

# DOWNLOAD PDF MODEL-BASED SCENARIOS TO DESCRIBE ECONOMIC IMPACTS OF AIDS: THE ROLE OF CASE-MIX

## Chapter 1 : Economic Aspects of AIDS and HIV Infection : Detlef Schwefel :

*Model-Based Scenarios to Describe Economic Impacts of AIDS: The Role of Case-Mix R. Leidl 1. Assessing future economic impacts of AIDS: a deterministic scenario.*

Suggested articles Citations A versatile ODE approximation to a network model for the spread of sexually transmitted diseases. Increase in high risk sexual behaviour among homosexual men, London 8: Antiretroviral-drug resistance among patients recently infected with HIV. Opportunistic infections after the initiation of highly active antiretroviral therapy in advanced AIDS patients in an area with a high prevalence of tuberculosis. System Dynamics Review Can antiretroviral therapy be used to prevent sexual transmission of human immunodeficiency virus type 1? Clin Infect Dis A Study in a Township of South Africa. J Acquir Immune Defic Syndr Can HIV-1 superinfection compromise antiretroviral therapy? Changes in the transmission dynamics of the HIV epidemic after the wide-scale use of antiretroviral therapy could explain increases in sexually transmitted infections: Sex Transm Dis Changing patterns of mortality across Europe in patients infected with HIV Clinical progression and virological failure on highly active antiretroviral therapy in HIV-1 patients: Predictors of virological success and ensuing failure in HIV-positive patients starting highly active antiretroviral therapy in Europe: Arch Intern Med Use of antiretroviral therapies among HIV-infected men who have sex with men: Quantification of HIV in semen: High viral load in semen of human immunodeficiency virus type 1-infected men at all stages of disease and its reduction by therapy with protease and nonnucleoside reverse transcriptase inhibitors. Viral replication under combination antiretroviral therapy: Shadow on the continent: Infrequent transmission of HIV-1 drug-resistant variants. Mechanisms of virologic failure in previously untreated HIVinfected patients from a trial of induction-maintenance therapy. Bull World Health Org Bull World Health Organ Transmission of drug-resistant strains of HIV Mathematical models of the transmission and control of sexually transmitted diseases. Public health consequences of screening patients for adherence to highly active antiretroviral therapy. Highly active antiretroviral therapy in resource-poor settings: The role of resistance characteristics of viral strains in the prediction of the response to antiretroviral therapy in HIV infection. HIV incidence among young men who have sex with men Antiretroviral medication use among injection drug users: From Slogans to Impact. Intersubtype human immunodeficiency virus type 1 superinfection following seroconversion to primary infection in two injection drug users. HIV incidence appears constant in men who have sex with men despite widespread use of effective antiretroviral therapy. Modeling dynamic and network heterogeneities in the spread of sexually transmitted diseases. Modelling HIV incidence in gay men: Modelling the effect of combination antiretroviral treatments on HIV incidence. A patient with HIV-1 superinfection. Measures of concurrency in networks and the spread of infectious disease. The most efficient use of resources to identify those in need of antiretroviral treatment in Africa: Sex Transm Infect Highly active antiretroviral treatment does not increase sexual risk behaviour among French HIV infected injecting drug users. New therapy explains the fall in AIDS incidence with a substantial rise in number of persons on treatment expected. Transmission of antiretroviral-drug-resistant HIV-1 variants. Quantifying residual HIV-1 replication in patients receiving combination antiretroviral therapy. Viral load and heterosexual transmission of human immunodeficiency virus type A tale of two futures: HIV and antiretroviral therapy in San Francisco. Preventing antiretroviral anarchy in sub-Saharan Africa. The cost effectiveness of combination antiretroviral therapy for HIV disease. Could widespread use of combination antiretroviral therapy eradicate HIV epidemics? Lancet Infect Dis Attitudes towards highly active antiretroviral therapy are associated with sexual risk taking among HIV-infected and uninfected homosexual men. The antiretroviral rollout and drug-resistant HIV in Africa: The contribution of steady and casual partnerships to the incidence of HIV infection among homosexual men in Amsterdam. Time trends in primary HIV-1 drug resistance among recently infected persons. AIDScience Science knowledge environment Understanding the clinical and economic outcomes of HIV therapy: Scaling up antiretroviral therapy in

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resource limited settings: Guidelines for a public health approach. The use of antiretroviral therapy: Clade B HIV-1 superinfection with wild-type virus after primary infection with drug-resistant clade B virus.

