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#### ***AIDS - Managing the financial consequences of a pandemic in a developing country context***

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## AIDS - Managing the financial consequences of a pandemic in a developing country context<sup>1</sup>

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### *Executive summary*

*More immediately and much more dramatically than ageing or any other development, the HIV/AIDS pandemic poses a huge challenge to the financial management of national social protection systems. This paper enters new territory in the financial governance of social protection as it tries - at least on the basis of a simplified social budget model - to first assess the dimension of the potential effects on a national social protection scheme and then tries to simulate possible coping mechanisms.*

*It presents the effect of HIV/AIDS on the demographic and economic variables that in turn influence the finances of social security schemes. The analysis is done through a hypothetical case (Demoland) hardly hit by HIV/AIDS. The paper compares different scenarios, with and without the impact of HIV/AIDS, in order to show how the social budget may be influenced by the evolution of those various factors.*

## Introduction

It is estimated by the joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) that 36.1 million persons were living with HIV by the end of 2000. It resulted in 3 million deaths from AIDS worldwide in 2000. By the end of that year, there are estimated to be 12 million AIDS orphans. The situation is not improving: some 5.3 million people became infected with the HIV virus in 2000.

Ninety-five per cent of people with AIDS live in the developing world. This proportion is set to grow as infection rates continue to rise in countries where poverty, poor health systems and limited resources for prevention and care compound the problem. Sub-Saharan Africa is the region of

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<sup>1</sup> This paper is an extended version of the paper "Assessing the impact of AIDS on social security pension schemes in developing countries." presented at the General Assembly of the International Social Security Association in Stockholm, September 2001. The original paper was limited to the effects of the pandemic on pension systems.

the world most affected by HIV/AIDS. AIDS is now the leading cause of death in Africa, responsible for one in five deaths. Life expectancy in Southern Africa, which rose from 44 years in the early 1950s to 59 years in the early 1990s, is set to drop to 45 years between 2005 and 2010 due to AIDS. Other parts of the world are also hit by the disease. AIDS has killed half a million persons in Asia in 2000.

The socio-economic impact of HIV/AIDS is immense given that the age range for those most affected is between 15 and 49 years, being the most economically productive and sexually active age group. Countries like Botswana, Namibia, Swaziland and Zimbabwe have been among the hardest hit nations with between 20 and 26 per cent of the population aged between 15 and 49 years living with HIV/AIDS. This results in an increase in morbidity and mortality rates, a decrease in population and a decline in the supply of labour.

As HIV/AIDS cuts into the size and quality of the workforce, it becomes increasingly disconcerting to business and economic policy makers. The direct and indirect costs of HIV/AIDS to business and the economy in these countries as a whole are staggering.

The number of households that will be left without an active "middle generation" will increase steeply in the developing world. AIDS deaths will completely modify the age structure of the population in some countries, principally affecting the very young and the population aged 20 to 49. Even if it can be expected that preventive measures will slow down the epidemic, the shape of the usual population pyramid will be completely modified and AIDS will affect the demographic picture over several decades in the future.

Due to these factors, HIV/AIDS may have significant impact on both revenue and expenditure of social security programmes in developing countries.

## **Presentation of Demoland**

Throughout this paper, the impact of HIV/AIDS will be illustrated with the use of a hypothetical case, Demoland, a developing country experiencing a high HIV prevalence. Its characteristics may be summarized as follows.

### **Population**

Demoland has a population of 14.8 million people in 2000. Its population is young: 43 per cent of the total population is under age 15 and only 5 per cent is 60 and over. The total fertility rate is 5.1 children per women.

There are presently 700,000 persons infected by the HIV in the country. Ten per cent of the adult population (aged 15 to 49) is estimated to be HIV positive. AIDS caused 72,000 deaths in 2000. The life expectancy at birth would be 56 for males and 59 for females in the absence of AIDS. Because of AIDS, the life expectancy has dropped to 49 for males and 54 for females. It is supposed that HIV/AIDS prevalence will reach its peak in 2010 and that prevention measures will make AIDS gradually disappear over the period 2010-2050.

## Economy

Gross domestic product (GDP) of Demoland is currently growing at a rate of 5 per cent per year. Productivity per worker is increasing at 1.2 per cent per year. Labour force participation rates are 76 per cent for males and 63 per cent for females and the unemployment rate is 13 per cent. It is estimated that 20 per cent of the labour force is in the informal sector. Inflation is low (2 per cent per year).

## Social programmes

Demoland introduced its pension scheme 30 years ago. The social security law provides coverage to the total labour force, but due to compliance problems and the size of the informal sector, only 34 per cent of the total workforce (for both males and females) actually pay contributions to the scheme. The present contribution rate is 8.0 per cent of insured earnings. Pension expenditure represents 1.1 per cent of GDP in 2000.

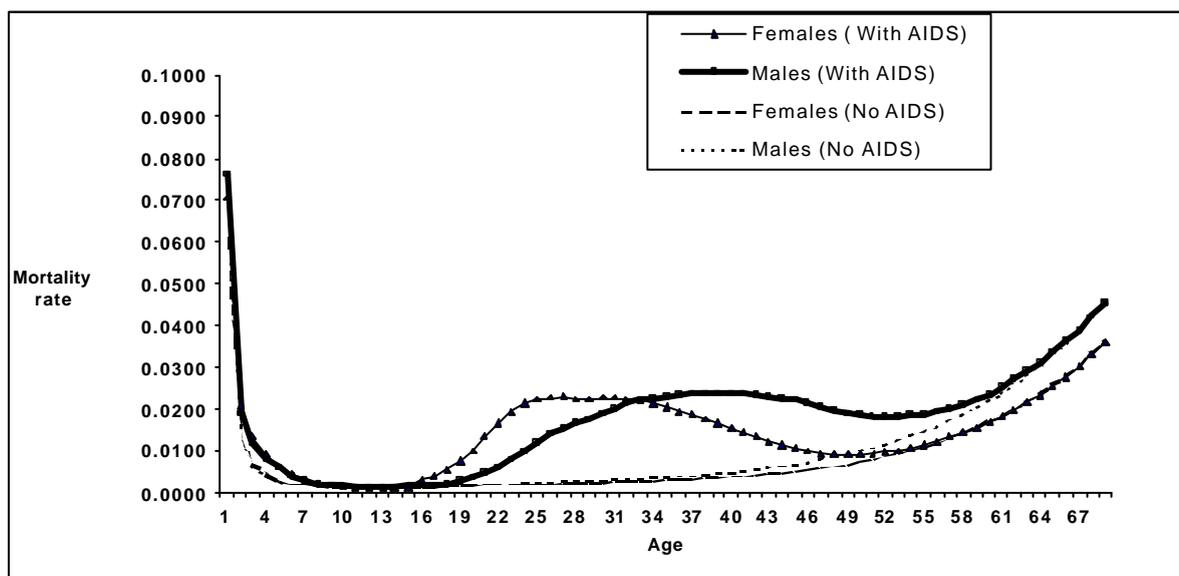
Health expenditure in Demoland represents 3.5 per cent of GDP (1.4 per cent for the public sector and 2.1 per cent for the private). Other social programmes, spending annually 1.2 per cent of GDP, include unemployment insurance, sickness and maternity benefits, some basic employment injury programme, tax-financed family benefits and a limited social assistance programme.

## Demographic impacts

### Mortality

AIDS will cause an increase in mortality for two critical age groups: the very young (0-4 years) and young adults (15-49 years). Mortality rates will increase dramatically for these two age groups. Figure 1 shows projected mortality rates in 2010 under the Demoland case. The year 2010 represents the peak of the number of AIDS deaths in our example.

