

Introduction

This report examines various dynamic aspects of the Nation's labor force during the 1991-93 period. Although much of this period of time was characterized by weak employment growth and high levels of unemployment, millions of persons continued to move into and out of the labor force and between jobs. Statistics reflecting these movements can provide important insights into the operation of this country's labor market and supplement more traditional measures of employment, unemployment, wages, and so on.

The data in this report were collected in the Survey of Income and Program Participation (SIPP), a longitudinal survey which follows the same persons over a period of time. Most of the data discussed here were obtained from the 1991 panel of SIPP and relate to the labor market activities of persons during the October 1990 to August 1993 period.

Previous reports from the SIPP (the most recent covering the 1990-92 period) have also dealt with the dynamic aspects of the labor force.¹ In this report, attention is focused on spells of unemployment, earnings on new jobs, and changes in health insurance status related to persons job

¹See *Dynamics of Economic Well-Being: Labor Force and Income, 1990 to 1992*, Current Population Reports, Household Economic Studies, Series P70-40, November 1994; *Job Creation During the Late 1980's: Dynamic Aspects of Employment Growth*, Current Population Reports, Household Economic Studies, Series P70-27, January 1992; and *Spells of Job Search and Layoff... and Their Outcomes*, Current Population Reports, Household Economic Studies, Series P-70-16, RD-2, July 1989.

transitions in the 1991-93 period. A concluding section examines the labor turnover process during 1991.

Highlights

(Note: The figures in parentheses signify the 90-percent confidence intervals of the estimates.)

- The median spell length of unemployment in the 1991-93 period was 2.6 (± .1) months, not significantly different from the comparable 1990-92 estimate.
- Of the men age 25 to 54 who found full-time jobs in the 1991-93 period, 23 (± 2.8) percent were paid less than \$215 a week but another 23 (± 2.6) percent were paid \$600 a week or more.
- The proportion of women age 25 to 54 entering full-time jobs paying \$400 a week or more rose from about 15 (± 2.4) percent in the 1984-86 period to 23 (± 3.1) percent in the 1991-93 period.
- The proportion of men age 25 to 54 experiencing a full-time job change and covered by health insurance provided through an employer fell from 49 (± 4.2) percent on the old job to 32 (± 3.9) percent on the new job.
- In 1991, persons entering or leaving jobs or transferring jobs between industries (labor turnover) averaged 7.5 million or 7.1 percent of average monthly wage and salary employment.
- Average monthly labor turnover in 1991 in retail trade was 9.8 percent and this industry accounted for the largest share

of total turnover actions of all industries.

- Average monthly labor turnover in 1991 was highest for young workers age 16 to 24 at 15.8 (± 1.3) percent.

Spells of Unemployment

According to the Bureau of Labor Statistics (BLS), the monthly unemployment rate in the country averaged 6.7 percent in 1991, 7.4 percent in 1992, and 6.8 percent in 1993. These rates of unemployment were the highest they had been since the mid-1980's. Underlying these estimates, of course, are persons who experienced spells of unemployment, some which may have lasted only a week or two and others which extended for many months.

In the 1991-93 period, the median length of a completed spell of unemployment was 2.6 months as is shown in table A.² This estimate was not significantly different from the median of 2.4 months for the 1990-92 period (presented in a previous SIPP report), but much higher than the median of 1.8 months in the 1987-89 period. The increase, of course, reflects the change in the demand for labor between the late 1980's and early 1990's.

Table A also shows median spell lengths of unemployment for

²These median spells of unemployment were estimated using a survival data analysis technique (See Martina Shea, *Dynamics of Economic Well-Being: Program Participation, 1990-92*, Current Population Reports, P70-41, U.S. Bureau of the Census, Washington, DC: USGPO, January 1995). Spells of unemployment were identified when respondents indicated that they had either been looking for work or on layoff an entire month or had been looking for work or on layoff and not in the labor force for the entire month.

Table A.

