# How accurate were projections of the 1980 labor force?

*All four Bureau of Labor Statistics projections,*
*the first in 1965 and the last in 1976,*
*were lower than the actual 1980 labor force;*
*most of the discrepancy can be attributed to the*
*underestimation of the participation rates of women*

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The final step in the projection process is evaluation. The Bureau of Labor Statistics has always assessed each of its labor force projections, but only the evaluation of the 1975 estimates has been published. The 1970 projections were evaluated by Marc Rosenblum of the City University of New York.[1] Both evaluations concluded that the BLS had underestimated the number of persons in the labor force, with too many men and too few women. Rosenblum also concluded that the BLS estimate of the 1975 labor force would be too low, based on a comparison with projections by Alfred Tella and Thomas F. Dernberg and others.[2] Bureau of Labor Statistics economist Paul Ryscavage confirmed the underestimation of the BLS projections for the 1975 labor force, finding that an earlier projection, made when the program was still in the Bureau of the Census, was more accurate. He also suggested that the projections for 1980 and 1985 would be too low, primarily because of underestimation of female labor force growth. All four of the BLS projections of the 1980 labor force demonstrated the same pattern of lower than actual growth; generally the male labor force was too high and the female labor force was always too low.[3]

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## Trend, projected, and actual rates

The Bureau of Labor Statistics published four projections of the 1980 labor force.[4] They were general purpose projections prepared using demographic techniques. In 1965, BLS projected a 1980 labor force (including the armed forces) of 100 million; in 1970, of 101 million; in 1973, of 102 million; and, finally, in 1976, of 104 million. (See table 1.) The actual 1980 labor force was 107 million (1970 census weights).

Each estimate of the 1980 labor force overprojected the male labor force and grossly underprojected the female labor force. For example, the 1970 projection had the men's labor force at 64 million; it totaled 62 million in 1980. At the same time, the 1970 projection placed the women's labor force at 37 million; it reached 45 million in 1980.

The most difficult group to project has been women age 25 to 34. In 1965, the 1980 labor force participation rate for these women was projected to be 40.3 percent. In 1970, the rate was estimated to be 46.5 percent; in 1973, 50.2 percent; and in 1976, 57.3 percent. The rate turned out to be 65.3 percent in 1980, or 25 percentage points higher than the 1965 projection.

The next most difficult group to project was women age 35 to 44. Projection errors ranged from 15.2 percent for the 1965 estimate to 7.2 percent for the 1976 estimate.

The most difficult male labor force group to project was men 55 to 64. The participation rate projected in 1965 was 12.3 percent too high; however, the 1976 projection missed by only 1.1 percent. For men 25 to 34, errors ranged from 2.0 percent in the 1965 projection to −0.1 percent in the 1976 projection.

Generally, more accurate projections are made over a recent period. But, how would the projections have fared if they were adjusted for the length of the projection span? To find out, we compared historic, projected, and actual growth rates. Historic growth rates use the same number of years back as the projection is forward. For example, the 1965 projection covered 16 years (from 1964 to 1980), making 1948 the reference year for the historic growth rate. The following tabulation shows the historic and the projected and actual growth rates of the 1980 labor force:

| Historic reference year | Year projection was published | Growth rate Historic | Projected | Actual |
|---|---|---|---|---|
| 1948 . . . . | 1965 | 1.25 | 1.73 | 2.14 |
| 1960 . . . . | 1970 | 1.43 | 1.84 | 2.38 |
| 1966 . . . . | 1973 | 2.00 | 1.68 | 2.28 |
| 1970 . . . . | 1976 | 1.97 | 1.81 | 2.39 |

Both the historic and the actual labor force growth rates increased between projections, but the projected growth changed only slightly. In effect, the improvement in the projections of the 1980 labor force was due to the application of the same growth rate to a labor force that was actually growing faster than anticipated. A simple extrapolation made on the basis of the historic growth rate would have increased the accuracy of the 1973 and 1976 projections, but not the 1965 and 1970 projections.[5]

