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BC STATS
Ministry of Finance and
Corporate Relations

British Columbia Labour Force Participation Rate Model

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June 2000.

British Columbia Participation Rate Model

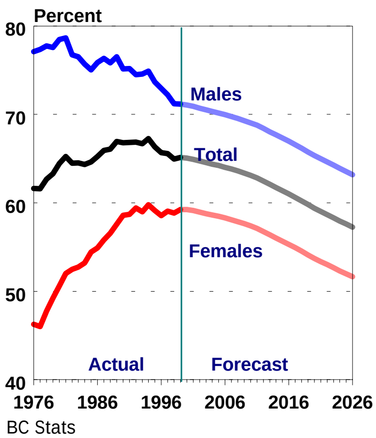
Labour Force Participation Rate
The percentage of working-age population (aged 15 and over) who are either working or looking for work.

Labour Force
The sum of those people aged 15 and over who are either working or are actively looking for work.

The structure of **labour force participation rates** has undergone dramatic change over the last half century in most of the western world. British Columbia has been no exception to this phenomenon. These changes have arisen from a variety of factors, including demographic, economic and social effects.

By far the most significant factor has been the social transformation wherein the proportion of women entering the **labour force** has increased dramatically over the last 50 years. The meteoric rise in female labour force participation rates has far outweighed the downward trend in male participation rates. This downward trend has occurred due to a combination of factors, including better pensions and early retirement incentives that have reduced the participation rate for men in the older age groups. However, these reasons do not explain the overall downward trend for males completely, since participation rates for males in younger age groups have also fallen. There are likely many reasons for the decline in these rates, ranging from economic cycles and structural changes in the economy such as the shift from male-dominated resource extraction industries to more service-oriented jobs, to social changes such as increasing enrolment rates in post-secondary education programs.

Figure 1
BC Labour Force Participation Rates Will Decline Even if Group Rates Remain at Current Levels



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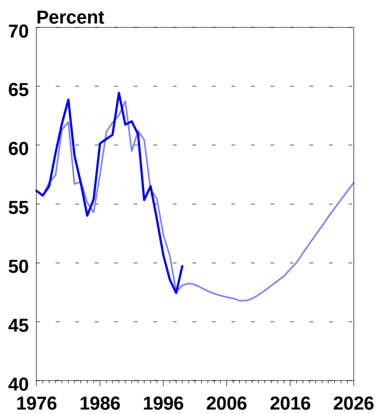
The variance in participation rates by age and gender and the complex reasons for the trends within these groupings makes forecasting an overall rate a complicated exercise. One cannot simply look to the past to forecast what will happen in the future when it comes to labour force participation rates. Whereas the increase in female participation was the main factor driving the change in the overall rate over the last half century, the demographics of an ageing population will likely be responsible for the direction the rate will take over at least the next 25 years. Figure 1 shows that even if the individual age/gender group rates are kept constant at their 1999 values, the overall male, female and total rates will continue to decline.[1] This is because participation rates decline with age and as the population ages and more people move into the older age groups, the proportion of the population 15 and over who are no longer in the labour force will grow correspondingly. This will become particularly acute as the "baby boom" generation starts to retire.

[1] The forecast is based on BC Stats' population forecast 5/00. The population was adjusted to match the labour force definition (i.e., non-institutionalised, non-reserve) by taking the average from 1976 to 1999 of the labour force population divided by the total population and multiplying this ratio by the population forecast.

Statistical Regression
A methodology that relates one or more explanatory variables to the variable one is trying to explain using a mathematical expression.

The British Columbia Labour Force Participation Rate Model (BCLFPRM) attempts to combine economic, social and demographic factors that affect labour force participation. Participation rates are modelled for specific age and gender groups to capture the purely demographic effects. For most age/gender groupings, **statistical regression** was employed to develop equations that can be used to forecast participation rates. In recognition of the different factors that affect different age and gender groups, the equation for each group has a unique structure. The separate age/gender equations are applied to a population projection by those same age/gender groupings to obtain the labour force figures for those groups. These figures are summed to get the male, female and total labour force figures, from which the overall participation rates are then calculated.