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## Chapter 2 : Economic and Social Effects of Hiv/Aids Essay Example | Graduateway

*Model-Based Scenarios to Describe Economic Impacts of AIDS: The Role of Case-Mix.- Scenarios as a Tool to Support Health Planning and Management.- Main Policy Issues of the Social and Economic Impact of AIDS from the Perspective of a Health Ministry*

The ensuing multinational effort launched in response to SARS placed unprecedented demands on affected countries for timely, accurate case reporting; cooperation with expert teams coordinated by the World Health Organization WHO ; and the sacrifice of immediate economic interests, such as trade, tourism, and investment. As one would expect, the model indicates that significant short-term economic losses in China resulted from a sharp decrease in foreign investment. Although the most immediate and dramatic economic effects of SARS occurred in Asia, nearly every major market was impacted directly or indirectly by the epidemic. Several agencies and experts have attempted to estimate the cost of SARS based on expenditures and near-term losses in key areas such as medical expenses, travel and related services, consumer confidence, and investment. The extent of the long-term economic consequences resulting from SARS will depend on whether—and how—the disease returns. The chapter continues with two political analyses that reflect upon issues of both national and global governance impacted by the SARS epidemic. The first political analysis frames the issue in terms of the new rules of international engagement during the age of globalization, described by the author as the post-Westphalian era see Fidler in which nonstate actors such as multinational corporations and multilateral organizations have increasing influence on global governance. Page 92 Share Cite Suggested Citation: Preparing for the Next Disease Outbreak: The National Academies Press. McKibbin Korea University and The Australian National University, The Australian National University and The Brookings Institution While the number of patients affected by the SARS coronavirus and its broader impact on the global public health community have been surveyed in considerable detail, the consequences of the disease in other areas are less well calibrated. The purpose of this paper is to provide an assessment of the global economic costs of SARS. Most previous studies on the economic effects of epidemics focus on the economic costs deriving from disease-associated medical costs or forgone incomes as a result of the disease-related morbidity and mortality. A few recent studies—including Chou et al. We have updated that original paper to include the last known case of SARS as well as adjusting the scale of some shocks given the knowledge that the SARS epidemic lasted approximately 6 months rather than the full year originally assumed. Alison Stegman provided excellent research assistance and Kang Tan provided helpful data. See also the preliminary results and links to the model documentation at <http://> The views expressed in the paper are those of the authors and should not be interpreted as reflecting the views of the institutions with which the authors are affiliated, including the trustees, officers, or other staff of the Brookings Institution. Page 93 Share Cite Suggested Citation: However, just calculating the number of canceled tourist trips, declines in retail trade, and similar factors is not sufficient to get a full picture of the impact of SARS because there are linkages within economies, across sectors, and across economies in both international trade and international capital flows. The economic costs from a global disease such as SARS go beyond the direct damages incurred in the affected sectors of disease-inflicted countries. This is not just because the disease spreads quickly across countries through networks related to global travel, but also because any economic shock to one country is quickly spread to other countries through the increased trade and financial linkages associated with globalization. As the world becomes more integrated, the global cost of a communicable disease like SARS can be expected to rise. Our global model is able to capture many of the important linkages across sectors as well as countries through capital flows and the trade of goods and services, thereby providing a broader assessment of disease-associated costs. The G-Cubed model also incorporates rational expectations and forward-looking intertemporal behavior on the part of individual agents. This feature is particularly important when we are interested in distinguishing the effects of a temporary shock from those of a persistent shock. For

