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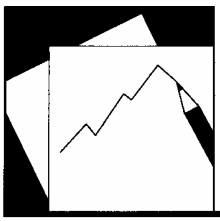

IMF Working Paper

Aging: Some Pleasant Fiscal Arithmetic

David Hauner

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Aging: Some Pleasant Fiscal Arithmetic

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Authorized for distribution by Manmohan S. Kumar

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Abstract

Projections of age-related public expenditure growth have raised widespread concerns about fiscal sustainability. This paper examines how total expenditure would develop under four policy rules on public expenditure growth. Some simple arithmetic of expenditure, GDP, and population is reviewed and applied in simulations for 19 member countries of the Organization for Economic Cooperation and Development (OECD) over 2000–50. A general and a specific conclusion arise from the results in this paper: Generally, long-term expenditure projections could benefit from revisiting common assumptions on non-age-related expenditure growth. Specifically, under realistic assumptions, the belt-tightening required to maintain fiscal sustainability under age-related spending pressures could be less painful than commonly thought.

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I. INTRODUCTION

Much has been written on the "fiscal time bomb" of age-related spending.[2] Given its expected growth, prominent publications on the topic, such as Economic Policy Committee (2001) and OECD (2001), project a severe deterioration (in the order of 6–8 percent of GDP) in primary fiscal balances for most member countries of the Organization for Economic Cooperation and Development (OECD) over 2000–50. Based on these sources, Standard and Poor's (2002) predicts a significant worsening of the credit ratings of most major industrialized countries. Alarmism about fiscal sustainability seems to be appropriate.

However, all these projections assume that non-age-related expenditure will grow with GDP, which is an assumption far from obvious. In fact, European Commission (2004, page 177) found that for the growth in EU countries' expenditures by function, GDP growth was a significant explanatory variable only for education and health. Tanzi and Schuknecht (2000, p. 23) note that most of the increase in public spending in recent decades was not due to the provision of government services, but cash transfers. Quote: "Most of this increase resulted from explicit policy decisions […]. In other words, there was nothing automatic or inevitable about it that could not have been prevented by determined governments."

This paper asks how total expenditure would turn out under alternative assumptions. To answer the question, the paper lays out the simple arithmetic of four policy rules on public expenditure growth and applies them in expenditure simulations for 19 OECD member countries, based on the projections of population, GDP, and age-related expenditure in OECD (2001), probably the most widely cited source in the field.

A general and a specific conclusion arise from the results in this paper: Generally, long-term expenditure projections could benefit from revisiting common assumptions on non-age-related expenditure growth. Alternative assumptions on long-term non-age-related expenditure growth lead to vastly different conclusions about fiscal sustainability. Specifically, under realistic assumptions, the belt-tightening required to maintain fiscal sustainability under age-related spending pressures could be less painful than commonly thought. According to the simulations here, in most OECD member countries projected GDP growth would suffice to accommodate not only projected increases in age-related spending, but also some real increase in non-age-related spending. While growth of public services and investment will have to slow down in most OECD member countries, it will remain substantial by recent standards—more substantial even in per capita terms as population growth is slowing. Only for some countries, these conclusions change significantly under a downside scenario.

Holding the total-expenditure-to-GDP ratio constant would likely allow reasonable non-age-related expenditure growth in 18 of 19 countries despite age-related spending hikes. Under this arguably most realistic of the four policy rules discussed in the paper, simulated

[2] Here defined as (i) old-age pensions; (ii) early retirement programs; (iii) health and long-term care; and (iv) child and family benefits and education.

annual real non-age-related expenditure growth from 2000 to the peak year of age-related expenditure would be 0.5–0.7 percent for Canada, Denmark, Germany, Japan, the Netherlands, New Zealand, and Spain; 1.1–1.2 percent for Austria, Belgium, the Czech Republic, Finland, France, and Italy; and even 1.4–1.7 percent for Australia, Korea, Sweden, the U.K., and the U.S.; only Norway would be suffering cutbacks in levels.[3]

By this standard, many countries could afford real non-age-related expenditure growth even higher than in recent years, or at least about the same. Even while age-related spending is growing, Belgium, Canada, the United Kingdom, and the United States could afford higher non-age-related expenditure growth than in recent years. For Denmark, Germany, the Netherlands, and Norway, possible real non-age-related expenditure growth would not change much. Only Australia, Austria, the Czech Republic, Finland, France, Spain, Sweden, and Korea would face a more significant belt-tightening in terms of real non-age-related expenditure growth.[4]

Also at odds with widespread belief, the results here suggest that countries with higher population growth might in fact face a bigger, not smaller, fiscal challenge from aging. They have to finance aging and expenditure demands from a growing population at the same time. Thus, to hold their total-expenditure-to-GDP ratios constant, Australia, Canada, and New Zealand would have to live with some of the lowest per capita growth rates of non-age-related expenditure (the United States could afford more due to higher per capita GDP growth).

However, the findings of this paper cannot lend support to complacency about the fiscal impact of aging. First, the argument presented here is based on simulations, not model-based forecasts. Second, deviations in the long-term forecasts of the underlying variables (output, population, age-related expenditure) from the baseline[5] could have substantial effects, as the downside scenario in this paper demonstrates. Third, price developments are treated as a black box here, as in all related studies, which could be particularly problematic regarding health expenditures. Fourth, even if the variables turn out exactly as in the simulations, only slowing the growth of non-age-related expenditure (or continuing the slow growth already observed recently in some countries) will already require a substantial political effort. Fifth, while this paper concentrates on fiscal sustainability, there are more aspects to the fiscal impact of aging, such as intergenerational fairness.[6] Sixth, there are upside risks to

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[3] The numbers for Austria, Finland, France, Germany, Italy, Japan, Korea, and Spain are more conservative than for the other countries, as projections of expenditure child/family benefits and education are unavailable and potential savings from these spending categories are not taken into account. For the countries reporting projections for this category, spending is expected to fall by 0.9 percent of GDP over 2000–2050, which is substantial, but small compared to the increases in other age-related spending. No past non-age-related expenditure is available for Italy, Japan, and New Zealand, and the countries are therefore not referred to in the below comparisons of potential future with past expenditure growth.

[4] Footnote 3 applies here as well.

