Office of the Superintendent
of Financial Institutions

Bureau du surintendant
des institutions financières

OLD AGE SECURITY PROGRAM

Fourth Actuarial Report

as at 31 December 1997

Canada

5 May 1999

The Honourable Pierre S. Pettigrew, P.C., M.P.
Minister of Human Resources Development
House of Commons
Ottawa, Ontario
K1A 0G5

Dear Minister:

Subject: Fourth Actuarial Report on the Old Age Security Program

Pursuant to section 6 of the *Public Pensions Reporting Act*, I am pleased to submit my report on the actuarial review, as at 31 December 1997, of the pension plan established under the *Old Age Security Act*.

Yours sincerely,

Michael Hafeman
Acting Chief Actuary

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I. Introduction

This is the Fourth Actuarial Report since the inception of the Old Age Security Plan (OAS) in 1952. It presents the results of an actuarial examination of the status of the OAS as at 31 December 1997, and includes projections of future experience through the year 2100. This report has been prepared on a basis that is largely consistent with that of the Seventeenth Actuarial Report on the Canada Pension Plan as at 31 December 1997.

A. Purposes of the Report

The *Public Pensions Reporting Act* requires the Chief Actuary to prepare a report every three years setting out the results of an actuarial examination of the OAS. It also specifies certain information that must be included in the report.

The Third Actuarial Report, dated June 1995, reported on the status of the OAS as at 31 December 1993. Therefore, the effective date of this report is one year later than required under the *Public Pensions Reporting Act*. However, the projections made in this report are based on data, methods and assumptions that are similar to those underlying actuarial examinations of the Canada Pension Plan (CPP). The one year delay enabled this report to be prepared with the same effective date as, and on a consistent basis with, the Seventeenth Actuarial Report on the Canada Pension Plan. Since actuarial reports on the CPP are now required every three years, also, this consistency can be maintained in the future. Accordingly, the next report on the OAS will be required as at 31 December 2000.

The *Public Pensions Reporting Act* requires that the actuarial report provide information in respect of benefits under Part I of the *Old Age Security Act*, which are the basic OAS pensions. Benefits under Part II, the Guaranteed Income Supplement (GIS), and Part III, the Spouse's Allowance (SPA), are not legally required to be included in the actuarial examination. However, in order to provide a more comprehensive financial picture of the OAS, all three types of benefits have been included in this report.

Another important purpose of the report is to inform the general public of the current and projected future financial status of the OAS. Such information should facilitate a better understanding of the factors that influence its cost, contributing to an informed public discussion of issues related to the OAS.

B. Overview of the Report

The actuarial status of the OAS is traditionally evaluated over a very long period of time. The actuarial estimates in this report are based on the current provisions of the OAS, data regarding the starting point for the projections, assumptions regarding future demographic and economic experience, and a methodology for translating this information into estimates of future OAS expenditures. The information required by statute has been derived using assumptions which reflect my best judgement regarding future experience.

Section II presents the results of these actuarial projections. It includes information on trends in key demographic and financial indicators and highlights of the projections of OAS expenditures. The amounts of OAS pension shown in this report have not been reduced by repayments ("clawbacks") under the *Income Tax Act*. However, the amounts of the GIS and SPA benefits reflect the income-related reductions.

Section III describes the key "best-estimate" assumptions that underlie the results presented in Section II.

A wide variety of factors influence both the current and the projected costs of the OAS. Accordingly, the results shown in this report differ from those shown in previous reports. Section IV provides an analysis of the changes between the results shown in this report and those presented in the Third Actuarial Report. Note that this analysis relates to basic OAS pensions only, since this is the first report that includes the GIS and SPA benefits.

Likewise, future actuarial examinations will reveal actual results that differ from the projections included in this report. Section V summarises the results of tests of the sensitivity of projected results to changes in key actuarial assumptions, both individually and under combined "low-cost" and "high-cost" scenarios.

Section VI consists of my formal opinion regarding this actuarial examination.

The appendices in Section VII provide a summary of the main provisions of the OAS and detailed descriptions of the data, assumptions and methods employed in the actuarial examination. They also include detailed tables setting out the results of projections under both the best-estimate and sensitivity-test assumptions.

II. Results Based on Best-Estimate Assumptions

A. Overview

The results of the actuarial projections of the financial position of the OAS presented in this report are generally consistent with the trends revealed in the Third Actuarial Report. For example:

- demographic changes will have a major impact on the ratio of retirees to workers; the ratio of the number of people ages 65 and over to the number ages 20 to 64 is expected to grow from about 20% in 1997 to 42% in 2050;

- the ratio of total annual expenditures to gross domestic product (GDP) is expected to decrease from its 1997 level of 2.55% to 2.38% in 2010. This decrease results from the indexation of maximum benefit rates in accordance with the rate of price increases, which is assumed to be lower than the rates of growth of both GDP and the incomes of new retirees (which reduces the amounts of income-tested GIS and SPA benefits payable);

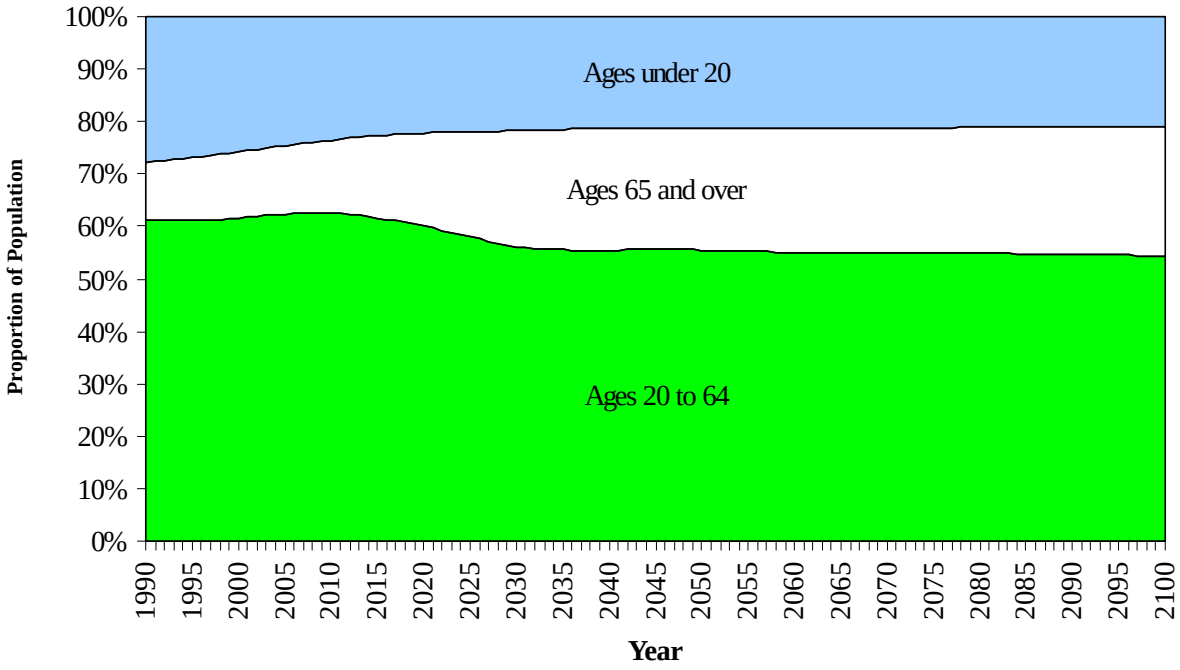
- the cost ratio increases from 2.38% in 2010 to a high of 3.28% in 2030, driven largely by the retirement of the baby boom generation, which more than offsets the effect of the indexation basis; and

- over the longer term, the effect of price-indexation of benefits predominates and results in the reduction of the ratio of expenditures to GDP to 2.58% by 2060 - slightly higher than its current level.

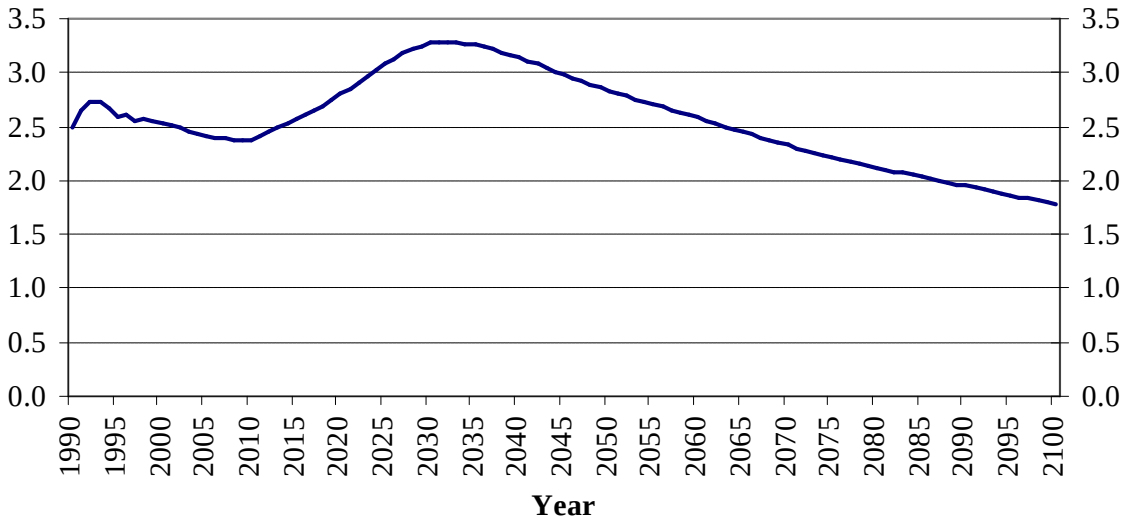
These trends are evident from the graphs below.

Over time, indexing benefit rates more slowly than the rate of growth in average employment earnings means that OAS benefits will replace a decreasing share of individuals' pre-retirement earnings. In the past, this issue has been addressed through occasional ad hoc increases in the benefit rates. One of the sensitivity tests shown in Section V provides an indication of the impact on projected results if OAS benefit rates are increased to partially reflect the growth in real wages.

Graph II.1 Distribution of Historical and Projected Population by Age Group



Graph II.2 Historical and Projected Expenditures as Percentages of Gross Domestic Product



B. Financial Projections

Table II.1 provides a summary of the historical expenditures of the OAS, both in amounts and as percentages of GDP. Table II.2 provides supplementary historical cost information, showing the costs as percentages of CPP/QPP contributory earnings and employment earnings. Table II.3 provides supplementary historical benefit information, such as number of beneficiaries, overall eligibility rates[1] and average benefits.

Tables II.4, II.5 and II.6 present comparable information on the results of projections using the best-estimate assumptions described in Section III.

[1] The overall eligibility rates have been calculated as the ratios of the number of beneficiaries during June of the given year to the population in the appropriate age range, i.e., ages 60 to 64 for SPA, 65 and over for GIS and 65 and over for OAS in 1969 and thereafter (eligibility age was higher in earlier years). Some of the rates exceed 1.0 due to differences between the census and beneficiary databases.

Table II.1 Historical Results *(millions of dollars)*

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1952	318	N/A	N/A	2	320	25,170	1.26	N/A	N/A	0.01	1.27
1953	335	N/A	N/A	2	337	26,395	1.27	N/A	N/A	0.01	1.28
1954	350	N/A	N/A	2	352	26,531	1.32	N/A	N/A	0.01	1.33
1955	363	N/A	N/A	3	366	29,250	1.24	N/A	N/A	0.01	1.25
1956	376	N/A	N/A	3	379	32,902	1.14	N/A	N/A	0.01	1.15
1957	434	N/A	N/A	3	437	34,467	1.26	N/A	N/A	0.01	1.27
1958	555	N/A	N/A	3	558	35,689	1.56	N/A	N/A	0.01	1.56
1959	571	N/A	N/A	3	574	37,877	1.51	N/A	N/A	0.01	1.52
1960	588	N/A	N/A	3	591	39,448	1.49	N/A	N/A	0.01	1.50
1961	603	N/A	N/A	3	606	41,253	1.46	N/A	N/A	0.01	1.47
1962	721	N/A	N/A	3	724	44,755	1.61	N/A	N/A	0.01	1.62
1963	775	N/A	N/A	3	778	48,059	1.61	N/A	N/A	0.01	1.62
1964	881	N/A	N/A	3	884	52,653	1.67	N/A	N/A	0.01	1.68
1965	917	N/A	N/A	4	921	58,050	1.58	N/A	N/A	0.01	1.59
1966	1,007	N/A	N/A	5	1,012	64,943	1.55	N/A	N/A	0.01	1.56
1967	1,119	216	N/A	7	1,342	69,834	1.60	0.31	N/A	0.01	1.92
1968	1,260	242	N/A	7	1,509	76,285	1.65	0.32	N/A	0.01	1.98
1969	1,424	259	N/A	9	1,692	84,006	1.70	0.31	N/A	0.01	2.01
1970	1,611	274	N/A	9	1,894	90,367	1.78	0.30	N/A	0.01	2.10
1971	1,668	470	N/A	12	2,150	98,630	1.69	0.48	N/A	0.01	2.18
1972	1,761	697	N/A	9	2,467	110,124	1.60	0.63	N/A	0.01	2.24
1973	2,130	725	N/A	8	2,863	129,196	1.65	0.56	N/A	0.01	2.22
1974	2,519	819	N/A	9	3,347	154,290	1.63	0.53	N/A	0.01	2.17
1975	2,883	896	13	10	3,802	173,893	1.66	0.52	0.01	0.01	2.19
1976	3,249	1,001	95	19	4,364	200,296	1.62	0.50	0.05	0.01	2.18
1977	3,563	1,057	113	22	4,755	221,358	1.61	0.48	0.05	0.01	2.15
1978	4,009	1,155	122	25	5,311	245,526	1.63	0.47	0.05	0.01	2.16
1979	4,537	1,468	140	27	6,172	280,309	1.62	0.52	0.05	0.01	2.20
1980	5,147	1,772	169	34	7,123	315,245	1.63	0.56	0.05	0.01	2.26
1981	5,918	2,180	197	42	8,337	360,494	1.64	0.60	0.05	0.01	2.31
1982	6,804	2,376	217	45	9,442	379,734	1.79	0.63	0.06	0.01	2.49
1983	7,504	2,508	232	54	10,298	411,160	1.83	0.61	0.06	0.01	2.50
1984	8,077	2,792	245	56	11,170	449,249	1.80	0.62	0.05	0.01	2.49
1985	8,696	3,278	295	60	12,329	485,139	1.79	0.68	0.06	0.01	2.54
1986	9,346	3,419	468	59	13,292	511,796	1.83	0.67	0.09	0.01	2.60
1987	10,070	3,577	482	59	14,188	558,106	1.80	0.64	0.09	0.01	2.54
1988	10,774	3,725	476	56	15,031	611,785	1.76	0.61	0.08	0.01	2.46
1989	11,579	3,851	464	62	15,957	656,190	1.76	0.59	0.07	0.01	2.43
1990	12,484	3,954	452	67	16,957	678,135	1.84	0.58	0.07	0.01	2.50
1991	13,545	4,102	447	63	18,157	683,239	1.98	0.60	0.07	0.01	2.66
1992	14,292	4,227	438	77	19,034	698,544	2.05	0.61	0.06	0.01	2.72
1993	14,872	4,393	430	90	19,785	724,960	2.05	0.61	0.06	0.01	2.73
1994	15,403	4,587	431	71	20,493	767,506	2.01	0.60	0.06	0.01	2.67
1995	15,832	4,601	411	107	20,950	806,778	1.96	0.57	0.05	0.01	2.60
1996	16,433	4,636	398	132	21,599	828,997	1.98	0.56	0.05	0.02	2.61
1997	16,944	4,710	393	85	22,131	866,252	1.96	0.54	0.05	0.01	2.55

Table II.2 Supplementary Cost Information - Historical (millions of dollars)

Year	CPP/QPP Contributory Earnings	Expenditures As % Of CPP/QPP Contributory Earnings					Total Employment Earnings	Expenditures As % Of Total Employment Earnings				
		OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1952	N/A	N/A	N/A	N/A	N/A	N/A	11,354	2.80	N/A	N/A	0.02	2.82
1953	N/A	N/A	N/A	N/A	N/A	N/A	12,260	2.73	N/A	N/A	0.02	2.75
1954	N/A	N/A	N/A	N/A	N/A	N/A	12,554	2.79	N/A	N/A	0.02	2.81
1955	N/A	N/A	N/A	N/A	N/A	N/A	13,397	2.71	N/A	N/A	0.02	2.73
1956	N/A	N/A	N/A	N/A	N/A	N/A	15,079	2.49	N/A	N/A	0.02	2.51
1957	N/A	N/A	N/A	N/A	N/A	N/A	16,303	2.66	N/A	N/A	0.02	2.68
1958	N/A	N/A	N/A	N/A	N/A	N/A	16,711	3.32	N/A	N/A	0.02	3.34
1959	N/A	N/A	N/A	N/A	N/A	N/A	17,832	3.20	N/A	N/A	0.02	3.22
1960	N/A	N/A	N/A	N/A	N/A	N/A	18,740	3.14	N/A	N/A	0.02	3.15
1961	N/A	N/A	N/A	N/A	N/A	N/A	20,147	2.99	N/A	N/A	0.02	3.01
1962	N/A	N/A	N/A	N/A	N/A	N/A	21,679	3.33	N/A	N/A	0.01	3.34
1963	N/A	N/A	N/A	N/A	N/A	N/A	23,111	3.35	N/A	N/A	0.01	3.37
1964	N/A	N/A	N/A	N/A	N/A	N/A	25,241	3.49	N/A	N/A	0.01	3.50
1965	N/A	N/A	N/A	N/A	N/A	N/A	28,077	3.27	N/A	N/A	0.01	3.28
1966	20,342	4.95	N/A	N/A	0.03	4.98	31,418	3.21	N/A	N/A	0.02	3.22
1967	23,416	4.78	0.92	N/A	0.03	5.73	34,773	3.22	0.62	N/A	0.02	3.86
1968	25,468	4.95	0.95	N/A	0.03	5.93	37,704	3.34	0.64	N/A	0.02	4.00
1969	27,364	5.20	0.95	N/A	0.03	6.18	42,161	3.38	0.61	N/A	0.02	4.01
1970	28,772	5.60	0.95	N/A	0.03	6.58	45,666	3.53	0.60	N/A	0.02	4.15
1971	30,397	5.49	1.55	N/A	0.04	7.07	50,048	3.33	0.94	N/A	0.02	4.30
1972	32,538	5.41	2.14	N/A	0.03	7.58	56,018	3.14	1.24	N/A	0.02	4.40
1973	35,484	6.00	2.04	N/A	0.02	8.07	64,536	3.30	1.12	N/A	0.01	4.44
1974	44,690	5.64	1.83	N/A	0.02	7.49	76,537	3.29	1.07	N/A	0.01	4.37
1975	52,844	5.46	1.70	0.03	0.02	7.20	88,973	3.24	1.01	0.01	0.01	4.27
1976	60,535	5.37	1.65	0.16	0.03	7.21	102,476	3.17	0.98	0.09	0.02	4.26
1977	67,726	5.26	1.56	0.17	0.03	7.02	113,156	3.15	0.93	0.10	0.02	4.20
1978	75,193	5.33	1.54	0.16	0.03	7.06	122,640	3.27	0.94	0.10	0.02	4.33
1979	85,926	5.28	1.71	0.16	0.03	7.18	137,961	3.29	1.06	0.10	0.02	4.47
1980	96,320	5.34	1.84	0.18	0.04	7.39	156,402	3.29	1.13	0.11	0.02	4.55
1981	110,652	5.35	1.97	0.18	0.04	7.53	179,634	3.29	1.21	0.11	0.02	4.64
1982	130,057	5.23	1.83	0.17	0.03	7.26	191,607	3.55	1.24	0.11	0.02	4.93
1983	127,035	5.91	1.97	0.18	0.04	8.11	200,078	3.75	1.25	0.12	0.03	5.15
1984	148,632	5.43	1.88	0.16	0.04	7.52	215,286	3.75	1.30	0.11	0.03	5.19
1985	149,461	5.82	2.19	0.20	0.04	8.25	231,829	3.75	1.41	0.13	0.03	5.32
1986	171,694	5.44	1.99	0.27	0.03	7.74	247,343	3.78	1.38	0.19	0.02	5.37
1987	185,480	5.43	1.93	0.26	0.03	7.65	268,756	3.75	1.33	0.18	0.02	5.28
1988	199,120	5.41	1.87	0.24	0.03	7.55	294,840	3.65	1.26	0.16	0.02	5.10
1989	208,542	5.55	1.85	0.22	0.03	7.65	318,716	3.63	1.21	0.15	0.02	5.01
1990	230,658	5.41	1.71	0.20	0.03	7.35	333,460	3.74	1.19	0.14	0.02	5.09
1991	234,336	5.78	1.75	0.19	0.03	7.75	338,525	4.00	1.21	0.13	0.02	5.36
1992	237,875	6.01	1.78	0.18	0.03	8.00	343,069	4.17	1.23	0.13	0.02	5.55
1993	237,295	6.27	1.85	0.18	0.04	8.34	347,236	4.28	1.27	0.12	0.03	5.70
1994	240,616	6.40	1.91	0.18	0.03	8.52	355,927	4.33	1.29	0.12	0.02	5.76
1995	260,102	6.09	1.77	0.16	0.04	8.05	366,548	4.32	1.26	0.11	0.03	5.72
1996	250,853	6.55	1.85	0.16	0.05	8.61	376,052	4.37	1.23	0.11	0.04	5.74
1997	263,455	6.43	1.79	0.15	0.03	8.40	393,702	4.30	1.20	0.10	0.02	5.62

Table II.3 Supplementary Benefit Information - Historical

	Number of Beneficiaries			Eligibility Rates			Average Benefit		
Year	**OAS**	**GIS**	**SPA**	**OAS**	**GIS**	**SPA**	**OAS**	**GIS**	**SPA**
1952	675,349	N/A	N/A	0.9815	N/A	N/A	471	N/A	N/A
1953	708,831	N/A	N/A	0.9921	N/A	N/A	473	N/A	N/A
1954	738,315	N/A	N/A	0.9948	N/A	N/A	474	N/A	N/A
1955	765,220	N/A	N/A	0.9993	N/A	N/A	474	N/A	N/A
1956	791,053	N/A	N/A	1.0025	N/A	N/A	475	N/A	N/A
1957	820,042	N/A	N/A	1.0080	N/A	N/A	529	N/A	N/A
1958	847,603	N/A	N/A	1.0124	N/A	N/A	655	N/A	N/A
1959	870,879	N/A	N/A	1.0068	N/A	N/A	656	N/A	N/A
1960	897,782	N/A	N/A	1.0109	N/A	N/A	655	N/A	N/A
1961	921,919	N/A	N/A	1.0078	N/A	N/A	654	N/A	N/A
1962	944,972	N/A	N/A	1.0097	N/A	N/A	763	N/A	N/A
1963	966,542	N/A	N/A	1.0106	N/A	N/A	802	N/A	N/A
1964	988,137	N/A	N/A	1.0110	N/A	N/A	892	N/A	N/A
1965	1,077,728	N/A	N/A	0.9836	N/A	N/A	851	N/A	N/A
1966	1,198,615	N/A	N/A	0.9809	N/A	N/A	840	N/A	N/A
1967	1,332,048	662,296	N/A	0.9811	0.4155	N/A	840	326	N/A
1968	1,470,199	759,938	N/A	0.9769	0.4663	N/A	857	318	N/A
1969	1,629,195	803,385	N/A	0.9742	0.4804	N/A	874	322	N/A
1970	1,688,768	815,959	N/A	0.9842	0.4755	N/A	954	336	N/A
1971	1,734,774	932,052	N/A	0.9827	0.5280	N/A	962	504	N/A
1972	1,780,203	998,167	N/A	0.9832	0.5513	N/A	989	698	N/A
1973	1,825,411	1,057,509	N/A	0.9823	0.5691	N/A	1,167	686	N/A
1974	1,873,835	1,068,987	N/A	0.9822	0.5603	N/A	1,344	766	N/A
1975	1,925,203	1,068,610	7,234	0.9819	0.5450	0.0080	1,498	838	1,842
1976	1,974,812	1,083,905	58,580	0.9750	0.5351	0.0641	1,645	924	1,622
1977	2,035,156	1,111,705	71,861	0.9726	0.5313	0.0778	1,751	951	1,567
1978	2,098,382	1,127,377	73,375	0.9721	0.5223	0.0791	1,911	1,025	1,662
1979	2,179,230	1,164,298	76,051	0.9758	0.5213	0.0817	2,082	1,261	1,846
1980	2,258,791	1,190,964	80,680	0.9786	0.5160	0.0846	2,279	1,488	2,100
1981	2,326,121	1,231,871	84,064	0.9775	0.5177	0.0850	2,544	1,770	2,339
1982	2,388,935	1,228,015	84,717	0.9772	0.5023	0.0820	2,848	1,935	2,559
1983	2,448,391	1,229,214	86,072	0.9783	0.4911	0.0801	3,065	2,040	2,692
1984	2,511,026	1,245,889	89,029	0.9775	0.4850	0.0800	3,217	2,241	2,751
1985	2,595,086	1,289,747	100,176	0.9777	0.4859	0.0887	3,351	2,542	2,941
1986	2,682,836	1,316,248	139,359	0.9783	0.4800	0.1222	3,484	2,598	3,356
1987	2,778,316	1,336,011	139,804	0.9774	0.4700	0.1216	3,624	2,677	3,446
1988	2,862,310	1,342,099	135,131	0.9772	0.4582	0.1162	3,764	2,776	3,521
1989	2,948,420	1,338,595	128,162	0.9748	0.4426	0.1095	3,927	2,877	3,621
1990	3,036,325	1,324,660	121,256	0.9741	0.4250	0.1027	4,112	2,985	3,732
1991	3,127,100	1,309,345	114,903	0.9739	0.4078	0.0965	4,331	3,133	3,892
1992	3,209,989	1,299,947	110,310	0.9724	0.3938	0.0916	4,452	3,252	3,968
1993	3,289,144	1,312,817	108,096	0.9705	0.3874	0.0891	4,522	3,346	3,974
1994	3,367,153	1,339,870	108,736	0.9697	0.3859	0.0894	4,574	3,423	3,967
1995	3,446,822	1,337,745	103,936	0.9687	0.3760	0.0855	4,593	3,439	3,950
1996	3,523,815	1,340,767	100,647	0.9671	0.3680	0.0829	4,663	3,458	3,956
1997	3,589,056	1,364,097	99,800	0.9640	0.3664	0.0824	4,721	3,453	3,935

Table II.4 Projected Financial Development *(millions of dollars)*

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,472	921,546	1.95	0.54	0.04	0.01	2.55
2000	18,618	5,103	398	109	24,228	956,748	1.95	0.53	0.04	0.01	2.53
2001	19,320	5,255	404	112	25,091	997,653	1.94	0.53	0.04	0.01	2.52
2002	20,091	5,417	416	117	26,041	1,044,721	1.92	0.52	0.04	0.01	2.49
2003	20,966	5,599	433	121	27,119	1,102,843	1.90	0.51	0.04	0.01	2.46
2004	21,927	5,806	453	127	28,312	1,163,566	1.88	0.50	0.04	0.01	2.43
2005	22,941	6,026	474	132	29,574	1,226,310	1.87	0.49	0.04	0.01	2.41
2006	24,057	6,261	497	139	30,954	1,291,254	1.86	0.48	0.04	0.01	2.40
2007	25,251	6,506	530	145	32,432	1,358,613	1.86	0.48	0.04	0.01	2.39
2008	26,577	6,769	561	153	34,059	1,429,449	1.86	0.47	0.04	0.01	2.38
2009	27,987	7,044	592	160	35,783	1,502,994	1.86	0.47	0.04	0.01	2.38
2010	29,484	7,337	627	169	37,617	1,579,312	1.87	0.46	0.04	0.01	2.38
2011	31,160	7,657	658	178	39,653	1,649,299	1.89	0.46	0.04	0.01	2.40
2012	33,213	8,031	669	189	42,102	1,721,095	1.93	0.47	0.04	0.01	2.45
2013	35,327	8,416	683	200	44,626	1,794,876	1.97	0.47	0.04	0.01	2.49
2014	37,516	8,809	701	212	47,237	1,869,857	2.01	0.47	0.04	0.01	2.53
2015	39,810	9,217	723	224	49,974	1,947,362	2.04	0.47	0.04	0.01	2.57
2016	42,219	9,644	745	237	52,844	2,027,351	2.08	0.48	0.04	0.01	2.61
2017	44,742	10,082	771	250	55,845	2,109,454	2.12	0.48	0.04	0.01	2.65
2018	47,505	10,543	796	265	59,109	2,193,824	2.17	0.48	0.04	0.01	2.69
2019	50,487	11,032	818	281	62,618	2,280,776	2.21	0.48	0.04	0.01	2.75
2020	53,678	11,553	837	297	66,366	2,370,244	2.26	0.49	0.04	0.01	2.80
2021	56,997	12,099	860	315	70,270	2,462,605	2.31	0.49	0.03	0.01	2.85
2022	60,566	12,686	877	334	74,462	2,558,365	2.37	0.50	0.03	0.01	2.91
2023	64,334	13,303	892	353	78,882	2,657,464	2.42	0.50	0.03	0.01	2.97
2024	68,256	13,939	905	374	83,474	2,760,654	2.47	0.50	0.03	0.01	3.02
2025	72,399	14,605	912	396	88,311	2,868,640	2.52	0.51	0.03	0.01	3.08
2026	76,740	15,306	908	418	93,371	2,982,692	2.57	0.51	0.03	0.01	3.13
2027	81,170	16,038	898	441	98,547	3,103,076	2.62	0.52	0.03	0.01	3.18
2028	85,785	16,794	879	466	103,924	3,229,578	2.66	0.52	0.03	0.01	3.22
2029	90,457	17,561	859	490	109,368	3,362,275	2.69	0.52	0.03	0.01	3.25
2030	95,107	18,326	842	514	114,790	3,501,280	2.72	0.52	0.02	0.01	3.28
2035	116,889	22,060	844	629	140,422	4,311,346	2.71	0.51	0.02	0.01	3.26
2040	139,420	25,952	875	748	166,995	5,324,826	2.62	0.49	0.02	0.01	3.14
2045	164,088	29,909	939	877	195,813	6,564,796	2.50	0.46	0.01	0.01	2.98
2050	192,987	33,945	1,000	1,026	228,957	8,072,770	2.39	0.42	0.01	0.01	2.84
2055	227,629	38,058	1,072	1,200	267,960	9,913,401	2.30	0.38	0.01	0.01	2.70
2060	270,123	42,556	1,085	1,412	315,176	12,208,400	2.21	0.35	0.01	0.01	2.58
2065	318,613	47,706	1,132	1,654	369,104	15,073,700	2.11	0.32	0.01	0.01	2.45
2070	375,766	53,918	1,198	1,939	432,820	18,621,010	2.02	0.29	0.01	0.01	2.32
2075	443,987	61,265	1,287	2,279	508,818	22,977,370	1.93	0.27	0.01	0.01	2.21
2080	526,466	69,683	1,381	2,689	600,218	28,317,680	1.86	0.25	0.00	0.01	2.12
2085	625,851	79,156	1,464	3,179	709,650	34,897,380	1.79	0.23	0.00	0.01	2.03
2090	743,788	89,747	1,545	3,758	838,839	43,047,360	1.73	0.21	0.00	0.01	1.95
2095	882,720	101,969	1,637	4,438	990,764	53,151,700	1.66	0.19	0.00	0.01	1.86
2100	1,046,787	116,234	1,749	5,241	1,170,011	65,645,190	1.59	0.18	0.00	0.01	1.78