Median Duration of Spells of Looking for a Job or Layoff for Persons Who Experienced at Least One Separation from a Wage and Salary Job by Age, Sex, and Education: 1991 to 1993

(In months)

Group	Median	Stand- and error
Total	2.6	.10
MEN	2.8	.13
16 to 19 years	2.1	.25
20 to 24 years	2.7	.33
25 to 34 years	2.8	.25
35 to 54 years	3.3	.21
55 years or more	3.3	.26
WOMEN	2.3	.15
16 to 19 years	1.7	.15
20 to 24 years	1.9	.21
25 to 34 years	2.7	.32
35 to 54 years	3.0	.28
55 years or more	3.2	.37
EDUCATION (age 21 or over)		
High school or less	3.1	.11
1 to 3 years of college	2.7	.21
College or more	2.5	.33

various groups of workers. Men age 35 to 54 experienced a median spell of unemployment of 3.3 months in the 1991-93 period, while for persons with 4 or more years of college the median was 2.5 months. Both medians were higher than their comparable medians in the 1987-89 period (2.5 and 1.6 months, respectively).

Earnings on New Jobs

Despite the weak demand for labor and mediocre employment growth during the years under investigation, the dynamic labor force data from SIPP indicate that millions of persons were moving into jobs—job accessions—and out of jobs—job separations. The job accession data, in particular, provide some insight into one important aspect of the kinds of jobs the economy was generating during the 1991-93 period, that is, the amount of the paycheck received from these jobs.

Table B shows distributions of men and women age 25 to 54 who moved into full-time (35 hours or more a week) wage and salary jobs in the 1991-93 period by their

weekly earnings on the new jobs.³ Average weekly earnings for the men who entered jobs was \$459 compared with \$306 for women. Similar data from earlier SIPP panels for the 1987-89 period and 1984-86 period are also displayed.⁴

One obvious fact in these data is that a substantial proportion of the jobs that were entered in the 1991-93 period were paying relatively low amounts (these are earnings before taxes and other deductions). Of the 6.3 million adult men moving into full-time jobs, about 23 percent of them received weekly pays of less than \$215 a week (this level is comparable to the average poverty threshold of a three-person family of \$11,189 in the 1991-93

period). Among women, approximately 47 percent of the 4.4 million women moved into full-time jobs that paid less than \$215 a week. It should be remembered that these earnings represent average weekly earnings received during the first month an individual entered a job and, therefore, in many cases, the averages reflect “entry” level earnings.

The data in table B also show that a significant proportion of workers, especially among the men, found jobs that paid on average \$600 or more a week. In the 1991-93 period, almost 23 percent of the men found full-time jobs which paid this amount or more. Consequently, relatively good-paying jobs were created during this period as well as low-paying jobs. Another aspect of these data is the small proportions of men who

Table B.

Distribution of Men and Women Age 25 to 54 Who Entered Full-Time Wage and Salary Jobs by Their Average Weekly Earnings (in 1991 to 1993 dollars): 1991 to 1993, 1987 to 1989, and 1984 to 1986
(Numbers in thousands)

Earnings intervals	Men			Women		
	1991-93	1987-89	1984-86	1991-93	1987-89	1984-86
Total	6,314	5,686	5,782	4,373	4,752	5,087
Total (in percent)	100.0	100.0	100.0	100.0	100.0	100.0
Less than \$100	4.0	3.0	4.0	9.3	11.9	12.1
\$100 to \$214	19.3	20.6	19.5	37.9	32.6	37.5
\$215 to \$299	19.3	17.2	18.4	17.3	19.6	19.8
\$300 to \$399	16.8	15.8	15.2	12.5	16.2	15.8
\$400 to \$499	9.6	11.2	11.0	7.5	7.1	5.2
\$500 to \$599	8.6	8.7	9.5	6.1	5.2	4.2
\$600 and over	22.5	23.5	22.4	9.4	7.4	5.4
Mean	\$459	\$498	\$480	\$306	\$299	\$269
Standard error	\$49	\$76	\$42	\$36	\$41	\$20

³Some persons may have entered more than one job during this period; the data presented here relate to the first job that was entered.

