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Financial Effects of HIV/AIDS on National Social Protection Schemes

PIERRE PLAMONDON, MICHAEL CICHON, AND PASCAL ANNYCKE

Through its demographic and economic effects, the HIV/AIDS pandemic poses a huge challenge to the financial management of national social protection systems. For example, increased mortality owing to HIV/AIDS may reduce the number of contributors to pension schemes. And although the share of contributors reaching retirement age declines, the number of surviving dependents entitled to benefits increases. At the same time, the demand for health services increases. Using a simplified social budget model, this chapter tries to assess the potential financial effects of HIV/AIDS on national social protection schemes.

The institutional arrangements and coverage of social insurance schemes differ substantially across developing countries, and often only a small proportion of the population is covered by formal schemes. The chapter therefore begins with an overview of social protection arrangements and coverage in low-income developing countries. The next section discusses the demographic and economic impact of HIV/AIDS, using the hypothetical case of a country (“Demoland”) hard hit by HIV/AIDS. The concluding section assesses the impacts of HIV/AIDS on different elements of social protection schemes, on the social budget, and on the fiscal balance.

Social Protection Arrangements and Coverage in Developing Countries

Formal public social protection systems cover only a minority of the population in developing countries, particularly in Africa. Typically, such

Table 8.1. Total Public Social Expenditure by Major Function in Six World Regions, 1990–93
(Percent of GDP)

Region	Total Expenditure	Pensions	Health Care	Other
All countries	14.5	6.6	4.9	3.0
Africa	4.3	1.4	1.7	1.2
Asia	6.4	3.0	2.7	0.7
Europe	24.8	12.1	6.3	6.4
Latin America and Caribbean	8.8	2.1	2.8	3.9
North America	16.6	7.1	7.5	2.0
Oceania	16.1	4.9	5.6	5.6

Sources: International Labour Organization (1999 and forthcoming).

protection in developing countries (that is, transfers organized by the state or by social partners) consists of pension schemes for formal sector workers, public health care systems, and a variety of other benefits of lesser financial importance.

Health care systems in developing countries are built around state delivery systems, which are often co-financed by out-of-pocket co-payments by patients at the point of delivery. As regards pensions, the majority of countries follow the social insurance approach, but four countries in Africa—Botswana, Mauritius, Namibia, and South Africa—have noncontributory pension schemes. Means-tested antipoverty benefits are rather rare and mostly of an ad hoc nature.

The availability of data is notoriously bad. Table 8.1 describes in highly aggregated fashion the composition of overall national social protection expenditure in the major regions of the world. In the early 1990s pension and health expenditure accounted for more than 70 percent of total social expenditure in most regions. Africa spends considerably less on social protection than the other regions. In Africa, where ratios of total public expenditure to GDP have been substantially lower, and fiscal deficits higher, than in other regions, the percentage of public expenditure going into the social protection sector also appears to be lower than elsewhere.¹ There is little reason to believe that the situation has changed markedly over the last decade, but no recent comprehensive data exist.²

¹See World Bank (2000, Table 14).

²The data situation on social expenditure will improve when the International Labour Organization resumes its inquiry into the cost of social security in 2004 or 2005.

Data on coverage are even scantier than data on expenditure. The following subsections describe what little is known about the level of coverage in the two main expenditure items in national social budgets.

Health Care Coverage

In principle, most developing countries provide health services to their citizens through a network of public sector delivery units, such as health centers, dispensaries, and government hospitals. The existence of such facilities, however, does not necessarily mean that people enjoy meaningful access to basic health services. Access may be compromised by

- lack of facilities or services in a given region,
- large distances separating people from the nearest health care delivery facility,
- poor quality of care in the nearest facility or facilities, or
- high user charges that constitute a barrier to access for the poor.

Again, internationally comparable indicators on access to care are few. Access to and quality of care can generally be estimated only indirectly. Table 8.2 provides some basic statistics on ratios of health care staff to population in Africa and compares them with ratios in the United Kingdom, the United States, and Germany. The United Kingdom can be regarded as providing a “lean” health service by industrial country standards, and Germany’s as an amply staffed service, with that of the United States somewhere in between.

Table 8.2 shows that, with a few notable exceptions, the staffing ratio (the number of health care staff per 100,000 people) in Africa is typically less than 10 percent of the U.K. ratio. This can be interpreted in one of two ways: either access to care is dramatically worse for virtually all of the population in most African countries than in Europe, or access meets or approaches European levels for some in these countries but a large proportion of the population have no access at all. Most likely the figures reflect a combination of the two. However, there are indications that a substantial proportion of the population in many African countries do not seek help from health professionals in the event of illness (Table 8.3). This fact indicates the existence of either physical or monetary barriers to access.

It is hard to predict how the understaffed and underfunded health systems of developing countries will be affected by increasing HIV infection rates.³ If capacity utilization is already at its limit, and cannot be expanded

³See Over (Chapter 10, this volume) for a more detailed discussion of the impact of HIV/AIDS on health systems.

Table 8.2. Staffing Ratios in National Health Care Systems in Selected African and Comparator Countries in the Mid-1990s*(Personnel per 100,000 population except where otherwise stated)¹*

Country	Year	Physicians	Nurses	Midwives	Dentists	Pharma- cists	Total	Total (percent of U.K. level)
Benin	1995	5.7	20.4	7.9	0.3	...	34.3	4.3
Burkina Faso	1995	3.4	19.6	3.4	0.3	...	26.7	3.3
Cameroon	1996	7.4	36.7	0.5	0.4	...	45.0	5.6
Cape Verde	1996	17.1	55.6	...	1.5	...	74.2	9.2
Central African Rep.	1995	3.5	8.8	4.9	0.2	...	17.4	2.2
Chad	1994	3.3	14.7	2.3	0.2	...	20.5	2.6
Côte d'Ivoire	1996	9.0	31.2	15.0	55.2	6.9
Eritrea	1996	3.0	16.0	2.2	0.1	...	21.3	2.7
Ghana	1996	6.2	72	53.2	0.2	...	131.6	16.4
Guinea	1995	13	55.7	5.2	73.9	9.2
Kenya	1995	13.2	90.1	...	2.2	...	105.5	13.1
Lesotho	1995	5.4	60.1	47	0.5	...	113	14.1
Liberia	1997	2.3	5.9	4.3	0.1	...	12.6	1.6
Mali	1994	4.7	13.1	3	0.1	...	20.9	2.6
Namibia	1997	29.5	168	116.5	4	...	318	39.6
Niger	1997	3.5	22.9	5.5	0.2	...	32.1	4.0
Nigeria	1992	18.5	66.1	52.4	2.6	...	139.6	17.4
Senegal	1995	7.5	22.1	6.6	1.2	...	37.4	4.7
Somalia	1997	4	20	...	0.2	0.1	24.3	3.0
South Africa	1996	56.3	471.8	...	17.8	...	545.9	68.0
Togo	1995	7.6	29.7	10.4	0.7	...	48.4	6.0
Zimbabwe	1995	13.9	128.7	28.1	1.3	...	172	21.4
<i>Memorandum:</i>								
United Kingdom	1993	164	497	43.3	39.8	58.2	802.3	100.0
Germany	1998	350	957	11.3	75.9	57.7	1,451.9	181.0
United States	1995	279	972	...	59.8	...	1,310.8	163.4

Source: World Health Organization Statistical Information System (WHOSIS).