Table II.5 Supplementary Cost Information - Projected (millions of dollars)

Year	CPP/QPP Contributory Earnings	Expenditures As % Of CPP/QPP Contributory Earnings					Total Employment Earnings	Expenditures As % Of Total Employment Earnings				
		OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	276,254	6.33	1.76	0.14	0.04	8.26	408,668	4.28	1.19	0.10	0.03	5.58
1999	287,883	6.25	1.73	0.14	0.04	8.15	421,152	4.28	1.18	0.09	0.02	5.57
2000	301,039	6.18	1.70	0.13	0.04	8.05	438,453	4.25	1.16	0.09	0.02	5.53
2001	316,348	6.11	1.66	0.13	0.04	7.93	458,471	4.21	1.15	0.09	0.02	5.47
2002	333,949	6.02	1.62	0.12	0.03	7.80	481,442	4.17	1.13	0.09	0.02	5.41
2003	352,942	5.94	1.59	0.12	0.03	7.68	508,226	4.13	1.10	0.09	0.02	5.34
2004	374,064	5.86	1.55	0.12	0.03	7.57	536,209	4.09	1.08	0.08	0.02	5.28
2005	396,214	5.79	1.52	0.12	0.03	7.46	565,124	4.06	1.07	0.08	0.02	5.23
2006	419,378	5.74	1.49	0.12	0.03	7.38	595,052	4.04	1.05	0.08	0.02	5.20
2007	443,536	5.69	1.47	0.12	0.03	7.31	626,093	4.03	1.04	0.08	0.02	5.18
2008	468,453	5.67	1.44	0.12	0.03	7.27	658,737	4.03	1.03	0.09	0.02	5.17
2009	495,105	5.65	1.42	0.12	0.03	7.23	692,629	4.04	1.02	0.09	0.02	5.17
2010	522,389	5.64	1.40	0.12	0.03	7.20	727,799	4.05	1.01	0.09	0.02	5.17
2011	547,422	5.69	1.40	0.12	0.03	7.24	760,051	4.10	1.01	0.09	0.02	5.22
2012	573,881	5.79	1.40	0.12	0.03	7.34	793,137	4.19	1.01	0.08	0.02	5.31
2013	601,224	5.88	1.40	0.11	0.03	7.42	827,138	4.27	1.02	0.08	0.02	5.40
2014	628,690	5.97	1.40	0.11	0.03	7.51	861,691	4.35	1.02	0.08	0.02	5.48
2015	657,623	6.05	1.40	0.11	0.03	7.60	897,408	4.44	1.03	0.08	0.02	5.57
2016	686,915	6.15	1.40	0.11	0.03	7.69	934,270	4.52	1.03	0.08	0.03	5.66
2017	717,563	6.24	1.41	0.11	0.03	7.78	972,106	4.60	1.04	0.08	0.03	5.74
2018	749,012	6.34	1.41	0.11	0.04	7.89	1,010,986	4.70	1.04	0.08	0.03	5.85
2019	781,337	6.46	1.41	0.10	0.04	8.01	1,051,056	4.80	1.05	0.08	0.03	5.96
2020	814,485	6.59	1.42	0.10	0.04	8.15	1,092,286	4.91	1.06	0.08	0.03	6.08
2021	848,567	6.72	1.43	0.10	0.04	8.28	1,134,849	5.02	1.07	0.08	0.03	6.19
2022	884,306	6.85	1.43	0.10	0.04	8.42	1,178,978	5.14	1.08	0.07	0.03	6.32
2023	921,090	6.98	1.44	0.10	0.04	8.56	1,224,646	5.25	1.09	0.07	0.03	6.44
2024	959,151	7.12	1.45	0.09	0.04	8.70	1,272,200	5.37	1.10	0.07	0.03	6.56
2025	999,272	7.25	1.46	0.09	0.04	8.84	1,321,963	5.48	1.10	0.07	0.03	6.68
2026	1,041,295	7.37	1.47	0.09	0.04	8.97	1,374,522	5.58	1.11	0.07	0.03	6.79
2027	1,085,851	7.48	1.48	0.08	0.04	9.08	1,429,999	5.68	1.12	0.06	0.03	6.89
2028	1,132,846	7.57	1.48	0.08	0.04	9.17	1,488,296	5.76	1.13	0.06	0.03	6.98
2029	1,181,719	7.65	1.49	0.07	0.04	9.25	1,549,446	5.84	1.13	0.06	0.03	7.06
2030	1,233,050	7.71	1.49	0.07	0.04	9.31	1,613,505	5.89	1.14	0.05	0.03	7.11
2035	1,531,867	7.63	1.44	0.06	0.04	9.17	1,986,809	5.88	1.11	0.04	0.03	7.07
2040	1,906,663	7.31	1.36	0.05	0.04	8.76	2,453,854	5.68	1.06	0.04	0.03	6.81
2045	2,365,743	6.94	1.26	0.04	0.04	8.28	3,025,273	5.42	0.99	0.03	0.03	6.47
2050	2,925,636	6.60	1.16	0.03	0.04	7.83	3,720,197	5.19	0.91	0.03	0.03	6.15
2055	3,609,349	6.31	1.05	0.03	0.03	7.42	4,568,420	4.98	0.83	0.02	0.03	5.87
2060	4,461,239	6.05	0.95	0.02	0.03	7.06	5,626,031	4.80	0.76	0.02	0.03	5.60
2065	5,524,627	5.77	0.86	0.02	0.03	6.68	6,946,456	4.59	0.69	0.02	0.02	5.31
2070	6,841,683	5.49	0.79	0.02	0.03	6.33	8,581,171	4.38	0.63	0.01	0.02	5.04
2075	8,460,182	5.25	0.72	0.02	0.03	6.01	10,588,730	4.19	0.58	0.01	0.02	4.81
2080	10,445,730	5.04	0.67	0.01	0.03	5.75	13,049,710	4.03	0.53	0.01	0.02	4.60
2085	12,892,400	4.85	0.61	0.01	0.02	5.50	16,081,860	3.89	0.49	0.01	0.02	4.41
2090	15,923,240	4.67	0.56	0.01	0.02	5.27	19,837,630	3.75	0.45	0.01	0.02	4.23
2095	19,679,580	4.49	0.52	0.01	0.02	5.03	24,494,040	3.60	0.42	0.01	0.02	4.04
2100	24,325,840	4.30	0.48	0.01	0.02	4.81	30,251,450	3.46	0.38	0.01	0.02	3.87

Table II.6 Supplementary Benefit Information - Projected

	Number of Beneficiaries			Eligibility Rates			Average Benefit		
Year	**OAS**	**GIS**	**SPA**	**OAS**	**GIS**	**SPA**	**OAS**	**GIS**	**SPA**
1998	3,663,256	1,384,220	98,474	0.9650	0.3646	0.0809	4,770	3,505	3,992
1999	3,729,774	1,394,242	97,518	0.9662	0.3612	0.0788	4,827	3,563	4,049
2000	3,796,315	1,403,312	96,367	0.9673	0.3576	0.0763	4,904	3,637	4,131
2001	3,862,394	1,410,150	95,597	0.9683	0.3535	0.0736	5,002	3,726	4,231
2002	3,922,775	1,413,260	95,791	0.9692	0.3492	0.0711	5,122	3,833	4,345
2003	3,984,880	1,416,562	96,596	0.9698	0.3448	0.0686	5,261	3,952	4,480
2004	4,051,735	1,423,185	97,841	0.9703	0.3408	0.0665	5,412	4,080	4,625
2005	4,121,221	1,430,859	99,445	0.9708	0.3371	0.0648	5,566	4,211	4,771
2006	4,201,551	1,440,699	100,931	0.9712	0.3330	0.0629	5,726	4,346	4,929
2007	4,287,623	1,451,122	104,205	0.9716	0.3288	0.0605	5,889	4,483	5,087
2008	4,387,301	1,464,255	106,686	0.9718	0.3243	0.0587	6,058	4,623	5,255
2009	4,491,806	1,477,786	109,308	0.9720	0.3198	0.0574	6,231	4,766	5,420
2010	4,600,949	1,492,610	112,138	0.9721	0.3154	0.0564	6,408	4,916	5,588
2011	4,727,553	1,510,945	113,977	0.9722	0.3107	0.0554	6,591	5,068	5,769
2012	4,898,999	1,538,381	111,854	0.9720	0.3052	0.0538	6,780	5,221	5,982
2013	5,066,686	1,564,733	110,588	0.9722	0.3002	0.0523	6,972	5,379	6,173
2014	5,231,932	1,589,782	109,995	0.9724	0.2955	0.0508	7,171	5,541	6,371
2015	5,398,488	1,614,588	109,911	0.9726	0.2909	0.0494	7,374	5,709	6,576
2016	5,567,121	1,639,522	109,763	0.9727	0.2865	0.0481	7,584	5,882	6,788
2017	5,736,912	1,663,704	110,065	0.9729	0.2821	0.0469	7,799	6,060	7,005
2018	5,914,126	1,688,848	110,095	0.9731	0.2779	0.0456	8,032	6,243	7,233
2019	6,102,653	1,715,630	109,471	0.9732	0.2736	0.0444	8,273	6,430	7,471
2020	6,299,636	1,744,079	108,493	0.9732	0.2694	0.0431	8,521	6,624	7,718
2021	6,494,516	1,772,691	107,982	0.9733	0.2657	0.0420	8,776	6,825	7,963
2022	6,700,333	1,804,001	106,592	0.9733	0.2621	0.0409	9,039	7,032	8,226
2023	6,910,115	1,835,876	105,020	0.9734	0.2586	0.0398	9,310	7,246	8,495
2024	7,117,959	1,866,803	103,258	0.9734	0.2553	0.0389	9,589	7,467	8,769
2025	7,330,092	1,897,869	100,681	0.9735	0.2520	0.0380	9,877	7,695	9,058
2026	7,543,259	1,929,476	96,997	0.9735	0.2490	0.0372	10,173	7,933	9,357
2027	7,746,432	1,960,606	92,913	0.9736	0.2464	0.0365	10,478	8,180	9,660
2028	7,948,324	1,990,753	88,054	0.9737	0.2439	0.0357	10,793	8,436	9,986
2029	8,137,195	2,017,997	83,268	0.9738	0.2415	0.0347	11,117	8,702	10,319
2030	8,306,363	2,041,116	78,984	0.9740	0.2393	0.0335	11,450	8,978	10,661
2035	8,804,392	2,092,268	67,640	0.9746	0.2316	0.0295	13,276	10,544	12,478
2040	9,053,984	2,092,549	59,779	0.9748	0.2253	0.0257	15,399	12,402	14,629
2045	9,187,893	2,053,784	54,771	0.9747	0.2179	0.0227	17,859	14,563	17,144
2050	9,319,860	1,990,308	49,716	0.9746	0.2081	0.0200	20,707	17,055	20,109
2055	9,482,767	1,913,100	45,487	0.9745	0.1966	0.0178	24,005	19,894	23,569
2060	9,708,308	1,841,243	39,276	0.9746	0.1848	0.0158	27,824	23,113	27,624
2065	9,877,902	1,774,438	34,980	0.9747	0.1751	0.0140	32,255	26,885	32,351
2070	10,048,050	1,721,499	31,632	0.9748	0.1670	0.0124	37,397	31,320	37,877
2075	10,239,892	1,677,548	29,018	0.9747	0.1597	0.0111	43,359	36,521	44,335
2080	10,473,250	1,636,844	26,611	0.9747	0.1523	0.0099	50,268	42,572	51,882
2085	10,739,825	1,596,538	24,126	0.9748	0.1449	0.0089	58,274	49,580	60,699
2090	11,010,154	1,555,868	21,772	0.9748	0.1378	0.0080	67,555	57,683	70,979
2095	11,271,068	1,519,152	19,736	0.9749	0.1314	0.0072	78,317	67,122	82,961
2100	11,528,706	1,487,411	18,044	0.9749	0.1258	0.0064	90,798	78,145	96,927

III. Key Assumptions

A. Overview

An actuarial examination of the OAS involves the projection of its expenditures over a long period of time. This is necessary in order to properly assess the future impact of historical and projected trends in demographic and economic factors. For this report, the projection period continues until 2100.

Since the OAS is financed from general tax revenues on a pay-as-you-go basis, there is no need to project either contributions or investment earnings. However, projections have been made of CPP/QPP contributory earnings, employment earnings and GDP, which are used as bases for measuring the relative costs of the OAS over time. The projections begin with a projection of the working-age population. This requires assumptions regarding demographic factors, such as fertility, migration and mortality. Employment earnings and CPP/QPP contributory earnings are derived by applying economic and demographic assumptions, including wage increase and participation rates. GDP is then derived simply by extrapolating the historical relationship between GDP and employment earnings.

Benefits are projected by applying assumptions regarding eligibility rates for various types and levels of benefits to the projected population at the relevant ages, along with assumptions regarding increases in the maximum benefits. Administrative expenses, a relatively small component of OAS expenditures, are projected based on historical experience.

B. Best-Estimate Assumptions

The information required by statute, which is presented in Section II, has been derived using assumptions which reflect my best judgement regarding future demographic and economic trends. They are referred to in the report as the "best-estimate" assumptions. Except for the assumption regarding net annual migration, the best-estimate assumptions are the same as those underlying the Seventeenth Actuarial Report on the Canada Pension Plan.

Most of the assumptions are graded from recent experience levels to their ultimate values during the first 5 to 18 years of the projection period. The exception is mortality, which is assumed to continue to improve throughout the projection period (although the relative annual rates of improvement remain constant after 2011). The most important of these demographic and economic assumptions, and the corresponding assumptions used in the most recent reports, are summarised in the table below and discussed briefly thereafter. The assumptions are described more fully in Appendix B.

Table III.1 Best-Estimate Demographic and Economic Assumptions - Ultimate Years

		Report 4	**Report 3**
1.	Total fertility rate	1.70	1.85
2.	Net annual migration	0.50% of population.	0.40% of population.
3.	Mortality	1990-92 Canada Life Tables with future improvements. Life expectancy at birth in 2100 of: males 82.0 years females 87.7 years	1985-87 Canada Life Tables with future improvements. Life expectancy at birth in 2100 of: males 80.5 years females 87.4 years
4.	Employment - estimated unemployment rate	7.0%	7.5%
5.	Real-wage differential	1.0%	1.0%
6.	Rate of increase in prices	3.0%	3.5%

1. Fertility

The total fertility rate for a year represents the average number of children that would be born to a woman in her lifetime if she were to experience the age-specific fertility rates observed in, or assumed for, that year. The total fertility rate has decreased dramatically since the late 1950s and in recent years it has generally been just under 1.70.

The decrease occurred as a result of changes in a variety of social, medical and economic factors. It seems unlikely that fertility will return to historical levels in the absence of significant societal change. Therefore, it has been assumed that the total fertility rate will increase slightly from its 1995 level of 1.64, to an ultimate level of 1.70 in 2016. This is consistent with the “medium” assumption adopted by Statistics Canada for its December 1994 population projections.

2. Migration

Migration is the net result of several components. The largest of these is immigration to Canada from other countries. This has averaged 233,000 annually from 1992 to 1996. In its 1994 immigration plan, the government established an annual target of 250,000.

The second largest component of net migration is emigration from Canada to other countries. Statistics Canada is currently in the process of revising its estimates of recent numbers of emigrants. Actual recent emigration may be as much as double the previous estimates, which averaged 45,000 annually from 1992 to 1996 and were similar to historical levels.

Some emigrants eventually return to Canada. The estimated number of returning Canadians averaged about 22,000 annually from 1992 to 1996. Returning Canadians were not reflected in the migration assumptions used in previous reports.

According to these revised estimates, net migration to Canada was about 0.53% of population in 1996. Based on a continuation of similar migration levels, an ultimate assumption of 0.50% has been established, beginning in 2005. This is consistent with experience over the last 10 to 15 years using the revised estimates. The migration assumption differs from that in the Seventeenth Actuarial Report on the Canada Pension Plan. Immigrants, emigrants and returning Canadians have been assumed to be distributed by age and sex in accordance with historical patterns.

3. Mortality

Life expectancy in Canada has increased considerably during this century. The life expectancy at birth according to the most recent mortality tables available from Statistics Canada, the 1990-1992 Canada Life Tables, is 74.6 years for males and 80.9 years for females. Mortality improvements are expected to continue in the future. The ultimate rates of improvement were established by adjusting the results of a detailed study prepared by the United States Social Security Administration actuaries regarding trends in mortality by age, sex and cause of death to reflect, in part, historical differences in mortality improvements between Canada and the United States. Rates of improvement were assumed to grade from their recent levels to the ultimate by 2011. Adjustments were made to the resulting mortality rates to account for the impact of AIDS.

The improvements are expected to result in the following life expectancies:

Table III.2 Projected Trends in Life Expectancy

	1991	2000	2050	2100
At birth				
males	74.6	76.2	79.4	82.0
females	80.9	82.2	85.2	87.7
At age 65				
males	15.7	16.5	18.4	20.2
females	19.9	20.7	22.8	24.8

The life expectancies shown in Table III.2 were calculated as if the mortality rates experienced or assumed for the given year were applicable in all future years. Thus, they are not "cohort" life expectancies.

4. Employment

Employment levels are reflected in the actuarial projection model through the assumption made regarding the proportions of the population, by age and sex, who have earnings in a given year. These proportions vary not only with the rate of unemployment, but also reflect trends in increased workforce participation by women, longer periods of formal education among young adults and the trends in retirement patterns of older workers.

The ultimate proportions of earners, assumed to apply in year 2010 and thereafter, were established based on a review of both historical trends and the results of projections prepared by Finance department economists using a cohort-based model. The assumptions are consistent with an ultimate unemployment rate of approximately 7.0%. The increases in the assumed proportions of earners produce an average annual increase in the workforce of 1.6% during the period 1997 to 2010.

5. Wage Increases

Wage increases impact the financial balance of the OAS program in two ways. In the short term, an increase in the average wage translates into higher CPP/QPP contributory earnings, employment earnings and GDP, with little immediate impact on benefits. Therefore, costs of the OAS in relation to these measurement bases will decrease. Over the longer term, higher average wages in relation to the level of prices may be expected to produce lower GIS and SPA benefits. The long-term projected cost of the OAS relative to the various measurement bases is more dependent on the differential between the assumed annual rates of wage increases and price increases

(the real-wage differential) than on the absolute level of wage increases assumed.

Historically, the real-wage differential has fluctuated significantly from year to year. The trend was generally downward through the late 1980s, with some improvement since then, e.g., the 10-year average annual real-wage differential was -0.59% for the period ending 1987 and 0.32% for the period ending 1997. Over the longer term, the annual real-wage differential averaged 1.52% for the 50-year period ending 1997.

Many factors have influenced the real rates of increase in average annual wages, including general productivity improvements, the move to a service economy and decreases in the average hours worked. Considering these factors, together with the historical trends and judgement regarding the long-term course of the economy, an ultimate real-wage differential of 1.0% has been assumed in years 2003 and thereafter. This ultimate differential is unchanged from the assumption used in the previous OAS actuarial report. Combined with the price increase assumption described below, it results in assumed nominal annual increases in wages of 4.0% in 2003 and thereafter. During the initial years of the projection period, the real-wage differential is assumed to increase uniformly from 0.6% in 1998 to its ultimate level.

The assumed increases in wages and proportions of earners result in projected average annual real increases in total employment earnings of 2.6% for 1998 to 2005. This decreases to about 1.35% ultimately, reflecting 1% increases in real wages and 0.35% annual growth in the working-age population.

6. Price Increases

Price increases, as measured by changes in the Consumer Price Index (CPI), also tend to fluctuate from year to year. Over the last 50 years, the trend was generally upward through the early 1980s and downward since then. For example, the average annual increases in the CPI for the 50-, 25- and 10-year periods ending in 1997 were 4.44%, 5.83% and 2.80%, respectively.

Based on these trends and judgement regarding the long-term outlook for inflation, an ultimate annual rate of price increase of 3.0% has been assumed. This is 0.5% lower than the ultimate price increase assumption used in the previous OAS actuarial report. The rates of price increase are assumed to increase uniformly from 1.0% in 1998 to their ultimate level in 2003.

IV. Comparison With Previous Projections

The results presented in this report differ from those previously projected for a variety of reasons. Differences between the actual experience during 1994 through 1997 and that projected in the Third Actuarial Report (for the basic OAS pension) are addressed in paragraph A below. Since historical results provide the starting point for the projections shown in this report, these historical differences also have an effect on projected future experience. The impacts of the experience update and the other factors that have significantly changed the projected future results are addressed in paragraph B.

A. Financial Results - 1994 to 1997

The financial results of the OAS from 1994 through1997 are summarised in Table IV.1.

Table IV.1 Financial Results - Basic OAS Pensions - 1994 to 1997
(millions of dollars)

	Actual Experience	Report 3 Projected	Difference (A - P)	Ratio (A / P)
Expenditures	64,913	65,144	-231	1.00
Gross Domestic Product	3,269,533	3,327,369	-57,836	0.98
Expenditures as % of GDP	1.99%	1.96%	0.03%	1.02

Expenditures during the period were about $231 million less than projected. In part, this was because the numbers of beneficiaries were slightly lower than projected. The average benefit per person was also slightly lower than projected, due to relatively stable price levels.

Total GDP over the period was lower than projected, due to slower than projected growth in both price levels and the underlying economy.

Overall, expenditures in relation to GDP were slightly higher than projected, at 1.99%.

B. Changes in Projected Results - 1998 to 2100

The ratio of expenditures to GDP in a given year is an important measure of the cost of the OAS. One way of understanding the differences between the best-estimate projections in this report and those presented in the Third Actuarial Report is by

looking at the effects of various factors on these cost ratios. The most significant effects are identified in the reconciliation presented in Table IV.2 and the discussion below. Note that this reconciliation does not include the GIS and SPA benefits, as they were not included in previous actuarial reports.

The methodology described in Section VII.B reflects a number of improvements from that employed in previous reports. Overall, these refinements had the effect of increasing the ultimate cost ratios by about 8%.

The primary variations in experience during 1994 to 1997 were discussed in paragraph A above. Overall, the effect of the experience update was minimal.

Key assumptions, and changes made from the previous reports, are outlined in Section III of the report. The effects of these changes may be summarised as follows:

- the decrease in the ultimate fertility rate significantly increases the long-term cost ratios, because its effect in slowing the growth in GDP outweighs the ultimate reductions in expenditures;

- conversely, the increase in the assumed level of net migration significantly decreases the cost ratios, as the higher levels of GDP outweigh the ultimate increases in expenditures;

- the more rapid mortality improvements assumed for this report increase the cost ratios, because beneficiaries are expected to receive their monthly benefits over longer periods of time;

- the decrease in the assumed proportions of earners in the population increases the cost ratios, since it results in lower levels of projected GDP;

- the assumption that the real-wage differential will increase to its ultimate level over five years, rather than reaching it immediately as was assumed in previous reports, produced a small increase in the cost ratios; and

- the reduction in the assumed rate of price increases results in almost no change in the cost ratios, because the savings due to lower increases in benefits in payment are offset by the slower growth in GDP.

Some of the less significant assumptions, which are described in Section VII.B, were also changed. For example, the experience adjustment factors applied in the projection of earnings and GDP were revised to reflect more recent experience. Overall, the changes in these "other" assumptions had the effect of decreasing projected GDP and thereby increasing the projected cost ratios.

The order used to determine the impact of each of the factors identified in the reconciliation influences the distribution of the total change among them. The order employed was as follows:

- methodology improvements, experience updates and changes in "other" assumptions - in the chronological order in which they were incorporated into the projection model; and

- changes in key assumptions - the aggregate impact of such changes was allocated among these assumptions in proportion to the impact of changing each assumption independently.

Comparison with Previous Projections

Table IV.2 Reconciliation of Changes in Cost as Percentages of GDP
(OAS Pensions Only)

		2000	2025	2050	2075	2100
Third Report rates*		1.83	2.39	2.09	1.68	1.38
I.	**Improvements in methodology**	-0.08	0.03	0.09	0.12	0.12
II.	**Experience update**					
	Demographic	-0.02	-0.06	-0.01	-0.02	-0.01
	Economic	0.05	0.06	0.07	0.04	0.04
	Benefits	-0.03	-0.05	-0.04	-0.03	-0.03
	Sub-total	0.00	-0.05	0.02	-0.01	0.00
III.	**Changes in assumptions**					
	Fertility	0.01	0.17	0.29	0.23	0.18
	Migration	-0.04	-0.29	-0.34	-0.32	-0.26
	Mortality	0.02	0.05	0.04	0.05	0.04
	Employment	0.10	0.10	0.11	0.09	0.07
	Real-wage differential	0.02	0.03	0.02	0.02	0.02
	Price increases	0.01	0.00	-0.01	0.00	0.00
	Other assumptions	0.08	0.11	0.09	0.08	0.05
	Sub-total	0.20	0.17	0.20	0.15	0.10
Total of I to III		0.12	0.15	0.31	0.26	0.22
Fourth Report rates*		1.95	2.54	2.40	1.94	1.60

* including administrative expenses attributable to OAS pensions.

V. Sensitivity Tests

A. Introduction

An actuarial examination of the OAS involves the projection of its income and expenditures over a long period of time. The information required by statute, which is presented in Section II, has been derived using "best-estimate" assumptions regarding future demographic and economic trends. The key best-estimate assumptions, i.e., those for which changes within a reasonable range have the most significant impact on the long-term financial results, are described in Section III.

Both the length of the projection period and the number of assumptions required ensure that actual future experience will not develop precisely in accordance with the best-estimate assumptions. Sensitivity tests have been performed, consisting of projections of OAS financial results using alternative assumptions.

For the first set of sensitivity tests, each of the six key assumptions was changed individually, with the other assumptions being maintained at their best-estimate levels. Two tests were performed with respect to each of the assumptions. The alternative assumptions selected are intended to represent a reasonable range of potential long-term experience. However, it is possible that actual experience could lie outside these ranges.

Each of these tests was then categorised as either a "low-cost" scenario or a "high-cost" scenario. In the "low-cost" scenarios, the alternative assumptions have the effect of reducing the ratios of expenditures to GDP. Conversely, in the "high-cost" scenarios, the assumptions would increase the cost ratios.

The second set of sensitivity tests consists of projections under which all of the key assumptions were changed at the same time. The low-cost combined scenario shows the effect of all six factors following their low-cost assumptions and vice-versa for the high-cost combined scenario. Historically, changes in certain factors are often accompanied by changes in other factors that have offsetting impacts on OAS costs. Therefore, it is unlikely that future experience, overall, would be either as favourable as the low-cost combined scenario or as unfavourable as the high-cost combined scenario.

Finally, a test was made of the cost impact of changing the rate at which OAS maximum benefits are indexed.

Over the long term, economic cycles have little impact on cost ratios as long as, on

average, the ultimate assumptions are realized. Considering the long-term focus of this report, scenarios testing the sensitivity of the OAS to assumed economic cycles have not been included.

B. Assumptions

Table V.1 below summarises the alternative assumptions that were used in the sensitivity tests. It is followed by a brief discussion of each assumption and the impact its variation has on the results.

Table V.1 Sensitivity Test Assumptions - Ultimate Years

		Low-Cost	Best-Estimate	High-Cost
1.	Total fertility rate	1.90	1.70	1.50
2.	Net annual migration	0.70% of population.	0.50% of population.	0.30% of population.
3.	Mortality	50% of best-estimate improvement rates.	1990-92 Canada Life Tables with improvements.	150% of best-estimate improvement rates.
4.	Employment - estimated unemployment rate	5.0%	7.0%	9.0%
5.	Real-wage differential	1.4%	1.0%	0.6%
6.	Rate of increase in prices	4.0%	3.0%	2.0%

1. Fertility

The best-estimate assumption is that the total fertility rate will increase slightly from its 1995 level of 1.64, to an ultimate level of 1.70 in 2016. This is consistent with the "medium" assumption adopted by Statistics Canada for its December 1994 population projections.

The low-cost assumption has the fertility rate increasing to an ultimate level of 1.90 in 2016. This represents a return to the levels typical in the early 1970s. Under this scenario, the population grows to a level in 2100 that is 24.1% higher than under the best-estimate assumption.

The high-cost assumption has the fertility rate decreasing to an ultimate level of 1.50 in 2016. This represents a continuation of the historical trend of decreases. Under this scenario, the population grows much more slowly, to a level in 2100 that is 20.2% lower than under the best-estimate assumption.

Changes in the fertility rate have very little short-term effect on the OAS's financial position. However, the long-term impact of changes may be significant.

2. Migration

Using revised estimates for emigration and returning Canadians from Statistics Canada, net migration to Canada was about 0.53% of population in 1996. Based on a continuation of similar migration levels, an ultimate best-estimate assumption of 0.50% has been established, beginning in 2005.

The low-cost assumption has net migration increasing to an ultimate level of 0.70% of population in 2005. Under this scenario, the population grows to a level in 2100 that is 33.0% higher than under the best-estimate assumption.

The high-cost assumption has net migration decreasing to an ultimate level of 0.30% of population in 2005. Under this scenario, the population grows much more slowly, to a level in 2100 that is 25.6% lower than under the best-estimate assumption.

3. Mortality

Mortality improvements are expected to continue in the future. The best-estimate ultimate rates of improvement were established by adjusting the results of a detailed study prepared by the United States Social Security Administration actuaries regarding trends in mortality by age, sex and cause of death to reflect, in part, historical differences in mortality improvements between Canada and the United States. Rates of improvement were assumed to grade from their recent levels to the ultimate by 2011.