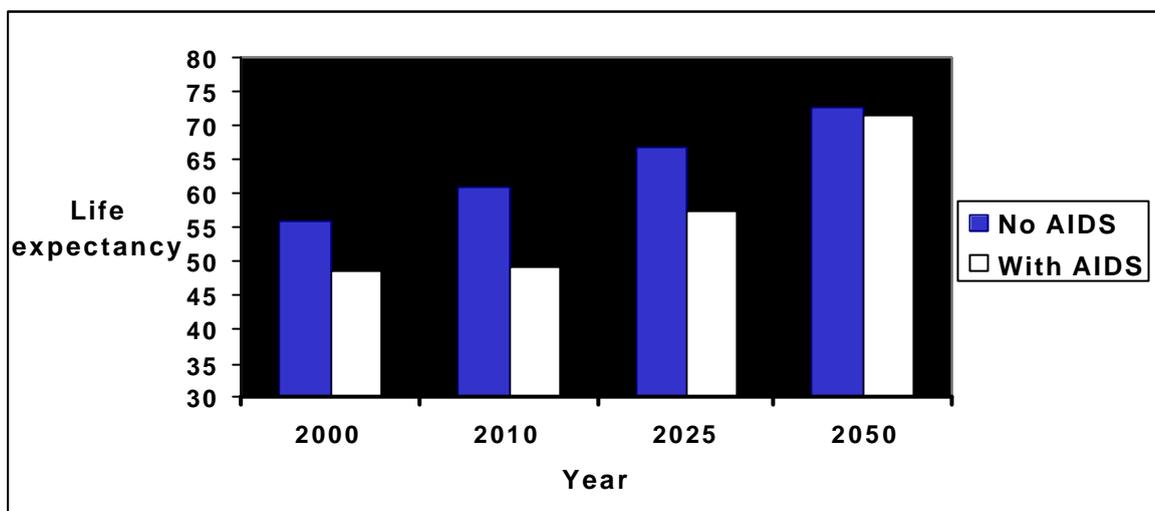
**Figure 1.** *Mortality rates for Demoland (with and without AIDS) in 2010*



The extra deaths due to AIDS are concentrated between ages 15 and 50. Extra mortality for men is likely to appear at ages slightly higher than for women. What cannot be seen on the graph is the extra mortality at very young ages (0-4 years) where HIV is transmitted from a mother to her child.

These changes in mortality will have a major impact on the life expectancy at birth. Under the scenario without AIDS, the 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. If AIDS is taken into account, the life expectancy does not improve before 2010 and after then it starts to increase to eventually approach the "non-AIDS" values only in 2050 (see Figure 2).

**Figure 2.** Projected life expectancy for men in Demoland (with and without the impact of AIDS)



## Fertility

HIV/AIDS also affects fertility because more women will become widows, thus generally stopping child-bearing. Reduction in fertility may also be caused by the poor health of women infected by HIV or by a decision by infected women to have no more children.

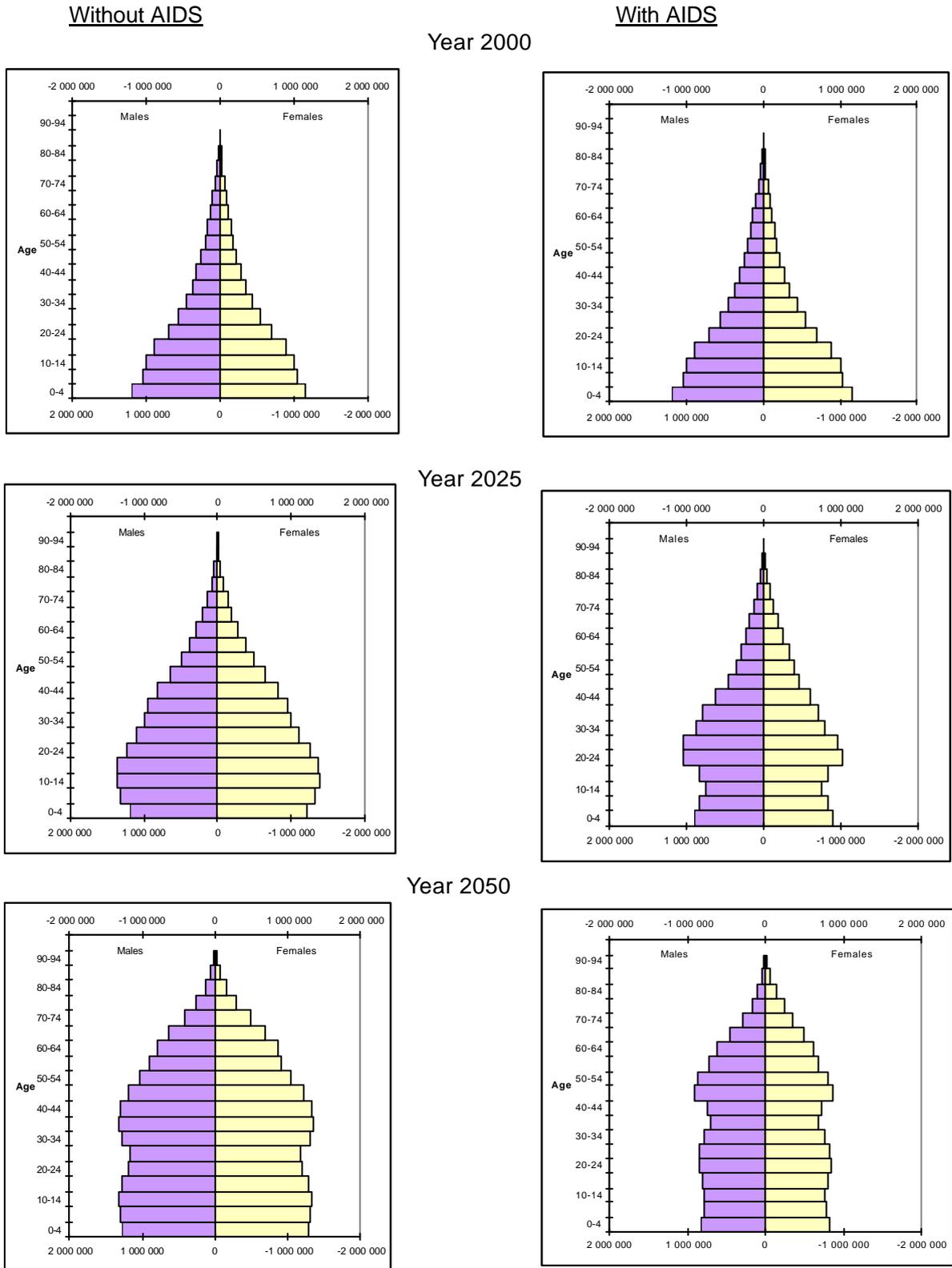
In the base scenario for Demoland (without the impact of HIV/AIDS), it was assumed that the total fertility rate would decrease from 5.1 in 2000 to 2.1 in 2025 and that it would remain at that level thereafter. In the scenario taking into account the impact of HIV/AIDS, it is assumed that the ultimate level of 2.1 will be reached more rapidly, in 2010 instead of 2025.

## Total effect on the projected structure of the population

By combining the effects of HIV/AIDS on mortality and fertility, the global impact on the projected population can be very important. Figure 3 illustrates the population structure with and without HIV/AIDS, by using population pyramids. Under the "no AIDS" scenario, the total population of Demoland would increase from 14.8 million in 2000 to 34.1 million in 2050, representing an average annual growth of 1.7 per cent. With the effect of AIDS, the population would be only 22.6 million in 2050 due to the lower number of births and the higher mortality. We can observe

in 2025 the combined effect of the lower fertility and the higher infant mortality on the population below age 20, which represents the future work force and social security contributors. Figure 3 also shows that mortality due to AIDS will prevent a large proportion of the population from reaching retirement age.