¹Numbers may not sum to totals because of rounding.

quickly, the new demand due to increased morbidity cannot be accommodated. In this case, there will be no impact on the cost of delivery systems—people will simply go uncared for. However, in light of the increased demand for HIV/AIDS-related health services and a crowding out of other health services, the system will most likely try to adjust, by requiring fresh public resources, seeking external funding, or diverting resources from other purposes.

Pension Coverage

Social insurance schemes in developing countries, where they exist, typically provide pensions and short-term cash benefits. Pensions are generally of much greater financial importance in the long run. The share of the

Table 8.3. Indicators of the Utilization of Care in Selected Sub-Saharan African Countries in the Mid-1990s
(Percent)

Country and Income Quintile	Share of Persons Reporting Illness During Past 4 Weeks	Care Sought by Persons Reporting Illness			
		None	Modern (public)	Modern (private)	Other, including traditional
Côte d' Ivoire					
Poorest	30	73	26	1	0
Richest	50	35	55	10	0
Ghana					
Poorest	33	59	23	14	4
Richest	58	43	28	24	5
Guinea					
Poorest	24	60	15	0	25
Richest	32	31	52	6	11
Madagascar					
Poorest	20	72	20	3	5
Richest	34	52	29	16	3
South Africa					
Poorest	12	25	46	23	6
Richest	26	14	9	74	3
Tanzania					
Poorest	12	42	37	17	4
Richest	22	27	32	39	2

Source: Castro-Leal and others (2000).

labor force that contributes to social insurance schemes is typically very low, because the informal sector is large and most social security institutions have difficulty enforcing the legally required contributions. Moreover, coverage of the formal labor force is high only in countries where the public sector dominates formal employment.

Figures for the early 1990s (Barbone and Sanchez, 1999) show that, in many African countries, fewer than 10 percent of the labor force are covered by national pension systems (Table 8.4). More recent data (for 1998) reveal that the coverage of social security schemes was only 19.4 percent in Kenya, 12.5 percent in Zambia, and 9.6 percent in Ghana (Baruti, 2003), levels that are very low when one considers that these three countries have some of the best organized social security systems in sub-Saharan Africa.

Public pension arrangements vary greatly in Africa, ranging from social insurance schemes to provident funds to social assistance schemes. In some countries the only existing pension scheme applies to state employees, and sometimes only a subset of those. As Table 8.5 shows, the majority of old-age pension arrangements are based on the social insurance

Table 8.4. Coverage of Formal Pension Systems in Selected Sub-Saharan African Countries
(Percent)

Country	Year	Covered Wage Bill as Fraction of GDP	Contributors as Share of Labor Force
Burundi	1993	5	3.3
Cameroon	1993	5.5	13.7
Côte d'Ivoire	1989	11	9.3
Ghana	1993	5.7	7.2
Kenya	1993	6.8	25
Madagascar	1993	...	5.4
Mali	1990	...	2.5
Niger	1992	5	1.3
Senegal	1992	...	6.9
Tanzania	1992	...	4.3
Togo	1993	...	6.6
Zambia	1994	...	10.2

Source: Barbone and Sanchez (1999).

principle, which links retirement pensions to contributions paid during the years spent at work. The majority of the population are excluded from old-age pension arrangements altogether, and typically the elderly continue to work regardless of age. When workers become disabled or exhausted by old age, traditional African family solidarity dictates that they be supported by their children.

Demographic and Economic Impact of HIV/AIDS

For our analysis we have built a model based on a hypothetical country called Demoland, which we will use to simulate the impact of the HIV/AIDS pandemic on social security. The demographic and economic characteristics of Demoland are similar to those that prevail in some countries in sub-Saharan Africa, the world region worst affected by HIV/AIDS. We assume that Demoland has a population of 14.8 million people in 2000, the starting year of the simulation. The population is young: 43 percent are under age 15, and only 5 percent are 60 and over. The total fertility rate is 5.1 children per woman. GDP per capita in 2000 is \$720 at the current exchange rate, corresponding to \$1,400 at purchasing power parity, and real GDP is growing at a rate of 5 percent a year. Productivity per worker is increasing at 1.2 percent a year. Labor force participation rates are 76 percent for males and 63 percent for females, and the unemployment rate is 13 percent. It is estimated that 20 percent of the labor force is in the informal sector.

Table 8.5. Pension Arrangements in Sub-Saharan African Countries

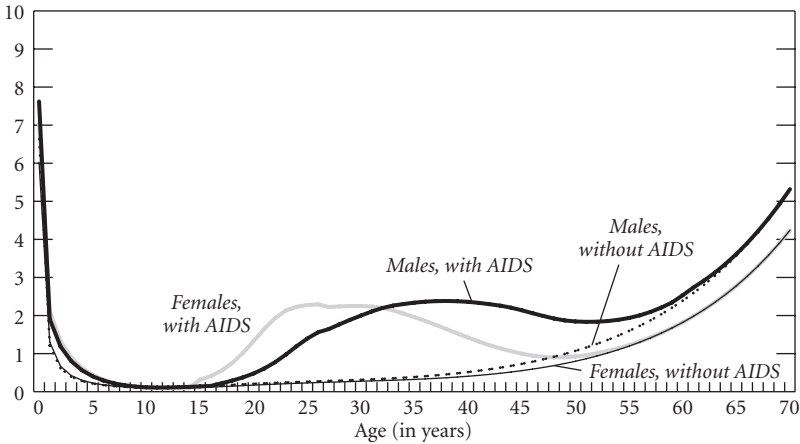
Country	Type of Arrangement	Special System for Public Employees?
Benin	Social insurance	Yes
Botswana	Universal program	Yes
Burkina Faso	Social insurance	Yes
Burundi	Social insurance	Yes
Cameroon	Social insurance	Yes
Cape Verde	Social insurance	Yes
Central African Republic	Social insurance	No
Chad	Social insurance	No
Congo, Dem. Rep. of	Social insurance	Yes
Congo, Rep. of	Social insurance	No
Côte d'Ivoire	Social insurance	Yes
Equatorial Guinea	Social insurance	No
Ethiopia	Social insurance	Yes
Gabon	Social insurance	Yes
Gambia	Pension scheme and provident fund	Yes
Ghana	Social insurance	For army only
Guinea	Social insurance	No
Kenya	Provident fund	Yes
Liberia	Social insurance and social assistance	No
Madagascar	Social insurance	Yes
Malawi	No countrywide arrangement	Only
Mali	Social insurance	Yes
Mauritania	Social insurance	Yes
Mauritius	Noncontributory program and social insurance	Yes
Niger	Social insurance	Yes
Nigeria	Social insurance	Yes
Rwanda	Social insurance	No
São Tomé and Príncipe	Social insurance	No
Senegal	Social insurance	Yes
Seychelles	Social security fund	No
South Africa	Social assistance	Yes
Sudan	Social insurance	Yes
Swaziland	Provident fund	Yes
Tanzania	Provident fund and social insurance	No
Togo	Social insurance	Yes
Uganda	Provident fund	Yes
Zambia	Provident fund	Yes
Zimbabwe	Social insurance	No

Source: U.S. Social Security Administration, Office of Policy (2003).