For the low-cost scenario, mortality is assumed to improve less rapidly. Rates of improvement were assumed to grade from recent levels to 50% of the best-estimate ultimate levels by 2011. Under this scenario, the population grows to a level in 2100 that is 5.5% lower than under the best-estimate assumption.

For the high-cost scenario, mortality is assumed to improve more rapidly. Rates of improvement were assumed to grade from recent levels to 150% of the best-estimate ultimate levels by 2011. Under this scenario, the population grows to a level in 2100 that is 5.2% higher than under the best-estimate assumption.
The adjustments made to the resulting mortality rates to account for the impact of

Sensitivity Tests

AIDS were the same under the alternative scenarios as those applied under the best-estimate projections.

The differing rates of improvement would result in the following life expectancies:

Table V.2 Life Expectancy in 2100 Under Alternative Assumptions

	Low-Cost	Best-Estimate	High-Cost
At birth			
males	78.5	82.0	85.3
females	84.4	87.7	90.9
At age 65			
males	17.9	20.2	22.6
females	22.3	24.8	27.5

The life expectancies shown in Table V.2 were calculated as if the mortality rates assumed for year 2100 were applicable in all subsequent years.

4. Employment

Employment levels are reflected in the actuarial projection model through the assumption made regarding the proportions of the population, by age and sex, who have earnings in a given year. These proportions vary not only with the rate of unemployment, but also reflect trends in increased workforce participation by women, longer periods of formal education among young adults and the trends in retirement patterns of older workers.

The ultimate proportions of earners, assumed to apply in year 2010 and thereafter, are consistent with an ultimate unemployment rate of approximately 7.0%.

For the low-cost scenario, the proportions of earners are assumed to increase more rapidly, to ultimate levels in year 2010 that are 102% of the best-estimate proportions for each age and sex. This is consistent with an unemployment rate of approximately 5.0%.

For the high-cost scenario, the proportions of earners are assumed to reach ultimate levels in year 2010 that are 98% of the best-estimate proportions. This is consistent with an unemployment rate of approximately 9.0%.

For each of the scenarios, the best-estimate assumption that GDP would be approximately 2.2 times total employment earnings was maintained.

5. Wage Increases

Wage increases impact the financial balance of the OAS in two ways. In the short term, an increase in the average wage translates into higher CPP/QPP contributory earnings, employment earnings and GDP, with little immediate impact on benefits. Accordingly, this will result in lower cost ratios relative to these measurement bases.

Over the longer term, higher average wages may be expected to result in higher incomes among the retiree population and reduce the amounts of income-tested GIS and SPA benefits payable. The long-term projected financial position of the OAS is more dependent on the differential between the assumed annual rates of wage increases and price increases (the real-wage differential) than on the absolute level of wage increases assumed.

An ultimate real-wage differential of 1.0% has been assumed in years 2003 and thereafter for the best-estimate projections. This ultimate differential is unchanged from the assumption used in recent OAS actuarial reports. Combined with the best-estimate price increase assumption of 3.0%, it results in assumed nominal annual increases in wages of 4.0% in 2003 and thereafter. During the initial years of the projection period, the real-wage differential is assumed to increase uniformly from 0.6% in 1998 to its ultimate level.

For the low-cost scenario, the assumed real-wage differential increases from 0.6% in 1998 to an ultimate level of 1.4% in 2003. This is roughly comparable to long-term historical averages, although much higher than recent experience.

For the high-cost scenario, a real-wage differential of 0.6% has been assumed in all years. While much lower than the long-term historical averages, it nevertheless represents an improvement from shorter-term historical averages. However, taking account of the factors which influenced the historical trends, this assumption seems appropriate as a conservative, long-term assumption.

6. Price Increases

An ultimate annual rate of price increases of 3.0% has been assumed for the best-estimate projections. The rates of price increase are assumed to increase uniformly from 1.0% in 1998 to their ultimate level in 2003.

For the low-cost scenario, the annual rate of price increases is assumed to increase to an ultimate level of 4.0% in 2003. This level of inflation is comparable to long-term historical averages. Although a higher rate of increase in prices results in higher OAS expenditures, it also results in higher CPP/QPP contributory earnings, employment earnings and GDP (this is because the same real-wage differential is added to a higher base of inflation, producing a higher nominal rate of wage increases). The net effect is a decrease in the cost ratios.

For the high-cost scenario, the annual rate of price increases is assumed to increase to an ultimate level of 2.0% in 2003. This level of inflation is comparable to that of the 1990s.

7. Combined

For the low-cost scenario, all of the individual low-cost assumptions are used in combination. Therefore, the ultimate real-wage differential of 1.4% combined with price increases of 4.0% produces nominal annual increases in average wages of 5.4%.

For the high-cost scenario, the ultimate real-wage differential of 0.6% combined with price increases of 2.0% produces nominal annual increases in average wages of 2.6%.

8. Benefit Indexation

The best-estimate projections are based on the provisions of the *Old Age Security Act*, which indicates that benefit rates will be indexed quarterly in accordance with price increases. Over time, indexing benefit rates more slowly than the rate of growth in average employment earnings means that OAS benefits will replace a decreasing share of individuals' pre-retirement earnings. In the past, this issue has been addressed through occasional legislation providing ad hoc increases in the benefit rates.

A test has been made of the impact on projected results if OAS benefit rates are increased to partially reflect the growth in real wages. The assumption made for this test is that benefit rates would be indexed at rates equal to the assumed rate of growth in prices plus 60% of the assumed real-wage differential. Accordingly, the ultimate annual benefit indexation rate is assumed to be 3.6%, instead of 3.0% under the best-estimate assumptions. Over the medium term, e.g., 30 years, the overall impact of this method of indexation on OAS costs is roughly comparable to the indexation basis inherent in the CPP/QPP, which provide benefits based on wage increases prior to retirement and price increases thereafter.

C. Results

The results of the sensitivity tests are summarized in the table below.

Table V.3 Sensitivity Test Results - Costs as Percentages of GDP
(percentages; first row is low-cost scenario, second row is high-cost scenario)

	Assumptions Tested	Cost Ratios				
		2000	**2025**	**2050**	**2075**	**2100**
0.	Best-Estimate	2.53	3.08	2.84	2.21	1.78
1.	Fertility	2.53	3.05	2.66	1.96	1.58
		2.53	3.11	3.04	2.52	2.03
2.	Migration	2.53	2.91	2.62	2.04	1.64
		2.54	3.26	3.09	2.42	1.95
3.	Mortality	2.52	2.95	2.62	2.00	1.58
		2.55	3.20	3.05	2.43	1.99
4.	Employment	2.52	3.02	2.78	2.17	1.75
		2.55	3.14	2.89	2.26	1.82
5.	Real Wages	2.52	2.73	2.27	1.60	1.17
		2.54	3.46	3.56	3.09	2.74
6.	Prices	2.53	3.07	2.83	2.22	1.79
		2.54	3.08	2.83	2.20	1.77
7.	Combined	2.49	2.41	1.79	1.19	0.85
		2.58	3.94	4.60	4.37	3.99
8.	Benefit Indexation	2.57	3.74	4.08	3.73	3.50

VI. Actuarial Opinion

I am an actuary and a Partner in the consulting firm of Morneau Sobeco. I have been retained by the Office of the Superintendent of Financial Institutions to fill a temporary vacancy by serving as Acting Chief Actuary, Public Insurance and Pension Programs. One of the duties of this position is to prepare a periodic actuarial examination of the Old Age Security Program, in accordance with section 6 of the *Public Pensions Reporting Act*.

I have completed such an examination, the results of which are presented in this Fourth Actuarial Report as at 31 December 1997. I gratefully acknowledge the considerable assistance provided by actuaries and other staff within OSFI's Office of the Chief Actuary, both in conducting the examination and in preparing this report.

In my opinion, for the purposes of this actuarial report:

- the methodology employed is appropriate and consistent with sound actuarial principles;

- the data on which this report is based are sufficient and reliable; and

- the assumptions used are, in aggregate, reasonable and appropriate.

This report has been prepared, and my opinion given, in accordance with accepted actuarial practice.

Michael Hafeman, F.S.A., F.C.I.A.

Ottawa, Canada
5 May 1999

VII. Appendix A - Main Provisions of the Old Age Security Act

1. Introduction

The *Old Age Security Act (OAS Act)* came into force in December 1951.

Benefits provided under the *OAS Act* include the Old Age Security Pension (OAS pension) which started being paid in 1952, the Guaranteed Income Supplement (GIS) which started in 1967 and the Spouse's Allowance (SPA) which started in 1975.

2. Financing

All benefits provided under the *OAS Act* are currently financed from federal general tax revenues.

All or a portion of the OAS pension paid to persons with high incomes may be subject to repayment ("clawback") under the *Income Tax Act*, as described below. Currently, about 5% of the OAS pensioners are affected by this provision, resulting in the repayment of about 3% of the total amount of OAS pensions payable. The amounts of OAS pension shown in this report have **not** been reduced by the repayments. The net amount of the OAS pension paid is taxable.

While GIS and SPA benefits are reduced in accordance with income levels, as described below, the net amounts paid are not taxable. The amounts of the GIS and SPA benefits shown in this report reflect the income-related reductions.

3. Old Age Security Pension

The OAS pension is a monthly benefit available, on application, to anyone age 65 or over who meets the residence requirements specified in the *OAS Act*. (These are described below.) An applicant's employment history is not a factor in determining eligibility, nor does the applicant need to be retired.

(a) Eligibility Conditions

To qualify for an OAS pension, a person must be 65 years of age or over, and

- must be a Canadian citizen or a legal resident of Canada on the day preceding the approval of his or her application; or
- if the person no longer lives in Canada, must have been a Canadian citizen or a legal resident of Canada on the day preceding the day he or she stopped living in Canada.

A minimum of 10 years of residence in Canada after reaching age 18 is required to receive an OAS pension in Canada. To receive an OAS pension outside the country, a person must have lived in Canada for a minimum of 20 years after reaching age 18. An international social security agreement may assist a person to meet the 10- and 20-year requirements.

(b) Amount of Benefits

The amount of a person's pension is determined by how long he or she has lived in Canada, according to the following rules:

- A person who has lived in Canada, after reaching age 18, for periods that total at least 40 years may qualify for a full OAS pension.

- A person who has not lived in Canada for 40 years after reaching age 18 may still qualify for a full pension if, on 1 July 1977, he or she was 25 years of age or over, and

  - lived in Canada on that date, or
  - had lived in Canada before that date and after reaching age 18, or
  - possessed a valid immigration visa on that date.

  In such cases, the individual must have lived in Canada for the 10 years immediately prior to approval of the application for the pension. Absences during this 10-year period may be offset if, after reaching age 18, the applicant was present in Canada before those 10 years for a total period that was at least three times the length of absence. In this instance, however, the applicant must also have lived in Canada for at least one year immediately prior to the date of the approval of the application. For example, an absence of two years between the ages of 60 and 62 could be offset by six years of presence in Canada after age 18 and before reaching age 55.

- A person who cannot meet the requirements for the full OAS pension may qualify for a partial pension. A partial pension is earned at the rate of 1/40th of the full monthly pension for each complete year of residence in Canada after reaching age 18. Once a partial pension has been approved, it may not be increased as a result of additional years of residence in Canada.

The maximum monthly OAS pension was $410.82 during the first quarter of 1999. This rate is adjusted quarterly, as described in paragraph 6 below.

The amount of OAS pension paid to persons with high incomes is reduced through a provision of Canada's *Income Tax Act*. For 1999, the reduction applies to persons whose total income exceeds $53,215. This income threshold is indexed upward in accordance with increases in the CPI minus 3% per annum. For every dollar of income above this limit, the amount of basic OAS pension is reduced by 15 cents.

4. Guaranteed Income Supplement

The GIS is a monthly benefit paid to residents of Canada who receive a basic OAS pension (either the full amount or a partial amount) and who have little or no other income.

Payment of the GIS may begin in the same month as payment of the basic OAS pension. The amount of the GIS benefit varies according to income (this is described in detail below). Starting in 1999, most of those receiving GIS can continue to do so by filing their income tax returns, rather than making a new application each year. The amount of monthly payments may increase or decrease according to reported changes in a person's yearly income. Unlike the basic OAS pension, the GIS is not subject to income tax. The GIS is not payable outside Canada beyond a period of six months following the month of departure from Canada, regardless of how long the person previously lived in Canada.

(a) Eligibility Conditions

To receive the GIS, a person must be receiving an OAS pension. The yearly income of the person (or, in the case of a couple, the combined income of the person and his or her spouse) cannot exceed certain limits.

Persons admitted to Canada as sponsored immigrants after 6 March 1996 and persons qualifying for benefits as of the year 2001 or later are not eligible, generally speaking, to receive the GIS for the duration of the sponsorship, up to a maximum of ten years. Exceptions are made, however, if an immigrant's sponsor dies, is incarcerated for a period of more than six months, is convicted of a criminal offence relating to the sponsored individual, or undergoes personal bankruptcy.

(b) Amount of Benefits

The amount of the GIS to which a person is entitled depends on his or her length of residence in Canada, marital status and income. If the person is married or living in a common-law relationship, the combined income of the person and his or her spouse is taken into account in determining the amount of the GIS.

To be entitled to a full benefit (maximum GIS, including any increase for persons receiving partial OAS pensions, as described below), persons admitted to Canada after 6 March 1996 and persons qualifying for benefits as of the year 2001 or later must have resided in Canada for at least 10 years after reaching age 18. If a person to whom either of these conditions applies has less than 10 years of residence, a partial benefit is payable (provided, as noted in the previous section, that the person is not a sponsored immigrant who is still in the period of sponsorship). The partial benefit is calculated at the rate of 1/10th of the amount of the full benefit for each complete year of residence in Canada after age 18. The proportion payable is re-calculated each year, taking into account additional residence in Canada during the previous year, building gradually to a full benefit after 10 years. The 10-year requirement for entitlement to a full benefit does not apply to persons who qualify for benefits before the year 2001 and who were permanent residents of Canada on or before 6 March 1996.

Income for purposes of the GIS is defined in the same way as for purposes of federal income tax, with a few specific exceptions – the most important of which is income from the basic OAS pension. In general, income includes any other money which a person receives, such as a retirement pension from the Canada or Québec Pension Plan or a private (occupational) pension plan, a foreign pension, interest, dividends, rents or wages.

Generally speaking, income received in the previous calendar year is used to calculate the amount of benefits paid in a fiscal year (which is the period starting on 1 April of a calendar year and ending on 31 March of the following calendar year). However, if an individual or spouse has retired or has suffered a loss of income, an estimate of income for the current calendar year may be substituted for the income of the preceding calendar year.

These are two basic rates of payment for a maximum GIS. The first applies to single individuals – including widowed, divorced or separated persons as well as individuals who have never married – and to married persons whose spouses do not receive either the basic OAS pension or the Spouse's Allowance. The second rate applies both to legally married couples and couples living in

common-law relationships, where both spouses are OAS pensioners. The single rate is higher than the married rate. However, each spouse in a couple is entitled to his or her own benefit, so the combined benefits for a couple are higher than those for a single person.

The maximum monthly GIS amounts were $488.23 and $318.01, for single and married persons, respectively, during the first quarter of 1999. These rates are adjusted quarterly, as described in paragraph 6 below.

If a person is receiving a partial OAS pension, the maximum GIS is increased by the difference between that partial pension and the full OAS pension.

For a single, widowed, divorced or separated person, the maximum monthly GIS is reduced by $1 for each $2 of other monthly income.

If both spouses in a couple are receiving the OAS pension, the maximum monthly GIS of each person is reduced by $1 for every $4 of their other combined monthly income.

A special provision applies in the case of a couple in which only one spouse is a pensioner and the other is not eligible for either the basic OAS pension or the SPA. In this instance, the pensioner can receive the GIS at the higher rate paid to those who are single. Moreover, the maximum monthly GIS is reduced by $1 for every $4 of the couple's combined monthly income (excluding, as usual, the pensioner's basic OAS pension), and the first reduction of $1 is made only when the combined yearly income of the couple reaches 12 times the basic monthly OAS pension plus $48.

5. Spouse's Allowance

The SPA is a monthly benefit designed to recognize the difficult circumstances faced by couples living on the pension of only one spouse as well as by many widowed persons.

An application must be made each year for the SPA. Benefits are not considered as income for income tax purposes. The SPA is not payable outside Canada beyond a period of six months following the month of departure from Canada, regardless of how long the person previously lived in Canada.

(a) Eligibility Conditions

The SPA may be paid to the spouse of an OAS pensioner, or to a widow or widower, who is between the ages of 60 and 64 and who has lived in Canada for at least 10 years after reaching age 18. An applicant must also be a Canadian citizen or a legal resident of Canada on the day preceding the approval of the application. To qualify for a benefit, the combined yearly income of the applicant and the spouse, or the annual income of the widow or widower, cannot exceed certain limits. For a couple, OAS and GIS benefits are not included in their combined yearly income.

The SPA stops being paid when the person becomes eligible for an OAS pension at age 65, if the person leaves Canada for more than six months, or if he or she dies. For a couple, the SPA stops being paid if the older spouse ceases to be eligible for the GIS or if the spouses separate or divorce. In addition, in the case of widows and widowers, the SPA stops if the person remarries.

Sponsored immigrants are subject to the same conditions regarding eligibility for the SPA as are described in the preceding section concerning the GIS.

(b) Amount of Benefits

The SPA is an income-tested benefit. Like the GIS, if the person is married or living in a common-law relationship, the combined income of the person and his or her spouse is taken into account in determining the amount of the SPA. In addition, to be entitled to the full SPA, persons admitted to Canada after 6 March 1996 and persons qualifying for benefits as of the year 2001 or later must have resided in Canada for at least 10 years after reaching age 18. If a person to whom either of these conditions applies has less than 10 years of residence, a partial SPA is payable, calculated at the rate of 1/10th of the amount of the full SPA for each complete year of residence in Canada after age 18. The proportion payable is re-calculated each year, taking into account additional residence in Canada during the previous year, building gradually to a full SPA after 10 years. The 10-year requirement for entitlement to a full SPA does not apply to persons who qualify for benefits before the year 2001 and who were permanent residents of Canada on or before 6 March 1996.

The maximum amount payable to the spouse of a pensioner is equal to the combination of a full OAS pension and the maximum GIS at the married rate. The maximum amount payable to a widowed person is somewhat higher.

The maximum monthly SPA amounts were $728.83 and $804.64, for the spouse

of a pensioner and a widowed person, respectively, during the first quarter of 1999. These rates are adjusted quarterly, as described in paragraph 6 below.

The maximum monthly SPA is reduced by $3 for every $4 of the person's monthly income (or the couple's combined monthly income) until the OAS-equivalent is reduced to zero. Then, for a couple, both the GIS-equivalent portion of the SPA and the pensioner's GIS are reduced by $1 for every additional $4 of the couple's combined monthly income. For a widow or widower, the GIS-equivalent portion is reduced by $1 for every additional $2 of monthly income.

6. Inflation Adjustments

All maximum benefit amounts under the *OAS Act* are adjusted at the beginning of each calendar quarter in line with changes in the Consumer Price Index (CPI). However, maximum benefit rates are not allowed to decrease. The adjustment applying to the monthly benefit rates of a given quarter to produce the rates for the subsequent quarter is equal to the ratio of:

- the average CPI over the 3-month period ending with the first month of the given quarter, to

- the average CPI over the preceding 3-month period or, in cases where benefit rates were frozen because of a decline in the CPI, such average CPI over the 3-month period ending with the first month of the quarter preceding that in which rates were last increased,

but not less than 1.0.

Appendix B - Data, Assumptions and Methodology

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VII. Appendix B - Data, Assumptions and Methodology

Appendix B describes the data, the assumptions and the methodology used in making the OAS financial projections that appear in Section II of this report. The assumptions used for purposes of the sensitivity tests presented in Section V are described in that section.

I. Population

The first step in the projection process is to project the population of Canada, by age and sex, in each year of the projection period.

1. Data

The following data were used in performing the demographic projections:

(a) Quinquennial census

Catalogue No.93F0022XDB96000 published by Statistics Canada is the main reference used for Canadian census data. The calculation of future average earnings and benefits requires population figures not only for the projection period (1998 to 2100), but also for 1952 to 1997. Data from each of the ten quinquennial censuses of 1952 to 1996 are accordingly maintained not only for the projection of average earnings and benefits of all relevant cohorts of workers and beneficiaries, but also for methodology validation purposes as described in section 3 below. The 1996 census data, by age and sex, serve as the starting point for the projection of the population and deaths until year 2100. The census data used for projection purposes consist primarily of the numbers of live persons by age (last birthday) and sex, the ratio of male to female births and the adjustments for undercount.

(b) Postcensal data

Between quinquennial censuses, Statistics Canada publishes annually various postcensal data. Data on actual past fertility rates and migration levels, taken from catalogues No.84-210-XMB, 91-520-XPB, 91-213-XPB and 93F0023XDB96006, are used as a basis for determining the assumptions required for projecting the actual 1996 population by age and sex. Moreover, previously assumed fertility rates and migration values for the period 1993 to 1996 were replaced by actual values in the projection process that, in a technical sense, starts in 1952.

(c) Life Tables, Canada and the Provinces, 1990-1992

These mortality tables, published by Statistics Canada (catalogue No. 84-537-XDB), are used as a basis for the determination of the assumptions required for projecting the population into the future. The Life Tables for 1995-1997 were not yet available when this report was completed. The 1990-1992 Life Tables for Canada and the ultimate mortality tables derived therefrom consist of one-year probabilities of death for individual ages from 0 to 109.

(d) Canadian Institute of Actuaries (CIA) Task Force on AIDS

The reports of this task force, published each year from 1988 to 1992, are the main reference used to estimate the effect of AIDS on mortality rates.

(e) Social Security Administration 1997 and 1998 trustees reports

These reports, prepared by the Social Security Administration (SSA) in the United States, show the extent to which mortality rates could be expected to decrease annually until year 2100. These annual rates of mortality improvement were determined by analysing the current trends in mortality decrease separately for each of 10 broad causes of death.

2. Demographic Assumptions

This section describes the assumptions most central to the demographic projections.

As in preceding reports, various auxiliary projections (see Section V of this report) provide an appreciation of the sensitivity of the financial projections to certain variations in key assumptions.

(a) Fertility

The fertility rate for a given age and year corresponds to the average number of live births per female of that age during that year. The total fertility rate for a year represents the average number of children that would be born to a woman in her lifetime if she were to experience the age-specific fertility rates observed in, or assumed for, that year. The actual total fertility rate for 1995 of 1.639 is 7.0% lower than that assumed for 1995 in the preceding actuarial report. The ultimate total fertility rate of 1.85 used in previous actuarial reports has been reduced to 1.70.

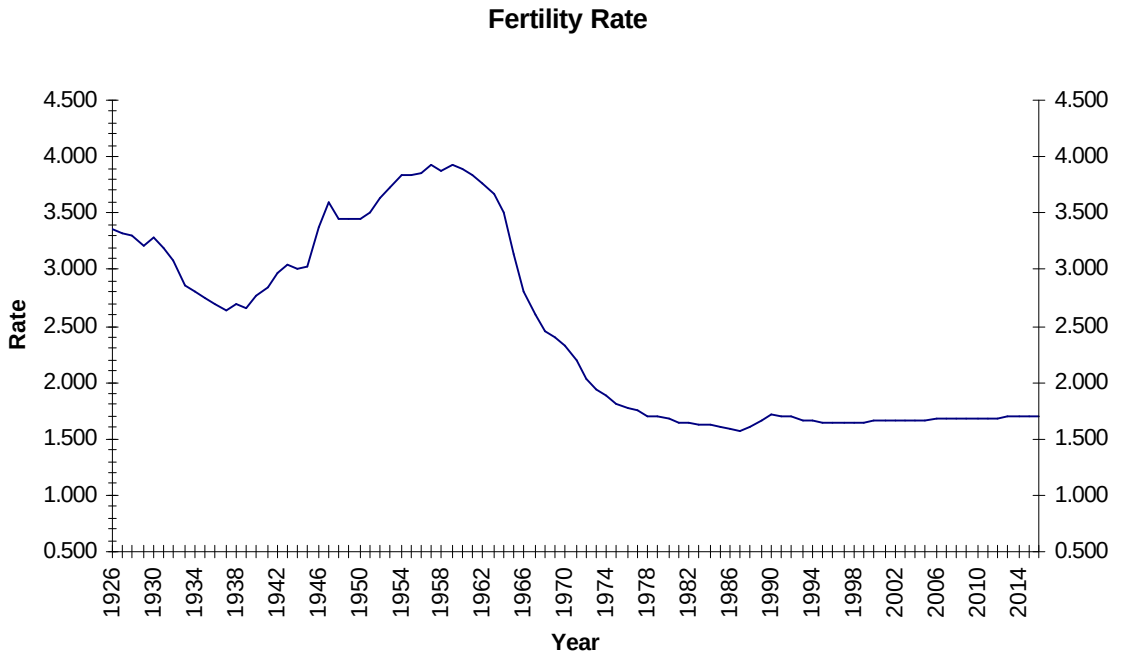
The new assumed ultimate total fertility rate reflects historical trends experienced over the 20 years ended 1995 and corresponds to the ultimate medium assumption assumed in the Statistics Canada December 1994

population projections 1993-2016 (Catalogue No. 91-520). For 1996 to 2015, the assumed total fertility rates were calculated by linear interpolation between the actual 1995 values and the assumed ultimate value of 1.70 for 2016. The distribution of assumed ultimate total fertility rates into age-specific rates corresponds to 1995 experience. In accordance with experience over the last 25 years, the assumed ratio of male to female births was maintained at 1.056.

Table VII.B.1 Annual and Total Fertility Rates

Age Group	Canada					
	1975	**1980**	**1985**	**1990**	**1995**	**2016+**
15-19	0.0348	0.0270	0.0233	0.0255	0.0245	0.0254
20-24	0.1084	0.0952	0.0815	0.0792	0.0706	0.0732
25-29	0.1288	0.1241	0.1207	0.1226	0.1097	0.1137
30-34	0.0642	0.0666	0.0724	0.0835	0.0868	0.0900
35-39	0.0214	0.0190	0.0216	0.0277	0.0313	0.0325
40-44	0.0048	0.0030	0.0030	0.0038	0.0048	0.0050
45-49	0.0004	0.0002	0.0001	0.0001	0.0002	0.0002
Total	**1.8140**	**1.6755**	**1.6130**	**1.7120**	**1.6395**	**1.7000**

Graph VII.B.1 Historical and Assumed Fertility Rates



Note that differences between the historical fertility rates presented above and those of the previous reports are due to the change in the population basis adopted by Statistics Canada since 1991, which now accounts for undercount and non-permanent residents.

(b) Mortality

Usually about two years following every population census new mortality tables, i.e., the Canadian Life Tables (CLTs), are produced. However, the 1995-1997 CLTs were not yet published at the time of this report. For this reason the 1990-1992 CLTs have been used. Therefore, mortality rates shown in Life Tables, Canada and the Provinces, 1990-1992, assumed to be applicable for 1991, were used as the starting point for mortality assumptions. Canada CLT rates are given only to age 105. Canada CLT rates were linearly extrapolated from the rate at age 105 to a rate of 1.0 at age 109.

To reflect anticipated sustained improvements in life expectancy, the 1991 mortality rates were projected to the year 2100 using the following annual rates of mortality improvement:

i) For 1992 to 2010, the annual rates of mortality improvement, varying by age, sex and calendar year, were determined by linear interpolation between:

- the average improvement rates experienced in Canada between 1981 and 1991, and
- the fixed improvement rates, described in ii) below, in respect of the period 2011 to 2100.

ii) For 2011 and subsequent years, the assumed annual rates of improvement, varying by age and sex only, not by calendar year, correspond to the SSA ultimate assumption for all causes of death, identified as *Alternative II (medium)* in the preliminary demographic projection results of the 1998 SSA trustees report (the SSA Actuarial Study had not yet been published at the time this report was prepared). These ultimate rates were then adjusted, to reflect Canadian experience, for age 0 and by quinquennial age-group from ages 1 to 94, by the ratio of the average improvement rates experienced in Canada between 1921 and 1991 for the particular age-group to the average improvement rates experienced in the United States for the same age-group over the same period. However, to moderate the influence of historical differences between the two countries, these ratios were increased or decreased, where necessary, to keep them within a range of 0.85 to 1.15.

The adjustment for each individual age in the age-group was assumed to be equal to the overall age-group adjustment as calculated above. The resulting assumed annual mortality improvement rates for 1992 and 2011 and thereafter are shown in the following table:

Table VII.B.2 Assumed Annual Mortality Improvement Rates
(percentages)

	Males		Females	
Age	**1992**	**2011+**	**1992**	**2011+**
0	4.10	1.47	3.61	1.54
1-4	4.35	1.06	4.26	1.05
5-9	4.87	1.12	5.37	1.09
10-14	3.86	0.94	3.20	0.98
15-19	3.05	0.50	2.11	0.51
20-24	2.55	0.51	2.06	0.53
25-29	1.62	0.58	2.19	0.60
30-34	0.09	0.58	1.69	0.59
35-39	0.42	0.63	2.05	0.58
40-44	2.10	0.59	2.72	0.54
45-49	2.98	0.58	2.10	0.50
50-54	3.12	0.54	2.07	0.49
55-59	2.71	0.53	1.75	0.49
60-64	2.18	0.52	1.54	0.52
65-69	2.09	0.40	1.61	0.41
70-74	1.75	0.41	1.53	0.41
75-79	1.33	0.42	1.27	0.44
80-84	0.89	0.43	1.19	0.47
85-89	0.56	0.43	1.10	0.55
90+	0.35	0.45	1.00	0.51
Average (1)	1.69	0.45	1.51	0.48

(1) Weighted by the 1990 distribution of population by age and sex.

To take AIDS into account, male mortality rates for ages 23 to 65 were increased for 1992 and thereafter based on adjustments to the extra AIDS mortality scenario of new infections forever as presented in the March 1992 CIA Guidance Notes on AIDS. These AIDS extra mortality rates were adjusted so as to produce a scenario where no new infections would occur after 2005. Moreover, because the assumed mortality improvement factors already include the effect of AIDS up to 1991, the levels of AIDS extra mortality assumed for 1992 and subsequent years have been further reduced by the level of the 1991 AIDS extra mortality. On the basis of the cumulative number of deaths attributable to AIDS (as reported by the U.S. Federal Center for AIDS), female mortality was also increased, but only by 10 percent of the above increments for males.

