S E D A P

A PROGRAM FOR RESEARCH ON

SOCIAL AND ECONOMIC DIMENSIONS OF AN AGING POPULATION

MEDS-E USERS' MANUAL

**Frank T. Denton
Christine H. Feaver
Byron G. Spencer**

SEDAP Research Paper No. 138

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by

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MEDS-E is the economic component of the MEDS (Models of the Economic-Demographic System) simulation/projection system. It is designed for use in projecting Canadian macro-economic aggregates for a period of up to 50 years, starting from 2001. Historical values are included back to 1991.

MEDS is maintained on an on-going basis: see http://socserv2.mcmaster.ca/qsep/ for further information.

MEDS-E Users' Manual

Frank T. Denton, Christine H. Feaver, and Byron G. Spencer

Abstract:
This report is the Users' Manual that accompanies MEDS-E, the economic component of a new Windows-based version of the MEDS (Models of the Economic-Demographic System) software. MEDS-E is designed to make use of the all-Canada population and labour force projections from MEDS-D in projecting various Canadian macro-economic aggregates. The projections, which are made year-to-year, extend as far as 2051.

The time paths of the economic projections are determined by the population and labour inputs, type of aggregate production function chosen, rates of depreciation, and investment, consumption, and other parameters. A set of "standard" assumptions is provided, but users can change those assumptions.

Keywords: population, labour force, projection

JEL Classification: J11, J21

Résumé:
Ce document est le Guide de l'utilisateur qui accompagne MEDS-E, le module économique de la nouvelle version pour Windows du logiciel MEDS (Modèles du système démographique-économique). MEDS-E est conçu pour utiliser les projections de la population et de la main-d'œuvre au Canada de MEDS-D, à l'estimation de divers agrégats macro-économiques canadiens. Les projections, calculées pour chaque année, sont possibles jusqu'en 2051.

Les trajectoires temporelles des projections économiques sont déterminées par la population et la main-d'œuvre, le choix d'une fonction de production agrégée, le taux de dépréciation, ainsi que du niveau de l'investissement, de la consommation et d'autres paramètres. Le MEDS-E fonctionne à partir d'une série d'hypothèses standards qui peuvent être modifiées par l'utilisateur.

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Introduction

MEDS is an acronym for "Models of the Economic-Demographic System." MEDS-E, the economic component of the projection/simulation system, is designed to make use of the all-Canada population and labour force projections from MEDS-D in projecting various Canadian macro-economic aggregates for up to 50 years starting from 2001. Historical values are included back to 1991. Unlike MEDS-D, MEDS-E makes projections only at the Canada level. The time paths of the economic projections are determined by assumptions about the production function, population and labour inputs, rates of depreciation, and investment and consumption parameters. Standard assumptions are provided; users can change them.

The program is designed around a main menu screen which is always displayed. Each option on the main menu has a sub-menu; choosing an option from a sub-menu will usually display another input screen. This manual describes the main menu and sub-menu options, showing sample screens where helpful. Appendix A lists the equations in the model along with definitions of the variables used. Appendix B provides some historical Canadian data which can be referred to in making assumptions about rates and other values that are required for making projections. Finally, Appendix C contains a selection of tables available from a MEDS-E projection.

Installation

MEDS is supplied in a zipped file for installation on a machine running Windows 98 or higher. Users should first read the file **readme.txt** on the Setup Disk. To install, insert the Setup Disk in a drive (e.g. A). Copy the file **pmedsz.zip** into a temporary directory (e.g. C:\temp) and unzip. Run C:\temp\setup.exe and follow the instructions on the screen. After installing, double click on the MEDS-E icon to begin the program. The Main Menu screen appears (see next page).

By default, MEDS-E will use the standard Canadian population and labour force projection as supplied in the MEDS-D file **pmedsd.var**. Other MEDS-D projections may be used in MEDS-E either by (1) changing the MEDS-D assumptions and saving the results in **pmedsd.var**, or (2) by inputting another file created using MEDS-D.

First-time Users

Click **OK** on the Welcome screen, then **About...** to get a quick overview of the program. Then click **Run**, **View Output**, and **Summary Tables** to view tables that show a macro-economic projection for Canada based on standard assumptions.

Main Menu Options

Files is used to save current assumptions and output choices for subsequent re-use, to change file names, and to return to default assumptions.
Select Output is used to view or change output selections; summary tables are always provided.

Assumptions is used to view or change assumptions.

Run is used to make a new projection.

View Output is used to display tables from the most recent projection on the screen.

Print is used to send the table file to the printer or to save it in a format for importing into a spreadsheet.

About is used to get a quick summary of instructions for using MEDS-E.

Quit is used to exit the program.

Note: Options may be selected either by clicking the mouse or from the Main Menu by typing Alt + the letter that is underlined, or from a drop-down menu, by typing only the letter that is underlined.
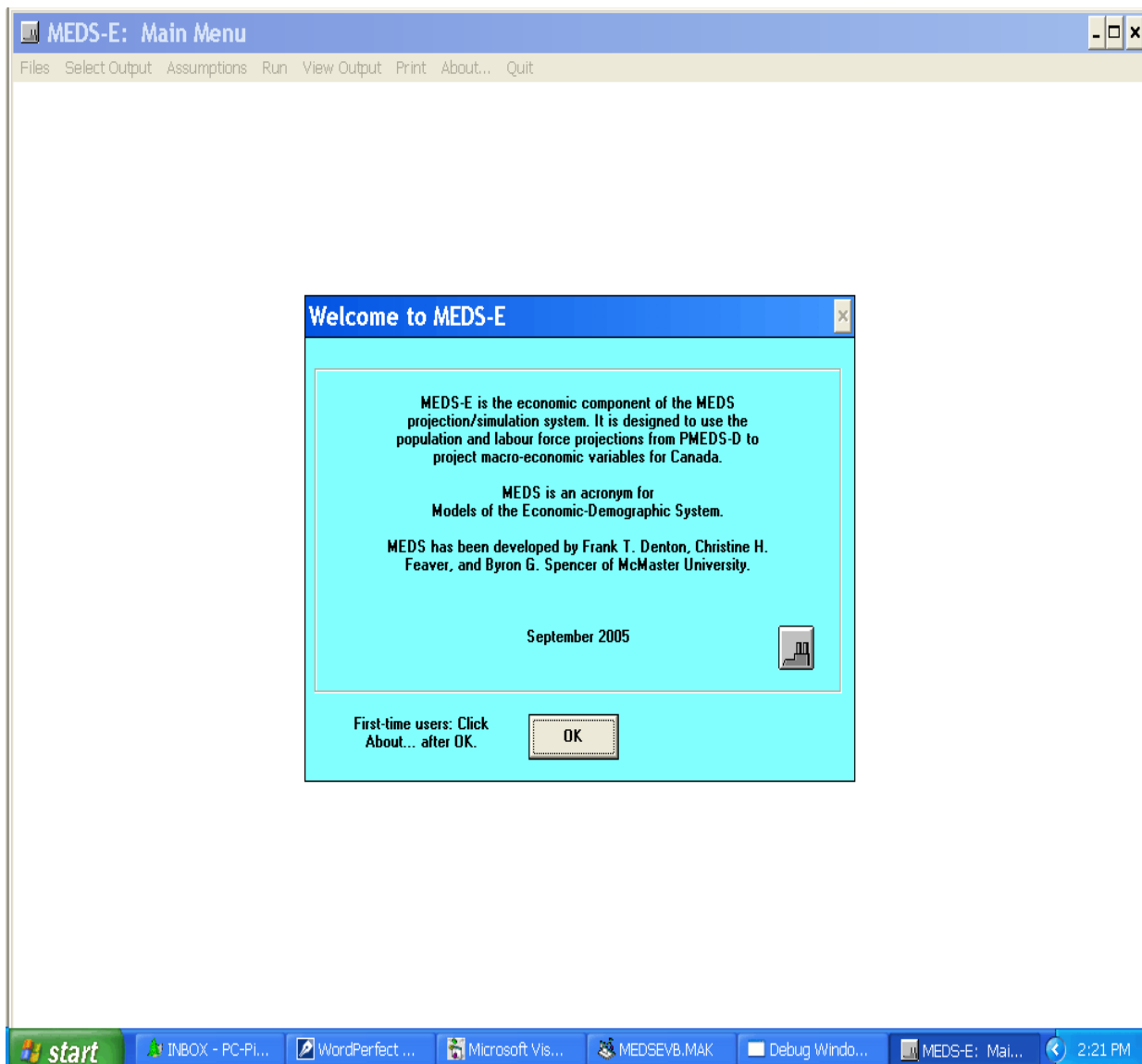
Files Options

Save current assumptions: You may wish to save changes that you have made to the

assumptions or to the output selected for easy recall and reuse.

Suggestion: When prompted to choose a file name, use **.ine** as the file extension to identify it as a MEDS-E input economic file.

Select MEDS-D Variable file: You may use only the default file (**pmedsd.var**) or another file previously saved during a MEDS-D run.

Select Input file: You will be prompted to choose a file name. You may use only the default file (**pmedestd.ine**) or another file previously saved by MEDS-E using the **Save current assumptions** option.

Set file name for Tables: By default, the program stores output tables in the file **pmedse.tab**, over-writing this file for each projection run. To save results from multiple runs for later use, supply a unique file name before each run.

Suggestion: Use **.tab** as the file extension to identify it as a MEDS-E output file.

Set file name for Spreadsheet Data: By default, the program stores output tables in a delimited format suitable for importing into a spreadsheet in the file **medse.prn** and over-writes this file for each projection run. To save results from multiple runs for later use, supply a unique file name before each run. To use this option, after a projection run select **Print**, **To Spreadsheet File**.
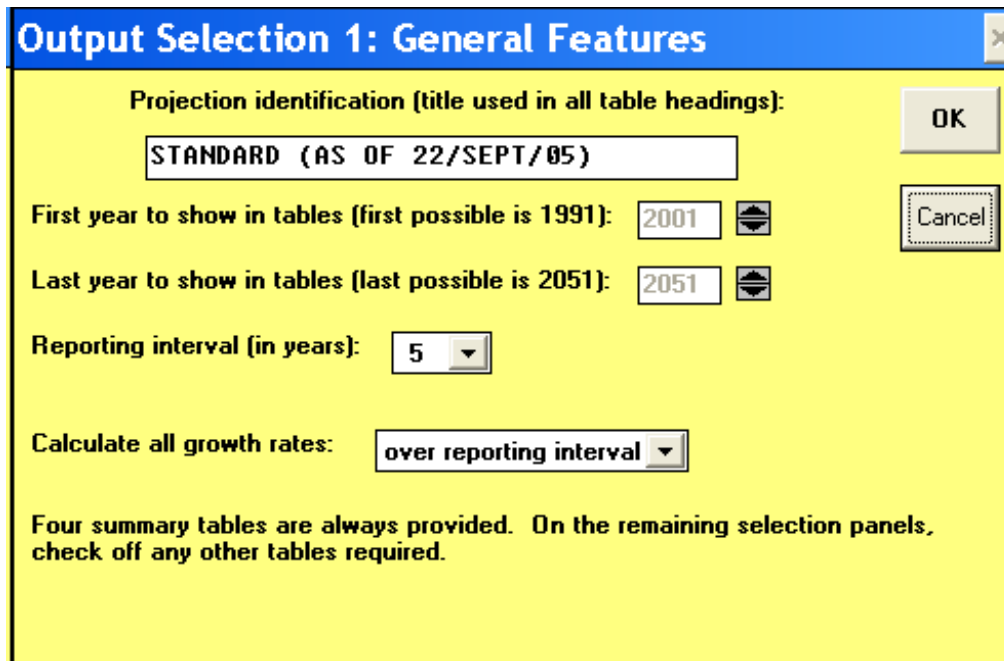
Suggestion: Use **.prn** as the file extension to identify it as a MEDS-E spreadsheet file.

Initialize with Default files: This option will restore all default file names and read in standard assumptions from the default input file, **pmedestd.ine**. If you have made changes which you wish to save for later use, save them in a file by using the **Save current assumptions** option before using the **Initialize** option.

Select Output Options:

For all output selections, when finished with a screen, use the **OK** button to make changes take effect; use **Cancel** to leave original values unchanged.