Demographic Impact

It is assumed that 700,000 Demolanders are infected with HIV. Ten percent of the adult population (those aged 15–49) are estimated to be HIV-positive. AIDS caused 72,000 deaths in 2000. In the absence of HIV/AIDS, life expectancy at birth would be 56 years for males and 59 years for females. With HIV/AIDS, however, life expectancy at birth has dropped to

Figure 8.1. Demoland: Mortality Rates by Sex, With and Without AIDS, 2010
(Percent)



Source: Authors' model described in the text.

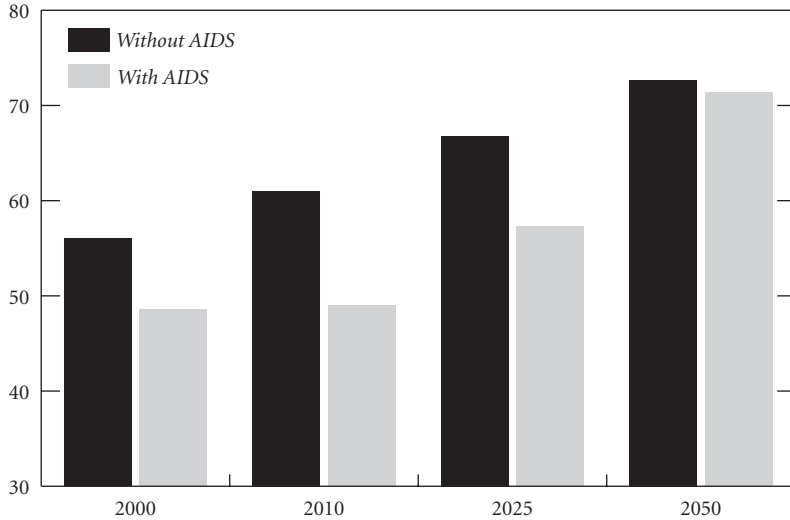
49 and 54 years, respectively. It is assumed that HIV/AIDS prevalence will reach its peak in 2010 and that preventive measures will make AIDS gradually disappear by 2050.

Demoland introduced its pension scheme 30 years before, in 1970. The country's social security law calls for coverage of the entire labor force, but because of compliance problems and the size of the informal sector, only 34 percent of the workforce (for both males and females) actually contribute to the scheme. The present legal contribution rate is 8.0 percent of insured earnings. Pension expenditure represented 1.1 percent of GDP in 2000.

Public health expenditure in Demoland amounts to 2.5 percent of GDP, and private health expenditure for 1 percent of GDP. Other social programs, with total annual spending of 1.2 percent of GDP, include unemployment insurance, sickness and maternity benefits, a basic disability program, tax-financed family benefits, and a limited social assistance program.

HIV/AIDS will cause a dramatic increase in mortality for two critical age groups: the very young (0–4 years) and young adults (15–49 years). Figure 8.1 shows projected mortality rates for the peak year 2010. The additional deaths due to AIDS are concentrated in the population between ages 15 and 50. The additional mortality for men is likely to appear at slightly higher ages than for women. The additional mortality among the very young results from transmission of HIV from mother to child.

Figure 8.2. Demoland: Projected Life Expectancy for Men, Without and With Impact of AIDS
(Years)



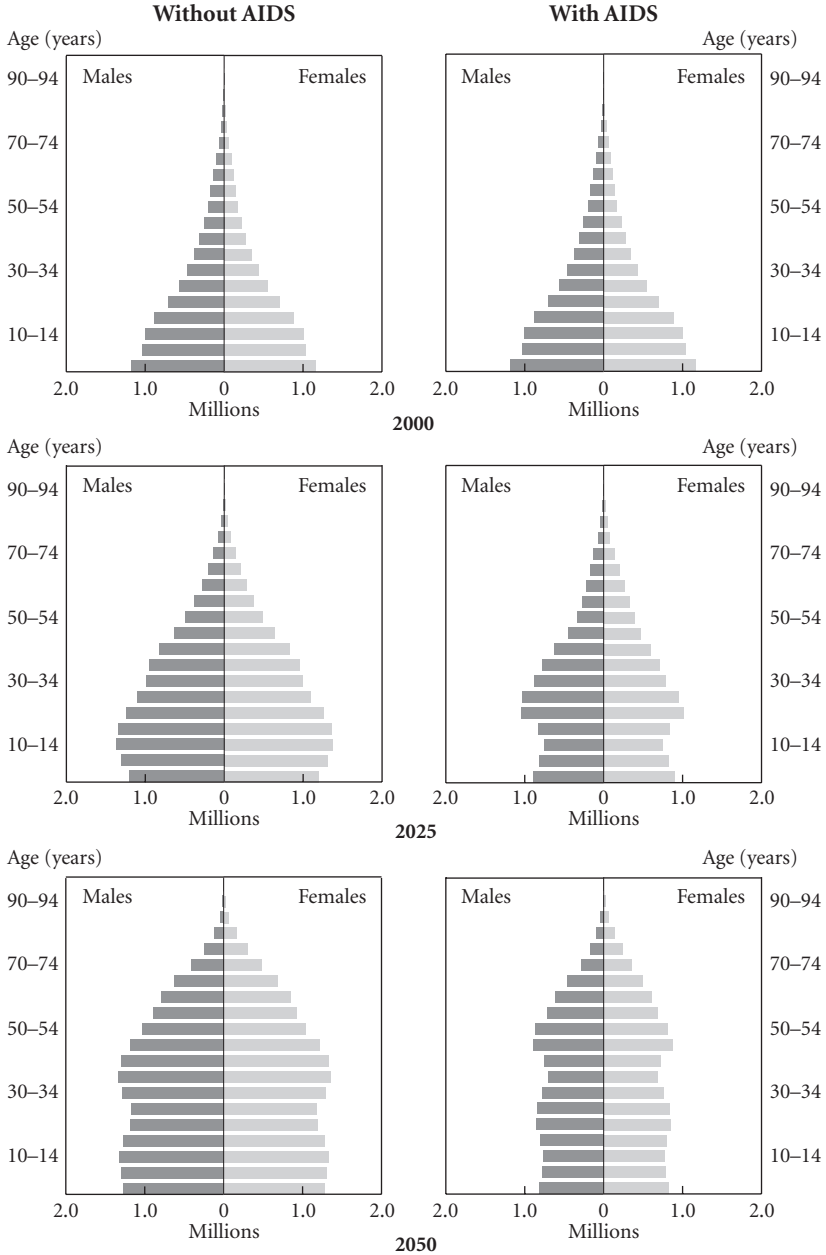
Source: Authors' calculations using model described in the text.