**Figure 3.** Population pyramids, with and without the impact of AIDS



## Economic impacts

### General considerations

The macroeconomic impacts of HIV/AIDS are difficult to assess. These impacts are sensitive to assumptions about how AIDS will affect savings and investment rates. If the costs associated with AIDS are financed out of savings, then the reduction in investment could lead to a significant reduction in economic growth. The impact also depends whether AIDS affects the best-educated employees more than others. In southern Africa, for example, there is generally a surplus of unskilled labour and a shortage of certain categories of skilled labour. If the epidemic is primarily located among unskilled and easily replaceable members of the work force, then it will have less of an impact than if it is located among highly skilled, hard to replace workers.<sup>2</sup>

A large proportion of HIV infected population is in the age group 20-49. If one makes the assumption that labour force participation rates would remain largely unchanged due to HIV/AIDS, this would imply that the labour force would be proportionately smaller, because of the decrease in the population at those ages. But it is likely that HIV/AIDS will affect the age and sex distribution of the labour force, due to growing number of widows and orphans who will seek employment. Moreover, the fact that a large proportion of the HIV infected population is in the age group 20-49 means greater pressure for an early entry of children into the labour force, and early retirement of infected persons as well as a later exit of non infected persons.

Replacing skilled workers will be difficult and will most likely remain incomplete, resulting in a decline in Gros Domestic Product (GDP). Theoretically, capital and technology could substitute the reduced supply of labour. But this is not always possible, especially with few technicians and inadequate systems of equipment adaptation and modification or maintenance of imported technology.

There is some evidence that with the already high un- and under-employment in many countries, the economic shock of reduced labour force supply will be compensated by persons seeking employment. In some other cases, import of labour from neighbouring countries may also softened this blow. However, even in case of high unemployment, it is not always possible to match the human resource requirements with available labour supply, in terms of skills and experience.

Since a large proportion of the HIV-infected population falls in the reproductive ages, the impact on productivity, costs and the economic environment is considerable. Employers are likely to face increased labour costs because of low productivity, absenteeism, shortage of labour, shorter working hours, increased sick leave and other benefits, early retirement and additional training costs. Both the well educated/skilled and uneducated/unskilled workers are affected. Even healthy workers also spend time away from work visiting the sick and attending funerals of colleagues.

AIDS deaths lead directly to a reduction in the number of workers available. If younger and less experienced workers replace experienced workers, productivity is reduced. A shortage of workers leads to higher wages and consequently to higher production costs. This may lead to a loss of international competitiveness and eventually to foreign exchange shortages.

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<sup>2</sup> See Bollinger, 1999, and Seghal, 1999.

The reduction in the number of employed persons lead to lower government revenues and reduced private savings, causing a drop in savings and capital accumulation, thereby having the effect of reducing employment creation in the formal sector. Some workers will be pushed from high paid jobs in the formal sector to lower paid jobs in the informal sector.

Economic growth is going to be negatively affected by all those factors. Various studies have estimated the expected decline in GDP growth. An early World Bank study, which examined the macroeconomic impact of AIDS in 30 Sub-Saharan countries, predicted a reduction of the annual growth rate of GDP of 0.8 to 1.4 percent per annum.

## Our assumptions

For Demoland, it is assumed that HIV/AIDS will cause a reduction of the GDP growth as shown in Table 1.

**Table 1.** Assumed future GDP growth for Demoland

Without AIDS		With AIDS	
Year	GDP growth	Year	GDP growth
2000-2004	5.0%	2000-2004	3.0%
2005-2009	4.5%	2005-2009	3.0%
2010-2019	4.0%	2010-2019	3.0%
2020-2035	3.5%	2020-2035	3.0%
2036-2039	3.0%	2036-2039	2.5%
2040-2049	2.5%	2040-2049	2.0%

Concerning productivity, it is assumed in the base scenario that productivity of labour increases by 1.2 per cent per year. Under the AIDS case, productivity is assumed to increase at 1.0 per cent per year until 2039 and return to 1.2 per cent thereafter. It is assumed, as a simplification, that salary increases follow productivity increases.

As regards the impact of AIDS on the labour supply, it is assumed that the participation rates of men will be lower at all ages except for the 15-19 age group. For women, the need for children and widows to seek employment would cause an increase of their participation rates at all ages below 44. Combined with the lower GDP growth, the unemployment rate under the AIDS scenario increases from 13 per cent in 2000 to 20 per cent in 2015 and then decreases due to

the decrease in the total population resulting from AIDS deaths.<sup>3</sup> Detailed economic assumptions for the different scenarios are presented in annex.

## Overall economic consequences

The overall economic consequences of the above assumptions on economic development and the development of the standard of living are dramatic. However, they can only be estimated using a crude indicator. They may be measured by the estimated extension of the time that Demoland would need to catch up to the standard of living of a typical southern European Union country. The GDP per capita measured in purchasing power parities is here used as a crude indicator of the standard of living as well as a measure of economic development. It is assumed that the GDP per capita of Demoland of US\$720, in the year 2000, reflects a purchasing power parity of US\$1,700.<sup>4</sup> The initial purchasing power parity of the GDP (in 2000) in our comparator country in southern Europe is US\$15,000 (which is similar to that of Portugal). We assume that Demoland's GDP follows the growth paths mapped out for scenarios 1 and 2. The different growth assumptions between the European comparator and Demoland lead to a slow catch-up of Demoland (in terms of per capita GDP measured in purchasing power parities) with the present GDP level of the comparator.

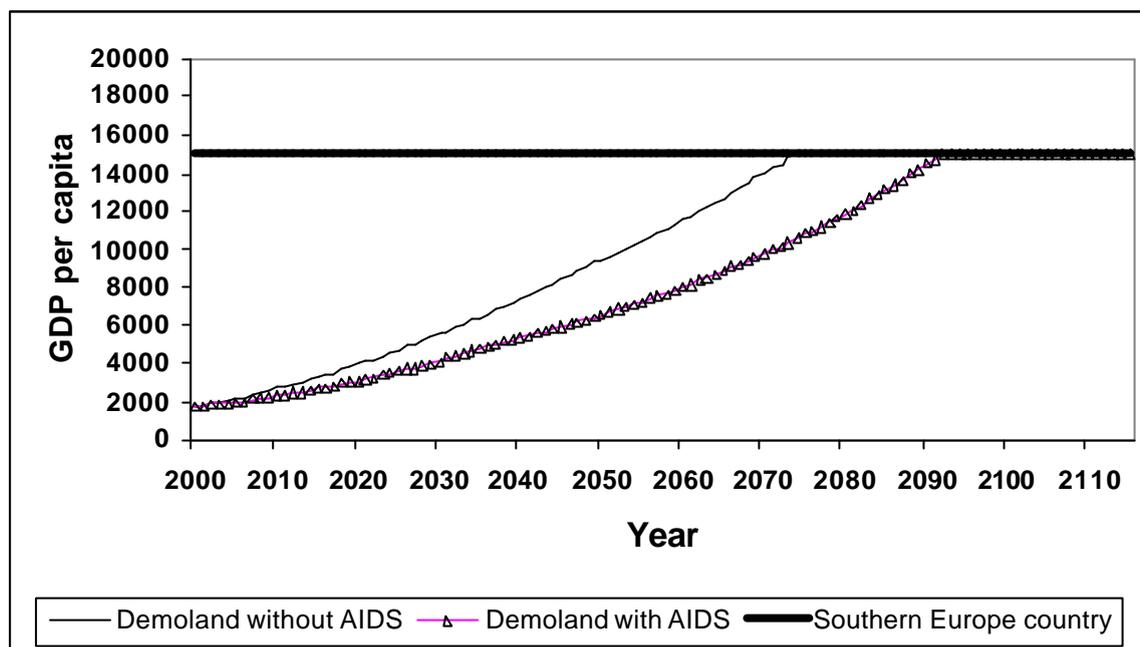
Without AIDS, Demoland would need about 74 years, under these assumptions, to catch up to the present level of GDP in the comparator country. This in itself is already bad news, but the AIDS pandemic would most likely extend that catch-up period by another 18 years. While one may hope that the economic catch-up to industrialized country levels proceeds faster, one must assume that AIDS throws the development of rapidly growing developing countries back by almost two decades. The authors consider this estimate rather optimistic.