Figure 2
BC Labour Force Participation Rates
Population aged 15 to 19
Actual vs. Fitted



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Males and Females aged 15 to 19

The labour force participation rates for this age group are fairly volatile, yet male and female rates are similar. For this reason, the BCLFPRM combines males and females for this age group only into a single equation. The participation rates for this age group, more than any other is affected by the economic cycle. In times of recession or poor economic performance, participation in the labour force is low, whereas in boom times, more people aged 15 to 19 are in the labour force. This is likely due to the fact that in poor economic times, the first people laid off will be those with less experience, as well as those who are working only part-time, which is more likely the case with this age group. Also, there are less likely to be new hires, which means that young people just entering the work force are less likely to get a job.

Dependent Variable
The variable that is being modelled. In this case, the labour force participation rate of the population 15 to 19.

Independent Variables
These are the variables that are used to explain the dependent variable. In this case, the per capita employment variable is an example of an independent variable.

To capture the effects of the economic cycle, a variable measuring change in per capita employment is included in the model (Specifically, the natural log of employment divided by population for the current year, minus the natural log of employment divided by population for the previous year). This variable reflects the economic cycle through the change in the supply of jobs. Both employment and population are measured in terms of the total for the province rather than by specific age group (although the population used is the labour force definition; i.e., it is the population aged 15 and over and does not include institutionalised population nor people living on Indian Reserves). This is in order to reduce any problems that may exist with having the same population base for both the **independent** and **dependent variables**. In addition, a one-year lag of the dependent variable is included. This lag variable reflects the recognition that populations are somewhat slow to change, and therefore the number of people participating in the labour force will be highly correlated to the number in the previous year.

The equation is as follows:

$$PRT^{1519}_{t} = \exp\left[0.206 + 0.947 \ln(PRT^{1519}_{t-1}) + 1.488\ LEP\right]$$

St. Error:	(0.364)	(0.090)	(0.339)
t-value:	(0.6)	(10.5)	(4.4)

Natural Log
The logarithm having base *e*, where *e*=2.71828.

where PRT^{1519} is the labour force participation rate for the age group 15 to 19, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the **natural log** of the items in parentheses, and LEP is the per capita employment variable defined above [i.e., $LEP = \ln(Emp_t/Pop_t) - \ln(Emp_{t-1}/Pop_{t-1})$].

Equation statistics:[2]
R^2: 85.8%
$\bar{R}^2$: 85.2%
Durbin h: 0.4
Observations: 23

Exponential
The exponential function is defined as e^x. Essentially, the exponential is the inverse of the natural log.

The purpose of taking the natural log is to reduce growth in the variance of the data over time. Note that both sides of the equation are logged and in order to solve for the labour force participation rate, the **exponential** is taken of the right side of the equation.

The forecast is for labour force participation rates in this group to recover over time as the economic performance improves. However, it is unlikely that rates will approach the highs reached in the late seventies and eighties. This is due in part to the increase in student enrolment in post-secondary education, as well as the decline in high school dropouts.

Serial Correlation
An equation has serial correlation (AKA **Autocorrelation**) if the error terms from different observations are correlated. The Durbin-Watson statistic is used to test for autocorrelation. Generally, if the Durbin-Watson statistic has a value near 2, there is no serial correlation.

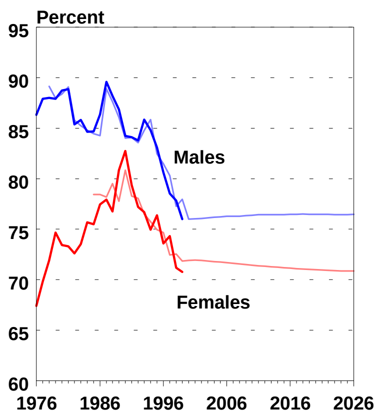
[2] The Durbin *h* statistic is used rather than the Durbin-Watson statistic to test for **serial correlation** when an equation has a lagged endogenous variable, since the presence of a lagged endogenous variable will often give the Durbin-Watson statistic a value close to 2 even when there is **autocorrelation**. The Durbin *h* statistic is defined as follows:

$$h = \left(1 - \frac{DW}{2}\right)\sqrt{\frac{T}{1 - T\left[Var(\hat{\beta})\right]}}$$

where DW is the Durbin-Watson statistic, T is the number of observations, and $Var(\hat{\beta})$ is estimated as the square of the standard error of the coefficient of the lagged endogenous variable [for more details see R.S. Pindyck and D.L. Rubinfield (1981) *Econometric Models and Economic Forecasts,* Second Edition. New York: McGraw-Hill, pp. 194-195.]