There was a steady increase in the discrepancy between actual and projected labor force growth. The successive projected growth rates were less accurate as 1980 approached. The following tabulation presents the change between the historical growth rate and the projected growth rate (projected change), the change between the historical and actual growth rate (actual change), and the difference between the two, which is also the error in the projected growth rate (a plus sign indicates growth was projected to increase from the historical rate; minus indicates that growth was projected to decrease):

| Year published | Projected change | Actual change | Difference (error) |
|---|---|---|---|
| 1965 | +0.48 | +0.89 | −0.41 |
| 1970 | + .41 | .95 | − .54 |
| 1973 | −0.32 | .28 | − .60 |
| 1976 | −0.16 | .42 | − .58 |

## Participation rates of groups

How accurate were the projections for individual age-sex groups? Among individual groups, some differences between projected and actual rates leap out; for example those for women age 25 to 34 for all four projections. However, the median of all the differences between the actual and projected rates was zero—the median for men was 1.2 percentage points and for women, −6.0. This was expected because the rates for men have been dropping while those for women have been rising rapidly.

The range of differences between actual and projected participation rates for women was very large. Usual methods for detecting unusually large values, or outliers, detected none. Combining the differences for male

**Table 1. The 1980 labor force and participation rates, actual and as projected in 1965, 1970, 1973, and 1976**

| Age | Labor force (in thousands) as projected in — 1965 | 1970 | 1973[1] | 1976[1] | Actual 1980[1] | Participation rates as projected in — 1965 | 1970 | 1973[1] | 1976[1] | Actual 1980[1] | Difference 1965 | 1970 | 1973[1] | 1976[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total . . . . . . . . . . . . . . . . | 99,942 | 100,727 | 101,809 | 103,759 | 106,821 | 60.4 | 60.5 | 60.8 | 61.6 | 63.3 | −2.9 | −2.8 | −2.5 | −1.7 |
| Men, total . . . . . . . . . . . . . . | 64,061 | 63,612 | 62,590 | 61,988 | 62,088 | 80.3 | 79.2 | 78.0 | 76.8 | 76.8 | 3.5 | 2.4 | 1.2 | 0.0 |
| 16 to 19 . . . . . . . . . . . . . . . | 4,824 | 4,895 | 4,668 | 5,239 | 5,191 | 56.7 | 56.7 | 56.0 | 61.8 | 61.2 | −4.5 | −4.5 | −5.2 | 0.6 |
| 20 to 24 . . . . . . . . . . . . . . . | 9,064 | 8,795 | 8,852 | 8,852 | 9,022 | 87.2 | 83.0 | 83.0 | 84.1 | 85.7 | 1.5 | −2.7 | −2.7 | −1.6 |
| 25 to 34 . . . . . . . . . . . . . . . | 17,590 | 17,815 | 17,523 | 16,925 | 16,943 | 96.2 | 96.0 | 94.6 | 94.1 | 94.2 | 2.0 | 1.8 | 0.4 | −0.1 |
| 35 to 44 . . . . . . . . . . . . . . . | 12,084 | 12,086 | 11,851 | 11,878 | 11,901 | 96.7 | 96.1 | 95.1 | 94.6 | 94.6 | 2.1 | 1.5 | 0.5 | 0.0 |
| 45 to 54 . . . . . . . . . . . . . . . | 10,219 | 10,082 | 9,908 | 9,929 | 9,989 | 95.0 | 94.0 | 91.6 | 90.0 | 90.3 | 4.7 | 3.7 | 1.3 | −0.3 |
| 55 to 64 . . . . . . . . . . . . . . . | 8,184 | 7,849 | 7,730 | 7,275 | 7,165 | 83.7 | 80.5 | 79.1 | 72.5 | 71.4 | 12.3 | 9.1 | 7.7 | 1.1 |
| 65 and over . . . . . . . . . . . . . | 2,096 | 2,090 | 2,058 | 1,890 | 1,877 | 21.8 | 22.0 | 21.2 | 18.7 | 18.3 | 3.5 | 3.7 | 2.9 | 0.4 |
| Women, total . . . . . . . . . . . . | 35,881 | 37,115 | 39,219 | 41,771 | 44,733 | 41.9 | 43.0 | 45.0 | 47.7 | 50.9 | −9.0 | −7.9 | −5.9 | −3.2 |
| 16 to 19 . . . . . . . . . . . . . . . | 3,286 | 3,449 | 3,669 | 4,246 | 4,358 | 46.6 | 41.0 | 45.5 | 44.6 | 53.0 | −6.4 | −12.0 | −7.5 | −8.4 |
| 20 to 24 . . . . . . . . . . . . . . . | 5,380 | 5,991 | 6,592 | 7,116 | 7,170 | 52.6 | 57.7 | 63.4 | 68.4 | 69.0 | −16.4 | −11.3 | −5.6 | −0.6 |
| 25 to 34 . . . . . . . . . . . . . . . | 7,347 | 8,427 | 9,250 | 10,417 | 11,890 | 40.3 | 46.5 | 50.2 | 57.3 | 65.3 | −25.0 | −18.8 | −15.1 | −8.0 |
| 35 to 44 . . . . . . . . . . . . . . . | 6,386 | 6,708 | 6,869 | 7,638 | 8,605 | 50.0 | 53.3 | 53.2 | 58.0 | 65.2 | −15.2 | −11.9 | −12.0 | −7.2 |
| 45 to 54 . . . . . . . . . . . . . . . | 6,805 | 6,259 | 6,537 | 6,609 | 6,973 | 59.5 | 55.2 | 56.2 | 56.6 | 59.6 | −0.1 | −4.4 | −3.4 | −3.0 |
| 55 to 64 . . . . . . . . . . . . . . . | 5,337 | 5,103 | 5,057 | 4,628 | 4,591 | 47.3 | 45.0 | 44.7 | 45.6 | 41.1 | 6.2 | 3.9 | 3.6 | 4.5 |
| 65 and over . . . . . . . . . . . . . | 1,340 | 1,178 | 1,239 | 1,737 | 1,144 | 9.9 | 8.5 | 8.6 | 11.7 | 7.6 | 2.3 | 0.9 | 1.0 | 4.1 |

