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COMPONENTS OF TRENDS IN SOCIAL SECURITY COSTS

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ABSTRACT

This paper presents, by means of examples, a rather simple procedure for analyzing the factors that affect federal Old Age, Survivors, and Disability Insurance (OASDI) costs in the U.S. Based on this procedure, the tripling of the program costs during the last 30 years is shown to have resulted from increases in the number of beneficiaries that were much more rapid than the increases in the number of covered workers. Also the rapid increases in the number of beneficiaries are shown to have resulted from increases in the proportion of the aged population that became eligible for retirement benefits, rather than from increases in the size of the aged population. On the other hand, the rapid increases in the number of beneficiaries estimated for the future are shown to be mostly the result of rapid increases in the size of the aged population. The trends in economic factors, such as the ratio of average retirement benefits to average wages, are shown to be of only secondary importance in both the past and the future.

1. INTRODUCTION

In 1985, the Social Security system in the United States celebrated its fiftieth anniversary. Although taxes began to be collected in 1937, and monthly benefit payments began in 1940, we can view the system as starting in 1935 when the original Social Security Act became law. Since then, the system has grown significantly both in the scope of risks covered and in type of employment covered; however, except for the addition of Medicare, this growth has been relatively minor since the mid-1950s. Currently, the pension part of the insurance system, usually referred to as the OASDI program provides monthly cash benefits to workers and their spouses and children, in the event of the worker's retirement or disability, and to survivors of deceased insured workers. In 1985, more than 90 percent of all employment in the national economy was covered by the system.

Based on monetary measures, the OASDI program now represents about 25 percent of the federal budget and about 5 percent of the gross national product (GNP). The program touches almost every individual in our country, and it is the main source of income for a vast number of citizens.

Because of the undeniable importance of the OASDI program, we believe that it is of interest to analyze actuarially certain key components that have contributed to the program's past growth, as well as to its projected growth.

In this paper, we intend to provide the reader with a simple quantitative understanding of how the key components have driven, and are expected to drive, the actuarial cost of the program. Regarding historical values, our interest is in providing, to a large number of analysts and actuaries, a better overall view of the trends in the program's cost, rather than in presenting a detailed or comprehensive discussion of the changes in the Social Security Act that may have contributed to such trends. Due to the growth in the types of employment covered by the system before the mid-1950s and to limitations in the availability of data, the analyses in this paper start with the year 1955.

II. DEFINITION OF COST

As is customary in the actuarial literature on OASDI, cost is defined in terms of the combined employer-employee tax rate on taxable earnings needed to finance the expenditures of the program. Cost, therefore, is defined in relative terms and not in absolute dollars. As an example of the measure, for calendar-year 1980 we quote an OASDI cost that was 10.76 percent of taxable earnings. This was the result of expenditures of $123,550 million and taxable earnings amounting to $1,148,624 million in that year. Because the time span covered in this analysis is so long, it would be inappropriate to use measures of cost that are not relative to the changing value of the monetary units or to the changing size of the covered population.

We recognize that a more extensive analysis would require, for certain purposes, a cost that is measured with reference to values other than taxable earnings (e.g., the overall significance of OASDI with respect to the national economy would require a measure with reference to the GNP; but the most widely used measure of OASDI costs has been with reference to taxable earnings, and we prefer to continue using this measure, at least in this initial analysis.

Table 1 and chart A show what the cost of the OASDI program has been in the last 30 years and what it is projected to be for the next 65 years, based on the intermediate Alternative II-B set of assumptions presented in

TABLE 1

OASDI COST AS PERCENT OF TAXABLE EARNINGS
CALENDAR YEARS 1955–2050

Year	Cost	Year	Cost
1955	3.34	1983	11.60
1956	3.55	1984	11.33
1957	4.32	1985	11.29
1958	5.11	1986	11.09
1959	5.52	1987	11.05
1960	5.80	1988	11.04
1961	6.53	1989	11.00
1962	7.16	1990	11.07
1963	7.44	1991	11.04
1964	7.45	1992	11.03
1965	7.93	1993	11.01
1966	6.90	1994	11.00
1967	7.01	1995	10.86
1968	7.11	1996	10.72
1969	7.13	1997	10.55
1970	8.19	1998	10.35
1971	9.28	1999	10.21
1972	9.18	2000	10.17
1973	9.72	2005	10.12
1974	9.78	2010	10.74
1975	10.67	2015	11.98
1976	10.88	2020	13.51
1977	10.97	2025	14.90
1978	10.74	2030	15.70
1979	10.25	2035	15.89
1980	10.76	2040	15.71
1981	11.38	2045	15.59
1982	12.01	2050	15.58

NOTE.—The cost rates shown in this table for the historical period, i.e., prior to 1985, differ somewhat from the cost rates shown in the 1985 OASDI Trustees Report because (1) *EXP*, the numerator of the cost rates in this table, includes special benefits to uninsured persons age 72 or over in September 1965 ("Prouty" benefits), whereas such benefits are not included in the cost rates shown in the 1985 Trustees Report, and (2) *ETP*, the denominator of the cost, has been updated as compared to the 1985 Trustees Report.

the 1985 Annual Report of the OASDI Board of Trustees. The cost has been increasing steadily except for a few instances. These exceptions occurred in the late 1960s and in the late 1970s. In 1955, the cost was about 3.34 percent of taxable earnings, and it increased to a peak of about 12.01 percent of taxable earnings in 1982. Currently, it is slightly above 11 percent of taxable earnings.

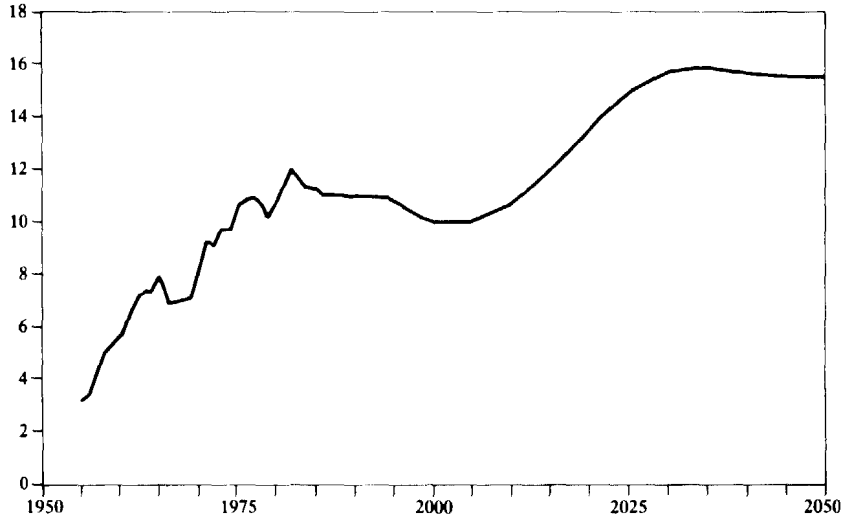

Chart A.—OASDI Cost as Percent of Taxable Earnings

For the future, the cost is projected to stay at about 11 percent of taxable earnings until around 1995. It will then decrease slowly for about a decade to a trough around 2005 with a cost level of about 10.1 percent of taxable earnings. Thereafter, it will increase rapidly for about 25 to 30 years reaching a relatively high plateau around 2030 where it is projected to stay at a level of about 15.5 to 16.0 percent of taxable earnings.

The future trends in OASDI costs can be described as consisting of three stages. In the first stage, which covers the next 20 to 25 years, the cost will slowly decrease or will remain relatively stable. The second stage, covering the following 25 to 30 years, will involve rapidly increasing costs. The final stage will be a plateau of relatively high costs.

III. KEY ASPECTS OF OASDI COST TRENDS

Because the OASDI program has such wide applicability, covering the vast majority of employees and self-employed persons and providing benefits to most retired workers, the program and its cost are directly affected by changes in the size and composition of the population of our nation. Substantial increases in the longevity of the population, without corresponding changes in work behavior at the older ages, would result in substantial

increases in the number of aged beneficiaries relative to the number of workers, and this in turn would produce higher costs. A lower level of fertility implies fewer orphan beneficiaries in the immediate future, fewer contributing workers somewhat later, and fewer retired workers in the distant future. We conclude that any analysis of the OASDI cost trends needs to include key demographic aspects to be complete.

The OASDI program also is affected strongly by changes in the national economy. Rapid growth in the labor force (particularly when accompanied by lower levels of unemployment) significantly increases the aggregate amount of national earnings taxable under the program and, therefore, its income. These higher earnings are eventually reflected in higher expenditures, because the retiring workers would have higher covered earnings on which higher benefits would be paid. Thus, a complete analysis of OASDI cost trends must also include key economic aspects.

We tend to see both the key demographic and economic aspects of the OASDI program as constituted by elements that pertain to the nation as a whole and that are not limited to the program. To a great extent, these aspects are affected by elements beyond the control of program planners and administrators. These elements are carefully considered in the formulation of policies for the program, but OASDI planners or administrators usually cannot do much beyond that.

A third set of key aspects strongly affects the OASDI program costs and depends greatly on how the program is structured and administered. The costs of disability benefits, for example, are highly dependent on the way that disability is defined and, once defined, on the way that such statutory (or regulatory) definition is administered. The same is true, to a lesser extent, with respect to the requirements established under the program for eligibility for retirement or survivors benefits. This third category of aspects, which we shall refer to as programmatic aspects, is largely (but not totally) under the control of legislators, planners, and administrators. These programmatic aspects also need to be included in any complete cost-trend analysis.

From a policy point of view, demographic and economic aspects have been described as "uncontrollable" and the programmatic aspects as "controllable." In actual practice, none of the sets is either fully controllable or uncontrollable. Policymakers have at their disposal a wide array of tools to affect the cost of the program. Also, policymakers may offset the effect of some of the uncontrollable elements by modifying some of the controllable ones. For example, as longevity increases and the demographic aspects tend

to yield higher OASDI costs, policymakers may increase the retirement age or lower the value of future benefits to partially or fully offset the cost increases.

The reader should recognize that the subdivision of all elements affecting OASDI costs into these three categories is not preordained or absolute. Some elements do not necessarily fall into only one, natural category; they could be assigned to one of the other two categories. The collection of the categories described is presented to help improve our understanding of the behavior of the cost trends from a point of view that the authors consider useful. Other points of view and collections could also yield useful insights.

IV. ELEMENTS OF OASDI COST

The OASDI cost is expressed in this paper as the ratio of the annual OASDI expenditures to the taxable earnings in that year. To be able to more readily analyze the trends, we segregate the cost into important elements. We recognize that significant preference and judgment enters into decisions as to how detailed the segregation should be, as well as to how to recombine the selected elements. The reader, after becoming acquainted with our methods, may want to try other relevant ways of subdividing the cost. Initially, our intent is to keep the number of elements small and to combine them into factors that would tend to be stable under "normal" circumstances. We believe that things should be kept simple and that departures from stable or fixed values are easier to detect than from moving values.

With these ideas in mind, we write the following identity:

$$\frac{(EXP)}{(ETP)} \equiv \frac{(EXP)\ (ABP)\ (APA)\ (NBA)\ (NCW)\ (ACE)\ (IAW)}{(ABP)\ (APA)\ (NBA)\ (NCW)\ (ACE)\ (IAW)\ (ETP)},$$

where the elements are defined as follows:[1]

EXP: Expenditures in the year. This is total program outgo, which mostly represents benefits and administrative expenses but which also includes some minor categories.