[5] For a discussion of the problems of long-term projections, see Heller (2003, pp. 58–83).

[6] See Heller (2003) for a discussion of the various aspects of the fiscal impact of aging.

expenditures beyond aging, which governments will have more trouble dealing with when their fiscal leeway is already extremely limited due to age-related expenditure pressures.

The rest of the paper sketches four policy rules on public expenditure in aging societies, based on some simple arithmetic of expenditure, GDP, and population, and applies them for 19 OECD member countries over 2000–2050 in a baseline and a downside scenario based on projections of GDP, population, and age-related expenditure growth from OECD (2001).

II. Some Simple Arithmetic

This section sketches the arithmetic of four simple policy rules of the fiscal impact of aging as a framework for the simulations in the next section. Let there be two periods, t and t+1. Let τ^r be real total government expenditure, α^r real age-related expenditure, and η^r real non-age-related expenditure. Let τ^y be total government expenditure, α^y age-related expenditure, and η^y non age-related expenditure, as a ratio to GDP, respectively. Let τ^c be real total government expenditure, α^c real age-related expenditure, and η^c real non age-related expenditure per capita, respectively. In all three cases, it holds that $\tau \equiv \alpha + \eta$. Let n, a, g, and p be the growth rates of α^r, η^r, output (real GDP), and population, respectively. Thus,

$$\tau^y_{t+1} = \frac{1+a_{t+1}}{1+g_{t+1}}\alpha^y_t + \frac{1+n_{t+1}}{1+g_{t+1}}\eta^y_t \qquad (1)$$

and

$$\tau^c_{t+1} = \frac{1+a_{t+1}}{1+p_{t+1}}\alpha^c_t + \frac{1+n_{t+1}}{1+p_{t+1}}\eta^c_t . \qquad (2)$$

Note the implicit assumption that the deflators of age-related and non-age-related spending grow at the same rate as the GDP deflator. This implies for, say, age-related spending, that the differential between the GDP deflator and the deflator of age-related spending will be captured in the real growth rate of age-related spending (see Levitt and Joyce, 1987, p. 21).

Now consider four simple policy rules for public expenditure growth.

Rule 1—Keep non-age-related expenditure constant in percent of GDP. This is the rule usually assumed in the debate, including in European Commission (2001), and OECD (2001). Here, η^r grows at the same rate as output, that is, by $(1+g_{t+1})$, η^c grows at the rate $(1+g_{t+1})/(1+p_{t+1})$, and the path of the ratio of total expenditure to GDP is

$$\tau^y_{t+1} = \alpha^y_{t+1} + \eta^y_t = \frac{1+a_{t+1}}{1+g_{t+1}}\alpha^y_t + \eta^y_t . \qquad (3)$$

Under this rule, increases in the ratio of age-related expenditure to GDP fully translate into an increase in the ratio of total expenditure to GDP. Real non-age-related expenditure grows with output. By definition, if population grows less than output, non-age-related expenditure per capita rises.

Rule 2—Keep real non-age-related expenditure constant. Here, η^c grows at the rate $1/(1+p_{t+1})$, that is, it falls with population growth, and the path of the ratio of total expenditure to GDP is

$$\tau^y_{t+1} = \frac{1+a_{t+1}}{1+g_{t+1}}\alpha^y_t + \frac{1}{1+g_{t+1}}\eta^y_t . \qquad (4)$$

By rearranging, it can be found that as long as it holds that

$$\frac{a_{t+1}-g_{t+1}}{g_{t+1}} < \frac{\eta^y_t}{\alpha^y_t}, \qquad (5)$$

keeping real non-age-related expenditure constant (that is, $\eta^r_{t+1} = \eta^r_t$) implies a declining ratio of total expenditure to GDP under any realistic set of assumptions on the growth rates (that is, $\tau^y_{t+1} < \tau^y_t$).

Rule 3—Keep real per capita non-age-related expenditure constant. Constant non-age-related spending per capita, that is, $\eta^c_{t+1} = \eta^c_t$, requires that spending grows with population, that is $n_{t+1} = p_{t+1}$. Thus, the path for the ratio of total expenditure to GDP is

$$\tau^y_{t+1} = \frac{1+a_{t+1}}{1+g_{t+1}}\alpha^y_t + \frac{1+p_{t+1}}{1+g_{t+1}}\eta^y_t . \qquad (6)$$

By rearranging, it can be found that as long as it holds that

$$\frac{a_{t+1}-g_{t+1}}{g_{t+1}-p_{t+1}} < \frac{\eta^y_t}{\alpha^y_t}, \qquad (7)$$

keeping real per capita non-age-related expenditure constant (that is, $\eta^c_{t+1} = \eta^c_t$) implies a declining ratio of total expenditure to GDP (that is, $\tau^y_{t+1} < \tau^y_t$).

While Rules 2 and 3 could be dismissed as unrealistic on the basis of well-known real-world budget dynamics (for example, the "Baumol effect," see Baumol, 1967), they do serve the cause of questioning the assumption of non-age-related expenditure growing with GDP that underlies Rule 1: Rule 2 does after all permit to buy as many kilometers of road and pay as

many civil servants (if wages grow only with the GDP deflator) in t+1 as in t. Rule 3, in turn, permits to continue to spend as much as before per capita on all those things. That's not that bad, one could argue.

Rule 4—Keep total expenditure constant in percent of GDP. For this (that is, $\tau^y_{t+1} = \tau^y_t$), it must hold that

$$\alpha^y_t + \eta^y_t = \frac{1+a_{t+1}}{1+g_{t+1}}\alpha^y_t + \frac{1+n_{t+1}}{1+g_{t+1}}\eta^y_t . \qquad (8)$$

Rearranging yields the "permissible" real growth rate of non-age-related expenditure,

$$n_{t+1} = \frac{g_{t+1}\tau^y_t - a_{t+1}\alpha^y_t}{\eta^y_t} . \qquad (9)$$

Freezing the ratio of total expenditure to GDP will still permit real non-age-related expenditure to grow at a positive rate n_{t+1} if it holds that

$$a_{t+1}\alpha^y_t < g_{t+1}\tau^y_t , \qquad (10)$$

that is, if given the expenditure ratios in period t, output grows sufficiently to finance some real non-age-related expenditure growth on top of age-related expenditure growth.