General Features:

Output Selection 1: General Features

Projection identification (title used in all table headings):

STANDARD (AS OF 22/SEPT/05)

First year to show in tables (first possible is 1991): 2001

Last year to show in tables (last possible is 2051): 2051
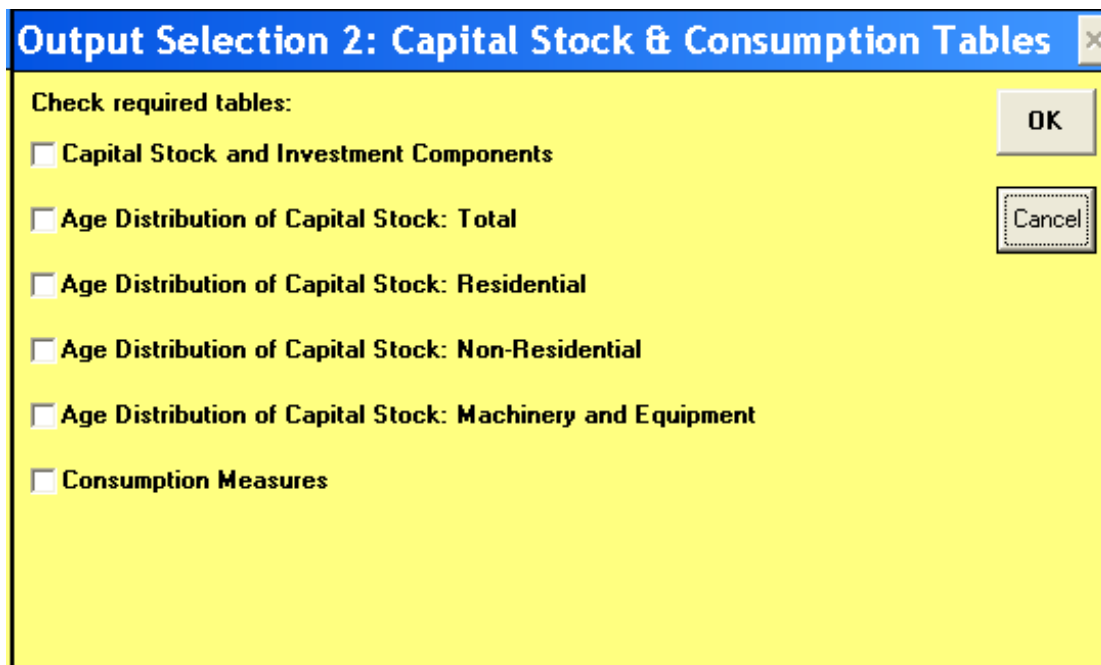
Reporting interval (in years): 5

Calculate all growth rates: over reporting interval

Four summary tables are always provided. On the remaining selection panels, check off any other tables required.

OK

Cancel

- Click on the spin button (the up and down arrowheads) to change the first and last years to be shown in the tables.
- The output can be displayed at 1, 5 or 10 year intervals; reported growth rates may be over the chosen interval or converted to annual averages.
- Projections start from 2001; however, as described below, use is made of more recent data; the user is able to update the information provided so that MEDS-E can take account of the most current information available.

Capital Stock and Consumption Tables:

Output Selection 2: Capital Stock & Consumption Tables

Check required tables:

☐ Capital Stock and Investment Components

☐ Age Distribution of Capital Stock: Total

☐ Age Distribution of Capital Stock: Residential

☐ Age Distribution of Capital Stock: Non-Residential

☐ Age Distribution of Capital Stock: Machinery and Equipment

☐ Consumption Measures

OK

Cancel

- Select by clicking boxes; unselect by clicking again.
- See Table 8 in Appendix C for an example of the Consumption Measures table.

Educational Composition Tables:

- Select by clicking boxes; unselect by clicking again.
- Click on spin button to change the number of age groups displayed (max = 8).
- Adjacent age groups may be combined by editing.
- The projected educational composition is based on assumptions discussed below; see **Assumptions**, **Labour Input**.

Human Capital Tables

- Select by clicking box; unselect by clicking again.
- Click on spin button to change the number of age groups displayed (max = 8).
- Adjacent age groups may be combined by editing.
- The calculations relating to human capital are described in Appendix A.

Assumptions Options

For all screens

- Values on a grey background are fixed; most values on a white background may be changed.
- Click on the spin control (the up and down arrowheads) to increase or decrease the number of years shown on the grid.
- During a projection, MEDS-E generates input values as needed by interpolating linearly between years for which values are specified.
- To change any value in the grid, click on it. Once a box with dotted outline appears, press Enter. Use the delete key to remove unwanted characters before inserting new ones.
- Use the **OK** button to make changes take effect; use **Cancel** to leave original values unchanged.

Production Function: Type:

- Select a production function by clicking the appropriate circle; the program will display the form of the equation, the current values of the parameters and the implied returns to scale.
- Parameter values may be changed.

Production Function: Rate of Neutral Technical Progress:

Rate of Neutral Technical Progress

Number of years: 16 ▲▼   OK

Cancel

Year	PN
1991	0
1992	-.0034
1993	.0037
1994	.0214
1995	.002
1996	-.0033
1997	.0132
1998	.0072
1999	.0188
2000	.0163
2001	-.0087
2002	-.0007
2003	-.0089
2004	.0018
2005	.005
2051	.005

The standard values supplied for 1991 to 2004 are based on the Cobb-Douglas production function; they are chosen to generate published estimates for GDP over this period.

- The standard assumption holds neutral technical progress, PN, constant from 2005 at 0.5% per year (a value consistent with average growth over the previous 25 to 30 years).
- Values of PN for 1992 through 2004 are set so as to be consistent with Statistics Canada estimates of GDP for those years.

Capital Stock and Investment:

Investment Proportions & Depreciation Rates

Number of years: 16

OK **Cancel**

Investment Categories:
RES: Residential;
NRES: Non-residential;
MACH: Machinery and Equipment;
DUR: Consumer Durables

Year	PRES	PNRES	PMACH	PDUR
1991	.20521	.28103	.24888	.26487
1992	.22384	.25185	.25277	.27153
1993	.21773	.25316	.2509	.27821
1994	.21191	.25956	.25551	.27302
1995	.18224	.25954	.2769	.28132
1996	.1916	.24614	.28093	.28133
1997	.18023	.23715	.30264	.27998
1998	.1685	.22853	.31795	.28502
1999	.16207	.21993	.33056	.28744
2000	.16206	.21247	.33494	.29053
2001	.1724	.21996	.31625	.29138
2002	.19039	.20724	.29682	.30556
2003	.19282	.20666	.303	.29753
2004	.19748	.19917	.31329	.29006
2006	.17998	.22368	.30733	.28902
2051	.17998	.22368	.30733	.28902

	DR	DNR	DM	DD
Depreciation Rates:	.025	.03	.085	.1

- The standard assumption moves investment proportions from their most recent actual values to the ten-year average of recent values by the year 2006.
- The proportion assigned to consumer durables is calculated residually and so cannot be changed directly.

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Labour Input: Proportion Part-time: Males, Females:

Proportion Working Part-time by Age: Males

Number of years: 5

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	.649	.177	.057	.037	.033	.029	.028	.042	.064	.122	.324	.445
1996	.655	.231	.078	.05	.04	.039	.038	.05	.072	.149	.336	.404
2001	.641	.201	.071	.045	.038	.039	.039	.049	.073	.152	.319	.383
2004	.633	.223	.074	.044	.039	.037	.038	.048	.082	.152	.305	.452
2051	.633	.223	.074	.044	.039	.037	.038	.048	.082	.152	.305	.452

OK

Cancel
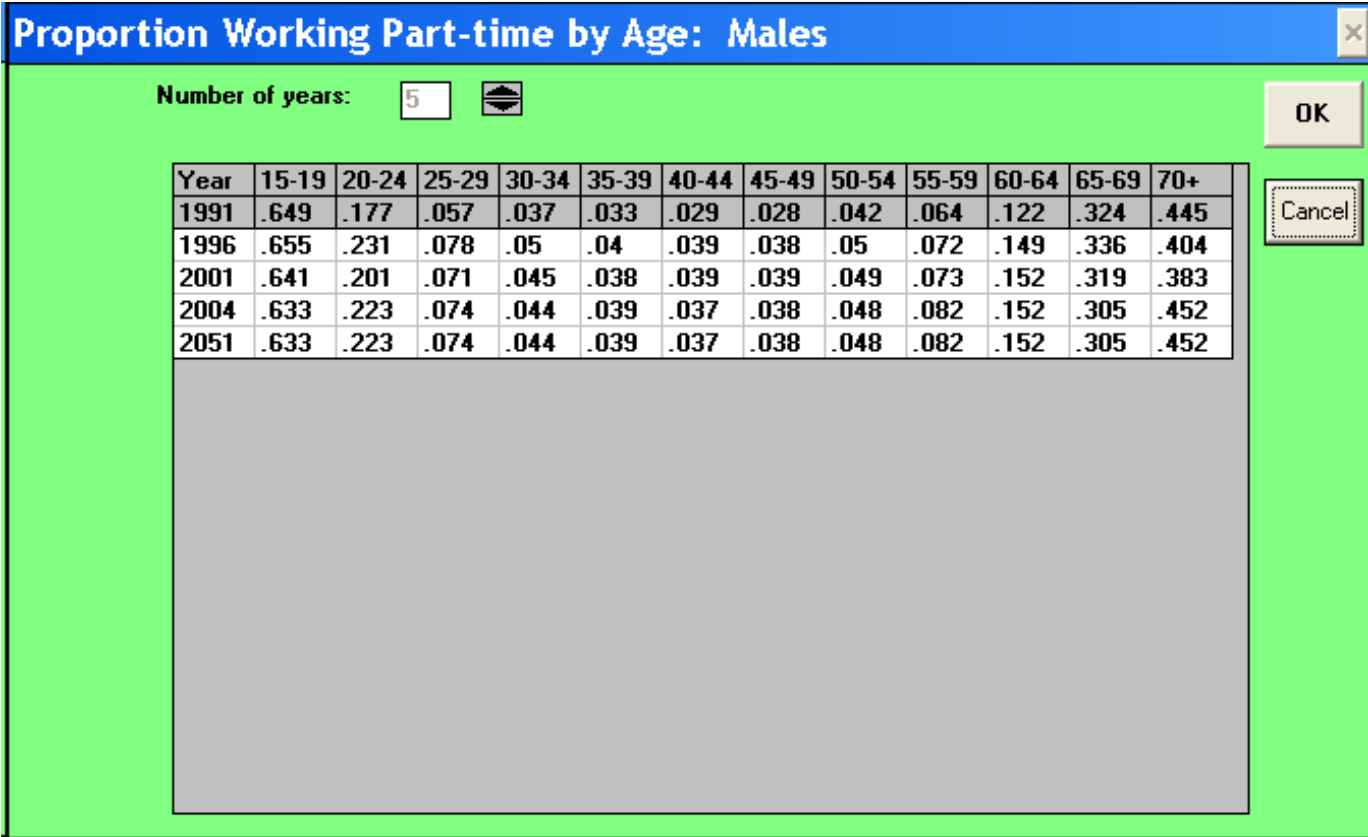
- The standard assumption holds the proportion of males and females working part-time constant at their most recent levels.

Labour Input: Full-time Hours: Males, Females:
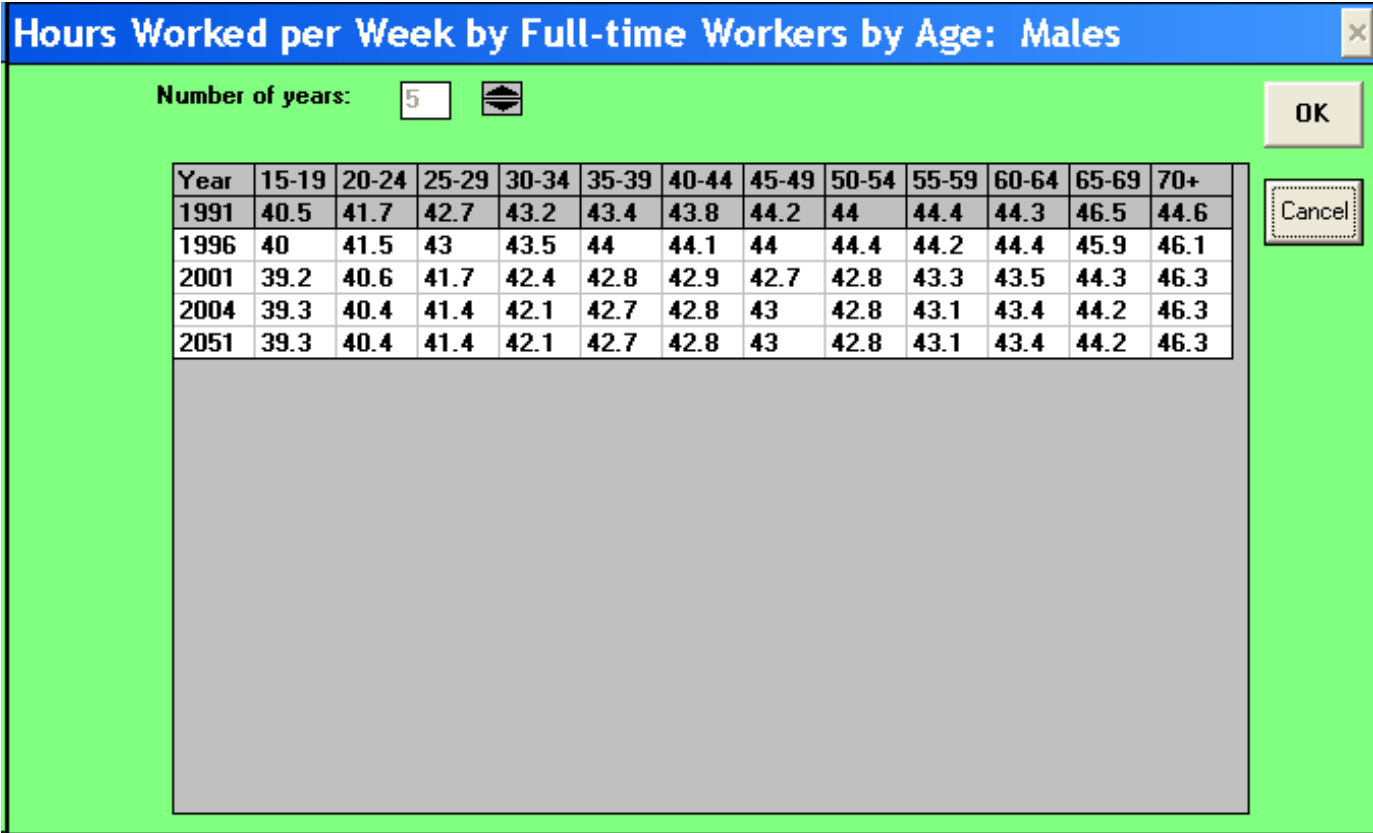
Hours Worked per Week by Full-time Workers by Age: Males