Figure 3

BC Labour Force Participation Rates
Population aged 20 to 24
Actual vs. Fitted



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Males aged 20 to 24

Over the last 25 years, the full-time student enrolment rate for men in this age group has doubled. This has had a significant effect on labour force participation rates in this age group. Participation rates have declined dramatically for men aged 20 to 24, particularly in the last 10 years. The increase in student enrolment can likely be attributed to more than one factor, including poor job markets during weak economic times, as well as an increasing demand for a highly educated workforce in a technical world where computers have become commonplace in many diverse workplaces.

To capture the effect of the change in student attendance, a variable measuring the percentage of males 20 to 24 enrolled full-time in school is included in the model. In addition, the same per capita employment variable used for the 15 to 19 age group is also included to reflect the impact of the economic cycle and the result of potential employees giving up the search for work out of discouragement (the "discouraged worker effect").

The equation is as follows:

$$PRM^{2024*} = 0.418 + 0.220\ LEP^* - 0.142\ SEM^*$$

St. Error:	(0.004)	(0.107)	(0.026)
t-value:	(95.0)	(2.1)	(-5.5)

$$PRM^{2024*} = \ln(PRM^{2024}_t) - \rho \ln(PRM^{2024}_{t-1})$$
$$LEP^* = LEP_t - \rho\ LEP_{t-1}$$
$$SEM^* = \ln(SEM_t) - \rho \ln(SEM_{t-1})$$
$$\rho = 0.9$$

or:

$$PRM^{2024}_t = \exp[0.418 + 0.220(LEP_t - 0.9\ LEP_{t-1}) - 0.142(\ln(SEM_t) - 0.9\ \ln(SEM_{t-1})) + 0.9\ \ln(PRM^{2024}_{t-1})]$$

where PRM^{2024} is the labour force participation rate for males 20 to 24, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses, LEP is the per capita employment variable defined earlier, and SEM is the school enrolment rate for males 20 to 24.

Equation statistics:
Transformed R^2: 93.8%
Durbin-Watson: 1.8
Observations: 22

Hildreth-Lu Procedure
A procedure used to correct for serial correlation. The procedure calculates the residual error based on values of ρ from 0 to 1 and selects the value that results in the lowest error (where ρ is the serial correlation coefficient). A value of 0 means there is no serial correlation, while a large value implies that first-order serial correlation is present in the equation.

This equation has been corrected for autocorrelation using the **Hildreth-Lu procedure**. The value of the Durbin-Watson statistic on the original equation was 0.5 which indicated that autocorrelation was present in the equation.

The forecast is for labour force participation rates far lower than those seen in the past, and this is a reflection of the belief that there has been a structural change in which the higher school enrolment rates are expected to continue indefinitely. It is assumed that enrolment rates will level off in the near future, not much higher than where they are presently. Therefore, most of the fluctuation in the participation rates in the future will likely be due to the economic climate that exists.

Females aged 20 to 24

Similar to men, women in this age group have experienced a dramatic increase in rates of student enrolment. In fact, over the last 25 years full-time enrolment rates have tripled, surpassing the enrolment rates for men in the same age group. The model for participation rates for females aged 20 to 24 includes a variable measuring the percentage of females aged 20 to 24 enrolled full-time in school to reflect this significant change.

The equation is as follows:

$$PRF^{2024*} = 2.044 - 0.165\ SEF^*$$

St. Error:	(0.031)	(0.042)
t-value:	(65.5)	(-4.0)

$PRF^{2024*} = \ln(PRF^{2024}_t) - \rho \ln(PRF^{2024}_{t-1})$
$SEF^* = \ln(SEF_t) - \rho \ln(SEF_{t-1})$
$\rho = 0.5$

or:

$$PRF^{2024}_t = \exp\left[2.044 - 0.165\left(\ln(SEF_t) - 0.5\ln(SEF_{t-1})\right) + 0.5\ \ln(PRF^{2024}_{t-1})\right]$$

where PRF^{2024} is the labour force participation rate for females 20 to 24, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses and SEF is the school enrolment rate for females 20 to 24.