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<sup>3</sup> The unemployment rate in many developing countries is significantly higher than those levels, sometimes reaching 40 per cent and even more. In that context, our assumptions could appear optimistic. However, as described earlier in the context of AIDS, high unemployment combined with unskilled labour may lead to an easier replacement of people dying from AIDS with people coming from the unemployed population or from the informal sector. Consequently, voluntarily keeping the unemployment rate at a low level may generate a greater impact of AIDS on the social security system.

<sup>4</sup> Such a relationship between the two indicators is observed for example in Côte d'Ivoire.

**Figure 4.** Projected GDP per capita for Demoland and a southern European country



## The impact of HIV/AIDS on social protection programmes

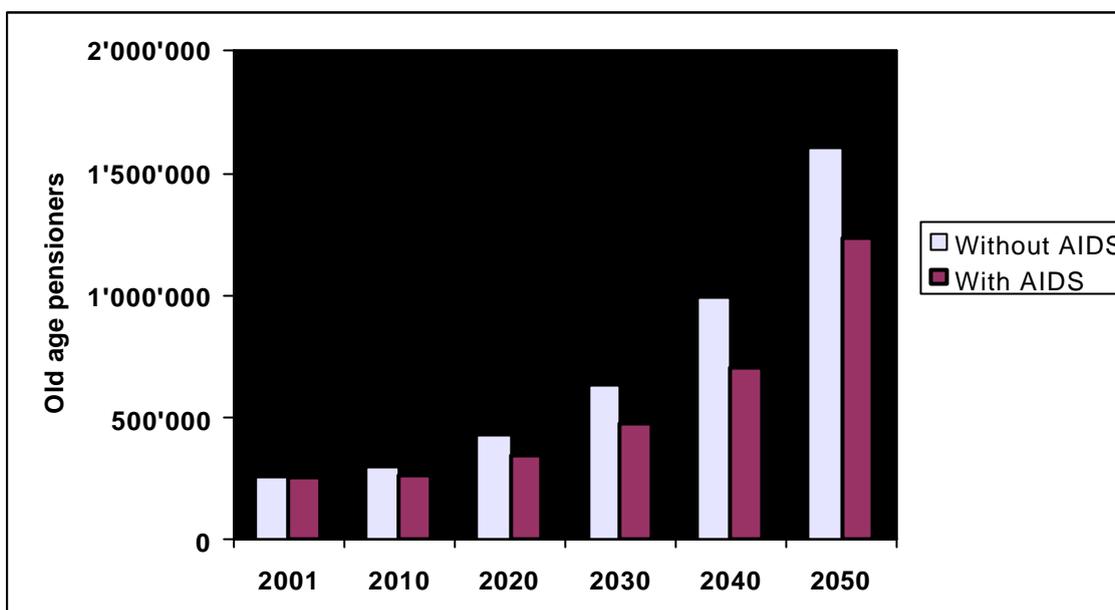
### Pensions

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

### Old age pensions

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

**Figure 5.** *Projected number of old age pensioners for the Demoland scheme (with and without AIDS)*



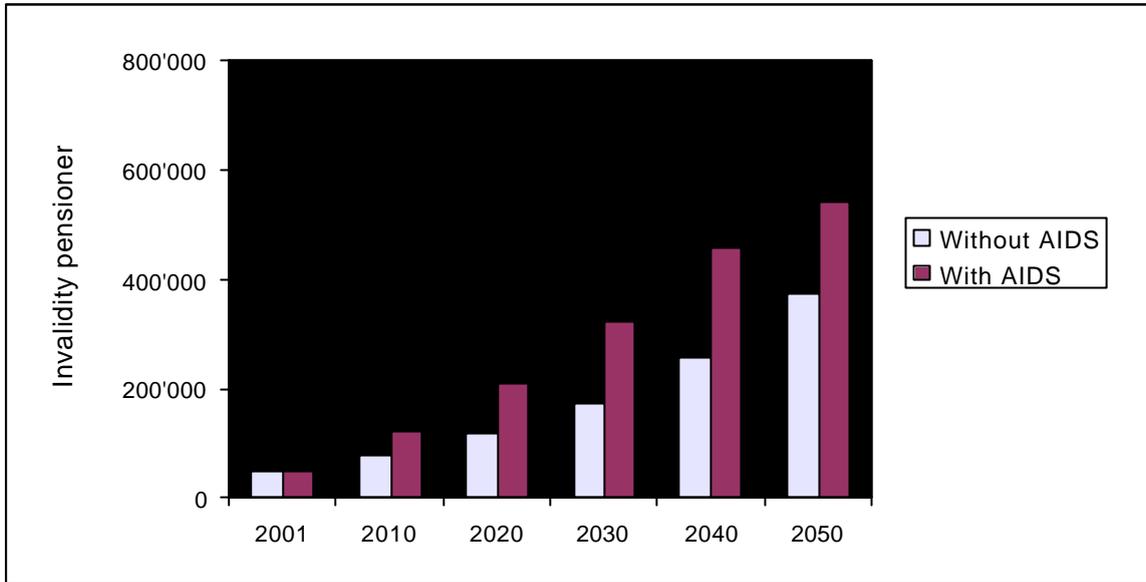
### Invalidity pensions

The number of invalidity pensions will be affected by the following factors:

- The incidence of new invalidity pensions should increase as a result of the incapacity to work of persons living with AIDS at a late stage of the disease. The impact on incidence of new cases depends on the length of the waiting period before the pension is paid. In developing countries, the period of time between the beginning of incapacity due to AIDS and the time of death is relatively short because life-prolonging drugs are often not available. Hence, it may well happen that few persons survive to claim the invalidity pension and receive benefits.
- The average duration of invalidity pensions should be reduced because of the rapid evolution of the disease and subsequent death.

Figure 6 presents one possible scenario assuming that the incidence of invalidity, with AIDS, is multiplied by a factor of 5.0 from 2000 to 2010 which gradually reduces to 1.0 between the years 2010 and 2050. To establish that factor, we have assumed that those who die from AIDS will be eligible for an invalidity pension at least for a short period before death. In addition, it is assumed that the duration of invalidity pensions is reduced for those affected by AIDS. It is assumed that the mortality rates of invalidity pensioners are 5 times higher than in the base scenario from 2000 to 2010 and that this factor thereafter reduces gradually to 1.0 between 2010 and 2050.