Number of years: 5

OK

Cancel

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	40.5	41.7	42.7	43.2	43.4	43.8	44.2	44	44.4	44.3	46.5	44.6
1996	40	41.5	43	43.5	44	44.1	44	44.4	44.2	44.4	45.9	46.1
2001	39.2	40.6	41.7	42.4	42.8	42.9	42.7	42.8	43.3	43.5	44.3	46.3
2004	39.3	40.4	41.4	42.1	42.7	42.8	43	42.8	43.1	43.4	44.2	46.3
2051	39.3	40.4	41.4	42.1	42.7	42.8	43	42.8	43.1	43.4	44.2	46.3

- The standard assumption holds the number of hours worked per week by males and females working full-time constant at their most recent levels.

Labour Input: Part-time Hours: Males, Females:

Hours Worked per Week by Part-time Workers by Age: Males

Number of years: 5

OK

Cancel

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	13.2	15.8	16.8	16.9	17.5	17.8	17.3	18	16.7	16.2	15.4	14.4
1996	12.7	16	17.1	17.7	17.3	18.3	17.3	17.7	16.6	15.8	14.6	14.8
2001	14.3	17	17.8	18.6	17.8	18.2	18.7	18.1	17.2	16.9	16.2	14.6
2004	14.3	16.9	17.8	18.3	18.8	18.2	18.3	18.2	17.8	17.2	16	15.2
2051	14.3	16.9	17.8	18.3	18.8	18.2	18.3	18.2	17.8	17.2	16	15.2

- The standard assumption holds the number of hours worked per week by males and females working part-time constant at their most recent levels.

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Labour Input: Weeks Worked per Year by Full-time Workers: Males, Females:
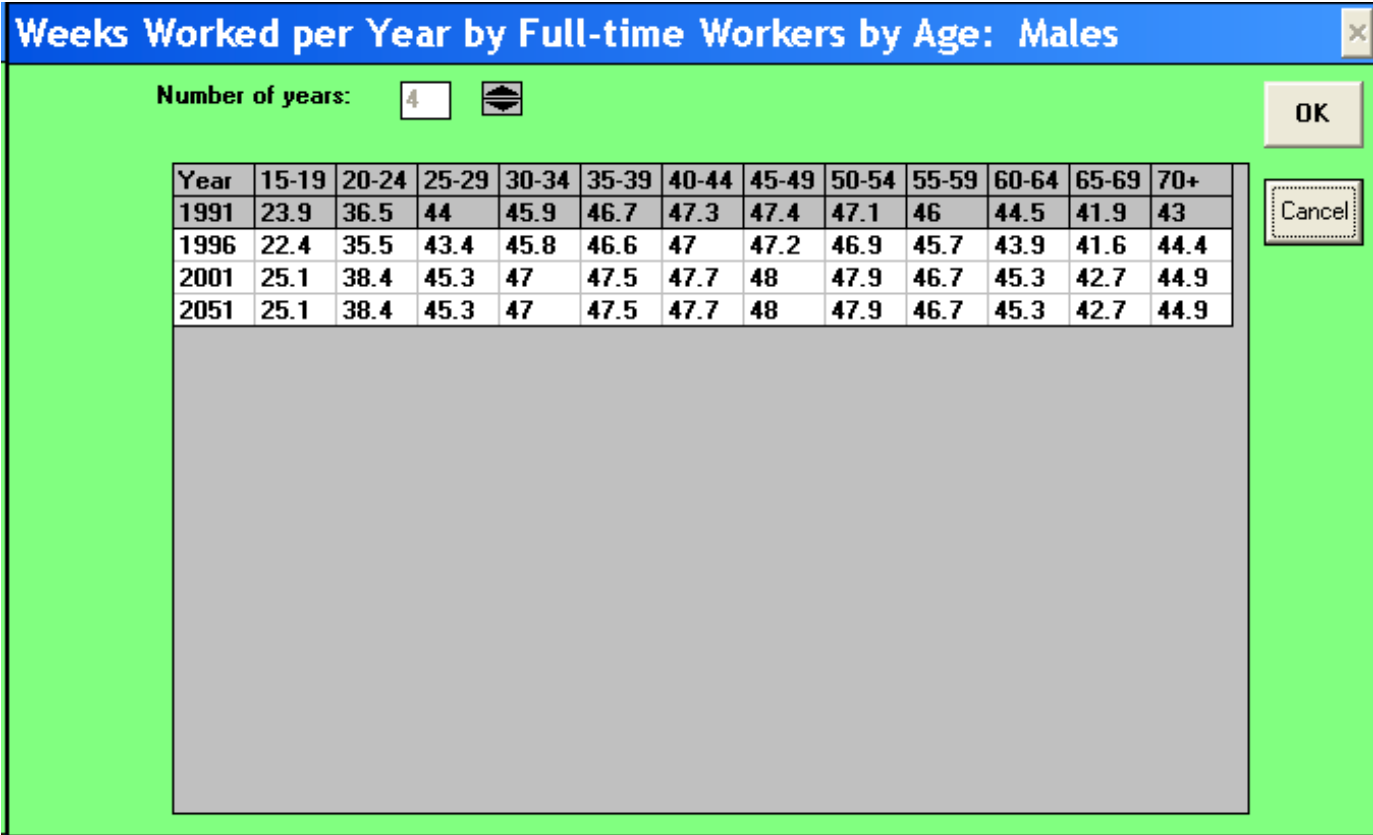
Weeks Worked per Year by Full-time Workers by Age: Males

Number of years: 4

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	23.9	36.5	44	45.9	46.7	47.3	47.4	47.1	46	44.5	41.9	43
1996	22.4	35.5	43.4	45.8	46.6	47	47.2	46.9	45.7	43.9	41.6	44.4
2001	25.1	38.4	45.3	47	47.5	47.7	48	47.9	46.7	45.3	42.7	44.9
2051	25.1	38.4	45.3	47	47.5	47.7	48	47.9	46.7	45.3	42.7	44.9

OK   Cancel

- The standard assumption holds the number of weeks worked per year by males and females working full-time constant at their most recent levels.

Labour Input: Weeks Worked per Year by Part-time Workers: Males, Females:
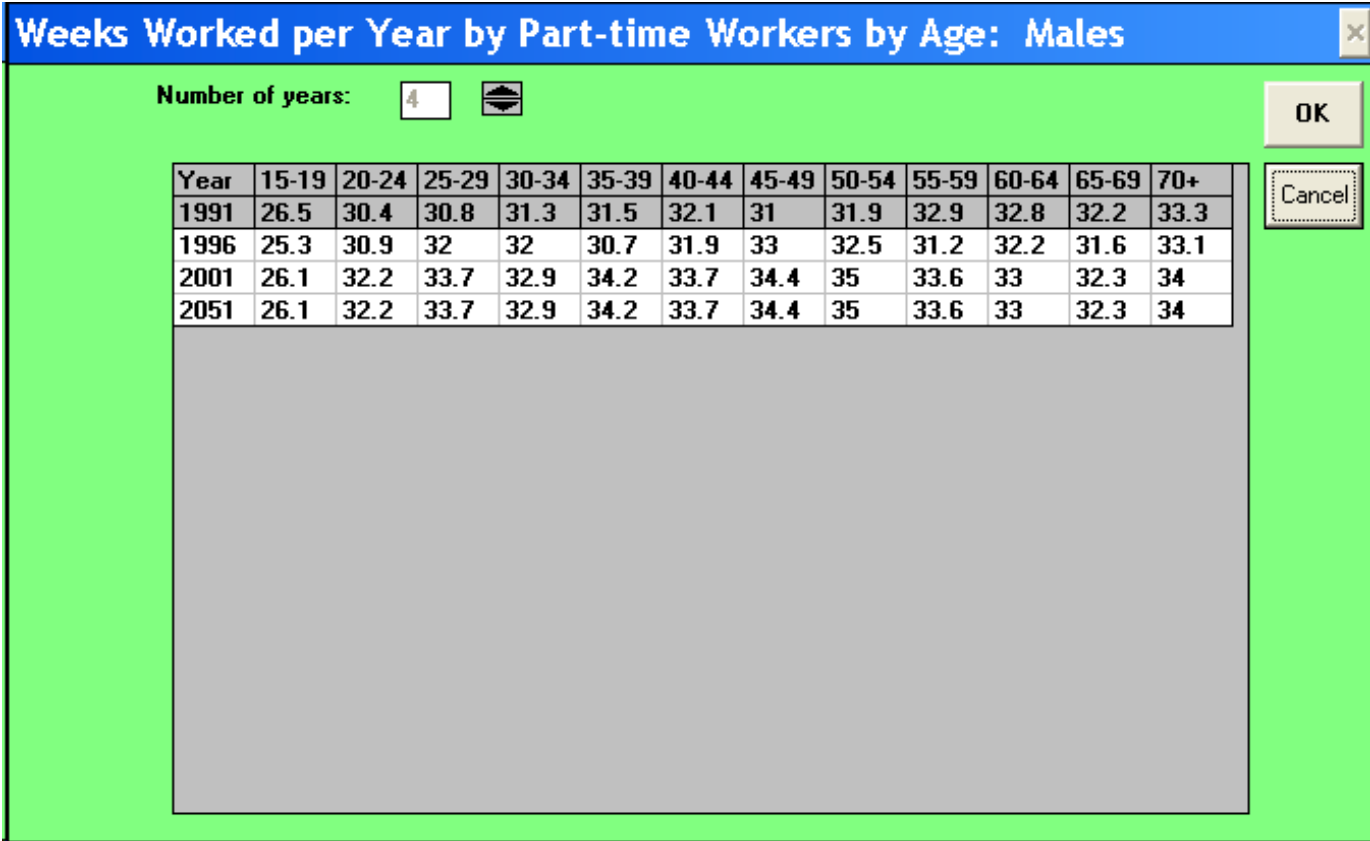
Weeks Worked per Year by Part-time Workers by Age: Males

Number of years: 4

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	26.5	30.4	30.8	31.3	31.5	32.1	31	31.9	32.9	32.8	32.2	33.3
1996	25.3	30.9	32	32	30.7	31.9	33	32.5	31.2	32.2	31.6	33.1
2001	26.1	32.2	33.7	32.9	34.2	33.7	34.4	35	33.6	33	32.3	34
2051	26.1	32.2	33.7	32.9	34.2	33.7	34.4	35	33.6	33	32.3	34

OK Cancel

- The standard assumption holds the number of weeks worked per year by males and females working part-time constant at their most recent levels.

Labour Input: Educational Composition of "Domestic" Population: Males, Females:

- Setting alpha equal to 1 continues recent trends in educational attainment.

Labour Input: Educational Composition of Immigrant Population: Males, Females:

Educational Composition of the Immigrant Population: ImWt

E1: grade 8 or less; E2: grades 9-13; E3: secondary school graduation; E4: some post-secondary; E5: post-secondary certificate; E6: completed bachelor's degree; E7: university degree above bachelor's

Number of years: 3

OK

Cancel

Year	E1	E2	E3	E4	E5	E6	E7
1991	1	1	1	1	1	1	1
2001	1	1	1	1	1	1	1
2051	1	1	1	1	1	1	1

ImWt applies to ages 20 and over. ImWt is a multiplier applied to the fraction of immigration in an educational group relative to the corresponding fraction in the rest of the population.

☑ **Apply immigrant educational composition adjustments**

- Setting ImWt to 1 implies a continuation of the 2001 relationship between immigrant and domestic levels of education.
- The standard assumption is to apply immigrant educational composition adjustments. If the box is unchecked, immigrants are assumed to have the same educational composition as the domestic population.