[1]The definitions of the various elements given in the main body of this paper are to some extent theoretical. Their quantification requires a willingness to depart somewhat from the realm of actual data. This means that to the extent that the data do not strictly conform to the theoretical concepts, an analysis of the differences would be required. Due to its highly technical nature, the required analysis is presented in an appendix rather than in the main body of the paper. We refer to Appendix C those readers who are interested in a discussion of the sources of the data presented in the paper and of the limitations of that data.

APA: All primary amounts. This is the average during the year of the aggregate amount of primary insurance amounts (PIAs) on which benefits were paid.

ABP: All benefit payments. This is the total of all PIA-related benefit payments made in the year.

NBA: Number of benefit accounts. This is the average number of worker accounts on which benefit payments were made in the year.

NCW: Number of covered workers. This is the number of workers for whom some earnings were taxable in the year.

ACE: All covered earnings. This is the total of all earnings (including earnings above the taxable base) in covered employment in the year.

IAW: Index of average wages. This is the value officially determined according to the Social Security Act to be the average wages per worker in the year for the national economy.

ETP: Effective taxable payroll. This is the amount which, when multiplied by the combined OASDI employer-employee tax rate, yields the OASDI tax liability for the year.

Note that all the elements in the right-hand side of the identity cancel out, except for *EXP* in the numerator and *ETP* in the denominator.

Data for each of these elements of OASDI cost are presented in table 2 for the period 1955 to 2050.

V. REGROUPING INTO FACTORS

Analysis of the data presented in table 2 is somewhat difficult because the values for many of the elements have a tendency to grow geometrically. To assist in the analysis, the elements in the right-hand side of the identity are regrouped into six factors as follows:

$$\frac{(EXP)}{(ABP)} \cdot \frac{(APA)}{(NBA)(IAW)} \cdot \frac{(ABP)}{(APA)} \cdot \frac{(NBA)}{(NCW)} \cdot \frac{(ACE)}{(ETP)} \cdot \frac{(NCW)(IAW)}{(ACE)}.$$

The Other Cost (OC) Factor

The first factor in the preceding expression refers to the elements *EXP* and *ABP*. It relates the annual total expenditures with the total annual benefit

TABLE 2

ELEMENTS OF OASDI COST TRENDS

Year	Expenditures $ Million (*EXP*)	Effective Taxable Payroll $ Million (*ETP*)	All Benefit Payments $ Million (*ABP*)	All Primary Amounts $ Million (*APA*)	Number Benefit Accounts Thousands (*NBA*)	Index Average Wages Dollar (*IAW*)	Number Covered Workers Thousands (*NCW*)	All Covered Earnings $ Million (*ACE*)
1955	5,079	152,173	4,854	3,704	5,017.82	3,301.44	65,200	196,100
1956	5,841	164,473	5,605	4,419	5,818.03	3,532.36	67,610	216,800
1957	7,567	175,003	7,266	5,271	6,785.60	3,641.72	70,590	233,900
1958	8,907	174,410	8,443	6,355	7,950.67	3,673.80	69,770	236,500
1959	10,793	195,673	10,128	7,969	9,092.21	3,855.80	71,700	255,000
1960	11,798	203,355	11,080	9,074	10,056.77	4,007.12	72,530	265,200
1961	13,388	205,170	12,577	10,155	11,008.47	4,086.76	72,820	270,700
1962	15,156	211,768	14,279	11,391	12,107.11	4,291.40	74,280	289,000
1963	16,217	218,001	15,221	12,573	13,185.72	4,396.64	75,540	302,300
1964	17,020	228,332	16,007	13,547	14,031.19	4,576.32	77,430	324,500
1965	19,187	241,847	18,093	15,373	14,758.75	4,658.72	80,680	351,700
1966	20,913	303,200	19,811	16,508	15,723.00	4,938.36	84,600	391,200
1967	22,471	320,378	21,154	17,752	16,925.52	5,213.44	87,040	422,300
1968	26,015	365,960	24,668	21,183	17,895.96	5,571.76	89,380	460,000
1969	27,892	391,255	26,460	22,931	18,593.58	5,893.76	92,060	502,800
1970	33,108	404,185	31,570	27,605	19,273.90	6,186.24	93,090	531,600
1971	38,542	415,174	36,865	32,509	20,022.31	6,497.08	93,340	559,700
1972	43,281	471,247	41,275	36,554	20,875.08	7,133.80	96,240	617,900
1973	53,148	546,566	51,131	44,225	21,825.33	7,580.16	99,830	686,700
1974	60,593	619,778	58,194	48,924	22,830.92	8,030.76	101,330	746,800
1975	69,184	648,306	66,586	57,894	23,789.27	8,630.92	100,200	787,600
1976	78,242	719,128	75,332	65,723	24,699.17	9,226.48	102,600	874,000
1977	87,254	795,748	84,263	73,818	25,593.65	9,779.44	105,800	963,800
1978	96,018	894,440	92,521	82,595	26,423.79	10,556.03	109,800	1,095,900
1979	107,320	1,047,417	103,924	93,384	27,141.79	11,479.46	112,700	1,225,200
1980	123,550	1,148,624	120,118	108,668	27,794.33	12,513.46	113,000	1,327,800

TABLE 2—*Continued*

Year	Expenditures $ Million (*EXP*)	Effective Taxable Payroll $ Million (*ETP*)	All Benefit Payments $ Million (*ABP*)	All Primary Amounts $ Million (*APA*)	Number Benefit Accounts Thousands (*NBA*)	Index Average Wages Dollar (*IAW*)	Number Covered Workers Thousands (*NCW*)	All Covered Earnings $ Million (*ACE*)
1981	144,352	1,268,569	140,663	125,344	28,259.10	13,773.10	113,400	1,442,800
1982	160,111	1,333,592	155,934	140,129	28,502.60	14,531.34	112,600	1,512,300
1983	171,177	1,476,102	166,492	149,449	28,954.18	15,239.24	113,400	1,589,100
1984	180,429	1,592,820	175,540	160,407	29,651.67	15,992.60	118,930	1,755,436
1985	193,190	1,710,947	187,966	174,113	30,735.67	16,595.52	122,900	1,883,521
1986	204,531	1,843,878	199,253	185,278	31,378.92	17,491.68	125,460	2,030,322
1987	220,027	1,991,064	214,449	199,080	31,955.29	18,591.91	127,830	2,201,027
1988	237,005	2,146,902	231,111	214,237	32,513.87	19,716.72	130,010	2,374,415
1989	254,456	2,313,966	248,315	229,494	33,045.93	20,943.10	131,800	2,556,858
1990	273,129	2,467,029	266,670	245,275	33,629.76	22,136.85	133,300	2,719,261
1991	290,704	2,633,045	283,872	260,019	34,104.85	23,338.88	134,710	2,897,556
1992	309,288	2,804,534	302,075	275,366	34,563.73	24,655.20	135,870	3,086,309
1993	328,880	2,986,221	321,254	291,438	34,994.58	26,040.82	137,050	3,287,628
1994	349,646	3,178,725	341,587	306,137	35,382.22	27,499.10	138,190	3,499,766
1995	368,141	3,389,881	360,007	324,561	35,767.18	29,008.81	139,485	3,729,695
1996	387,288	3,612,601	379,020	342,874	36,133.20	30,598.49	140,822	3,974,085
1997	406,101	3,849,621	397,718	362,167	36,487.81	32,275.28	142,177	4,234,489
1998	424,650	4,101,575	416,092	383,112	36,870.15	34,043.97	143,491	4,511,956
1999	446,344	4,369,649	437,587	405,337	37,247.29	35,909.58	144,849	4,807,604
2000	473,161	4,654,546	464,114	429,263	37,643.55	37,877.42	146,113	5,122,625
2005	640,221	6,323,304	629,243	581,930	40,151.51	49,456.55	151,562	6,960,686
2010	904,322	8,421,037	890,490	830,729	44,534.78	64,575.42	154,247	9,271,339
2015	1,324,072	11,054,859	1,306,262	1,230,651	50,719.54	84,316.13	154,856	12,172,627
2020	1,945,104	14,395,541	1,921,884	1,828,570	57,815.47	110,091.57	154,308	15,852,727
2025	2,790,163	18,724,855	2,759,740	2,659,758	64,734.92	143,746.56	153,588	20,622,059
2030	3,840,694	24,459,960	3,802,271	3,697,510	69,587.03	187,689.89	153,521	26,940,257
2035	5,098,721	32,088,101	5,051,773	4,940,046	71,912.06	245,066.68	154,108	35,344,213
2040	6,611,793	42,084,805	6,554,707	6,433,119	72,410.40	319,983.57	154,658	46,357,993
2045	8,605,649	55,186,956	8,535,472	8,412,429	72,938.38	417,802.55	155,184	60,793,655
2050	11,290,169	72,442,920	11,203,749	11,083,397	73,674.56	545,524.78	155,872	79,806,535

payments. We refer to it as the *other cost (OC) factor* and define it as follows:

$$OC = \frac{(EXP)}{(ABP)}.$$

The *OC* factor presents a way of recognizing that, although the main task of OASDI is paying benefits, additional expenditures are involved in running the system. These additional expenditures include the cost of collecting the taxes needed to pay the benefits; keeping of records of workers' covered earnings; receiving and processing applications for benefits; issuing the monthly checks; monitoring continued eligibility; and so on. Other expenses involved in the *OC* factor relate to the payment of lump-sum death benefits, transfers to the Railroad Retirement Account under the financial interchange provisions, and transfers for vocational rehabilitation expenses. In analyzing the OASDI cost trends, it would be of interest to see how this factor moved in the past and how it is projected to move in the future.

The Relative Benefit (RB) Factor

The second factor, which we will refer to as the *relative benefit (RB) factor*, is defined as follows:

$$RB = \frac{(APA)}{(NBA)(IAW)}.$$

This factor is associated with the average primary benefit per worker account as it relates to the index of average wages. In the definition of this factor, the assumed benchmark is a level of OASDI primary benefits that bears a constant relationship to the average wage. We believe that growth in average benefits paralleling growth in wages is a useful norm, particularly when the analysis covers long periods. Having faster or slower growth as a norm would result in a tendency for OASDI to become a larger or smaller sector of the national economy, and we believe that such an outcome should involve a deliberate decision, as opposed to an assumption implicitly built into the norm.

The Family and Age (FA) Factor

The third factor is called the *family and age (FA) factor*, and it is defined as follows:

$$FA = \frac{(ABP)}{(APA)}.$$

This factor compares the benefits that are being paid with those that would be paid if only the primary amount were paid for each account. Several ingredients significantly affect this factor's trend. Because the system pays benefits not only to the workers but also to others in their families and to survivors, we should expect that changes in the composition of families (the number and types of auxiliary beneficiaries and survivors that are entitled under the worker's account) would affect the movement of this factor. In addition, changes in the statutory amounts payable to the family members or survivors with respect to the primary amounts would also affect the factor. Further affecting the factor are the reductions (or increases) in benefits for early (or delayed) retirement and changes in the proportion of benefits that are paid retroactively for prior months. Finally, as a larger proportion of the population becomes eligible for primary benefits, the number and the amount of auxiliary or survivors benefits goes down, which is reflected in the factor.

