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POST-SECONDARY  
LONG-TERM COSTING MODEL  
VOLUME SYSTEM USER GUIDE

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POST-SECONDARY  
LONG-TERM COSTING MODEL  
VOLUME SYSTEM USER GUIDE

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## 1. INTRODUCTION

The volume side of the Post-Secondary Student Support Program Long Term Costing Model (PSSSP-LTCM) has been "programmed" using LOTUS 123 version 2.2. The volume system is comprised of four LOTUS worksheets. The first worksheet contains the enrolment figures (historical) and the population figures (historical and projections) needed for the calculations. The other three worksheets contain the programs for the regression, the logistic and the damped exponential approaches. The programs were built to be as userfriendly as possible considering the capability of LOTUS 123 version 2.2.

The purpose of this document is to provide a guide to help the user to run the volume system in order to produce post-secondary enrolment projections. The STEPS to operate each of the worksheets are described below. However, it is assumed that the person who will manipulate the worksheets has some knowledge of LOTUS 123. Consequently, basic operations such as retrieve, save etc., are not explained in this document. Please refer to the LOTUS manual if need be. Furthermore, it is assumed that the user is fully familiar with the methodology of volume side of the PSSSP-LTCM. The methodology and data on which each of the approaches are modelled is described in the documentation for the PSSSP-LTCM.

The volume system should be run year by year. For example, If two years of data need to be entered (eg. 1990 and 1991) then the whole system should be run two times. The first time the first year of data (1990) should be entered and the projections run. The process should then be repeated for the second year of data (1991).

The year for which the system is run (last year of historical data) is referred to as the current year.

The projections are computed taking into account all the historical data from 1976 to the current year.

NOTE: For programming reasons, the number 100 represents the year 2000 and so on (101=2001, 102=2002 etc.).

## 2. PROTECTED CELLS

All the worksheets have protected cells in order to protect the formulas, the macros and the historical data that have been entered. Please do not change the type of protection that has been programmed except when it is specified in the STEPS.

### 3. HOW TO RUN A MACRO

The volume system uses macros to perform the majority of the calculations. The macros are already programmed and they are easy to use. The following instructions describe how to call and run a macro.

STEP M1 Press <ALT-F3> to call the macros

STEP M2 Press F3 to obtain the list of the macros

STEP M3 To select a macro move the cursor to the desired macro and press <ENTER>. Then respond to the prompt (beep) as explained in the STEPS.

NOTE: The macros are displayed in each worksheet around row 100.

### 4. ERROR

If you make a mistake while running one of the worksheets, please do not try to play with protected cells and formulas.

Just cancel the macro : Press <CTRL-BREAK> and press <ESC> then retrieve the same worksheet (without having saved it) and redo the steps.

### 5. STEPS TO RUN THE WORKSHEETS

ENTER LOTUS 2.2

FIRST STEP Change the current directory to A:\SYSTEM

TYPE ==> / F D A:\system <ENTER>

The four worksheets are located in the same directory.

Directory A:\SYSTEM

INITIAL.WK1: Enrolment and population data  
REGRESS.WK1: Regression  
LOGISTIC.WK1: Logistic curve  
DAMPED.WK1: Damped exponential

When one of the last three worksheets is run, enrolment and population data for 1989 and over are automatically retrieved from the worksheet INITIAL.WK1. In order to work properly, all four worksheets MUST stay in the same directory and in LOTUS, the current directory MUST be set to this same directory.

## 5.1 WORKSHEET INITIAL.WK1

This worksheet contains:

- Post-secondary enrolment figures from 1976 to 1989
- Registered Indian population aged 18 to 34, Canada excluding NWT, from 1976 to 1989.
- Registered Indian population projection (aged 18-34), Canada excluding NWT, from 1990 to 2011, (medium scenario).

### 5.1.1 Initial steps

STEP I1. Retrieve the worksheet INITIAL.WK1

STEP I2. Enter or change the enrolment figure for the current year (> 1989) (column D).

NOTE: Figures from 1976 to 1989 must not be changed.

STEP I3. Population figures (Column B) from 1990 to 2015 are projections. If desired these figures can be replaced by the Indian Register values and/or alternative projections as they become available.

STEP I3.1 Move the cursor to the population figure that you wish to change.

STEP I3.2 Unprotect the cell.

TYPE ==> / R U <ENTER>

STEP I3.3 Type the Indian Register population figure (number of registered Indians aged 18 to 34, Canada excluding NWT) and press <ENTER>

STEP I3.4 Protect the cell.