**Figure 6.** *Projected number of invalidity pensioners for the Demoland scheme (with and without AIDS)*

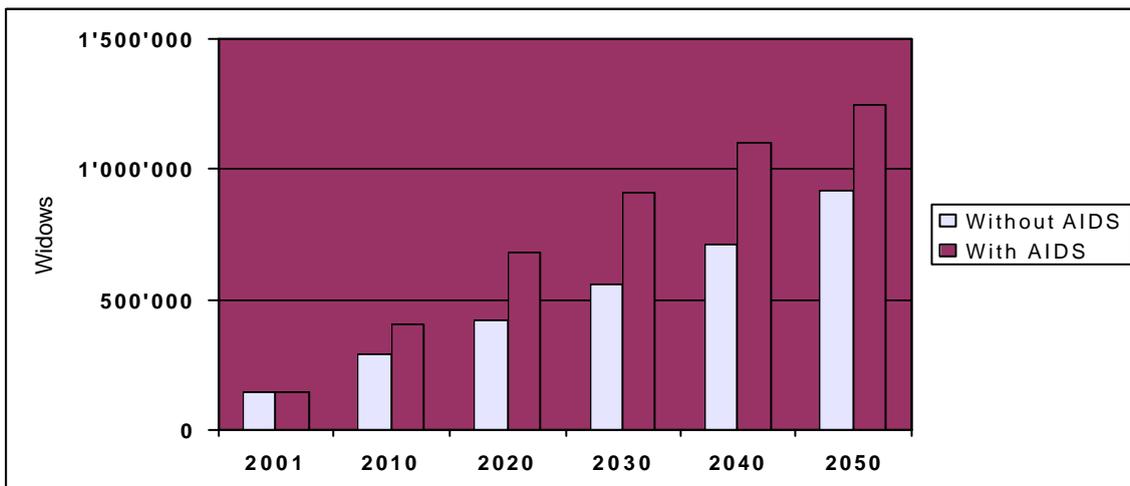


**Survivors' benefits**

As regards survivors' benefits, AIDS will cause an increase of the number of widows(ers) and an increase of the number of orphans. If the scheme provides for a funeral grant, expenditure on this benefit will increase sharply.

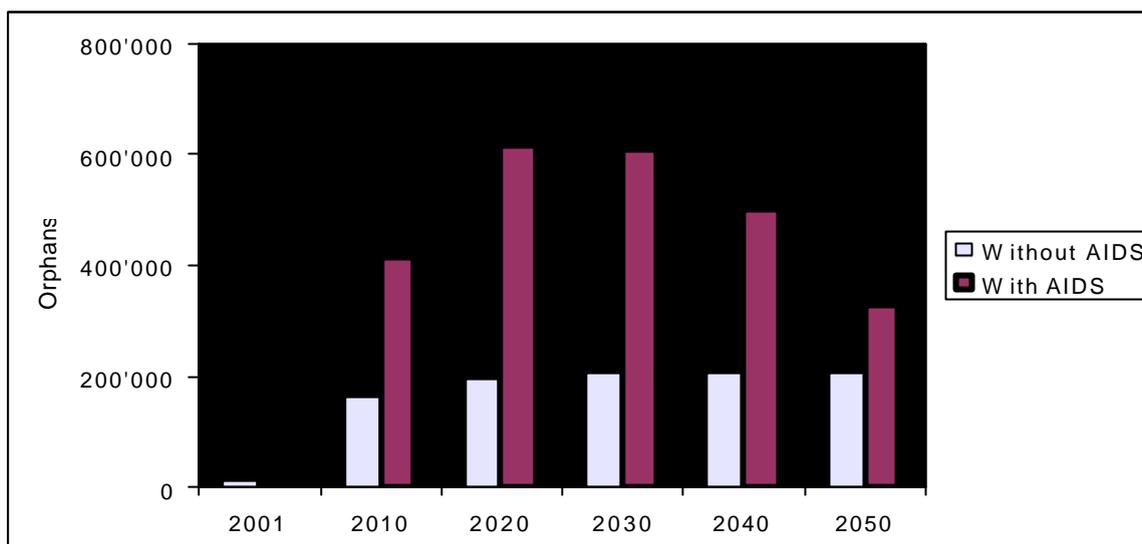
The duration of survivors' pensions should decrease as a result of AIDS, since survivors have a high probability of having been infected by the HIV before the death of the insured person.

**Figure 7.** *Projected number of widows for the Demoland scheme (with and without AIDS)*



Concerning the orphans' pensions, the increase in the number of pensions is proportionately larger than for widows' pensions because the death of the insured person happens at an early age, at a time when there are more dependent children under the age of 20 (in our case) in the household.

**Figure 8.** *Projected number of orphans for the Demoland scheme (with and without AIDS)*



### Impact on the revenue of the scheme

HIV/AIDS will have an impact on the revenue of the scheme to the extent that it affects the number of contributors and their average contributory earnings. For our simulation on Demoland, we have included three scenarios according to the impact of AIDS on the number of contributors. Scenario 1 is the base scenario, without AIDS. In Scenario 2, we transfer directly to the pension scheme the reduction in the number of workers, keeping constant the percentage of workers that are covered by the scheme (constant age-specific coverage rates). In Scenario 3, the number of contributors remains unchanged, thus leaving the revenue of the scheme unaffected. It is assumed, in Scenario 3, that there is high unemployment in the labour force and that (unskilled) workers are easily replaceable. Scenario 4 freezes the number of contributors at its 2000 level, assuming that the AIDS deaths and the lower economic growth prevent any increase in the covered population. See Box 1 for a summary description of the various scenarios.

### **Box 1. Summary description of the scenarios**

Four Scenarios are studied regarding the impact of AIDS on the number of contributors. They are as follows.

#### *Scenario 1*

Base scenario, without AIDS.

#### *Scenario 2*

AIDS affects the number of contributors to the social security scheme the same way it affects the total labour force. The coverage rates are set equal to those of the base scenario. So the deaths resulting from AIDS and the lower economic growth affect the number of contributors to the social security scheme in the same proportion as they affect the rest of the labour force.

#### *Scenario 3*

The number of contributors to the social security scheme is the same as in the base scenario (without AIDS). It is assumed that, because of the large size of the uncovered population and of the informal sector, there is full substitution of contributors dying from AIDS by workers not previously covered by the scheme.

#### *Scenario 4*

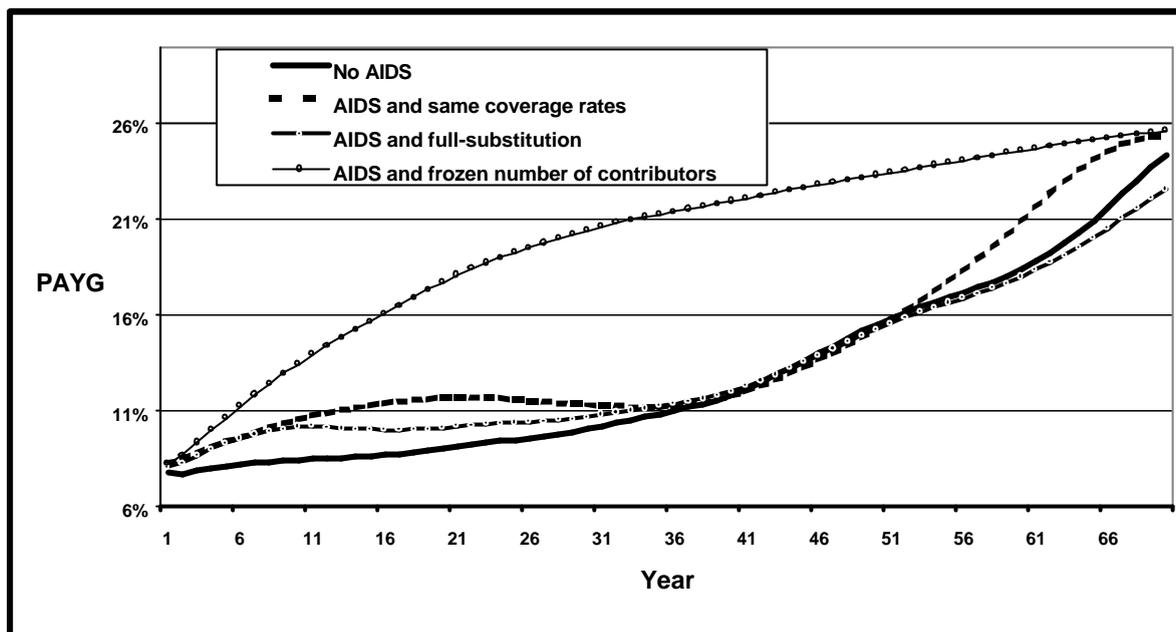
The number of contributors is constant and equal to the absolute number observed in 2000. It is assumed that AIDS will freeze the participation in the social security scheme at its 2000 level.