Labour Input: Miscellaneous:

- The underlying equations are described in Appendix A, section 4.
- The standard assumption of 0 for PL assumes that there is no distinction between cohorts in terms of their embodied technical progress.
- In MEDS-E, relative earnings form the basis for parameters relating to relative productivity; the parameter DIFF allows for changes in male-female productivity differentials.

Income: Associated with Labour:

- The standard assumption is that wages are equal to marginal products; RWM1 allows for differences by sex, RWM2 for differences by age, and RWM3 for differences by educational attainment.

Income: Associated with Capital:

Relative Per Capita Ownership of Capital Stock by Age Group

Number of years: 2

OK

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+
1991	-.001	-.008	-.008	.002	.01	.021	.061	.1	.158	.16	.167	.338
2051	-.001	-.008	-.008	.002	.01	.021	.061	.1	.158	.16	.167	.338
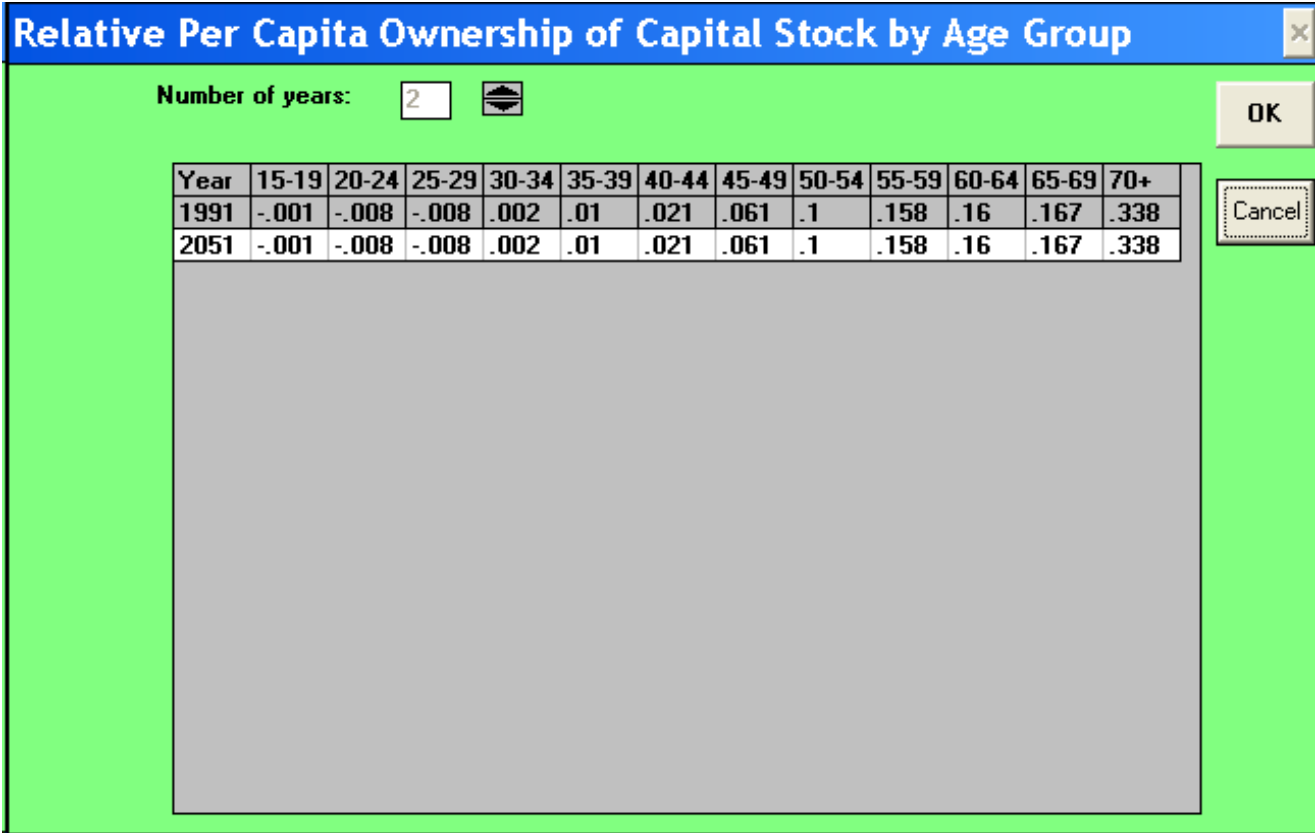
Cancel

- The 70+ share is calculated residually and so cannot be changed directly.
- The ownership share parameters are derived from simulations using a lifecycle model.

Consumption and Saving:

Consumption and Saving

Number of years: 16

OK

Cancel

Year	PCON1	PCON2	PGB
1991	.7439	.73	0
1992	.75068	.73	0
1993	.74265	.73	0
1994	.71554	.73	0
1995	.70525	.73	0
1996	.70592	.73	0
1997	.6885	.73	0
1998	.67724	.73	0
1999	.65764	.73	0
2000	.64531	.73	0
2001	.6534	.73	0
2002	.65199	.73	0
2003	.65998	.73	0
2004	.66137	.73	0
2006	.67066	.73	0
2051	.67066	.73	0

PGB: the fraction of government current consumption expenditure (GOVC) that is not financed by taxes.

Aggregate Consumption

⦿ CONSUM(t) = PCON1(t) * (GDP(t) - GOVC(t))

◯ CONSUM(t) = PCON2(t) * NETY(t)

- Choose the form of the consumption function by clicking the appropriate circle.
- The standard assumption moves PCON1 from its most recent actual value to the ten-year average of recent values by the year 2006.
- The standard assumption for PGB implies that all of government current consumption expenditure is financed by taxes.

Government Expenditure, Inventory Change, Trade Balance, Statistical Discrepancy:

Proportion of GDP

Number of years: 16

GOVC: current government expenditure on goods and services; INVY: inventory change; TRD: trade balance; STATD: statistical discrepancy

Year	PGOVC	PINVY	PTRD	PSTATD
1991	.23668	-.01155	-.00679	.00002
1992	.23678	-.01242	-.00008	-.00219
1993	.23145	-.0038	.01006	-.00271
1994	.21798	.00039	.02469	-.00152
1995	.21097	.01073	.03468	-.00103
1996	.20527	.00309	.03765	-.00075
1997	.19457	.00927	.01964	-.00008
1998	.1929	.00646	.03516	-.00042
1999	.18675	.0068	.04728	.00009
2000	.18288	.01311	.05181	.00069
2001	.18713	-.0023	.058	-.00039
2002	.18607	.00165	.0548	-.00059
2003	.18697	.01011	.03027	-.00037
2004	.18582	.01021	.01951	-.00044
2006	.19193	.00691	0	-.00033
2051	.19193	.00691	0	-.00033

OK

Cancel

- The standard assumption moves PGOVC, PINVY, and PSTATD from their most recent actual values to ten-year average values by the year 2006. As implied by PTRD = 0, external trade is assumed to be in balance by the year 2006.

Human Capital:

Human Capital Calculations

○ set RDISC to a fixed value   **OK**

● set RDISC to a fraction (PDISC) of RN   Cancel

PDISC   [1]   RDISC: the discount rate for present-value calculations; RN: the net rate of return to nonhuman capital.

-   Select the form of the discount rate by clicking the appropriate circle; the present value of human capital for each cohort is based on calculations involving the current period's earnings (see Section 17 in Appendix A).

View Output Options:

-   Four **Summary Tables** are provided with each projection. Other tables that were selected before running the projection are also available for viewing on screen.
-   If the set of tables selected for viewing is sufficiently large, a **More** button will appear on the screen. Click this button to view the remaining tables.

APPENDIX A:

THE ECONOMIC PROJECTION MODEL

What follows is a discussion of the structure of the MEDS-E subsystem. A listing of the equations and of the associated definitions of variables is included. We organize our discussion under the headings of the sections in the equation listing.

Aggregate Production and Factor Products

Total output (income) of the economy is generated by a production function, with inputs of labour and capital, and provision for technical progress (or technological change). A user may choose one of four alternative production functions: Cobb-Douglas, Constant Elasticity of Substitution (CES), Generalized Leontief, or Translog. (The standard assumption is Cobb-Douglas, but parameter values -- which may be altered by a user -- are provided for all four.) The rate of technical progress can be varied over the projection period, or held constant. Constant returns to scale is the standard assumption, but that can be replaced by increasing or decreasing returns. Marginal factor products are calculated separately for each age-sex-education category of employment.

Capital Stock Excluding Consumer Durables

Three types of producer capital stock are calculated -- residential construction, nonresidential construction, and machinery and equipment. The three are then aggregated to obtain the total producer capital stock, for entry into the chosen production function. The stocks are calculated from real investment by the perpetual inventory method: they are updated each year, as the economy moves through time, by applying depreciation rates and adding in new annual investment. The age distributions (or "vintages," to use a term familiar in economic growth theory) are determined for each type of stock, that being made possible by the use of the perpetual inventory method. (The depreciation rates vary with the type of stock; they can be modified by a user, if that is desired.)

Fixed Investment

Real (fixed, as opposed to inventory) investment of each type is generated each year by applying share parameters to the aggregate saving generated by the economy. (See below for the calculation of aggregate saving.) Total investment is the sum of the three types.

Labour Supply and the Services of Labour

Labour input is calculated in this section, for incorporation into the production function. Account is taken of the changing educational composition of the population, of the numbers of part-time and full-time workers and their hours of work, and of the accumulated labour force experience of different age-sex cohorts. The numbers employed in each age-sex group are weighted to reflect differences in productivity across the education, part-time/full-time, and experience categories in arriving at total (effective) labour input.

Income Associated with Labour

Wages (earnings) are based on marginal products, although they are not necessarily equal to marginal products: parameters are included to allow for differences because of discrimination, or for other reasons. The wage calculations are carried out separately for each age-sex-education category. Aggregate labour income is calculated as the difference between total gross domestic product and the share accruing to capital (before depreciation). An adjustment is then made to assure that the wages for individual groups are consistent with the labour income aggregate. Net wages are calculated by adjusting wages for taxes and transfer payments. (Note: it is convenient to speak of "wages" as the returns to labour; however the calculations include self-employment earnings and supplementary labour income, as well as wages in the narrower sense.)

Ownership of Capital and Income from Capital

Total wealth in the form of capital is defined as the sum of the producer capital stock (as discussed above) and the stock of consumer durables (see below). The total wealth so calculated

is then distributed among population age cohorts, based on ownership share parameters derived from simulations using a lifecycle model that we have published elsewhere. Rates of return on producer capital, before and after depreciation, are calculated in this section also, followed by the calculation of the after-tax wealth income accruing to each age cohort.

Total Income

The calculations in the previous two sections allow the calculation in this one of the total after-tax income of each age cohort.

Consumer Durables: Stock and the Flow of Services

The stock of consumer durables is generated here, using again the perpetual inventory method. As with producer durables, that method allows the age distribution of the stock in each year to be kept track of. Investment in consumer durables is determined by a parameter that allocates a share of aggregate saving to the generation of durable goods. The consumption of the durable goods is calculated as equal to the annual depreciation on the stocks. The conventional national accounts do not take account of the consumption of durable goods, as such, but only expenditures on durable goods, which are essentially investments rather than consumption. We have made it a practice, though, in designing MEDS to include an explicit calculation of durable-goods consumption. Aggregate consumption can thus be calculated either in the conventional way, or in the stricter (and theoretically preferable) way, by including durable consumption rather than durable expenditure.

Aggregate Consumption and Consumer Expenditure

Aggregate consumption is calculated here according to the strict definition given above (i.e., including durable consumption, rather than expenditure). Two options are provided: consumption can be generated by applying a share parameter to the gross domestic product remaining after government (all levels combined) has removed the amount required for its

current real expenditures on goods and services, or by applying a different parameter to total net (after-tax) income. (The standard parameter values are based on observed historical averages; those averages tend to be quite stable, in the longer-term, but the parameters -- like the other parameters of the model -- can be modified by a user to reflect anticipated changes, or to see how sensitive the projection results are to alternative values.) Consumer expenditure based on the conventional definition is calculated also in this section by adjusting aggregate consumption so as to replace the consumption of durables by durable expenditure (i.e., investment in durable goods).

Aggregate Saving

Aggregate saving in the economy is identically equal (by national accounting rules) to the gross domestic product, minus consumption (the strict definition), government current expenditure on goods and services, the trade balance (exports minus imports), and the national accounts statistical discrepancy, plus consumption of durable consumer goods. Saving for purposes of fixed producer investment is equal to aggregate saving, minus inventory change, and minus the portion of government current expenditure financed by borrowing (rather than tax revenues).

Government Expenditure

Government current expenditure on goods and services is modeled (for the long run) as a fraction of the gross domestic product. (The fraction can be altered at a user's discretion.)

Aggregate Tax Rate, Net of Transfers

The overall tax rate, as defined for purposes of MEDS-E, is the ratio of the tax-financed portion of government expenditure on goods and services to the gross domestic product.