Table VII.B.3 shows sample values of the extra mortality assumed to apply in connection with AIDS for ages 30 to 45, the ages at which the adjustments are most significant. Table VII.B.4 below sets out sample values of the ultimate mortality rates as well as sample values of mortality rates of the 1990-92 CLTs.

Table VII.B.3 AIDS Extra Mortality
(annual deaths per 1,000 persons)

Age	1992	1995	2000	2005	2010
30	0.00	0.13	0.13	0.10	0.00
35	0.02	0.08	0.15	0.13	0.04
40	0.01	0.05	0.04	0.07	0.03
45	0.01	0.05	0.02	0.00	0.00

100% of these increases apply to male mortality rates; only 10% apply to female rates.

Table VII.B.4 Mortality Rates for Canada
(annual deaths per 1,000 persons)

	1990-1992 CLT		Assumed for 2100	
Age	**Males**	**Females**	**Males**	**Females**
0	7.09	5.77	1.09	0.87
1	0.51	0.45	0.12	0.10
5	0.20	0.14	0.04	0.03
10	0.15	0.12	0.04	0.03
20	1.09	0.36	0.51	0.17
30	1.22	0.47	0.68	0.22
40	1.85	0.99	0.84	0.45
50	4.49	2.72	1.93	1.37
60	12.75	6.79	6.17	3.50
70	31.99	16.74	18.02	9.66
80	79.91	47.35	47.63	26.47
90	181.45	132.24	111.95	72.30
100	354.75	315.19	218.88	172.32
105	473.84	457.25	292.36	249.98
109	1,000.00	1,000.00	1,000.00	1,000.00

Life expectancies (longevity expressed in years) resulting from the above mortality assumptions are shown below if the mortality rates assumed for the year shown applied forever.

Table VII.B.5 Projected Life Expectancies for Canada

	At birth		At age 65	
Year	**Males**	**Females**	**Males**	**Females**
2000	76.2	82.2	16.5	20.7
2025	78.0	83.8	17.5	21.8
2050	79.4	85.2	18.4	22.8
2075	80.7	86.5	19.3	23.8
2100	82.0	87.7	20.2	24.8

(c) Migration

Immigration and emigration are generally recognized to be volatile parameters of future population growth, since they are subject to a variety of demographic, economic, social and political factors; immigration, especially, is subject to government control. During the period from 1972 to 1996, for example, annual immigration to Canada varied from 83,691 to 265,405.

Migration is the net result of several components. The largest of these is immigration to Canada from other countries. This has averaged 233,000 annually from 1992 to 1996. In its 1994 immigration plan, the government established an annual target of 250,000.

The second largest component of net migration is emigration from Canada to other countries. Statistics Canada is currently in the process of revising its estimates of recent numbers of emigrants. Actual recent emigration may be as much as double the previous estimates, which averaged 45,000 annually from 1992 to 1996, similar to historical levels.

Some emigrants eventually return to Canada. The estimated number of returning Canadians averaged about 22,000 annually from 1992 to 1996. Returning Canadians were not reflected in the migration assumptions used in previous reports.

For purposes of this report, net migration was assumed to start from a level of 210,000 immigrants to Canada in 1996, 75,000 emigrants leaving Canada and 25,000 returning Canadians. These figures represent a ratio of net migration to total Canadian population of about 0.53% for 1996. Based on a continuation of similar migration levels, an ultimate assumption of 0.50% has been established, beginning in 2005. This is consistent with experience over the last 10 to 15 years using the revised estimates. The migration assumption differs from that in the Seventeenth Actuarial Report on the Canada Pension Plan.

The distributions of immigrants, emigrants and returning Canadians by age group and sex used for the demographic projections correspond to Statistics Canada data averaged over the period 1992 to 1996.

Table VII.B.6 Distribution of Immigrants, Emigrants and Returning Canadians - 1992 to 1996

Age Group	Immigrants		Emigrants		Returning	
	Males %	Females %	Males %	Females %	Males %	Females %
0-4	2.927	2.977	2.475	2.349	3.438	3.386
5-9	3.857	3.630	3.723	3.646	2.993	2.884
10-14	3.966	3.662	3.829	3.837	3.015	2.636
15-19	3.720	3.984	3.394	3.209	3.757	3.838
20-24	4.611	6.141	2.024	3.551	6.673	7.758
25-29	6.870	7.641	6.240	7.038	8.415	7.651
30-34	6.257	6.499	7.536	6.952	5.960	5.818
35-39	4.681	4.873	6.363	6.127	3.994	4.207
40-44	3.337	3.297	5.643	4.974	3.798	3.219
45-49	2.051	2.072	3.483	2.959	2.541	2.109
50-54	1.331	1.696	1.955	1.651	1.902	1.331
55-59	1.362	1.777	1.155	0.963	1.427	1.395
60-64	1.279	1.521	0.678	0.541	1.021	1.120
65-69	0.888	1.060	0.730	0.988	0.751	0.878
70+	0.869	1.165	0.961	1.025	0.854	1.231
Total:	**48.006**	**51.994**	**50.189**	**49.811**	**50.540**	**49.460**
Average Age	**29.43**	**30.26**	**31.44**	**30.82**	**29.26**	**29.27**

3. Methodology

The most recent Canada population census is as at 1 July 1996. The starting point for demographic projections accordingly corresponds to mid-1996 and consists of numbers of males and females by age. However, population data for 1952 to 1995 are also required for the calculation of future benefits of the relevant cohorts of OAS beneficiaries. For this latter purpose, use is made of historical data developed by Statistics Canada. These historical data take into account the 1991 change in the definition of the census population, which now includes both permanent and non-permanent residents of Canada.

The 1996 census data is available by individual ages up to 89, but the data for ages 90 and over is grouped. Hence, the latter data were disaggregated for individual ages 90 to 109 by surviving the population at age 89, using the extrapolated 1990-1992 Canada Life Tables, up to age 109. A constant proportional adjustment was made to the disaggregated population for each age from 90 to 109 to match its total with the census aggregate value for this age group.

To compensate for the census undercount, adjustment factors developed by Statistics Canada were applied to the 1996 census population data. These factors vary by age and sex.

The population, by age and sex, was then projected from one year to the next by adding births, immigrants and returning Canadians, and subtracting deaths and emigrants. The annual numbers of births, deaths, immigrants, emigrants and returning Canadians were developed by applying the fertility, mortality and migration assumptions to the mid-year population. The projections carry forward to 2100.

4. Population Tables

The first three tables below show the 1996 starting population (1996 census adjusted for undercount) and the projected mid-year populations for 2000, 2025, 2050, 2075 and 2100. The populations shown are distributed by sex and broad age groups. The fourth table shows corresponding dependency ratios.

Table VII.B.7 Population of Canada - Both Sexes
(thousands)

Age Group	1996	2000	2025	2050	2075	2100
0-4	1,951	1,886	2,009	2,128	2,262	2,424
5-9	2,017	2,041	2,065	2,167	2,308	2,477
10-14	2,020	2,058	2,087	2,204	2,362	2,539
15-19	2,004	2,067	2,094	2,247	2,418	2,597
0-19	**7,992**	**8,052**	**8,255**	**8,746**	**9,350**	**10,037**
20-24	2,038	2,064	2,147	2,328	2,499	2,674
25-29	2,225	2,164	2,292	2,475	2,631	2,810
30-34	2,633	2,351	2,498	2,592	2,737	2,929
35-39	2,668	2,746	2,518	2,621	2,785	2,994
40-44	2,388	2,639	2,492	2,596	2,794	3,015
45-49	2,160	2,334	2,413	2,568	2,790	3,004
50-54	1,673	2,073	2,374	2,557	2,773	2,965
55-59	1,333	1,575	2,414	2,602	2,724	2,898
60-64	1,215	1,262	2,651	2,485	2,617	2,804
20-64	**18,333**	**19,208**	**21,799**	**22,824**	**24,350**	**26,093**
65-69	1,130	1,145	2,388	2,307	2,440	2,657
70-74	981	1,010	1,926	2,044	2,222	2,458
75-79	705	819	1,479	1,757	1,957	2,185
80-84	468	512	890	1,438	1,637	1,802
85-89	240	293	488	1,123	1,157	1,318
90+	120	146	358	895	1,092	1,404
65+	**3,644**	**3,925**	**7,529**	**9,564**	**10,505**	**11,824**
Grand Total	**29,969**	**31,185**	**37,583**	**41,134**	**44,205**	**47,954**

Table VII.B.8 Population of Canada - Males
(thousands)

Age Group	1996	2000	2025	2050	2075	2100
0-4	1,000	964	1,029	1,091	1,160	1,243
5-9	1,032	1,044	1,055	1,107	1,179	1,265
10-14	1,032	1,050	1,065	1,123	1,203	1,293
15-19	1,027	1,055	1,066	1,142	1,229	1,320
0-19	**4,091**	**4,113**	**4,215**	**4,463**	**4,771**	**5,121**
20-24	1,034	1,053	1,087	1,178	1,266	1,355
25-29	1,122	1,088	1,149	1,242	1,322	1,412
30-34	1,335	1,181	1,250	1,294	1,367	1,462
35-39	1,345	1,386	1,253	1,303	1,383	1,487
40-44	1,192	1,325	1,239	1,287	1,384	1,494
45-49	1,085	1,164	1,202	1,270	1,381	1,489
50-54	839	1,040	1,174	1,262	1,372	1,469
55-59	662	786	1,196	1,287	1,347	1,435
60-64	597	622	1,317	1,223	1,290	1,384
20-64	**9,211**	**9,645**	**10,867**	**11,346**	**12,112**	**12,987**
65-69	537	552	1,165	1,121	1,187	1,296
70-74	434	460	908	970	1,053	1,172
75-79	289	340	670	793	891	1,006
80-84	175	191	372	606	701	784
85-89	78	95	178	426	446	521
90+	32	37	97	263	329	437
65+	**1,545**	**1,675**	**3,390**	**4,179**	**4,607**	**5,216**
Grand Total	**14,847**	**15,433**	**18,472**	**19,988**	**21,490**	**23,324**

Table VII.B.9 Population of Canada - Females
(thousands)

Age Group	1996	2000	2025	2050	2075	2100
0-4	951	922	980	1,037	1,102	1,181
5-9	985	997	1,010	1,060	1,129	1,212
10-14	988	1,008	1,022	1,081	1,159	1,246
15-19	977	1,012	1,028	1,105	1,189	1,277
0-19	**3,901**	**3,939**	**4,040**	**4,283**	**4,579**	**4,916**
20-24	1,004	1,011	1,060	1,150	1,233	1,319
25-29	1,103	1,076	1,143	1,233	1,309	1,398
30-34	1,298	1,170	1,248	1,298	1,370	1,467
35-39	1,323	1,360	1,265	1,318	1,402	1,507
40-44	1,196	1,314	1,253	1,309	1,410	1,521
45-49	1,075	1,170	1,211	1,298	1,409	1,515
50-54	834	1,033	1,200	1,295	1,401	1,496
55-59	671	789	1,218	1,315	1,377	1,463
60-64	618	640	1,334	1,262	1,327	1,420
20-64	**9,122**	**9,563**	**10,932**	**11,478**	**12,238**	**13,106**
65-69	593	593	1,223	1,186	1,253	1,361
70-74	547	550	1,018	1,074	1,169	1,286
75-79	416	479	809	964	1,066	1,179
80-84	293	321	518	832	936	1,018
85-89	162	198	310	697	711	797
90+	88	109	261	632	763	967
65+	**2,099**	**2,250**	**4,139**	**5,385**	**5,898**	**6,608**
Grand Total	**15,122**	**15,752**	**19,111**	**21,146**	**22,715**	**24,630**

Table VII.B.10 Population Dependency Ratios
(percentages)

Year	Children (1)	Seniors (2)	Total
1996	43.6	19.9	63.5
2000	41.9	20.4	62.4
2025	37.9	34.5	72.4
2050	38.3	41.9	80.2
2075	38.4	43.1	81.5
2100	38.5	45.3	83.8

(1) Population aged 19 years and under as a percentage of population aged 20 to 64 years.
(2) Population aged 65 years and over as a percentage of population aged 20 to 64 years.

II. Earnings and Benefits

1. Data

(a) Demographic

Historical (1952 to 1996) and projected (1997 to 2100) population for Canada, the output of section I above, is used for various computational purposes in the economic projections. For example, the relevant population times the benefit eligibility rate, times the maximum benefit rate and times the proportion of the maximum benefit for each age-sex cohort, type of benefit and level of benefit produces the projected amount of benefits.

(b) Economic indices

The Consumer Price Index (CPI) and the Average Industrial Aggregate Wages statistic (AIAW, the current measure of the average rate of weekly wages and salaries) are produced by Statistics Canada (catalogues 72-002 and 11-010, respectively). The observed (1966 to 1997) annual increases in the CPI and the AIAW replace, for methodology validation purposes, values assumed in previous actuarial reports; they are also used as a basis for the determination of corresponding assumptions for the future. For purposes of selecting related assumptions, use was also made of these CPI and AIAW indices averaged over the last 5, 10, 15, 25 and 50 years as determined by the Canadian Institute of Actuaries in its Report on Canadian Economic Statistics 1924-1997. Rates of interest are not required for purposes of this report.

(c) Administrative reports

The annual accounting reports and the Reference Guide on Income Security Programs, flowing from the administration of the OAS by the Ministry of Human Resources Development Canada (HRDC), provide aggregate financial data such as the number of beneficiaries and the amount of benefits. OAS administrative expenses were obtained from the Income Security Programs branch of HRDC.

Such aggregate data are also compiled over each calendar year after the preparation of an actuarial report and compared with corresponding aggregate projected values of that report for further methodology validation purposes until the next report comes due.

(d) Monthly statistics

Statistics published monthly by HRDC are similar to benefits statistics (section (e) below), but are generally less detailed (e.g., no information on age or terminations). Because the more detailed benefits statistics are not produced as frequently as monthly statistics, these monthly statistics are used for various preliminary experience studies between valuation dates.

(e) Benefits statistics

Special reports providing statistics on the numbers and average amounts of benefits paid in the month of June each year are prepared for us by HRDC. The information is provided by cells consisting of type of benefit, sex, age and size of benefit, i.e., in six categories relative to the maximum benefit rate: 0-19%, 20-39%, 40-59%, 60-79%, 80-99%, and 100% or more. Benefits in excess of 100% of the maximum benefit rate are possible in some circumstances, such as the GIS paid to a person with a partial OAS pension. The data includes benefits paid to those who have qualified under international social security agreements.

(f) Earnings statistics

Statistics on the average employment earnings, by sex and age-group, of all workers covered by the CPP (i.e., Canada less Québec basis) are prepared annually and transmitted as machine-readable files by HRDC. These data originate from Revenue Canada, which is responsible for the processing of CPP contributions through salary deductions. The complete employment earnings data pertaining to a given calendar year normally becomes available only in the second year (about mid-year) following that given year. This delay is partly due to the contribution adjustments resulting from tax returns filed after the given year, but mainly by the annual (as opposed to monthly) cycle of Revenue Canada's allocation of monthly pay deductions between Employment Insurance and CPP contributions. The data is validated and aggregates are compared with the published annual HRDC report on CPP contributors and contributions. These earnings statistics include the number of earners and the average annual employment earnings of these earners.

Earnings statistics available for the most current year (1996) are used as the basis for projecting (by age, sex and calendar year) average employment earnings and contributory earnings.

(g) Aggregate Employment Earnings for Canada

The amount of total employment earnings for all of Canada is obtained from Statistics Canada and corresponds to total gross earnings (CANSIM matrix #6611).

(h) Gross Domestic Product

The annual gross domestic product (GDP) for Canada is obtained from Statistics Canada (CANSIM matrix #6575).

2. Assumptions

The exhaustive list of assumptions is quite extensive. The following sections cover the most significant of these assumptions.

The assumptions described were used in the "best-estimate" projections. To the extent applicable, these assumptions are consistent with the best-estimate assumptions used in the Canada Pension Plan Seventeenth Actuarial Report as at 31 December 1997.

(a) Annual rates of increase in average employment earnings and in the CPI

For the period 1999 to 2002, the assumptions were derived to fall smoothly between the 1998 assumptions and the ultimate (2003 and subsequent years) assumptions described below.

Since the financial projections of this report cover a long period, ultimate key economic assumptions were chosen on the basis of:

- The average long-term (about 50 years) past experience and the observed trends over the past short (about 15 years) and medium (about 25 years) terms.

- Judgmental opinion as to the outlook of the overall economy over the future long term.

- Historically, the real-wage differential has fluctuated significantly from year to year. The trend was generally downward through the late 1980s, with some improvement since then, e.g., the 10-year average annual real-wage differential was -0.59% for the period ending 1987 and 0.32% for the period ending 1997. Over the longer term, the annual real-wage differential averaged 1.52% for the 50-year period ending 1997. Many factors have influenced real rates of wage increases, including general productivity improvements, the move to a service economy and decreases

in the average hours worked. Considering these factors, together with the historical trends and judgement regarding the long-term course of the economy, an ultimate real-wage differential of 1.0% has been assumed in years 2003 and thereafter.

- It is generally believed that, in this post-industrialized era where the economy is more and more service-oriented, the productivity rate should not, in the long-term, be as high as during the industrialized era.

- Price increases, as measured by changes in the Consumer Price Index (CPI), also tend to fluctuate from year to year. Over the last 50 years, the trend was generally upward through the early 1980s and downward since then. For example, the average annual increases in the CPI for the 50-, 25- and 10-year periods ending in 1997 were 4.44%, 5.83% and 2.80%, respectively.

For the above reasons it was accordingly decided to reduce the ultimate assumptions for the annual increase in prices and average employment earnings to 3.0% and 4.0%, respectively, as compared to 3.5% and 4.5% for the previous OAS actuarial report.

The table below shows the short-term and ultimate assumptions adopted for this report regarding the annual increases in earnings and prices.

Table VII.B.11 Annual Rates of Increase in Prices and Average Employment Earnings *(percentages)*

Year	Prices	Earnings	Real-Wage Differential
1996	1.60	2.10	0.50
1997	1.50	2.10	0.60
1998	1.00	1.60	0.60
1999	1.40	2.08	0.68
2000	1.80	2.56	0.76
2001	2.20	3.04	0.84
2002	2.60	3.52	0.92
2003+	3.00	4.00	1.00

(b) Proportions of earners

The assumed proportions of earners were determined, on a Canada less Québec basis, exactly as under the CPP Seventeenth Actuarial Report as at 31 December 1997. These proportions of earners were assumed, for calculation purposes, to apply to Canada as a whole. Adjustments are made in the projections of earnings to reflect historical differences between Québec and the rest of Canada, as described in paragraphs 3(f) and 3(g) below.

In respect of each past year (1966 to 1996), actual proportions of earners are computed, by age and sex, as the ratio of the number of earners (from earnings statistics) to the corresponding population (from demographic computations). In addition to being used for the computation of the past and future benefits of the relevant cohorts of contributors, these historical values constitute an important reference for the selection of assumed future proportions of earners.

These proportions for the future were accordingly determined taking partly into account the trends in their counterpart actual, adjusted (see 3(c) below) values for 1966 to 1996. These trends reveal quite variable proportions for males, and significant year to year increases for females.

Employment levels are reflected in the actuarial projection model through the assumption made regarding the proportions of the population, by age and sex, who have earnings in a given year. These proportions vary not only with the rate of unemployment, but also reflect trends in increased workforce participation by women, longer periods of formal education among young adults and the trends in retirement patterns of older workers.

The ultimate proportions of earners, assumed to apply in year 2010 and thereafter, were established based on a review of both historical trends and the results of projections prepared by Finance department economists using a cohort-based model. The assumptions are consistent with an ultimate unemployment rate of approximately 7.0%. Assumed proportions for 1997 to 2009 were obtained by linear interpolation between the latest experience figures (i.e., 1996) and the values assumed for 2010 and subsequent years. The assumed increases in proportions of earners for the years 1997 through 2010 produce an average annual increase in the workforce of 1.6% during that period.

Selected values of the adjusted past actual and future assumed proportions of earners are shown by age, sex and calendar year in section 3(c) below.

(c) Average employment earnings

The assumed average employment earnings were determined, on a Canada less Québec basis, exactly as under the CPP Seventeenth Actuarial Report as at 31 December 1997. These average employment earnings were assumed, for calculation purposes, to apply to Canada as a whole. Adjustments are made in the projections of earnings to reflect historical differences between Québec and the rest of Canada, as described in paragraphs 3(f) and 3(g) below.

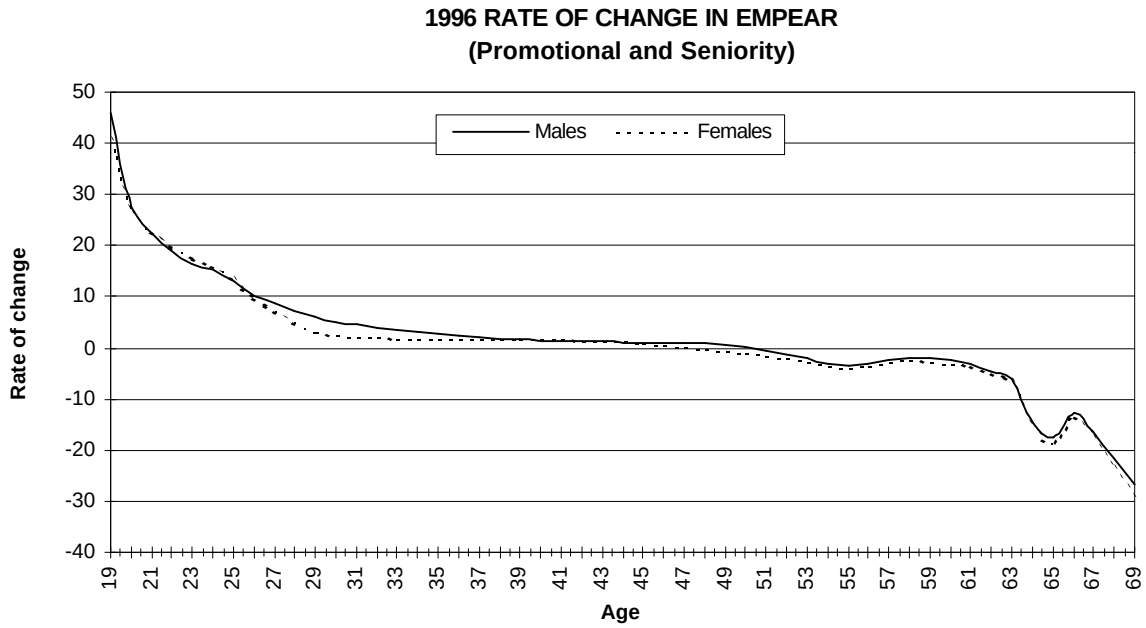
In respect of a cohort of earners of a given age and sex, the average employment earnings for a given calendar year corresponds to the ratio of the sum of individual employment earnings earned during the year to the number of earners in the cohort. On the other hand, the AIAW, compiled by Statistics Canada, corresponds to the weekly rate of pay, at a particular point in time, averaged over all industries.

For a given age, average employment earnings are deemed to increase from one year to the next at the assumed rate of increase in the AIAW. Consistent with past experience, the annual seniority and promotional increases are accordingly implicitly assumed constant at the actual 1996 rates for every year of the projection period. The seniority and promotional increase for a given *age*/*year* cell is accordingly deemed equal to the ratio, minus one, of the average earnings for that *age*/*year* cell to the average earnings for the *preceding age*/*same year* cell. Therefore, projected average earnings for a given *age/year* cell are obtained simply by applying the annual increase in the AIAW assumed for this year to the average earnings for the *same age*/*previous year* cell.

$$EMPEAR_x^N = EMPEAR_{x-1}^{N-1} \times (1+p_x^N) \times (1+s^N) = EMPEAR_x^{N-1} \times (1+s^N)$$

where
- N = calendar year
- x = age attained during calendar year N
- $EMPEAR$ = average employment earnings
- p_x^N = constant (by year) promotional and seniority rate of change in EMPEAR from age x-1 to age x
  = $\{EMPEAR_x^{1996} / EMPEAR_{x-1}^{1996}\} - 1$
- s^N = assumed constant (for any given age or sex) overall annual increase in EMPEAR from year N-1 to N

Graph VII.B.3 Changes in Average Employment Earnings by Age - 1996
(percentages)



However, this assumed rate of increase in average employment earnings is subject to the following two adjustments:

- The preceding statement of the above assumption implies that the effect, on average employment earnings, of unemployment levels prevailing on average during the base year (1996) of earnings projections, will remain constant each year in the future.

C The assumed annual rate of increase in the AIAW was not implemented uniformly by sex since it was further assumed that an annual geometrical narrowing of 1% in the gap between male and female average employment earnings would apply. Hence, rates of increase in average employment earnings were developed by age and by sex so as to produce:
  < an aggregate rate of increase equal to that assumed for the AIAW;
  < rates of increase for each age, both sexes combined, that would be the same for all ages; and
  < separate rates of increase for male and female average earnings for each age such that the ratio of female to male average earnings would move 1% of the way to unity each year.

(d) Distributions of earners and earnings over 78 earnings categories

The distributions of earners and earnings relative to average earnings are assumed for the projection period to be constantly equal to their actual adjusted five-year (1992 to 1996) average described and shown in section 3(c) below.

(e) Rates of eligibility for benefits

Since benefits are computed for age-sex cohorts of persons as opposed to individual persons, rates of eligibility by type of benefit and amount are required.

Data received from HRDC for each type of benefit (e.g., OAS, GIS married spouse pensioner, GIS single, SPA widowed, etc.) consist of the number of beneficiaries at June of each year (1983 to 1997) by sex, age and six levels of benefit as a percentage of the maximum benefit (0-19%, 20-39%, 40-59%, 60-79%, 80-99%, and 100% and over).

Actual (1983 to 1997) proportions eligible for a benefit for each of the cells described above correspond to the ratio of the number of beneficiaries in that cell to the population of Canada for the specific age/sex/year cell.

Assumed proportions eligible for a benefit for the projection period (1998 to 2100) are then determined as follows:

i) OAS

The proportion eligible for new OAS benefits (cohorts reaching age 65 during the projection period 1998 to 2100) is assumed to be 93.5% at age 65 and gradually increase to 98.5% and 97% by age 70 for males and females, respectively. It is then kept at that level for ages 71 and over.

For those under age 71 who are already receiving benefits in 1997, it is assumed that their actual smoothed 1997 eligibility rate will gradually increase to a level of 98.5% and 97% by age 70 for males and females, respectively, and will then remain at that level forever. For those aged 71 and over in 1997, it is assumed that their future eligibility rates will remain at the actual smoothed 1997 level forever.

The distribution of the overall proportion eligible for an OAS pension among the six level-of-benefit categories is assumed as follows:

- The actual 1997 distribution by level of benefit at each age is gradually shifted from 1998 to 2017 by reducing the proportion in the 100% category by 0.02% each year (as experience shows from 1983 to 1997) and redistributing this reduction proportionally among the under 100% categories. It is then kept constant at that level for the remainder of the projection period. This is done to gradually phase out of the effects of the grandfathering rules introduced in 1977.

ii) GIS and SPA

The actual 1997 proportions eligible for GIS and SPA for each age/sex/type/level cell are used as the starting point for determining the assumed proportions eligible during the projection period.

The proportions for each age/sex/type/level for any given year "n" (1998-2100) are obtained as follows:

$$e_{(n,i,j,k,l)} = e_{\langle(n-1),i,j,k,l\rangle} \times \frac{\sum_{j=1}^{6} e_{\langle(n-1),i,j,k,l\rangle}\ f_{(j,beninc,aiawinc)}}{\sum_{j=1}^{6} e_{\langle(n-1),i,j,k,l\rangle}}$$

Where:

$e_{(n,i,j,k,l)}$ = Proportion eligible in year "n", age "i"
Benefit level category "j", type of benefit "k" and sex "l".

$$f_{(j,beninc,aiawinc)} = \frac{1}{c_j} - \left(\frac{(1-c_j)}{c_j}\right) \times \left(\frac{(1+aiawinc)}{(1+beninc)}\right)$$

c_j = Average benefit as a proportion of the maximum benefit for benefit level "j"

$beninc$ = Annual increase in maximum benefit rate

$aiawinc$ = Annual increase in average employment earnings

This adjustment accounts for the assumption that each new cohort and beneficiaries will be somewhat wealthier than the preceding one and thus fewer members will be eligible for these benefits. The assumed distributions of those eligible among the six level-of-benefit categories are the same as their actual 1997 distributions. This approach automatically accounts for the erosion of post-retirement incomes as the patterns of proportions eligible for GIS and SPA by age are kept at their 1997 levels. However, it does not reflect the impact on future eligibility rates of changes in the levels of workforce participation by women. Refinements of the methodology will be developed for future reports, in order to explicitly capture the effects of such factors in the projections.

