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Methodology for Minnesota Labor Force Participation Projections, 2010-2045

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This describes the methodology used to produce Minnesota statewide labor force participation projections by age-cohort and by gender every five years, beginning in 2010 and extending to 2040. The projections were produced by the Minnesota State Demographic Center and published in August 2013. Each year in the timeline indicates either the projected number or rate of persons considered to be 'in the labor force' as of 1 July of that year.

Data and Time Window:
Statewide labor force participation data from the Decennial Census from 1980-2010, as well as 2011 statewide labor force participation estimates – produced by the American Community Survey[1] – were used to forecast total labor force participation for the next three decades. Bureau of Labor Statistics projections were used for consideration when selecting regression models. Historic data was limited to a time window from 1980-2011; although, alternatives were calculated limiting the historic data to either 1990 or 2000.

Age-cohorts for each gender were each projected individually and are parsed as follows:

[1] Labor Force participation estimates from the American Community Survey can be found here (http://www.census.gov/acs/www/)

Age 16 – 19
Age 20 – 21
Age 22 – 24
Age 25 – 29
Age 30 – 34
Age 35 – 44
Age 45 – 54
Age 55 – 59
Age 60 – 61
Age 62 – 64
Age 65 – 69
Age 70 – 74
Age 74+

Forecast Methods:
Statistical analysis was conducted using the statistical program STATA. Three basic models were used to project the labor force participation of Minnesota by age-cohorts and gender. Analysis of the historical trend, in conjunction with larger regional trends, national projections, and professional intuition, served to guide the choice between different models for each age-cohort by gender. The models are:

1. **Linear regression of statewide participation rate on year**
    a. (*1980*) – Female 62-64, Female 65-69
    b. (*1990*) – Female 22-24, Female 25-29, Female 30-34, Female 75+
    c. (2000) – Male 65-69, Female 70-74
2. **Linear regression of statewide participation rate on year and year-squared**
    a. (*1980*) – Male 25-29, Female 55-59, Female 60-61
    b. (*1990*) – none
    c. *(2000)* – none
3. **Linear regression of log on statewide participation rate on year**
    a. (*1980*) – Male 16-19, Female 16-19, Male 20-21, Male 22-24, Male 60-61, Male 62-64, Male 70- 74
    b. (*1990*) – Male 35-44, Female 35-44, Female 45-54
    c. *(2000)* – Female 20-21, Male 30-34, Male 45-54, Male 55-59, Male 75+

More recent years of historic labor force participation rates – since 2000 – are likely to be more indicative of future trends than are previous rates – from 1980[2]. For this reason, labor force

[2] For example, the 2020 labor force participation rates for any given age-cohort by sex will be more affected by the 2010 rates than by the 1980 rates.

participation rates were each 'weighted'[3] twice as heavy for years 2010 and 2011 relative to all previous data points. This weighting procedure was used consistently for each of the models described above, and for each of the historic time windows[4].

Model choices were decided upon for each age-cohort and gender and labor force participation rates were calculated. These rates were applied to the previously calculated Minnesota age and sex population projections[5] in order to attain whole numbers for male and female labor force participation. Male and female were added together to form a 'total labor force participation' number for each age-cohort. Each age-cohort's total labor force participation was then divided by the corresponding age-cohort's total population, from the same dataset mentioned above, to generate a total labor force participation rate. Please note that because of the process of rounding during calculation, numbers for the total labor force participation will not equal the sum of numbers for male and female labor force participation.

POTENTIAL SOURCES OF ERROR IN PROJECTIONS

There exist potential sources of error in labor force projections. These include:

1. The 2011 estimates used for these projections were based on Census 2010 with a 100% sample. These estimates are likely to be more accurate than estimates will be later in the decade.
2. The national projections could be imprecise.
3. The predicted trend in the Minnesota share of national labor force participation (which these projections are based upon) could change in an unexpected direction.
4. The predicted trend of each age-cohort by gender share of Minnesota population, based upon Minnesota's share of the national totals, could change in an unexpected direction.

For more information regarding the methodology described here, please contact Megan Robertson at Megan.Robertson@state.mn.us or 651-201-2461.

[3] 'Importance weights' in STATA were used to implement this procedure. Using a weight of '2' for each of the following years: 2010 and 2011, while using a '1' for the remaining years, is equivalent to including a second data point with the same value for those years that were weighted double.
[4] For any given age-cohort by gender, the 2010 labor force participation rates were 'weighted' as being twice as 'important' as the 1980 rates, regardless of the model selection or the beginning of the time series.
[5] This dataset is located on the State Demographic Center's website, here: http://www.demography.state.mn.us/resource.html?Id=33109