The Demographic Load (DL) Factor

The fourth factor is called the *demographic load (DL) factor*, and it is defined as follows:

$$DL = \frac{(NBA)}{(NCW)}.$$

This factor compares the number of accounts on which benefit payments are made to the number of covered workers. It indicates the demographic load that the workers are shouldering in supporting the beneficiaries. This factor is affected by changes in the population, changes in the coverage rates, and changes in the coverage requirements for eligibility for benefits. The extension of the program's coverage to other groups of workers results in an immediate decrease in the factor. A higher participation of the population in the labor force also results in an immediate decrease in the factor. On the other hand, a liberalization in the eligibility requirements for benefits results in an increase in the factor. Similarly, a trend towards earlier retirement also increases the factor.

The Taxable Base (TB) Factor

The fifth factor is called the *taxable base (TB) factor*, and it is defined as follows:

$$TB = \frac{(ACE)}{(ETP)}.$$

This factor relates in reciprocal form the taxable earnings covered by the program to the total earnings in the covered economy. It indicates the extent to which total earnings in the covered economy exceed taxable earnings.

From the beginning, OASDI taxes have been payable on only a portion of all earnings in covered employment. This portion has changed through time as the taxable earnings base has been increased or as it has been allowed to lag behind the increases in earnings in covered employment. It should be recognized also that, to the extent that some earnings are taxed at a lower rate (e.g., tips and, in the past, self-employment income), the *ETP* is lower than *ACE*.

The Relative Earnings (RE) Factor

The sixth factor is the *relative earnings (RE) factor*, defined as follows:

$$RE = \frac{(NCW)(IAW)}{(ACE)}.$$

This factor relates in reciprocal form the average covered earnings per covered worker to the index of average wages. It indicates the extent to which average wages exceed average earnings covered by the program.

VI. ANALYSIS OF TRENDS IN COST FACTORS

Table 3 presents the data after regrouping into the six factors previously described. With this regrouping, the data become somewhat easier to analyze, and trends are simpler to discern.

The OC Factor

A study of table 3 and chart B show that the *OC* factor was about 1.046 in 1955. This means that, at that time, the other OASDI costs (besides the actual value of the monthly benefit checks that were paid) involved in the operations of the program added about 4.6 percent to the expenditures. This additional cost decreased to about 4.1 percent in 1957 but then increased to a peak of about 6.6 percent in 1959, due principally to the higher expenditures related to administration of monthly disability benefits, which generally are more costly to administer than are old-age or survivors benefits and which had been recently added. In the last 25 years, this factor has been decreasing due largely to significant improvements in administrative efficiency, but the decline has been somewhat erratic because of statutory modifications to the program enacted in that period. Each modification involves

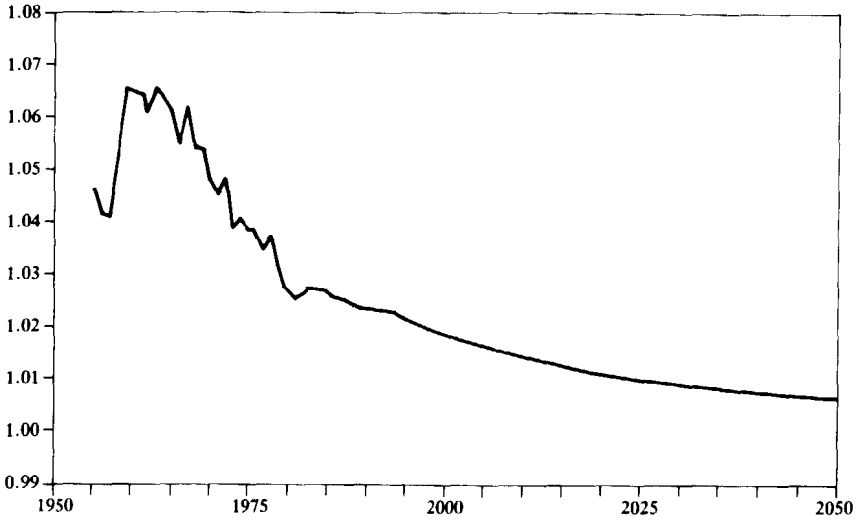

Chart B.—Other Cost Factor (OC)

some additional immediate cost of administration. Even those that eventually result in significant savings have the effect of temporarily increasing costs, due to the shifting from one way of doing things to another.

The *OC* factor, which for 1985 is estimated to add about 2.8 percent to program costs, is projected to decline slowly, as more of the activities related to the administration of the program are moved to faster computers with more efficient configurations and procedures. In the 25-year period, 1959-84, the additional cost decreased from about 6.6 percent to about 2.8 percent; this represents an annual compounded rate of decline of about 3.4 percent. The projected annual compounded rate of decline for the 65-year period 1985-2050 is about 1.9 percent. In the light of actual experience, the Alternative II-B projections in the 1985 Trustees Report related to the OC factor are conservative.

The RB Factor

A brief analysis of the *RB* factor in table 3 and chart C shows that from the mid-1950s to the end of the 1960s, OASDI benefits moved more or less at the same pace as average wages in the national economy. Beginning with 1970, this factor increased rapidly for over a decade. In large part, this faster increase in OASDI benefits than in average wages was due to problems with

TABLE 3

FACTORS OF OASDI COST TRENDS

Year	Other Cost (*OC*)	Relative Benefit (*RB*)	Family and Age (*FA*)	Demographic Load (*DL*)	Taxable Base (*TB*)	Relative Earnings (*RE*)	All Six Factors Combined*
1955	1.046	0.2236	1.311	0.0770	1.289	1.098	0.0334
1956	1.042	0.2150	1.268	0.0861	1.318	1.102	0.0355
1957	1.041	0.2133	1.378	0.0961	1.337	1.099	0.0432
1958	1.055	0.2176	1.329	0.1140	1.356	1.084	0.0511
1959	1.066	0.2273	1.271	0.1268	1.303	1.084	0.0552
1960	1.065	0.2252	1.221	0.1387	1.304	1.096	0.0580
1961	1.064	0.2257	1.239	0.1512	1.319	1.099	0.0653
1962	1.061	0.2192	1.254	0.1630	1.365	1.103	0.0716
1963	1.065	0.2169	1.211	0.1746	1.387	1.099	0.0744
1964	1.063	0.2110	1.182	0.1812	1.421	1.092	0.0745
1965	1.060	0.2236	1.177	0.1829	1.454	1.069	0.0793
1966	1.056	0.2126	1.200	0.1859	1.290	1.068	0.0690
1967	1.062	0.2012	1.192	0.1945	1.318	1.075	0.0701
1968	1.055	0.2124	1.165	0.2002	1.257	1.083	0.0711
1969	1.054	0.2093	1.154	0.2020	1.285	1.079	0.0713
1970	1.049	0.2315	1.144	0.2070	1.315	1.083	0.0819
1971	1.045	0.2499	1.134	0.2145	1.348	1.084	0.0928
1972	1.049	0.2455	1.129	0.2169	1.311	1.111	0.0918
1973	1.039	0.2673	1.156	0.2186	1.256	1.102	0.0972
1974	1.041	0.2668	1.189	0.2253	1.205	1.090	0.0978
1975	1.039	0.2820	1.150	0.2374	1.215	1.098	0.1067
1976	1.039	0.2884	1.146	0.2407	1.215	1.083	0.1088
1977	1.035	0.2949	1.141	0.2419	1.211	1.074	0.1097
1978	1.038	0.2961	1.120	0.2407	1.225	1.058	0.1074
1979	1.033	0.2997	1.113	0.2408	1.170	1.056	0.1025
1980	1.029	0.3124	1.105	0.2460	1.156	1.065	0.1076

*It will be observed that the product of all six factors combined yields the same cost as percent of taxable earnings presented in table 1.

TABLE 3—*Continued*

Year	Other Cost (*OC*)	Relative Benefit (*RB*)	Family and Age (*FA*)	Demographic Load (*DL*)	Taxable Base (*TB*)	Relative Earnings (*RE*)	All Six Factors Combined*
1981	1.026	0.3220	1.122	0.2492	1.137	1.083	0.1138
1982	1.027	0.3383	1.113	0.2531	1.134	1.082	0.1201
1983	1.028	0.3387	1.114	0.2553	1.077	1.087	0.1160
1984	1.028	0.3383	1.094	0.2493	1.102	1.083	0.1133
1985	1.028	0.3413	1.080	0.2501	1.101	1.083	0.1129
1986	1.026	0.3376	1.075	0.2501	1.101	1.081	0.1109
1987	1.026	0.3351	1.077	0.2500	1.105	1.080	0.1105
1988	1.026	0.3342	1.079	0.2501	1.106	1.080	0.1104
1989	1.025	0.3316	1.082	0.2507	1.105	1.080	0.1100
1990	1.024	0.3295	1.087	0.2523	1.102	1.085	0.1107
1991	1.024	0.3267	1.092	0.2532	1.100	1.085	0.1104
1992	1.024	0.3231	1.097	0.2544	1.100	1.085	0.1103
1993	1.024	0.3198	1.102	0.2553	1.101	1.086	0.1101
1994	1.024	0.3167	1.109	0.2560	1.101	1.086	0.1100
1995	1.023	0.3128	1.109	0.2564	1.100	1.085	0.1086
1996	1.022	0.3101	1.105	0.2566	1.100	1.084	0.1072
1997	1.021	0.3075	1.098	0.2566	1.100	1.084	0.1055
1998	1.021	0.3052	1.086	0.2570	1.100	1.083	0.1035
1999	1.020	0.3030	1.080	0.2571	1.100	1.082	0.1021
2000	1.019	0.3011	1.081	0.2576	1.101	1.080	0.1017
2005	1.017	0.2931	1.081	0.2649	1.101	1.077	0.1012
2010	1.016	0.2889	1.072	0.2887	1.101	1.074	0.1074
2015	1.014	0.2878	1.061	0.3275	1.101	1.073	0.1198
2020	1.012	0.2873	1.051	0.3747	1.101	1.072	0.1351
2025	1.011	0.2858	1.038	0.4215	1.101	1.071	0.1490
2030	1.010	0.2831	1.028	0.4533	1.101	1.070	0.1570
2035	1.009	0.2803	1.023	0.4666	1.101	1.069	0.1589
2040	1.009	0.2776	1.019	0.4682	1.102	1.068	0.1571
2045	1.008	0.2761	1.015	0.4700	1.102	1.066	0.1559
2050	1.008	0.2758	1.011	0.4727	1.102	1.065	0.1558

*It will be observed that the product of all six factors combined yields the same cost as percent of taxable earnings presented in table 1.

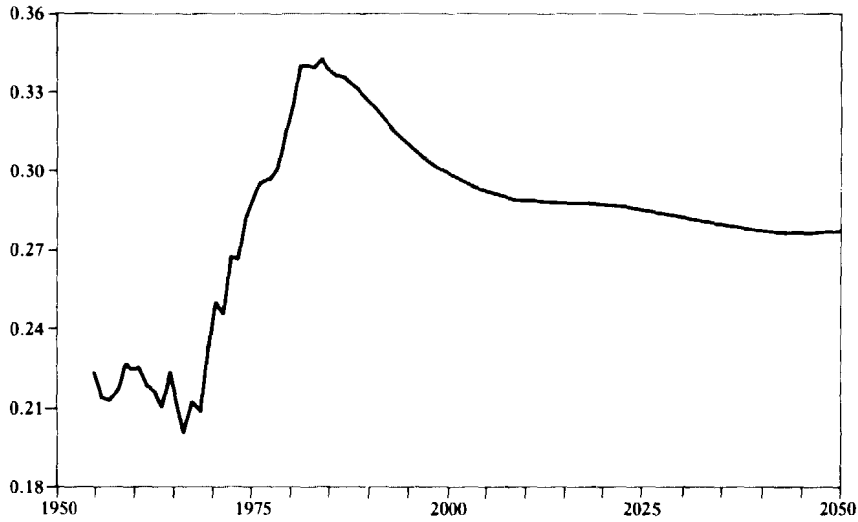

Chart C.– Relative Benefit (RB)

the coupled nature of the benefits computation procedures enacted in 1972 and corrected by entirely new procedures in the 1977 amendments. It should be recognized, however, that the faster increases started before the 1972 amendments and that they continued after the enactment of the 1977 amendments. Benefit increases amounting to 15 percent and 10 percent became effective in 1970 and 1971, respectively. These increases went well beyond what was needed to keep the OASDI benefits in line with wage increases. Social Security students should recognize, therefore, that a portion of the 60 percent increase in relative benefits that was experienced in the period 1969-83 represented a decision to expand the role of OASDI. A portion of the increase was not intended and is due to the problem with the coupled formula in effect with respect to newly eligible beneficiaries through 1978. The remainder is due to larger increases in the consumer price index (CPI), which is used to adjust benefits, than in wages.