Aggregate Inventory Change

A parameter is provided, representing the (long-run) ratio of inventory change to gross domestic product. Historically, the inventory change/GDP ratio has been relatively stable, in the long run, although there have been substantial fluctuations from year to year, the result in large part of fluctuations in farm inventories, and especially grain inventories.

Aggregate Trade Balance

The net trade balance (exports minus imports) varies from year to year. In the long run, though, it must show some stability. It is modeled as a ratio to gross domestic product.

Statistical Discrepancy

The statistical discrepancy represents the difference between gross domestic product calculated from the income side of the accounts, and GDP calculated from the expenditure side. It is erratic, but small, and is treated as a ratio to GDP.

Total Factor Productivity

Labour productivity or capital productivity measures can be calculated as ratios of GDP to labour or capital inputs. However, it is useful to have also a total factor productivity measure. That is provided in the form of GDP divided by a weighted combination of labour and capital inputs, the weights being calculated from base-period marginal products of the two factors.

Human Capital

The human capital embodied in an individual age-sex population cohort in each year of the projection period is calculated as the present value of the future earnings stream of the cohort, under the assumption that the age structure of employment patterns, mortality rates, and marginal product levels in the given year will hold for future years. The present values can be calculated using a fixed annual discount rate (of the user's choosing), or a variable rate equal to the current rate of return on physical capital (the "real interest rate," roughly speaking). Total human capital

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is then obtained by summing over cohorts.

EQUATIONS IN THE MEDS-E SUBSYSTEM

1.   AGGREGATE PRODUCTION AND FACTOR PRODUCTS

Cobb-Douglas Production Function --

   GDP(T) = PCD0(T) * (KTOT(T)**PCD1) * (LINPUT(T)**PCD2)

   PCD0(T) = PCD0(T-1) * (1+PN(T))

   MPKTOT(T) = PCD1 * (GDP(T)/KTOT(T))

   MPETOT(T) = PCD2 * (GDP(T)/LINPUT(T))

   PRTS = PCD1 + PCD2

CES Production Function --

   GDP(T) = PCES0(T) * ((PCES1 * (KTOT(T)**PCES3) + PCES2 *

        (LINPUT(T)**PCES3)) ** (PCES4/PCES3)

   PCES0(T) = PCES0(T-1) * (1+PN(T))

   MPKTOT(T) = PCES4 * PCES1 * PCES0(T) * (PCES1 *

       KTOT(T)**PCES3 + PCES2 * LINPUT(T) ** PCES3) **

       ((PCES4 - PCES3)/PCES3) * KTOT(T) ** (PCES3-1)

   MPETOT(T) = PCES4 * PCES2 * PCES0(T) * (PCES1 *

        KTOT(T)**PCES3 + PCES2 * LINPUT(T) ** PCES3) **

        ((PCES4 - PCES3)/PCES3) * LINPUT(T) ** (PCES3-1)

   PRTS = PCES4

Generalized Leontief Production Function --

   GDP(T) = PGL0(T) * (PGL1 * KTOT(T)**PGL4 + PGL2 *

         LINPUT(T)**PGL4 + 2.0 * PGL3 * KTOT(T)**(0.5*PGL4) *

         LINPUT(T)**(0.5*PGL4))

   PGL0(T) = PGL0(T-1) * (1+PN(T))

   MPKTOT(T) = PGL4 * PGL0(T) * (PGL1 + PGL3 *

            (LINPUT(T)/KTOT(T))**(0.5*PGL4)) * KTOT(T)**(PGL4-1)

   MPETOT(T) = PCL4 * PGL0(T) * (PGL2 + PGL3 *

            (KTOT(T)/LINPUT(T))**(0.5*PGL4)) * LINPUT(T)**(PGL4-1)

   PRTS = PGL4

Translog Production Function --

$$LN(GDP(T)) = PTL0(T) + PTL1 * LN(KTOT(T)) + PTL2 *$$
$$LN(LINPUT(T)) + 0.5 * PTL3 * (LN(KTOT(T)))**2 +$$
$$PTL4 * LN(KTOT(T)) * LN(LINPUT(T)) + 0.5 * PTL5 *$$
$$(LN(LINPUT(T)))**2$$

$$PTL0(T) = PTL0(T-1) + T * (LN((1+PN(T)))$$

$$MPKTOT(T) = (PTL1 + PTL3 * LN(KTOT(T) + PTL4 * LN(LINPUT(T)))$$
$$* (GDP(T)/KTOT(T))$$

$$MPETOT(T) = (PTL2 + PTL4 * LN(KTOT(T)) + PTL5 *$$
$$LN(LINPUT(T))) * (GDP(T)/LINPUT(T))$$

$$PRTS = PTL1 + PTL2$$

Marginal Product Calculations, All Production Functions --

$$MPROD(S,A,T) = MPETOT(T) * LWT1(A,T) * LEX(S,A,T)**ETA *$$
$$LADJ1(S,A,T) * (SUM(E) (LWT2(S,A,E,T) *$$
$$ECOMP(S,A,E,T))) \qquad (S = 1,2; A = A1,...,A8)$$

$$MPRODE(S,A,E,T) = MPETOT(T) * LWT1(A,T) * LEX(S,A,T)**ETA *$$
$$LADJ1(S,A,T) * LWT2(S,A,E,T)$$
$$(S = 1,2; A = A1,...,A8; E = E1,...,E5)$$

2. CAPITAL STOCK EXCLUDING CONSUMER DURABLES

Fixed Capital Stock, by Type --

$$KRES(T) = (1-DR) * KRES(T-1) + IRES(T-1)$$

$$KNRES(T) = (1-DNR) * KNRES(T-1) + INRES(T-1)$$

$$KMACH(T) = (1-DM) * KMACH(T-1) + IMACH(T-1)$$

$$KTOT(T) = KRES(T) + KNRES(T) + KMACH(T)$$

Fixed Capital Stock, by Type and Vintage --

$$KR(A,T) = ((1-DR)**A) * IRES(T-A-1) \qquad (A = 0,1,2,...)$$

$$KNR(A,T) = ((1-DNR)**A) * INRES(T-A-1) \qquad (A = 0,1,2,...)$$

$$KM(A,T) = ((1-DM)**A) * IMACH(T-A-1) \qquad (A = 0,1,2,...)$$

$$KT(A,T) = KR(A,T) + KNR(A,T) + KM(A,T) \qquad (A = 0,1,2,...)$$

Depreciation --

DEP(T) = DR*KRES(T) + DNR*KNRES(T) + DM*KMACH(T)

DELTA(T) = DEP(T)/KTOT(T)

3. FIXED INVESTMENT

IRES(T) = PRES(T) * ISAVING(T)

INRES(T) = PNRES(T) * ISAVING(T)

IMACH(T) = PMACH(T) * ISAVING(T)

ITOT(T) = IRES(T) + INRES(T) + IMACH(T)

4. LABOUR SUPPLY AND THE SERVICES OF LABOUR
   Educational Composition of the Population --
   POPED(S,A,E,T) = ECOMP(S,A,E,T) * POP(S,A,T)
   IMED(S,A,E,T) = IMECOMP(S,A,E,T)*IM(S,A,T)
   ECOMP(S,A,E,T) = ECOMP1(S,A,E,T)*(POPED(S,A,E,T-1)-

   IMED(S,A,E,T))/(POPED(S,A,E,T-1) +

   IMECOMP(S,A,E,T)*IMED(S,A,E,T)/POPED(S,A,E,T-1) + ECOMP(S,A,E,T-1) -

   ECOMP1(S,A,E,T-1)

   Note: SUM(E) (ECOMP(S,A,E,T)) = 1.0 for A=A1,...,A12

   ECOMP1(S,A,E,T) = ECOMP1(S,A-1,E,T-5) + ALPHA(T) * 1/2 *

   ((ECOMP1(S,A,E,2001) - ECOMP1(S,A-1,E,1996) + ECOMP1(S,A,E,1996) -

   ECOMP1(S,A-1,E,1991))   for A=A2,...,A4

   ECOMP1(S,A1,E,T) = ECOMP1(S,A1,E,T-5) + ALPHA(T) * 1/2 *

   ((ECOMP1(S,A1,E,2001) - ECOMP1(S,A1,E,1991))

   ECOMP1(S,A,E,T) = ECOMP1(S,A-1,E,T-5) for A = A5,...,A12

   0 # ECOMP1(S,A,E,T) # 1

   SUM(A) (ECOMP1(S,A,E,T)) = 1.000

   IMREL(S,A,E,2001) = IMECOMP(S,A,E,2001) / ECOMP(S,A,E,2001)

   IMECOMP(S,A1,E,T) = IMREL(S,A1,E,2001) * ECOMP1(S,A1,E,T)

   IMECOMP(S,A,E,T) = IMWT(E,T)*IMREL(S,A,E,2001)*ECOMP1(S,A,E,T)

   for A = A2,...,A12

   SUM(E) (IMECOMP(S,A,E,T)) = 1.0 for A=A1,...,A12

Labour in Aggregate Production –

$$LF(S,A,E,T) = LFPR(S,A,E,T) *(1-XPROP(S,A,E,T))* POPED(S,A,E,T)$$

$$LFPR(S,A,E,T) = f\ (LF(S,A,T))$$

$$XPROP(S,A.E,T) = XPROP(S,A,T)$$

$$EMPLOY(S,A,E,T) = (1-URATE(S,A,E,T))*LF(S,A,E,T)$$

$$URATE(S,A,E,T) = f\ (UFIX(T))$$

$$LINPUT(T) = SUM(S,A)\ (LWT1(A,T) * LEXR(S,A,T)**ETA * SUM(E)$$
$$(LWT2(S,A,E,T) * LADJ1(S,A,E,T) * EMPLOY(S,A,E,T))$$

$$LWT1(A,T) = (SUM(AA=AL,AH)\ (1+PL(T-TBASE-AA+15)) ** (T-TBASE-AA+15))/(AH-AL+1)$$

$$LEX(S,A,T) = LEX(S,A,T-1)*(4/5) + (PRATE(S,A-1,T-1)/PRMAX)*(1/5)\qquad (A = A3,...A12)$$

$$LEX(S,A,T) = 1.0 \qquad\qquad (A = A1,A2)$$

$$LEXR(S,A,T) = LEX(S,A,T)/LEX(S,A,TBASE)$$

$$LWT2(2,A,E,T) = (LWT2(2,A,E,TBASE) + DIFF(T) *$$
$$(LWT2(1,A,E,TBASE) - LWT2(2,A,E,TBASE)))$$

$$LADJ1(S,A,E,T) = PPART(S,A,E,T) * HRSPW(S,A,E,T) * WKSPY(S,A,E,T) + (1-PPART(S,A,E,T)) * HRSFW(S,A,E,T) * WKSFY(S,A,E,T)$$

$$PPART(S,A,E,T) = f\ (PPART(S,A,T))$$

$$HRSPW(S,A,E,T) = f\ (HRSPW(S,A,T))$$

$$HRSFW(S,A,E,T) = f\ (HRSFW(S,A,T))$$

5. INCOME ASSOCIATED WITH LABOUR

$$WAGE(S,A,E,T) = (RWM(S,A,E) * MPRODE(S,A,E,T) / PRTS) * WCFACT(T)$$

$$WCFACT(T) = SHAREA(T) / SHAREB(T)$$

$$SHAREA(T) = GDP(T) - RG(T) * KTOT(T)$$

$$SHAREB(T) = SUM(S,A,E)\ (\ (EMPLOY(S,A,T)*ECOMP(S,A,E,T))$$
$$* WAGE(S,A,E,T)\ )$$

$$RWM(S,A,E) = RWM1(S) * RWM2(A) * RWM3(E)$$

$$NETWAGE(S,A,E,T) = (1-TRATE(T)) * WAGE(S,A,E,T)$$

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NETYL(A,T) = SUM(S,E) (EMPLOY(S,A,E,T) * NETWAGE(S,A,E,T))

6. OWNERSHIP OF CAPITAL AND INCOME FROM CAPITAL

   KWEALTH(T) = KTOT(T) + KDUR(T)

   KW(A,T) = PKW(A,T) * KWEALTH(T)

   PKW(A,T) = PKWLC(A,T) * POP(A,T) / SUM(A) (PKWLC(A,T) *
           POP(A,T))

   RG(T) = MPKTOT(T) / PRTS

   RN(T) = RG(T) - DELTA(T)

   NETYK(A,T) = KW(A,T) * RN(T) * (1-TRATE(T))

7. TOTAL INCOME

   NETY(A,T) = NETYL(A,T) + NETYK(A,T)

   GROSSDY(A,T) = NETY(A,T) + DELTA(T) * KW(A,T)

8. CONSUMER DURABLES: STOCK AND THE FLOW OF SERVICES

   KDUR(T) = (1-DD) * KDUR(T-1) + IDUR(T-1)

   KD(A,T) = ((1-DD)**A) * IDUR(T-A-1)   (A = 0,1,2,...)