III. Simulating Expenditure Under the Four Rules

Based on the four policy rules just discussed, this section presents expenditure simulations for 19 OECD member countries[7] from 2000 to the peak of age-related spending. The variables underlying the simulations, that is, population, GDP, and age-related expenditure are from OECD (2001, 2002), for which they were reported by the national authorities.[8] Age-related spending includes old-age pensions, early retirement programs, health and long-term care, child and family benefits, and education. Figure 1 shows the

[7] The OECD countries Greece, Iceland, Ireland, Luxemburg, Mexico, the Slovak Republic, Switzerland, and Turkey were not included in OECD (2001); Hungary, Poland, and Portugal did not report health and long-term care expenditure projections and are thus excluded here.

[8] The GDP and population projections are from the background study for OECD (2001), Dang and others (2001). See also there for details on assumptions and methods underlying the projections of population, GDP and age-related expenditure used here. Gaps in the projections of health and long-term care spending for Austria, France, Germany, Italy, and Spain in OECD (2001) were filled with projections from OECD (2002); as no separate projections for the peak-year, but only for 2050 are available, it is here assumed that health and long-term care spending remains stable in percent of GDP from the unknown peak year until 2050. For GDP growth, it is assumed that the 2000–peak average equals the 2000–2050 average.

projected average annual growth rates from 2000 to the peak year of age-related expenditure for population, output, and real age-related expenditure: Population growth is highest in Australia and the United States and lowest in Italy, Japan, and the Czech Republic; output growth is highest in Australia, Korea and the United States and lowest in Japan and Norway; and real age-related expenditure growth is highest in Korea and the United States and lowest in Italy, Japan, and the United Kingdom.

Table 1 shows the simulations of expenditure under the four rules. The uppermost panel shows total expenditure and age-related expenditure in percent of GDP in 2000 and estimated average annual real non-age-related expenditure growth over 1990–2003,[9] which will be used below to gauge the realism of the four rules by comparing past and potential future growth rates of non-age-related expenditure. The second panel shows the projections of the underlying variables from 2000 to the peak year of the age-related-expenditure-to-GDP ratio from OECD (2001): population, GDP, and age-related expenditure. The remaining four panels show the expenditure simulations under the four rules.

It must be noted that the simulations below are more conservative for Austria, Finland, France, Germany, Italy, Japan, Korea, and Spain than for the other countries: As projections of expenditure for child/family benefits and education are unavailable for these countries, potential savings from this category are not taken into account. (For the countries reporting this category, spending here is expected to fall by 0.9 percent of GDP over 2000–2050, which is small compared to the rise in other age-related spending.) Note also that past non-age-related expenditure is unavailable for Italy, Japan, and New Zealand, and the countries are thus not cited in the below comparisons of future with past expenditure growth.

Rule 1—Keep non-age-related expenditure constant in percent of GDP: While widely assumed (see Section I), this rule would imply unrealistically high non-age-related expenditure growth for many countries. In fact, ten of the 19 countries could loosen the belt and have higher non-age-related expenditure growth than in the recent past (comparing the simulations in the third panel of Table 1 to the history in the uppermost panel): Belgium, Canada, Finland, France, Germany, the Netherlands, Norway, Spain, the United Kingdom, and the United States. Only the Czech Republic, Korea, and Sweden would feel a significant belt-tightening relative to recent real non-age-related expenditure growth. As population growth is slowing, all countries except Korea and the Netherlands would enjoy higher per capita real non-age-related expenditure growth than in the recent past.

Rule 2—Keep real non-age-related expenditure constant: This rule would imply drastic declines in the non-age-related- and total-expenditure-to-GDP ratios. It is thus probably politically unrealistic, although it would permit to buy as much in goods and services as in 2000, which, arguably, would not be so bad: Indeed, Belgium, Canada, the United Kingdom, and the United States could even have higher per capita real non-age-related

[9] Non-age-related expenditure was assumed to be total expenditure minus spending on education, health, and social security, as reported in the functional classification in the IMF *Government Finance Statistics*. Real growth was derived by the GDP deflator. See again the related discussion in Section II.

expenditure growth than in the recent past (comparing the simulations in the fourth panel of Table 1 to the history in the uppermost panel).

Rule 3—Keep real per capita non-age-related expenditure constant: This rule again implies drastic declines in the non-age-related- and total-expenditure-to-GDP ratios. It is probably politically still unrealistic, although it would permit to buy as much in goods and services per capita as in 2000 and would therefore allow for modest growth in the value of non-age-related expenditure (except where projected population growth is zero or negative). Again, there are countries that would even have higher real non-age-related expenditure growth than in the recent past: Belgium, Canada, the United Kingdom, and the United States (comparing the simulations in the fifth panel of Table 1 to the history in the uppermost panel).

Rule 4—Keep total expenditure constant in percent of GDP: This most realistic rule allows in most countries for reasonable non-age-related expenditure growth even while age-related expenditure will be booming. The rule seems most realistic as it effectively contributes to fiscal sustainability, but with the minimal political effort. As the bottom panel of Table 1 shows, annual real non-age-related expenditure growth under this rule would be 0.5–0.7 percent in Canada, Denmark, Germany, Japan, the Netherlands, New Zealand, and Spain; 1.1–1.2 percent in Austria, Belgium, the Czech Republic, Finland, France, and Italy; and even 1.4–1.7 percent in Australia, Korea, Sweden, the United Kingdom, and the United States; only Norway would be suffering cutbacks in levels.[10]

In per capita terms, countries with relatively high population growth are at the bottom of the ranking of real non-age-related expenditure growth under Rule 4: Australia, Canada, the Netherlands, and New Zealand. This runs against the common argument that countries with higher population growth would be able to weather aging better: If a country must finance aging without some savings from spending on youth, it might be in fact worse off due to higher population growth. This effect does not apply to the United States, where it is more than compensated by high projected GDP growth.