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example, when foreign investors expect that SARS or other epidemics of unknown etiology can break out in some Asian countries not just this year but persistently for the next few years, they would demand a greater risk premium from investing in affected economies. Their forward-looking behavior would have immediate global impacts. Needless to say, our empirical assessment is preliminary and relies on our limited knowledge about the disease and constrained methodology. For instance, there is speculation that SARS could reemerge in an even deadlier form in the next influenza season. There is also no consensus yet on the likely developments of any future epidemic and the precise mechanism by which SARS affects economic activities. Although a global model is better than simple back-of-the-envelope calculations, it is a coarse representation of a complex world. Nonetheless, even simple calculations are important inputs into the model. We saw this with the Asian Crisis of , when the transmission of shocks in Asia to the rest of the world and the adjustment within economies in Asia were poorly predicted when only trade flows were considered. Because we take into account the interdependencies among economies and the role of confidence, our costs are larger than many of the estimates that currently appear in the media. Page 94 Share Cite Suggested Citation: The costs are magnified by the need to maintain sterile environments, implement prevention measures, and conduct basic research. In the Southern African regions, the total HIV-related health service costs, based on an assumed coverage rate of 10 percent, ranges from 0. The costs of disease also include income forgone as a result of disease-related morbidity and mortality. Forgone income is normally estimated by the value of workdays lost due to the illness. In the case of mortality, forgone income is estimated by the capitalized value of future lifetime earnings lost to the disease-related death, based on projected incomes for different age groups and age-specific survival rates. This cost can be substantial for some epidemics. Previous researchers have also focused on long-term effects from the demographic consequences of epidemics. The first and foremost impact of epidemics is a negative shock to population and labor force. However, economic theory provides conflicting predictions regarding the economic effects of negative population shocks. A disease that kills mostly children and the elderly without affecting the economically active population aged 15 to 54 can lead to an initial increase in GDP per head. Even when the disease mostly attacks prime earners, its long-term economic consequences are not unambiguous. Standard neoclassical growth models predict that a negative shock to population growth can lead to a faster accumulation of capital and subsequently faster output growth see Barro and Sala-I-Martin, Conversely, an exogenous, one-time reduction in labor force raises the capital-labor ratio and lowers the rate of return to capital, which subsequently leads to slower capital accumulation and thereby lower output growth. Empirical studies also present conflicting results. Brainerd and Siegler show that the Spanish flu epidemic of 1918-19, which killed at least 40 million 2 Page 95 Share Cite Suggested Citation: In contrast, Bloom and Mahal show no significant impact of that epidemic on acreage sown per capita in India across 13 Indian provinces. Epidemics can have further effects on demographic structures by influencing fertility decisions of households. Under this theory, risk-averse households raise fertility by even more than expected child mortality. Evidence shows that high infant and child mortality rates in African regions of intense malaria transmission are associated with a disproportionately high fertility rate and high population growth Sachs and Malaney, Thus, the increase in fertility has a further negative impact on long-term growth. Human capital, the stock of knowledge embodied in the population, is considered an important determinant of long-term growth Barro and Sala-I-Martin, Epidemics also adversely affect labor productivity by inhibiting the movement of labor across regions within a country as well as across countries. Restricted mobility thus inhibits labor from moving to the places where it is most productive. Researchers simulating the effect of AIDS on growth in Southern African countries find that AIDS has had significant negative effects on per capita income growth mainly through the decline in human capital Haacker, The number of probable SARS cases is still small in comparison to other major historical epidemics. Furthermore, unlike AIDS, the duration of hospitalization of the infected patients is short, with more than 90 percent of the patients recovering in a relatively short period, thereby rendering the medical costs comparatively very low. The SARS-related demographic or human capital consequences are also currently estimated to be

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insignificant. The fatality rate of the SARS coronavirus is high, but, with current estimates indicating fewer than deaths from SARS worldwide, the death toll is tiny compared with the 3 million who died of AIDS last year or at least 40 million people worldwide who died in the Spanish flu epidemic of 1918. Therefore, forgone incomes associated with morbidity and mortality as a result of SARS appear to be insignificant. If SARS became endemic in the future, it would substantially increase private and public expenditures on health care and would have more significant impacts on demographic structure and human capital in the infected economies. However, based on information to date, this is unlikely to happen with the SARS epidemic.

Page 96 Share Cite Suggested Citation: We summarize three mechanisms by which SARS influences the global economy. First, fear of SARS infection leads to a substantial decline in consumer demand, especially for travel and retail sales service. The fast speed of contagion makes people avoid social interactions in affected regions. The adverse demand shock becomes more substantial in regions that have much larger service-related activities and higher population densities, such as Hong Kong or Beijing, China. The psychological shock also ripples around the world, not just to the countries of local transmission of SARS, because the world is so closely linked by international travel. Second, the uncertain features of the disease reduce confidence in the future of the affected economies. This effect seems to be potentially very important, particularly as the shock reverberates through China, which has been a key center of foreign investment. The response by the Chinese government to the epidemic was fragmented and nontransparent. This effect is also transmitted to other countries competing with China for foreign direct investment FDI. Third, SARS undoubtedly increases the costs of disease prevention, especially in the most affected industries such as the travel and retail sales service industries. This cost may not be substantial, at least in global terms, as long as the disease is transmitted only by close human contact. However, the global cost could become enormous if the disease is found to be transmitted by other channels such as through international cargo.

Simulations Using the G-Cubed Asia Pacific Model Given the important linkages among affected countries in the region through capital flows and the trade of goods and services, any analysis of the implications of SARS on the global economy needs to be undertaken with a model that adequately captures these interrelationships. The G-Cubed Asia Pacific model, based on the theoretical structure of the G-Cubed model outlined in McKibbin and Wilcoxon, is ideal for such analysis, having both a detailed country coverage of the region and rich links between countries through goods and asset markets.