Equation statistics:
Transformed R^2: 77.7%
Durbin-Watson: 2.4
Observations: 14

As with the males, this equation has been corrected for autocorrelation using the Hildreth-Lu procedure. The value of the Durbin-Watson statistic on the original equation was 0.8 which indicated that autocorrelation was present in the equation. In addition, the time series was shortened, with the data for the years 1976 through 1983 taken out of the calculation. This is in recognition of a structural change that has occurred. As can be seen from Figure 3 on page 4, female participation rates for this age group increased rapidly until 1990, before starting to fall again. Much of this increase is due to **cohort** effects where the later cohorts have entered this age group in an era when female participation in the labour force has been encouraged far more than was the case for earlier cohorts. Around 1984, participation rates for females aged 20 to 24 began to experience similar movements to the corresponding male rates for the same age group. This is also around the time when school enrolment rates began to take off.

Cohort
An age cohort is similar to an age group, except that one remains in the same cohort one's entire life, whereas one moves through different age groups over one's lifetime. An example of a cohort is the group of people known as baby-boomers.

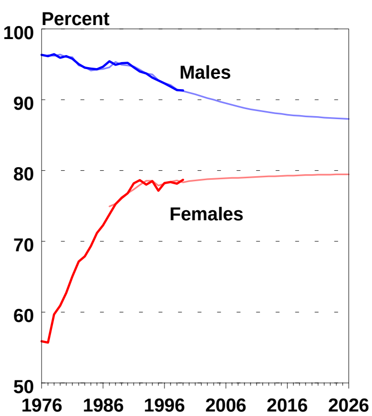
As with males, the forecast is for labour force participation rates far lower than those seen in the recent past due to the belief that the higher school enrolment rates will continue indefinitely.

Males aged 25 to 44

This age group represents the bulk of the labour force. This group has by far the highest labour force participation rates of any age/gender group. However, the rates have been declining over the last 25 years. The model for participation rates for males aged 25 to 44 includes a simple trend variable to account for the downward movement. The same per capita employment variable used in previous equations is also included, as well as a one year lag of the dependent variable to reflect the reality that populations are generally slow to change.

Figure 4

BC Labour Force Participation Rates
Population aged 25 to 44
Actual vs. Fitted



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The equation is as follows:

$$PRM^{2544}_t = \exp[0.149 + 0.967\ \ln(PRM^{2544}_{t-1}) + 0.106\ LEP - 0.001\ \ln(Trend)]$$

St. Error:	(0.360)	(0.078)	(0.034)	(0.001)
t-value:	(0.4)	(12.3)	(3.1)	(-0.8)

where PRM^{2544} is the labour force participation rate for males aged 25 to 44, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses, LEP is the per capita employment variable defined earlier, and Trend is a series 1, 2, 3,…, n, where n is the number of years of the projection.

Equation statistics:
R^2: 96.1%
$\overline{R}^2$: 95.7%
Durbin h: -0.9
Observations: 23

***t*-Statistic**
The *t*-statistic is a statistic derived to test hypotheses based on the *t* distribution, which is a symmetrical distribution similar to the Normal distribution. Normally when it is said that a t-statistic is significant, it means it is significant at 5 percent. This means there is a 95 percent chance that the hypothesis is correct. The hypothesis tested here is that an independent variable should be included in the equation because it helps explain the dependent variable.

Multicollinearity
A situation where two or more independent variables are highly correlated with each other.

Although the ***t*-statistic** on the trend variable is insignificant, to remove the variable will weaken the model. There is some **multicollinearity** between the lag variable and the trend variable that explains the low *t*-statistic. Since this is a forecast model and not an explanatory model, leaving variables that have a high degree of multicollinearity in the model is not necessarily a problem. However, it does mean that interpretation of the coefficients is more difficult.