⁴The data were adjusted for inflation by the CPI-U of the BLS and the earnings intervals are expressed in terms of 1991-93 dollars. Earnings in the 1987-89 period were adjusted by using the average of the CPI-U over the October 1986-April 1989 period and in the 1984-86 period by the average of the June 1983-July 1986 period.

entered jobs in the \$400 to \$500 range (9.6 percent) and \$500 to \$600 range (8.6 percent) relative to adjacent earnings intervals (the proportions in these intervals were not significantly different from one another). This pattern of job growth for men, that is, jobs paying low wages and high wages but few jobs in the mid-wage level,

has been evident for many years and the subject of much research.

Another dimension of the data shown in table B concerns the women's distributions over time. While the majority of women moving into full-time jobs over time have done so in jobs paying less than \$300 a week, upward shifts in the top-half of the distribution are observable as well. The proportion of women entering full-time jobs paying \$400 a week or more rose from about 15 percent in the 1984-86 period to 23 percent in the 1991-93 period. Changes of this type have been observed in wage distributions for women from other data as well.⁵

Health Insurance and Job Change

Because so many Americans obtain health insurance through their own or someone else's employment, much attention has focused on the nature of the linkage between jobs and health insurance coverage. Indeed, a large part of the rising anxiety over job security stems from a concern over the strength of this linkage.

With the data from SIPP, it is possible to examine the consequences of a job change, whether it be voluntary or involuntary, on the health insurance status of adult men and women. The data displayed in table C relate to men and women age 25 to 54 who, at some time in the 1991-93 period, left a full-time job and then, after a period of time, entered a full-time job. The data show what their health insurance status was at the time of both jobs, that is, what proportion (1) had health insurance in their own name through their employer or some other means, or (2) did not have coverage in their own name or had no coverage at all.

The data demonstrate that leaving one job and then entering

⁵See Paul Ryscavage, "Gender-Related Shifts in the Distribution of Wages," *Monthly Labor Review*, July, 1994, pp. 3-15.

another does jeopardize one's health insurance coverage if it had been obtained through an employer. Among adult men, 49 percent of the 3.4 million involved in full-time job changes had health insurance coverage in their own name through their employer when they left their job. Upon finding another full-time job, however, only 32 percent had employer-provided health insurance in their own name.

For the 1.8 million adult women involved in full-time job changes, the comparable proportions were 46 and 30 percent. These differences in percentages do not necessarily suggest that these persons went without health insurance (although no doubt many did) since they could have obtained coverage through someone else's plan or were only waiting to pick-up coverage from their new employer. But the fact remains that job changing in

about by the interaction of the demand for and supply of labor.

One of the more specific uses of information on labor turnover relates to the "costs" associated with this turnover. These costs are frequently thought of as accruing to the employer (e.g., recruitment, training), but they can also be thought of as costs to workers (e.g., lost wages and benefits) and costs to society (e.g., unemployment compensation, retraining programs).

The measurement of labor turnover is difficult because it involves observing and recording changes in labor force or job status. The BLS measured labor turnover in manufacturing (and to some extent in mining and communications) for many years by means of an establishment survey but discontinued it in the early 1980's because of budgetary cutbacks.⁶ Since then, motivated by interest in the job creation-

Table C.
Men and Women Age 25 to 54 Who Left Full-Time Jobs and Then Entered Full-Time Jobs by Method of Health Insurance Coverage at the Time of Leaving and Entering Jobs: 1991 to 1993

(Numbers in thousands)

Method of coverage	Men		Women	
	Left	Entered	Left	Entered
Total	3,449	3,449	1,846	1,846
Total (percent)	100.0	100.0	100.0	100.0
Covered in own name:				
Employer provided	49.3	32.3	45.7	30.2
Other means	8.8	7.0	3.7	5.4
Not own name or none	41.9	60.7	50.7	64.4

the 1991-93 period did involve the risk of losing one's health insurance coverage.