### **Global impact on the cost of the scheme**

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 invalidity pensions will increase the expenditure of the scheme and HIV/AIDS may have the effect of reducing the number of contributors because of the death or incapacity to work of these people. In the longer run, AIDS is expected to reduce the number of persons who reach the retirement age, thus reducing the expenditure relative to old age pensions.

Under the less favourable case (frozen contributor population), the Pay-as-you-go (PAYG) rate increases dramatically from its present level of 7.7 per cent to 20 per cent in 2030 and eventually to 23 per cent in 2050. On the other hand, if we assume that those who die from AIDS are rapidly replaced by new contributors to the scheme (Scenario 3), then the impact on the overall cost is slightly reduced with a PAYG rate under 12 per cent for the next 40 years. Figure 7 presents the pay-as-you-go cost of the scheme under the various scenarios.

**Figure 9.** *Pay-as-you-go cost of the Demoland scheme under various scenarios*



It may be helpful to compare the general average premium (GAP) under the various scenarios. The general average premium is defined here as the constant contribution rate that is necessary to finance all benefits of the scheme over the period 2000-2050. Under the base scenario without the impact of AIDS, the GAP would be 10.3 per cent. Under Scenario 2, the GAP is 11.4 per cent. This means that AIDS would require an immediate and constant increase of 1.1 per cent of the contribution rate over the next 50 years. On the other hand, if we assume that AIDS does not affect the number of contributors because of a full substitution of the labour force (Scenario 3), then the GAP would increase to 11.0 per cent. Under the less favourable Scenario 4, the GAP would be 16.5 per cent over the next 50 years.

### Impact on contribution rates

As mentioned in the presentation of Demoland, the present contribution rate of 8 per cent was considered sufficient, in the absence of AIDS, to support the scheme until 2027. The presence of AIDS will change the picture and force an early increase of the contribution rate because of the short-term deficit caused by the increase in expenditure and the possible shrinking of the contributor population. Table 2 presents the contribution rates under the different scenarios. These contribution rates are determined starting with the present 8 per cent rate and increasing it only to face the pay-as-you-go cost of the scheme when the present contribution rate becomes insufficient.

**Table 2.** *Required contribution rates for Demoland, with and without HIV/AIDS*

Year	Contribution rate			
	Scenario 1	Scenario 2	Scenario 3	Scenario 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%

In the second scenario where AIDS affects the number of contributors in the same proportion as the entire labour force, we observe that the present contribution rate of 8 per cent is not sufficient as early as in 2000. The contribution rate must be increased gradually to reach 10.5 per cent in 2010 in order to face the increasing expenditure pattern and the lower contributory salary base resulting from HIV/AIDS. The third scenario, where AIDS does not affect the number of contributors, also requires a faster contribution rate increase (compared to the base scenario without AIDS) but at a slower pace than in Scenario 2. According to the worst-case scenario, the contribution rate would have to increase rapidly to 17.3 per cent in 2020 and eventually to 23.2 per cent in 2050.

## Health

Health is a sector that is directly hit by AIDS. Health expenditures related to AIDS can be divided into curative care and prevention. Health care may be offered by the public sector, by the private sector and by donors.

In the particular case of Demoland, it is assumed that all public expenditures on health are financed from general revenues and that no national health insurance scheme exists. We use the assumption that the annual health care cost related to AIDS for an individual is equal to 1.5 times the per capita GDP.<sup>5</sup> This translates into an expenditure of US\$1,080 per affected individual in 2000. It is considered here that health expenditure related to AIDS does not vary much according to age because of the nature of the disease and its short duration. Following these

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<sup>5</sup> Based on World Bank data for certain African countries.

assumptions, total health expenditures represent, in 2000, 2.5 per cent of GDP without AIDS and 3.5 per cent of GDP with the impact of AIDS.

For projecting health care cost in the future, we make the assumption that the total health care costs without AIDS remain constant as a percentage of GDP (2.5 per cent). Assuming that the expenditure related to AIDS grows at the same pace as the number of AIDS deaths (as projected under the demographic model), total health expenditures in the context of AIDS increase from 3.5 per cent of GDP in 2000 to 5.1 per cent of GDP in 2015.

**Table 3.** *Projected health care expenditure for Demoland, with and without AIDS*

Year	Health expenditure as % of GDP	
	Without AIDS	With AIDS
2000	2.5%	3.5%
2005	2.5%	4.4%
2010	2.5%	4.9%
2015	2.5%	5.1%

## Unemployment insurance

The unemployment programme will be affected by AIDS since the pandemic will slow down the economic growth and cause unemployment. Table 4 presents the unemployment rates used in the economic scenario of this paper. It must be noted that after 2015, because AIDS causes a reduction of the population at working ages, the unemployment rate would start to decrease and eventually become lower than the rates under the scenario without AIDS after 2025 (see point 5 of the annex).

**Table 4.** *Unemployment rates, with and without AIDS, 2000 to 2015*

Year	Without AIDS	With the impact of AIDS
2000	13%	14%
2005	12%	17%
2010	12%	18%
2015	13%	20%

We suppose that Demoland has introduced an unemployment insurance scheme financed by employer/worker contributions equal to 1 per cent of covered salaries. AIDS will cause an increase of unemployment as illustrated in Table 4. If we assume that registered unemployment (and consequently unemployment benefits) will follow the same pattern, the unemployment insurance contribution will have to increase gradually from 1.0 per cent of covered earnings in 2000 to 1.5 per cent in 2015.

## Short-term benefits

In our scenario, short-term benefits include sickness, maternity and employment injury benefits. We assume that the cost of sickness benefits will increase by 50 per cent as a result of AIDS,

from 0.5 per cent of payroll to 0.75 per cent of payroll. Maternity benefits (0.5 per cent of payroll in 2000) will follow the decrease of the fertility rate as a result of AIDS and the cost employment injury benefits will not be affected (at 1.0 per cent of payroll).

## **Family benefits**

We assume that tax financed family benefits will not be affected by AIDS.

## **Social assistance**

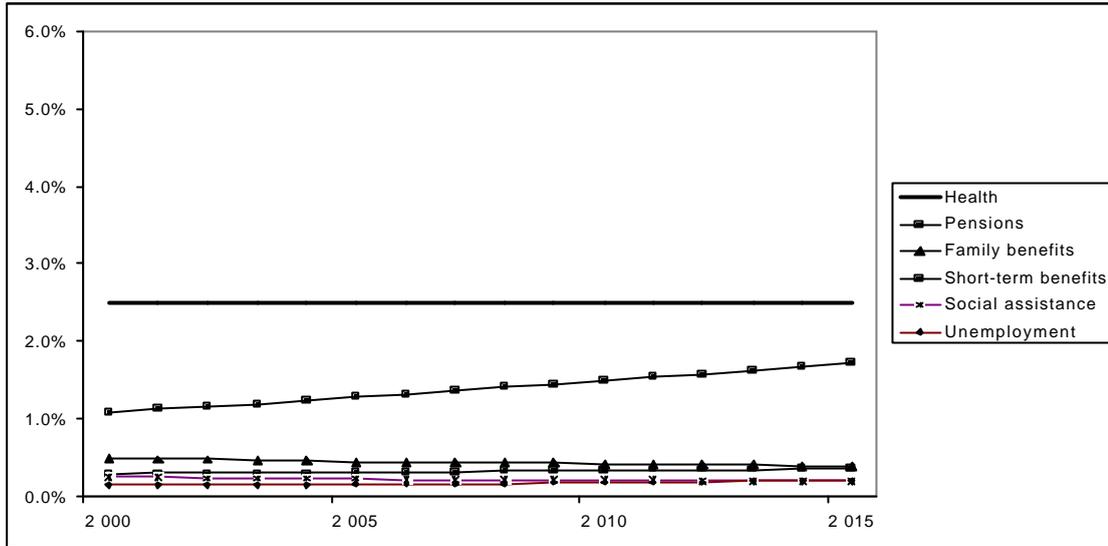
A basic social assistance program exists in Demoland. The expenditures of the program, financed from government's general revenue, represent 0.25 per cent of GDP. We assume that AIDS will increase poverty and that the government will have to support those in need because of loss of income or increase in personal health care expenses. We assume that the social assistance program would have to pay additional cash benefits of US\$500 to 53,000 persons affected by AIDS in 2000 and that this amount, indexed annually, would be payable to an increasing number of persons, in line with the demographic projections.