[1] Middle scenarios.
[2] The 1980 labor force data are based on 1970 census weights.
NOTE: Differences with negative values were projected less than actual; those with a positive value were projected higher than actual.

and female rates does detect some outliers. The rates projected in 1965 and 1970 for women age 25 to 34 were underprojected by 25.0 and 18.8 percent. This group also had the greatest change in labor force participation over the period. One questions if a projected rise in participation of more than 25 percentage points would have been credible in 1965. The changes affecting labor force participation of women—fewer births, fewer marriages, unprecedented inflation, more education—affected women in the 25 to 44 age group the most.

*Labor force composition.* The projected labor force composition (age-sex structure) is of concern to those using the projections for equal opportunity purposes or for some types of market research. Table 2 shows the projected and actual distribution of the labor force. The actual and projected labor force participation rates for all four projections are illustrated in chart 1. If the projections were perfect, they would be plotted on a straight line with a slope of one (an angle of 45 degrees) going through the origin, which is the line of perfect projection.[6] When the four projections are combined, our hypothesis that the actual and projected fall on the line of perfect projection, or that the composition was correctly projected is rejected. The implication is that the composition of the labor force was poorly projected.

The bars on chart 1 show the means of the actual and projected labor force rates; if the bars were on the line of perfect fit, there would be no bias in the projection. The fit of projected against actual always goes through the point where the two means cross. If the slope of this line is different from the line of perfect fit, the composition has not been accurately projected. If the line is parallel to the line of perfect fit, then it is biased. On the other hand, if the projection is unbiased but the trend has not been accurately projected, the projection line will cross the line of perfect fit where the means cross on the line of perfect forecast.

## Assumptions and realities

The Bureau of Labor Statistics' labor force projections have been based on past trends of labor force activity extended forward to particular "target" years. The extrapolated rates (modified when necessary) are then applied to population levels projected by the Bureau of the Census, producing projected labor force levels.