Labor Turnover

The aggregate movement of persons into and out of jobs and between jobs, or labor turnover, represents an important labor market indicator. In a very broad sense, it reflects the degree of flexibility or fluidity in the marketplace for human labor brought

job destruction process, various researchers have developed measures of labor turnover primarily from data collected in establish-

⁶From a survey of establishments, the BLS collected data on job accessions which consisted of new hires, recalls, and other accessions, as well as job separations which consisted of layoffs, quits, discharges, and other separations. See Carol M. Utter, "Labor Turnover in Manufacturing: The Survey in Retrospect," *Monthly Labor Review*, June 1982, pp. 15-17.

ment surveys.⁷ It is also possible to estimate labor turnover from the SIPP (although without the precision of establishment-based data) for persons by various demographic and economic characteristics, something which is more difficult to do with data from establishment surveys.

The following sections present labor turnover estimates for 1991. The estimates are based on three possible changes in job status over two consecutive months as reported by survey respondents: (1) a person went from no job in one month to a job in a specific industry group in the next month—a job accession;

changes occurring within a month or within an industry.

Turnover in 1991

Table D displays the labor turnover estimates for pairs of months covering calendar year 1991.⁸ The number of turnover actions (the sum of job accessions, job separations, and interindustry transfers, the latter which involve both a job separation and job accession for the same individual) between two consecutive months averaged 7.5 million in 1991 for a rate of 7.1 percent, or 71 turnover actions per 1,000 workers. The proportion of these actions which were job accessions and job

Labor turnover during a year contains a seasonal component. As shown in table D, the rate rose from its January-February level of 5.3 percent to 7.7 percent in the May-June period. This increase is associated with improving weather conditions across the country and the influx of young workers into the labor force at the end of the school year. Job accessions rose from 30 percent of all job changes in the January-February period to 43 percent as of the April-May period.

Labor turnover peaked again in late summer and early fall. In the August-September period, the rate was 8.3 percent. At this time of year, job separations typically rise because of the return to school of young workers. In 1991, the rate of turnover continued to rise reaching 9.3 percent in the September-October period, as interindustry transfers began to increase, accounting for over half of all the turnover actions for the rest of the year. Whether or not this latter development was related to the worsening unemployment situation in that year, seasonality, or the operation of the survey, is a matter for further investigation.⁹

Turnover by Industry

The turnover data in table E show that the degree of labor turnover varies by industry group and is influenced by the kinds of workers (i.e., their demographic, skill, and educational backgrounds) employed, economic conditions, seasonality, and so on. Retail trade has a relatively high rate of turnover—almost

(Table D.
Labor Turnover in 1991 by Month
(Numbers in thousands)

Months	Average Employment	Turnover Actions	Composition of Turnover				RATE (%)
			Turnover Actions (%)	Accessions (%)	Separations (%)	Interindustry Transfers (%)	
Jan.–Feb.	105,186	5,618	100.0	30.3	40.1	29.5	5.3
Feb.–Mar.	104,805	5,282	100.0	32.6	36.7	30.7	5.0
Mar.–Apr.	105,089	6,068	100.0	41.1	28.2	30.7	5.8
Apr.–May	106,197	6,941	100.0	42.8	22.1	35.9	6.5
May–Jun.	107,099	8,243	100.0	33.4	28.9	37.7	7.7
Jun.–Jul.	107,382	7,559	100.0	35.2	32.6	32.2	7.0
Jul.–Aug.	107,129	6,499	100.0	25.1	35.9	39.0	6.1
Aug.–Sep.	105,982	8,796	100.0	25.1	43.3	31.6	8.3
Sep.–Oct.	105,314	9,833	100.0	23.5	20.9	55.6	9.3
Oct.–Nov.	105,103	8,829	100.0	16.5	24.2	59.3	8.4
Nov.–Dec.	104,473	8,368	100.0	18.1	25.0	56.9	8.0
Dec.–Jan.	104,162	8,463	100.0	22.6	23.1	54.4	8.1
Average	105,660	7,542	100.0	28.0	29.4	42.5	7.1

(2) a person went from a job in a specific industry group in one month to no job in the following month—a job separation; and (3) a person went from a job in one industry group to a job in another industry group between the two months—an interindustry transfer. Obviously, these turnover actions represent an underestimate of the true amount of labor turnover because, for example, they exclude job

separations (28 versus 29 percent, and not significantly different from one another) suggests little change in wage and salary employment during the year.