   IDUR(T) = PDUR(T) * ISAVING(T)

   CDUR(T) = DD * KDUR(T)

9. AGGREGATE CONSUMPTION AND CONSUMER EXPENDITURE

   Standard Specification --

   CONSUM(T) = PCON1(T) * (GDP(T) - GOVC(T))

   Alternative Specification --

   CONSUM(T) = PCON2(T) * NETY(T)

   Consumer Expenditure --

   CONEX(T) = CONSUM(T) + IDUR(T) - CDUR(T)

10. AGGREGATE SAVING

SAVING(T) = GDP(T) - CONSUM(T) - GOVC(T) - TRADEBAL(T) -

          STATD(T) + CDUR(T)

ISAVING(T) = SAVING(T) - INVENT(T) - PGB(T) * GOVC(T)

11. GOVERNMENT EXPENDITURE

GOVC(T) = PGOVC(T) * GDP(T)

12. AGGREGATE TAX RATE, NET OF TRANSFERS

TRATE(T) = (1-PGB(T)) * (GOVC(T)/GDP(T))

13. AGGREGATE INVENTORY CHANGE

INVENT(T) = PINVY(T) * GDP(T)

14. AGGREGATE TRADE BALANCE

TRADEBAL(T) = PTRD(T) * GDP(T)

15. STATISTICAL DISCREPANCY

STATD(T) = PSTATD(T) * GDP(T)

17. HUMAN CAPITAL

RDISC(T) = PDISC * RN(T)   or   RDISC(T) = RDISCF

ADISC(T) = 1/(1+RDISC(T))

DISC(AJ,A,T) = F(ADISC(T))

HCAP(S,A,T) = EMPLOY(S,A,T) * MPROD(S,A,T) * YRS(A)/2

        + SUM(AJ=A+1,AMAX)(DISC(AJ,A,T)

        * (LX(S,AJ,T)/LX(S,A,T))

        * (EMPLOY(S,AJ,T)/POP(S,AJ,T))

        * (MPROD(S,AJ,T) * YRS(AJ)))

        * POP(S,A,T)

HCAPTOT(T) = SUM(S,A)(HCAP(S,A,T))

LIST OF DEFINITIONS

A	subscript denoting age of population or labour force cohort (A = A1,...,A12) or of vintage of capital stock (A = 0,1,...)
AA	subscript denoting age of labour force or population cohort, used to indicate single years of age
ADISC	annual discount factor for calculation of human capital
AH	subscript denoting highest single year of age
AJ	subscript denoting age group
AL	subscript denoting lowest single year of age
ALPHA*	adjustment factor for rate of change of educational composition
AMAX	maximum age group in calculation of human capital
CDUR	services provided by consumer durable goods
CONEX	consumer expenditures, measured on a national accounts basis
CONSUM	consumption; the flow of services provided by consumer goods, including the service of consumer durables
DD*	annual rate of depreciation associated with consumer durables
DELTA	annual rate of depreciation on the fixed capital stock, excluding consumer durables
DEP	depreciation of the fixed capital stock, excluding consumer durables
DIFF*	parameter relating to the difference between male and female marginal productivity
DISC(AJ,A,T)	factor calculated from ADISC for discounting between midpoint of age group A and midpoint of age group AJ (for AJ greater than or equal to A)
DM*	annual rate of depreciation associated with machinery and equipment
DNR*	annual rate of depreciation associated with non-residential construction
DR*	annual rate of depreciation associated with residential construction

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E	subscript indicating education (highest level of schooling) (E = E1,...,E7)
ECOMP	educational composition of the population
ECOMP1	educational composition of the population in the absence of immigration
EMPLOY+	employment
ETA*	elasticity parameter relating to labour experience
ETOT+	total employment
F	general symbol used to denote a function
GDP	gross domestic product
GOV	total government expenditures
GOVC	government current expenditure on goods and services
GROSSDY	gross disposable income
HCAP	human capital of population of given sex and age
HCAPTOT	total human capital
HOUSE+	number of households
HRSFW*	average weekly hours of full-time workers
HRSPW*	average weekly hours of part-time workers
IDUR	annual gross investment expenditure on consumer durables
IM	immigration
IMACH	annual gross investment expenditure on machinery and equipment
IMECOMP	educational composition of immigration
IMED	immigration by educational group
IMREL	fraction of immigration in educational group relative to corresponding fraction in rest of population
IMWT	relative weight associated with educational group in determining

educational distribution of immigration

INRES	annual gross investment expenditure on non-residential construction
INVENT	annual gross investment expenditure on inventory change
IRES	annual gross residential construction expenditure
ISAVING	annual gross saving for investment, including consumer durables
ITOT	annual gross investment expenditure, excluding consumer durables
KD	stock of consumer durables, by vintage
KDUR	aggregate stock of consumer durables
KM	stock of machinery and equipment, by vintage
KMACH	aggregate stock of machinery and equipment
KNR	stock of non-residential construction, by vintage
KNRES	aggregate stock of non-residential construction
KR	stock of residential construction, by vintage
KRES	aggregate stock of residential construction
KT	capital stock, excluding consumer durables, by vintage
KTOT	aggregate capital stock, excluding consumer durables
KW	capital stock by age of owner
KWEALTH	physical wealth (total fixed capital stock, including consumer durables)
LADJ1	employment adjustment factor, to make allowance for part-weeks and part-hours of work
LEX	labour force experience variable
LEXR	labour force experience relative to base period
LFTOT+	total labour force
LINPUT	effective labour input in aggregate production process

LF	labour force in age-sex-education group
LFPR	labour force participation rate for age-sex-education group
LWT1	productivity factor associated with cohort
LWT2	age-productivity profile, specified for each education level and each sex
LX	proportion of population surviving to given age (based on current mortality rates)
MPETOT	marginal product of labour (in the aggregate)
MPKTOT	marginal product of capital (in the aggregate)
MPROD	marginal product of labour for age-sex-specific group
MPRODE	marginal product of labour for age-sex-education-specific group
NETWAGE	net wages, after allowance for taxes
NETY	net income, after allowance for taxes and depreciation
NETYK	net income from capital, after allowance for taxes and depreciation
NETYL	net income from labour, after allowance for taxes
PCD0	measure incorporating neutral technological progress, associated with Cobb-Douglas production function
PCD1*	parameter associated with Cobb-Douglas production function
PCD2*	parameter associated with Cobb-Douglas production function
PCES0	measure incorporating neutral technological progress, associated with CES production function
PCES1*	parameter associated with CES production function
PCES2*	parameter associated with CES production function
PCES3*	parameter associated with CES production function
PCES4*	parameter associated with CES production function
PCON1*	parameter in consumption function

PCON2*   parameter in consumption function

PDISC*   parameter representing proportionate adjustment of RN for calculation
            of human capital

PDUR*   parameter in consumer durable goods investment equation

PGB*   parameter indicating the proportion of government expenditure not
            financed by taxes

PGL0   measure incorporating neutral technological progress, associated with
            generalized Leontief production function

PGL1*   parameter associated with generalized Leontief production function

PGL2*   parameter associated with generalized Leontief production function

PGL3*   parameter associated with generalized Leontief production function

PGL4*   parameter associated with generalized Leontief production function

PGOVC*   parameter in government expenditure equation

PINVY*   parameter in inventory change equation

PKW   proportion of aggregate fixed wealth that is held by a particular group,
            based on life-cycle optimization model

PKWLC*   life-cycle value of parameter that allocates total fixed wealth to an age
            group

PL*   rate of labour-embodied technological change

PMACH*   parameter in machinery and equipment investment equation

PN*   rate of neutral technological change

PNRES*   parameter in non-residential construction investment equation

POP+   population

POPED   population by educational group

POPTOT+   total population

PPART*   proportion of employed labour force that works part-time

PRATE+	labour force participation rate
PRES*	parameter in residential construction investment equation
PRMAX	maximum labour force participation rate
PRTS	parameter indicating returns to scale
PSTATD*	parameter in statistical discrepancy equation
PTL0	measure incorporating neutral technological progress, associated with translog production function
PTL1*	parameter associated with translog production function
PTL2*	parameter associated with translog production function
PTL3*	parameter associated with translog production function
PTL4*	parameter associated with translog production function
PTRD*	parameter in trade balance equation
RDISC	annual rate of discount for calculation of human capital
RDISCF*	fixed value assigned to RDISC (at the option of a user of the model)
RG	gross rate of return on the aggregate capital stock, excluding consumer durables
RN	net (i.e., after depreciation) rate of return on the capital stock, excluding consumer durables
RWM	ratio of wage to marginal product
RWM1*	ratio of wage to marginal product, component associated with age
RWM2*	ratio of wage to marginal product, component associated with gender
RWM3*	ratio of wage to marginal product, component associated with education
S	subscript indicating sex (S=1 for male, S=2 for female)
SAVING	aggregate saving
SHAREA	labour income, calculated as that portion of GDP not accruing to capital

SHAREB	labour income, calculated as the summation of income accruing to each age-sex-education group
STATD	statistical discrepancy in the national accounts
SUM	operator indicating summation (e.g., SUM(E) indicates summation over E, SUM(S,A) indicates summation over A and S)
T	subscript indicating time
TBASE	base year (1991)
TRADEBAL	aggregate trade balance (exports less imports)
TRATE	aggregate tax rate net of transfers
URATE+	unemployment rate
UFIX*	age-sex standardized unemployment rate (specified in MEDS-D)
WAGE	annual wage rate
WCFACT	adjustment factor, used to ensure that labour income, as allocated, is equal to total labour income available
WKSFY*	average weeks worked per year by part-time workers
WKSPY*	average weeks worked per year by full-time workers
XPROP	proportion of population excluded in calculating labour force source population
YRS	number of years in a given age group (e.g., 5 for 15-19 age group, 10 for 25-34 age group)

*Indicates parameters chosen by the user.
+Indicates values provided by MEDS-D.

APPENDIX B:

SELECTED CANADIAN HISTORICAL SERIES

1991 - 2004

This appendix contains historical data back to 1981 for some selected series; the series shown here are of particular importance in framing assumptions for projections. The CANSIM identifier number is shown, where applicable.

Symbols not mentioned in Appendix A are defined as follows:

BINV   -- annual gross business investment expenditure on inventory change
GINV   -- annual gross government investment expenditure on inventory change
EXPORT -- annual exports of goods and services
IMPORT -- annual imports of goods and services