TYPE ==> / R P <ENTER>

STEP I4 Press <HOME> and save the worksheet INITIAL.WK1

### 5.1.2 Initial worksheet graphics

Three graphics are pre-programmed (population, enrolments and participation rates) in this worksheet. To manipulate the graphs, please refer to the instructions described in section 6.

## 5.2 WORKSHEET REGRESS.WK1

This worksheet computes participation rate projections based on the theory of the linear regression model.

### 5.2.1 Regression steps

STEP R1 Retrieve the worksheet REGRESS.WK1

NOTE: The worksheet REGRESS.WK1 must be in the same directory as the worksheet INITIAL.WK1. The current LOTUS directory must be A:\SYSTEM.

STEP R2 Run the macro \DEBUT (see section 3)

This macro will copy the formulas needed to compute the projections, confidence intervals and the Mean of Absolute Deviation (MAD).

STEP R2.1 At first beep (column R), move the cursor to current year + 3 and press <ENTER>.

STEP R2.3 At second beep (column Z), move the cursor to current year + 3 and press <ENTER>.

STEP R2.4 At third beep (column Q), move the cursor to current year + 3 and press <ENTER>.

STEP R2.5 At fourth beep (column AE), move the cursor to current year and press <ENTER>.

STEP R3 Run the macro \REGRESSION

This macro enlarges the range for the regression variables and performs the calculations needed to obtain the projections.

STEP R3.1 At first beep (column A), move the cursor to the current year and press <ENTER>.

STEP R3.2 At second beep (Column F), move the cursor to the current year and press <ENTER>.

The participation rate projections and the corresponding enrolment projections can be found in columns R (R14) and U (U14) respectively.

**STEP R4** Run the macro \CONF.INTERVAL

This macro performs the calculations needed to compute the confidence intervals.

**STEP R4.1** At first beep (column K) move the cursor to the current year and press <ENTER>.

**STEP R4.2** At second beep (column J) move the cursor to the current year and press <ENTER>.

The 90%, 95% and 99% confidence intervals can be found in the following areas:

Part. rates confidence intervals: cell Q56  
Enrolment confidence intervals: cell Z3

**NOTE:** For programming reasons, the confidence intervals are displayed from year 1990 and over. The years that you need are those for the projections i.e.: current year+1, current year+2 and current year+3. Please do not delete any year of data.

The MSE and the MAD can be found in the area of the cell J24.

**STEP R5** Press <HOME> and save the worksheet REGRESS.WK1.

### 5.2.2 Regression worksheet graphics

Six graphics are pre-programmed in the regression worksheet. Three for the participation rates and three for the enrolments. Each graph contains the historical data, the projections and a confidence interval. To manipulate the graphs please refer to the instructions described in section 6.



5.2.3 How to change enrolment and/or population figures for the current year and re-run the REGRESS.WK1 worksheet after a save.

1. Retrieve the worksheet INITIAL.WK1 and execute the STEPS I2 to I4.
2. Retrieve the worksheet REGRESS.WK1 and execute the STEPS R3 to R5.

==>Be careful<==, since you saved the worksheet in the previous run, ranges (column A, F, and J) and formula (column K) are already correctly set. For STEPS R3.1, R3.2, R4.1 and R4.2, even if the cursor appears on year 1989, you don't have to move it, just press <ENTER>.

5.3 WORKSHEET LOGISTIC.WK1

This worksheet computes participation rate projections based on the theory of the logistic curve.

5.3.1 Logistic steps

STEP L1 Retrieve the worksheet LOGISTIC.WK1

NOTE: The worksheet LOGISTIC.WK1 must be in the same directory as the worksheet INITIAL.WK1. The current LOTUS directory must be A:\SYSTEM.

STEP L2 Run the macro \DEBUT

This macro will copy the formulas needed to compute the Mean of Absolute Deviation (MAD) and the Mean Square Error (MSE).

STEP L2.1 At first beep (column K), move the cursor to current year +11 and press <ENTER>.

STEP L2.2 At second beep (column N), move the cursor to current year and press <ENTER>.

STEP L3 Enter the saturation level value(s) in the appropriate cell.

Logistic Low = Cell O3  
Logistic Medium = Cell O4  
Logistic High = Cell O5

NOTE: All the saturation levels must be greater than the largest historical participation rate (actual data in column H cell 20 and onward).

STEP L4 Move the cursor to the cell H20.