For the future, the *RB* factor is projected to decline slowly because (1) the computation period for retirement benefits will continue to increase, which results in lower benefits; (2) the wage-indexed benefit formula enacted in 1977 was intended to result ultimately in roughly a 5 percent reduction in benefits for age-62 entitlement and larger reductions at other ages; (3) wages are projected to increase faster than the CPI; (4) most of the effect

of the increase in the normal retirement age which was enacted in 1983 will be to reduce benefits; (5) females with relatively lower benefits will be a larger proportion of the beneficiaries; and (6) longer life expectancies will increase the proportion of very old beneficiaries with lower benefits. According to the projections, the relative benefits will decrease by about 20 percent in the 65-year period 1985-2050. After that decrease, the relative level of benefits would still be about 25 percent higher than the level prevailing in the 1960s.

The FA Factor

An analysis of the *FA* factor in table 3 and chart D reveals a rapidly, although perhaps erratically, declining trend. The factor was about 1.31 in 1955; it increased to a peak of 1.38 in 1957 and is currently about 1.08. A large portion of the decrease is due to declining retirement age and to availability of reduced benefits for early retirement in 1956 for females and 1961 for males.

As a higher proportion of women becomes eligible for benefits on their own accounts, the number and the relative amount of wife's and widow's benefits will decline. In addition, when the increase in the normal retirement age enacted in 1983 becomes effective after the turn of the century, a shift

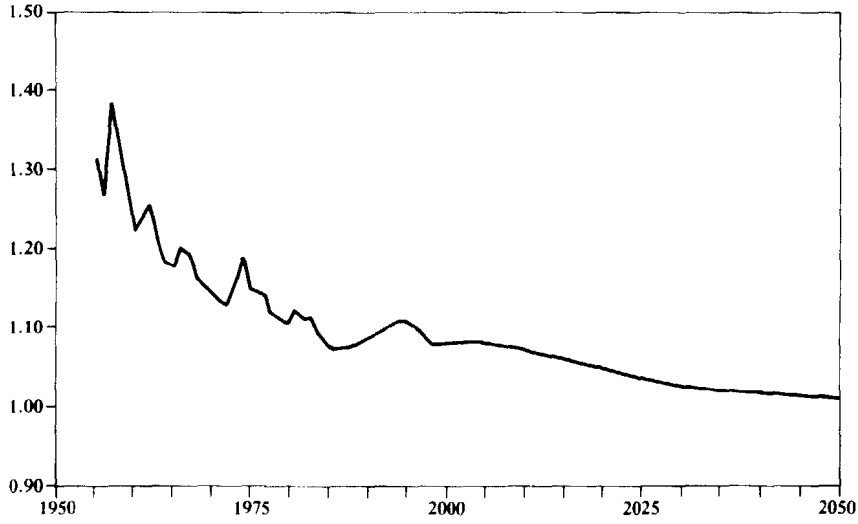

Chart D.—Family and Age (FA)

in the reference point for *PIA* to age 67 will occur, and a much larger proportion of beneficiaries will be receiving reduced benefits. This causes the *FA* factor to decrease considerably. The factor is projected to attain levels as low as 1.01, which implies that the additional benefits payable in excess of the *PIA*, because of dependents, survivors, or delayed retirements, almost would be offset by the reduction in benefits due to early retirement.

The DL Factor

The *DL* factor, as shown in table 3 and chart E, has been and is projected to be the most important of the six factors presented. In the past, this factor increased rapidly and relatively smoothly. In 1955, it was about 0.077—that is, benefits were being paid on 77 accounts for every 1,000 accounts on which taxes were being collected. As the program matured and as a larger proportion of the population had enough work covered under the program to become eligible for benefits, the *DL* factor increased rapidly. In addition, there was a tendency to retire earlier among the eligible workers. Several amendments to the law enacted in the 1950s and 1960s also made qualifying for benefits easier. On the other hand, no new large groups of contributors were added to the program through legislation. Except for government employees, most large groups of workers already were covered by the

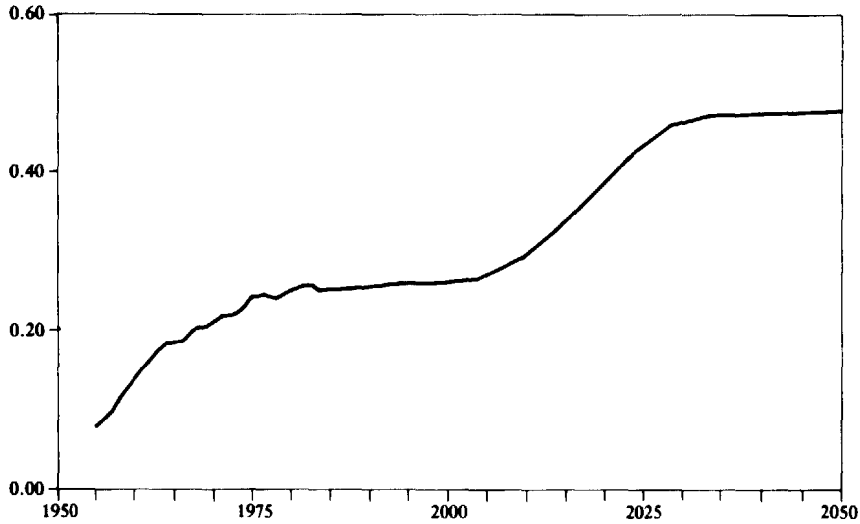

Chart E.—Demographic Load (DL)

mid-1950s. Although increases in the female labor force participation added new workers, these did not compare to the growth in the beneficiary rolls. By 1984, the factor had increased to 0.255—that is, benefits were being paid on 255 accounts for every 1,000 accounts on which taxes were being collected.

The *DL* factor is projected to stay around the 0.250 to 0.260 level until after the turn of the century and then to increase quickly for the following 25 to 30 years, to a level of about 0.450 to 0.460. This means that significant increases will occur in DL even though an increase in the normal retirement age was enacted in 1983.

The TB Factor

The *TB* factor shown in table 3 and chart F has experienced two different trends. Until 1965, it had a tendency to increase because, although the maximum amount of earnings taxable under the program was revised periodically, the amount was not increased rapidly enough to compensate for the relative increases in earnings. This led to a larger proportion of earnings in covered employment above the taxable base and, thus, resulted in a higher *TB* factor. The reverse was the case from 1965 to the present. In this period, the revisions in the taxable earnings base have been more than enough to

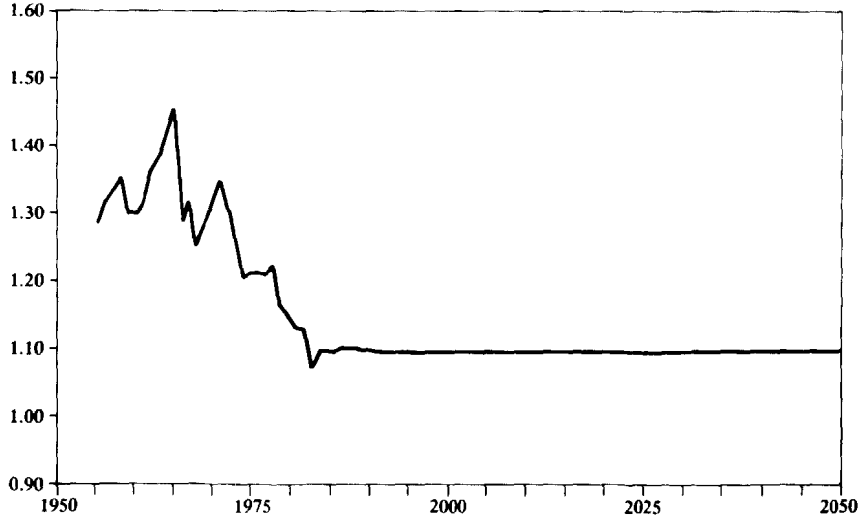

Chart F.—Taxable Base (TB)

compensate for the increase in earnings. For the future, the *TB* factor is projected to remain about level, because the automatic-adjustment provisions in the current law require that the taxable base be adjusted for increases in wages.

The RE Factor

The last factor to be analyzed, as shown in table 3 and chart G, is the *RE* factor. In the past, this factor has moved within a narrow range. A slight tendency for the factor to decrease may be observed. We do not have acceptable explanations for the fluctuations in the past. They could be due to the differences that exist between the wage series (on which the *IAW* is based) and earnings in employment covered by the system, *ACE*. The latter includes self-employment and refers to a slightly different group of workers. The fluctuation may also be due to differences in the methodologies used to estimate the amount of wages or earnings that are above the taxable base. In addition, changes in the unemployment rates may affect each series differently.

For the future, the *RE* factor is projected to continue declining slowly. This is mostly due to the gradual coverage of federal workers, which will tend to result in lower factors due to their higher earnings. In addition, an

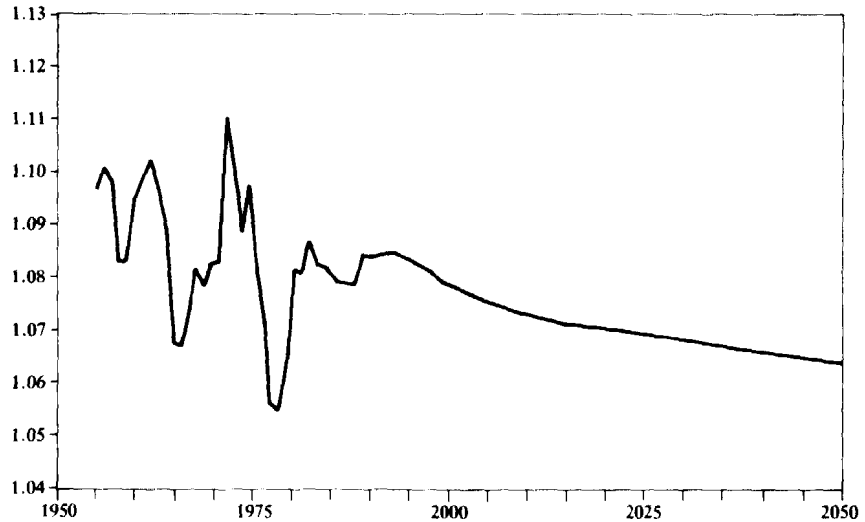

Chart G.—Relative Earnings (RE)

assumption that net earnings from self-employment income will increase slightly more rapidly than wages will cause the factor to continue decreasing after about 2015.