This general approach is essentially supply oriented. Because of this orientation, the characteristics which received the most attention from the analysts were the impact of marital status and the presence of children on the labor force activity of women and the impact of school enrollment on the participation of younger workers. For example, the analysts who prepared the 1965 and 1970 projections considered work and childrearing

| Age | Projected in | | | | Actual 1980[2] | Difference | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1965 | 1970 | 1973[1] | 1976[1] | | 1965 | 1970 | 1973 | 1976 |
| Men, total | 64.1 | 63.2 | 61.5 | 59.7 | 58.1 | 6.0 | 5.0 | 3.4 | 1.6 |
| 16 to 19 | 4.8 | 4.9 | 4.6 | 5.0 | 4.9 | -0.1 | 0.0 | -0.3 | 0.2 |
| 20 to 24 | 9.1 | 8.7 | 8.7 | 8.5 | 8.4 | 0.6 | 0.3 | 0.2 | 0.1 |
| 25 to 34 | 17.6 | 17.7 | 17.2 | 16.3 | 15.9 | 1.7 | 1.8 | 1.4 | 0.5 |
| 35 to 44 | 12.1 | 12.0 | 11.6 | 11.4 | 11.1 | 0.9 | 0.9 | 0.5 | 0.3 |
| 45 to 54 | 10.2 | 10.0 | 9.7 | 9.6 | 9.4 | 0.9 | 0.7 | 0.4 | 0.2 |
| 55 to 64 | 8.2 | 7.8 | 7.6 | 7.0 | 6.7 | 1.5 | 1.1 | 0.9 | 0.3 |
| 65 and over | 2.1 | 2.1 | 2.0 | 1.8 | 1.8 | 0.3 | 0.3 | 0.2 | 0.0 |
| Women, total | 35.9 | 36.8 | 38.5 | 40.3 | 41.9 | -6.0 | -5.0 | -3.4 | -1.6 |
| 16 to 19 | 3.3 | 3.4 | 3.6 | 4.1 | 4.1 | -0.8 | -0.7 | -0.5 | 0.0 |
| 20 to 24 | 5.4 | 5.9 | 6.5 | 6.9 | 6.7 | -1.3 | -0.8 | -0.2 | 0.1 |
| 25 to 34 | 7.4 | 8.4 | 9.1 | 10.0 | 11.1 | -3.8 | -2.8 | -2.0 | -1.1 |
| 35 to 44 | 6.4 | 6.7 | 6.7 | 7.4 | 8.1 | -1.7 | -1.4 | -1.3 | -0.7 |
| 45 to 54 | 6.8 | 6.2 | 6.4 | 6.4 | 6.5 | 0.3 | -0.3 | -0.1 | -0.2 |
| 55 to 64 | 5.3 | 5.1 | 5.0 | 4.5 | 4.3 | 1.0 | 0.8 | 0.7 | 0.2 |
| 65 and over | 1.3 | 1.2 | 1.2 | 1.7 | 1.1 | 0.3 | 0.1 | 0.1 | 0.6 |

**Table 2. Distribution of the 1980 labor force, actual and as projected in 1965, 1970, 1973, and 1976**

[1] Middle scenarios.
[2] The 1980 labor force data are based on 1970 census weights.

uncompatible roles. The analysts who prepared the 1973 projections felt that the rapid changes in participation rates would not continue; the analyst who prepared the 1976 projection allowed the rapid changes in female participation rates to continue.[7]

It will be helpful to review the changes in marital status, presence of children, and educational attainment that have occurred since 1965. While such a discussion will not explain the projection errors, it will indicate whether the underlying supply assumptions of the four BLS projections were met.[8]

*Fertility.* Births, which peaked in 1958 with a total fertility rate of 3.8 children per woman, dropped during the 1960's, turned up slightly at the end of the decade, and then dropped until 1976, when fertility rates were below those of the Great Depression. Since then, the rate has risen slowly. The decline in fertility was not anticipated and is an important factor in the underprojection of the labor force activity of women. The negative relationship between fertility and participation lessened, which also was not anticipated. These assumptions by the BLS projectionists were not different from those of other projectionists.

Three points should be remembered when considering the effect of fertility on the labor force status of women. First, the total fertility rate—the sum of the birth rates in a year by specific age groups—overstates the actual changes. That is, no cohort of women averaged 3.8 children, nor does it appear likely that the average will drop to 1.7 children. The changes in fertility were accomplished by shifting both the timing of marrying and of giving birth.[9] It appears that 20 to 30 percent of recent generations of women will not have children.[10] Second, the direction of causality between births and labor force activity is ambiguous. Both are affected by similar

factors, such as education, inflation, and the changing social expectation. Increased labor force participation may induce tastes that are incompatible with motherhood. Third, there is a direct effect on labor force participation in that childbirth generally results in the mother withdrawing from the labor force, even if for a short time.