⁸Estimates for 1992 and part of 1993 from the remainder of the SIPP 1991 panel are not presented since the rates of labor turnover appeared to be downwardly biased. Such a bias might be expected in a longitudinal survey of this type because of sample attrition and panel conditioning. In the first instance, persons who leave the survey are most likely to be in an out of the labor market; in the second instance, some persons in the survey may find that after several interviews the quickest way to get through the interview is to report little change in job status. These two survey effects would be particularly evident in estimates of labor turnover.

⁷See, for example, Steve J. Davis and John Haltiwanger, *Gross Job Creation, Gross Job Destruction, and Employment Reallocation*, Center for Economic Studies: Discussion Paper, U.S. Bureau of the Census, CES 90-4, February 1990.

⁹The Nation's civilian unemployment rate averaged 6.9 percent (seasonally adjusted) of the labor force in the fourth quarter of 1991 compared with 6.5 percent (seasonally adjusted) in the first quarter. With respect to seasonality, the increase in interindustry transfers as a proportion of all turnover actions did not occur in the latter part of 1992, but the proportion did decline dramatically as 1992 opened (to levels like those of the summer of 1991). Regarding possible survey-related problems, the sudden growth in interindustry transfers in the latter part of 1991 was also evident in the data for 1990 from the 1990 SIPP panel.

Table E.
Average Monthly Labor Turnover in 1991 by Industry Group
(Numbers in thousands)

Group	Average Employment	Turnover Actions	Composition of Turnover					RATE (%)
			Turnover Actions (%)	Accessions (%)	Separations (%)	InterIndustry Transfers		
						Inflow (%)	Outflow (%)	
Ag., For., Fish.	1,698	245	100.0	35.1	37.6	13.9	13.5	14.4
Mining	623	38	100.0	18.4	34.2	31.6	13.2	6.0
Construction	4,973	529	100.0	30.4	35.2	16.6	17.6	10.6
Manufacturing	20,863	975	100.0	24.0	30.6	25.2	20.3	4.7
Trans., Com., PU	7,463	350	100.0	24.3	25.4	27.4	22.9	4.7
Wholesale Trade	4,421	283	100.0	17.7	25.8	31.1	25.4	6.4
Retail Trade	17,641	1,737	100.0	32.5	30.5	16.4	20.7	9.8
Fin., Ins., RE	6,621	387	100.0	21.4	28.7	26.4	23.3	5.8
Bus. & Rep. Ser.	5,589	712	100.0	24.4	22.3	26.1	27.1	12.7
Personal Services	2,825	330	100.0	29.1	30.3	20.3	20.3	11.7
Enter. & Rec.	1,241	218	100.0	33.9	27.1	17.4	21.6	17.6
Pro. & Rel. Ser.	25,441	1,431	100.0	30.2	30.8	19.4	19.6	5.6
Public Admin.	5,639	270	100.0	23.0	24.4	30.0	22.6	4.8

Table F.
Average Monthly Labor Turnover in 1991 for Selected Groups
(Numbers in thousands)

Groups	Average Employment	Turnover Actions	Composition of Turnover				RATE (%)
			Turnover Actions (%)	Accessions (%)	Separations (%)	Interindustry Transfers (%)	
Age & Sex							
Both Sexes, 16 to 24	19,366	3,061	100.0	30.3	27.8	41.9	15.8
Men, 25 to 54	39,892	1,952	100.0	24.9	27.6	47.5	4.9
Women 25 to 54	37,172	2,150	100.0	26.7	28.7	44.6	5.8
Both Sexes, 55+	10,562	513	100.0	28.5	49.8	21.7	4.9
Education							
Both Sexes, 21 to 29, Col.	6,336	515	100.0	22.3	22.3	55.3	8.1
Men, College 25 to 54,	11,837	476	100.0	22.2	24.7	53.0	4.0
High School 25 to 54,	19,692	1,080	100.0	26.6	28.8	44.5	5.5

