimates of level, then one should look at the accuracy of estimates of change. If decisions are going to be made based on the estimates of change, then the accuracy should be sufficient for detecting change. In the pilot test results for Phase 1, the statistical significance of change in the level of job openings between quarters was not being detected due not only to the small sample size, but also to the fact that the overall number of job openings was not changing that much. The estimate of job openings rate in Massachusetts ranged from 2.5 to 2.9 percent between March and September, 1979. The rate in Florida ranged from 2.3 to 2.7 percent, and in Texas and Utah the rate ranged from 2.2 to 2.8 percent. Some of the changes in Phase II were more dramatic and therefore were detected. Roughly speaking, changes of a magnitude of 0.2 percent should be detectable at the state level under the proposed reliability criteria. Correspondingly, changes in the job openings rate of a major occupational division of a magnitude of 0.8 percent should be detectable.

The above discussion is not intended to imply that the reliability criteria is not rigid enough, but is meant to present the implications for the reliability criteria. It should be noted that the effect of nonsampling errors has not been discussed. Their effect should also be considered in the design, and in particular the effect of nonresponse.

#### B. Necessary Sample Size for a National Job Openings Survey

The preliminary analysis of job opening statistics from the pilot test yielded results which contradicted some of the initial assumptions concerning vacancy distributions. Only an estimated 17% of all establishments had one or more vacancies. Also, employees in certain occupational divisions are found only in a small percentage of many industries. Even when the percentage of firms having one or more employees in an occupational division was large, the standard errors were higher than expected. In order to reduce the RSE to the desired 10% level for the pilot test survey design, it is estimated that the example size would have to be 9 times larger than the pilot test sample size. However, it is believed that additional research on our pilot test data into stratification criteria and allocation within strata can greatly improve the efficiency of

the sample. Preliminary analysis of Massachusetts data suggested that a properly allocated size class stratification could yield at least a 10% reduction in the standard error for a given sample size; an additional 30% reduction in standard error of the estimate of total vacancies could be achieved with an appropriate allocation by industry division.

Based on BLS experience in gains due to stratification, it will be assumed that further stratification by 2.3 or 4 digit SIC would reduce the standard error beyond 40% to approximately 50%. Hence, it will be assumed that the pilot sample size in a state such as Massachusetts will need to be increased by about 4 1/2 times in order to achieve the accuracy desired.

A proposed sample size of 5400 establishments in Massachusetts assumes that the response rates in a full scale survey will be at least 75%. The sample size needed in Massachusetts, which is the 10th largest State in terms of the total number of establishments, will be assumed to be the average sample size per State for 50 States and the District of Columbia. While there was not enough evidence from the pilot test to assure that a 75% response rate could be achieved for all States in the initial survey period, the design described below may be able to achieve an initial response rate of greater than 75% and continue to achieve a high response rate in subsequent quarterly surveys....

## APPENDIX VI

### Internet Resources on Job Vacancies Studies

(as of December 1, 1998)

#### DATA SOURCES AND COUNTRY

##### Establishment Surveys

###### **Australia - Job Vacancies and Overtime**

[www.statistics.gov.au](http://www.statistics.gov.au)

At this address, click on "Statistics," then "Selected Main Features," then "Labour Statistics and Prices," then "6354.0 Job Vacancies and Overtime" to view the most recent figures and analysis of job vacancies in Australia.

###### **The Netherlands - Vacancy Statistics**

[www.cbs.nl/eng/kfig/sip\\_240z.htm](http://www.cbs.nl/eng/kfig/sip_240z.htm)

A table of annual vacancy statistics obtained by a quarterly vacancy rate survey.

###### **South Africa - Statistical Release PO201: Manpower Survey**

[www.css.gov.za/wwwsrch/releases/labour/yr1994/p0201.htm](http://www.css.gov.za/wwwsrch/releases/labour/yr1994/p0201.htm)

A summary of the results of the 1994 Manpower Survey conducted in South Africa.

###### **United Kingdom - Skill Needs in Britain, 1997**

[www.open.gov.uk/dfee/skneeds](http://www.open.gov.uk/dfee/skneeds)

A summary of the results of the most recent skill needs survey in England.

##### Employment Service

###### **Germany - Employment Statistics**

[http://194.95.119.6/basis/e/be03\\_t05.htm](http://194.95.119.6/basis/e/be03_t05.htm)

A table of employment statistics including job vacancies and a summary of the analysis.

###### **Japan - White Paper on Labour**

[www.jil.go.jp/bulletin/index.htm](http://www.jil.go.jp/bulletin/index.htm)

An outline of annual analyses of the Japanese labour market.

##### Want Ads

###### **Australia - Skilled Vacancy Survey**

[www.deetya.gov.au/aed/svs/svshome.htm](http://www.deetya.gov.au/aed/svs/svshome.htm)

The site of a monthly bulletin providing information on existing and emerging skills shortages in Australia.

###### **United States - The Conference Board's Help Wanted Index**

[www.conference-board.org](http://www.conference-board.org)

From this address choose "Economic Research and Analysis" and then "Help Wanted Index." An explanation and most recent results of a monthly survey of 51 newspapers' help wanted advertising to gauge changes in the labor market.

## ARTICLES AND RESOURCES

### GENESYS Yellow Page-Based Business Samples

[www.m-s-g.com](http://www.m-s-g.com)

Provides background on the construction and maintenance of yellow page-based business frames.

### Measurement of Quality in Establishment Surveys

[www.bts.gov/NTL/DOCS/wp15.html](http://www.bts.gov/NTL/DOCS/wp15.html)

A paper by the U.S. Federal Committee on Statistical Methodology detailing sources of error in establishment surveys and practices to improve and measure the quality of establishment data.

### Performance Evaluation of Public Employment Services (PES)

[www.ilo.org/public/english/80relpro/admitra/papers/1998/pes/index.htm](http://www.ilo.org/public/english/80relpro/admitra/papers/1998/pes/index.htm)

A detailed analysis by the International Labour Organization of methods of evaluating PES including its use as a sources of job vacancy data.

### Recruitment and Selection in Australia: Results from a National Survey of Employers

[www.deetya.gov.au/publications/nils/Pages/chap4\\_1.htm#Anchor-30974](http://www.deetya.gov.au/publications/nils/Pages/chap4_1.htm#Anchor-30974)

A detailed discussion of the 1996 establishment survey conducted in Australia contained in the report *Trends in Staff Selection and Recruitment* published in 1997.

### Survey Coverage

[www.bts.gov/NTL/DOCS/wp17.html](http://www.bts.gov/NTL/DOCS/wp17.html)

A paper by the U.S. Federal Committee on Statistical Methodology offering a discussion of coverage error and guidance on assessing the improving coverage in sample surveys.

### Tools and Methods for Identifying Skill Shortages: A Cross-Country Comparison

[www.hrdc-drhc.gc.ca/stratpol/arb/tchncl/t-96-3e.pdf](http://www.hrdc-drhc.gc.ca/stratpol/arb/tchncl/t-96-3e.pdf)

An analysis of the methods used in six countries to identify skill shortages, published by Human Resources Development Canada.