Page 97 Share Cite Suggested Citation: We make two alternative assumptions in generating a range of possible scenarios under this model. In an earlier analysis, we assumed in the first scenario that the shock lasted for a year. To capture the fact that the shock lasted 6 months, in reality we now scale down the shocks by 50 percent to capture the shorter duration. This is called a temporary shock. The second assumption is that the shocks are the same magnitude in the first year as the temporary shock, but are more persistent in that they fade out equiproportionately over a year period. This illustrates the impact of expectations of the future evolution of the disease on the estimated costs in the region. It also gives some insight into what might happen to the region if the SARS virus is considered the beginning of a series of annual epidemics emerging from China.

Initial Shock to China and Hong Kong We first calculate the shocks to the economies of mainland China and Hong Kong SAR, which were hit most heavily by the disease, and then work out some indexes summarizing how these shocks are likely to occur in other economies. There are three main shocks, based on observations of financial market analysts about the existing data emerging from China and Hong Kong: An increase in costs in the exposed activities in the service sector of 5 percent. These shocks are then scaled to last only 6 months rather than 1 year. We could also consider several other shocks, such as the impact on health expenditures and fiscal deficits. It is not clear how large this shock should be for the persistent shock, nor even whether the shock should have a positive or negative sign. Because SARS kills a higher proportion of vulnerable people in a very short period, it may be that the large expenditure for these people will be reduced.

These issues include Reaganomics in the 1980s, German unification in the early 1990s, fiscal consolidation in Europe in the mid-1990s, the formation of NAFTA, the Asian crisis, and the productivity boom in the United States. We follow the updated research of Australian Treasury in adjusting this shock to basis points.

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## Chapter 3 : The epidemiological impact of antiretroviral use predicted by mathematical models: a review - C

*From the early days of its recognized occurrence, AIDS has been perceived as posing tremendous threats, burdens and challenges to human beings. Individuals, societies and, in a global point of.*

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. 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. 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. International Labour Organization and forthcoming. 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. In the early s 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. There is little reason to believe that the situation has changed markedly over the last decade, but no recent comprehensive data exist. 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. Again, internationally comparable indicators on access to care are few. Access to and quality of care can generally be estimated only indirectly. This can be interpreted in one of two ways: 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. 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. United Kingdom Germany United States In this case, there will be no impact on the cost of delivery systems—people will simply go uncared for. 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. Castro-Leal and others Moreover, coverage of the formal labor force is high only in countries where the public sector dominates formal employment. Figures for the early s Barbone and Sanchez, show that, in many African countries, fewer than 10 percent of the labor force are covered by national pension systems Table 8. More recent data for reveal that the coverage of social security schemes was only 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. Barbone and Sanchez 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. We assume that Demoland has a population of The population is young: The total fertility rate is 5. Productivity per worker is increasing at 1. Labor force

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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. Social Security Administration, Office of Policy Ten percent of the adult population those aged 15–49 are estimated to be HIV positive. AIDS caused 72, deaths in Demoland introduced its pension scheme 30 years before, in The present legal contribution rate is 8. Pension expenditure represented 1. Public health expenditure in Demoland amounts to 2. Other social programs, with total annual spending of 1. The additional deaths due to AIDS are concentrated in the population between ages 15 and 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. 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 to 72 years for males and 77 years for females in In the scenario with AIDS, in contrast, life expectancy does not improve until , after which it starts to increase so as to eventually approach the without-AIDS values only in Figure 8. With AIDS, however, the population reaches only 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. 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. Labor productivity increases by 1. 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. For women, the need for children and widows to seek employment will cause their participation rates to rise at all ages below For contribution-financed social security schemes, such as the pension scheme discussed below, the assumptions regarding the number of contributors are critical. 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. 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 level, on the assumption that AIDS deaths and slower economic growth prevent any increase in the covered population. 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. 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. Assumptions on Social Security Coverage Rates by Age and Sex, Percent Age years 15–19 20–24 25–29 30–34 35–39 40–44 45–49 50–54 55–59

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

Source: 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: Assumptions tially, the number of pensions will be on Social Security Coverage Rates by almost unaffected, because the dis- Sex and Year ease mainly strikes

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persons younger than 34 34 35 35 50 reach retirement age, the scheme 36 36 will experience a reduction in the 37 37 number of old-age pensioners. 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 shortâ€”for instance, because life-prolonging drugs are unavailableâ€”it may well happen that only a few persons will claim the disability pension and receive benefits for more than a short period. 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 to and that this factor thereafter declines gradually to unity between and If the pension scheme provides for a funeral grant, expenditure on such benefits will increase sharply. 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 contribution rate must be increased in increments, to In the worst-case scenario, scenario 4, the contribution rate has to increase rapidly, to 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 â€” In the base scenario the general average premium would be This means that, in scenario 2, the advent of AIDS requires an immediate and sustained increase in the contribution rate of 1. In the least favorable scenario, scenario 4, the general average premium would be