10 percent—and in terms of absolute numbers accounted for the largest share of all turnover actions. The entertainment and recreation services industry had the highest turnover in 1991—a rate of nearly 18 percent. Both industries, of course, represent sources of employment for millions of younger workers.

Other industry groups with relatively high turnover rates are the construction industry and the agriculture, forestry, and fisheries industries. The rates in these industries were 10.6 percent and 14.4 percent, respectively (not

significantly different from one another). Their rates are influenced by seasonal changes to a large extent.

At the other end of the turnover spectrum are the industry groups of manufacturing and transportation, communication, and public utilities. In 1991, monthly turnover in these industries averaged 4.7 percent. Turnover in public administration was 4.8 percent (this rate was not significantly different from the rates in manufacturing and transportation, communication, and public utilities). Many of the indus-

tries with relatively low turnover tend to pay above average wages.

Turnover by Group

Table F presents labor turnover data for various groups of workers classified by age, gender, and educational attainment. Within these groups, young workers age 16 to 24 had the highest rate of labor turnover at 15.8 percent. Adult men age 25 to 54 have somewhat lower labor turnover rates than women of the same age group—4.9 percent versus 5.8 percent.

Although older workers age 55 and over had the same rate of labor turnover as adult men—4.9 percent—the composition of the turnover actions was different. Almost 50 percent of the turnover actions for the older workers were job separations compared with only 28 percent for adult men.

The data also reflect some interesting differences in turnover for college-educated workers. Adult men with college educations had a low rate of turnover—4.0 percent—and the data also show that over half of their turnover actions consisted of moving from one industry to another. Young persons age 21 to 29 with college educations also exhibited a similar proportion of interindustry transfers at that time, but their overall turnover rate was 8.1 percent—twice as high as that for adult men with college educations. This differential represents the greater intensity of the job search process on the part of many younger workers who were shopping for the “right” job in a period of slack labor demand.

User Comments

The Census Bureau welcomes the comments and advice of data users. If you have suggestions or comments, please write to:

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Source and Accuracy Statement

Source Of Data

The SIPP universe is the noninstitutionalized resident population living in the United States. Field representatives interview eligible persons who are at least 15 years of age at the time of the interview. Not eligible to be in the survey are crew members of merchant vessels, Armed Forces personnel living in military barracks, institutionalized persons, such as correctional facility inmates and nursing home residents, and United States citizens residing abroad.

The SIPP sample for the 1991 panel is located in 230 Primary Sampling Units (PSUs) each consisting of a county or a group of contiguous counties.

For the 1991 panel, interviewing began in February, March, April, or May of 1991 for four random subsamples, respectively. For the remainder of the panel, interviews for each person occurred every 4 months for a total of 8 interviews. (One round of interviewing all 4 subsamples is called a wave.) At each interview, the reference period was the 4 months preceding the interview month.

Occupants of about 93 percent of all eligible living quarters participated in the first interview of the panel. For later interviews, field representatives interviewed only original sample persons and persons living with them. We followed respondents who moved during the panel. The Census Bureau automatically designated noninterviewed households at the first wave as noninterviews for subsequent waves.¹⁰

We classified a person as interviewed for the entire panel and both calendar years based on the following two definitions:¹¹

¹⁰Details on nonresponse and Hispanic controls are in "SIPP 91: Source and Accuracy Statement for the Longitudinal Panel File REVISION," dated October 19, 1994

(1) Those for whom self, proxy, or imputed responses were obtained for each reference month of all eight interviews for the 1991 panel, and all three interviews for each calendar year; or

(2) Those for whom self or proxy responses were obtained for the first reference month of the interview period and responses exist for each subsequent month until they were known to have died or moved to an ineligible address (foreign living quarters, institutions, or military barracks).