Table VII.B.12 Eligibility Rates

	1995		2000		2025		2050	
	0-99%	**100%**	**0-99%**	**100%**	**0-99%**	**100%**	**0-99%**	**100%**
				OAS - Males				
65	0.0273	0.9073	0.0313	0.9037	0.0631	0.8719	0.0631	0.8719
70	0.0478	0.9291	0.0562	0.9288	0.0897	0.8953	0.0897	0.8953
75	0.0476	0.9283	0.0560	0.9190	0.0901	0.8949	0.0901	0.8949
80	0.0433	0.9348	0.0509	0.9141	0.0854	0.8996	0.0854	0.8996
85	0.0349	0.9371	0.0477	0.9173	0.0822	0.9028	0.0822	0.9028
90+	0.0239	0.8511	0.0347	0.8753	0.0711	0.9139	0.0711	0.9139
				OAS - Females				
65	0.0293	0.9034	0.0352	0.8998	0.0669	0.8681	0.0669	0.8681
70	0.0417	0.9223	0.0518	0.9182	0.0848	0.8852	0.0848	0.8852
75	0.0390	0.9277	0.0478	0.9172	0.0810	0.8890	0.0810	0.8890
80	0.0362	0.9441	0.0432	0.9218	0.0764	0.8936	0.0764	0.8936
85	0.0308	0.9532	0.0409	0.9241	0.0741	0.8959	0.0741	0.8959
90+	0.0227	0.9390	0.0312	0.9078	0.0652	0.9048	0.0652	0.9048
				GIS - Males				
65	0.1964	0.0486	0.2002	0.0386	0.1314	0.0272	0.0907	0.0200
70	0.2344	0.0441	0.2267	0.0385	0.1491	0.0270	0.1008	0.0196
75	0.2553	0.0417	0.2440	0.0382	0.1582	0.0258	0.1040	0.0178
80	0.3159	0.0453	0.3019	0.0417	0.2024	0.0287	0.1365	0.0199
85	0.3916	0.0511	0.3585	0.0470	0.2566	0.0341	0.1843	0.0249
90+	0.4031	0.0929	0.3878	0.0702	0.3076	0.0560	0.2445	0.0448
				GIS - Females				
65	0.2346	0.0554	0.2301	0.0443	0.1426	0.0293	0.0912	0.0199
70	0.2862	0.0614	0.2896	0.0582	0.2020	0.0419	0.1427	0.0304
75	0.3434	0.0710	0.3473	0.0659	0.2521	0.0490	0.1845	0.0366
80	0.4100	0.0910	0.4129	0.0852	0.3166	0.0665	0.2439	0.0520
85	0.4478	0.1258	0.4465	0.1132	0.3624	0.0926	0.2950	0.0760
90+	0.4262	0.2247	0.4335	0.1794	0.3741	0.1553	0.3233	0.1345
				SPA - Males				
60	0.0053	0.0011	0.0051	0.0008	0.0028	0.0005	0.0016	0.0004
61	0.0085	0.0010	0.0079	0.0008	0.0041	0.0004	0.0023	0.0003
62	0.0128	0.0013	0.0116	0.0008	0.0058	0.0005	0.0031	0.0003
63	0.0192	0.0016	0.0164	0.0010	0.0083	0.0006	0.0045	0.0004
64	0.0264	0.0019	0.0253	0.0012	0.0115	0.0007	0.0056	0.0004
				SPA - Females				
60	0.0807	0.0067	0.0731	0.0053	0.0367	0.0032	0.0194	0.0020
61	0.1103	0.0086	0.1017	0.0065	0.0504	0.0038	0.0264	0.0023
62	0.1396	0.0106	0.1279	0.0079	0.0628	0.0046	0.0327	0.0028
63	0.1689	0.0125	0.1532	0.0089	0.0747	0.0052	0.0385	0.0031
64	0.1930	0.0138	0.1837	0.0105	0.0891	0.0060	0.0456	0.0036

(f) Average benefits by cell in relation to maximum benefits

For each cell, determined by age group, sex, type of benefit and amount category, the average benefit paid was compared to the maximum benefit rate. In most cases, the averages were close to the midpoint of the amount category and did not vary significantly from year to year.

Therefore, except for the "100% and over" category for GIS, it was assumed that these averages would remain constant in future years, in accordance with their average levels over the most recent five year period.

For GIS it is possible for a beneficiary to receive more than 100% of the maximum benefit if receiving a partial OAS pension. In these cases, the maximum GIS benefit is increased by the difference between the full and partial OAS pension. For this purpose, it was necessary to make a special assumption for this category. It was assumed that the average benefit as a percentage of the maximum would be kept at the 1997 levels throughout the projection period.

Table VII.B.13 Average Benefits By Cell As Proportions of Maximum Benefit Rates

	Males					
	0-19%	**20-39%**	**40-59%**	**60-79%**	**80-99%**	**100%**
OAS	0.113	0.274	0.508	0.676	0.873	1.000
GIS-S	0.115	0.310	0.501	0.700	0.908	1.124
GIS-SP	0.112	0.303	0.499	0.690	0.894	1.603
GIS-SNP	0.113	0.287	0.501	0.699	0.899	1.127
GIS-SSPA	0.000	0.000	0.455	0.702	0.898	1.161
SPA-R	0.113	0.312	0.489	0.696	0.907	1.000
SPA-W	0.107	0.310	0.482	0.680	0.906	1.000
SPA-E	0.102	0.299	0.476	0.694	0.904	1.000
	Females					
	0-19%	**20-39%**	**40-59%**	**60-79%**	**80-99%**	**100%**
OAS	0.101	0.270	0.512	0.674	0.874	1.000
GIS-S	0.115	0.309	0.507	0.699	0.908	1.129
GIS-SP	0.112	0.303	0.499	0.690	0.894	1.596
GIS-SNP	0.113	0.289	0.508	0.709	0.921	1.082
GIS-SSPA	0.000	0.000	0.456	0.699	0.895	1.086
SPA-R	0.116	0.310	0.479	0.696	0.906	1.000
SPA-W	0.111	0.316	0.489	0.700	0.910	1.000
SPA-E	0.107	0.302	0.472	0.694	0.905	1.000

GIS-S = GIS single
GIS-SP = GIS spouse is a pensioner
GIS-SNP = GIS spouse not a pensioner
GIS-SPA = GIS spouse has SPA

SPA-R = SPA regular
SPA-W = SPA widowed
SPA-E = SPA extended

3. Methodology

(a) General approach

Given the inherent complexity of the valuation methodology and the intent here to facilitate its comprehension as much as possible, it is appropriate at this stage to point out two significant characteristics of the general approach underlying the valuation methodology.

i) The actuarial approach used for projections is macro-simulated as opposed to micro-simulated. One of the important characteristics of such macro-simulation is that projections are made relying on grouped, as opposed to individual, data (mainly numbers of persons and earnings). This results in the need for a considerably smaller volume of data to be processed. Using micro-simulation, individual benefits can be easily determined via calculations involving individual data. Using macro-simulation, only aggregate benefits (i.e., combined for all those at a given age and sex for each type of benefit) can be obtained directly, since the data used in the computational processes are aggregate values.

ii) All projections are made using 1966 as the starting point for population and earnings projections and 1983 as the starting point for benefit projections instead of the beginning (1998) of the statutory valuation period. This is done so that the valuation methodology can be validated for the pre-valuation years by comparing the values computed for these years with actual results. The computerized valuation system incorporates an extensive methodology validation process that examines the numbers and amounts of all past benefits by calendar year.

(b) Projection of economic indices

i) Consumer Price Index (CPI)

The CPI is projected for each calendar year of the valuation period by increasing geometrically its most recent average, over the 12-month period ending in December, in accordance with the assumed annual increase in prices. Designating this assumed rate of increase in prices as “c” (e.g., c = 0.03 in respect of a 3.0% assumption), the CPI for a given calendar year is accordingly obtained by multiplying the previous year’s CPI by “1+c”.

ii) Benefit Index (BI)

The BI is used for the price-escalation of maximum benefit rates. The BI for a given calendar year is calculated by multiplying the BI for the previous year by the following indexation factor:

$$\left(\frac{CPI_{N-1}}{CPI_{N-2}}\right)^{1/3}+\left(\frac{CPI_{N}}{CPI_{N-1}}\right)^{2/3}$$

If the benefit index resulting from the above formula for a given year "N" is lower than the previous year's index, the index for year "N" is set at the value of the index for year "N-1". This is to reflect the provision that maximum benefit rates are never allowed to decrease from one quarter to the next.

iii) Average Industrial Aggregate Wage (AIAW)

The most current (1997) value for the AIAW is projected into the future using the assumed annual rate of increase in earnings in a manner exactly parallel to that used for the CPI projections. Values of the AIAW are used in projecting future values of the YMPE.

iv) Year's Maximum Pensionable Earnings (YMPE)
Year's Basic Exemption (YBE)

The YMPE is projected for each calendar year of the valuation period by increasing its most recent unrounded value in accordance with the applicable increase in the AIAW computed as above. The AIAW increase applicable to the YMPE of a given year, to produce the YMPE for the following year, is the one experienced on average during the 12-month period ending with 30 June of the given year. Therefore, the increase factor corresponds on average to the ratio of the AIAW as at 1 January of the given year to that as at 1 January of the preceding year. Since AIAWs computed as described in paragraph iii) above correspond to 1 July as opposed to 1 January, the YMPE for a given calendar year is accordingly obtained by multiplying the previous year's unrounded YMPE by the square root of the ratio of the AIAW for the previous year to the AIAW for the third year preceding the given year, and by rounding the result to the next lower multiple of $100. The calculation of the unrounded YMPE for a given calendar year N can therefore be expressed as:

$$YMPE_N = YMPE_{N-1} \times \sqrt{\frac{AIAW_{N-1}}{AIAW_{N-3}}} = YMPE_{N-1} \times \sqrt{(1+s_{N-2})(1+s_{N-1})}$$

where s_N corresponds to the assumed annual increase in average employment earnings from year N-1 to year N.

The unrounded value of the YMPE is $36,902.19 for 1998. The first year for which the YMPE was projected is 1999.

For any year after 1997, according to Bill C-2 (effective 1 January 1998) the YBE is defined as $3,500. For years prior to 1998, the YBE was obtained by taking 10% of the rounded value of the YMPE for that year and by rounding the result to the next lower multiple of $100.

(c) Proportions of earners and average employment earnings

As mentioned in section 1(f) above, earnings statistics are combined into quinquennial age groups. Since the valuation process works on an individual age basis, actual past (1966 to 1996) proportions of earners, average employment earnings and distributions of earners and earnings are desegregated to an individual age basis using appropriate interpolation formulae.

They are also adjusted so that the age corresponds to 1 July instead of 31 December of the relevant calendar year. This is required because the valuation methodology is designed on an average mid-year basis. For this purpose, specific 4-pivotal point actuarial interpolation formulae were developed.

A sample of past actual and future assumed proportions of earners and average employment earnings, and of the assumed (constant over the years) distributions of earners and of their average employment earnings over 78 earnings categories is shown in the tables below.

Table VII.B.14 Historical and Assumed Proportions of Earners for Canada Less Québec

	Males					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
20	0.7636	0.7994	0.8824	0.8824	0.8824	0.8824
25	0.8502	0.8765	0.9236	0.9236	0.9236	0.9236
30	0.8672	0.8929	0.9374	0.9374	0.9374	0.9374
35	0.8671	0.8834	0.9424	0.9424	0.9424	0.9424
40	0.8664	0.8935	0.9274	0.9274	0.9274	0.9274
45	0.8732	0.8764	0.9097	0.9097	0.9097	0.9097
50	0.8545	0.8478	0.8847	0.8847	0.8847	0.8847
55	0.7901	0.7942	0.8301	0.8301	0.8301	0.8301
60	0.5802	0.5374	0.4500	0.4500	0.4500	0.4500
65	0.2369	0.2070	0.1500	0.1500	0.1500	0.1500
18-69 (1)	0.7795	0.7906	0.7687	0.7784	0.7793	0.7778
18-69 (2)	0.7797	0.7908	0.8303	0.8303	0.8303	0.8303
	Females					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
20	0.7231	0.7629	0.8512	0.8512	0.8512	0.8512
25	0.7703	0.7911	0.8355	0.8355	0.8355	0.8355
30	0.7610	0.7764	0.7974	0.7974	0.7974	0.7974
35	0.7565	0.7723	0.8274	0.8274	0.8274	0.8274
40	0.7793	0.7995	0.8274	0.8274	0.8274	0.8274
45	0.7957	0.7890	0.8010	0.8010	0.8010	0.8010
50	0.7394	0.7396	0.7760	0.7760	0.7760	0.7760
55	0.6195	0.6497	0.7398	0.7398	0.7398	0.7398
60	0.3986	0.3983	0.4000	0.4000	0.4000	0.4000
65	0.1446	0.1365	0.1250	0.1250	0.1250	0.1250
18-69 (1)	0.6758	0.6910	0.6787	0.6861	0.6872	0.6860
18-69 (2)	0.6764	0.6906	0.7333	0.7333	0.7333	0.7333

1 overall average using population of the year shown.
2 overall average using population of 1996.

Table VII.B.15 Historical and Assumed Average Employment Earnings for Canada Less Québec

	Males						
Age	**1985**	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
20	8,268	9,240	10,061	25,910	67,747	177,558	467,294
25	17,322	20,476	22,214	57,307	150,190	394,345	1,039,307
30	23,257	29,279	31,723	81,027	211,228	552,247	1,450,810
35	27,507	34,992	37,811	96,171	249,065	648,118	1,696,478
40	30,139	38,539	41,369	105,113	271,952	707,141	1,849,857
45	30,174	41,085	43,940	111,250	288,302	749,920	1,962,386
50	29,412	42,202	45,456	115,411	298,041	773,667	2,021,559
55	27,634	37,697	40,887	104,527	269,135	697,705	1,820,766
60	24,521	33,273	36,324	93,435	240,712	623,313	1,625,577
65	13,025	20,540	22,268	57,520	148,168	383,404	999,413
	Females						
Age	**1985**	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
20	6,652	7,146	7,712	21,204	58,176	158,046	427,352
25	12,408	16,215	17,478	47,804	130,817	354,780	958,201
30	14,345	20,808	22,885	63,468	175,624	479,844	1,302,860
35	15,282	22,639	25,055	70,935	198,229	545,222	1,486,983
40	15,648	24,758	27,190	77,090	215,558	593,082	1,617,774
45	15,386	26,276	29,086	81,997	229,336	630,618	1,719,559
50	14,921	25,886	28,965	82,843	232,623	641,580	1,753,104
55	14,084	22,542	25,307	73,547	207,090	572,596	1,566,816
60	13,453	19,763	22,023	64,822	183,375	507,828	1,391,312
65	7,968	11,776	13,110	39,119	111,300	309,199	848,960

Table VII.B.16 Assumed Distributions of Earners by Earnings Category for Canada Less Québec

Earnings Category (*)	Males Age										
	18	20	25	30	35	40	45	50	55	60	65
5	0.0398	0.0382	0.0376	0.0343	0.0325	0.0316	0.0313	0.0324	0.0400	0.0691	0.1246
10	0.0810	0.0729	0.0674	0.0607	0.0577	0.0567	0.0561	0.0574	0.0687	0.1055	0.1780
20	0.1572	0.1392	0.1257	0.1133	0.1098	0.1100	0.1108	0.1146	0.1329	0.1722	0.2523
30	0.2291	0.2069	0.1866	0.1688	0.1621	0.1607	0.1621	0.1676	0.1928	0.2355	0.3161
40	0.2988	0.2768	0.2462	0.2199	0.2108	0.2092	0.2093	0.2157	0.2470	0.2907	0.3704
50	0.3667	0.3477	0.3028	0.2682	0.2584	0.2550	0.2550	0.2624	0.2978	0.3419	0.4188
60	0.4292	0.4158	0.3569	0.3161	0.3065	0.3021	0.3021	0.3104	0.3474	0.3907	0.4636
70	0.4866	0.4768	0.4088	0.3651	0.3569	0.3535	0.3537	0.3628	0.3975	0.4380	0.5067
80	0.5386	0.5308	0.4593	0.4162	0.4109	0.4114	0.4143	0.4236	0.4510	0.4851	0.5477
90	0.5855	0.5790	0.5083	0.4687	0.4706	0.4741	0.4797	0.4899	0.5104	0.5343	0.5845
100	0.6291	0.6218	0.5547	0.5245	0.5333	0.5427	0.5463	0.5530	0.5708	0.5871	0.6224
200	0.8776	0.8706	0.9061	0.9376	0.9464	0.9523	0.9586	0.9553	0.9341	0.9120	0.8822
500	0.9930	0.9968	0.9995	0.9998	0.9997	0.9997	0.9997	0.9997	0.9992	0.9983	0.9933
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Earnings Category (*)	Females Age										
	18	20	25	30	35	40	45	50	55	60	65
5	0.0314	0.0330	0.0420	0.0487	0.0480	0.0429	0.0390	0.0408	0.0488	0.0730	0.1253
10	0.0656	0.0646	0.0745	0.0834	0.0816	0.0731	0.0665	0.0686	0.0793	0.1102	0.1798
20	0.1326	0.1272	0.1351	0.1456	0.1428	0.1300	0.1198	0.1229	0.1375	0.1733	0.2559
30	0.1995	0.1944	0.1942	0.2034	0.2023	0.1880	0.1775	0.1830	0.2009	0.2320	0.3101
40	0.2647	0.2638	0.2534	0.2604	0.2593	0.2435	0.2326	0.2398	0.2625	0.2943	0.3674
50	0.3304	0.3334	0.3102	0.3126	0.3127	0.2980	0.2882	0.2966	0.3200	0.3477	0.4137
60	0.3932	0.4002	0.3645	0.3629	0.3655	0.3512	0.3423	0.3510	0.3750	0.3993	0.4577
70	0.4523	0.4639	0.4171	0.4115	0.4157	0.4021	0.3940	0.4028	0.4263	0.4484	0.5013
80	0.5080	0.5214	0.4669	0.4579	0.4627	0.4518	0.4456	0.4528	0.4747	0.4941	0.5403
90	0.5599	0.5727	0.5136	0.5027	0.5088	0.5015	0.4993	0.5042	0.5202	0.5375	0.5794
100	0.6078	0.6188	0.5575	0.5467	0.5548	0.5539	0.5554	0.5581	0.5653	0.5777	0.6159
200	0.8869	0.8704	0.8962	0.9027	0.9024	0.9060	0.9055	0.8986	0.8940	0.8913	0.8724
500	0.9961	0.9978	0.9995	0.9994	0.9992	0.9994	0.9995	0.9994	0.9988	0.9973	0.9909
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Percentage of earners earning less than the earnings category percentage of the average earnings of the age-sex cell.

Table VII.B.17 Assumed Distributions of Employment Earnings for Canada Less Québec

Earnings Category (*)	Males Age										
	18	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**
5	0.0011	0.0010	0.0009	0.0008	0.0007	0.0007	0.0007	0.0007	0.0009	0.0014	0.0026
10	0.0042	0.0035	0.0031	0.0028	0.0027	0.0027	0.0027	0.0027	0.0032	0.0044	0.0068
20	0.0158	0.0135	0.0120	0.0108	0.0109	0.0111	0.0114	0.0119	0.0136	0.0152	0.0182
30	0.0339	0.0306	0.0274	0.0248	0.0243	0.0243	0.0249	0.0260	0.0294	0.0320	0.0352
40	0.0583	0.0558	0.0483	0.0429	0.0418	0.0419	0.0422	0.0438	0.0495	0.0528	0.0554
50	0.0886	0.0893	0.0736	0.0651	0.0639	0.0634	0.0639	0.0660	0.0737	0.0775	0.0788
60	0.1224	0.1289	0.1029	0.0921	0.0911	0.0904	0.0913	0.0940	0.1026	0.1062	0.1055
70	0.1593	0.1703	0.1364	0.1245	0.1249	0.1253	0.1266	0.1300	0.1373	0.1390	0.1364
80	0.1981	0.2117	0.1741	0.1635	0.1667	0.1706	0.1745	0.1782	0.1800	0.1767	0.1706
90	0.2381	0.2529	0.2157	0.2087	0.2191	0.2261	0.2332	0.2378	0.2337	0.2213	0.2044
100	0.2798	0.2931	0.2596	0.2623	0.2805	0.2940	0.2997	0.3011	0.2945	0.2749	0.2433
200	0.6363	0.6160	0.7682	0.8472	0.8691	0.8824	0.8982	0.8892	0.8339	0.7585	0.6443
500	0.9543	0.9850	0.9982	0.9989	0.9987	0.9987	0.9989	0.9983	0.9965	0.9872	0.9622
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Earnings Category (*)	Females Age										
	18	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**
5	0.0008	0.0008	0.0010	0.0011	0.0011	0.0009	0.0008	0.0009	0.0010	0.0014	0.0023
10	0.0034	0.0031	0.0034	0.0037	0.0036	0.0032	0.0029	0.0029	0.0033	0.0042	0.0064
20	0.0136	0.0126	0.0125	0.0130	0.0128	0.0118	0.0110	0.0111	0.0121	0.0138	0.0177
30	0.0303	0.0299	0.0272	0.0275	0.0279	0.0265	0.0256	0.0263	0.0282	0.0289	0.0305
40	0.0529	0.0553	0.0477	0.0476	0.0480	0.0462	0.0450	0.0463	0.0498	0.0510	0.0508
50	0.0821	0.0883	0.0729	0.0714	0.0722	0.0711	0.0703	0.0720	0.0759	0.0754	0.0713
60	0.1163	0.1270	0.1024	0.0994	0.1016	0.1006	0.1004	0.1021	0.1064	0.1043	0.0951
70	0.1541	0.1706	0.1361	0.1314	0.1345	0.1341	0.1343	0.1359	0.1400	0.1367	0.1239
80	0.1957	0.2152	0.1731	0.1664	0.1701	0.1718	0.1734	0.1736	0.1766	0.1716	0.1535
90	0.2398	0.2596	0.2127	0.2047	0.2096	0.2146	0.2195	0.2176	0.2155	0.2089	0.1883
100	0.2855	0.3034	0.2545	0.2468	0.2538	0.2650	0.2733	0.2690	0.2589	0.2475	0.2250
200	0.6886	0.6211	0.7510	0.7570	0.7519	0.7625	0.7660	0.7444	0.7224	0.7040	0.6215
500	0.9769	0.9898	0.9978	0.9983	0.9972	0.9972	0.9978	0.9971	0.9958	0.9909	0.9549
1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

* Percentage of average employment earnings earned by earners earning less than the earnings category percentage of the average earnings of the age-sex cell.

(d) Proportions of contributors

In respect of a given calendar year, one of the conditions to be a CPP contributor is to have employment earnings over the YBE. Proportions of contributors are accordingly determined by multiplying proportions of earners by the complement of the fraction of earners earning less than the YBE. This fraction was determined for each age, sex and calendar year by expressing the YBE as a percentage of average employment earnings and using the distribution of earners described in paragraph (c) above. The resulting proportions of contributors are those used for the calculation of average contributory earnings. Sample values of these proportions of contributors are shown below.

Table VII.B.18 Assumed Proportions of Earners for Contributory Earnings Purposes for Canada Less Québec

	Males					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
18	0.342	0.372	0.626	0.717	0.754	0.768
20	0.569	0.607	0.798	0.848	0.869	0.877
25	0.760	0.788	0.883	0.907	0.917	0.921
30	0.807	0.834	0.910	0.927	0.933	0.936
35	0.818	0.836	0.920	0.934	0.939	0.941
40	0.822	0.850	0.908	0.920	0.925	0.926
45	0.832	0.836	0.892	0.903	0.907	0.909
50	0.814	0.809	0.867	0.878	0.882	0.884
55	0.740	0.746	0.808	0.821	0.827	0.829
60	0.518	0.482	0.427	0.441	0.447	0.449
65	0.183	0.161	0.130	0.141	0.147	0.149
	Females					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
18	0.303	0.331	0.615	0.712	0.747	0.759
20	0.494	0.533	0.762	0.818	0.839	0.847
25	0.662	0.684	0.788	0.817	0.829	0.833
30	0.667	0.686	0.756	0.782	0.792	0.795
35	0.671	0.690	0.788	0.813	0.822	0.826
40	0.706	0.728	0.795	0.816	0.823	0.826
45	0.730	0.728	0.774	0.791	0.798	0.800
50	0.676	0.680	0.749	0.766	0.773	0.775
55	0.552	0.584	0.705	0.728	0.735	0.738
60	0.336	0.339	0.370	0.389	0.396	0.399
65	0.101	0.096	0.104	0.115	0.121	0.124

(e) Average pensionable earnings

Average pensionable earnings by age, sex and calendar year, unadjusted for the earnings index (i.e., the wage escalation factor), correspond to the average portion of individual employment earnings below the YMPE for a cohort's earners earning more than the YBE. Average pensionable earnings are accordingly computed by removing from average employment earnings the earnings of earners earning less than the YBE and the portion of earnings in excess of the YMPE. Since earnings statistics are aggregate (by age, sex and calendar year) as opposed to individual, such removal is made using the distributions of earners and earnings. The formula below used for the computation of average pensionable earnings (used for the later calculation of contributory earnings) applies for each age, sex and calendar year:

$$PENEAR = \frac{EMPEAR \times (EU - EL) + YMPE \times (1 - CU)}{1 - CL}$$

where:

PENEAR = Average Pensionable Earnings
EMPEAR = Average Employment Earnings
CL = Proportion of earners earning less than the YBE (computed using the distribution of earners)
CU = Proportion of earners earning less than the YMPE (computed using the distribution of earners)
EL = Proportion of employment earnings in the age-sex cell attributable to earners earning less than the YBE (computed using the distribution of earnings)
EU = Proportion of employment earnings in the age-sex cell attributable to earners earning less than the YMPE (computed using the distribution of earnings)

Sample values of unadjusted average pensionable earnings, which are the earnings used for calculating contributory earnings, are shown below. For comparison purposes, the YMPE is also shown, for the selected years, at the end of the table.

Table VII.B.19 Assumed Average Pensionable Earnings for Contributory Earnings Purposes for Canada Less Québec

	Males					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
18	7,990	8,545	16,866	39,447	98,798	255,881
20	11,678	12,556	28,184	69,828	178,807	466,625
25	20,810	22,536	55,028	141,170	368,362	969,980
30	25,675	27,892	69,079	178,932	469,228	1,238,338
35	27,563	29,972	74,611	193,967	509,589	1,345,389
40	28,435	30,898	77,112	201,054	528,914	1,397,960
45	28,929	31,436	78,534	205,218	540,643	1,430,005
50	28,967	31,518	78,803	205,883	542,047	1,434,029
55	27,563	30,006	74,591	193,447	507,414	1,339,311
60	26,254	28,595	69,912	178,212	463,906	1,219,464
65	21,838	23,610	55,393	137,299	334,492	866,306
	Females					
Age	**1995**	**2000**	**2025**	**2050**	**2075**	**2100**
18	6,709	7,108	14,253	34,524	89,339	237,193
20	9,629	10,250	23,493	60,487	160,290	429,340
25	18,102	19,459	48,794	128,271	341,685	915,218
30	21,340	23,292	59,032	155,739	416,079	1,115,945
35	22,191	24,297	62,372	165,342	442,994	1,189,281
40	23,185	25,305	65,391	174,122	467,074	1,253,923
45	23,812	26,106	67,504	180,227	483,531	1,298,142
50	23,449	25,848	67,259	179,667	482,342	1,295,604
55	21,738	24,007	62,846	167,194	448,963	1,206,836
60	20,603	22,647	58,908	154,430	412,492	1,107,633
65	15,687	17,202	43,480	110,697	289,465	775,190
YMPE:	34,900	38,200	98,300	262,100	698,800	1,863,000

(f) Average and total contributory earnings

Average contributory earnings were computed in respect of any given age-sex-year cell of contributors by subtracting the YBE from the average pensionable earnings computed for contributory earnings purposes.

In respect of a given age-sex cell, total contributory earnings for a given year were calculated as the product of:

- the proportion of contributors computed for contributory earnings purposes,
- the average contributory earnings computed as above, and
- the population number for Canada.

Total contributory earnings for the given year were obtained by summing contributory earnings computed for each age-sex cell. Total annual contributions for each past year (1966 to 1996), obtained as the product of the total contributory earnings computed as above and the actual contribution rate, are very close to those taken from earnings statistics, which validates average contributory earnings used for benefit computation purposes. Indeed, the deviation is -0.3% on average for 1987 to 1996, and 1% for 1972 to 1996. However, computed contributions are 2.52% (1987 to 1996) and 4.28% (1972 to 1996) lower than corresponding actual contributions as taken from monthly information reports. Total future contributory earnings computed as above were accordingly increased by 3.0%, which accounts for the non-refundable portion of employers' contributions corresponding to contributions in excess of the maximum contribution (arising generally in respect of employees with multiple employers during a year) or to contributions made in respect of employees earning less than the YBE during a given year.

Total contributory earnings obtained in this manner for Canada as a whole were then compared to actual CPP and QPP contributory earnings for the period 1966 to 1997. Such validation reveals that, on average, this approach produces contributory earnings that are about 5% higher than actual CPP and QPP combined contributory earnings. For this reason, projected contributory earnings for Canada have been multiplied by an experience adjustment factor. This factor is graded from the 1997 actual-to-expected ratio to the ultimate level over 5 years. The ultimate experience adjustment factor of 0.946, corresponds approximately to the historical actual-to-expected ratio over the most recent 5 years.

(g) Total employment earnings

Total employment earnings for a given year were obtained by summing employment earnings computed for each age-sex cell and adjusting the result to reflect historical experience. Aggregate employment earnings for a given calendar year were first estimated by calculating the sum, over each age and sex, of the products of the Canada population by the appropriate Canada less Québec

proportion of earners and by the appropriate Canada less Québec average employment earnings. Aggregate employment earnings estimated in this manner were compared with historical actual statistics, from Statistics Canada, of total employment earnings for Canada. These estimates are 5% higher, on average for 1993 to 1997, than actual corresponding experience data. For this reason projected employment earnings for Canada have been multiplied by an experience adjustment factor. This adjustment factor is graded from the 1997 actual-to-expected ratio to the ultimate level over 5 years. The ultimate experience adjustment factor of 0.951 corresponds approximately to the historical actual-to-expected ratio over the most recent 5 years.

(h) Gross domestic product

Gross domestic product (GDP) is perhaps the most suitable basis for comparison of OAS costs, since benefits are financed through general revenues and not on the basis of employment earnings. Historical GDP were compared to historical total employment earnings for Canada for the period 1966 to 1997. Such comparison reveals that on average GDP has been over that period about 2.04 times total projected employment earnings. For this reason GDP were projected as total employment earnings multiplied by an experience adjustment factor. This adjustment factor is graded from its 1997 level to the ultimate level over 5 years. The ultimate adjustment factor of 2.17 corresponds approximately to the historical ratio over the most recent 5 years.

(i) Annual expenditures

i) Benefits

Basic OAS pensions became payable for the first time in 1952, GIS benefits in 1967 and SPA benefits in 1975.

The expenditure for each year for a given type of benefit was computed as the sum, over all relevant population cells, of the product of:

- the population as at July 1 (by age and sex);
- the proportion of the population eligible for a benefit (varies by type of benefit, level of benefit, age, sex and calendar year);
- the average benefit of those in the level-of-benefit cell as a percentage of the maximum benefit (varies by type of benefit, age, sex and calendar year); and
- 12 times the maximum benefit as at July 1.

The benefit paid in the beneficiary's year of death is assumed to be 50% of the annualized amount. This is implicitly accounted for in the approach described above, since the population is computed as at mid-year.

An adjustment is made to account for the SPA benefits paid in a year to those who attain age 65 prior to July 1. The amount of such benefit payments is estimated as one-eighth of the product described above, but calculated using the population that is age 65 as at July 1 and the eligibility rates and average benefits relating to those age 64.

As part of the methodology validation process, the number of beneficiaries and amounts of total annual benefits computed as above were compared to historical actual results for 1983 through 1997. Based on these comparisons, as described below, adjustments were made to the projected results.

The comparisons revealed that the actual numbers of beneficiaries tend to be slightly higher than the calculated numbers. Therefore, the numbers of beneficiaries projected as described above were multiplied by experience adjustment factors. These factors were graded from the 1997 actual-to-expected ratios to ultimate levels over five years. The ultimate experience adjustment factors of 1.0019, 1.0052 and 1.0172 for OAS, GIS and SPA, respectively, correspond approximately to the historical actual-to-expected ratios over the most recent four years.