These changes in mortality will have a major impact on life expectancy. In the scenario without AIDS, life expectancy at birth is assumed to increase gradually and continuously from its present level of 56 years for males and 59 years for females in 2000 to 72 years for males and 77 years for females in 2050. In the scenario with AIDS, in contrast, life expectancy does not improve until 2010, after which it starts to increase so as to eventually approach the without-AIDS values only in 2050 (Figure 8.2).

HIV/AIDS may also affect fertility, in part because more women will become widows and stop bearing children, but also because women infected by HIV will be in too poor health to bear children or will decide to have no more. In the base scenario (that is, without the impact of HIV/AIDS), it is supposed that the total fertility rate decreases from 5.1 children per woman in 2000 to 2.1 in 2025 and remains at that level thereafter. Taking into account the impact of HIV/AIDS, it is supposed that the ultimate rate of 2.1 will be reached more rapidly, in 2010 instead of 2025.

The combined effects of HIV/AIDS on mortality and fertility in the projected population can be very important. Figure 8.3 illustrates the pop-

Figure 8.3. Demoland: Population Pyramids by Sex, Without and With Impact of AIDS



Source: Authors' calculations using model described in the text.

ulation structure with and without HIV/AIDS, using population pyramids. Under the no-AIDS scenario, the total population of Demoland increases from 14.8 million in 2000 to 34.1 million in 2050, for an average annual growth rate of 1.7 percent. With AIDS, however, the population reaches only 22.6 million in 2050, because of fewer births and higher mortality. The figure shows the combined effect of lower fertility and higher infant mortality on the population below age 20, which represents the future workforce and social security contributors. Figure 8.3 also shows that mortality due to AIDS will prevent a large proportion of the population from reaching retirement age.

Economic Impact

HIV/AIDS affects the economy in many different ways. For example, increased mortality and morbidity adversely affect productivity, increased expenditure on health is likely to affect public and private saving, and increased production costs and a deteriorating economic outlook affect investment behavior. In analyzing the financing of social security, the most important economic variables are GDP (or, more specifically, the tax base for domestic government revenue), labor force participation rates, and the number of contributors to the social security scheme.

A detailed analysis of the impact of HIV/AIDS on GDP is beyond the scope of this chapter.⁴ For Demoland it is assumed that HIV/AIDS causes a reduction in GDP growth of 2 percentage points (from 5 percent to 3 percent) initially (2000–04) and that the impact of HIV/AIDS on GDP growth then gradually diminishes to 1.5 percentage points in 2005–09, 1 percentage point in 2010–19, and 0.5 percentage point thereafter.

Labor productivity increases by 1.2 percent a year in the scenario without AIDS. With HIV/AIDS, productivity is assumed to increase at a rate of only 1.0 percent a year until 2039 and to return to its earlier growth rate thereafter. For simplicity, we assume that salary increases go hand in hand with increases in productivity.

As regards the impact of AIDS on labor supply, it is assumed that the participation rates of men will be lower at all ages except 15–24 (Table 8.6). For women, the need for children and widows to seek employment will cause their participation rates to rise at all ages below 44. Reflecting slower GDP growth, the unemployment rate in the with-AIDS scenario is

⁴See Haacker (Chapter 2, this volume) for a discussion of the macroeconomic effects of HIV/AIDS.

Table 8.6. Demoland: Assumptions on Labor Force Participation Rates by Age and Sex
(Percent of working-age population)

Age (years)	Scenario 1 (No AIDS)		Scenarios 2–4 (With AIDS)	
	Males	Females	Males	Females
15–19	58	37	65	50
20–24	89	44	90	60
25–29	97	47	90	60
30–34	98	49	90	60
35–39	99	49	90	60
40–44	98	51	90	60
45–49	97	51	90	50
50–54	97	49	90	50
55–59	90	46	60	30
60–64	88	39	20	20
65–69	72	23	20	20

Source: Authors' model described in the text.

assumed to increase from 14 percent in 2000 to 20 percent in 2015, and then decrease as total population falls as a result of AIDS mortality.⁵

For contribution-financed social security schemes, such as the pension scheme discussed below, the assumptions regarding the number of contributors are critical. In assessing the impact of HIV/AIDS on contribution rates, we distinguish four different scenarios. *Scenario 1* is the base scenario, without AIDS. In *scenario 2* the number of contributors changes in proportion to the change in the total number of workers, so that the percentage of workers covered by the scheme is held constant. For these two scenarios, the assumed coverage rates are presented in Tables 8.7 and 8.8.

In *scenario 3* the number of contributors to the social security scheme is the same as in the base scenario. This reflects the assumption that, because of the size of the uncovered population and of the informal sector, all contributors dying from AIDS are replaced by workers previously not covered by the scheme. This scenario may also be realistic in the context of a civil service pension plan, which is the principal pension arrangement in a large number of developing countries. *Scenario 4*, the most pessimistic scenario, freezes the number of contributors at its 2000 level, on the assumption that AIDS deaths and slower economic growth prevent any increase in the covered population.

⁵Unemployment rates in many developing countries are significantly above these levels, sometimes reaching 40 percent or more. In that context our assumptions may appear optimistic. However, as described earlier, high unemployment combined with an abundance of unskilled labor may make it easier to replace workers dying from AIDS with unemployed workers or workers from the informal sector. Consequently, keeping the unemployment rate low may generate a greater impact of AIDS on the social security system.

Individual Social Protection Schemes and the Fiscal Balance

HIV/AIDS will most likely increase expenditure on all social protection schemes and consequently affect the budgetary situation of the government. This section presents the financial implications of the epidemic on the individual schemes and shows how they affect the social budget and the fiscal balance of Demoland.

Table 8.7. Demoland: Assumptions on Social Security Coverage Rates by Age and Sex, 2000
(Percent)

Age (years)	Males	Females
15–19	20	20
20–24	25	25
25–29	30	30
30–34	40	35
35–39	40	40
40–44	50	45
45–49	50	50
50–54	60	55
55–59	60	60

Source: Authors' model described in the text.

Pensions

The impact of HIV/AIDS on pension schemes may be viewed from two perspectives. On the expenditure side, AIDS is expected to reduce the number of old-age pensions in the long term, but to increase survivors' and disability pensions in the short term. On the revenue side, AIDS will have an impact to the extent that a smaller total population will cause a reduction in the number of people employed, and to the extent that those employed persons affected by HIV/AIDS are among the contributors to the scheme. The reality in most developing countries is that the coverage of social security schemes is far from complete, and it can be assumed in some cases that new contributors will replace—at least partly—those who die from AIDS. However, the extent of this substitution is unknown. Thus we analyze two scenarios with respect to the impact of AIDS on the number of contributors to the Demoland pension scheme: a zero-substitution scenario and a full-substitution scenario.

The impact of HIV/AIDS on *old-age pensions* varies over time. Initially, the number of pensions will be almost unaffected, because the disease mainly strikes persons younger than 50 (Figure 8.4). But later, when the generations now younger than 50 reach retirement age, the scheme will experience a reduction in the number of old-age pensioners.