*Marital status.* The changing marital status of the population also affected the growth of the labor force. Not as many married women lived in traditional (spouse present) households.

There was a small, 3-percent annual change in the proportion of married women over the 15-year-period, but if applied to the 87 million women in 1980 who

**Chart 1. Labor force participation rates for 1980, actual and projected in 1965, 1970, 1973, and 1976**
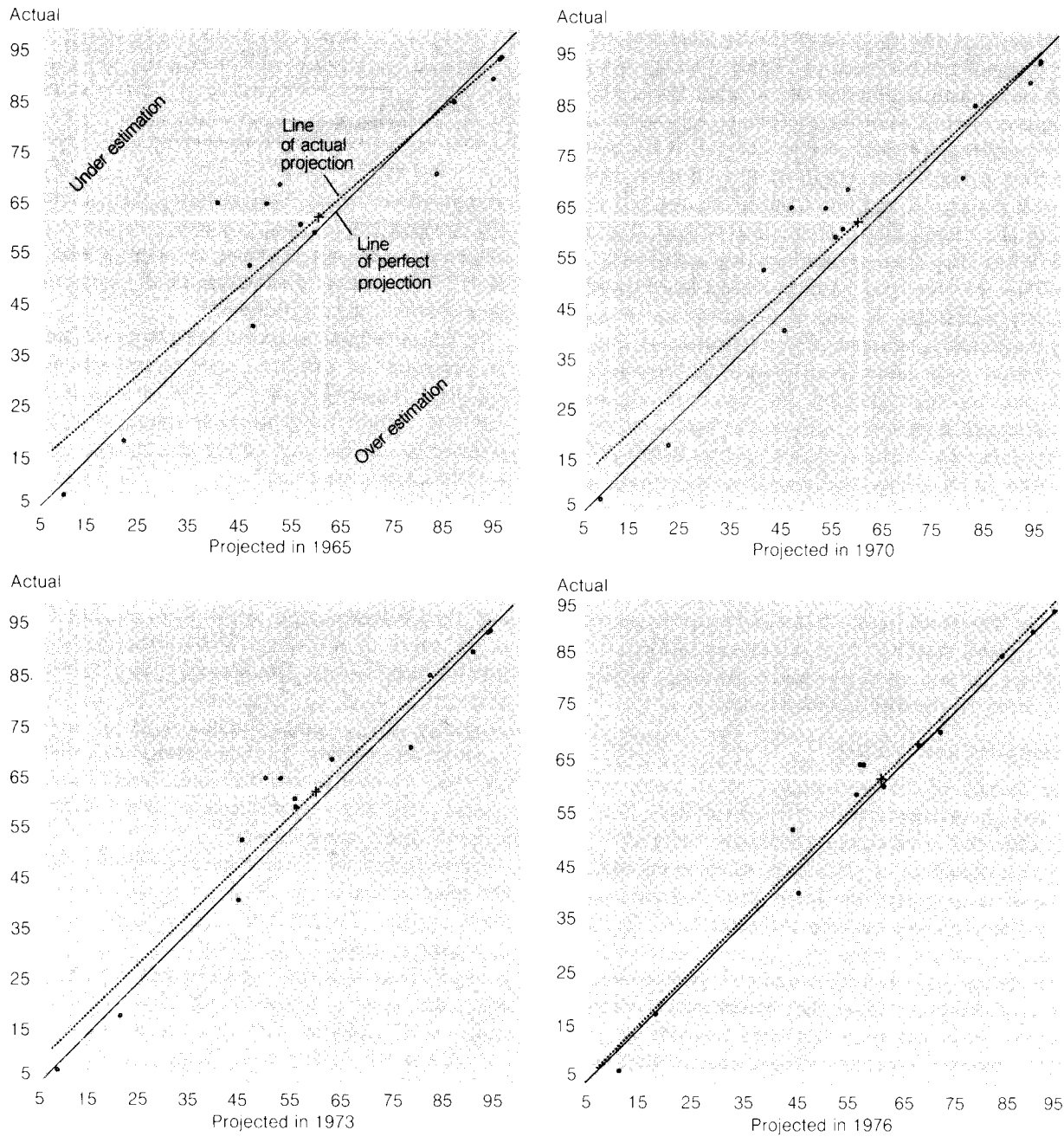
were 16 or older, it amounts to almost 3 million fewer married women. This shift in the proportion of married women resulted in a greater number of women in the labor force, and was reinforced by the increase in the participation rates of married women. The drop in the proportion of married women reflects the "marriage squeeze," the increased divorce rate, and the postponement of marriage. (Marriage squeeze refers to the joint effect of increasing births and the marriage of women to men about 2 years older. About 20 years after the period of increasing births, there would be fewer men than women of marriageable age.) These factors also lowered the birth rate and the proportion of women with young children.

