Technical/productive efficiency of the Global HIV/AIDS strategy

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The value for money debate – a concept that has now found its way from the boards of private companies and is now being readily applied to international non-profit institutions – has somehow been blurred by both a lack of appropriate data to acurately describe the facts, but also by diverging understandings of the basic definitions to be used. For example, the Global Fund has claimed to increase value for money by cutting 10 % of all its grants, without the appropriate consideration of these cuts effects on outcome indicators.[1] This stricly financial perpective is clearly irrelevant when applied to public health programmes, where the health outcome is of upmost importance. However, the requirement to efficiently utilize public resources in public institutions and programmes has been deemed an ethical obligation.[2] This is why technical and productive efficiency are key considerations when selecting health activities or production techniques. In this paper, I will discuss key factors for consideration when evaluating technical and/or productive efficiency as applied to the global HIV/AIDS strategy. After recalling some basic definitions (part I), I will discuss technical efficiency in the context of current world inequities, and the opportunity to increase the efficiency of public international funding (II) ; then I turn to productive efficiency , specifically as a means to review the state of economic analysis of alternative health strategies (III) ; contrasting with these perspectives, it is also useful to describe what has been done with the resources devoted to HIV/AIDS during the past twenty years, and bringing to light the reduction of the dispersion of the mean disbursement per patient, the continued exceptionnalism with respect to the relative burden of disease, the death-induced allocation of the global funding effort and the lack of consideration for the future of the epidemic in the allocation decisions (IV).

Basic definitions

The value for money agenda includes a multitude of seamingly similar terms that need to be defined in order to better undestand the relevant concepts and measures : efficacy, effective and effectiveness, efficient and efficiency. These concepts can be explained using the simplest description of a production technique (i.e. the quantities of inputs needed to obtain one unit of product) and proceeding step by step to the description of the general equilibrium (i.e. taking into account the prices of all goods and services and their relations : production functions, demand functions). Moreover, those concept can apply to different aspects of health care performance.

1) Health care can be seen as an intermediate product, in the sense of being a means to the end of improved health, or as a final product. Numbers of treated patients, or waiting time at consultation can be considered as indicators/measures of the intermediate products/outputs. But lives saved, life years gained, disability or quality adjusted life years are better approximations for the health services's final health outcome.

2) Effectiveness is simply the capability of producing a desired result in practice; it does not imply a goal of optimizing (i.e. setting to the minimum) the resources needed to obtain a specific result. Medical doctors are generally trained to use effectiveness as the ability to produce a desired result in

[1] The Global Fund 14th Finance and Audit Committee Meeting, Geneva 8-10 march 2010 ; Progress Report on Programmatic Efficiencies, GF/FAC14/08

[2] Williams A. : Cost-effectiveness analysis, is it ethical ? *The Journal of Medical Ethics*, 18, 7-11 (1992)

the field, whereas efficacy is meant as the ability of producing that result in a clinical setting, clinical trial, or lab.

3) Although many evaluations use intermediate outputs as a measure of effectiveness, this can lead to suboptimal recommendations.[3] However such measures can serve as a first pedagogical step on the way towards a better use of the available resources; nevertheless proper economic evaluations should focus on final health outcomes.

4) Efficiency is concerned with the relation between resource inputs (quantities of labour, capital, or equipment used in the productive process) and **either** intermediate outputs (numbers treated, waiting time, etc) **or** final health outcomes (lives saved, life years gained, disability or quality adjusted life years –DALYs or QALYs).

5) Technical efficiency refers to the physical relation between resources (capital and labour) and health outcome obtained from one product (good or service). A technically efficient position is achieved when the maximum possible improvement in outcome is obtained from a given set of resource inputs; or conversley when a given outcome is obtained form the minimum set of inputs. An intervention is considered technically inefficient if the same (or greater) outcome could be produced with less of one or more types of input.