As Figure 2 shows, Rule 4 would require only in a few countries a significant slowdown in real non-age-related expenditure growth relative to the recent past. By this standard, Belgium, Canada, the United Kingdom, and the United States could even afford higher non-age-related expenditure growth than in recent years. For Denmark, Germany, the Netherlands, and Norway, possible real non-age-related expenditure growth would not change much. Australia, Austria, the Czech Republic, Finland, France, Spain, Sweden, and particularly Korea would face a more significant belt-tightening in terms of real non-age-related expenditure growth. Slowing population growth relaxes the constraint further in per capita terms, and only a couple of countries would have to markedly slow down real per capita non-age-related spending under the rule: Australia, the Czech Republic, Korea, the Netherlands, and Sweden.

[10] Norway is a special case due to its oil fund, which will permit to dampen any potential need for cutbacks.

A downside scenario was calculated based on "worst case" age-related expenditure growth projections. Table 2 replicates the baseline under the "increased longevity" scenario in Dang and others (2001), implying an additional increase in age-related expenditure until 2050 of between 0.4 percent of GDP (Italy) and 2.6 percent of GDP (Netherlands); for the individual countries' numbers, see the projections of the underlying variables in the second panel of Table 2.[11]

Results change most markedly under Rule 4, where some countries would face non-age-related expenditure growth significantly lower than in the baseline: Canada, Denmark, and New Zealand could only afford about a third to two thirds of the baseline growth, and the Netherlands would have to freeze real non-age-related expenditure. The rest of the countries would still be able to afford real non-age-related expenditure growth (also per capita) that is not more than a fifth lower than in the baseline. Under Rules 1–3, the assumed additional increases in age-related spending by design fully translate into the ratio of total expenditure to GDP, while the other variables remain unchanged relative to the baseline.

How realistic are the simulation results? Recent trends in public expenditure suggest that they are, provided that past trends are sustainable. Table 3 shows the average real growth of expenditures by functional classification over 1990–2003.[12] On average (see the very right column of Table 3), most of the non-age-related expenditure categories—including the three largest, general public services (including interest expenditure), defense, and economic affairs (including transportation and subsidies)—have been growing less than GDP, and have actually been falling even in real terms in many countries. For the future, the decisive question is whether the trends in these categories are sustainable, given that interest rates have been declining drastically during the 1990s, and public infrastructure might increasingly show signs of neglect. Looking at the 2003 expenditure weights shown in Table 4, one could argue that there could still to be room for cuts in some potentially "less productive" expenditure categories in some of countries.

IV. Concluding Remarks

This paper examined how total expenditure would develop under four policy rules on public expenditure growth and found that some common assumptions might be worth revisiting. Some simple arithmetic of expenditure, GDP, and population was reviewed and applied in simulations under four simple policy rules for 19 countries over 2000–2050. A general and a specific conclusion arose from the results: Generally, long-term expenditure

[11] It is assumed that the additional percent-of-GDP increase in age-related expenditure will have an impact in the peak year and in 2050 by the same amount. Dang and others (2001) does not report alternative scenarios for Australia, Austria, Canada, Finland, New Zealand, Norway, and the United Kingdom; for these countries, age-related expenditure is here assumed to rise under the downside scenario by an additional 1.5 percent of GDP, the mean of the number for the countries for which projections are available. Also, Dang and others (2001) does not report GDP growth projections for the alternative scenarios; here, GDP growth in the downside scenario is assumed to be the same as in the baseline, implying that higher longevity only increases the retired population, not employment.

[12] See page 4 for the treatment of price inflation.

projections could benefit from revisiting common assumptions on non-age-related expenditure growth. As demonstrated in this paper, alternative assumptions on long-term non-age-related expenditure growth lead to vastly different conclusions about fiscal sustainability. Specifically, under realistic assumptions, the belt-tightening required to maintain fiscal sustainability under age-related spending pressures could be less painful than commonly thought. Only for some countries, the conclusions change significantly under an alternative downside scenario. However, for the reasons cited in Section I, the results presented here cannot reassure the reader about the potential implications of aging on fiscal sustainability.

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Table 1. Expenditure Projections: Baseline