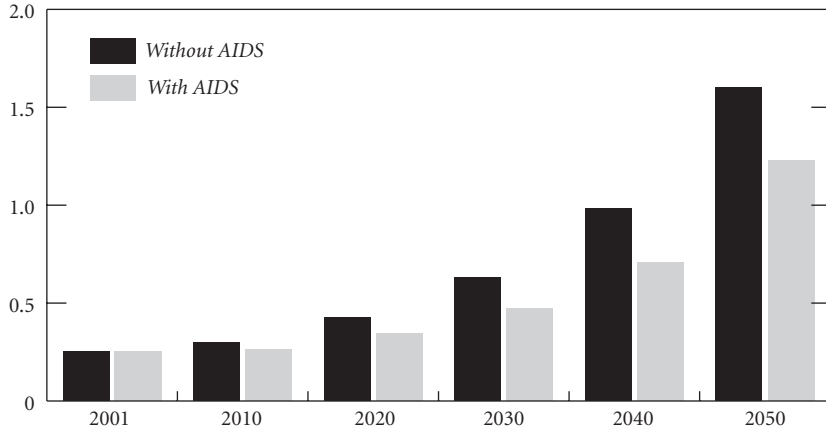
The number of *disability pensions* will be affected by several factors.

Table 8.8. Demoland: Assumptions on Social Security Coverage Rates by Sex and Year
(Percent)

Year	Males	Females
2000	34	34
2010	35	35
2020	36	36
2030	37	37
2040	38	38
2050	37	38

Source: Authors' model described in the text.

Figure 8.4. Demoland: Projected Number of Old-Age Pensioners Without and With Impact of AIDS
(Millions)



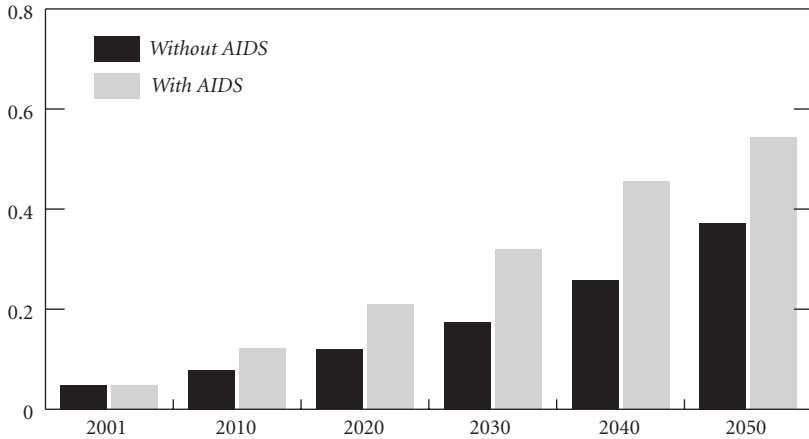
Source: Authors' calculations using model described in the text.

The incidence of new disability cases should increase as workers in the late stages of AIDS become incapacitated. However, the average duration of disability pensions should fall because of the relatively rapid and fatal course of AIDS. Moreover, if the period from incapacitation to death is relatively short—for instance, because life-prolonging drugs are unavailable—it may well happen that only a few persons will claim the disability pension and receive benefits for more than a short period.

Figure 8.5 presents one possible scenario in which the presence of AIDS multiplies the incidence of disability by a factor of 5 from 2000 to 2010, after which the multiplier gradually falls to 1 between 2010 and 2050. In choosing these values, we have assumed that those who die from AIDS will be eligible for a disability pension for at least a short period before death. In addition, it is assumed that the average duration of disability pensions is reduced for those afflicted by AIDS. Finally, it is assumed that the mortality rates of disability pensioners are five times higher than in the base scenario from 2000 to 2010 and that this factor thereafter declines gradually to unity between 2010 and 2050.

As regards *survivors' benefits*, AIDS will increase the number of widows and widowers (Figure 8.6) and the number of orphans (Figure 8.7). If the pension scheme provides for a funeral grant, expenditure on such benefits will increase sharply. On the other hand, the duration of widows' and widowers' pensions should decrease as a result of HIV/AIDS, since sur-

Figure 8.5. Demoland: Projected Number of Disability Pensioners Without and With Impact of AIDS
(Millions)



Source: Authors' calculations using model described in the text.

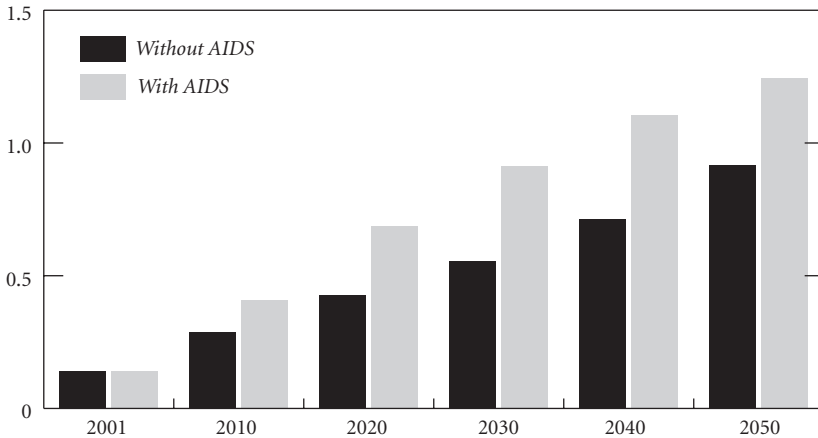
living spouses have a high probability of having been infected by HIV themselves before the death of their spouse. The increase in the number of orphans' pensions will be proportionately larger than that for widows' and widowers' pensions, because the death of the insured person typically happens at an early age, when there are many dependent children under the age of 20 (as in the Demoland case) in the household.

HIV/AIDS will have an impact on *pension scheme revenue* to the extent that it affects the number of contributors, their earnings, and contribution rates. Below we assume that contribution rates are adjusted regularly so that pension outlays equal pension revenue at all times. The macroeconomic assumptions for each of four scenarios are described above.

The global impact of HIV/AIDS on the cost of a social security pension scheme will vary over time. In the short run the additional survivors' and disability pensions will increase expenditure, and HIV/AIDS may (depending on the scenario) have the effect of reducing the number of contributors through death or incapacitation. In the longer run HIV/AIDS is expected to reduce the number of persons who reach retirement age, thus reducing expenditure on old-age pensions.