6) When the resources inputs are added up using prices, efficiency measures whether (healthcare) resources are being used to get the best value for money (in the health sector).[4]

7) Productive efficiency implies the allocation of available resources across various production processes; the simplest case is that of two products (good or service), and is represented by the production possibility frontier.

8) When considering the health sector alone, adopting the criterion of productive efficiency implies that society is ready to make choices which maximise the health outcomes gained from the resources allocated to healthcare[5], and inefficiency is revealed when resources could be reallocated (for example accross diseases) in a way which would increase the health outcomes produced. Often, however, the allocation of resources is decided based on values and processes that do not reflect health maximization, by priority given to specific patient groups. The process of allocation of resources for health, and the decisions that result, are often hightly controversial.

9) If a monetary value can be given to the health outcomes (utility) as well as to other products in the society, it becomes possible to consider an economic optimum, which implies that every marginal (additional unit of) resource is allocated to that activity (health care, education, car or TV production, etc) where it will produce the highest marginal utility.

With those definitions in mind, one can assume that :

- Achieving technical efficiency is mainly the responsibility of the medical professionals ; each decision of the medical professional implies knowledge of the clinical research results and knowledge of the particular case of the patient, and their combination that constitute the clinical practice. Medical practitionners are supposed to strive for the best intermediate (or final) result with the limited resources available to them, those resources being dependent on supply chains, service delivery systems, and effective procurement, etc.

[3] Mooney G, Russell EM, Weir RD. *Choices for health care: a practical introduction to the economics of health care provision*. London: Macmillan; 1986

[4] Williams A. Priority setting in public and private health care. A guide through the ideological jungle. *Journal of Health Economics*, 1988;7:173–183

[5] Weinstein M, Stason W. Foundations of cost-effectiveness analysis for health and medical practices. *N Engl J Med.* 1977;296:716–721,

- As technical efficiency cannot directly compare alternative interventions, one intervention may produce the same (or better) health outcome with less (or more) of one resource; hence the pressing need to compare the interventions choosen by the practitionners and to inform them about the results.
- In practice, however, data on the the physical relation between resources (measures of quantities used of equipment, labour, etc) and health outcome are generally unavailable (not recorded).
- Estimates of health outcomes (lives saved, life years gained, DALYs or QALYs) are seldom available at country level, where such a quantitative approach arouses the same (if not a far greater) opposition than at international level.[6]
- Technical efficiency is too narrow a concept; it makes sense only at the base level of the productive unit.

In this context we have to stress the huge difference between the standard meaning of the term efficiency (clearly understood and in use in most of the specialized institutions)[7] and that given to "programmatic efficiency", "adjustment of/for efficiency", "efficiency savings" or "efficiency gains" in the documents made available by the GFATM Secretariat to its Board. In these documents, efficiency has not been evaluated[8] : indeed, all of these terms have only refered to attempts to reduce budgets. The objective was to reduce the expenditures on each grant by 10%, irrespective of the consequences on the level and quality of concerned activities. Moreover, GFATM uses only rough indicators, such as number of people under treatment or number of deaths. Historically, the GFATM only refers to efficiency in the context of influencing political decisions, in a highly financial and shortsighted context, not in order to reach an optimum allocation. As mentioned previously, it is not possible to evaluate efficiency without considering both the cost and the outcome.

Morevover the specialised institutions seem to face a generalized misunderstanding of what "priority" means. As an illustration, is it the case that the simple fact that some behaviours put people at greater risk of HIV infection "provides the basis for prioritizing interventions to those populations thought to be at higher risk" ?[9] Neither the role of a determinant in the spread of the infection, nor the relevance and efficacy of the considered interventions are sufficient for prioritizing: as long as we live in a resources-constrained world, the cost-effectiveness of each intervention is a necessary dimension of the process leading to give this intervention its fair ranking in a comparison including all relevant interventions.