	Australia	Austria	Belgium	Canada	Czech Rep.	Denmark	Finland	France	Germany	Italy	Japan	Korea	Netherlands	New Zealand	Norway	Spain	Sweden	UK	US
Actuals																			
Total expenditure in 2000 (in percent of GDP)	35.6	52.3	49.4	41.0	46.1	54.9	49.1	52.5	45.7	46.9	38.2	22.0	45.3	40.2	43.4	40.0	57.3	37.0	33.7
Age-related expenditure in 2000 (in percent of GDP)	16.7	15.5	22.1	17.9	23.1	29.3	19.4	19.0	17.5	19.7	13.7	3.1	19.1	18.7	17.9	15.6	29.0	15.6	11.2
Average annual real non-age-related expenditure growth 1990-2003 (in percent) 1/	2.7	1.9	-0.5	-0.4	2.5	0.5	1.6	1.6	0.9	...	...	14.2	0.8	...	-0.5	1.5	2.6	-2.6	-0.3
Per capita	1.5	1.4	-0.6	-1.4	2.6	0.2	1.2	1.2	0.6	...	...	13.2	2.7	...	-1.0	1.2	2.2	-2.9	-1.4
Underlying Variables: OECD Projections 2000 to Peak Year 2/																			
Average annual population growth (in percent)	0.7	-0.1	0.0	0.4	-0.4	0.0	-0.1	0.1	-0.2	-0.4	-0.5	0.0	0.2	0.4	0.3	-0.2	0.1	0.1	0.5
Average annual real GDP growth (in percent)	2.2	1.7	1.7	1.7	1.8	1.6	1.8	1.6	1.4	1.4	1.1	2.9	1.7	1.7	1.2	1.8	1.8	1.7	2.3
Age-related expenditure 3/																			
Percentage point change	5.6	6.9	5.4	8.7	6.9	7.3	8.5	6.4	8.1	2.8	3.1	8.5	10.1	8.4	13.7	10.5	3.4	0.8	5.5
Average annual real growth (in percent)	2.8	2.6	2.3	2.5	2.3	2.4	2.5	2.3	2.2	1.7	1.6	5.7	2.8	2.5	2.6	2.9	2.0	1.8	3.1
Expenditure Simulations 2000 to Peak Year 2/																			
Rule 1: Keep non-age-related spending constant in percent of GDP																			
Change in total expenditure (in percentage points of GDP)	5.6	6.9	5.4	8.7	6.9	7.3	8.5	6.4	8.1	2.8	3.1	8.5	10.1	8.4	13.7	10.5	3.4	0.8	5.5
Average annual real non-age-related expenditure growth (in percent)	2.2	1.7	1.7	1.7	1.8	1.6	1.8	1.6	1.4	1.4	1.1	2.9	1.7	1.7	1.2	1.8	1.8	1.7	2.3
Average annual real non-age-related expenditure growth per capita (in percent)	1.5	1.8	1.7	1.3	2.2	1.5	1.9	1.5	1.6	1.8	1.5	2.9	1.5	1.3	0.9	2.0	1.7	1.6	1.8
Rule 2: Keep real non-age-related spending constant																			
Change in non-age-related expenditure (in percentage points of GDP)	-12.6	-18.0	-13.4	-13.2	-13.6	-9.7	-17.5	-15.7	-14.1	-11.6	-8.4	-14.4	-12.8	-12.3	-9.7	-14.4	-12.9	-9.5	-15.3
Change in total expenditure (in percentage points of GDP)	-7.0	-12.4	-7.8	-7.6	-8.0	-4.1	-11.9	-10.1	-8.5	-6.0	-2.8	-8.8	-7.2	-6.7	-4.1	-8.8	-7.3	-3.9	-9.7
Average annual real non-age-related expenditure growth per capita (in percent)	-0.7	0.1	0.0	-0.4	0.4	0.0	0.1	-0.1	0.2	0.4	0.5	0.0	-0.2	-0.4	-0.3	0.2	-0.1	-0.1	-0.5
Rule 3: Keep real non-age-related spending constant per capita																			
Change in non-age-related expenditure (in percentage points of GDP)	-9.9	-19.0	-13.6	-11.2	-15.3	-9.4	-18.0	-15.0	-15.3	-13.7	-11.1	-14.3	-11.6	-10.4	-7.7	-15.5	-12.5	-9.3	-13.0
Change in total expenditure (in percentage points of GDP)	-4.3	-13.4	-8.0	-5.6	-9.7	-3.8	-12.4	-9.4	-9.7	-8.1	-5.5	-8.7	-6.0	-4.8	-2.1	-9.9	-6.9	-3.7	-7.4
Average annual real non-age-related expenditure growth (in percent)	0.7	-0.1	0.0	0.4	-0.4	0.0	-0.1	0.1	-0.2	-0.4	-0.5	0.0	0.2	0.4	0.3	-0.2	0.1	0.1	0.5
Rule 4: Keep total spending constant in percent of GDP																			
Change in non-age-related expenditure (in percentage points of GDP)	-5.6	-6.9	-5.4	-8.7	-6.9	-7.3	-8.5	-6.4	-8.1	-2.8	-3.1	-8.5	-10.1	-8.4	-13.7	-10.5	-3.4	-0.8	-5.5
Average annual real non-age-related expenditure growth (in percent)	1.5	1.2	1.1	0.7	1.1	0.5	1.1	1.1	0.7	1.1	0.7	1.7	0.5	0.7	-0.7	0.7	1.4	1.6	1.7
Average annual real non-age-related expenditure growth per capita (in percent)	0.8	1.3	1.2	0.4	1.5	0.4	1.2	1.0	0.9	1.5	1.2	1.7	0.2	0.3	-1.0	0.9	1.3	1.5	1.2

Sources: IMF *Government Finance Statistics,* OECD (2001, 2002), and author's calculations.

1/ Total expenditure minus education, health, and social protection. 1990-2002 for Austria, Finland, France, Sweden, and the UK; 1990-2001 for Korea and Spain; 1998-2002 for Belgium; 1993-2003 for the Czech Republic.
2/ The peak year is 2015 for Japan, 2030 for Denmark and Italy, 2035 for Austria, France, Sweden and the UK, 2040 for Belgium, the Netherlands, and Norway, and 2050 for the rest.
3/ Old-age pensions, early retirement programs, health and long-term care, child/familiy benefits and education. Austria, Finland, France, Germany, Italy, Japan, Korea, and Spain excluding child/familiy benefits and education.