Furthermore, even after adjusting the numbers of beneficiaries calculated for past years by the ultimate experience adjustment factors, the calculated total annual benefits were slightly lower than the actual expenditures. Therefore, the projected amounts of benefits were multiplied by experience adjustment factors. These factors were graded from the 1997 actual-to-expected ratios to ultimate levels over five years. The ultimate benefit experience adjustment factors of 1.0047, 1.0145 and 0.9966 for OAS, GIS and SPA, respectively, correspond approximately to the historical actual-to-expected ratios over the most recent four years.

ii) Administrative expenses

Historically, OAS annual administrative expenses have averaged about 0.45% of total annual benefit payments. This has been assumed to continue throughout the projection period.

Appendix C - Detailed Financial Tables
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Table VII.C.1 Projected Financial Results - Annually - 1998 to 2100
(millions of dollars)

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,472	921,546	1.95	0.54	0.04	0.01	2.55
2000	18,618	5,103	398	109	24,228	956,748	1.95	0.53	0.04	0.01	2.53
2001	19,320	5,255	404	112	25,091	997,653	1.94	0.53	0.04	0.01	2.52
2002	20,091	5,417	416	117	26,041	1,044,721	1.92	0.52	0.04	0.01	2.49
2003	20,966	5,599	433	121	27,119	1,102,843	1.90	0.51	0.04	0.01	2.46
2004	21,927	5,806	453	127	28,312	1,163,566	1.88	0.50	0.04	0.01	2.43
2005	22,941	6,026	474	132	29,574	1,226,310	1.87	0.49	0.04	0.01	2.41
2006	24,057	6,261	497	139	30,954	1,291,254	1.86	0.48	0.04	0.01	2.40
2007	25,251	6,506	530	145	32,432	1,358,613	1.86	0.48	0.04	0.01	2.39
2008	26,577	6,769	561	153	34,059	1,429,449	1.86	0.47	0.04	0.01	2.38
2009	27,987	7,044	592	160	35,783	1,502,994	1.86	0.47	0.04	0.01	2.38
2010	29,484	7,337	627	169	37,617	1,579,312	1.87	0.46	0.04	0.01	2.38
2011	31,160	7,657	658	178	39,653	1,649,299	1.89	0.46	0.04	0.01	2.40
2012	33,213	8,031	669	189	42,102	1,721,095	1.93	0.47	0.04	0.01	2.45
2013	35,327	8,416	683	200	44,626	1,794,876	1.97	0.47	0.04	0.01	2.49
2014	37,516	8,809	701	212	47,237	1,869,857	2.01	0.47	0.04	0.01	2.53
2015	39,810	9,217	723	224	49,974	1,947,362	2.04	0.47	0.04	0.01	2.57
2016	42,219	9,644	745	237	52,844	2,027,351	2.08	0.48	0.04	0.01	2.61
2017	44,742	10,082	771	250	55,845	2,109,454	2.12	0.48	0.04	0.01	2.65
2018	47,505	10,543	796	265	59,109	2,193,824	2.17	0.48	0.04	0.01	2.69
2019	50,487	11,032	818	281	62,618	2,280,776	2.21	0.48	0.04	0.01	2.75
2020	53,678	11,553	837	297	66,366	2,370,244	2.26	0.49	0.04	0.01	2.80
2021	56,997	12,099	860	315	70,270	2,462,605	2.31	0.49	0.03	0.01	2.85
2022	60,566	12,686	877	334	74,462	2,558,365	2.37	0.50	0.03	0.01	2.91
2023	64,334	13,303	892	353	78,882	2,657,464	2.42	0.50	0.03	0.01	2.97
2024	68,256	13,939	905	374	83,474	2,760,654	2.47	0.50	0.03	0.01	3.02
2025	72,399	14,605	912	396	88,311	2,868,640	2.52	0.51	0.03	0.01	3.08
2026	76,740	15,306	908	418	93,371	2,982,692	2.57	0.51	0.03	0.01	3.13
2027	81,170	16,038	898	441	98,547	3,103,076	2.62	0.52	0.03	0.01	3.18
2028	85,785	16,794	879	466	103,924	3,229,578	2.66	0.52	0.03	0.01	3.22
2029	90,457	17,561	859	490	109,368	3,362,275	2.69	0.52	0.03	0.01	3.25
2030	95,107	18,326	842	514	114,790	3,501,280	2.72	0.52	0.02	0.01	3.28
2031	99,525	19,071	837	537	119,970	3,647,407	2.73	0.52	0.02	0.01	3.29
2032	103,792	19,814	839	560	125,005	3,801,625	2.73	0.52	0.02	0.01	3.29
2033	108,053	20,553	842	583	130,031	3,963,791	2.73	0.52	0.02	0.01	3.28
2034	112,398	21,298	844	605	135,145	4,133,901	2.72	0.52	0.02	0.01	3.27
2035	116,889	22,060	844	629	140,422	4,311,346	2.71	0.51	0.02	0.01	3.26
2036	121,442	22,833	843	653	145,770	4,497,038	2.70	0.51	0.02	0.01	3.24
2037	125,875	23,615	848	677	151,014	4,691,370	2.68	0.50	0.02	0.01	3.22
2038	130,286	24,390	856	700	156,232	4,894,258	2.66	0.50	0.02	0.01	3.19
2039	134,735	25,161	867	723	161,487	5,105,373	2.64	0.49	0.02	0.01	3.16
2040	139,420	25,952	875	748	166,995	5,324,826	2.62	0.49	0.02	0.01	3.14
2041	144,182	26,738	883	773	172,577	5,553,458	2.60	0.48	0.02	0.01	3.11
2042	148,972	27,517	895	798	178,182	5,791,865	2.57	0.48	0.02	0.01	3.08
2043	153,815	28,301	910	824	183,850	6,039,919	2.55	0.47	0.02	0.01	3.04
2044	158,833	29,096	925	850	189,704	6,297,465	2.52	0.46	0.01	0.01	3.01
2045	164,088	29,909	939	877	195,813	6,564,796	2.50	0.46	0.01	0.01	2.98
2046	169,529	30,714	951	905	202,099	6,842,929	2.48	0.45	0.01	0.01	2.95
2047	175,086	31,507	963	934	208,489	7,133,203	2.45	0.44	0.01	0.01	2.92
2048	180,806	32,307	974	963	215,050	7,435,259	2.43	0.43	0.01	0.01	2.89
2049	186,757	33,114	986	994	221,851	7,748,442	2.41	0.43	0.01	0.01	2.86
2050	192,987	33,945	1,000	1,026	228,957	8,072,770	2.39	0.42	0.01	0.01	2.84

Table VII.C.1 Projected Financial Results - Annually - 1998 to 2100 (continued) (millions of dollars)

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
2051	199,442	34,770	1,014	1,059	236,284	8,410,450	2.37	0.41	0.01	0.01	2.81
2052	205,935	35,560	1,034	1,091	243,620	8,762,067	2.35	0.41	0.01	0.01	2.78
2053	212,651	36,354	1,054	1,125	251,184	9,129,300	2.33	0.40	0.01	0.01	2.75
2054	219,839	37,178	1,068	1,161	259,247	9,512,739	2.31	0.39	0.01	0.01	2.73
2055	227,629	38,058	1,072	1,200	267,960	9,913,401	2.30	0.38	0.01	0.01	2.70
2056	235,726	38,944	1,072	1,241	276,982	10,333,290	2.28	0.38	0.01	0.01	2.68
2057	244,118	39,822	1,071	1,283	286,293	10,771,150	2.27	0.37	0.01	0.01	2.66
2058	252,595	40,701	1,073	1,325	295,694	11,228,870	2.25	0.36	0.01	0.01	2.63
2059	261,249	41,604	1,078	1,368	305,299	11,707,590	2.23	0.36	0.01	0.01	2.61
2060	270,123	42,556	1,085	1,412	315,176	12,208,400	2.21	0.35	0.01	0.01	2.58
2061	279,067	43,525	1,096	1,457	325,145	12,732,190	2.19	0.34	0.01	0.01	2.55
2062	288,492	44,510	1,104	1,503	335,609	13,279,650	2.17	0.34	0.01	0.01	2.53
2063	298,233	45,520	1,113	1,552	346,417	13,851,820	2.15	0.33	0.01	0.01	2.50
2064	308,269	46,578	1,121	1,602	357,570	14,449,590	2.13	0.32	0.01	0.01	2.47
2065	318,613	47,706	1,132	1,654	369,104	15,073,700	2.11	0.32	0.01	0.01	2.45
2066	329,289	48,876	1,143	1,707	381,015	15,724,960	2.09	0.31	0.01	0.01	2.42
2067	340,326	50,067	1,155	1,762	393,310	16,404,320	2.07	0.31	0.01	0.01	2.40
2068	351,742	51,288	1,168	1,819	406,017	17,112,780	2.06	0.30	0.01	0.01	2.37
2069	363,549	52,567	1,183	1,878	419,176	17,851,330	2.04	0.29	0.01	0.01	2.35
2070	375,766	53,918	1,198	1,939	432,820	18,621,010	2.02	0.29	0.01	0.01	2.32
2071	388,417	55,310	1,215	2,002	446,944	19,422,940	2.00	0.28	0.01	0.01	2.30
2072	401,537	56,732	1,232	2,068	461,569	20,258,240	1.98	0.28	0.01	0.01	2.28
2073	415,155	58,184	1,250	2,136	476,724	21,128,140	1.96	0.28	0.01	0.01	2.26
2074	429,297	59,691	1,268	2,206	492,462	22,034,020	1.95	0.27	0.01	0.01	2.24
2075	443,987	61,265	1,287	2,279	508,818	22,977,370	1.93	0.27	0.01	0.01	2.21
2076	459,241	62,870	1,305	2,355	525,772	23,959,830	1.92	0.26	0.01	0.01	2.19
2077	475,089	64,510	1,325	2,434	543,357	24,983,120	1.90	0.26	0.01	0.01	2.17
2078	491,560	66,176	1,344	2,516	561,596	26,049,120	1.89	0.25	0.01	0.01	2.16
2079	508,679	67,896	1,362	2,601	580,539	27,159,860	1.87	0.25	0.01	0.01	2.14
2080	526,466	69,683	1,381	2,689	600,218	28,317,680	1.86	0.25	0.00	0.01	2.12
2081	544,932	71,498	1,398	2,780	620,608	29,524,950	1.85	0.24	0.00	0.01	2.10
2082	564,090	73,368	1,415	2,875	641,748	30,784,000	1.83	0.24	0.00	0.01	2.08
2083	583,956	75,262	1,432	2,973	663,623	32,097,290	1.82	0.23	0.00	0.01	2.07
2084	604,542	77,190	1,448	3,074	686,255	33,467,410	1.81	0.23	0.00	0.01	2.05
2085	625,851	79,156	1,464	3,179	709,650	34,897,380	1.79	0.23	0.00	0.01	2.03
2086	647,882	81,150	1,480	3,287	733,800	36,390,080	1.78	0.22	0.00	0.01	2.02
2087	670,661	83,213	1,497	3,399	758,770	37,948,440	1.77	0.22	0.00	0.01	2.00
2088	694,228	85,334	1,513	3,515	784,590	39,575,340	1.75	0.22	0.00	0.01	1.98
2089	718,603	87,511	1,529	3,634	811,277	41,273,940	1.74	0.21	0.00	0.01	1.97
2090	743,788	89,747	1,545	3,758	838,839	43,047,360	1.73	0.21	0.00	0.01	1.95
2091	769,796	92,047	1,562	3,885	867,290	44,898,800	1.71	0.21	0.00	0.01	1.93
2092	796,654	94,414	1,580	4,017	896,665	46,831,530	1.70	0.20	0.00	0.01	1.91
2093	824,401	96,855	1,598	4,153	927,006	48,848,940	1.69	0.20	0.00	0.01	1.90
2094	853,079	99,372	1,617	4,293	958,361	50,954,480	1.67	0.20	0.00	0.01	1.88
2095	882,720	101,969	1,637	4,438	990,764	53,151,700	1.66	0.19	0.00	0.01	1.86
2096	913,362	104,647	1,658	4,589	1,024,256	55,444,160	1.65	0.19	0.00	0.01	1.85
2097	945,046	107,409	1,679	4,744	1,058,878	57,835,660	1.63	0.19	0.00	0.01	1.83
2098	977,809	110,260	1,702	4,904	1,094,675	60,330,240	1.62	0.18	0.00	0.01	1.81
2099	1,011,705	113,200	1,725	5,070	1,131,700	62,931,980	1.61	0.18	0.00	0.01	1.80
2100	1,046,787	116,234	1,749	5,241	1,170,011	65,645,190	1.59	0.18	0.00	0.01	1.78

Table VII.C.2 Sensitivity Test - Fertility - Low Cost

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,475	4,852	393	102	22,823	887,292	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,472	921,549	1.95	0.54	0.04	0.01	2.55
2000	18,618	5,103	398	109	24,228	956,754	1.95	0.53	0.04	0.01	2.53
2001	19,320	5,255	404	112	25,091	997,665	1.94	0.53	0.04	0.01	2.51
2002	20,091	5,417	416	117	26,041	1,044,741	1.92	0.52	0.04	0.01	2.49
2003	20,966	5,599	433	121	27,119	1,102,875	1.90	0.51	0.04	0.01	2.46
2004	21,927	5,806	453	127	28,312	1,163,616	1.88	0.50	0.04	0.01	2.43
2005	22,941	6,026	474	132	29,574	1,226,380	1.87	0.49	0.04	0.01	2.41
2006	24,057	6,261	497	139	30,954	1,291,354	1.86	0.48	0.04	0.01	2.40
2007	25,251	6,506	530	145	32,432	1,358,751	1.86	0.48	0.04	0.01	2.39
2008	26,577	6,769	561	153	34,059	1,429,633	1.86	0.47	0.04	0.01	2.38
2009	27,987	7,044	592	160	35,784	1,503,236	1.86	0.47	0.04	0.01	2.38
2010	29,485	7,337	627	169	37,617	1,579,627	1.87	0.46	0.04	0.01	2.38
2011	31,161	7,658	658	178	39,653	1,649,699	1.89	0.46	0.04	0.01	2.40
2012	33,214	8,031	669	189	42,103	1,721,594	1.93	0.47	0.04	0.01	2.45
2013	35,329	8,416	683	200	44,627	1,795,498	1.97	0.47	0.04	0.01	2.49
2014	37,517	8,809	701	212	47,239	1,870,621	2.01	0.47	0.04	0.01	2.53
2015	39,811	9,218	723	224	49,976	1,948,475	2.04	0.47	0.04	0.01	2.56
2016	42,221	9,644	745	237	52,847	2,029,151	2.08	0.48	0.04	0.01	2.60
2017	44,745	10,082	771	250	55,849	2,112,230	2.12	0.48	0.04	0.01	2.64
2018	47,508	10,544	796	265	59,113	2,197,893	2.16	0.48	0.04	0.01	2.69
2019	50,492	11,033	818	281	62,623	2,286,484	2.21	0.48	0.04	0.01	2.74
2020	53,684	11,554	837	297	66,372	2,377,978	2.26	0.49	0.04	0.01	2.79
2021	57,003	12,100	860	315	70,278	2,472,789	2.31	0.49	0.03	0.01	2.84
2022	60,574	12,687	877	334	74,471	2,571,463	2.36	0.49	0.03	0.01	2.90
2023	64,343	13,304	892	353	78,893	2,673,987	2.41	0.50	0.03	0.01	2.95
2024	68,266	13,941	906	374	83,487	2,781,163	2.45	0.50	0.03	0.01	3.00
2025	72,411	14,606	912	396	88,326	2,893,756	2.50	0.50	0.03	0.01	3.05
2026	76,754	15,308	908	418	93,389	3,013,100	2.55	0.51	0.03	0.01	3.10
2027	81,187	16,040	898	442	98,567	3,139,526	2.59	0.51	0.03	0.01	3.14
2028	85,805	16,797	880	466	103,947	3,272,894	2.62	0.51	0.03	0.01	3.18
2029	90,481	17,565	860	490	109,395	3,413,359	2.65	0.51	0.03	0.01	3.20
2030	95,134	18,330	843	514	114,821	3,561,119	2.67	0.51	0.02	0.01	3.22
2035	116,943	22,068	845	629	140,486	4,433,206	2.64	0.50	0.02	0.01	3.17
2040	139,527	25,967	876	749	167,118	5,542,027	2.52	0.47	0.02	0.01	3.02
2045	164,288	29,935	942	878	196,043	6,921,228	2.37	0.43	0.01	0.01	2.83
2050	193,354	33,990	1,004	1,028	229,375	8,633,772	2.24	0.39	0.01	0.01	2.66
2055	228,273	38,135	1,079	1,204	268,690	10,774,130	2.12	0.35	0.01	0.01	2.49
2060	271,210	42,681	1,101	1,417	316,410	13,495,470	2.01	0.32	0.01	0.01	2.34
2065	321,060	47,958	1,173	1,666	371,857	16,942,360	1.90	0.28	0.01	0.01	2.19
2070	381,811	54,483	1,268	1,969	439,532	21,263,520	1.80	0.26	0.01	0.01	2.07
2075	456,674	62,382	1,390	2,342	522,788	26,637,440	1.71	0.23	0.01	0.01	1.96
2080	549,983	71,690	1,519	2,804	625,997	33,321,400	1.65	0.22	0.00	0.01	1.88
2085	664,931	82,489	1,625	3,371	752,416	41,701,680	1.59	0.20	0.00	0.01	1.80
2090	802,545	94,878	1,736	4,046	903,205	52,262,630	1.54	0.18	0.00	0.01	1.73
2095	966,597	109,494	1,870	4,851	1,082,812	65,559,040	1.47	0.17	0.00	0.01	1.65
2100	1,163,427	126,818	2,035	5,815	1,298,094	82,234,150	1.41	0.15	0.00	0.01	1.58

Table VII.C.3 Sensitivity Test - Fertility - High Cost

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,472	921,543	1.95	0.54	0.04	0.01	2.55
2000	18,618	5,103	398	109	24,228	956,742	1.95	0.53	0.04	0.01	2.53
2001	19,320	5,255	404	112	25,091	997,642	1.94	0.53	0.04	0.01	2.52
2002	20,091	5,417	416	117	26,041	1,044,702	1.92	0.52	0.04	0.01	2.49
2003	20,966	5,599	433	121	27,119	1,102,812	1.90	0.51	0.04	0.01	2.46
2004	21,927	5,806	453	127	28,312	1,163,520	1.88	0.50	0.04	0.01	2.43
2005	22,941	6,026	474	132	29,573	1,226,240	1.87	0.49	0.04	0.01	2.41
2006	24,057	6,261	497	139	30,954	1,291,156	1.86	0.48	0.04	0.01	2.40
2007	25,251	6,506	530	145	32,432	1,358,480	1.86	0.48	0.04	0.01	2.39
2008	26,576	6,769	561	153	34,059	1,429,269	1.86	0.47	0.04	0.01	2.38
2009	27,986	7,044	592	160	35,783	1,502,756	1.86	0.47	0.04	0.01	2.38
2010	29,484	7,337	627	169	37,616	1,579,003	1.87	0.46	0.04	0.01	2.38
2011	31,159	7,657	658	178	39,652	1,648,906	1.89	0.46	0.04	0.01	2.40
2012	33,212	8,031	669	189	42,101	1,720,598	1.93	0.47	0.04	0.01	2.45
2013	35,326	8,416	683	200	44,625	1,794,260	1.97	0.47	0.04	0.01	2.49
2014	37,514	8,809	701	212	47,236	1,869,095	2.01	0.47	0.04	0.01	2.53
2015	39,808	9,217	723	224	49,971	1,946,254	2.05	0.47	0.04	0.01	2.57
2016	42,217	9,643	745	237	52,842	2,025,558	2.08	0.48	0.04	0.01	2.61
2017	44,739	10,081	771	250	55,842	2,106,685	2.12	0.48	0.04	0.01	2.65
2018	47,501	10,543	796	265	59,105	2,189,762	2.17	0.48	0.04	0.01	2.70
2019	50,483	11,032	818	280	62,613	2,275,075	2.22	0.48	0.04	0.01	2.75
2020	53,673	11,552	837	297	66,360	2,362,519	2.27	0.49	0.04	0.01	2.81
2021	56,990	12,098	860	315	70,263	2,452,433	2.32	0.49	0.04	0.01	2.87
2022	60,558	12,685	877	334	74,453	2,545,278	2.38	0.50	0.03	0.01	2.93
2023	64,325	13,301	892	353	78,872	2,640,955	2.44	0.50	0.03	0.01	2.99
2024	68,245	13,938	905	374	83,462	2,740,163	2.49	0.51	0.03	0.01	3.05
2025	72,386	14,603	912	396	88,296	2,843,548	2.55	0.51	0.03	0.01	3.11
2026	76,725	15,304	907	418	93,354	2,952,316	2.60	0.52	0.03	0.01	3.16
2027	81,153	16,035	897	441	98,527	3,066,668	2.65	0.52	0.03	0.01	3.21
2028	85,765	16,791	879	465	103,900	3,186,313	2.69	0.53	0.03	0.01	3.26
2029	90,434	17,558	859	490	109,341	3,311,262	2.73	0.53	0.03	0.01	3.30
2030	95,081	18,322	841	514	114,758	3,441,531	2.76	0.53	0.02	0.01	3.33
2035	116,835	22,053	843	629	140,359	4,189,839	2.79	0.53	0.02	0.02	3.35
2040	139,315	25,938	873	748	166,873	5,108,948	2.73	0.51	0.02	0.01	3.27
2045	163,889	29,884	936	876	195,585	6,212,617	2.64	0.48	0.02	0.01	3.15
2050	192,625	33,900	995	1,024	228,545	7,523,325	2.56	0.45	0.01	0.01	3.04
2055	226,996	37,983	1,066	1,197	267,242	9,079,624	2.50	0.42	0.01	0.01	2.94
2060	269,057	42,433	1,069	1,407	313,966	10,976,680	2.45	0.39	0.01	0.01	2.86
2065	316,208	47,458	1,090	1,641	366,397	13,308,270	2.38	0.36	0.01	0.01	2.75
2070	369,801	53,360	1,129	1,909	426,199	16,157,900	2.29	0.33	0.01	0.01	2.64
2075	431,451	60,163	1,184	2,218	495,015	19,614,850	2.20	0.31	0.01	0.01	2.52
2080	503,230	67,700	1,244	2,575	574,749	23,792,050	2.12	0.28	0.01	0.01	2.42
2085	587,319	75,868	1,308	2,990	667,485	28,842,370	2.04	0.26	0.00	0.01	2.31
2090	686,174	84,704	1,363	3,475	775,717	34,978,410	1.96	0.24	0.00	0.01	2.22
2095	801,258	94,616	1,419	4,038	901,331	42,457,800	1.89	0.22	0.00	0.01	2.12
2100	935,003	105,980	1,487	4,691	1,047,160	51,567,060	1.81	0.21	0.00	0.01	2.03

Table VII.C.4 Sensitivity Test - Migration - Low Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,759	1.97	0.55	0.04	0.01	2.57
1999	18,005	4,968	395	105	23,473	922,746	1.95	0.54	0.04	0.01	2.54
2000	18,619	5,104	398	109	24,229	958,976	1.94	0.53	0.04	0.01	2.53
2001	19,322	5,255	405	112	25,095	1,001,253	1.93	0.52	0.04	0.01	2.51
2002	20,096	5,418	417	117	26,047	1,050,097	1.91	0.52	0.04	0.01	2.48
2003	20,973	5,600	434	122	27,129	1,110,458	1.89	0.50	0.04	0.01	2.44
2004	21,939	5,808	454	127	28,327	1,173,959	1.87	0.49	0.04	0.01	2.41
2005	22,958	6,029	476	133	29,596	1,240,090	1.85	0.49	0.04	0.01	2.39
2006	24,081	6,265	500	139	30,985	1,308,799	1.84	0.48	0.04	0.01	2.37
2007	25,285	6,512	533	145	32,474	1,380,329	1.83	0.47	0.04	0.01	2.35
2008	26,622	6,777	564	153	34,115	1,455,774	1.83	0.47	0.04	0.01	2.34
2009	28,045	7,054	596	161	35,855	1,534,405	1.83	0.46	0.04	0.01	2.34
2010	29,558	7,350	631	169	37,708	1,616,320	1.83	0.45	0.04	0.01	2.33
2011	31,252	7,673	662	178	39,766	1,692,228	1.85	0.45	0.04	0.01	2.35
2012	33,326	8,051	674	189	42,240	1,770,466	1.88	0.45	0.04	0.01	2.39
2013	35,465	8,439	688	201	44,793	1,851,247	1.92	0.46	0.04	0.01	2.42
2014	37,681	8,837	707	213	47,437	1,933,813	1.95	0.46	0.04	0.01	2.45
2015	40,005	9,250	730	225	50,211	2,019,522	1.98	0.46	0.04	0.01	2.49
2016	42,450	9,682	753	238	53,123	2,108,399	2.01	0.46	0.04	0.01	2.52
2017	45,013	10,127	780	252	56,172	2,200,111	2.05	0.46	0.04	0.01	2.55
2018	47,821	10,596	807	267	59,489	2,294,859	2.08	0.46	0.04	0.01	2.59
2019	50,855	11,093	830	282	63,059	2,393,009	2.13	0.46	0.03	0.01	2.64
2020	54,104	11,623	850	300	66,877	2,494,550	2.17	0.47	0.03	0.01	2.68
2021	57,488	12,179	874	317	70,859	2,599,919	2.21	0.47	0.03	0.01	2.73
2022	61,132	12,778	893	337	75,140	2,709,680	2.26	0.47	0.03	0.01	2.77
2023	64,985	13,408	910	357	79,660	2,823,840	2.30	0.47	0.03	0.01	2.82
2024	69,002	14,059	926	378	84,364	2,943,205	2.34	0.48	0.03	0.01	2.87
2025	73,253	14,741	935	400	89,329	3,068,533	2.39	0.48	0.03	0.01	2.91
2026	77,716	15,460	933	423	94,533	3,201,156	2.43	0.48	0.03	0.01	2.95
2027	82,284	16,213	925	447	99,869	3,341,393	2.46	0.49	0.03	0.01	2.99
2028	87,053	16,993	910	472	105,428	3,489,091	2.49	0.49	0.03	0.01	3.02
2029	91,900	17,786	893	498	111,076	3,644,398	2.52	0.49	0.02	0.01	3.05
2030	96,745	18,579	879	523	116,726	3,807,490	2.54	0.49	0.02	0.01	3.07
2035	119,908	22,511	901	645	143,965	4,762,912	2.52	0.47	0.02	0.01	3.02
2040	144,733	26,717	953	776	173,179	5,972,492	2.42	0.45	0.02	0.01	2.90
2045	172,844	31,135	1,037	923	205,938	7,476,687	2.31	0.42	0.01	0.01	2.75
2050	206,472	35,798	1,118	1,095	244,484	9,340,371	2.21	0.38	0.01	0.01	2.62
2055	247,371	40,734	1,214	1,302	290,621	11,658,030	2.12	0.35	0.01	0.01	2.49
2060	298,009	46,282	1,254	1,555	347,099	14,589,620	2.04	0.32	0.01	0.01	2.38
2065	356,966	52,732	1,331	1,850	412,879	18,298,940	1.95	0.29	0.01	0.01	2.26
2070	427,654	60,529	1,433	2,203	491,820	22,958,940	1.86	0.26	0.01	0.01	2.14
2075	513,413	69,802	1,561	2,631	587,407	28,778,450	1.78	0.24	0.01	0.01	2.04
2080	618,404	80,560	1,698	3,153	703,815	36,040,050	1.72	0.22	0.00	0.01	1.95
2085	746,479	92,886	1,829	3,785	844,979	45,138,580	1.65	0.21	0.00	0.01	1.87
2090	900,804	106,956	1,964	4,544	1,014,268	56,582,940	1.59	0.19	0.00	0.01	1.79
2095	1,085,778	123,419	2,117	5,451	1,216,765	70,984,990	1.53	0.17	0.00	0.01	1.71
2100	1,308,015	142,834	2,299	6,539	1,459,686	89,073,450	1.47	0.16	0.00	0.01	1.64