In scenario 2, where HIV/AIDS affects the number of contributors in the same proportion as the entire labor force, the present contribution rate of 8 percent becomes insufficient as early as 2000. The contribution rate must be increased in increments, to 10.5 percent in 2010 (Table 8.9),

Figure 8.6. Demoland: Projected Number of Widows Without and With Impact of AIDS
(Millions)



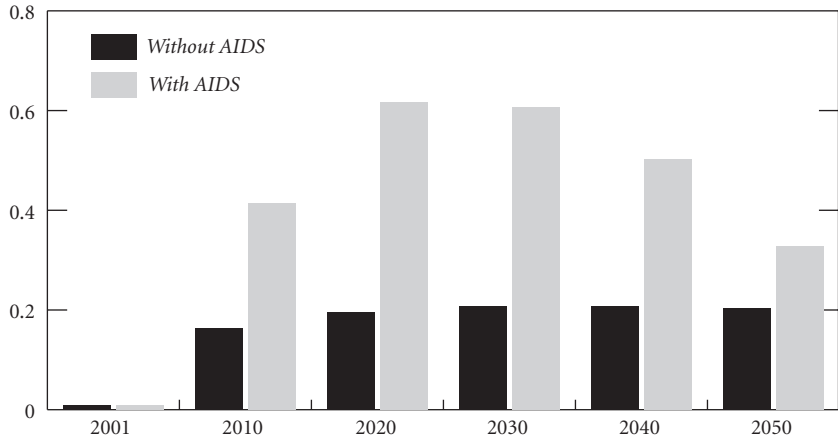
Source: Authors' calculations using model described in the text.

because of the increasing expenditure pattern and the lower salary base resulting from HIV/AIDS. Scenario 3, where HIV/AIDS does not affect the number of contributors, also requires an increase in contribution rates compared with the base scenario without HIV/AIDS, but the increase is more gradual than in scenario 2. In the worst-case scenario, scenario 4, the contribution rate has to increase rapidly, to 17.3 percent in 2020 and eventually to 23.2 percent in 2050.

It may be helpful to compare the general average premium for the pension scheme under the various scenarios. The general average premium is defined here as the minimum constant contribution rate sufficient to finance all benefits of the scheme over the period 2000–50. In the base scenario the general average premium would be 10.3 percent, whereas in scenario 2 it rises to 11.4 percent. This means that, in scenario 2, the advent of AIDS requires an immediate and sustained increase in the contribution rate of 1.1 percentage point over the next 50 years. On the other hand, if we assume that HIV/AIDS does not affect the number of contributors because of full substitution by previously uncovered workers (scenario 3), the general average premium increases only to 11.0 percent, or by 0.7 percentage point. In the least favorable scenario, scenario 4, the general average premium would be 16.5 percent.

The above discussion assumes a typical defined-benefit pension scheme. *Other types of pension arrangements* may exist in a number of

Figure 8.7. Demoland: Projected Number of Orphans Without and With Impact of AIDS
(Millions)



Source: Authors' calculations using model described in the text.

countries, which will thus face the AIDS threat in a different way. Box 8.1 describes the impact of AIDS in the context of a defined-contribution (or provident fund) arrangement and shows how this type of scheme is equipped to address the issue of HIV/AIDS.

Health

Health expenditure related to HIV/AIDS can be divided into curative care and prevention. In a developing country, health care may be offered by the public sector, by the private sector, or by foreign-based donors. In the case of Demoland, it is assumed that all public expenditure on health is financed from general revenue and that no national health insurance scheme exists.⁶ Initially, most of the additional need for health services due to HIV/AIDS goes unmet. Through 2003, only 10 percent of opportunistic infections are treated, partly reflecting limited capacity at the local level, but also limited take-up of HIV-related health services because of stigmatization. The public sector does not provide any antiretroviral (ARV) treat-

⁶In fact, the private sector may provide some health treatments, and thus the economic effect of HIV/AIDS may extend beyond the fiscal effect, but given the high cost of treating HIV patients it is assumed here that the private sector provides very limited coverage and that most health expenditure is supported by the government.

Table 8.9. Demoland: Required Pension Contribution Rates
(Percent)

Year	Scenario ¹			
	1	2	3	4
2000	8.0	8.2	8.0	8.3
2001	8.0	8.5	8.2	8.9
2002	8.0	8.8	8.6	9.6
2003	8.0	9.1	9.0	10.4
2004	8.0	9.4	9.3	11.1
2005	8.1	9.6	9.5	11.7
2010	8.4	10.5	10.1	14.1
2020	9.0	11.7	10.1	17.3
2030	10.0	11.3	10.7	19.9
2040	11.8	11.7	12.0	21.6
2050	15.5	15.2	15.2	23.2

Source: Authors' calculations using model described in the text.

¹Scenario 1 is a no-AIDS scenario; in scenario 2 the change in the number of contributors is proportional to the change in the total number of workers, so that the percentage of workers covered by the scheme is held constant; in scenario 3 contributors dying from AIDS are replaced by workers previously not covered by the scheme, so that the number of contributors is the same as in the scenario without AIDS; and in scenario 4 the number of covered workers remains constant.

ment through 2003, although a small percentage of patients (fewer than 1 percent of those requiring treatment) may receive ARV drugs through pilot projects or private providers. In 2004 the government embarks on an ambitious program to improve access to treatment, reaching coverage rates of 45 percent (for ARV treatment) and 40 percent (for opportunistic infections) by 2007, and 65 percent and 70 percent, respectively, by 2015.⁷ Annual spending per patient is \$400 for opportunistic infections and \$500 for ARV treatment, enough to cover the costs of the drugs and of service delivery.⁸ HIV patients are assumed to need treatment for opportunistic infections for the last two years of their lives, and ARV treatment is assumed to begin two years before the patient would otherwise die and to extend life by three years, so that patients receive treatment for a total of five years.⁹

In most countries afflicted by HIV/AIDS, the effects on health expenditure are very small initially, because the health sector is not well equipped to deal with the additional demand, or because fixed budget allocations

⁷The assumed coverage rates are inspired by targets proposed by the Commission on Macroeconomics and Health (2001).

⁸These estimates are derived from Schwartländer and others (2001) and Individual Members of the Faculty of Harvard University (2001), using updated prices for ARV drugs.

⁹See Schwartländer and others (2001). An economic side effect of ARV treatment is that it reduces or delays outlays on treatment of opportunistic diseases.

mean that, in the short run, hospitals and doctors must resort to rationing. In Demoland, public health expenditure increases by only about 2 percent (0.05 percent of GDP) by 2000. As coverage rates for ARV treatment and opportunistic infections increase, public health expenditure rises by 0.3 percent of GDP by 2005, 1.1 percent of GDP by 2010, and 1.3 percent of GDP by 2015, in which year HIV/AIDS-related expenditure amounts to 52 percent of initial public health expenditure.

Other Social Security Schemes

Unemployment insurance schemes are rather rare in developing countries. We assume that Demoland is one of the few countries with such a scheme for the formal sector. In our example, as already mentioned, the unemployment rate increases from 14 percent in 2000 to 20 percent in 2015. After 2015, because HIV/AIDS reduces the working-age population, the unemployment rate starts to decrease and eventually (after 2025) falls below the rate in scenario 1. Demoland's unemployment insurance scheme is financed by employer and worker contributions that together equal 1 percent of covered earnings initially. In line with the increase in unemployment, we assume that unemployment insurance contributions will have to increase gradually to 1.5 percent of covered earnings in 2015.