*Parental status.* As the proportion of women with young children dropped (as the lower fertility rates implied), their share of the labor force rose. The 1965 projection did not assume growth in the labor force participation of mothers of young children and also did not expect births to drop to such a low level. The 1970 projection also did not explicitly include these assumptions. The 1973 and the 1976 projections attempted to project the number of women with young children by using the current population projections of births. However, both projections overestimated the proportion of mothers of young children and, thus, underprojected the growth of the labor force. The implicit assumption in each projection of the size of the negative relationship between the presence of young children and the labor force activity of their mothers was another factor in the underprojection of the labor force activity of women with young children. In addition, it is more difficult to project marital and parental status than labor force status.

*Education.* American workers steadily increased their years of formal schooling between 1965 and 1980. This behavior was explicitly modeled in the 1965 and 1970 projections and implicitly assumed in the 1973 and 1976 projections. As education increases, the labor force participation of women also increases.[11]

*Inflation.* Price changes affect many aspects of economic and social life and, thus, would be expected to have some effect upon labor force activity. Certainly, the projectionists made no explicit assumptions about the rate of price increase, but its effect on participation has been explored by many.[12] Valerie K. Oppenheimer suggested that wives participate more actively in the labor force to maintain family spending because real earnings of the husband remain constant while the family life-cycle requires increasing real income. James E. Duggan found that increased participation of wives is partly caused by the uncertainty engendered by rapid rates of price

change. Thus, the rapid price changes of recent years probably contributed to the larger than anticipated labor force growth.

To summarize the assumed versus actual experiences affecting the 1980 labor force, fertility was lower than anticipated, resulting in higher female participation than projected; the lesser rate of withdrawal by women to tend young children also meant higher participation. The proportion of women living with their spouses dropped, which would tend to make female participation rise. We cannot evaluate how well this was anticipated in 1965 because of data limitations; since 1970, it has not been formally a part of the "model." The number of years of schooling completed rose and, for women, so did participation.[13] Finally, the unprecedented rise in inflation was not anticipated and probably resulted in more wives actively seeking work.

## Comparison with other projections

In 1977, Data Resources, Inc., projected that the civilian labor force would increase to 102,500,000 in 1980, or 1.95 percent per year.[14] By comparison, in 1976, BLS projected a civilian labor force of 101,600,000 in 1980, a growth rate of 1.86 percent per year. The 1980 labor force was 104,700,000, a 2.46-percent growth rate.

Data Resources projection had a somewhat smaller error (−.51 percent) than the BLS projection (−.60 percent), and, of course, was made a year later. Table 3 compares the projected civilian labor force rates of Data Resources and BLS.

Overall, BLS did slightly better at projecting 1980 participation rates than did Data Resources; the mean of the absolute values of the deviations is 2.0 for BLS and 2.5 for Data Resources. Both were good at projecting male rates, but Data Resources was superior at projecting female rates. Interestingly, Data Resources was

**Table 3. Comparison of Data Resources and BLS projections of 1980 civilian labor force participation rates**

[In percent]