Table 2. Expenditure Projections: Downside

	Australia	Austria	Belgium	Canada	Czech Rep.	Denmark	Finland	France	Germany	Italy	Japan	Korea	Netherlands	New Zealand	Norway	Spain	Sweden	UK	US
Actuals																			
Total expenditure in 2000 (in percent of GDP)	35.6	52.3	49.4	41.0	46.1	54.9	49.1	52.5	45.7	46.9	38.2	22.0	45.3	40.2	43.4	40.0	57.3	37.0	33.7
Age-related expenditure in 2000 (in percent of GDP)	16.7	15.5	22.1	17.9	23.1	29.3	19.4	19.0	17.5	19.7	13.7	3.1	19.1	18.7	17.9	15.6	29.0	15.6	11.2
Average annual real non-age-related expenditure growth 1990-2003 (in percent) 1/	2.7	1.9	-0.5	-0.4	2.5	0.5	1.6	1.6	0.9	...	...	14.2	0.8	...	-0.5	1.5	2.6	-2.6	-0.3
Per capita	1.5	1.4	-0.6	-1.4	2.6	0.2	1.2	1.2	0.6	...	...	13.2	2.7	...	-1.0	1.2	2.2	-2.9	-1.4
Underlying Variables: OECD Projections 2000 to Peak Year 2/																			
Average annual population growth (in percent)	0.7	-0.1	0.0	0.4	-0.4	0.0	-0.1	0.1	-0.2	-0.4	-0.5	0.0	0.2	0.4	0.3	-0.2	0.1	0.1	0.5
Average annual real GDP growth (in percent)	2.2	1.7	1.7	1.7	1.8	1.6	1.8	1.6	1.4	1.4	1.1	2.9	1.7	1.7	1.2	1.8	1.8	1.7	2.3
Age-related expenditure 3/																			
Percentage point change	7.1	8.4	7.3	10.2	8.8	8.5	10.0	7.6	9.8	3.2	4.2	9.2	12.7	9.9	15.2	11.5	5.2	2.3	7.6
Average annual real growth (in percent)	2.9	2.8	2.4	2.6	2.5	2.2	2.6	2.5	2.3	1.8	1.7	5.8	3.0	2.6	2.8	2.9	2.2	2.0	3.4
Expenditure Simulations 2000 to Peak Year 2/																			
Rule 1: Keep non-age-related spending constant in percent of GDP																			
Change in total expenditure (in percentage points of GDP)	7.1	8.4	7.3	10.2	8.8	8.5	10.0	7.6	9.8	3.2	4.2	9.2	12.7	9.9	15.2	11.5	5.2	2.3	7.6
Average annual real non-age-related expenditure growth (in percent)	2.2	1.7	1.7	1.7	1.8	1.6	1.8	1.6	1.4	1.4	1.1	2.9	1.7	1.7	1.2	1.8	1.8	1.7	2.3
Average annual real non-age-related expenditure growth per capita (in percent)	1.5	1.8	1.7	1.3	2.2	1.5	1.9	1.5	1.6	1.8	1.5	2.9	1.5	1.3	0.9	2.0	1.7	1.6	1.8
Rule 2: Keep real non-age-related spending constant																			
Change in non-age-related expenditure (in percentage points of GDP)	-12.6	-18.0	-13.4	-13.2	-13.6	-9.7	-17.5	-15.7	-14.1	-11.6	-8.4	-14.4	-12.8	-12.3	-9.7	-14.4	-12.9	-9.5	-15.3
Change in total expenditure (in percentage points of GDP)	-5.5	-10.9	-6.3	-6.1	-6.5	-2.6	-10.4	-8.6	-7.0	-4.5	-1.3	-7.3	-5.7	-5.2	-2.6	-7.3	-5.8	-2.4	-8.2
Average annual real non-age-related expenditure growth per capita (in percent)	-0.7	0.1	0.0	-0.4	0.4	0.0	0.1	-0.1	0.2	0.4	0.5	0.0	-0.2	-0.4	-0.3	0.2	-0.1	-0.1	-0.5
Rule 3: Keep real non-age-related spending constant per capita																			
Change in non-age-related expenditure (in percentage points of GDP)	-9.9	-19.0	-13.6	-11.2	-15.3	-9.4	-18.0	-15.0	-15.3	-13.7	-11.1	-14.3	-11.6	-10.4	-7.7	-15.5	-12.5	-9.3	-13.0
Change in total expenditure (in percentage points of GDP)	-2.8	-11.9	-6.5	-4.1	-8.2	-2.3	-10.9	-7.9	-8.2	-6.6	-4.0	-7.2	-4.5	-3.3	-0.6	-8.4	-5.4	-2.2	-5.9
Average annual real non-age-related expenditure growth (in percent)	0.7	-0.1	0.0	0.4	-0.4	0.0	-0.1	0.1	-0.2	-0.4	-0.5	0.0	0.2	0.4	0.3	-0.2	0.1	0.1	0.5
Rule 4: Keep total spending constant in percent of GDP																			
Change in non-age-related expenditure (in percentage points of GDP)	-7.1	-8.4	-7.3	-10.2	-8.8	-8.5	-10.0	-7.6	-9.8	-3.2	-4.2	-9.2	-12.7	-9.9	-15.2	-11.5	-5.2	-2.3	-7.6
Average annual real non-age-related expenditure growth (in percent)	1.2	1.0	0.9	0.5	0.8	0.2	1.0	0.9	0.5	1.1	0.6	1.5	0.0	0.5	-1.1	0.5	1.2	1.4	1.5
Average annual real non-age-related expenditure growth per capita (in percent)	0.6	1.2	0.9	0.2	1.2	0.2	1.1	0.8	0.7	1.4	1.0	1.5	-0.2	0.1	-1.4	0.7	1.1	1.3	0.9

Sources: IMF *Government Finance Statistics,* OECD (2001, 2002), and author's calculations.

1/ Total expenditure minus education, health, and social protection. 1990-2002 for Austria, Finland, France, Sweden, and the UK; 1990-2001 for Korea and Spain; 1998-2002 for Belgium; 1993-2003 for the Czech Republic.
2/ The peak year is 2015 for Japan, 2030 for Denmark and Italy, 2035 for Austria, France, Sweden and the UK, 2040 for Belgium, the Netherlands, and Norway, and 2050 for the rest.
3/ Old-age pensions, early retirement programs, health and long-term care, child/familiy benefits and education. Austria, Finland, France, Germany, Italy, Japan, Korea, and Spain excluding child/familiy benefits and education.

Table 3. Real Central Government Expenditure Growth, 1990-2003 1/

(average annual percentage change, deflated with GDP deflator)

	Australia	Austria	Belgium	Canada	Czech R.	Denmark	Finland	France	Germany	Korea	Netherlands	Norway	Spain	Sweden	UK	US	Mean
"Non-age-related"																	
General public services	2.8	3.5	-0.9	-0.1	-0.5	0.1	6.2	-5.0	1.2	8.3	1.9	-1.5	2.0	3.2	-10.5	-2.3	0.5
of which: Public debt transactions	0.7	1.9	...	-5.5	-5.9	-2.6	9.3	4.4	4.7	11.1	-2.1	-2.0	1.9	-2.0	...	-1.4	0.9
Defense	2.2	1.4	0.4	-1.2	0.3	0.8	1.9	0.9	-2.4	2.5	-1.3	-0.8	1.0	0.7	-0.7	1.1	0.4
Public order and safety	4.4	4.7	4.7	1.7	3.4	3.0	3.7	4.3	5.6	...	5.2	5.3	3.7	2.5	6.5	6.2	4.3
Economic affairs	3.1	-0.8	0.8	-2.1	4.3	0.1	-1.8	9.6	1.8	9.6	-0.4	-0.6	-1.8	3.4	0.2	-0.5	1.5
Housing and community amenities	-3.2	-4.4	...	-0.4	5.7	2.1	-4.9	1.3	9.6	12.2	-13.2	-11.8	-9.2	-14.4	-4.0	0.2	-2.3
Recreation, culture and religion	2.0	3.7	2.5	0.0	4.3	3.8	0.6	4.1	4.0	14.2	8.3	3.4	9.2	2.8	13.9	0.4	4.8
"Age-related"																	
Health	5.1	2.8	4.0	-3.2	2.3	0.0	0.7	3.4	3.9	-5.3	0.3	16.3	10.2	11.8	4.3	6.9	4.0
Education	6.9	3.6	5.1	-1.9	1.7	3.5	1.8	6.4	0.3	7.4	1.3	4.1	-7.8	-1.0	16.8	5.7	3.4
Social protection	5.8	3.1	2.4	1.2	5.5	1.9	6.0	3.0	4.6	13.0	2.0	3.8	2.8	0.9	4.9	4.2	4.1

Source: IMF *Government Finance Statistics* and author's calculations.