The forecast is for a continuation of the slight decline over time in the participation rates for this group. The decline is likely due to a combination of factors, including an increased incidence of “stay-at-home” dads, an increase in educational enrolment as men stay in school longer to get more advanced degrees, and possibly some discouraged workers as men working in the resource sectors find their jobs disappearing and can’t find other employment with the same level of remuneration.

Females aged 25 to 44

The participation rates of females aged 25 to 44 experienced a dramatic increase through the seventies and eighties before reaching a plateau in the nineties. It is likely that the rates of this age/gender group will not experience much further growth, although there has been an upward trend in the number of women in this age group who are single, either because they were never married, or because they have been separated or divorced from their spouses. Single women tend to have higher participation rates due to either having fewer family responsibilities, or simply out of necessity, which means if this trend continues, there could still be more increase in the participation rates for this group.

To account for this upward trend in the percentage of single women in this age group and the effect this has on participation rates, the model includes a variable that measures the percentage of single women (including those that are divorced/separated and those that are widowed as well as those that have never been married) in this age group.

The equation is as follows:

$PRF^{2544}* = 2.245 + 0.101\ MSF*$
St. Error: (0.025) (0.038)
t-value: (90.7) (2.7)

$PRF^{2544}* = \ln(PRF^{2544}_t) - \rho \ln(PRF^{2544}_{t-1})$
$MSF* = \ln(MSF_t) - \rho \ln(MSF_{t-1})$
$\rho = 0.5$

or:

$$PRF^{2544}_t = \exp\left[2.245 - 0.101\left(\ln(MSF_t) - 0.5 \ln(MSF_{t-1})\right) + 0.5\ \ln(PRF^{2544}_{t-1})\right]$$

where PRF^{2544} is the labour force participation rate for females 25 to 44, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses and MSF is the percentage of females 25 to 44 who are single.

Equation statistics:
Transformed R^2: 82.7%
Durbin-Watson: 1.9
Observations: 12

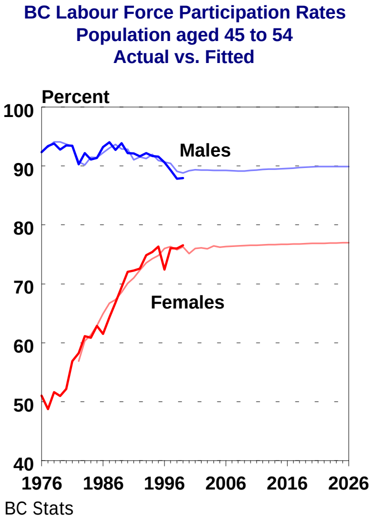
This equation has been corrected for autocorrelation using the Hildreth-Lu procedure. The value of the Durbin-Watson statistic on the original equation was 0.6, which indicated that autocorrelation was present in the equation. The first ten years of the time-series were removed to reflect the structural change where females in this age group have ramped up their participation in the labour force and have now reached somewhat of a plateau. If the earlier years were left in the equation, the dramatic upward trend would unduly affect the equation. The forecast is for a very slow upward creep as the percentage of single women continues to increase slightly, and also as more couples choose to have the husband stay at home with the children while the wife goes to work.

Males aged 45 to 54

The labour force participation rates for this group have been relatively flat over the last 25 years, experiencing only a slight downward trend, and fluctuating somewhat with the economic cycle.

To reflect the stability of participation rates for this age/gender group, the model includes a one-year lag of the dependent variable. A trend variable is included to capture the slight downward trend, and the employment per capita variable used in previous equations is also included here to capture the changes due to the economic climate.

Figure 5



The equation is as follows:

$$PRM^{4554}_t = \exp[1.595 + 0.650 \ln(PRM^{4554}_{t-1}) + 0.346\, LEP - 0.006 \ln(Trend)]$$

St. Error:	(0.665)	(0.146)	(0.100)	(0.003)
t-value:	(2.4)	(4.4)	(3.5)	(-2.1)

where PRM^{4554} is the labour force participation rate for males aged 45 to 54, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses, LEP is the per capita employment variable defined earlier, and Trend is a series 1, 2, 3,…, n, where n is the number of years of the projection.