Table VII.C.5 Sensitivity Test - Migration - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,822	886,824	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,471	920,346	1.96	0.54	0.04	0.01	2.55
2000	18,617	5,103	398	109	24,226	954,523	1.95	0.53	0.04	0.01	2.54
2001	19,317	5,254	404	112	25,088	994,061	1.94	0.53	0.04	0.01	2.52
2002	20,087	5,417	416	117	26,035	1,039,364	1.93	0.52	0.04	0.01	2.50
2003	20,958	5,597	432	121	27,109	1,095,265	1.91	0.51	0.04	0.01	2.48
2004	21,915	5,804	451	127	28,297	1,153,241	1.90	0.50	0.04	0.01	2.45
2005	22,924	6,023	473	132	29,552	1,212,642	1.89	0.50	0.04	0.01	2.44
2006	24,032	6,256	495	139	30,923	1,273,887	1.89	0.49	0.04	0.01	2.43
2007	25,218	6,500	528	145	32,390	1,337,160	1.89	0.49	0.04	0.01	2.42
2008	26,532	6,761	558	152	34,003	1,403,493	1.89	0.48	0.04	0.01	2.42
2009	27,929	7,034	589	160	35,712	1,472,086	1.90	0.48	0.04	0.01	2.43
2010	29,411	7,324	623	168	37,526	1,542,970	1.91	0.47	0.04	0.01	2.43
2011	31,069	7,642	653	177	39,541	1,607,228	1.93	0.48	0.04	0.01	2.46
2012	33,101	8,012	664	188	41,965	1,672,807	1.98	0.48	0.04	0.01	2.51
2013	35,192	8,393	677	199	44,461	1,739,860	2.02	0.48	0.04	0.01	2.56
2014	37,354	8,781	694	211	47,041	1,807,566	2.07	0.49	0.04	0.01	2.60
2015	39,617	9,185	716	223	49,741	1,877,230	2.11	0.49	0.04	0.01	2.65
2016	41,993	9,606	737	236	52,571	1,948,752	2.15	0.49	0.04	0.01	2.70
2017	44,477	10,038	762	249	55,526	2,021,726	2.20	0.50	0.04	0.01	2.75
2018	47,196	10,492	786	263	58,737	2,096,267	2.25	0.50	0.04	0.01	2.80
2019	50,129	10,973	807	279	62,187	2,172,641	2.31	0.51	0.04	0.01	2.86
2020	53,263	11,485	825	295	65,868	2,250,739	2.37	0.51	0.04	0.01	2.93
2021	56,518	12,021	846	312	69,697	2,330,889	2.42	0.52	0.04	0.01	2.99
2022	60,015	12,596	861	331	73,803	2,413,538	2.49	0.52	0.04	0.01	3.06
2023	63,702	13,200	875	350	78,127	2,498,577	2.55	0.53	0.04	0.01	3.13
2024	67,531	13,823	886	370	82,610	2,586,712	2.61	0.53	0.03	0.01	3.19
2025	71,571	14,472	890	391	87,324	2,678,605	2.67	0.54	0.03	0.01	3.26
2026	75,794	15,156	883	413	92,247	2,775,483	2.73	0.55	0.03	0.01	3.32
2027	80,093	15,867	871	436	97,267	2,877,559	2.78	0.55	0.03	0.02	3.38
2028	84,559	16,602	850	459	102,469	2,984,577	2.83	0.56	0.03	0.02	3.43
2029	89,065	17,344	827	483	107,718	3,096,563	2.88	0.56	0.03	0.02	3.48
2030	93,528	18,081	806	506	112,921	3,213,575	2.91	0.56	0.03	0.02	3.51
2035	113,989	21,627	790	614	137,020	3,892,386	2.93	0.56	0.02	0.02	3.52
2040	134,344	25,219	800	722	161,085	4,731,940	2.84	0.53	0.02	0.02	3.40
2045	155,777	28,741	847	834	186,199	5,741,588	2.71	0.50	0.01	0.01	3.24
2050	180,298	32,193	891	960	214,342	6,944,581	2.60	0.46	0.01	0.01	3.09
2055	209,244	35,549	943	1,106	246,842	8,382,797	2.50	0.42	0.01	0.01	2.94
2060	244,451	39,093	934	1,280	285,759	10,149,420	2.41	0.39	0.01	0.01	2.82
2065	283,742	43,083	956	1,475	329,256	12,325,840	2.30	0.35	0.01	0.01	2.67
2070	329,198	47,907	994	1,701	379,800	14,980,360	2.20	0.32	0.01	0.01	2.54
2075	382,493	53,599	1,052	1,967	439,111	18,182,530	2.10	0.29	0.01	0.01	2.42
2080	446,125	60,041	1,113	2,283	509,561	22,032,130	2.02	0.27	0.01	0.01	2.31
2085	521,891	67,146	1,162	2,656	592,854	26,689,240	1.96	0.25	0.00	0.01	2.22
2090	610,381	74,895	1,204	3,089	689,569	32,365,430	1.89	0.23	0.00	0.01	2.13
2095	712,674	83,706	1,251	3,589	801,221	39,295,310	1.81	0.21	0.00	0.01	2.04
2100	831,208	93,898	1,314	4,169	930,589	47,724,590	1.74	0.20	0.00	0.01	1.95

Table VII.C.6 Sensitivity Test - Mortality - Low Cost

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,420	4,843	393	102	22,758	887,151	1.96	0.55	0.04	0.01	2.57
1999	17,916	4,949	395	105	23,364	921,247	1.94	0.54	0.04	0.01	2.54
2000	18,492	5,073	398	108	24,071	956,270	1.93	0.53	0.04	0.01	2.52
2001	19,152	5,212	404	111	24,880	996,974	1.92	0.52	0.04	0.01	2.50
2002	19,877	5,361	415	115	25,769	1,043,813	1.90	0.51	0.04	0.01	2.47
2003	20,700	5,528	432	120	26,779	1,101,695	1.88	0.50	0.04	0.01	2.43
2004	21,605	5,718	451	125	27,899	1,162,151	1.86	0.49	0.04	0.01	2.40
2005	22,556	5,920	473	130	29,080	1,224,598	1.84	0.48	0.04	0.01	2.37
2006	23,605	6,136	495	136	30,373	1,289,219	1.83	0.48	0.04	0.01	2.36
2007	24,727	6,360	528	142	31,757	1,356,230	1.82	0.47	0.04	0.01	2.34
2008	25,974	6,602	558	149	33,283	1,426,689	1.82	0.46	0.04	0.01	2.33
2009	27,300	6,854	589	156	34,900	1,499,829	1.82	0.46	0.04	0.01	2.33
2010	28,709	7,123	623	164	36,619	1,575,715	1.82	0.45	0.04	0.01	2.32
2011	30,289	7,417	654	173	38,533	1,645,252	1.84	0.45	0.04	0.01	2.34
2012	32,237	7,764	665	183	40,848	1,716,569	1.88	0.45	0.04	0.01	2.38
2013	34,239	8,120	678	194	43,230	1,789,843	1.91	0.45	0.04	0.01	2.42
2014	36,308	8,483	696	205	45,691	1,864,285	1.95	0.46	0.04	0.01	2.45
2015	38,475	8,860	717	216	48,268	1,941,207	1.98	0.46	0.04	0.01	2.49
2016	40,748	9,253	739	228	50,969	2,020,575	2.02	0.46	0.04	0.01	2.52
2017	43,127	9,657	765	241	53,789	2,102,019	2.05	0.46	0.04	0.01	2.56
2018	45,731	10,082	790	255	56,858	2,185,690	2.09	0.46	0.04	0.01	2.60
2019	48,544	10,533	811	269	60,157	2,271,902	2.14	0.46	0.04	0.01	2.65
2020	51,552	11,014	830	285	63,681	2,360,586	2.18	0.47	0.04	0.01	2.70
2021	54,676	11,517	852	302	67,347	2,452,119	2.23	0.47	0.03	0.01	2.75
2022	58,035	12,059	869	319	71,282	2,547,003	2.28	0.47	0.03	0.01	2.80
2023	61,577	12,628	884	338	75,426	2,645,176	2.33	0.48	0.03	0.01	2.85
2024	65,256	13,214	897	357	79,724	2,747,381	2.38	0.48	0.03	0.01	2.90
2025	69,139	13,826	903	377	84,246	2,854,316	2.42	0.48	0.03	0.01	2.95
2026	73,201	14,470	898	399	88,967	2,967,234	2.47	0.49	0.03	0.01	3.00
2027	77,334	15,140	888	420	93,782	3,086,389	2.51	0.49	0.03	0.01	3.04
2028	81,630	15,831	870	442	98,773	3,211,568	2.54	0.49	0.03	0.01	3.08
2029	85,965	16,528	850	465	103,808	3,342,844	2.57	0.49	0.03	0.01	3.11
2030	90,259	17,219	833	487	108,797	3,480,318	2.59	0.49	0.02	0.01	3.13
2035	109,992	20,504	833	591	131,921	4,280,648	2.57	0.48	0.02	0.01	3.08
2040	129,964	23,805	862	696	155,327	5,280,130	2.46	0.45	0.02	0.01	2.94
2045	151,565	27,048	925	808	180,345	6,500,582	2.33	0.42	0.01	0.01	2.77
2050	176,889	30,279	983	937	209,088	7,981,777	2.22	0.38	0.01	0.01	2.62
2055	207,394	33,550	1,053	1,089	243,085	9,786,273	2.12	0.34	0.01	0.01	2.48
2060	244,938	37,193	1,063	1,274	284,469	12,032,440	2.04	0.31	0.01	0.01	2.36
2065	287,338	41,366	1,107	1,484	331,294	14,831,840	1.94	0.28	0.01	0.01	2.23
2070	336,776	46,342	1,169	1,729	386,017	18,290,630	1.84	0.25	0.01	0.01	2.11
2075	395,268	52,107	1,253	2,019	450,647	22,529,130	1.75	0.23	0.01	0.01	2.00
2080	465,693	58,597	1,342	2,365	527,998	27,713,530	1.68	0.21	0.00	0.01	1.91
2085	550,341	65,824	1,421	2,779	620,366	34,087,440	1.61	0.19	0.00	0.01	1.82
2090	650,300	73,871	1,496	3,266	728,934	41,965,780	1.55	0.18	0.00	0.01	1.74
2095	767,146	83,108	1,582	3,833	855,670	51,711,870	1.48	0.16	0.00	0.01	1.65
2100	903,931	93,766	1,686	4,497	1,003,879	63,734,610	1.42	0.15	0.00	0.01	1.58

Table VII.C.7 Sensitivity Test - Mortality - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,528	4,861	393	103	22,885	887,423	1.98	0.55	0.04	0.01	2.58
1999	18,090	4,986	395	106	23,577	921,826	1.96	0.54	0.04	0.01	2.56
2000	18,739	5,133	399	109	24,380	957,193	1.96	0.54	0.04	0.01	2.55
2001	19,481	5,296	405	113	25,296	998,284	1.95	0.53	0.04	0.01	2.53
2002	20,297	5,472	417	118	26,304	1,045,561	1.94	0.52	0.04	0.01	2.52
2003	21,222	5,668	434	123	27,447	1,103,900	1.92	0.51	0.04	0.01	2.49
2004	22,238	5,891	454	129	28,712	1,164,865	1.91	0.51	0.04	0.01	2.46
2005	23,312	6,128	476	135	30,051	1,227,872	1.90	0.50	0.04	0.01	2.45
2006	24,493	6,382	499	141	31,515	1,293,106	1.89	0.49	0.04	0.01	2.44
2007	25,758	6,647	532	148	33,085	1,360,776	1.89	0.49	0.04	0.01	2.43
2008	27,159	6,931	563	156	34,809	1,431,946	1.90	0.48	0.04	0.01	2.43
2009	28,649	7,229	595	164	36,638	1,505,850	1.90	0.48	0.04	0.01	2.43
2010	30,233	7,546	630	173	38,582	1,582,551	1.91	0.48	0.04	0.01	2.44
2011	32,002	7,892	661	182	40,738	1,652,934	1.94	0.48	0.04	0.01	2.46
2012	34,157	8,293	673	194	43,317	1,725,150	1.98	0.48	0.04	0.01	2.51
2013	36,380	8,706	687	206	45,979	1,799,380	2.02	0.48	0.04	0.01	2.56
2014	38,685	9,129	705	218	48,737	1,874,831	2.06	0.49	0.04	0.01	2.60
2015	41,102	9,569	728	231	51,629	1,952,850	2.10	0.49	0.04	0.01	2.64
2016	43,642	10,028	750	245	54,666	2,033,385	2.15	0.49	0.04	0.01	2.69
2017	46,306	10,501	777	259	57,842	2,116,065	2.19	0.50	0.04	0.01	2.73
2018	49,221	10,999	802	275	61,297	2,201,047	2.24	0.50	0.04	0.01	2.78
2019	52,369	11,525	824	291	65,010	2,288,646	2.29	0.50	0.04	0.01	2.84
2020	55,736	12,086	844	309	68,975	2,378,799	2.34	0.51	0.04	0.01	2.90
2021	59,243	12,675	867	328	73,112	2,471,883	2.40	0.51	0.04	0.01	2.96
2022	63,015	13,307	884	347	77,554	2,568,407	2.45	0.52	0.03	0.01	3.02
2023	67,002	13,971	900	368	82,241	2,668,315	2.51	0.52	0.03	0.01	3.08
2024	71,157	14,658	913	390	87,118	2,772,362	2.57	0.53	0.03	0.01	3.14
2025	75,551	15,377	920	413	92,261	2,881,265	2.62	0.53	0.03	0.01	3.20
2026	80,161	16,135	916	437	97,650	2,996,308	2.68	0.54	0.03	0.01	3.26
2027	84,878	16,929	906	462	103,175	3,117,760	2.72	0.54	0.03	0.01	3.31
2028	89,800	17,751	888	488	108,927	3,245,411	2.77	0.55	0.03	0.02	3.36
2029	94,799	18,588	868	514	114,768	3,379,343	2.81	0.55	0.03	0.02	3.40
2030	99,794	19,427	850	540	120,611	3,519,673	2.84	0.55	0.02	0.02	3.43
2035	123,578	23,614	853	666	148,711	4,338,166	2.85	0.54	0.02	0.02	3.43
2040	148,654	28,116	885	799	178,454	5,363,735	2.77	0.52	0.02	0.01	3.33
2045	176,425	32,828	951	946	211,150	6,620,554	2.66	0.50	0.01	0.01	3.19
2050	208,988	37,740	1,014	1,115	248,856	8,151,652	2.56	0.46	0.01	0.01	3.05
2055	247,880	42,791	1,088	1,313	293,072	10,023,520	2.47	0.43	0.01	0.01	2.92
2060	295,404	48,247	1,103	1,551	346,306	12,360,680	2.39	0.39	0.01	0.01	2.80
2065	350,007	54,470	1,153	1,825	407,455	15,282,820	2.29	0.36	0.01	0.01	2.67
2070	414,844	62,005	1,222	2,151	480,223	18,906,290	2.19	0.33	0.01	0.01	2.54
2075	492,817	71,053	1,314	2,543	567,728	23,364,010	2.11	0.30	0.01	0.01	2.43
2080	587,511	81,589	1,412	3,017	673,530	28,838,410	2.04	0.28	0.00	0.01	2.34
2085	701,903	93,574	1,501	3,586	800,564	35,595,240	1.97	0.26	0.00	0.01	2.25
2090	838,137	107,035	1,586	4,260	951,018	43,978,980	1.91	0.24	0.00	0.01	2.16
2095	999,455	122,602	1,683	5,057	1,128,797	54,391,480	1.84	0.23	0.00	0.01	2.08
2100	1,191,103	140,872	1,801	6,002	1,339,778	67,290,250	1.77	0.21	0.00	0.01	1.99

Table VII.C.8 Sensitivity Test - Employment - Low Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	888,849	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,968	395	105	23,472	924,769	1.95	0.54	0.04	0.01	2.54
2000	18,618	5,103	398	109	24,228	961,744	1.94	0.53	0.04	0.01	2.52
2001	19,320	5,255	404	112	25,091	1,004,569	1.92	0.52	0.04	0.01	2.50
2002	20,091	5,417	416	117	26,041	1,053,735	1.91	0.51	0.04	0.01	2.47
2003	20,966	5,599	433	121	27,119	1,113,938	1.88	0.50	0.04	0.01	2.43
2004	21,927	5,806	453	127	28,312	1,176,921	1.86	0.49	0.04	0.01	2.41
2005	22,941	6,026	474	132	29,574	1,242,103	1.85	0.49	0.04	0.01	2.38
2006	24,057	6,261	497	139	30,954	1,309,674	1.84	0.48	0.04	0.01	2.36
2007	25,251	6,506	530	145	32,432	1,379,856	1.83	0.47	0.04	0.01	2.35
2008	26,577	6,769	561	153	34,059	1,453,738	1.83	0.47	0.04	0.01	2.34
2009	27,987	7,044	592	160	35,783	1,530,552	1.83	0.46	0.04	0.01	2.34
2010	29,484	7,337	627	169	37,617	1,610,369	1.83	0.46	0.04	0.01	2.34
2011	31,160	7,657	658	178	39,653	1,681,732	1.85	0.46	0.04	0.01	2.36
2012	33,213	8,031	669	189	42,102	1,754,939	1.89	0.46	0.04	0.01	2.40
2013	35,327	8,416	683	200	44,626	1,830,172	1.93	0.46	0.04	0.01	2.44
2014	37,516	8,809	701	212	47,237	1,906,626	1.97	0.46	0.04	0.01	2.48
2015	39,810	9,217	723	224	49,974	1,985,655	2.00	0.46	0.04	0.01	2.52
2016	42,219	9,644	745	237	52,844	2,067,217	2.04	0.47	0.04	0.01	2.56
2017	44,742	10,082	771	250	55,845	2,150,937	2.08	0.47	0.04	0.01	2.60
2018	47,505	10,543	796	265	59,109	2,236,964	2.12	0.47	0.04	0.01	2.64
2019	50,487	11,032	818	281	62,618	2,325,627	2.17	0.47	0.04	0.01	2.69
2020	53,678	11,553	837	297	66,366	2,416,854	2.22	0.48	0.03	0.01	2.75
2021	56,997	12,099	860	315	70,270	2,511,031	2.27	0.48	0.03	0.01	2.80
2022	60,566	12,686	877	334	74,462	2,608,673	2.32	0.49	0.03	0.01	2.85
2023	64,334	13,303	892	353	78,882	2,709,719	2.37	0.49	0.03	0.01	2.91
2024	68,256	13,939	905	374	83,474	2,814,937	2.42	0.50	0.03	0.01	2.97
2025	72,399	14,605	912	396	88,311	2,925,045	2.48	0.50	0.03	0.01	3.02
2026	76,740	15,306	908	418	93,371	3,041,342	2.52	0.50	0.03	0.01	3.07
2027	81,170	16,038	898	441	98,547	3,164,092	2.57	0.51	0.03	0.01	3.11
2028	85,785	16,794	879	466	103,924	3,293,080	2.60	0.51	0.03	0.01	3.16
2029	90,457	17,561	859	490	109,368	3,428,386	2.64	0.51	0.03	0.01	3.19
2030	95,107	18,326	842	514	114,790	3,570,124	2.66	0.51	0.02	0.01	3.22
2035	116,889	22,060	844	629	140,422	4,396,117	2.66	0.50	0.02	0.01	3.19
2040	139,420	25,952	875	748	166,995	5,429,528	2.57	0.48	0.02	0.01	3.08
2045	164,088	29,909	939	877	195,813	6,693,881	2.45	0.45	0.01	0.01	2.93
2050	192,987	33,945	1,000	1,026	228,957	8,231,515	2.34	0.41	0.01	0.01	2.78
2055	227,629	38,058	1,072	1,200	267,960	10,108,340	2.25	0.38	0.01	0.01	2.65
2060	270,123	42,556	1,085	1,412	315,176	12,448,460	2.17	0.34	0.01	0.01	2.53
2065	318,613	47,706	1,132	1,654	369,104	15,370,120	2.07	0.31	0.01	0.01	2.40
2070	375,766	53,918	1,198	1,939	432,820	18,987,170	1.98	0.28	0.01	0.01	2.28
2075	443,987	61,265	1,287	2,279	508,818	23,429,180	1.90	0.26	0.01	0.01	2.17
2080	526,466	69,683	1,381	2,689	600,218	28,874,490	1.82	0.24	0.00	0.01	2.08
2085	625,851	79,156	1,464	3,179	709,650	35,583,580	1.76	0.22	0.00	0.01	1.99
2090	743,788	89,747	1,545	3,758	838,839	43,893,820	1.69	0.20	0.00	0.01	1.91
2095	882,720	101,969	1,637	4,438	990,764	54,196,770	1.63	0.19	0.00	0.01	1.83
2100	1,046,787	116,234	1,749	5,241	1,170,011	66,935,940	1.56	0.17	0.00	0.01	1.75

Table VII.C.9 Sensitivity Test - Employment - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	885,730	1.97	0.55	0.04	0.01	2.58
1999	18,004	4,968	395	105	23,472	918,318	1.96	0.54	0.04	0.01	2.56
2000	18,618	5,103	398	109	24,228	951,746	1.96	0.54	0.04	0.01	2.55
2001	19,320	5,255	404	112	25,091	990,731	1.95	0.53	0.04	0.01	2.53
2002	20,091	5,417	416	117	26,041	1,035,704	1.94	0.52	0.04	0.01	2.51
2003	20,966	5,599	433	121	27,119	1,091,745	1.92	0.51	0.04	0.01	2.48
2004	21,927	5,806	453	127	28,312	1,150,206	1.91	0.50	0.04	0.01	2.46
2005	22,941	6,026	474	132	29,574	1,210,509	1.90	0.50	0.04	0.01	2.44
2006	24,057	6,261	497	139	30,954	1,272,827	1.89	0.49	0.04	0.01	2.43
2007	25,251	6,506	530	145	32,432	1,337,363	1.89	0.49	0.04	0.01	2.43
2008	26,577	6,769	561	153	34,059	1,405,151	1.89	0.48	0.04	0.01	2.42
2009	27,987	7,044	592	160	35,783	1,475,427	1.90	0.48	0.04	0.01	2.43
2010	29,484	7,337	627	169	37,617	1,548,245	1.90	0.47	0.04	0.01	2.43
2011	31,160	7,657	658	178	39,653	1,616,854	1.93	0.47	0.04	0.01	2.45
2012	33,213	8,031	669	189	42,102	1,687,237	1.97	0.48	0.04	0.01	2.50
2013	35,327	8,416	683	200	44,626	1,759,568	2.01	0.48	0.04	0.01	2.54
2014	37,516	8,809	701	212	47,237	1,833,072	2.05	0.48	0.04	0.01	2.58
2015	39,810	9,217	723	224	49,974	1,909,053	2.09	0.48	0.04	0.01	2.62
2016	42,219	9,644	745	237	52,844	1,987,467	2.12	0.49	0.04	0.01	2.66
2017	44,742	10,082	771	250	55,845	2,067,957	2.16	0.49	0.04	0.01	2.70
2018	47,505	10,543	796	265	59,109	2,150,666	2.21	0.49	0.04	0.01	2.75
2019	50,487	11,032	818	281	62,618	2,235,908	2.26	0.49	0.04	0.01	2.80
2020	53,678	11,553	837	297	66,366	2,323,616	2.31	0.50	0.04	0.01	2.86
2021	56,997	12,099	860	315	70,270	2,414,160	2.36	0.50	0.04	0.01	2.91
2022	60,566	12,686	877	334	74,462	2,508,035	2.41	0.51	0.03	0.01	2.97
2023	64,334	13,303	892	353	78,882	2,605,184	2.47	0.51	0.03	0.01	3.03
2024	68,256	13,939	905	374	83,474	2,706,344	2.52	0.52	0.03	0.01	3.08
2025	72,399	14,605	912	396	88,311	2,812,206	2.57	0.52	0.03	0.01	3.14
2026	76,740	15,306	908	418	93,371	2,924,016	2.62	0.52	0.03	0.01	3.19
2027	81,170	16,038	898	441	98,547	3,042,031	2.67	0.53	0.03	0.01	3.24
2028	85,785	16,794	879	466	103,924	3,166,046	2.71	0.53	0.03	0.01	3.28
2029	90,457	17,561	859	490	109,368	3,296,131	2.74	0.53	0.03	0.01	3.32
2030	95,107	18,326	842	514	114,790	3,432,403	2.77	0.53	0.02	0.01	3.34
2035	116,889	22,060	844	629	140,422	4,226,531	2.77	0.52	0.02	0.01	3.32
2040	139,420	25,952	875	748	166,995	5,220,070	2.67	0.50	0.02	0.01	3.20
2045	164,088	29,909	939	877	195,813	6,435,646	2.55	0.46	0.01	0.01	3.04
2050	192,987	33,945	1,000	1,026	228,957	7,913,963	2.44	0.43	0.01	0.01	2.89
2055	227,629	38,058	1,072	1,200	267,960	9,718,396	2.34	0.39	0.01	0.01	2.76
2060	270,123	42,556	1,085	1,412	315,176	11,968,250	2.26	0.36	0.01	0.01	2.63
2065	318,613	47,706	1,132	1,654	369,104	14,777,190	2.16	0.32	0.01	0.01	2.50
2070	375,766	53,918	1,198	1,939	432,820	18,254,710	2.06	0.30	0.01	0.01	2.37
2075	443,987	61,265	1,287	2,279	508,818	22,525,370	1.97	0.27	0.01	0.01	2.26
2080	526,466	69,683	1,381	2,689	600,218	27,760,590	1.90	0.25	0.00	0.01	2.16
2085	625,851	79,156	1,464	3,179	709,650	34,210,880	1.83	0.23	0.00	0.01	2.07
2090	743,788	89,747	1,545	3,758	838,839	42,200,530	1.76	0.21	0.00	0.01	1.99
2095	882,720	101,969	1,637	4,438	990,764	52,106,050	1.69	0.20	0.00	0.01	1.90
2100	1,046,787	116,234	1,749	5,241	1,170,011	64,353,760	1.63	0.18	0.00	0.01	1.82

Table VII.C.10 Sensitivity Test - Real Wage Differential - Low Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,950	392	105	23,451	924,074	1.95	0.54	0.04	0.01	2.54
2000	18,618	5,075	393	108	24,195	960,869	1.94	0.53	0.04	0.01	2.52
2001	19,320	5,210	397	112	25,039	1,004,284	1.92	0.52	0.04	0.01	2.49
2002	20,091	5,350	405	116	25,963	1,054,916	1.90	0.51	0.04	0.01	2.46
2003	20,966	5,503	417	121	27,006	1,117,889	1.88	0.49	0.04	0.01	2.42
2004	21,927	5,679	431	126	28,163	1,183,977	1.85	0.48	0.04	0.01	2.38
2005	22,941	5,866	447	132	29,386	1,252,620	1.83	0.47	0.04	0.01	2.35
2006	24,057	6,066	464	138	30,725	1,324,031	1.82	0.46	0.04	0.01	2.32
2007	25,251	6,273	490	144	32,158	1,398,458	1.81	0.45	0.04	0.01	2.30
2008	26,577	6,497	513	151	33,737	1,477,031	1.80	0.44	0.03	0.01	2.28
2009	27,987	6,729	536	159	35,410	1,558,999	1.80	0.43	0.03	0.01	2.27
2010	29,484	6,977	562	167	37,189	1,644,462	1.79	0.42	0.03	0.01	2.26
2011	31,160	7,247	584	175	39,166	1,723,941	1.81	0.42	0.03	0.01	2.27
2012	33,213	7,565	588	186	41,552	1,805,905	1.84	0.42	0.03	0.01	2.30
2013	35,327	7,890	594	197	44,009	1,890,565	1.87	0.42	0.03	0.01	2.33
2014	37,516	8,220	604	209	46,548	1,977,119	1.90	0.42	0.03	0.01	2.35
2015	39,810	8,561	617	220	49,208	2,066,990	1.93	0.41	0.03	0.01	2.38
2016	42,219	8,915	630	233	51,997	2,160,169	1.95	0.41	0.03	0.01	2.41
2017	44,742	9,276	646	246	54,910	2,256,297	1.98	0.41	0.03	0.01	2.43
2018	47,505	9,655	661	260	58,080	2,355,564	2.02	0.41	0.03	0.01	2.47
2019	50,487	10,054	673	275	61,490	2,458,346	2.05	0.41	0.03	0.01	2.50
2020	53,678	10,479	682	292	65,131	2,564,606	2.09	0.41	0.03	0.01	2.54
2021	56,997	10,923	694	309	68,923	2,674,789	2.13	0.41	0.03	0.01	2.58
2022	60,566	11,399	702	327	72,994	2,789,487	2.17	0.41	0.03	0.01	2.62
2023	64,334	11,898	708	346	77,286	2,908,684	2.21	0.41	0.02	0.01	2.66
2024	68,256	12,410	712	366	81,744	3,033,251	2.25	0.41	0.02	0.01	2.69
2025	72,399	12,943	711	387	86,440	3,164,022	2.29	0.41	0.02	0.01	2.73
2026	76,740	13,503	701	409	91,353	3,302,471	2.32	0.41	0.02	0.01	2.77
2027	81,170	14,087	687	432	96,376	3,448,976	2.35	0.41	0.02	0.01	2.79
2028	85,785	14,688	667	455	101,595	3,603,386	2.38	0.41	0.02	0.01	2.82
2029	90,457	15,294	647	479	106,877	3,765,870	2.40	0.41	0.02	0.01	2.84
2030	95,107	15,894	629	502	112,133	3,936,642	2.42	0.40	0.02	0.01	2.85
2035	116,889	18,778	605	613	136,884	4,941,374	2.37	0.38	0.01	0.01	2.77
2040	139,420	21,728	603	728	162,479	6,221,226	2.24	0.35	0.01	0.01	2.61
2045	164,088	24,651	623	852	190,213	7,818,577	2.10	0.32	0.01	0.01	2.43
2050	192,987	27,539	640	995	222,161	9,800,880	1.97	0.28	0.01	0.01	2.27
2055	227,629	30,349	663	1,164	259,805	12,268,770	1.86	0.25	0.01	0.01	2.12
2060	270,123	33,297	648	1,368	305,436	15,401,850	1.75	0.22	0.00	0.01	1.98
2065	318,613	36,652	655	1,602	357,521	19,385,190	1.64	0.19	0.00	0.01	1.84
2070	375,766	40,741	671	1,877	419,055	24,411,190	1.54	0.17	0.00	0.01	1.72
2075	443,987	45,591	699	2,206	492,483	30,705,890	1.45	0.15	0.00	0.01	1.60
2080	526,466	51,090	728	2,602	580,886	38,575,780	1.36	0.13	0.00	0.01	1.51
2085	625,851	57,162	749	3,077	686,839	48,460,290	1.29	0.12	0.00	0.01	1.42
2090	743,788	63,798	768	3,638	811,991	60,936,280	1.22	0.10	0.00	0.01	1.33
2095	882,720	71,388	790	4,297	959,195	76,697,590	1.15	0.09	0.00	0.01	1.25
2100	1,046,787	80,218	820	5,075	1,132,900	96,561,260	1.08	0.08	0.00	0.01	1.17