1/ 1990-2002 for Austria, Finland, France, Sweden, and the UK; 1990-2001 for Korea and Spain; 1998-2002 for Belgium; 1993-2003 for the Czech Republic.

Table 4. Central Government Expenditure Shares, 2003

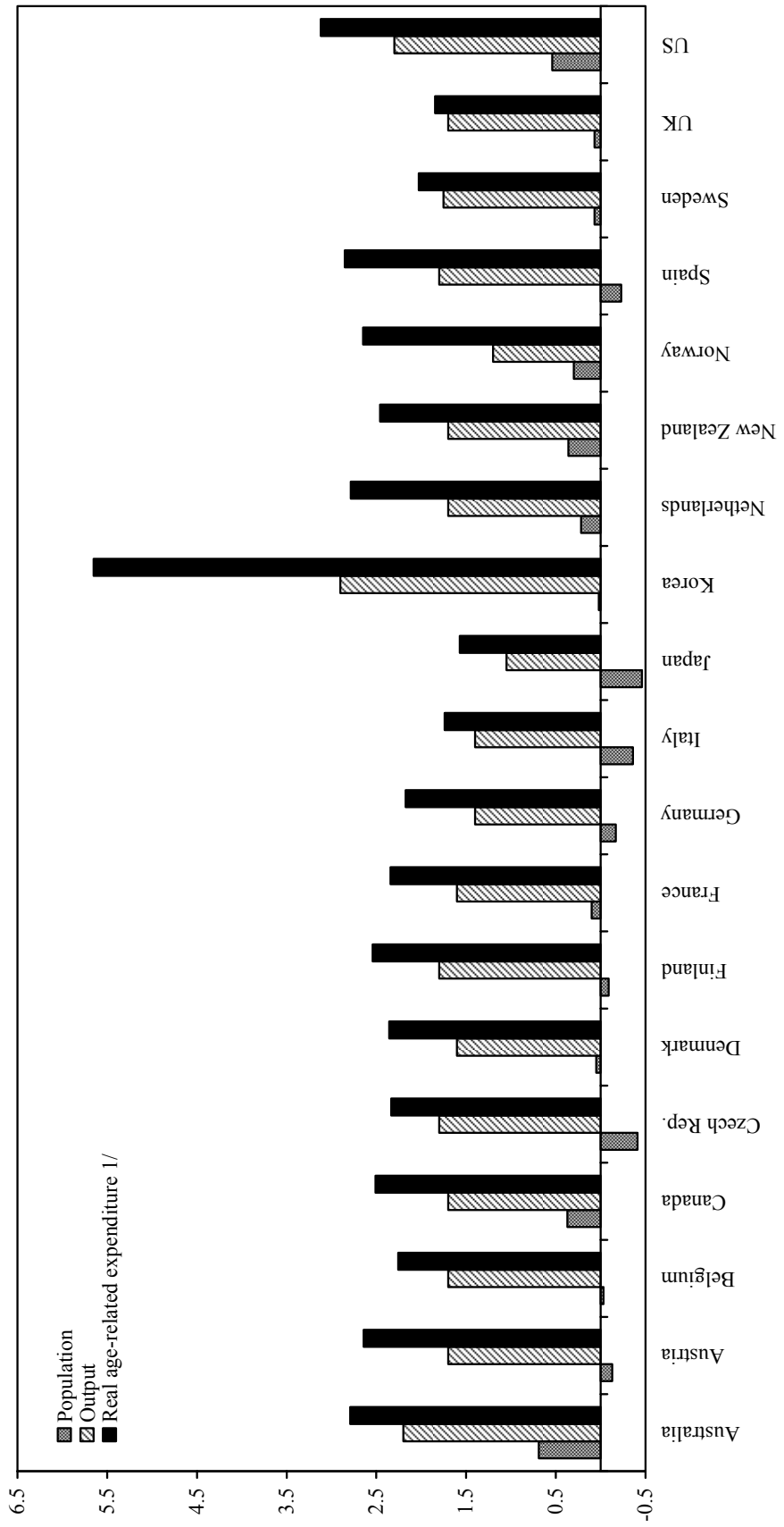
(in percent of total expenditure)

	Australia	Austria 1/	Belgium 1/	Canada	Czech R.	Denmark	Finland 1/	France 2/	Germany	Italy 3/	Korea 2/	Netherlands	N. Zealand	Norway	Spain 2/	Sweden 1/	UK 1/	US	Mean
General public services	26.6	15.6	37.8	30.3	12.4	27.2	12.7	7.7	13.7	20.6	25.2	22.1	9.0	17.5	28.6	23.5	5.2	12.2	19.3
of which: Public debt transactions	5.0	8.4	12.9	9.4	1.8	9.1	5.9	5.9	5.8	13.9	5.7	5.5	5.4	3.4	8.2	7.4	...	9.2	7.2
General transfers to other levels of government	16.6	...	...	14.2	4.6	8.6	...	...	...	...	...	...	2.9	...	17.3	...	...	...	10.7
Defense	6.5	2.2	2.9	5.8	4.7	4.6	4.0	5.2	3.6	2.6	12.5	3.6	2.9	5.0	3.7	5.7	7.4	19.1	5.7
Public order and safety	0.9	3.1	2.3	3.0	5.7	2.6	3.1	1.7	0.4	4.4	5.0	3.7	4.1	2.6	3.8	3.2	5.1	1.4	3.1
Economic affairs	6.2	6.4	4.3	6.0	13.8	6.8	10.4	10.0	6.7	5.7	21.5	6.0	6.8	10.1	6.2	9.4	6.9	7.0	8.3
Environment protection	0.2	0.3	0.1	0.6	1.3	...	0.5	0.2	0.1	1.7	...	0.4	0.0	0.3	0.2	0.5	...	...	0.5
Housing and community amenities	0.7	1.1	0.0	1.3	2.5	1.6	0.7	1.0	0.9	1.7	2.2	0.5	1.5	0.2	0.1	0.6	1.3	2.0	1.1
Health	14.2	13.0	14.9	2.7	16.6	0.9	8.2	16.9	19.3	12.7	0.4	10.4	16.5	15.9	15.3	2.9	16.4	23.4	12.3
Recreation, culture and religion	0.9	0.7	0.2	1.5	1.0	2.3	1.1	0.7	0.1	2.0	1.0	0.9	2.2	1.2	1.2	0.8	1.4	0.2	1.1
Education	9.3	10.2	2.7	2.1	9.4	12.6	12.5	10.0	0.4	10.5	17.7	10.8	21.2	6.5	1.6	6.4	12.5	2.6	8.8
Social protection	34.5	47.4	34.8	46.6	32.6	41.3	47.2	44.3	54.8	38.2	14.3	41.5	35.9	40.7	39.3	47.2	42.5	32.0	39.7
Other/statistical discrepancy	0.0	0.0	0.0	0.0	0.0	0.0	-0.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.2