| Age | Projection | | Actual | Errors | |
|---|---|---|---|---|---|
| | Data Resources | BLS | | Data Resources | BLS |
| Women: | | | | | |
| 16 to 17 | 45.3 | 43.1 | 43.8 | 1.5 | −0.7 |
| 18 to 19 | 62.5 | 60.0 | 62.1 | .4 | −2.1 |
| 20 to 24 | 69.7 | 68.4 | 69.0 | −.7 | −.6 |
| 25 to 34 | 62.4 | 57.4 | 65.4 | −3.0 | −8.0 |
| 35 to 44 | 60.1 | 58.3 | 65.5 | −5.4 | −7.2 |
| 45 to 54 | 55.7 | 57.1 | 59.9 | −4.2 | −2.8 |
| Men: | | | | | |
| 16 to 17 | 50.3 | 50.6 | 50.1 | .2 | .5 |
| 18 to 19 | 66.5 | 71.5 | 71.5 | −5.0 | 0 |
| 20 to 24 | 81.6 | 84.2 | 86.0 | −4.4 | −1.8 |
| 25 to 34 | 93.1 | 95.2 | 95.3 | −2.2 | −.1 |
| 35 to 44 | 94.0 | 95.5 | 95.5 | −1.5 | 0 |
| 45 to 54 | 89.9 | 91.2 | 91.2 | −1.3 | 0 |

NOTE: These rates do not reflect any adjustment for the 1980 census.

much better at projecting rates for women age 25 to 34 (estimating rates for this age group has always been difficult for BLS). Also, Data Resources' worst projection, that for women age 35 to 44 years, was still better than any of the BLS projection rates for women. Among women, only for those age 16 and 17, and 45 to 54, did BLS have lower projection errors than Data Resources. Among men, the Data Resources projection was better than the BLS projection only for those 16 to 17 years. The feat of projecting some of the rates for men exactly should be discounted, indeed the Data Resources error of 0.2 percentage point should be considered equivalent to an exact projection. In general, the superior projection made by one projecting group for a sex was offset by the errors made in projecting rates for the other group.

## Guidelines for users

The labor force projections are prepared for a variety of users. Within the Bureau of Labor Statistics, they are an input into the employment, output, and occupational projections; they are also used in employment and training policy development, in market research, in equal employment opportunity work, and by many States as inputs into State labor force and population projections.[15] It is not clear what level of accuracy is satisfactory—we presented several measures of errors; the user of the projections should select the measure most relevant to the specific application.

There are occasions when the levels or accuracy described here are not sufficient (for example, when the range of uncertainty exceeds the usual levels of unemployment).

If the projections are to be used in simulations concerning unemployment, they should be used with great caution. Nathan Keyfitz commented that the errors in population projections over a 20-year span are sufficiently wide as to limit their usefulness; labor force projections are even more constrained.[16]

Most users tolerate a lower accuracy in long-run than in short-run projections because of their different purposes, and because decisions based on long-run projections can be revised or shifted over time. For example, the decision to build or to not build a sewage treatment facility does not depend on the accuracy of the population projected for a locality, but rather on the likelihood of the population exceeding a specific number. If the facility is built and the population does exceed the threshold number, then the projection was useful even if it was not accurate.[17]

If the future labor force could be determined with no error, it would not be necessary to revise projections. Four comments should be helpful. First, at the time each of the four projections was made the assumptions about the future of the labor force were reasonable. Second, none of the projections has any turning points; it is quite likely that some of the labor force series will indeed change direction. Third, as Henri Theil points out, projections must at some place in their structure hold change constant, whether it is the level of net migration or the rate of change; this has the effect of underestimating the amount of change.[18] Further Jacob Mincer and Victor Zarnowitz say that it is harder to project a rising level of activity.[19] These tendencies results in overestimate of the level of men's labor force activity—and underestimate of the activity of women. The relative sizes of the two components of the labor force is more poorly projected.  □

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————— *FOOTNOTES* —————

[1] Marc Rosenblum, "On the accuracy of labor force projections," *Monthly Labor Review*, October 1972, p. 22–29.

[2] Alfred Tella, "Labor Force Sensitivity to Employment by Age, Sex," *Industrial Relations*, February 1965; and Thomas F. Dernberg, Kenneth Strand, and Judith Dukler, "A Parametric Approach to Labor Force Projection," *Industrial Relations*, October 1966.

[3] Labor force projections are used in preparing employment, output, and occupational projections. The Bureau's occupational projections for 1980 are evaluated by Max L. Carey and Kevin Kasunic, in "Evaluating the 1980 projection of occupational employment," *Monthly Labor Review*, this issue, pp. 22–30.