Everyone else is considered non-interview.¹²

Some estimates are based on monthly averages from cross-sectional files. Nonresponse rates for the months on the file vary from 8 percent to 21 percent.

Some respondents did not respond to some of the questions. Therefore, the overall nonresponse rate for some items, especially sensitive income and money related items, is higher than the person nonresponse rate.¹³

Estimation

We used several stages of weight adjustments in the estimation procedure to derive the SIPP longitudinal person weights. We gave each person a base weight equal to the inverse of his/her

¹¹Details on interview-status classification are in "Weighting of Persons for SIPP Longitudinal Tabulations," paper by Judkins, Hubble, Dorsch, McMillen and Ernst in the *1984 Proceedings of the Survey Research Methods Section, American Statistical Association*.

¹²Details on patterns of nonresponse are in "Weighting Adjustment for Partial Nonresponse in the 1984 SIPP Panel," paper by Lepkowski, Kalton, and Kasprzyk in the *1989 Proceedings of the Survey Research Methods Section, American Statistical Association*.

¹³For more discussion on nonresponse and the existence and control of nonsampling errors in the SIPP, see the *Quality Profile for the Survey of Income and Program Participation*, May 1990, by T. Jabine, K. King and R. Pertoni. Available from Customer Services, Data User Services Division (301-457-1139)

probability of selection and applied adjustments to account for noninterviews.¹⁴

We performed an additional stage of adjustment to longitudinal person weights to reduce the mean square error of the survey estimates by age, sex, race, and ethnicity (Hispanic/non-Hispanic).

Accuracy of Estimates

We base SIPP estimates on a sample. The sample estimates may differ somewhat from the values obtained from administering a complete census using the same questionnaire, instructions, and enumerators. The difference occurs because a sample survey estimate is subject to two types of errors: nonsampling and sampling. We can provide estimates of the magnitude of the SIPP sampling error, but this is not true of nonsampling error. The next few sections describe SIPP nonsampling error sources, followed by a discussion of sampling error, its estimation, and its use in data analysis.

Nonsampling Variability. We attribute nonsampling errors to many sources; they include but are not limited to the following:

- Inability to obtain information about all cases in the sample.
- Inability or unwillingness on the part of the respondents to provide correct information.
- Errors made in collection (e.g. recording or coding the data).
- Undercoverage.

We used quality control and edit procedures to reduce errors made by respondents, coders, and interviewers.¹⁶

Undercoverage in SIPP resulted from missed living quarters and missed persons within sample

¹⁴For more details on noninterview adjustment for longitudinal estimates, see *Nonresponse Adjustment Methods for Demographic Surveys at the U.S. Bureau of the Census*, November 1988, Working Paper 8823, by R. Singh and R. Petroni.

¹⁵See footnote 10.

¹⁶See footnote 13.

households. It is known that undercoverage varies with age, race, and sex. Generally, undercoverage is larger for males than for females and larger for Blacks than for non-Blacks. Ratio estimation to independent age-race-sex population controls partially corrects for the bias resulting from survey undercoverage. However, biases exist in the estimates when persons in missed households or missed persons in interviewed households have characteristics different from those of interviewed persons in the same age-race-sex group. Further, we did not adjust the independent population controls for undercoverage in the census.¹⁷

Comparability with Other

Estimates. Exercise caution when comparing data from this report with data from other SIPP publications or with data from other surveys. Comparability problems are from varying seasonal patterns for many characteristics, different nonsampling errors, and different concepts and procedures.¹⁸

Sampling Variability. Standard errors indicate the magnitude of the sampling error. They also partially measure the effect of some nonsampling errors in response and enumeration, but do not measure any systematic biases in the data. The standard errors mostly measure the variations that occurred by chance because we surveyed a sample rather than the entire population.