Source: IMF *Government Finance Statistics.*

1/ 2002. UK: General government.
2/ 2001.
3/ 2000.

Figure 1. Underlying Variables: Projections from 2000 to Peak Year of Age-Related Expenditure
(annual average growth rates)

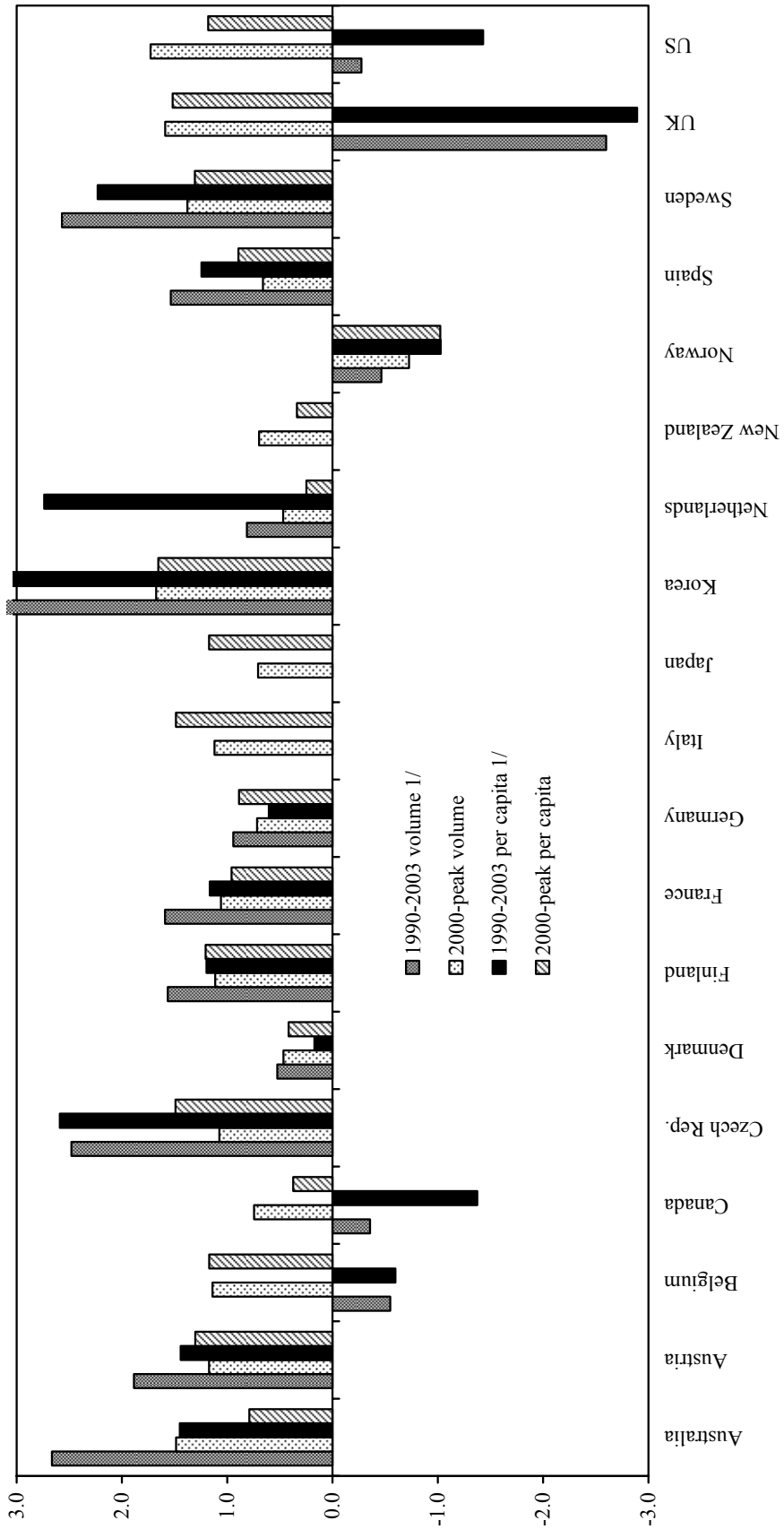


Sources: OECD (2001, 2002) and author's calculations.

1/ Old-age pensions, early retirement programs, health and long-term care, child/familiy benefits and education.
Numbers for Austria, Finland, France, Germany, Italy, Japan, Korea, and Spain do not include child/family benefits and education.

Figure 2. Real Non-Age-Related Expenditure Growth: Recent History and Rule 4 Simulation

(annual average growth rates)



Sources: *IMF Government Finance Statistics* and author's calculations.

1/ Total expenditure minus education, health, and social protection. 1990-2002 for Austria, Finland, France, and Sweden; 1990-2001 for Korea and Spain; 1990-1999 for the UK; 1998-2002 for Belgium; 1993-2003 for the Czech Republic.