VII. GENERAL OBSERVATIONS

In section VI, the trends in each one of the six selected OASDI cost factors were analyzed. It should be evident that when all six factors are multiplied together, the resulting trend would be that of the overall cost of the OASDI program, which was discussed in section II. This may be more readily observable from charts H and I for the past (covering the period 1955-84) and for the projected future (covering the period 1985-2050), respectively. Analysis of the factors, as shown in table 3 and in these charts, has provided us with relative measures of their importance.

It is also evident that of all six factors, the most important one has been and will continue to be the *DL* factor. In fact, the more than tripling of the OASDI cost experienced in the period 1955-84 was almost entirely due to the *DL* factor. The other five factors taken as a group contributed only about 5 percent to the increase in cost.

For the future, the *DL* factor is projected to increase by over 80 percent relatively after the turn of the century. If it were not for the dampening effect of the other five factors, the OASDI cost would reach levels of about 20 percent of taxable payroll.

This general analysis leads us to believe, regarding the future cost of the OASDI program, that policymakers will need to give a major share of their attention to subjects related to the number of beneficiaries. Obviously, the normal retirement age would be a prime target. As life expectancy continues to increase, further increases in the normal retirement age would be needed, if OASDI costs are to be kept from increasing significantly. Increasing the minimum retirement age would be of even more importance. Without an increase in the minimum retirement age, the result of an increase in the normal retirement age would be mostly to lower further the level of relative benefits beyond the approximate 20 percent reduction projected under present law, without having much of an effect on the demographic load.

Another possibility for reducing the number of beneficiaries, besides that of increasing the normal retirement age together with the minimum retirement age, would be to tighten the requirements regarding eligibility for retirement benefits so that a lower portion of aging workers would be able to draw benefits. We feel, however, that such tightening would work against

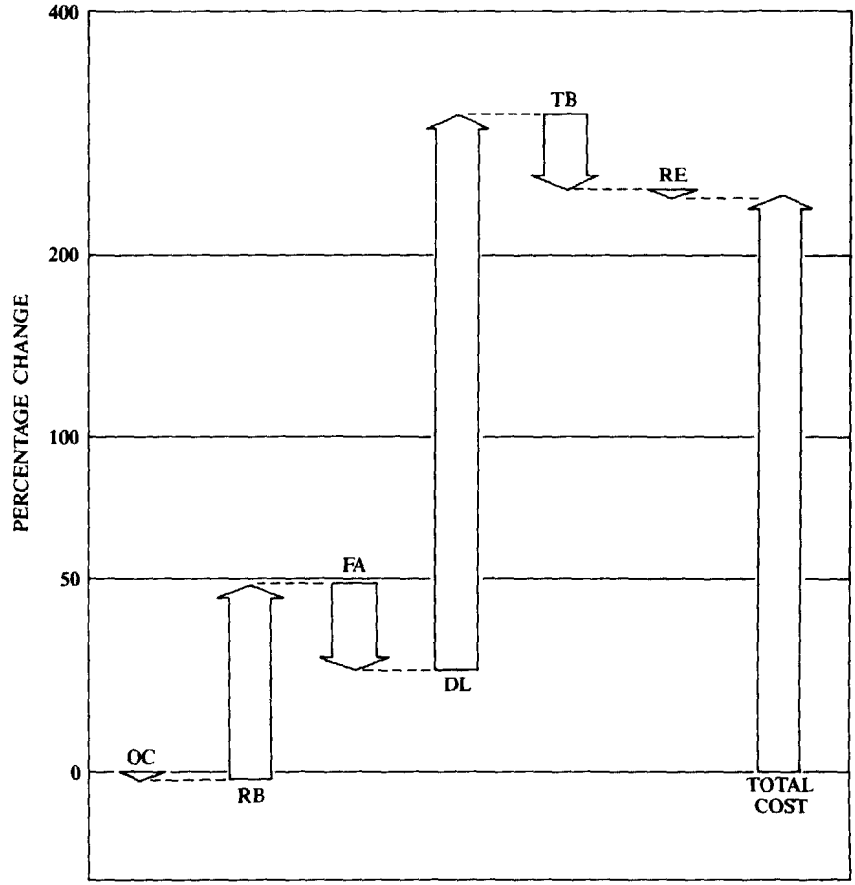

Chart H.—Percentage Change in OASDI Cost by Factor, 1955–84

the principle of universality of benefits towards which the OASDI program has been guided for many years.

A third possibility relates to encouraging aging workers to continue in the labor force. Some Social Security experts believe that, due to future labor shortages, workers may decide to continue working to a higher age. We believe that although any delay in the average retirement age would reduce the cost of the program, the resulting reductions would offset only a minor portion of the projected increases in program costs. The OASDI program,

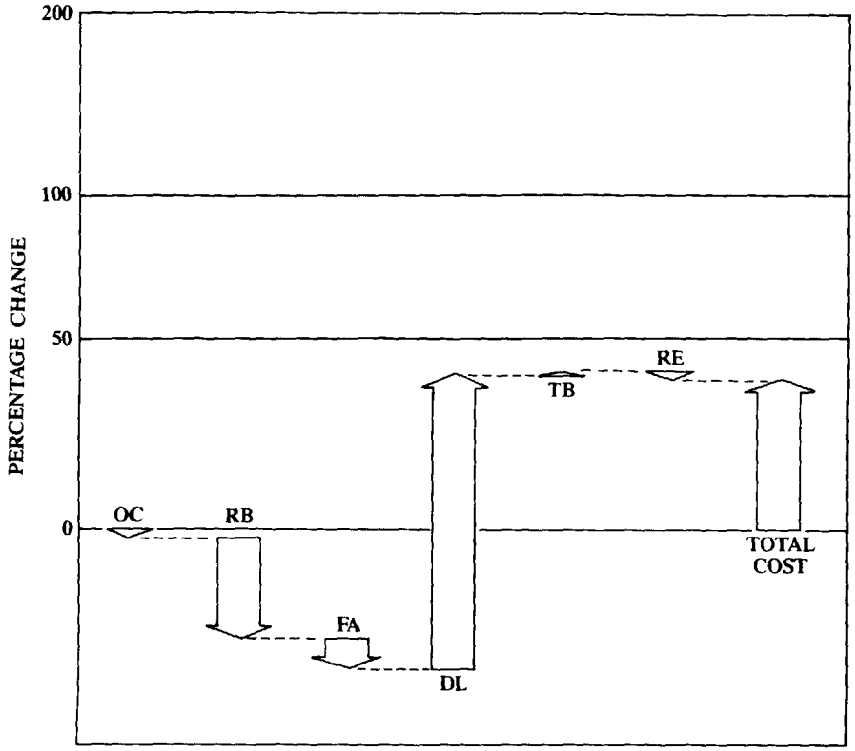

Chart I.—Percentage Change in OASDI Projected Cost by Factor, 1985–2050

as presently structured, rewards individuals delaying retirement with increases in monthly benefits that are close to the long-range actuarial equivalent of the foregone benefits. Voluntary increases in the retirement age, whether encouraged or not, will not result in substantial reductions in the projected long-range costs of the OASDI program, but rather in a slight postponement of such higher costs.

Before ending, we would like to reiterate that, as indicated in section IV, we have deliberately kept the number of elements and factors small. A higher number of elements and factors could yield deeper insights into the cost trends, but only at the risk of losing the overall view. However, we do not want to leave the reader with the impression that such deeper analyses are not useful or justifiable. It is mostly a matter of judgment, which must be

exercised based on the uses and purposes of the end product and on the amount and quality of data available. As examples of a more detailed analyses, we refer the reader to appendixes A and B.

VIII. SUMMARY AND CONCLUSIONS

In the interest of simplifying the presentation, we have in many cases opted to disregard certain peculiarities of the OASDI program and of data pertaining to it. We do believe, however, that the salient conclusions of the analysis are correct and that more precise concepts or data will not refute them but rather might blur the trends and the reader's understanding of them.

Among the principal conclusions, we list the following:

1. In the 1970s and early 1980s, OASDI benefits increased more rapidly than wages, exceeding their relative value by a cumulative increase of about 60 percent. During the next 65 years, however, relative benefits are projected to decrease by about 20 percent.
2. The most important aspect affecting OASDI costs has been the demographic trends, i.e., the ratio of beneficiaries to workers. Such will also be the case in the future, and after the turn of the century, the demographic load is projected to increase by over 80 percent. Other factors are not projected to significantly affect future costs.
3. Policies intended to keep OASDI costs from increasing significantly will need to address the issue of restraining the rapid growth in the number of beneficiaries.

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APPENDIX A

A MORE DETAILED SEGREGATION OF THE DEMOGRAPHIC LOAD FACTOR

As a first example of a more detailed segregation we show in this appendix one way of more closely analyzing the *DL* factor.

In section V, the *DL* factor was defined as follows:

$$DL = \frac{(NBA)}{(NCW)}.$$

This factor compares the number of accounts on which benefit payments are made to the number of accounts on which OASDI taxes are collected and provides a rough idea of the relative beneficiary load that each worker carries. This relative load is affected by many elements. Among these elements we have selected a few that we consider to be important and for which data can be obtained. On that basis, we redefine the *DL* factor as follows:

$$DL = \frac{(NBA)}{(NOA)} \cdot \frac{(NOA)}{(NOE)} \cdot \frac{(NOE)}{(NOP)} \cdot \frac{(NOP)}{(NYP)} \cdot \frac{(NYP)}{(NCW)}.$$

The new elements are defined as follows:

NOA: Number of old-age accounts, i.e, the number of accounts on which old-age retirement benefits are being paid.

NOE: Number of old-age eligibles, i.e., the number of accounts on which old-age benefits could be paid. This includes those accounts on which old-age benefits are being paid as well as those on which benefits are not being paid although they are eligible for payment. The latter are usually workers who have not yet retired even though all the benefit eligibility requirements have been met.

NOP: Number of old-age persons, i.e., the number of persons aged 62 and over in the United States population.

NYP: Number of young persons, i.e., the number of persons aged 16-61 in the United States population.