In our example, *short-term benefits* include sickness, maternity, and on-the-job injury benefits. We assume that the cost of sickness benefits increases by 50 percent as a result of HIV/AIDS, from 0.50 percent of payroll to 0.75 percent. Maternity benefits (0.5 percent of payroll in 2000) follow the decrease in the fertility rate as a result of HIV/AIDS, and the cost of on-the-job injury benefits is unaffected, remaining at 1.0 percent of payroll.

We assume that tax-financed *family benefits* are unaffected by HIV/AIDS. Any change in the country's demography is compensated by a change in benefit amounts so as to keep total expenditure constant.

A basic *social assistance* program exists in Demoland. The program's expenditure, financed from general revenue, amounts to 0.25 percent of GDP. We assume that HIV/AIDS increases poverty and that the government will have to support those in need because of loss of income or increased personal health care expenses. We further assume that the number of social assistance recipients doubles in 2000 because of AIDS and that the number of additional recipients increases over time in line with the demographic projections presented above. Under these assumptions the cost of the social assistance program doubles in 2000, to 0.50 percent of GDP, and reaches 0.90 percent of GDP in 2015.

Box 8.1. Impact of AIDS on Defined-Contribution Pension Schemes

This box addresses the financial impact of HIV/AIDS in the context of defined-benefit pension schemes, which are the most common form of public sector pension scheme. However, certain developing countries have adopted other forms of pension provision, such as provident funds or other forms of defined-contribution systems. Defined-contribution pension schemes have also become more common in the private sector, as companies seek to contain the rising costs of risk benefits associated with HIV/AIDS (see Rosen and Simon, 2003).

Under a defined-contribution scheme, contributions are accumulated in an individual account, and the accumulated amount is normally paid at retirement in the form of an annuity, a lump sum, or scheduled withdrawals. The usual death benefit under a defined-contribution scheme is a refund of the amount accumulated on behalf of the accountholder (the sum of contributions previously paid plus accumulated interest) at the time of death. If death occurs not long after the worker has started contributing to the scheme, the accumulated amount will be low. Using the same 8 percent contribution rate as in the Demoland case, the table presents the accumulated value of a defined-contribution account at different ages for a worker who started contributing to the scheme at age 20.

The regular income that can be purchased from the accumulated account is far below the current salary if death occurs before age 45. This also shows that defined-contribution schemes are poorly adapted to face the threat of AIDS, because they cannot provide regular long-term income to the survivors of par-

Impact of HIV/AIDS on the Social Budget and the Fiscal Balance

Table 8.10 presents the social budget of Demoland without and with the impact of HIV/AIDS, respectively. Without HIV/AIDS total social expenditure represents 5.0 percent of GDP in 2000, of which 2.5 percent of GDP is for public health expenditure and 1.1 percent for pensions. Under this scenario, total social expenditure grows modestly through 2015, from 5.0 percent of GDP to 5.4 percent, mainly because of increased expenditure on pensions. Since pensions are financed from payroll contributions from employers and workers, the burden on general revenue decreases slightly during the period, from 3.2 percent of GDP to 3.1 percent.

The HIV epidemic already has a significant effect on social expenditure in 2000. Compared with the scenario with no AIDS, current social expenditure rises by 0.5 percent of GDP (10 percent), mainly because of increased outlays for social assistance. In light of our assumptions based on limited historical coverage rates for HIV/AIDS-related health services, health expenditure increases only very modestly at this stage. By 2015

Accumulated Pension Contributions in a Defined-Contribution Scheme¹

Age of Worker (years)	Current Salary (dollars)	Accumulated Value of Account (dollars)	Ratio of Accumulated Account Value to Current Salary	Value of a \$1-a-Year Life Annuity to a Surviving Spouse (dollars)	Spouse's Income from Life Annuity (percent of current salary) ²
25	5,853	3,096	0.5	19.4	2.7
30	6,851	7,122	1.0	18.6	5.6
35	8,020	13,017	1.6	17.6	9.2
40	9,388	21,502	2.3	16.5	13.9
45	10,989	33,552	3.1	15.2	20.1

Source: Authors' calculations.

¹It is assumed that workers enroll in the pension plan at age 20, that their starting salary is \$5,000 and increases by 3.2 percent (nominal) a year, that each individual account earns interest at 6.0 percent a year, and that the life annuity is indexed at 2 percent a year.

²Calculated as $100 \times (\text{accumulated account value} / \text{current salary}) / \text{value of } \$1\text{-a-year life annuity}$.

ticipants in the age groups most affected by HIV/AIDS (those aged 20–45). On the other hand, some provident funds allow the prepayment of the account balance in the case of certain defined events before retirement. Such a provision may help pay medicines and hospital expenses and support the worker's family during his or her last months of life.

social expenditure reaches 8.4 percent of GDP in this scenario, an increase of 3.2 percent of GDP relative to a situation with no HIV/AIDS. Most notably, HIV/AIDS results in an increase in health expenditure of 1.3 percent of GDP by 2015 (with much improved access to HIV/AIDS-related health services, including ARV treatment), pension outlays rise by 0.5 percent of GDP, and social assistance payments rise by 0.7 percent of GDP, relative to the no-AIDS scenario.

To assess the impact of increased social expenditure on the fiscal balance, it is also important to take into account the financing of that expenditure. We have assumed that pensions, unemployment insurance, and short-term benefits are financed by contributions; the increase in expenditure on these items (1 percent of GDP) is offset by increased contributions.¹⁰ As a conse-

¹⁰Additional sources of financing are changes in reserves and investment income of social security institutions. In our example, these items play a minor role. However, in a situation with significant reserves of the social security system, these can be used to smooth peaks in contribution rates or taxes to finance HIV/AIDS-related expenditure.

Table 8.10. Demoland: Social Budget Without and With Impact of HIV/AIDS
(Percent of GDP)¹

Item	Without Impact of AIDS				With Impact of AIDS			
	2000	2005	2010	2015	2000	2005	2010	2015
Expenditure								
Total current social expenditure	4.7	4.9	5.1	5.4	5.2	6.1	7.5	8.4
Pensions	1.1	1.3	1.5	1.7	1.1	1.5	1.8	2.2
Health (public expenditure only)	2.5	2.5	2.5	2.5	2.6	2.8	3.6	3.8
Unemployment	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4
Short-term benefits	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.6
Family benefits	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5
Social assistance	0.2	0.2	0.2	0.2	0.5	0.7	0.8	0.9
Change in reserves	0.2	0.2	0.1	—	0.2	0.2	0.2	0.1
Pension insurance	0.2	0.2	0.1	—	0.2	0.2	0.2	0.1
Health insurance	—	—	—	—	—	—	—	—
Short-term benefits	—	—	—	—	—	—	—	—
Unemployment insurance	—	—	—	—	—	—	—	—
Total social expenditure	5.0	5.1	5.2	5.4	5.4	6.3	7.7	8.5
Income								
Social security contributions	1.6	1.7	2.0	2.2	1.6	2.1	2.6	3.2
Pension insurance	1.1	1.3	1.5	1.6	1.1	1.5	1.8	2.2
Health insurance	—	—	—	—	—	—	—	—
Short-term benefits	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.6
Unemployment insurance	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4
Investment income	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Pension insurance	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Health insurance	—	—	—	—	—	—	—	—
Short-term benefits	—	—	—	—	—	—	—	—
Unemployment insurance	—	—	—	—	—	—	—	—
Income from general revenue	3.2	3.2	3.0	3.1	3.6	4.0	4.9	5.1
Total income	5.0	5.1	5.2	5.4	5.4	6.3	7.7	8.5

Source: Authors' calculations.