Productive efficiency addresses the question of choosing among different combinations of resources to achieve the maximum health benefit,[10] as illustrated by the production frontier. Suppose the best combination of factors is chosen, given their relative prices: then technical efficiency is granted for that special product/service, and results in a given health outcome are effectively evaluated. Then it is possible to ask whether the same value of inputs used to produce a differing health product/service, would result in a higher health outcome. Therefore, productive efficiency refers to the maximisation of health outcomes for a given cost, or the minimisation of cost for a given outcome. Productive efficiency can be expanded to encompass multiple factor combinations,

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[6] C. J. Murray and A. D. Lopez : The utility of DALYs for public health policy and research: a reply. Bull World Health Organ. 1997, 75(4): 377–381.

[7] UNAIDS, UNICEF, WHO, United States Agency for International Development, Centre for Diseases Control, Measure Evaluation and Family Health International. *A framework for monitoring and evaluating HIV prevention programmes for most-at-risk populations.* UNAIDS, Geneva, 2007. UNAIDS/07.15E/JC1338E. first edition, April 2007, http://www.hivpolicy.org/Library/HPP001708.pdf (1rst Reprint, December 2008)

[8] The Global Fund 14th Finance and Audit Committee Meeting, Geneva 8-10 march 2010 ; Progress Report on Programmatic Efficiencies, GF/FAC14/08

[9] UNAIDS, UNICEF, WHO, United States Agency for International Development, Centre for Diseases Control, Measure Evaluation, and Family Health International. *A framework*… p. 12

[10] Stephen Palmer, David J Torgerson : Definitions of efficiency, *British Medical Journal*, 1999 April 24; 318(7191): 1136

multiple products (and therefore, for example, to various diseases contributing to ill-health) and multiple healthcare settings.

As is evident from the preceding, productive efficiency as an analysis of health services implies the availability of health outcome indicators, as opposed to intermediate health outcomes, such as the number of treated patients. This is why health outcome indicators, such as DALYs and QALYs are integral to understanding and driving health system preformance.

A last basic point. A prevailing economic theory that has emerged during the past centuries, and received a rigorous and elegant formulation during the last one, gives a major role to marginal adjustments. All equilibria (such as that of the producer, that of the consumer, that of the market of a given product or service, and finally the general equilibrium –all markets, all producers, all consumers) are defined by conditions on marginal prices or costs and marginal quantities. As Mead Over writes, it follows that «there is no theorem anywhere that asserts that TOTAL spending should be allocated in accordance with the potential TOTAL benefit, but only that marginal dollars should be allocated in accordance with actual MARGINAL benefits. ». [11]

Reviewing total disease burden is nevertheless the first move of most public health specialists, as well as of political decision-makers, and was the first criterion set by WHO when beginning to promote health planning thirty years ago. However, this attitude is shortsighted, as is evidenced by the HIV/AIDS epidemic, as efforts over the last two decades on treating the patients have proved unable to limit the expansion of the epidemic. Is this because international funding incentivizes the high disease burden[12], or because the latter gives heavy political weight to the treatment of present patients, even if this implies suboptimal allocation to combat the epidemic as a whole? Indeed, the determinants of the epidemic have been neglected, and have lacked necessary evaluation in order to choose which of them are amenable to specific interventions. The question is whether the global HIV/AIDS strategy has been directed against the epidemic core or has had as its first objective to use the exceptional international funding to create a strong industry, able to sustain high level research activities and to take care of the patients according to locally available resources.

Considering the amount of research which has been done respectively on the treatment and prevention of HIV/AIDS reveals how the research on the determinants of the infection and the means to mitigate them has been neglected. Even if some expertise is now available in modelling an epidemic and projecting the impact and, quite recently, the externalities and costs of alternative strategies,[13] the case of HIV is more complex than that of many other infections, and the lack of empirical data on HIV prevention effectiveness prevents their inclusion in many models.