The preceding equation could also be seen as defining the *DL* factor in terms of the following five separate factors:

1. The other benefits (*OB*) factor, defined as:

$$OB = \frac{(NBA)}{(NOA)}.$$

2. The retirement prevalence (*RP*) factor, defined as:

$$RP = \frac{(NOA)}{(NOE)}.$$

3. The old-age eligibility (*OE*) factor, defined as:

$$OE = \frac{(NOE)}{(NOP)}.$$

4. The pure demographic (*PD*) factor, defined as:

$$PD = \frac{(NOP)}{(NYP)}.$$

5. The coverage rate (*CR*) factor, defined as:

$$CR = \frac{(NYP)}{(NCW)}.$$

Values for each of these five new factors are shown in appendix table A. According to the first column in the table, the *OB* factor was at a level of 1.32 in 1955, which means that for every 100 old-age accounts on which retirement benefits were being paid, there were an additional 32 accounts on which other benefits (disability or survivors) were being paid. This factor increased to a peak of about 1.50 in the late 1960s and early 1970s, due

APPENDIX TABLE A

FURTHER SEGREGATION OF THE DEMOGRAPHIC LOAD (*DL*) FACTOR

Year	Other Benefit (*OB*)	Retirement Prevalence (*RP*)	Old-Age Eligibility (*OE*)	Pure Demographic (*PD*)	Coverage Rate (*CR*)
1955	1.3161	0.6693	0.3240	0.1885	1.5474
1956	1.3099	0.7020	0.3493	0.1924	1.5027
1957	1.3059	0.6424	0.4390	0.1958	1.4507
1958	1.3141	0.6813	0.4696	0.1985	1.4805
1959	1.3361	0.7078	0.4866	0.2006	1.4584
1960	1.3519	0.7239	0.4997	0.2039	1.4572
1961	1.3619	0.7327	0.5272	0.2057	1.4677
1962	1.3659	0.6486	0.6426	0.2073	1.4538
1963	1.3704	0.6662	0.6601	0.2066	1.4576
1964	1.3774	0.6706	0.6749	0.2066	1.4456
1965	1.3931	0.6720	0.6891	0.2067	1.4095
1966	1.4398	0.6715	0.7092	0.2065	1.3677
1967	1.4837	0.6759	0.7196	0.2074	1.3483
1968	1.4964	0.6747	0.7301	0.2081	1.3341
1969	1.5019	0.6755	0.7387	0.2088	1.3157
1970	1.5016	0.6774	0.7470	0.2099	1.3234
1971	1.5005	0.6899	0.7471	0.2111	1.3428
1972	1.5000	0.7026	0.7473	0.2128	1.3244
1973	1.4956	0.7223	0.7478	0.2135	1.2998
1974	1.4923	0.7399	0.7486	0.2141	1.3032
1975	1.4922	0.7505	0.7496	0.2152	1.3412
1976	1.4927	0.7601	0.7507	0.2163	1.3325
1977	1.4903	0.7687	0.7516	0.2177	1.3143
1978	1.4839	0.7776	0.7526	0.2185	1.2884
1979	1.4732	0.7850	0.7536	0.2193	1.2764
1980	1.4602	0.7948	0.7545	0.2198	1.2943
1981	1.4275	0.8033	0.7553	0.2211	1.3074
1982	1.3982	0.8086	0.7559	0.2235	1.3315
1983	1.3907	0.8137	0.7569	0.2262	1.3348
1984	1.3862	0.8162	0.7579	0.2294	1.2832
1985	1.3831	0.8191	0.7589	0.2321	1.2530
1986	1.3760	0.8232	0.7598	0.2344	1.2394
1987	1.3671	0.8266	0.7608	0.2367	1.2280
1988	1.3596	0.8301	0.7616	0.2391	1.2164
1989	1.3536	0.8332	0.7624	0.2413	1.2083
1990	1.3477	0.8382	0.7633	0.2433	1.2026
1991	1.3438	0.8408	0.7639	0.2448	1.1987
1992	1.3404	0.8428	0.7642	0.2463	1.1966
1993	1.3378	0.8449	0.7648	0.2472	1.1955
1994	1.3358	0.8476	0.7657	0.2471	1.1955
1995	1.3347	0.8495	0.7668	0.2469	1.1951

APPENDIX TABLE A—*Continued*

Year	Other Benefit (*OB*)	Retirement Prevalence (*RP*)	Old-Age Eligibility (*OE*)	Pure Demographic (*PD*)	Coverage Rate (*CR*)
1996	1.3339	0.8506	0.7683	0.2463	1.1958
1997	1.3338	0.8505	0.7697	0.2458	1.1962
1998	1.3341	0.8501	0.7714	0.2454	1.1970
1999	1.3345	0.8496	0.7735	0.2449	1.1974
2000	1.3350	0.8481	0.7756	0.2452	1.1970
2005	1.3395	0.8291	0.7892	0.2532	1.1941
2010	1.3261	0.8101	0.8089	0.2796	1.1887
2015	1.2890	0.8136	0.8289	0.3194	1.1797
2020	1.2512	0.8191	0.8445	0.3715	1.1653
2025	1.2256	0.8259	0.8558	0.4220	1.1529
2030	1.2050	0.8465	0.8644	0.4451	1.1549
2035	1.1960	0.8549	0.8697	0.4531	1.1582
2040	1.1961	0.8576	0.8745	0.4470	1.1677
2045	1.1992	0.8481	0.8775	0.4519	1.1654
2050	1.1973	0.8481	0.8805	0.4543	1.1637

mostly to the rapid increases in disability benefits. Since then it has decreased to slightly below the 1.40 level. It can be concluded that, although the demographic load factor tripled in the period 1955-84 as discussed in the main body of the paper, only about 5 percent of the increase was due to other than old-age benefits. This means that the combined effect of the disability and survivors portion of the program added only about 5 percent to the increase in the OASDI demographic load factor.

Column 1 also shows that the *OB* factor is projected to decline slowly from the present level of about 1.38 to around 1.20 by 2050. The projected increase in the OASDI demographic load factor, therefore, is not due to the projected trends in the disability and survivors portion of the program.

Column 2 shows the trends in the retirement prevalence factor. In the period 1955-84, the *RP* factor increased from 0.67 to 0.82, or by about 22 percent relatively. This increase has been due mostly to the trends toward earlier retirement. For the future, the *RP* factor is projected to increase by about 4 percent relatively to a level in which about 85 monthly old-age benefits will be paid for every 100 eligible persons. The small dip in this factor after the turn of the century is due to the effect of the "baby-boom" generation which will be reaching retirement age around that time. The trends in the *RP* factor can be summarized by stating that, although in the past workers have tended to retire early and that this tendency has increased OASDI costs significantly, this has not been the major reason for the tripling of the costs that were experienced by the program. For the future, this factor will increase the OASDI costs only slightly.

The third factor, shown in column 3 in the table, refers to the eligibility among the aged population to receive old-age retirement benefits. The *OE* factor was at a level of about 32 percent in 1955; i.e., about 32 out of every 100 aged persons in the United States population were eligible to receive OASDI retirement benefits. This ratio increased by over 130 percent to about 76 eligibles out of every 100 persons by 1984. There are three principal reasons for this rapid increase: (1) the requirements for eligibility were liberalized significantly from one quarter of coverage for every two elapsed quarters to one quarter of coverage for every four elapsed quarters; (2) the continued higher level of participation by females in the labor force made a higher proportion of them eligible for retirement benefits; and (3) the normal maturation of the program resulted in a higher proportion of those reaching retirement age having a larger portion of their working years covered by the program.

The *OE* factor is projected to increase from about 0.76 to about 0.88 mostly because of the increasing eligibility of female workers for old-age benefits on their own accounts. About 13 percentage points of the 80 percent increase in the demographic load factor projected to occur after the turn of the century are due to higher eligibility for retirement benefits.

The fourth factor is the *PD* factor, and its level and trends can be observed from the fourth column of the table. In 1955, there were about 19 persons aged 62 and over for every 100 persons aged 16-61 in the United States population. This ratio increased slowly by about 22 percent to around 23 aged persons per 100 young persons by 1984. Thus, although in the past the *PD* factor increased significantly, it was not the main reason for the tripling of the OASDI costs.

For the future, the *PD* factor is projected to almost double from 0.23 to 0.45, with most of the increase occurring after the turn of the century. Thus, the pure demographic factor will be the major reason for the projected increase in OASDI costs.

The fifth factor is the *CR* factor which, according to the last column in the table, decreased from 1.55 in 1955 to 1.28 in 1984. This means that, due to the *CR* factor, the OASDI cost should have declined by about 18 percent relatively in the 29-year period. The decline in the *CR* factor has been due mostly to the higher level of participation of females in the labor force.

In the future, the *CR* factor is projected to decrease further to a level of about 1.16, as females continue increasing their participation in the labor force and as federal employment becomes more fully covered by the OASDI program.

In summary, it can be concluded that the tripling of the *DL* factor in the 1955-84 period was due mostly to the increasing eligibility for retirement benefits and partly to a combination of pure demographic shifts and a tend-

ency to retire earlier. The effect of the disability and survivors benefits on the *DL* factor was minor, while the increasing program coverage kept the costs from increasing faster.

The effects of these factors in the future are projected to be different from what they were in the past. The most important factor will be the pure demographic factor; i.e., shift in the United States population. Other factors are projected to add little to or to reduce program costs.

APPENDIX B

A MORE DETAILED SEGREGATION OF THE RELATIVE EARNINGS FACTOR

As another example of a more detailed segregation, we base the *RE* factor on elements that we have used in connection with previous work.

The *RE* factor was defined in section V as follows:

$$RE = \frac{(NCW)(IAW)}{(ACE)}.$$

This factor provides an indication of the extent to which the average earnings covered by the system are keeping up with the official Social Security average wages series. Because changes in wages are generally regarded as consisting of a combination of inflation in prices and increases in real wage, a more detailed analysis would involve a study of the different growth in the OASDI covered earings as compared with the official Social Security wage series, after adjustment for inflation. If the same measure of inflation (*CPI-W*) is used to adjust both series, the comparison would be reduced to the differences between the series of real wages in the official wage series and real earnings covered by the OASDI system. Taking this into account, more elements could be developed on the basis of the work presented in [4], *Economic Projections for OASDI Cost and Income Estimates, 1984*. Special attention should be given to pages 11 through 17 of that reference. On that basis, the *RE* factor could be redefined as follows:

$$RE = \frac{(NCW)}{(COM)} \cdot \frac{(COM)}{(PRO)} \cdot \frac{(PRO)}{(GPD)} \cdot \frac{(GPD)}{(CPI)} \cdot \frac{(CPI)}{(HOU)} \cdot \frac{(HOU)}{(USE)} \cdot \frac{(USE)}{(USW)} \cdot \frac{(USW)}{(ACE)} \cdot (IAW).$$

The additional elements not already defined in section IV of the paper would be defined as follows:

COM: Total compensation paid for all employment in the year

PRO: Total production in the year

GPD: Gross national product (GNP) deflator

CPI: Consumer price index

HOU: Hours worked per worker in the year

USE: Total earnings in the United States economy

USW: Total number of workers in the United States economy

The elements on the right side of the previous equation could be regrouped as follows:

$$\frac{(USW)(HOU)(GPD)}{(PRO)} \cdot \frac{(PRO)}{(COM)} \cdot \frac{(COM)}{(USE)} \cdot \frac{(CPI)}{(GPD)} \cdot \frac{1}{(HOU)} \cdot \frac{(USE)(NCW)}{(ACE)(USW)} \cdot \frac{(IAW)}{(CPI)}.$$

After this regrouping, the first five factors are recognized from the analysis of linkages between productivity and real earnings that was presented in [4]. In this appendix, however, they appear in reciprocal form.

The first factor is the reciprocal of productivity; the second factor is the reciprocal of the ratio of total compensation to total production; the third factor is the reciprocal of the ratio of total earnings to total compensation; the fourth factor is the reciprocal of the *GNP* deflator to the *CPI*; and the fifth factor is the reciprocal of the number of hours worked. These first five factors taken together would represent a measure of the real earnings in the United States economy, although in reciprocal form.

The sixth factor converts the value of the first five factors from its reference to the total United States economy to the OASDI covered economy, in reciprocal form. Therefore, the first six factors taken together represent, in reciprocal form, the series of average real earnings covered by OASDI.

The last factor represents the growth in real wages that is implicit in the official Social Security wage index series.

In brief, the *RE* factor could be viewed as consisting of three basic factors: (1) the reciprocal of growth of average real earnings in the United States economy, (2) the conversion factor from the United States economy to the OASDI covered economy, and (3) the real growth underlying the official wage index series. We show, in appendix table B, values for the conversion factor and for the ratio of real average earnings underlying the official Social Security wage index series to the real average earnings in the United States economy.