==> Press <F5>, type ==> h20 and press <ENTER>

This step is very important. If not performed, the program will fail.

STEP L5 Run one of the macros \LOGLOW, \LOGMED or \LOGHIGH.

These macros test the saturation levels, enlarge the ranges of some variables and perform the calculations needed to obtain the projections.

STEP L5.1 The first operation performed by one of these macros is to test if the saturation level meets the requirements stated earlier (see step L3).

If the saturation level is correct, nothing will happen.

If the saturation level is not correct then you will hear a beep (different from the other that indicates year range) and you will be asked to enter a new saturation level. The instructions will appear at the command line. Please enter the new saturation level and press <ENTER>.

Note: The test will be performed again.

STEP L5.2 At first beep (column G), move the cursor to the current year and press <ENTER>.

STEP L5.3 At second beep (Column I), move the cursor to the current year and press <ENTER>.

The participation rate projections, the corresponding enrolments projections, MSE and MAD can be found in the following areas:

Logistic Low: cell R13  
Logistic Med: cell W13  
Logistic High: cell AB13

STEP L6 Press <HOME> and save the worksheet LOGISTIC.WK1.

### 5.3.2 How to run another macro (\LOGLOW, \LOGMED OR \LOGHIGH)

Re-execute the STEP L3, L4, L5 and L6.

==>Be careful<==, when you ran the first macro, the ranges (column G and I) were already enlarged. In STEP L5.2 and L5.3 you don't have to move the cursor you just press <ENTER>.

### 5.3.3 Logistic worksheet graphics

Two graphics are available. One for the participation rates and one for the enrolments. Each graph contains the historical data and the three curves of projections (LOW MED and HIGH). To manipulate the graphs please refer to the instructions described in section 6.

### 5.3.4 How to change enrolment and/or population figures for the current year and re-run the LOGISTIC.WK1 worksheet after a save.

1. Retrieve the worksheet INITIAL.WK1 and execute the STEPS I2 to I4.
2. Retrieve the worksheet LOGISTIC .WK1 and execute the STEPS L3 to L6

==>Be careful<==, since you saved the worksheet in the previous run, ranges (column G and I) are already correctly set. For STEPS L5.2 and L5.3, you don't have to move the cursor, just press <ENTER>.

## 5.4 WORKSHEET DAMPED.WK1

This worksheet computes participation rate projections based on the exponential smoothing theory.

### 5.4.1 Damped exponential steps

STEP D1 Retrieve the worksheet DAMPED.WK1

NOTE: The worksheet DAMPED.WK1 must be in the same directory as the worksheet INITIAL.WK1. The current LOTUS directory must be A:\SYSTEM.



STEP D2    Run the macro \DEBUT

This macro will copy the formulas needed to compute the projections.

STEP D2.1    At first beep (column G), enter the number of historical data you are using and press <ENTER>.

                  i.e. The number of years from 1976 to the current year inclusive.

                  The number must be greater than or equal to 14.

STEP D2.2    At second beep (column Q), move the cursor to current year and press <ENTER>.

STEP D2.3    At third beep (column M), move the cursor to current year and press <ENTER>.

STEP D2.4    At fourth beep (column N), move the cursor to current year + 1 and press <ENTER>.

STEP D2.5    At fifth beep (column N), move the cursor to current year + 11 and press <ENTER>.

STEP D3    Run the macro \TABLE.

This macro computes the MSE and the MAD tables. There are no steps to execute for this macro. Just wait for the signal "READY" in the top right corner of the screen (about 1 minute).

STEP D4    Run the macro \SERIE.8

This macro computes projections using a trend-adjustment factor of .8 and decreasing the weight factor from 1 to .3 by .1. There are no steps to execute for this macro. Just wait for the signal "READY" in the top right corner of the screen (about 11 seconds).

STEP D5    Run the macro \SERIE.9

This macro computes projections using a trend-adjustment factor of .9 and decreasing the weight factor from 1 to .3 by .1. There are no steps for this macro. Just wait for the signal "READY" in the top right corner of the screen (about 11 seconds).

STEP D6 Press <HOME> and save the worksheet DAMPED.WK1.

The participation rate projections and the corresponding enrolments projections can be found in the following cells:

Participation rates, serie .9: cell AL13  
Enrolment, serie .9: cell AW13

Participation rates, serie .8: cell BH13  
Enrolment, serie .8: cell BS13

5.4.2 How to change the trend-adjustment factor and/or the weight control factor.

1. Go to cell Q3 and enter the trend-adjustment factor. It must be between 0 and 1 inclusive.
2. Go to cell L4 and enter the weight control. It must be between 0 and 1 inclusive.