Under these assumptions, the cost of the social assistance program would double in 2000 (from 0.25 to 0.50 per cent of GDP) because of AIDS, reaching 0.9 per cent of GDP in 2015.

## **Social budget**

Tables 5 and 6 present the social budget of Demoland without and with the impact of AIDS. In year 2000, without AIDS, total social expenditure represent 5.0 per cent of GDP, out of which 2.5 per cent of GDP is for health and 1.1 per cent for pensions. Under the scenario without the impact of AIDS, social expenditure grows modestly over the next 15 years from 5.0 per cent of GDP to 5.4 per cent of GDP mainly because of the increase of the expenditures on pensions. Since pensions are financed from payroll contributions from employers and workers, the burden on general revenues decreases slightly during the period from 3.2 per cent of GDP to 3.1 per cent of GDP.

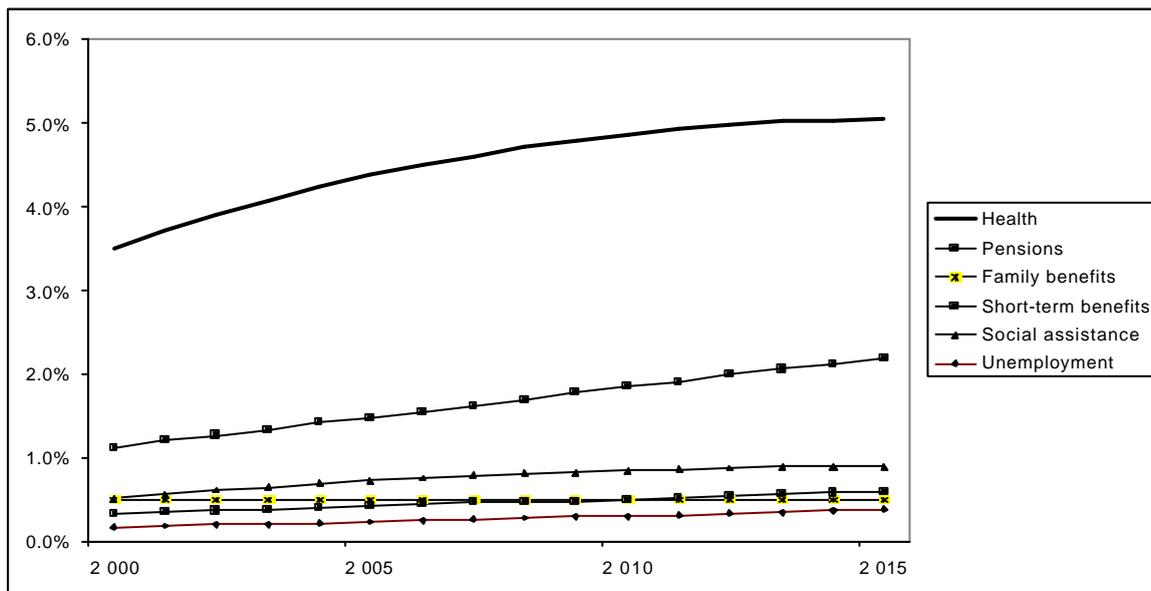
**Figure 10.** *Projection of social expenditure, without AIDS (as % of GDP)*



With AIDS the picture is seriously distorted. Health expenditures, which represent the main social expenditure financed from general revenues, increases from 3.5 per cent of GDP in 2000 to 5.1 per cent of GDP in 2015. The pension burden doubles (from 1.1 to 2.2 per cent of GDP) during the same period. The resulting impact of AIDS on general revenues is that the government will have to finance expenditure amounting to 4.5 per cent of GDP (compared to 3.2 per cent) in 2000 and 6.3 per cent of GDP (instead of 3.1 per cent) in 2015.

So the addition of all components of social expenditures show that AIDS will have a dramatic impact on government financed schemes and may cause serious budgetary problems for the government.

**Figure 11.** *Projection of social expenditure, without AIDS (as % of GDP)*



**Table 5. Demoland's Social Budget in percent of GDP - without AIDS**

	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>
<b>EXPENDITURE</b>				
1. Pensions	1.1%	1.3%	1.5%	1.7%
2. Health	2.5%	2.5%	2.5%	2.5%
Public	1.0%	1.0%	1.0%	1.0%
Private	1.5%	1.5%	1.5%	1.5%
3. Unemployment	0.1%	0.2%	0.2%	0.2%
4. Short-term benefits	0.3%	0.3%	0.3%	0.4%
5. Family benefits	0.5%	0.4%	0.4%	0.4%
6. Social assistance	0.2%	0.2%	0.2%	0.2%
Total current social expenditure	4.7%	4.9%	5.1%	5.4%
Change of reserves	0.2%	0.2%	0.1%	0.0%
Pension insurance	0.2%	0.2%	0.1%	0.0%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.0%	0.0%	0.0%	0.0%
Unemployment insurance	0.0%	0.0%	0.0%	0.0%
Total social expenditure	5.0%	5.1%	5.2%	5.4%
<b>INCOME</b>				
Social security contributions	1.6%	1.7%	2.0%	2.2%
Pension insurance	1.1%	1.3%	1.5%	1.6%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.3%	0.3%	0.3%	0.4%
Unemployment insurance	0.1%	0.2%	0.2%	0.2%
Investment income	0.2%	0.2%	0.2%	0.2%
Pension insurance	0.2%	0.2%	0.2%	0.2%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.0%	0.0%	0.0%	0.0%
Unemployment insurance	0.0%	0.0%	0.0%	0.0%
Income from General revenues	3.2%	3.2%	3.0%	3.1%
Total income	5.0%	5.1%	5.2%	5.4%