Technical efficiency and international inequity

Assume that the treatment is defined at international level, and popularized through scientific meetings which define the best and most recent scientific guidelines. Assume that the treatment is implemented in each country under the constraint of eliminating every waste (as a consequence of the conditionalities imposed to the countries by the bilateral and multilateral donors, and of the own efforts of each country to do its best in producing the health services). These two assumptions would define technical efficiency at that place and that time. Then the mean treatment cost of that treatment in each country is defined by both fixed and variable costs. The variable aspect includes

[11] Mead Over, personal communication, e-mail may 2nd, 2012
[12] Victoria Fan, personal communication, e-mail may 2nd, 2012
[13] Georgiy Bobashev, Maureen L. Cropper, Joshua M. Epstein, D. Michael Goedecke, Stephen Hutton, Mead Over : Policy Response to Pandemic Influenza : The Value of Collective Actions, NBER Working Paper 17195, 2011, http://www.nber.org/papers/w17195

drug costs (even if most drugs used in most-at-risk countries have an international market and tend to have an unique international price) and the labour cost, more or less proportional to each country's GDP per capita (as the salaries vary considerably from one country to the other), but is also dependant on the country's organisational and management abilities (which determine the labor productivity). Therefore, due to the limited proportion of the mean cost that is linked to national living standards, one can suspect that the mean costs of the recommended treatment are less dispersed than the GDP per capita.

Is it the case that the mean cost of treatment doesn't vary accross countries more than the GDP per capita ? Indeed, it is hard task to assemble comparable data on the HIV/AIDS treatment costs. Until 2010, money flows were so abundant than it was politically incorrect to ask questions about the costs. And if some efforts have been devoted to build National Aids Spending Assessment tables, their scope was limited to countries benefiting from development aid,[14] as if the resources devoted to HIV/AIDS by developed countries were so huge as to be kept secret. Therefore the so-called global strategy is blind to the most important national efforts to fight HIV/AIDS, namely that of the most developed and less affected countries.

Available information has been compiled in Table 1. The data for developed countries has been generally obtained from specific studies on a limited number of treatment sites, and refers to the direct costs of treatment (including care and social support). As exceptions, the data for France and the US refer to total costs (all activities linked with HIV/AIDS, including prevention, research, ODA, overhead costs, etc).[15] The data for African countries refer to the total domestic and international spending for HIV/AIDS, as recorded in the UNAIDS files ; and the regional groups are as defined by the World Bank.

The table illustrates two striking facts : i) the differences beetwen developped and African countries in the mean cost per treated patient seem unbelievable, in the range of 1 to 50 ; ii) as hypothesized, the mean cost per treated patient doesn't seem to vary accross countries more than the GDP per capita, even if no distribution parameter can be estimated on so sparse data. Part of the explanation lies also in the fact that a significant proportion of the treatment costs in African countries is paid by international resources, i.e. not constrained by the country's limited GDP per capita.

One might expect that the treatments given to the patients in more developed countries differ from those available to the patients in the African countries. The first-line treatment tenofovir/ emtricitabine + efavirenz, which was recommended in 2011 by the US Department of Health[16], is dispensed to only 2.5 % of the patients in 45 low- and middle-income countries surveyed by UNAIDS in December 2010[17]. The low usage of this combination can be attributed to the fact that the cost of that regimen is about six times that of the most frequent regimen used in the low- and middle-income countries[18]. The most frequently prescribed drugs in the selected low- and middle-income countries were approved by the US Food and Drug Administration in 1995 and 1996, whereas the drugs recommended today as first line treatment in developed countries have been approved about

[14] See http://www.unaids.org/en/dataanalysis/knowyourresponse/nasacountryreports/

[15] For Great Britain it is possible to compare the total public expenditure recorded by UNAIDS for 2008 (US$925 millions) and the projected direct costs (including community care costs) estimated using numbers of patients and treatment site costs for the same year (about £ 750 millions, that is about US$ 1350 millions). The second is nearly 50 % higher. Cf. S. Mandalia et alii : Rising Population Cost for Treating People Living with HIV in the UK, 1997-2013, PlosOne December 2010, Volume 5, Issue 12, e15677
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3012705/pdf/pone.0015677.pdf