Uses and Computation of Standard Errors

Confidence Intervals. The sample estimate and its standard error

¹⁷More detailed discussions of the population controls are in the SIPP *Dynamics of Economic Well-Being: Labor Force and Income, 1990 to 1992*, Report P70-40, by Wilfred Masumura and Paul Ryscavage.

¹⁸See footnote 13.

enable one to construct confidence intervals, ranges that would include the average result of all possible samples with a known probability.

Approximately 90 percent of the intervals from 1.645 standard errors below the estimate to 1.645 standard errors above the estimate would include the average result of all possible samples.

The average estimate derived from all possible samples is or is not contained in any particular computed interval. However, for a particular sample, one can say with a specified confidence that the confidence interval includes the average estimate derived from all possible samples.

Hypothesis Testing. One may also use standard errors for hypothesis testing. Hypothesis testing is a procedure for distinguishing between population characteristics using sample estimates. The most common type of hypothesis tested is (1) the population characteristics are identical versus (2) they are different. One can perform tests at various levels of significance, where a level of significance is the probability of concluding that the characteristics are different when, in fact, they are identical.

Unless noted otherwise, all statements of comparison in the report passed a hypothesis test at the 0.10 level of significance or better. This means that, for differences cited in the report, the estimated absolute difference between parameters is greater than 1.645 times the standard error of the difference.

Note that as we perform more tests, more erroneous significant differences will occur. For example, at the 10-percent significance level, if we perform 100 independent hypothesis tests in which

there are no real differences, it is likely that about 10 erroneous differences will occur. Therefore, interpret the significance of any single test cautiously.

Standard Error Parameters and Tables and Their Use.

Most SIPP estimates have greater standard errors than those obtained through a simple random sample because we sampled clusters of living quarters for the SIPP. To derive standard errors at a moderate cost and applicable to a wide variety of estimates, we made a number of approximations. We grouped estimates with similar standard error behavior and developed two parameters (denoted "a" and "b") to approximate the standard error behavior of each group of estimates. The standard errors we computed from these parameters provide an indication of the order of magnitude of the standard error for any specific estimate.

Methods for using these parameters and tables for computation of standard errors are given in the following sections. To calculate standard errors for estimates of persons ever participating or persons participating all of two years, use $a = -0.0000483$ and $b = 8,912$. The bases for percentages are found in appropriate text tables.

Standard Errors of Estimated Numbers. Approximate s_x using the formula,

$$s_x = \sqrt{ax^2 + bx}.$$

Here x is the size of the estimate.

Illustration. As shown in text table E, the 1991 SIPP estimates approximately 1.7 million labor turnover actions occurred in the retail trade industry in an average month during 1991. The appropriate "a" and "b" parameters are $a = -0.0000483$ and $b = 8,912$

Using the above formula, the approximate standard error is

$$s_x = \sqrt{(-0.0000483)(1,737,000)^2 + (8,912)(1,737,000)} = 123,832$$

The 90-percent confidence interval is from 1,533,296 to 1,940,704. Therefore, a conclusion that the average estimate derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all samples.

Standard Errors of Estimated Percentages.

The reliability of an estimated percentage, computed using sample data for both numerator and denominator, depends on the size of the percentage and its base.

Approximate the standard error by the formula:

$$S_{(x,p)} = \sqrt{\frac{b}{x} (p)(100-p)}.$$

Here x is the total number of persons in the base of the percentage and p is the percentage ($0 \leq p \leq 100$).

Illustration. As shown in text table F, the 1991 SIPP estimates that the average monthly labor turnover rate for men age 25 to 54, was 4.9% in

1991. To find the base for the percentage, use text table F. In this example, the base is 39,892,000. The appropriate "b" parameter is $b = 8,912$

Using the above formula, the approximate standard error is

$$S_{(x,p)} = \sqrt{\left(\frac{8,912}{39,892,000}\right)(4.9)(100-4.9)} = 0.32 \text{ percent}$$

The 90-percent confidence interval is from 4.4 to 5.4 percent. Therefore, a conclusion that the average percentage derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all samples.

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