Table VII.C.11 Sensitivity Test - Real Wage Differential - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,004	4,973	396	105	23,478	920,824	1.96	0.54	0.04	0.01	2.55
2000	18,618	5,119	401	109	24,246	954,507	1.95	0.54	0.04	0.01	2.54
2001	19,320	5,286	410	113	25,128	992,998	1.95	0.53	0.04	0.01	2.53
2002	20,091	5,458	423	117	26,089	1,038,641	1.93	0.53	0.04	0.01	2.51
2003	20,966	5,668	445	122	27,200	1,092,208	1.92	0.52	0.04	0.01	2.49
2004	21,927	5,907	470	127	28,431	1,147,913	1.91	0.51	0.04	0.01	2.48
2005	22,941	6,160	498	133	29,731	1,205,159	1.90	0.51	0.04	0.01	2.47
2006	24,057	6,431	527	140	31,154	1,264,103	1.90	0.51	0.04	0.01	2.46
2007	25,251	6,714	568	146	32,679	1,324,930	1.91	0.51	0.04	0.01	2.47
2008	26,577	7,019	607	154	34,356	1,388,649	1.91	0.51	0.04	0.01	2.47
2009	27,987	7,339	648	162	36,135	1,454,480	1.92	0.50	0.04	0.01	2.48
2010	29,484	7,680	692	170	38,027	1,522,456	1.94	0.50	0.05	0.01	2.50
2011	31,160	8,053	734	180	40,127	1,583,808	1.97	0.51	0.05	0.01	2.53
2012	33,213	8,488	754	191	42,646	1,646,395	2.02	0.52	0.05	0.01	2.59
2013	35,327	8,937	777	203	45,244	1,710,370	2.07	0.52	0.05	0.01	2.65
2014	37,516	9,399	806	215	47,935	1,774,967	2.11	0.53	0.05	0.01	2.70
2015	39,810	9,882	839	227	50,758	1,841,430	2.16	0.54	0.05	0.01	2.76
2016	42,219	10,389	874	241	53,722	1,909,694	2.21	0.54	0.05	0.01	2.81
2017	44,742	10,913	913	255	56,823	1,979,390	2.26	0.55	0.05	0.01	2.87
2018	47,505	11,468	952	270	60,194	2,050,640	2.32	0.56	0.05	0.01	2.94
2019	50,487	12,058	988	286	63,819	2,123,718	2.38	0.57	0.05	0.01	3.01
2020	53,678	12,689	1,021	303	67,692	2,198,536	2.44	0.58	0.05	0.01	3.08
2021	56,997	13,353	1,058	321	71,729	2,275,421	2.50	0.59	0.05	0.01	3.15
2022	60,566	14,068	1,090	341	76,064	2,354,809	2.57	0.60	0.05	0.01	3.23
2023	64,334	14,823	1,119	361	80,637	2,436,616	2.64	0.61	0.05	0.01	3.31
2024	68,256	15,606	1,147	383	85,391	2,521,496	2.71	0.62	0.05	0.02	3.39
2025	72,399	16,428	1,166	405	90,398	2,610,048	2.77	0.63	0.04	0.02	3.46
2026	76,740	17,297	1,171	428	95,637	2,703,382	2.84	0.64	0.04	0.02	3.54
2027	81,170	18,207	1,169	452	100,999	2,801,675	2.90	0.65	0.04	0.02	3.60
2028	85,785	19,151	1,156	477	106,570	2,904,674	2.95	0.66	0.04	0.02	3.67
2029	90,457	20,114	1,140	503	112,214	3,012,391	3.00	0.67	0.04	0.02	3.73
2030	95,107	21,081	1,127	528	117,844	3,124,866	3.04	0.67	0.04	0.02	3.77
2035	116,889	25,880	1,182	648	144,599	3,774,413	3.10	0.69	0.03	0.02	3.83
2040	139,420	30,988	1,279	773	172,459	4,572,713	3.05	0.68	0.03	0.02	3.77
2045	164,088	36,321	1,432	908	202,749	5,529,962	2.97	0.66	0.03	0.02	3.67
2050	192,987	41,936	1,589	1,064	237,576	6,670,461	2.89	0.63	0.02	0.02	3.56
2055	227,629	47,904	1,774	1,248	278,555	8,035,043	2.83	0.60	0.02	0.02	3.47
2060	270,123	54,672	1,866	1,470	328,130	9,706,355	2.78	0.56	0.02	0.02	3.38
2065	318,613	62,500	2,021	1,724	384,858	11,755,730	2.71	0.53	0.02	0.01	3.27
2070	375,766	71,926	2,220	2,025	451,936	14,245,080	2.64	0.50	0.02	0.01	3.17
2075	443,987	83,112	2,471	2,383	531,953	17,242,250	2.57	0.48	0.01	0.01	3.09
2080	526,466	96,106	2,747	2,814	628,133	20,844,110	2.53	0.46	0.01	0.01	3.01
2085	625,851	111,033	3,016	3,330	743,229	25,197,110	2.48	0.44	0.01	0.01	2.95
2090	743,788	128,105	3,292	3,938	879,124	30,488,550	2.44	0.42	0.01	0.01	2.88
2095	882,720	148,033	3,605	4,655	1,039,012	36,926,580	2.39	0.40	0.01	0.01	2.81
2100	1,046,787	171,455	3,977	5,500	1,227,719	44,735,960	2.34	0.38	0.01	0.01	2.74

Table VII.C.12 Sensitivity Test - Prices - Low Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	18,028	4,970	395	105	23,498	923,352	1.95	0.54	0.04	0.01	2.54
2000	18,704	5,119	399	109	24,330	962,361	1.94	0.53	0.04	0.01	2.53
2001	19,510	5,294	406	113	25,324	1,009,350	1.93	0.52	0.04	0.01	2.51
2002	20,435	5,479	418	118	26,451	1,067,180	1.91	0.51	0.04	0.01	2.48
2003	21,518	5,711	438	124	27,791	1,137,384	1.89	0.50	0.04	0.01	2.44
2004	22,723	5,980	463	131	29,297	1,211,548	1.88	0.49	0.04	0.01	2.42
2005	24,004	6,268	490	138	30,901	1,289,156	1.86	0.49	0.04	0.01	2.40
2006	25,416	6,577	519	146	32,658	1,370,481	1.85	0.48	0.04	0.01	2.38
2007	26,937	6,901	559	155	34,551	1,455,838	1.85	0.47	0.04	0.01	2.37
2008	28,626	7,251	597	164	36,638	1,546,471	1.85	0.47	0.04	0.01	2.37
2009	30,438	7,620	637	174	38,868	1,641,673	1.85	0.46	0.04	0.01	2.37
2010	32,378	8,015	680	185	41,258	1,741,620	1.86	0.46	0.04	0.01	2.37
2011	34,550	8,447	721	197	43,915	1,836,287	1.88	0.46	0.04	0.01	2.39
2012	37,184	8,947	741	211	47,083	1,934,647	1.92	0.46	0.04	0.01	2.43
2013	39,935	9,467	764	226	50,392	2,036,983	1.96	0.46	0.04	0.01	2.47
2014	42,821	10,007	792	241	53,861	2,142,481	2.00	0.47	0.04	0.01	2.51
2015	45,880	10,574	825	258	57,536	2,252,742	2.04	0.47	0.04	0.01	2.55
2016	49,130	11,171	859	275	61,435	2,367,824	2.07	0.47	0.04	0.01	2.59
2017	52,571	11,794	897	294	65,556	2,487,407	2.11	0.47	0.04	0.01	2.64
2018	56,359	12,455	936	314	70,064	2,611,767	2.16	0.48	0.04	0.01	2.68
2019	60,479	13,160	971	336	74,946	2,741,393	2.21	0.48	0.04	0.01	2.73
2020	64,926	13,917	1,004	359	80,206	2,876,323	2.26	0.48	0.03	0.01	2.79
2021	69,609	14,718	1,041	384	85,752	3,017,139	2.31	0.49	0.03	0.01	2.84
2022	74,686	15,583	1,073	411	91,753	3,164,600	2.36	0.49	0.03	0.01	2.90
2023	80,103	16,501	1,102	440	98,146	3,318,788	2.41	0.50	0.03	0.01	2.96
2024	85,811	17,461	1,130	470	104,871	3,480,810	2.47	0.50	0.03	0.01	3.01
2025	91,904	18,474	1,149	502	112,029	3,651,742	2.52	0.51	0.03	0.01	3.07
2026	98,360	19,551	1,155	536	119,602	3,833,437	2.57	0.51	0.03	0.01	3.12
2027	105,048	20,688	1,154	571	127,461	4,026,504	2.61	0.51	0.03	0.01	3.17
2028	112,098	21,877	1,142	608	135,724	4,230,947	2.65	0.52	0.03	0.01	3.21
2029	119,352	23,101	1,127	646	144,225	4,447,142	2.68	0.52	0.03	0.01	3.24
2030	126,705	24,344	1,115	685	152,849	4,675,529	2.71	0.52	0.02	0.01	3.27
2035	163,431	30,774	1,174	879	196,259	6,039,436	2.71	0.51	0.02	0.01	3.25
2040	204,582	38,019	1,279	1,097	244,977	7,824,717	2.61	0.49	0.02	0.01	3.13
2045	252,696	46,010	1,443	1,351	301,498	10,119,620	2.50	0.45	0.01	0.01	2.98
2050	311,911	54,832	1,614	1,658	370,014	13,054,060	2.39	0.42	0.01	0.01	2.83
2055	386,110	64,552	1,818	2,036	454,517	16,816,100	2.30	0.38	0.01	0.01	2.70
2060	480,868	75,791	1,933	2,514	561,105	21,724,070	2.21	0.35	0.01	0.01	2.58
2065	595,262	89,211	2,118	3,090	689,681	28,137,290	2.12	0.32	0.01	0.01	2.45
2070	736,787	105,869	2,356	3,803	848,815	36,462,380	2.02	0.29	0.01	0.01	2.33
2075	913,641	126,308	2,658	4,692	1,047,299	47,197,820	1.94	0.27	0.01	0.01	2.22
2080	1,136,989	150,841	2,996	5,809	1,296,635	61,018,130	1.86	0.25	0.00	0.01	2.12
2085	1,418,527	179,908	3,338	7,208	1,608,981	78,881,280	1.80	0.23	0.00	0.01	2.04
2090	1,769,280	214,170	3,701	8,942	1,996,093	102,072,200	1.73	0.21	0.00	0.01	1.96
2095	2,203,692	255,489	4,118	11,085	2,474,384	132,207,900	1.67	0.19	0.00	0.01	1.87
2100	2,742,626	305,773	4,621	13,739	3,066,759	171,286,600	1.60	0.18	0.00	0.01	1.79

Table VII.C.13 Sensitivity Test - Prices - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,475	4,852	393	102	22,823	887,291	1.97	0.55	0.04	0.01	2.57
1999	17,981	4,965	395	105	23,446	919,741	1.95	0.54	0.04	0.01	2.55
2000	18,532	5,088	398	108	24,126	951,150	1.95	0.53	0.04	0.01	2.54
2001	19,130	5,215	403	111	24,860	986,040	1.94	0.53	0.04	0.01	2.52
2002	19,752	5,342	412	115	25,621	1,024,580	1.93	0.52	0.04	0.01	2.50
2003	20,424	5,475	425	118	26,443	1,071,182	1.91	0.51	0.04	0.01	2.47
2004	21,153	5,622	440	122	27,337	1,119,295	1.89	0.50	0.04	0.01	2.44
2005	21,916	5,777	457	127	28,277	1,168,308	1.88	0.49	0.04	0.01	2.42
2006	22,760	5,943	474	131	29,308	1,218,353	1.87	0.49	0.04	0.01	2.41
2007	23,658	6,115	500	136	30,409	1,269,583	1.86	0.48	0.04	0.01	2.40
2008	24,658	6,300	524	142	31,623	1,322,933	1.86	0.48	0.04	0.01	2.39
2009	25,714	6,491	548	147	32,900	1,377,623	1.87	0.47	0.04	0.01	2.39
2010	26,827	6,695	574	153	34,249	1,433,657	1.87	0.47	0.04	0.01	2.39
2011	28,076	6,919	596	160	35,751	1,482,793	1.89	0.47	0.04	0.01	2.41
2012	29,635	7,185	600	168	37,589	1,532,461	1.93	0.47	0.04	0.01	2.45
2013	31,216	7,455	606	177	39,455	1,582,789	1.97	0.47	0.04	0.01	2.49
2014	32,828	7,727	616	185	41,356	1,633,054	2.01	0.47	0.04	0.01	2.53
2015	34,497	8,006	629	194	43,326	1,684,391	2.05	0.48	0.04	0.01	2.57
2016	36,230	8,293	642	203	45,369	1,736,717	2.09	0.48	0.04	0.01	2.61
2017	38,022	8,585	658	213	47,478	1,789,675	2.12	0.48	0.04	0.01	2.65
2018	39,978	8,890	673	223	49,763	1,843,358	2.17	0.48	0.04	0.01	2.70
2019	42,075	9,211	684	234	52,204	1,897,992	2.22	0.49	0.04	0.01	2.75
2020	44,300	9,551	693	245	54,790	1,953,479	2.27	0.49	0.04	0.01	2.80
2021	46,582	9,904	705	257	57,448	2,010,085	2.32	0.49	0.04	0.01	2.86
2022	49,019	10,282	712	270	60,283	2,068,168	2.37	0.50	0.03	0.01	2.91
2023	51,563	10,676	717	283	63,239	2,127,622	2.42	0.50	0.03	0.01	2.97
2024	54,175	11,077	721	297	66,269	2,188,987	2.47	0.51	0.03	0.01	3.03
2025	56,906	11,492	718	311	69,427	2,252,740	2.53	0.51	0.03	0.01	3.08
2026	59,732	11,925	708	326	72,691	2,319,783	2.57	0.51	0.03	0.01	3.13
2027	62,567	12,373	693	340	75,973	2,390,205	2.62	0.52	0.03	0.01	3.18
2028	65,482	12,829	672	355	79,339	2,463,726	2.66	0.52	0.03	0.01	3.22
2029	68,378	13,283	650	370	82,682	2,540,291	2.69	0.52	0.03	0.01	3.25
2030	71,195	13,725	631	385	85,937	2,619,878	2.72	0.52	0.02	0.01	3.28
2035	83,335	15,727	602	448	100,111	3,073,876	2.71	0.51	0.02	0.01	3.26
2040	94,666	17,611	593	508	113,377	3,617,410	2.62	0.49	0.02	0.01	3.13
2045	106,110	19,320	606	567	126,603	4,249,455	2.50	0.45	0.01	0.01	2.98
2050	118,857	20,872	614	632	140,974	4,979,140	2.39	0.42	0.01	0.01	2.83
2055	133,518	22,277	626	704	157,125	5,826,044	2.29	0.38	0.01	0.01	2.70
2060	150,899	23,712	603	788	176,002	6,836,429	2.21	0.35	0.01	0.01	2.57
2065	169,513	25,303	598	879	196,294	8,042,856	2.11	0.31	0.01	0.01	2.44
2070	190,402	27,224	603	982	219,211	9,467,009	2.01	0.29	0.01	0.01	2.32
2075	214,259	29,448	616	1,099	245,423	11,130,870	1.92	0.26	0.01	0.01	2.20
2080	241,966	31,886	629	1,235	275,716	13,070,900	1.85	0.24	0.00	0.01	2.11
2085	273,949	34,482	635	1,391	310,456	15,348,300	1.78	0.22	0.00	0.01	2.02
2090	310,072	37,218	637	1,566	349,493	18,039,880	1.72	0.21	0.00	0.01	1.94
2095	350,471	40,256	642	1,761	393,130	21,223,790	1.65	0.19	0.00	0.01	1.85
2100	395,823	43,685	653	1,981	442,142	24,976,310	1.58	0.17	0.00	0.01	1.77

Table VII.C.14 Sensitivity Test - Combined - Low Cost

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,420	4,843	393	102	22,758	889,178	1.96	0.54	0.04	0.01	2.56
1999	17,940	4,946	394	105	23,385	928,213	1.93	0.53	0.04	0.01	2.52
2000	18,579	5,073	396	108	24,156	971,426	1.91	0.52	0.04	0.01	2.49
2001	19,344	5,220	401	112	25,077	1,024,079	1.89	0.51	0.04	0.01	2.45
2002	20,222	5,383	411	117	26,133	1,087,288	1.86	0.50	0.04	0.01	2.40
2003	21,253	5,570	426	123	27,372	1,166,731	1.82	0.48	0.04	0.01	2.35
2004	22,401	5,792	446	129	28,767	1,251,606	1.79	0.46	0.04	0.01	2.30
2005	23,620	6,028	467	136	30,251	1,341,549	1.76	0.45	0.03	0.01	2.25
2006	24,965	6,281	490	143	31,878	1,436,676	1.74	0.44	0.03	0.01	2.22
2007	26,414	6,545	522	151	33,631	1,537,435	1.72	0.43	0.03	0.01	2.19
2008	28,026	6,830	552	159	35,567	1,645,250	1.70	0.42	0.03	0.01	2.16
2009	29,755	7,129	583	169	37,636	1,759,540	1.69	0.41	0.03	0.01	2.14
2010	31,608	7,449	617	179	39,853	1,880,637	1.68	0.40	0.03	0.01	2.12
2011	33,686	7,800	648	190	42,324	1,995,217	1.69	0.39	0.03	0.01	2.12
2012	36,217	8,208	660	203	45,288	2,115,321	1.71	0.39	0.03	0.01	2.14
2013	38,859	8,631	673	217	48,380	2,241,371	1.73	0.39	0.03	0.01	2.16
2014	41,629	9,066	692	231	51,619	2,372,622	1.75	0.38	0.03	0.01	2.18
2015	44,566	9,521	714	247	55,048	2,511,121	1.77	0.38	0.03	0.01	2.19
2016	47,685	9,999	737	263	58,684	2,657,305	1.79	0.38	0.03	0.01	2.21
2017	50,989	10,493	764	280	62,526	2,810,931	1.81	0.37	0.03	0.01	2.22
2018	54,627	11,016	790	299	66,732	2,972,517	1.84	0.37	0.03	0.01	2.24
2019	58,587	11,573	813	319	71,292	3,142,832	1.86	0.37	0.03	0.01	2.27
2020	62,865	12,169	834	341	76,208	3,322,187	1.89	0.37	0.03	0.01	2.29
2021	67,369	12,798	858	365	81,389	3,511,501	1.92	0.36	0.02	0.01	2.32
2022	72,256	13,476	877	390	86,999	3,711,922	1.95	0.36	0.02	0.01	2.34
2023	77,471	14,194	894	417	92,977	3,923,877	1.97	0.36	0.02	0.01	2.37
2024	82,968	14,941	910	445	99,263	4,148,933	2.00	0.36	0.02	0.01	2.39
2025	88,838	15,725	920	475	105,958	4,388,672	2.02	0.36	0.02	0.01	2.41
2026	95,060	16,558	919	506	113,043	4,645,569	2.05	0.36	0.02	0.01	2.43
2027	101,506	17,433	912	539	120,391	4,920,761	2.06	0.35	0.02	0.01	2.45
2028	108,305	18,345	898	574	128,122	5,214,759	2.08	0.35	0.02	0.01	2.46
2029	115,301	19,277	883	610	136,071	5,528,507	2.09	0.35	0.02	0.01	2.46
2030	122,396	20,217	871	646	144,130	5,863,070	2.09	0.34	0.01	0.01	2.46
2035	157,940	24,972	900	827	184,639	7,915,700	2.00	0.32	0.01	0.01	2.33
2040	198,358	30,208	961	1,033	230,560	10,722,880	1.85	0.28	0.01	0.01	2.15
2045	246,627	35,876	1,059	1,276	284,838	14,509,300	1.70	0.25	0.01	0.01	1.96
2050	307,238	42,056	1,158	1,577	352,029	19,614,210	1.57	0.21	0.01	0.01	1.79
2055	384,582	48,830	1,276	1,956	436,644	26,529,190	1.45	0.18	0.00	0.01	1.65
2060	484,706	56,715	1,347	2,442	545,210	36,003,050	1.35	0.16	0.00	0.01	1.51
2065	608,478	66,247	1,480	3,043	679,248	48,951,860	1.24	0.14	0.00	0.01	1.39
2070	766,888	78,211	1,650	3,810	850,559	66,530,510	1.15	0.12	0.00	0.01	1.28
2075	971,835	92,941	1,861	4,800	1,071,437	90,272,570	1.08	0.10	0.00	0.01	1.19
2080	1,239,697	110,760	2,094	6,086	1,358,638	122,343,800	1.01	0.09	0.00	0.00	1.11
2085	1,587,169	132,160	2,316	7,747	1,729,391	165,884,700	0.96	0.08	0.00	0.00	1.04
2090	2,028,328	157,746	2,561	9,849	2,198,484	225,184,200	0.90	0.07	0.00	0.00	0.98
2095	2,586,236	189,022	2,856	12,502	2,790,615	305,902,000	0.85	0.06	0.00	0.00	0.91
2100	3,294,926	227,283	3,212	15,864	3,541,285	415,519,600	0.79	0.05	0.00	0.00	0.85

Table VII.C.15 Sensitivity Test - Combined - High Cost

	Expenditures (millions of dollars)					Gross Domestic	Expenditures As % Of Gross Domestic Product				
Year	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**	**Product**	**OAS**	**GIS**	**SPA**	**Expenses**	**Total**
1998	17,528	4,861	393	103	22,885	885,392	1.98	0.55	0.04	0.01	2.58
1999	18,065	4,989	396	106	23,556	914,882	1.97	0.55	0.04	0.01	2.57
2000	18,652	5,133	400	109	24,294	942,189	1.98	0.54	0.04	0.01	2.58
2001	19,288	5,288	408	112	25,096	971,702	1.98	0.54	0.04	0.01	2.58
2002	19,950	5,449	421	116	25,937	1,003,444	1.99	0.54	0.04	0.01	2.58
2003	20,667	5,624	439	120	26,850	1,041,824	1.98	0.54	0.04	0.01	2.58
2004	21,442	5,816	459	125	27,842	1,080,812	1.98	0.54	0.04	0.01	2.58
2005	22,254	6,018	482	129	28,884	1,119,756	1.99	0.54	0.04	0.01	2.58
2006	23,149	6,234	505	134	30,023	1,159,011	2.00	0.54	0.04	0.01	2.59
2007	24,100	6,458	538	140	31,237	1,198,698	2.01	0.54	0.04	0.01	2.61
2008	25,156	6,699	570	146	32,570	1,239,677	2.03	0.54	0.05	0.01	2.63
2009	26,269	6,949	602	152	33,972	1,281,170	2.05	0.54	0.05	0.01	2.65
2010	27,441	7,215	637	159	35,451	1,323,149	2.07	0.55	0.05	0.01	2.68
2011	28,751	7,504	668	166	37,090	1,359,862	2.11	0.55	0.05	0.01	2.73
2012	30,376	7,843	680	175	39,074	1,396,455	2.18	0.56	0.05	0.01	2.80
2013	32,024	8,189	693	184	41,091	1,433,034	2.23	0.57	0.05	0.01	2.87
2014	33,706	8,540	711	193	43,151	1,468,911	2.29	0.58	0.05	0.01	2.94
2015	35,446	8,903	733	203	45,285	1,505,000	2.36	0.59	0.05	0.01	3.01
2016	37,252	9,279	755	213	47,498	1,541,078	2.42	0.60	0.05	0.01	3.08
2017	39,119	9,663	781	223	49,786	1,576,846	2.48	0.61	0.05	0.01	3.16
2018	41,155	10,065	806	234	52,260	1,612,364	2.55	0.62	0.05	0.01	3.24
2019	43,335	10,489	827	246	54,897	1,647,802	2.63	0.64	0.05	0.01	3.33
2020	45,645	10,939	845	258	57,687	1,683,029	2.71	0.65	0.05	0.02	3.43
2021	48,014	11,407	867	271	60,558	1,718,248	2.79	0.66	0.05	0.02	3.52
2022	50,540	11,908	882	285	63,615	1,753,739	2.88	0.68	0.05	0.02	3.63
2023	53,176	12,431	896	299	66,802	1,789,362	2.97	0.69	0.05	0.02	3.73
2024	55,881	12,966	907	314	70,068	1,825,557	3.06	0.71	0.05	0.02	3.84
2025	58,707	13,523	911	329	73,470	1,862,710	3.15	0.73	0.05	0.02	3.94
2026	61,629	14,105	904	345	76,983	1,901,573	3.24	0.74	0.05	0.02	4.05
2027	64,560	14,707	891	361	80,519	1,942,163	3.32	0.76	0.05	0.02	4.15
2028	67,571	15,326	869	377	84,142	1,984,167	3.41	0.77	0.04	0.02	4.24
2029	70,561	15,945	845	393	87,744	2,027,477	3.48	0.79	0.04	0.02	4.33
2030	73,467	16,556	823	409	91,255	2,072,005	3.55	0.80	0.04	0.02	4.40
2035	85,932	19,405	803	478	106,617	2,319,875	3.70	0.84	0.03	0.02	4.60
2040	97,295	22,177	809	541	120,822	2,603,155	3.74	0.85	0.03	0.02	4.64
2045	108,375	24,774	850	603	134,602	2,912,421	3.72	0.85	0.03	0.02	4.62
2050	120,330	27,196	886	668	149,080	3,242,238	3.71	0.84	0.03	0.02	4.60
2055	133,708	29,427	930	738	164,804	3,593,595	3.72	0.82	0.03	0.02	4.59
2060	149,299	31,673	905	818	182,695	3,989,451	3.74	0.79	0.02	0.02	4.58
2065	165,263	34,045	894	901	201,102	4,443,792	3.72	0.77	0.02	0.02	4.53
2070	182,030	36,753	896	989	220,667	4,959,100	3.67	0.74	0.02	0.02	4.45
2075	200,018	39,805	913	1,083	241,819	5,533,431	3.61	0.72	0.02	0.02	4.37
2080	219,713	43,058	932	1,187	264,890	6,167,122	3.56	0.70	0.02	0.02	4.30
2085	241,409	46,378	952	1,299	290,038	6,866,984	3.52	0.68	0.01	0.02	4.22
2090	265,367	49,716	959	1,422	317,464	7,649,071	3.47	0.65	0.01	0.02	4.15
2095	291,377	53,233	964	1,555	347,128	8,529,920	3.42	0.62	0.01	0.02	4.07
2100	319,607	57,088	974	1,700	379,369	9,519,780	3.36	0.60	0.01	0.02	3.99

Table VII.C.16 Sensitivity Test - Benefit Indexation

Year	Expenditures (millions of dollars)					Gross Domestic Product	Expenditures As % Of Gross Domestic Product				
	OAS	GIS	SPA	Expenses	Total		OAS	GIS	SPA	Expenses	Total
1998	17,537	4,892	398	103	22,930	887,291	1.98	0.55	0.04	0.01	2.58
1999	18,138	5,053	406	106	23,703	921,546	1.97	0.55	0.04	0.01	2.57
2000	18,838	5,242	416	110	24,606	956,748	1.97	0.55	0.04	0.01	2.57
2001	19,641	5,456	430	115	25,643	997,653	1.97	0.55	0.04	0.01	2.57
2002	20,532	5,692	452	120	26,796	1,044,721	1.97	0.54	0.04	0.01	2.56
2003	21,548	5,958	480	126	28,111	1,102,843	1.95	0.54	0.04	0.01	2.55
2004	22,667	6,260	512	132	29,572	1,163,566	1.95	0.54	0.04	0.01	2.54
2005	23,853	6,581	549	139	31,123	1,226,310	1.95	0.54	0.04	0.01	2.54
2006	25,159	6,927	588	147	32,822	1,291,254	1.95	0.54	0.05	0.01	2.54
2007	26,562	7,292	640	155	34,649	1,358,613	1.96	0.54	0.05	0.01	2.55
2008	28,120	7,686	691	164	36,661	1,429,449	1.97	0.54	0.05	0.01	2.56
2009	29,784	8,102	746	174	38,806	1,502,994	1.98	0.54	0.05	0.01	2.58
2010	31,560	8,549	806	184	41,100	1,579,312	2.00	0.54	0.05	0.01	2.60
2011	33,548	9,038	864	196	43,647	1,649,299	2.03	0.55	0.05	0.01	2.65
2012	35,967	9,605	898	209	46,679	1,721,095	2.09	0.56	0.05	0.01	2.71
2013	38,480	10,197	936	223	49,836	1,794,876	2.14	0.57	0.05	0.01	2.78
2014	41,102	10,814	981	238	53,134	1,869,857	2.20	0.58	0.05	0.01	2.84
2015	43,868	11,464	1,033	254	56,619	1,947,362	2.25	0.59	0.05	0.01	2.91
2016	46,794	12,152	1,087	270	60,303	2,027,351	2.31	0.60	0.05	0.01	2.97
2017	49,880	12,872	1,148	288	64,188	2,109,454	2.36	0.61	0.05	0.01	3.04
2018	53,268	13,639	1,211	307	68,425	2,193,824	2.43	0.62	0.06	0.01	3.12
2019	56,943	14,462	1,269	327	73,001	2,280,776	2.50	0.63	0.06	0.01	3.20
2020	60,894	15,346	1,326	349	77,915	2,370,244	2.57	0.65	0.06	0.01	3.29
2021	65,035	16,283	1,390	372	83,080	2,462,605	2.64	0.66	0.06	0.02	3.37
2022	69,511	17,298	1,447	397	88,652	2,558,365	2.72	0.68	0.06	0.02	3.47
2023	74,266	18,377	1,502	424	94,568	2,657,464	2.79	0.69	0.06	0.02	3.56
2024	79,251	19,509	1,556	451	100,767	2,760,654	2.87	0.71	0.06	0.02	3.65
2025	84,552	20,707	1,599	481	107,339	2,868,640	2.95	0.72	0.06	0.02	3.74
2026	90,143	21,982	1,624	512	114,261	2,982,692	3.02	0.74	0.05	0.02	3.83
2027	95,903	23,327	1,638	544	121,412	3,103,076	3.09	0.75	0.05	0.02	3.91
2028	101,945	24,737	1,637	577	128,897	3,229,578	3.16	0.77	0.05	0.02	3.99
2029	108,125	26,190	1,632	612	136,559	3,362,275	3.22	0.78	0.05	0.02	4.06
2030	114,345	27,670	1,631	646	144,292	3,501,280	3.27	0.79	0.05	0.02	4.12
2035	144,674	35,319	1,802	818	182,612	4,311,346	3.36	0.82	0.04	0.02	4.24
2040	177,646	43,923	2,055	1,006	224,630	5,324,826	3.34	0.82	0.04	0.02	4.22
2045	215,237	53,459	2,424	1,220	272,341	6,564,796	3.28	0.81	0.04	0.02	4.15
2050	260,605	64,115	2,832	1,474	329,026	8,072,770	3.23	0.79	0.04	0.02	4.08
2055	316,442	76,153	3,329	1,782	397,706	9,913,401	3.19	0.77	0.03	0.02	4.01
2060	386,582	90,457	3,684	2,163	482,885	12,208,400	3.17	0.74	0.03	0.02	3.96
2065	469,414	107,576	4,197	2,615	583,802	15,073,700	3.11	0.71	0.03	0.02	3.87
2070	569,931	128,683	4,847	3,166	706,627	18,621,010	3.06	0.69	0.03	0.02	3.79
2075	693,246	154,466	5,671	3,840	857,224	22,977,370	3.02	0.67	0.02	0.02	3.73
2080	846,254	185,538	6,623	4,673	1,043,088	28,317,680	2.99	0.66	0.02	0.02	3.68
2085	1,035,653	222,721	7,638	5,697	1,271,708	34,897,380	2.97	0.64	0.02	0.02	3.64
2090	1,267,084	267,076	8,752	6,943	1,549,855	43,047,360	2.94	0.62	0.02	0.02	3.60
2095	1,548,074	320,666	10,058	8,455	1,887,253	53,151,700	2.91	0.60	0.02	0.02	3.55
2100	1,889,904	385,701	11,643	10,293	2,297,541	65,645,190	2.88	0.59	0.02	0.02	3.50