¹Numbers may not sum to totals because of rounding.

quence, the balance of the social budget (financed from general revenue) increases by 2.0 percent of GDP by 2015. This could be financed from an increase in external grants or from domestic revenue. As detailed by Haacker (Chapter 7, this volume), a substantial proportion of health expenditure in most countries severely affected by HIV/AIDS currently is financed in this way.¹¹ However, other components of the additional costs (such as most forms of social assistance) are usually financed from domes-

¹¹Summers and Kates (2003), updating estimates by the Joint United Nations Programme on HIV/AIDS (UNAIDS), project that over three-fourths of institutional spending on HIV/AIDS in developing countries in 2003 was financed through external assistance. Martin (2003), in a study of several countries in southern Africa, reports similar findings.

tic revenue. Thus, financing these expenditures, to the extent that they are not financed externally, would require an increase in tax and other revenue or cutbacks in other areas.

Improving the Coverage of Social Protection Schemes to Cope with HIV/AIDS

How can governments of developing countries meet the social challenges posed by HIV/AIDS and its expected severe budgetary consequences? The social challenges are of a twofold nature. On the one hand, health care has to be provided to those affected. On the other hand, the victims of the pandemic and their families need income support to prevent the medical disaster caused by AIDS from turning into a social disaster. Improving the coverage of social protection schemes appears to be the solution.

Because traditional social insurance transfers fail to reach the majority of the population, both in Africa and in other developing countries, and given that the AIDS pandemic will affect all population subgroups, more-universal income replacement schemes could be effective new instruments in the struggle against AIDS-triggered poverty. A universal flat-rate pension for the elderly, the disabled, and survivors, paid to all persons over a certain age (on the basis of residency, for example), is one way to provide basic income to families that have an elderly member. Such a measure combats old-age poverty while also reinforcing the intergenerational support so urgently needed among AIDS families with a missing generation. Ancillary benefits or additional conditions attached to a universal pension can be used to provide supplementary income for families to take care of AIDS-affected individuals; they may also help prevent children from having to leave school at an early age to earn an income. According to all available experience, a universal pension would cost on the order of 1 to 2 percent of the developing country's GDP.¹² The financing of such pensions may require the suppression of subsidies to social insurance schemes or the suppression of tax advantages for private pension schemes. Introducing universal pension benefits where they did not exist before will, of course, require substantial public debate. However, the total cost does not seem exorbitant, and a gradual introduction over 10 or more years may be feasible in a range of countries.¹³

¹²See the figures quoted by the Institute of Development and Policy Management and Help Age (United Kingdom, Department for International Development, 2003, Chapter 3.5).

¹³The Financial and Actuarial Service of the International Labour Organization has started an initiative to establish the financial affordability of this type of benefit.

Another way to reduce the pressure on the government budget would be to “bail in” the private sector, by introducing a public health insurance scheme financed by earmarked contributions. However, such a scheme would be introduced in an environment where HIV/AIDS is already raising companies’ personnel costs, and where many companies are taking steps to contain the rising costs of health coverage related to a high incidence and high cost of care related to AIDS. Thus, fiscal measures to finance such a scheme would have to be mindful of the impact on personnel costs, especially for employees at the low end of the pay scale.

Although HIV/AIDS raises the costs of social insurance, these programs also have substantial benefits. For example, income support mitigates the adverse economic effects on the families affected, and Ainsworth, Beegle, and Koda (2002) suggest that such support has a positive effect on school enrollment rates for orphans. Improved health coverage results in fewer new HIV infections, fewer orphans, more people staying at work, fewer disability grants, and longer life expectancy.¹⁴ Thus, in addition to mitigating the impact on the affected individuals and households and reducing the human toll, these measures would also help to reduce or even reverse the economic decline caused by HIV/AIDS, thereby helping to finance the increased costs of social security.¹⁵

Conclusions

Health and pension expenditure account for about three-fourths of all social expenditure in any country with a fairly well developed national social transfer system. But HIV/AIDS affects each of these two types of spending differently. These effects can be simulated, but not without a substantial degree of uncertainty. In particular, the effects on the pension system are probably less predictable than those on the health system.

As long as a pension scheme can find new contributors to replace those prematurely dying of AIDS, the impact of AIDS on national pension schemes appears to be financially manageable. However, the impact of HIV/AIDS on the number of contributors to these schemes is the great

¹⁴See Haacker (Chapter 2, this volume) for a discussion of the macroeconomic benefits of ARV treatment.

¹⁵See Masha (Chapter 9, this volume) for an assessment of the macroeconomic effects of Botswana’s National Strategic Plan on HIV/AIDS.

unknown. For developing countries it may be assumed that high unemployment and a large informal sector will allow HIV/AIDS-related deaths in the workforce to be replaced to a considerable degree by workers from outside the formal sector and the unemployed. Even then, however, overall economic growth may slow, because the productivity of the replacements is likely to be less than that of the workers they are replacing. Moreover, the cost of training the new workers will increase the overall cost to the enterprise, also reducing growth. The dramatic results of our nonreplacement scenario show (although it describes an improbable, extreme case in which the number of contributors is frozen at the 2000 level) that the financial risks of pension schemes associated with a potential draining of the economy of qualified workers are substantial.

The social budget exercise presented in this chapter shows that the cost of social programs other than pension schemes might also increase substantially as a result of AIDS. The cost of health care, sickness, and unemployment benefits schemes may rise dramatically as HIV/AIDS puts people out of work and generates the need for income support and health care. In countries where the prevalence of HIV/AIDS is high, the burden on general revenue may put governments in a difficult financial position, even though the emerging deficits in the next decades may not be unmanageable, as our projections show.

Solutions appear to be available in the form of a set of policy options that could help address the medical, social, and financial consequences of the AIDS pandemic. Universal pensions, probably combined with more-targeted social assistance for AIDS-affected families, would help alleviate the social consequences. Abolishing tax breaks for private pension schemes could possibly finance most of the cost without increasing the emerging government deficit.¹⁶ Investing a part of the social budget in awareness campaigns can also reduce the long-term cost. And the introduction of a national health insurance scheme could probably help close the emerging deficit. Even so, deficits will most likely increase over what they would have been under the status quo. Further tax increases may be necessary, although these may be less dramatic than is often assumed. The challenge will be to design these taxes in such a way that they do not further weaken countries' already fragile growth rates.

¹⁶The cost of South Africa's social pension is estimated to be on the order of 1.4 percent of GDP, compared with tax breaks for private pensions that currently amount to 1.7 percent of GDP.

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