After reviewing the last two columns in the table, we conclude that the additional analysis, although more detailed than that presented in the body of the paper, does not yield significant additional information about past

APPENDIX TABLE B

FURTHER SEGREGATION OF THE RELATIVE EARNINGS (*RE*) FACTOR

Year	All U.S. Earnings $ Million (*USE*) (1)	Number U.S. Workers Thousands (*USW*) (2)	All Covered Earnings $ Million (*ACE*) (3)	Number Covered Workers Thousands (*NCW*) (4)	Index Average Wages Dollar (*IAW*) (5)	Conversion Factor (1) × (4) / ((3) × (2)) (6)	Ratio of Wages to Earnings (5) × (2) / (1) (7)
1955	254,600	65,220	196,100	65,200	3,301.44	1.2979	0.8457
1956	272,200	66,660	216,800	67,610	3,532.36	1.2734	0.8651
1957	284,600	66,870	233,900	70,590	3,641.72	1.2844	0.8557
1958	288,200	65,672	236,500	69,770	3,673.80	1.2946	0.8371
1959	306,500	67,183	255,000	71,700	3,855.80	1.2828	0.8452
1960	319,100	68,290	265,200	72,530	4,007.12	1.2779	0.8576
1961	328,100	68,321	270,700	72,820	4,086.76	1.2919	0.8510
1962	347,900	69,528	289,000	74,280	4,291.40	1.2861	0.8576
1963	363,900	70,499	302,300	75,540	4,396.64	1.2898	0.8518
1964	388,600	72,046	324,500	77,430	4,576.32	1.2870	0.8484
1965	418,900	73,813	351,700	80,680	4,658.72	1.3019	0.8209
1966	458,900	76,021	391,200	84,600	4,938.36	1.3054	0.8181
1967	488,200	77,820	422,300	87,040	5,213.44	1.2930	0.8310
1968	533,600	79,458	460,000	89,380	5,571.76	1.3049	0.8297
1969	582,700	81,409	502,800	92,060	5,893.76	1.3105	0.8234
1970	614,900	81,865	531,600	93,090	6,186.24	1.3153	0.8236
1971	650,913	82,176	559,700	93,340	6,497.08	1.3210	0.8202
1972	712,054	84,575	617,900	96,240	7,133.80	1.3113	0.8473
1973	796,391	87,387	686,700	99,830	7,580.16	1.3249	0.8318
1974	853,942	89,030	746,800	101,330	8,030.76	1.3014	0.8373
1975	896,409	88,035	787,600	100,200	8,630.92	1.2954	0.8476
1976	983,997	90,895	874,000	102,600	9,226.48	1.2708	0.8523
1977	1,087,013	94,155	963,800	105,800	9,779.44	1.2673	0.8471
1978	1,225,022	98,172	1,095,900	109,800	10,556.03	1.2502	0.8459
1979	1,369,531	100,912	1,225,200	112,700	11,479.46	1.2484	0.8458
1980	1,474,091	101,413	1,327,800	113,000	12,513.46	1.2370	0.8609

APPENDIX TABLE B—*Continued*

Year	All U.S. Earnings $ Million (*USE*) (1)	Number U.S. Workers Thousands (*USW*) (2)	All Covered Earnings $ Million (*ACE*) (3)	Number Covered Workers Thousands (*NCW*) (4)	Index Average Wages Dollar (*IAW*) (5)	Conversion Factor (1)×(4) / ((3)×(2)) (6)	Ratio of Wages to Earnings (5)×(2) / (1) (7)
1981	1,618,305	102,537	1,442,800	113,400	13,773.10	1.2405	0.8727
1982	1,679,789	101,717	1,512,300	112,600	14,531.34	1.2296	0.8799
1983	1,780,482	103,028	1,589,100	113,400	15,239.24	1.2332	0.8818
1984	1,956,100	107,168	1,755,436	118,930	15,992.60	1.2366	0.8762
1985	2,089,214	110,095	1,883,521	122,900	16,595.52	1.2382	0.8745
1986	2,238,680	112,815	2,030,322	125,460	17,491.68	1.2262	0.8815
1987	2,417,214	115,340	2,201,027	127,830	18,591.91	1.2171	0.8871
1988	2,598,452	117,337	2,374,415	130,010	19,716.72	1.2126	0.8903
1989	2,788,776	119,244	2,556,858	131,800	20,943.10	1.2056	0.8955
1990	2,972,041	120,566	2,719,261	133,300	22,136.85	1.2084	0.8980
1991	3,159,383	121,831	2,897,556	134,710	23,338.88	1.2056	0.9000
1992	3,360,115	122,960	3,086,309	135,870	24,655.20	1.2030	0.9022
1993	3,573,554	124,058	3,287,628	137,050	26,040.82	1.2008	0.9040
1994	3,799,256	125,133	3,499,766	138,190	27,499.10	1.1988	0.9057
1995	4,041,549	126,248	3,729,695	139,485	29,008.81	1.1972	0.9062
1996	4,298,809	127,289	3,974,085	140,822	30,598.49	1.1967	0.9060
1997	4,572,444	128,322	4,234,489	142,177	32,275.28	1.1964	0.9058
1998	4,863,498	129,282	4,511,956	143,491	34,043.97	1.1964	0.9050
1999	5,173,078	130,294	4,807,604	144,849	35,909.58	1.1962	0.9045
2000	5,502,364	131,246	5,122,625	146,113	37,877.42	1.1958	0.9035
2005	7,428,672	135,269	6,960,686	151,562	49,456.55	1.1958	0.9006
2010	9,857,309	137,293	9,271,339	154,247	64,575.42	1.1945	0.8994
2015	12,922,054	137,455	12,172,627	154,856	84,316.13	1.1960	0.8969
2020	16,833,499	136,602	15,852,727	154,308	110,091.57	1.1995	0.8934
2025	21,904,192	135,666	20,622,059	153,588	143,746.56	1.2025	0.8903
2030	28,623,541	135,524	26,940,257	153,521	187,689.89	1.2036	0.8887
2035	37,563,670	136,142	35,344,213	154,108	245,066.68	1.2030	0.8882
2040	49,283,789	136,716	46,357,993	154,658	319,983.57	1.2026	0.8877
2045	64,650,094	137,174	60,793,655	155,184	417,802.55	1.2031	0.8865
2050	84,895,078	137,726	79,806,535	155,872	545,524.78	1.2039	0.8850

trends in the *RE* factor. It does, however, confirm our conclusions about the projected future trends. The conversion factor decreases slowly until around the year 2010, due to the gradual coverage of federal employees who have higher than average earnings. Thereafter, the factor increases slightly because of the changing age structure of the working population due to the retirement of the baby-boom generation.

The factor related to the ratio of wages to earnings increases until 1995 and decreases thereafter. This is due to an assumption that the recent slower increases in self-employment earnings will continue for another ten years and that thereafter the trend will be reversed.

APPENDIX C

SOURCES AND LIMITATIONS OF DATA, PROXIES, AND FORMULAS

The source of any series of data is usually dependent on the natural division of the years covered into the historical period and the projection period. The sources that we shall give for the elements of cost, which are defined in section IV, apply to the historical period only. Data for the projection period are not generally published in the needed degree of detail and are only available from computer mass storage records kept by the Office of the Actuary in the Social Security Administration.

General Information

The major source of data for the historical period is the *Annual Statistical Supplement* to the *Social Security Bulletin*. This is the major publication regarding Social Security data on benefits, beneficiaries, and covered workers. It is also a convenient secondary source of data on income and outgo of the Social Security trust funds; in this case, the information is summarized from trust fund data published by the U.S. Department of the Treasury.

Some of the needed data have been published already in a complete time series form in the *Annual Supplement* to the *Social Security Bulletin*, e.g., the trust fund operations. Other data had to be constructed from the whole series of bulletins, because the information in each statistical supplement, although containing much detail, pertains to only that particular year; an important example here is the table of family benefits in current payment status.

The data for the projection period were obtained from the set of cost and income projections of the OASDI system prepared for the 1985 Report of the Board of Trustees of the OASDI Trust Funds. The data in the report were developed by the Office of the Actuary and the Office of Statistics,

Research, and International Policy, both of the Social Security Administration. Substantial contributions were also obtained, in the area of economic assumptions, from the staff of the Assistant Secretary for Economic Policy of the U.S. Department of the Treasury. Of the four different sets of projections prepared for that Trustees Report, which reflect varying degrees of optimism or pessimism, we selected the intermediate Alternative II-B as the primary source of future data.

In between the historical period through 1982, and the projection period, which starts in 1985, there is a gap where some of the actual benefit data were not available. We have used simple linear interpolation to fill in the primary series for the two years 1983 and 1984, where needed. The reader, therefore, must be careful in interpreting the information for these two years.

The reader who is interested in how projected annual OASDI cost estimates are developed should send for the publications listed in [1], [3], [4], [5], and [8].

In the discussion of the sources for the specific elements, note that often the series actually shown did not appear in that same format in the primary data source; interpolation formulas were sometimes needed to generate more appropriate values (e.g., note how *APA* was generated).

Sources for the Elements

EXP: (Expenditures, i.e., total program outgo.) This series is given without conceptual or numerical approximation in tables 14 and 16 of the *Social Security Bulletin, 1983 Annual Statistical Supplement*. The value for 1984 was obtained from the 1985 Report of the Board of Trustees.

APA: (All primary amounts.) Both total number of families and average *PIA* are published for the end of each year in the *Annual Statistical Supplement* to the *Social Security Bulletin* in the table of family benefits in current payment status. The aggregate *PIA* for the end of the year is the product of the average *PIA* and the number of families with benefits in current payment status. $\bar{F}$, the average number of families with benefits in current payment status during the year, is calculated from the beginning- and end-of-year values F_0 and F_1 as follows:

$$\bar{F} = \frac{13}{24} F_0 + \frac{11}{24} F_1.$$

This formula recognizes that, except for retroactive payments, OASDI benefits are generally paid in the month following the month for which they are payable; e.g., the benefits for December are generally paid in January.

In order to calculate $\bar{P}$, the average *PIA* during the year, we need to take into account the benefit increase i in the year, and the month m for which the benefit increase was first effective. The beginning- and end-of-year values P_0 and P_1 are used as follows:

$$\bar{P} = \frac{13}{24} P_0 + \frac{11}{24} \cdot P_1 \cdot \frac{1}{1+i} \left(1 + \frac{(12-m)}{12} i \right).$$

APA, the number actually used in our series, is the products of $\bar{P}$ times $\bar{F}$.

ABP: (All benefit payments.) This series is given, without conceptual or numerical approximation in tables 14 and 16 of the *Social Security Bulletin, 1983 Annual Statistical Supplement.*

NBA: (Number of benefit accounts.) This is the average number of families with benefits in current payment status during the year, F. Its source and the formula for its calculation were described in the discussion of *APA*.

NCW: (Number of covered workers.) The immediate source is an unpublished update of table 14 in Actuarial Study Number 94. A more basic source, which includes firm historical data only through 1978, is the *Annual Statistical Supplement* to the *Social Security Bulletin.*

ACE: (All covered earnings.) Based on an unpublished update of table 20 in Actuarial Study Number 94.

IAW: (Index of average wages.) Actuarial Note Number 115 carries the values through 1981. Subsequent values in the series have first been published in the *Federal Register* on or before November 1 of each year. As compared with *ACE*, this index refers to the total national economy (not just the covered economy). However, it is limited to wages and salaries only and does not include self-employment income.

ETP: (Effective taxable payroll.) Based on an unpublished update of table 20 in Actuarial Study Number 94. As compared to *ACE*, this element does not include earnings above the maximum taxable base. It also incorporates self-employment earnings and tips at a lower value that reflects the lower applicable tax rate.