Appendix B: Selected Canadian Historical Series

CANSIM #   V1992045   V1992044

Year	IRES	INRES	IMACH	ITOT	IDUR	ISAVING	CONEX	CDUR	CONSUM
1981	36904.	54894.	33104.	124902.	35132.	160034.	344779.	22277.	331924.
1982	30532.	51525.	28381.	110438.	30926.	141364.	336080.	23562.	328716.
1983	35618.	47529.	27312.	110459.	35202.	145661.	344897.	24299.	333994.
1984	35661.	47276.	29291.	112228.	40371.	152599.	359502.	25389.	344520.
1985	38726.	50818.	32350.	121894.	46236.	168130.	377329.	26887.	357980.
1986	43462.	48026.	35661.	127149.	48966.	176115.	391399.	28822.	371255.
1987	49784.	49559.	40845.	140188.	52245.	192433.	407702.	30836.	386293.
1988	50876.	53287.	48204.	152367.	55793.	208160.	425265.	32977.	402449.
1989	52903.	55654.	52073.	160630.	56347.	216977.	439855.	35259.	418767.
1990	47434.	56768.	50002.	154204.	54739.	208943.	444920.	37368.	427549.
1991	40572.	55562.	49205.	145339.	52367.	197706.	437916.	39105.	424654.
1992	43365.	48792.	48970.	141127.	52604.	193731.	444643.	40431.	432470.
1993	41715.	48504.	48070.	138289.	53303.	191592.	452569.	41648.	440914.
1994	43351.	53100.	52271.	148722.	55852.	204574.	466296.	42814.	453258.
1995	36887.	52532.	56047.	145466.	56942.	202408.	475880.	44118.	463056.
1996	40458.	51973.	59319.	151750.	59405.	211155.	488155.	45400.	474150.
1997	43765.	57587.	73489.	174841.	67988.	242829.	510695.	46801.	489508.
1998	42212.	57251.	79653.	179116.	71404.	250520.	524807.	48919.	502322.
1999	43725.	59334.	89179.	192238.	77547.	269785.	544753.	51168.	518374.
2000	46014.	60329.	95100.	201443.	82492.	283935.	566664.	53806.	537978.
2001	50832.	64855.	93244.	208931.	85913.	294844.	579513.	56674.	550274.
2002	58103.	63247.	90584.	211934.	93252.	305186.	600701.	59598.	567047.
2003	61689.	66117.	96940.	224746.	95189.	319935.	619401.	62964.	587176.
2004	66803.	67374.	105976.	240153.	98119.	338272.	640630.	66186.	608697.

```
CANSIM # V1992049  V1992057  V1992051            V1992060  V1992063            V1992066  V1992059

Year        GOVC      BINV      GINV    INVENT    EXPORT    IMPORT  TRADEBAL     STATD       GDP
1981      137226.     -524.     3119.     2595.   128879.   129473.     -594.     2533.   594082.
1982      139942.      169.   -22408.   -22239.   126858.   108616.    18242.     1134.   576744.
1983      142262.      -95.   -10180.   -10275.   134353.   119425.    14928.    -1280.   592684.
1984      143736.       41.     -134.      -93.   159088.   139824.    19264.    -1082.   626378.
1985      149892.     -128.     -494.     -622.   166749.   151482.    15267.      127.   660318.
1986      152597.      -67.    -1632.    -1699.   173904.   162412.    11492.     -766.   677802.
1987      154614.      -71.     -459.     -530.   179015.   171070.     7945.    -1661.   705701.
1988      161662.      118.     -257.     -139.   195014.   194083.      931.     2170.   740592.
1989      166112.       -2.     2459.     2457.   196924.   205490.    -8566.      463.   759821.
1990      171971.      122.    -4695.    -4573.   206121.   209664.    -3543.       30.   762381.
1991      177006.      -61.    -8576.    -8637.   209812.   214887.    -5075.       12.   747857.
1992      178729.      -67.    -9310.    -9377.   224857.   224920.      -63.    -1652.   754835.
1993      178796.       -5.    -2931.    -2936.   249226.   241458.     7768.    -2090.   772498.
1994      176570.        0.      314.      314.   280890.   260894.    19996.    -1233.   810016.
1995      175557.       49.     8877.     8926.   304727.   275871.    28856.     -859.   832138.
1996      173484.       -3.     2611.     2608.   321787.   289968.    31819.     -634.   845157.
1997      171756.        5.     8174.     8179.   348604.   331271.    17333.      -72.   882734.
1998      177277.      -26.     5964.     5938.   380407.   348095.    32312.     -386.   919000.
1999      181006.       -3.     6589.     6586.   421046.   375219.    45827.       86.   969242.
2000      186589.       23.    13353.    13376.   458574.   405715.    52859.      709.  1020258.
2001      193876.       13.    -2399.    -2386.   444986.   384894.    60092.     -409.  1036048.
2002      198828.      -40.     1800.     1760.   449305.   390744.    58561.     -627.  1068540.
2003      204593.       14.    11052.    11066.   439784.   406664.    33120.     -405.  1094278.
2004      210049.       19.    11517.    11536.   461675.   439619.    22056.     -493.  1130405.
```

Ratios:

	to ISAVING				to GDP				
Year	PRES	PNRES	PMACH	PDUR	PCON1	PGOVC	PINVY	PTRD	PSTATD
1981	0.23060	0.34301	0.20686	0.21953	0.72654	0.23099	0.00437	-0.00100	0.00426
1982	0.21598	0.36448	0.20077	0.21877	0.75255	0.24264	-0.03856	0.03163	0.00197
1983	0.24453	0.32630	0.18750	0.24167	0.74151	0.24003	-0.01734	0.02519	-0.00216
1984	0.23369	0.30981	0.19195	0.26456	0.71382	0.22947	-0.00015	0.03075	-0.00173
1985	0.23033	0.30225	0.19241	0.27500	0.70134	0.22700	-0.00094	0.02312	0.00019
1986	0.24678	0.27270	0.20249	0.27803	0.70688	0.22514	-0.00251	0.01695	-0.00113
1987	0.25871	0.25754	0.21226	0.27150	0.70097	0.21909	-0.00075	0.01126	-0.00235
1988	0.24441	0.25599	0.23157	0.26803	0.69516	0.21829	-0.00019	0.00126	0.00293
1989	0.24382	0.25650	0.23999	0.25969	0.70534	0.21862	0.00323	-0.01127	0.00061
1990	0.22702	0.27169	0.23931	0.26198	0.72416	0.22557	-0.00600	-0.00465	0.00004
1991	0.20521	0.28103	0.24888	0.26487	0.74390	0.23668	-0.01155	-0.00679	0.00002
1992	0.22384	0.25185	0.25277	0.27153	0.75068	0.23678	-0.01242	-0.00008	-0.00219
1993	0.21773	0.25316	0.25090	0.27821	0.74265	0.23145	-0.00380	0.01006	-0.00271
1994	0.21191	0.25956	0.25551	0.27302	0.71554	0.21798	0.00039	0.02469	-0.00152
1995	0.18224	0.25954	0.27690	0.28132	0.70525	0.21097	0.01073	0.03468	-0.00103
1996	0.19160	0.24614	0.28093	0.28133	0.70592	0.20527	0.00309	0.03765	-0.00075
1997	0.18023	0.23715	0.30264	0.27998	0.68850	0.19457	0.00927	0.01964	-0.00008
1998	0.16850	0.22853	0.31795	0.28502	0.67724	0.19290	0.00646	0.03516	-0.00042
1999	0.16207	0.21993	0.33056	0.28744	0.65764	0.18675	0.00680	0.04728	0.00009
2000	0.16206	0.21247	0.33494	0.29053	0.64531	0.18288	0.01311	0.05181	0.00069
2001	0.17240	0.21996	0.31625	0.29138	0.65340	0.18713	-0.00230	0.05800	-0.00039
2002	0.19039	0.20724	0.29682	0.30556	0.65199	0.18607	0.00165	0.05480	-0.00059
2003	0.19282	0.20666	0.30300	0.29753	0.65998	0.18697	0.01011	0.03027	-0.00037
2004	0.19748	0.19917	0.31329	0.29006	0.66137	0.18582	0.01021	0.01951	-0.00044

APPENDIX C:

SELECTED OUTPUT OF MEDS-E SYSTEM

```
MEDS-E TABLE 1:   MAJOR DEMOGRAPHIC AND ECONOMIC AGGREGATES
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
------------------------------------------------------------------------------
                                      Gross            Fixed   Gov't   Fixed
              Popula-  Labour  Employ Domestic Consump Invest Current Capital
              tion     Force   -ment  Product  -tion   -ment  Expend.  Stock
      YEAR    POPTOT   LFTOT   ETOT   GDP      CONSUM   ITOT    GOVC    KTOT
------------------------------------------------------------------------------
                                     - levels -

      2001    31021.   16168.  15004.  1036.0   550.2   206.3   193.9  2744.3
      2006    32509.   17755.  16476.  1209.7   655.6   275.2   232.2  3284.5
      2011    33899.   18635.  17293.  1403.9   760.9   324.9   269.5  4002.2
      2016    35237.   19123.  17746.  1590.2   861.8   373.3   305.2  4792.4
      2021    36472.   19161.  17782.  1754.2   950.7   417.4   336.7  5633.9
      2026    37531.   19095.  17720.  1905.7  1032.8   458.6   365.8  6502.3
      2031    38342.   19073.  17700.  2042.1  1106.7   496.2   391.9  7382.4
      2036    38888.   19129.  17752.  2179.3  1181.1   533.3   418.3  8265.7
      2041    39208.   19160.  17780.  2311.7  1252.8   569.1   443.7  9150.4
      2046    39359.   19091.  17716.  2435.8  1320.1   602.8   467.5 10031.0
      2051    39400.   18935.  17572.  2552.4  1383.3   634.5   489.9 10900.7


      ------------------------------------------------------------------------
Note:   Numbers of persons are in thousands; income/expenditure figures
        are in billions of 1997 dollars.


MEDS-E TABLE 2:   MAJOR DEMOGRAPHIC AND ECONOMIC AGGREGATES
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
------------------------------------------------------------------------------
                                      Gross            Fixed   Gov't   Fixed
              Popula-  Labour  Employ Domestic Consump Invest Current Capital
              tion     Force   -ment  Product  -tion   -ment  Expend.  Stock
      YEAR    POPTOT   LFTOT   ETOT   GDP      CONSUM   ITOT    GOVC    KTOT
------------------------------------------------------------------------------
                              - percentage growth rates -

      2006      4.8      9.8     9.8   16.8    19.2    33.4    19.8    19.7
      2011      4.3      5.0     5.0   16.1    16.1    18.1    16.1    21.8
      2016      3.9      2.6     2.6   13.3    13.3    14.9    13.3    19.7
      2021      3.5       .2      .2   10.3    10.3    11.8    10.3    17.6
      2026      2.9      -.3     -.3    8.6     8.6     9.9     8.6    15.4
      2031      2.2      -.1     -.1    7.2     7.2     8.2     7.2    13.5
      2036      1.4       .3      .3    6.7     6.7     7.5     6.7    12.0
      2041       .8       .2      .2    6.1     6.1     6.7     6.1    10.7
      2046       .4      -.4     -.4    5.4     5.4     5.9     5.4     9.6
      2051       .1      -.8     -.8    4.8     4.8     5.3     4.8     8.7


      ------------------------------------------------------------------------
Note:   The growth rates show total growth over the preceding 5 years.
```

```
MEDS-E TABLE 3:   RATIOS OF AGGREGATE VARIABLES
               ID:  STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-------------------------------------------------------------------------------
        GDP/POPTOT           Percent of GDP--              URATE   KTOT
Year   --------------   -----------------------------      (%)    ----
       index % growth   CONSUM    ITOT    GOVC  TRADEBAL            GDP
-------------------------------------------------------------------------------

 2001   100.0      .      53.1    19.9    18.7     5.8      7.2     2.6
 2006   111.4    11.4     54.2    22.7    19.2      .0      7.2     2.7
 2011   124.0    11.3     54.2    23.1    19.2      .0      7.2     2.9
 2016   135.1     9.0     54.2    23.5    19.2      .0      7.2     3.0
 2021   144.0     6.6     54.2    23.8    19.2      .0      7.2     3.2
 2026   152.0     5.6     54.2    24.1    19.2      .0      7.2     3.4
 2031   159.5     4.9     54.2    24.3    19.2      .0      7.2     3.6
 2036   167.8     5.2     54.2    24.5    19.2      .0      7.2     3.8
 2041   176.6     5.2     54.2    24.6    19.2      .0      7.2     4.0
 2046   185.3     5.0     54.2    24.7    19.2      .0      7.2     4.1
 2051   194.0     4.7     54.2    24.9    19.2      .0      7.2     4.3


-------------------------------------------------------------------------------
Note:  The growth rates show total growth over the preceding 5 years.


MEDS-E TABLE 4:   PRODUCTIVITY MEASURES
               ID:  STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-------------------------------------------------------------------------------
        GDP/ETOT            GDP/KTOT             KTOT/ETOT
Year   ----------------   ----------------    ----------------
       index   % growth   index   % growth    index   % growth
-------------------------------------------------------------------------------

 2001   100.0      .       100.0      .        100.0      .
 2006   106.3     6.3       97.6    -2.4       109.0     9.0
 2011   117.6    10.6       92.9    -4.8       126.5    16.1
 2016   129.8    10.4       87.9    -5.4       147.6    16.7
 2021   142.9    10.1       82.5    -6.2       173.2    17.3
 2026   155.8     9.0       77.6    -5.9       200.6    15.8
 2031   167.1     7.3       73.3    -5.6       228.0    13.7
 2036   177.8     6.4       69.8    -4.7       254.6    11.6
 2041   188.3     5.9       66.9    -4.2       281.4    10.5
 2046   199.1     5.8       64.3    -3.9       309.6    10.0
 2051   210.4     5.6       62.0    -3.6       339.2     9.6


-------------------------------------------------------------------------------
Note:  The growth rates show total growth over the preceding 5 years.
```

```
MEDS-E TABLE 5:   FIXED CAPITAL STOCK AND INVESTMENT
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-----------------------------------------------------------------------------
  Year     KTOT     KRES    KNRES    KMACH    ITOT     IRES    INRES    IMACH
-----------------------------------------------------------------------------
                                  - levels -

  2001    2744.3    988.9   1137.9    617.5    206.3     50.2     64.0     92.1
  2006    3284.5   1164.2   1297.3    823.0    275.2     69.7     86.6    118.9
  2011    4002.2   1381.5   1551.8   1068.9    324.9     82.2    102.2    140.4
  2016    4792.4   1632.3   1843.5   1316.6    373.3     94.5    117.4    161.4
  2021    5633.9   1909.7   2163.4   1560.7    417.4    105.7    131.3    180.4
  2026    6502.3   2205.7   2501.5   1795.2    458.6    116.1    144.3    198.2
  2031    7382.4   2514.2   2850.5   2017.7    496.2    125.6    156.1    214.5
  2036    8265.7   2831.1   3205.8   2228.8    533.3    135.0    167.8    230.5
  2041    9150.4   3154.5   3565.1   2430.9    569.1    144.1    179.0    246.0
  2046   10031.0   3481.5   3925.4   2624.1    602.8    152.6    189.6    260.6
  2051   10900.7   3809.2   4283.6   2808.0    634.5    160.6    199.6    274.3


-----------------------------------------------------------------------------
Note:  Figures are in billions of 1997 dollars.


MEDS-E TABLE 6:   FIXED CAPITAL STOCK AND INVESTMENT
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-----------------------------------------------------------------------------
  Year     KTOT     KRES    KNRES    KMACH    ITOT     IRES    INRES    IMACH
-----------------------------------------------------------------------------
                          - percentage growth rates -

  2006     19.7     17.7     14.0     33.3     33.4     38.8     35.2     29.2
  2011     21.8     18.7     19.6     29.9     18.1     18.1     18.1     18.1
  2016     19.7     18.2     18.8     23.2     14.9     14.9     14.9     14.9
  2021     17.6     17.0     17.4     18.5     11.8     11.8     11.8     11.8
  2026     15.4     15.5     15.6     15.0      9.9      9.9      9.9      9.9
  2031     13.5     14.0     14.0     12.4      8.2      8.2      8.2      8.2
  2036     12.0     12.6     12.5     10.5      7.5      7.5      7.5      7.5
  2041     10.7     11.4     11.2      9.1      6.7      6.7      6.7      6.7
  2046      9.6     10.4     10.1      8.0      5.9      5.9      5.9      5.9
  2051      8.7      9.4      9.1      7.0      5.3      5.3      5.3      5.3


-----------------------------------------------------------------------------
Note:  The growth rates show total growth over the preceding 5 years.
```

```
MEDS-E TABLE 7:   FIXED CAPITAL STOCK AND ITS AGE DISTRIBUTION (TYPE: KTOT )
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
---------------------------------------------------------------------------
                Median    Age Distribution of KTOT , in Years (%)
  Year    KTOT    Age    ------------------------------------------------
                (years) All ages  10+     20+     30+     40+     50+
---------------------------------------------------------------------------

  2001   2744.3   10.4    100.0   51.4    24.3    11.0    4.9     1.9
  2006   3284.5    9.7    100.0   49.2    25.2    11.8    5.3     2.2
  2011   4002.2    8.9    100.0   46.5    25.4    12.4    5.7     2.5
  2016   4792.4    8.9    100.0   45.9    24.2    12.8    6.1     2.7
  2021   5633.9    9.2    100.0   47.2    23.4    13.3    6.6     3.0
  2026   6502.3    9.7    100.0   48.7    23.8    13.1    7.0     3.4
  2031   7382.4   10.1    100.0   50.4    25.2    13.0    7.6     3.8
  2036   8265.7   10.6    100.0   52.0    26.7    13.6    7.7     4.2
  2041   9150.4   11.0    100.0   53.4    28.3    14.7    7.8     4.6
  2046  10031.0   11.5    100.0   54.6    29.8    15.9    8.3     4.8
  2051  10900.7   11.9    100.0   55.8    31.3    17.2    9.1     4.9


---------------------------------------------------------------------------
Note:  KTOT  is in billions of 1997 dollars.


MEDS-E TABLE 8:   CONSUMER DURABLES AND MEASURES OF CONSUMPTION
                  ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
---------------------------------------------------------------------------
            Stock of Consumer Durables, KDUR
            ----------------------------------
  Year           Median Age Distribution (%) CONSUM  CDUR  CONEX  CONSUM CONSUM
         Total    Age    -------------------                      ------ ------
                (years)   5+   10+   15+                          POPTOT HOUSE
---------------------------------------------------------------------------

  2001    565.5   4.6    47.4  24.1  10.5    550.2  56.6  578.5   17.7   45.0
  2006    730.1   4.4    45.7  21.7  11.0    655.6  73.0  694.5   20.2   49.8
  2011    925.5   4.6    46.6  21.3  10.1    760.9  92.6  800.4   22.4   53.9
  2016   1123.0   4.8    48.7  22.7  10.4    861.8 112.3  901.2   24.5   57.3
  2021   1317.4   5.1    50.3  24.5  11.4    950.7 131.7  988.6   26.1   59.8
  2026   1503.3   5.3    51.7  26.0  12.7   1032.8 150.3 1068.9   27.5   62.0
  2031   1678.8   5.4    52.9  27.4  13.8   1106.7 167.9 1140.5   28.9   64.1
  2036   1844.9   5.6    53.7  28.4  14.7   1181.1 184.5 1213.4   30.4   66.7
  2041   2003.8   5.7    54.4  29.2  15.4   1252.8 200.4 1283.8   32.0   69.6
  2046   2155.7   5.8    54.9  29.8  16.0   1320.1 215.6 1349.5   33.5   72.7
  2051   2300.1   5.9    55.3  30.4  16.5   1383.3 230.0 1411.2   35.1   75.9


---------------------------------------------------------------------------
Note:  KDUR, CONSUM, CDUR, and CONEX are in billions of 1997 dollars; the
       ratios involving CONSUM are in thousands of 1997 dollars per person
       and per household.
```

```
MEDS-E TABLE  9:   PROJECTED EDUCATION OF POPULATION              BOTH SEXES
                   ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-----------------------------------------------------------------------------
                       15+                             20-24
          ------------------------------    ------------------------------
  YEAR
          E1    E2    E3    E4    E5    E6    E7    E1    E2    E3    E4    E5    E6    E7
-----------------------------------------------------------------------------
               - thousands -                       - thousands -

  2001   2491  4408  4873  2300  7094  2724  1273    39   234   500   535   608   170    22
  2006   2048  4342  5068  2562  7885  3286  1679    34   253   485   606   615   177    24
  2011   1669  4199  5188  2835  8655  3889  2014    33   255   465   645   613   179    27
  2016   1310  3909  5258  3105  9305  4496  2353    35   255   443   680   606   179    29
  2021   1039  3661  5250  3333  9912  5041  2615    34   232   384   652   546   164    29
  2026    838  3536  5237 363210376  5427  2814    35   224   353   664   522   160    30
  2031    740  3459  5079 393810775  5776  2963    37   228   340   708   525   164    33
  2036    669  3220  4795 426911113  6201  3122    40   231   327   756   528   168    35
  2041    576  2966  4354 460911283  6680  3330    42   231   310   792   523   170    37
  2046    529  2612  3893 488211551  6989  3507    43   221   287   813   510   168    39
  2051    526  2370  3698 524411480  7058  3599    43   207   261   822   489   165    39


-----------------------------------------------------------------------------
Note:  E1 refers to grade 8 or lower, E2 to some secondary, E3 to secondary
       school graduation, E4 to some post-secondary, E5 to post-secondary
       certificate or diploma, E6 to completed bachelor's degree, and E7
       to university degree or certificate above bachelor's.


MEDS-E TABLE 10:   PROJECTED EDUCATION OF POPULATION              BOTH SEXES
                   ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-----------------------------------------------------------------------------
                       15+                             20-24
          ------------------------------    ------------------------------
  YEAR
          E1    E2    E3    E4    E5    E6    E7    E1    E2    E3    E4    E5    E6    E7
-----------------------------------------------------------------------------
               - percentage distribution -         - percentage distribution -

  2001    9.9  17.5  19.4   9.1  28.2  10.8   5.1   1.9  11.1  23.7  25.4  28.8   8.1   1.1
  2006    7.6  16.2  18.9   9.5  29.3  12.2   6.2   1.6  11.5  22.1  27.6  28.0   8.1   1.1
  2011    5.9  14.8  18.2  10.0  30.4  13.7   7.1   1.5  11.5  21.0  29.1  27.6   8.1   1.2
  2016    4.4  13.1  17.7  10.4  31.3  15.1   7.9   1.6  11.4  19.9  30.5  27.2   8.1   1.3
  2021    3.4  11.9  17.0  10.8  32.1  16.3   8.5   1.7  11.4  18.8  31.9  26.7   8.1   1.4
  2026    2.6  11.1  16.4  11.4  32.6  17.0   8.8   1.8  11.3  17.7  33.3  26.2   8.1   1.5
  2031    2.3  10.6  15.5  12.0  32.9  17.6   9.1   1.9  11.2  16.7  34.8  25.8   8.1   1.6
  2036    2.0   9.6  14.4  12.8  33.3  18.6   9.4   1.9  11.1  15.7  36.2  25.3   8.1   1.7
  2041    1.7   8.8  12.9  13.6  33.4  19.8   9.9   2.0  11.0  14.7  37.6  24.8   8.1   1.8
  2046    1.6   7.7  11.5  14.4  34.0  20.6  10.3   2.1  10.6  13.8  39.0  24.5   8.1   1.9
  2051    1.5   7.0  10.9  15.4  33.8  20.8  10.6   2.2  10.2  12.9  40.5  24.1   8.1   2.0


-----------------------------------------------------------------------------
Note:  E1 refers to grade 8 or lower, E2 to some secondary, E3 to secondary
       school graduation, E4 to some post-secondary, E5 to post-secondary
       certificate or diploma, E6 to completed bachelor's degree, and E7
       to university degree or certificate above bachelor's.
```

```
MEDS-E TABLE 12:   AGGREGATE MEASURES RELATING TO HUMAN CAPITAL
                   ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-------------------------------------------------------------------------------
  Year       HCAP     HCAP/POPTOT   HCAP/ETOT    HCAP/GDP   HCAP/KTOT    RDISC
-------------------------------------------------------------------------------
                                   - levels -

  2001      8510.        274.3        567.2         8.2        3.1        7.3
  2006     10232.        314.8        621.0         8.5        3.1        6.8
  2011     12413.        366.2        717.8         8.8        3.1        6.2
  2016     14739.        418.3        830.5         9.3        3.1        5.6
  2021     17169.        470.8        965.6         9.8        3.0        5.0
  2026     19678.        524.3       1110.5        10.3        3.0        4.4
  2031     22139.        577.4       1250.8        10.8        3.0        4.0
  2036     24488.        629.7       1379.5        11.2        3.0        3.6
  2041     26817.        684.0       1508.3        11.6        2.9        3.3
  2046     29187.        741.5       1647.5        12.0        2.9        3.0
  2051     31607.        802.2       1798.7        12.4        2.9        2.8


-------------------------------------------------------------------------------
Note:   HCAP represents human capital embodied in the population 15 years of
        age and over; it is in billions of 1997 dollars; HCAP/POPTOT and
        HCAP/ETOT are in thousands of 1997 dollars per person; HCAP/GDP and
        HCAP/KTOT are ratios; RDISC is a percent.


MEDS-E TABLE 13:   AGGREGATE MEASURES RELATING TO HUMAN CAPITAL
                   ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
-------------------------------------------------------------------------------
  Year       HCAP     HCAP/POPTOT   HCAP/ETOT    HCAP/GDP   HCAP/KTOT    RDISC
-------------------------------------------------------------------------------
                             - percentage growth rates -

  2006       20.2         14.7          9.5         3.0         .5
  2011       21.3         16.3         15.6         4.5        -.4
  2016       18.7         14.2         15.7         4.8        -.8
  2021       16.5         12.5         16.3         5.6        -.9
  2026       14.6         11.4         15.0         5.5        -.7
  2031       12.5         10.1         12.6         5.0        -.9
  2036       10.6          9.1         10.3         3.6       -1.2
  2041        9.5          8.6          9.3         3.2       -1.1
  2046        8.8          8.4          9.2         3.3        -.7
  2051        8.3          8.2          9.2         3.3        -.3


-------------------------------------------------------------------------------
Note:   The growth rates show total growth over the preceding 5 years.
```

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MEDS-E TABLE 17:   AGE-SEX COMPOSITION OF HUMAN CAPITAL          MALES
                ID:   STANDARD (AS OF 22/SEPT/05)          DATE: 26SEP2005
--------------------------------------------------------------------------
                                        AGE GROUP
   YEAR   TOTAL   ----------------------------------------------------------
          15+     15-19    20-24    25-34    35-44    45-54    55-64   65-69    70+
--------------------------------------------------------------------------
                                    - per capita -

   2001   421.4   320.5    511.2    667.1    619.0    436.4    150.4    19.6     6.4
   2006   450.2   350.0    547.5    727.7    685.5    476.7    188.0    29.9     8.1
   2011   497.9   411.7    628.7    833.6    798.3    531.9    211.0    40.4    10.7
   2016   549.1   487.3    726.2    957.0    914.6    600.6    234.0    48.8    13.8
   2021   605.4   583.7    848.0   1107.4   1037.0    689.1    253.3    53.5    15.7
   2026   662.7   691.6    981.5   1273.2   1169.0    770.3    275.6    56.8    16.5
   2031   724.7   811.7   1127.3   1451.0   1311.6    842.2    312.3    62.8    17.0
   2036   786.1   928.6   1268.0   1625.0   1445.2    912.4    340.7    70.7    18.4
   2041   851.5  1045.5   1409.7   1802.5   1588.4    984.4    359.7    77.4    20.6
   2046   923.6  1168.6   1560.0   1988.9   1738.3   1051.7    381.1    81.6    22.3
   2051  1000.9  1297.4   1716.9   2185.6   1891.7   1133.9    404.7    86.6    23.2


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Note:   Figures are in thousands of 1997 dollars.
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