[4] See the following *Monthly Labor Review* articles: Sophia Cooper and Denis F. Johnston, "Labor Force Projections for 1970–80," February 1965, p. 129–39 (reprinted as Special Labor Force Report 49); Sophia Cooper Travis, "The U.S. labor force: projections to 1985," May 1970, pp. 3–12 (reprinted as Special Labor Force Report 119); Denis F. Johnston, "The U.S. labor force: projections to 1990," July 1973, pp. 3–13 (reprinted as Special Labor Force Report 156); and Howard N Fullerton and P.O. Flaim, "New labor force projections to 1990," December 1976, pp. 3–13 (reprinted as Special Labor Force Report 197).

[5] Michael A. Stoto, "The Accuracy of Population Projections" (Laxenburg, Austria, International Institute for Applied Systems Analysis, 1979). Stoto also found that over the first 10 years of a population projection, the naive extrapolation method was more accurate than other methods.

[6] For more information on this type of comparison, see Henri Theil, *Economic Forecasts and Policy* (Amsterdam, North-Holland Publishing Co., 1965), and *Applied Econometric Forecasting* (Chicago, Rand-McNally and Co., 1966).

[7] The 1965, 1973, and 1976 projections each looked at specific population groups (for example, mothers of young children), thus, it should be possible to partition the error in the labor force projection into that due to the size of a specific group and that due to the projection of labor force rate. However, the archives for the labor force projections are not available, and we can only look at the overall error for the major group.

[8] Only 1965 projections considered the effects of a drop in the unemployment rate (to 3 percent); it concluded that for every 3 jobs created 2 would be filled by the unemployed and one by new labor force entrants. Attempts to prove the effect symmetric were unsuccessful, so it is not possible to conclude what effect the higher unemployment rate would have had on the labor force.

⁹ Arthur A. Campbell, "Beyond the Demographic Transition," *Demography*, 1974, pp. 549–61; and "Baby Boom to Birth Dearth and Beyond," *Annals*, American Academy of Political and Social Sciences, January 1978, pp. 40–60.

¹⁰ David E. Bloom, "What's Happening to the Age at First Birth in the United States? A Study of Recent White and Nonwhite Cohorts," a paper presented at the 1981 meetings of the Population Association of America.

¹¹ Although increases in educational attainment of the population were considered in making labor force projections, the Bureau's two projections of the educational attainment of the labor force were made by forcing the overall labor force projections to the Census Bureau's educational attainment projection for the population.

¹² See, for example, Valerie K. Oppenheimer, "The Life-Cycle Squeeze: The Interaction of Men's Occupational and Family Life Cycles," *Demography*, 1974, pp. 227–45; James E. Duggan, "Inflation, uncertainty, and labor force participation," Bureau of Labor Statistics, 1979; and "The Labor Supply of Married Persons: Evidence From the Current Population Survey," Bureau of Labor Statistics, 1981.

¹³ Reasons for the decrease in male participation rates are not explored in this article. For an analysis, see William V. Deutermann, Jr., "Another look at working-age men who are not in the labor force," *Monthly Labor Review*, June 1977, pp. 9–14.

¹⁴ James Yrshus and Roger Brinner, "Labor force growth to 1990: The impact of changing social roles," *DRI Long Term Review*, Winter 1977, pp. 92–100.

¹⁵ See Ronald E. Kutscher, "New economic projections through 1990—an overview," *Monthly Labor Review*, April 1979, pp. 9–17.

¹⁶ Nathan Keyfitz, "The Limits of Population Forecasting," *Population and Developments Review*, December 1981, pp. 579–93.

¹⁷ Nathan Keyfitz, *Applied Mathematical Demography* (New York, John Wiley and Sons, 1977).

¹⁸ Henri Theil, *Applied Econometric Forecasting*.

¹⁹ Jacob Mincer, and Victor Zarnowitz, "The Evaluation of Economic Forecasts," in Jacob Mincer, ed, *Economic Forecasts and Expectations; Analysis of Forecasting Behavior and Performance* (New York, National Bureau of Economic Research, Columbia University Press, 1969), pp. 3–46.

## A note on communications

The *Monthly Labor Review* welcomes communications that supplement, challenge, or expand on research published in its pages. To be considered for publication, communications should be factual and analytical, not polemical in tone. Communications should be addressed to the Editor-in-Chief, *Monthly Labor Review*, Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C. 20212.