DISCUSSION OF PRECEDING PAPER

JAMES L. COWEN:

Messrs. Bayo, Glanz, and Trowbridge have presented some interesting insights into the components affecting social security costs. These will help actuaries understand what is involved. I feel, however, that the presentations are simplistic, and may give people the wrong impression as to how social security costs can and should be controlled. The authors present a means of making comparisons between years and of isolating areas in which changes took place or are expected to take place.

My main problem with the presentation is that the social security program is looked at as a separate entity. In reality, this program is a component of the economy of the country. What happens in the economy affects social security and what happens to social security affects the economy. Decisions which are made to control social security costs may have to be changed in the future in the interest of the economy. In this respect, political considerations will also come into play.

In the summary and conclusions, the authors state that policies intended to control social security costs will have to address the issue of restraining the growth in the number of social security beneficiaries. This is true, but at the same time the politicians who make policy will also have to address the effects that this restraining of the number of beneficiaries will have on other parts of the economy. For instance, the 1983 amendments increase the age for unreduced old-age benefits gradually to age 67 beginning in the year 2000. This undoubtedly will keep more elderly people in the labor force, so at that time the question will have to be asked whether the increased retirement age is desirable. If the economy is at full employment, the answer will be yes, but if there is significant unemployment, it may be no.

High social security benefit outlays help the economy because social security beneficiaries spend a higher proportion of their income than most other groups in the population. This increases the demand for goods and services and thus helps the economy. Again, the desirability of these higher outlays depends on the state of the economy.

The tables in the paper show costs beginning in 1955. I do not believe that it is proper to compare costs in 1955 with those in 1986. In 1955 the social security system was immature and a very significant proportion of the

elderly were not entitled to benefits, whereas in 1986 very few of the elderly are not entitled to benefits. We as professionals must be careful in making comparisons which may be picked up by the media and used improperly.

A major problem in controlling social security costs is that, when the economy is in bad shape, benefit outlays will be high and covered payroll will be low. Thus, in bad times the cost as a percent of payroll will be high. In good times the reverse will be true. This implies that reserves should be built up in good times and should be allowed to decrease in bad times. Here, however, politics rears its ugly head. If the trust funds are large, there is a tendency to increase benefit levels, which defeats the purpose of building up reserves. Furthermore, the 1970 Advisory Council recommended that the reserve be held to one year's benefits (the trust funds have never reached that level), and this has given the politicians ammunition for not building up reserves.

Not only should reserves be built up in good economic times, but they should be built up also when problems due to demographics can be anticipated. As the authors have stated, demographics will cause a problem after the year 2005 when the baby-boom generation begins to retire and the labor force participation will be primarily from the baby-bust generation.

An economic consideration which surfaces in years when the trust funds are increasing is the effect on interest rates. Since the excess of income over outgo goes into government securities, the amount of government securities issued for purchase by the general public in these years will decrease. This could cause a decrease in interest rates and an effect on the economy.

From the preceding, it is apparent that although the ratios analyze the components of the costs and permit comparisons between years which show what caused the changes, they really do not provide any basis for controlling costs which can be applied reasonably. They show the elements affecting social security but ignore how the economy is affected by these. The authors state that some of these are controllable and others are not, but even the controllable items must be considered in relationship to the total economy and not just their effect on social security.

Considerations for controlling social security should be long term. I fear that decisions affecting social security will be short term, and attempts will be made to control the economy by using social security as a tool. Recent restrictions in the cost-of-living increases used social security to control budget deficits. This type of manipulation has applied to other entitlement programs such as the Civil Service Retirement system, medicare, and the military retirement programs. Gramm-Rudman will increase this type of

manipulation and make reductions in funding all important without regard to the needs of the population. Perhaps taking social security out of the unified budget will keep social security from being used to control budget deficits.

Politics can be peculiar. For instance, in 1983, delayed retirement credits were increased, providing higher benefits when there really was no need. At the same time, student benefits were eliminated, and the prospective higher retirement age was introduced. This is an indication that much needs to be done to improve the decision-making process for social security.

CHARLES M. LARSON:

I would like to discuss potential errors in Table 2 of this paper. Table 2 figures are statistical projections. As such the statistical errors are vastly greater in the projections for 2050 than for earlier years, yet the number of significant figures used for the 65-year projections are the same or more than the number of significant figures used for, say, the 5-year projections. My point is that, for the unwary, the table appears to be equally accurate in all areas. Parallel tables should be presented establishing more liberal and more conservative projections. That would give some idea of the overall range of projection error, and would disclose the unacceptable statistical errors in the longer projections.

THE POLITICAL PROBLEM

Table 2 will be examined by many politicians seeking to bolster one or another viewpoint in the continuing Social Security debate. It is unfair to give them, without warning, a figure carried to eight significant digits that an opponent can show has potential statistical projection errors in excess of 100 percent. It would be embarassing to have this pointed out in a Congressional study group.

ESTABLISHING AN ASSUMPTION RANGE FOR COLUMN (IAW)

TABLE EXTRACTED FROM TABLE 2 COLUMN (IAW)

YEAR	INDEX AVERAGE WAGES DOLLAR (IAW)	AVERAGE ANNUAL % INCREASE TO 1985
1955	$ 3,301	5.53%
1965	4,659	6.56
1975	8,631	10.68
1985	16,596	.....

Table 2 has an increase in IAW that averages out to about 5.52 percent annually. A conservative assumption error range might be 4 to 7 percent. The following table is based upon that assumption range:

	Projected IAW Values			Projected Error Range	
Year	Low (4%)	Table 2	High (7%)	Dollars	As % of IAW
1990	$ 21,832	$ 23,137	$ 24,462	$ 2,630	11%
2000	30,914	37,877	46,032	15,118	40
2010	45,586	64,575	90,207	44,621	69
2020	67,221	110,092	176,775	109,554	100
2030	99,123	187,690	346,416	247,292	132
2040	146,167	319,984	678,851	532,684	166
2050	215,536	545,525	1,330,304	1,114,767	204

For illustration, the calculation of the 7 percent projection for the year 2020 was done as follows,

$$176{,}775 = 100{,}092 \times (1.07 / 1.0552)^{(2020 - 1986)}$$

All other years were projected in the same way. It is an approximate method but would produce errors well within the error ranges already in Table 2 (IAW).

The whole numbers might have been rounded to fewer significant figures. However, I only see this as necessary when the reader has not been warned of the extent of the projection error ranges.

My objective in drawing attention to this issue is to suggest a distinction between the work of the futurist and the work of the actuary. In my opinion, the latter should either eschew 65-year estimates entirely or else show them with appropriate error ranges. Actuarial practice in corporate pension work illustrates the point.

LONG-RANGE PROJECTIONS IN A CORPORATE PENSION PLAN

Corporate pension plan 65-year projections are totally unlike the 65-year projections in Table 2. Corporate pension plan projections are discounted back 65 years for interest, mortality, turnover, and so on. They are then combined with other, largely shorter, discounted projections, into a valuation factor. No immediate important decisions are ever based upon undiscounted long-range predictions because they are too inaccurate. Even decisions based upon the discounted valuation factors are normally revised annually.

STATE-OF-THE-ART

This discussion is not intended as a criticism of the authors. They did a lot of hard work creating a statistical table that was entirely state-of-the-art. I am just struggling to change the state-of-the-art. It has not been a struggle as hopeless as it may seem:

1. Recently the American Academy Actuarial Committee on Social Insurance came to the long-overdue conclusion that pay-as-you-go is best for Social Security funding.
2. This article itself breaks welcome new ground in section II where it says, "the overall significance of [Old-Age, Survivors, and Disability Insurance] OASDI with respect to the national economy would require a measure with reference to the [gross national product] GNP...." Less than two years ago a most prestigious pension actuary shocked me by saying that a 75-year cost estimate could be used to recommend a cut in Social Security benefits without studying any 75-year projection of GNP or any other measure of the country's ability to continue the benefits after present taxes became inadequate. I am pleased to see at least a small improvement in state-of-the-art in that area. It may change slowly but it does change.

ROBERT J. MYERS:

Messrs. Bayo, Glanz, and Trowbridge are to be heartily congratulated on this excellent paper analyzing the many factors which affect the cost of the U. S. OASDI system. Such analysis permits better insight into the cost trends, past and future, of this program, which has such an important impact on the economic and social conditions in the nation.

I draw somewhat different conclusions than do the authors in analyzing the trends for one factor—the TB (or maximum taxable and creditable earnings base). In the last paragraph on page 25. I would rephrase the analysis as follows:

> The TB factor shown in Table 3 and Chart F has experienced three different trends. From 1951 through 1972, after each ad hoc change it was at about the same level (but increased thereafter until the next ad hoc change—a sort of sawtooth effect). Then, after 1972 and until 1981, it slowly decreased because the revisions in the taxable earnings base were more frequent, being in some cases ad hoc and in other cases automatic, and so were more than enough to compensate for the increases in earnings. After 1981, the TB factor is projected to remain about level, because the automatic-adjustment provisions in the current law require that the base be adjusted for increases in nationwide average wages.

(AUTHORS' REVIEW OF DISCUSSION)

FRANCISCO R. BAYO, MILTON P. GLANZ, AND CHARLES L. TROWBRIDGE:

We give thanks to Messrs. Cowen, Larson, and Myers for their comments and for the interest that they have taken in our paper.

We agree with Mr. Cowen with respect to the fact that decisions regarding social security benefit structure and financing must take into account political factors and the possible effect on the national economy. The analyses presented in the paper do not represent a negation of this fact nor our desire to disregard it. Much to the contrary, our experience in this field leads us to believe that that is the proper way of making those decisions. It is our view, however, that the decisons should also have high quality technical input, and that this could best be obtained through simple actuarial analyses and presentations that the decision makers can fully understand and take into consideration. But we disagree that the decision-making process is basically flawed; in fact, we believe that technicians such as actuaries should, in their professional capacities, refuse to assume political postures.

We agree again with Mr. Cowen that the components of costs presented in the paper do not provide any basis for controlling costs. However, that was not the purpose of the paper. As an illustrative example, we could say that it is proper to advise drivers to pay close attention to the speedometer, even though the instrument does not control the speed of the vehicle.

We disagree with Mr. Cowen regarding the comparison of costs in 1955 with those in 1986. Rather than just offering arguments about noncomparability, as Mr. Cowen suggests, we opted for presenting the values in an appendix and showing numerically what were the different factors that caused such disparity in costs.

Regarding Mr. Larson's comments, we presented figures only on the basis of Alternative II-B projections in the 1985 OASDI Trustees Report, because (1) Alternative II-B is the most widely used projection in discussing OASDI matters; (2) the presentation of other alternative projections would mostly add to the length of an already lengthy paper; (3) the main purpose of the paper was to show the "components of trends" method; and (4) we believe that the level of readership of *TSA* does not require specific statements about the uncertainties involved in long-range economic and demographic projections.

In these types of projections into the long-range future, however, we prefer to stay away from the notion of "statistical error." The projections that we prepare are not based on statistical principles, but rather on assumed scenarios that we regard as plausible. We feel uncomfortable with the notion

that the series we are working with here may be described as random variables that have the textbook characteristics of being repeatable and knowable.

We do not share Mr. Larson's view that the actuary's work can be so clearly separated from the futurist's in all cases. The long history of actuarial practice in the social insurance field provides a clear example to the contrary.

Mr. Myers's suggested paragraph is clearly superior to the one we have in the paper. We thank him for his contribution.