**Table 6. Demoland's Social Budget in percent of GDP - with the effect of AIDS**

	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>
<b>EXPENDITURE</b>				
1. Pensions	1.1%	1.5%	1.8%	2.2%
2. Health	3.5%	4.4%	4.9%	5.1%
Public	1.4%	1.7%	1.9%	2.0%
Private	2.1%	2.6%	2.9%	3.0%
3. Unemployment	0.2%	0.2%	0.3%	0.4%
4. Short-term benefits	0.3%	0.4%	0.5%	0.6%
5. Family benefits	0.5%	0.5%	0.5%	0.5%
6. Social assistance	0.5%	0.7%	0.8%	0.9%
Total current social expenditure	6.1%	7.7%	8.8%	9.6%
Change of reserves	0.2%	0.2%	0.2%	0.1%
Pension insurance	0.2%	0.2%	0.2%	0.1%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.0%	0.0%	0.0%	0.0%
Unemployment insurance	0.0%	0.0%	0.0%	0.0%
Total social expenditure	6.3%	7.9%	9.1%	9.7%
<b>INCOME</b>				
Social security contributions	1.6%	2.1%	2.6%	3.2%
Pension insurance	1.1%	1.5%	1.8%	2.2%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.3%	0.4%	0.5%	0.6%
Unemployment insurance	0.2%	0.2%	0.3%	0.4%
Investment income	0.2%	0.2%	0.2%	0.2%
Pension insurance	0.2%	0.2%	0.2%	0.2%
Health insurance	0.0%	0.0%	0.0%	0.0%
Short-term benefits	0.0%	0.0%	0.0%	0.0%
Unemployment insurance	0.0%	0.0%	0.0%	0.0%
Income from General revenues	4.5%	5.6%	6.2%	6.3%
Total income	6.3%	7.9%	9.1%	9.7%

## The impact of AIDS on the government budget

Under our hypothetical scenario, general taxes collected in Demoland represent 15 per cent of GDP and, in 2000, those taxes can finance all government expenditures not related to social security and health. It is supposed that 60 per cent of tax revenues result from indirect taxation on consumption (which follows the growth of GDP) and that 40 per cent is direct taxes that follow the contribution revenue of the public pension scheme.

In the context without AIDS, the government budget would be in equilibrium in 2000 and the surplus/deficit position of the government would remain the same, assuming that the increase in taxes (due to the move of workers from the informal to the formal sector of the economy) is compensated by a decrease of other government revenues.

AIDS changes the picture dramatically. The pandemic generates a government deficit equal to 1.3 per cent of GDP in 2000 and if the pandemic is not controlled, the budget deficit reaches 3.7 per cent of GDP in 2015.

**Table 7.** *Government budget for 2000 and 2015, with and without the impact of AIDS (as percent of GDP)*

	2000		2015	
	Without <u>AIDS</u>	With <u>AIDS</u>	Without <u>AIDS</u>	With <u>AIDS</u>
<b>Revenue</b>				
Taxes	15.0%	15.0%	17.5%	17.1%
Social security contributions and investment income	1.8%	1.8%	2.4%	3.4%
<u>Other income</u>	3.2%	3.2%	0.5%	0.5%
Total	20.0%	20.0%	20.4%	21.0%
<b>Expenditure</b>				
Social assistance and social security	2.5%	2.8%	2.9%	4.6%
Health	2.5%	3.5%	2.5%	5.1%
<u>Other</u>	15.0%	15.0%	15.0%	15.0%
Total	20.0%	21.3%	20.4%	24.7%
<b>Surplus/deficit</b>	<b>0.0%</b>	<b>-1.3%</b>	<b>0.0%</b>	<b>-3.7%</b>

Notes:

- ✎ The increase in tax revenue between 2000 and 2015 is due to the increase of the number of workers in the formal sector; direct taxes are assumed to increase in proportion to the total payroll covered by the public pension scheme.
- ✎ The figures “With AIDS” are expressed as a percentage of a GDP that is lower than under the scenario “Without AIDS” because of the impact of AIDS on the rate of growth of GDP.

What are the solutions for the government in such a difficult budgetary context. Two options, which are attractive at first glance, are not really viable:

- One avenue is to increase general taxes for financing the increase in health care costs. But this option may just put additional pressure on a fragile economy and create more unemployment.
- Another option is to shift the cost burden of the most costly item (the health expenditures) from the government to the private sector by introducing a health insurance scheme, financed by employee/employer contributions. This would have a direct effect of the government budget. However, a health insurance scheme introduced in the context of a pandemic of this importance has no real chance of being viable because of the incapacity to charge premiums related to the high cost of curative care related to AIDS. In addition, this option would increase the cost of labour and affect negatively the economy, thus reducing growth, increasing unemployment and reducing general tax revenues.

The only viable solution appears to be the investment in awareness campaigns in order to reduce the financial impact of AIDS notably on the health expenditure. Investments in awareness campaigns at workplaces, which would reduce the incidence of AIDS, could contribute substantially to the safeguarding of the future financial well-being of the social security system. Some co-sponsoring of awareness campaigns by the social security pension schemes seems to be fully justified and a rational course of action.

## Conclusion

As long as a pension scheme is able to replace the workers who are prematurely dying of AIDS, the impact of AIDS on national pension schemes appears to be manageable from the financial point of view. However, the great unknown is the impact of HIV/AIDS on the number of contributors to these schemes. For developing countries, it may be assumed that the high unemployment and the large size of the informal sector will make it possible to replace AIDS deaths in the workforce to a considerable degree by workers not presently employed in the formal sector. But even under this assumption, it is possible that overall growth rates will drop as the productivity of these replacements is not likely to be as high as the productivity of the workers replaced, and the cost of training the new workers will increase the overall cost to the enterprise and hence affect growth. However, the dramatic results of the non-replacement scenario (which certainly describes an improbable extreme case) shows that the financial risks of pension schemes affiliated with a potential draining of the economy of qualified workers is substantial.

On the other hand, the theoretical social budget exercise presented in this paper shows that the cost of social programmes other than pension schemes might 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 job and generates the need for income support and health care. In countries with high HIV/AIDS prevalence, the burden on general revenues may put governments in an unbearable financial position. One solution remains with the investment in early-awareness campaigns.

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## Description of the main economic assumptions used for projections

### 1. Description of the four scenarios

The paper compares projections under four scenarios, according to the presence or not of AIDS, and to what extent AIDS affects the number of contributors to the social security scheme. The scenarios are as follows:

Scenario 1: Base scenario, without AIDS.

Scenario 2: AIDS affects the number of contributors to the social security scheme the same way it affects the total labour force. The coverage rates are set equal to those of the base scenario.

Scenario 3: The number of contributors to the social security scheme is the same as in the base scenario (without AIDS). It is assumed that there is full substitution of contributors dying from AIDS by workers previously not covered by the scheme.

Scenario 4: The number of contributors is constant and equal to the absolute number observed in 2000.

### 2. Rate of growth of GDP

Year	Scenario 1	Year	Scenarios 2, 3 and 4
2000-2004	5.0%	2000-2004	3.0%
2005-2009	4.5%	2005-2009	3.0%
2010-2019	4.0%	2010-2019	3.0%
2020-2035	3.5%	2020-2035	3.0%
2036-2039	3.0%	2036-2039	2.5%
2040-2049	2.5%	2040-2049	2.0%

### 3. Rate of growth of the productivity per worker

Year	Scenario 1	Year	Scenarios 2, 3 and 4
2000 +	1.2%	2000-2039	1.0%
		2040 +	1.2%

#### 4. Participation rates

Age	Scenario 1		Scenarios 2, 3 and 4	
	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%

#### 5. Unemployment rates

Year	Scenario 1	Scenarios 2, 3 and 4
2000	13%	14%
2005	12%	17%
2010	12%	18%
2015	13%	20%
2020	14%	19%
2025	16%	17%
2030	17%	12%
2035	17%	7%
2040	16%	6%
2045	15%	6%
2050	13%	6%

## 6. Percentage of workers covered by the social security scheme

The following coverage rates are assumed for Scenario 1 without AIDS. Under Scenario 2, the same coverage rates are applied to a reduced labour force, resulting in a reduced covered population.

Age	Age-specific coverage rates	
	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%

Year	Global coverage rate	
	Males	Females
2000	34%	34%
2010	35%	35%
2020	36%	36%
2030	37%	37%
2040	38%	38%
2050	37%	38%

Scenario 3 uses the same number of insured persons as Scenario 1. Scenario 4 uses a constant absolute number of insured persons equal to the observed covered population in 2000.