Participation rates (column N) and corresponding enrolments (column T) are automatically calculated.

5.4.3 Damped exponential worksheet graphics

Five graphics are available. Two for the participation rates, Two for the enrolments and one for the MSE table. The graphics for the participation rates and the enrolments contain the historical data and three curves of projections (weight = 1, .9, .8). To manipulate the graphs please refer to the instructions described in section 6.

5.4.4 How to change enrolment and/or population figures for the current year and re-run the DAMPED.WK1 worksheet after a save.

Replace the enrolment and/or the population figure for the current year.

1. Retrieve the worksheet INITIAL.WK1 and execute the STEPS I2 to I4.
2. Retrieve the worksheet DAMPED.WK1 and execute the STEPS D3 to D6.

## 6. HOW TO PRODUCE A GRAPHIC:

Various pre-programmed graphics are available in the four worksheets.

### INITIAL.WK1

- ENROLMENTS: Historical enrolments
- PART.RATES: Historical participation rates
- POPULATION: Registered Indian population aged 18-34, Canada excluding NWT, 1976 to 2005:

### REGRESS.WK1

- RATES.90: Participation rate projections with 90 % confidence interval.
- RATES.95: Participation rate projections with 95 % confidence interval.
- RATES.99: Participation rate projections with 99 % confidence interval.
- ENROL.90: Enrolment projections with 90 % confidence interval.
- ENROL.95: Enrolment projections with 95 % confidence interval.
- ENROL.99: Enrolment projections with 99 % confidence interval.

NOTE: All the graphics of the regression worksheet will contain confidence interval from 1990. If the projections are made for 1995, 1996 and 1997 the graphics will show confidence interval from 1990. Please DO NOT ERASE the years you don't need because they contain formulas that are needed in the program. Instead, edit the graph using Harvard Graphics or copy (using range value) the data you need somewhere else in the worksheet and create a new graph.

### LOGISTIC.WK1

- PART.RATES: Participation rate projections
- ENROLMENTS: Enrolment projections

### DAMPED.WK1

- RATES.8: Participation rate projections serie trend=.8
- RATES.9: Participation rate projections serie trend=.9
- ENROL.8: Enrolment projections serie trend=.8
- ENROL.9: Enrolment projections serie trend=.9
- MSE: Table of MSE for various trend and weight



## 6.1 HOW TO ACCESS A GRAPH

- STEP G1 Retrieve the desired worksheet
- STEP G2 To access a graph, TYPE ==> / G
- STEP G3 In the graphic MENU select the command NAME and then the command USE.
- STEP G4 Select the desired graph and press <ENTER>.
- STEP G5 Press any key to get back to the graphic MENU.
- STEP G6 To see the graph again select the command VIEW

## 6.2 HOW TO MODIFY A GRAPH

The graphics were built to include data from 1976 to 1989. To add more years follow these STEPS:

- STEP G7 TYPE ==> X to modify the range of the X axis (years). Move the cursor to the desired year and press <ENTER>.
- STEP G8 TYPE ==> A to modify the range of the historical data (participation rates or enrolments). Move the cursor to the desired year and press <ENTER>.
- STEP G9 TYPE ==> B, C, D, E or F to modify the range of the projections or the confidence intervals. Move the cursor to the desired year and press <ENTER>.

NOTE: Refer to the legend that appears on the screen to see to which data each letter corresponds.

- STEP G10 Select the command view to see the graph

You can also create your own graphics. PLEASE give your graphic a name different from the ones that already exist.

## 6.3 HOW TO SAVE A GRAPH

Once the graphic is correctly modified you must save it in the graphic menu.

- STEP G11 In the graphic Menu TYPE ==> N C then select or write the name of the graphic and press <ENTER>.
- STEP G12 Select the command QUIT to quit the graphic MENU.
- STEP G13 Press <HOME> and save the worksheet.

#### 6.4 HOW TO PRINT A GRAPH

The graphics can be printed either through Lotus 123 or through the Harvard Graphics software. Harvard graphic produce better output and is more flexible in terms of patterns, fonts and printing devices. To produce a graphic output with Harvard Graphics use the IMPORT/EXPORT command combined with IMPORT LOTUS GRAPH command in Harvard Graphics. For more details consult the Harvard Graphics user manual.