Equation statistics:
R^2: 75.8%
$\bar{R}^2$: 73.4%
Durbin h: -0.2
Observations: 23

The forecast for labour force participation rates for males aged 45 to 54 is for a recovery from the decline over the last few years (probably due to the poor economic climate) and then to remain relatively flat.

Females aged 45 to 54

Similar to females aged 25 to 44, participation rates for those aged 45 to 54 have undergone a dramatic increase over the last 25 years. Rates have started to reach a plateau, but there should continue to be a slight increase. Most of the increase in participation rates in this age/gender group can be attributed to cohort effects. Young women who were the pioneers with regard to women entering the labour force have moved through this age group as well as those women who followed in their steps. As each cohort increased their rate of participation, as they aged, the result was an increasing participation rate for the older age groups as well. To reflect this cohort effect, the equation includes a five-year lag of the labour force participation rates for females aged 25 to 44.

The equation is as follows:

$$PRF^{4554}_t = \exp[0.604 + 0.855 \ln(PRF^{2544}_{t-5})]$$

St. Error:	(0.236)	(0.056)
t-value:	(2.6)	(15.4)

where PRF^{4554} is the labour force participation rate for females aged 45 to 54, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses, and PRF^{2544} is the labour force participation rate for females aged 25 to 44.

Equation statistics:
R^2: 93.7%
Durbin-Watson: 1.3
Observations: 18

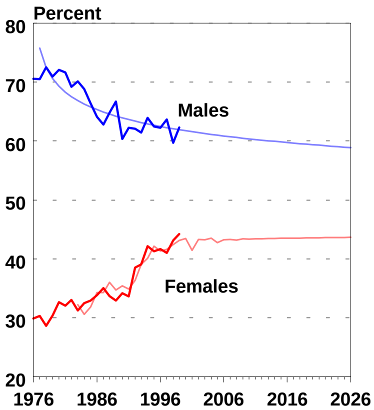
The forecast is for a slight increase over time as later cohorts who have had greater labour force participation than earlier cohorts continue to enter this age group. The increase will be nowhere near the level experienced in the eighties, since cohort differences are dissipating.

Males aged 55 to 64

The participation rates of men in this age group have been trending downward over the last 20 years. The improvement in pensions and the option of early retirement are likely the main reasons for this trend. The participation rate decline is starting to flatten out and will not likely fall much further. The model for male labour force participation rates uses a trend variable to capture the movement towards early retirement.

Figure 6

BC Labour Force Participation Rates
Population aged 55 to 64
Actual vs. Fitted



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The equation is as follows:

$$PRM^{5564}_t = \exp[4.327 - 0.064 \ln(Trend)]$$

St. Error:	(0.021)	(0.009)
t-value:	(209.8)	(-7.4)

where PRM^{5564} is the labour force participation rate for males aged 55 to 64, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses, and Trend is a series 1, 2, 3,…, n, where n is the number of years of the projection.

Equation statistics:
R^2: 72.5%
Durbin-Watson: 1.3
Observations: 23

Females aged 55 to 64

Labour force participation rates for women aged 55 to 64 have been increasing steadily over the last 25 years. As is the case with women in earlier age groups, most of this increase is due to cohort effects. That is, women from later cohorts have had greater labour force participation than those from earlier cohorts, and as these cohorts have moved into this age group, participation rates have correspondingly increased. Similar to the females aged 45 to 54 group, the model for this age/gender group includes a five-year lag of the younger age group of females (45 to 54) to capture this cohort effect.

The equation is as follows:

$$PRF^{5564*} = -0.041 + 0.886\ PRF^{4554*}$$
St. Error: (0.320) (0.128)
t-value: (-0.1) (6.9)

$$PRF^{5564*} = \ln(PRF^{5564}_{t}) - \rho \ln(PRF^{5564}_{t-1})$$
$$PRF^{4554*} = \ln(PRF^{4554}_{t}) - \rho \ln(PRF^{4554}_{t-1})$$
$$\rho = 0.4$$

or:

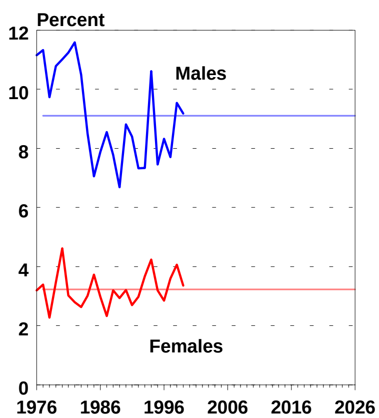
$$PRF^{5564}_{t} = \exp[-0.041 + 0.886(\ln(PRF^{4554}_{t}) - 0.4\ \ln(PRF^{4554}_{t-5})) + 0.4\ \ln(PRF^{5564}_{t-1})]$$

where PRF^{5564} is the labour force participation rate for females 55 to 64, t is the time period, exp is the exponential value of the items enclosed in the square brackets, ln is the natural log of the items in parentheses and PRF^{4554} is the labour force participation rate of females aged 45 to 54.

Equation statistics:
Transformed R^2: 89.3%
Durbin-Watson: 1.8
Observations: 17

This equation has been corrected for autocorrelation using the Hildreth-Lu procedure. The value of the Durbin-Watson statistic on the original equation was 0.9, which indicated that autocorrelation was present in the equation. The forecast is for participation rates for this group to continue to increase slightly as later cohorts who have had greater labour force participation than earlier cohorts continue to enter this age group. As with females aged 45 to 54, the increase will be muted compared to the level of increases experienced in the last few decades.

Figure 7
BC Labour Force Participation Rates
Population aged 65 and Over
Actual vs. Fitted



BC Stats

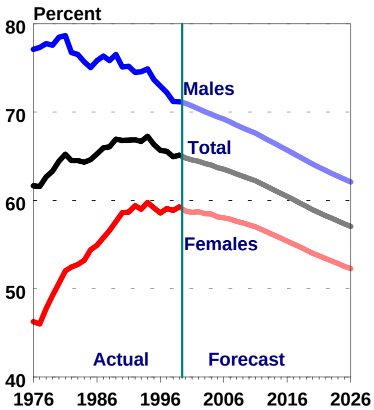
Males and Females aged 65 and over

Labour force participation rates in this age group have been the lowest of any age group. They do not seem to follow any kind of trend and for this reason, it is extremely difficult to attempt to fit a regression line through the observed values. Consequently, no attempt was made to model these age/gender groups, but rather, a simple average over the 1976 to 1999 period is used. Coincidentally, the average over this period for both males and females is very similar to the last observed value in 1999.

British Columbia Overall

Figure 8

BC Labour Force Participation Rates
Overall Projection



BC Stats

Once the age and gender-specific participation rates are calculated using the regression equations that have been developed, the population by age group (as projected by BC Stats) is multiplied by the rates to obtain the labour force by the specified age/gender groups. These numbers are summed to obtain total male, female and overall labour force figures, then the labour force participation rates are calculated for these aggregate groups.[3] Figure 8 displays the actual labour force data to 1999, with forecast values from 2000 to 2026.

The forecast is for labour force participation rates to fall over time, with the gap between male and female rates continuing to shrink, albeit at a diminishing rate. The main reason for the participation rate decline is the demographic effect of an ageing population and the fact that the participation rates for older age groups, particularly the 65 and over group, are substantially lower than rates for younger groups.

The consequences of participation rates declining in this manner are serious. This could lead to severe labour shortages in the future, which in turn will drive up wages. The wage hikes would likely result in inflation, which in turn could lead to substantial interest rate hikes in order to quell the inflation.

The likelihood of this scenario is questionable, however. If wages were to increase substantially, it is likely that more people would be drawn back into the labour force. There would be more opportunities for part-time work, which may also attract more people into the labour force. In addition, there could be legislative changes, such as raising the retirement age, which could lead to increases in labour force participation rates in some age groups. Early retirement may no longer be an option and many older people will be forced to keep working. What all this suggests is that there is likely to be another major structural change in the nature of labour force participation rates sometime within the next 10 to 20 years. For this reason, it is probably a good idea to look at the results of this model for short-term use only. The model may track well for the next five to ten years, but after that, there will likely be renewed growth in labour force participation.

[3] For the age group 15 to 19, the separate male and female labour force figures were derived by applying the growth rate of the total labour force for the age group. This made it possible to calculate overall male and female participation rates.