[16] http://aidsinfo.nih.gov/ContentFiles/HIVandItsTreatment_cbrochure_en.pdf

[17] WHO, UNAIDS, UNICEF : Global HIV/AIDS response: epidemic update and health sector progress towards universal access: progress report 2011, http://whqlibdoc.who.int/publications/2011/9789241502986_eng.pdf, p. 110

[18] WHO, UNAIDS, UNICEF : Towards universal access: scaling up priority HIV/AIDS interventions in the health sector: progress report 2010, http://whqlibdoc.who.int/publications/2010/9789241500395_eng.pdf, table 4.10 p. 71

ten years later[19]. Similarly, in a study of PEPFAR supported treatment centres, Filler incidentally notes that « Protease inhibitors (PIs) in resource-limited settings are often reserved for second-line therapy and were used for only a small number of patients »[20], that is 3.5 % of patients.

Table 1 : Costs of HIV/AIDS treatment across countries and regions.

Country	Mean cost of HIV/AIDS treatment (national currency units)	Mean cost of HIV/AIDS treatment (US$) 1 € = 1,4 US$ 1 £ = 1,8 US$	PIB per capita (US$) 2011 or 2010 (World Bank)	Mean cost of HIV/AIDS treatment (US$)/ GDP per capita (US$)
Germany (2010)*	€ 18000	25000 (S)	39852	62 %
Spain (2005)[2]*	€ 11000	15000(S)	32000	47 %
Canada (2000s)[3]*		19463 (S)	38000	50 %
Great Britain (2006)[7]*	£ 12400	22000 (S)	40300	54 %
Sweden[8]*(2000-2005)	€ 12828	22290 (S)		
United States[4]* (2011)		50000 (A)	46000	109 %
France[5]* (2000s)	€ 14500	20000 (A)	40000	50 %
Africa East[6]*		1168 (A)	583	200 %
Africa South[6]*		2087 (A)	6590	31 %
Africa Center[6]*		1094 (A)	1416	77 %
Africa West[6]*		1316 (A)	1174	112 %

S : specific studies on a limited number of treatment sites (direct costs)
A : audit of concerned national institutions (total costs)

* Matthias Stoll et alii : Calculation of Direct Antiretroviral Treatment Costs and Potential Cost Savings by Using Generics in the German HIV ClinSurv Cohort, *PLoS ONE* 6(9): e23946. doi:10.1371/journal.pone.0023946, http://www.ncbi.nlm.nih.gov/pubmed/12568973

2* Velasco M, et al. Differences in the use of health resources by Spanish and immigrant HIV-infected patients, *Enferm Infecc Microbiol Clin*. 2012. doi:10.1016/j.eimc.2012.01.007, http://www.elsevier.es/sites/default/files/elsevier/eop/S0213-005X%2812%2900047-X.pdf

3*JoAnn Kingston-Riechers, The Economic Cost of HIV/AIDS in Canada, Canadian Aids Society 2011, http://www.cdnaids.ca/files.nsf/pages/economiccostofhiv-aidsincanada/$file/Economic%20Cost%20of%20HIV-AIDS%20in%20Canada.pdf

4* U.S. Federal Funding for HIV/AIDS: The President's FY 2011 Budget Request, http://www.kff.org/hivaids/upload/7029-06.pdf; and : Global HIV/AIDS Response, Epidemic update and health sector progress towards Universal Access, 2011 Report, http://whqlibdoc.who.int/publications/2011/9789241502986_eng.pdf

5* Rapport du Sénat commentant le rapport de la Cour des comptes en 2010, http://www.senat.fr/rap/r09-333/r09-3331.pdf

6* authors's calculations, using UNAIDS 2010 Global Report, http://www.unaids.org/globalreport/global_report.htm (file Tap, sheet 3)

7* Sundhiya Mandalia et alii : Rising Population Cost for Treating People Living with HIV in the UK, 1997-2013, Plos ONE 5(12): e15677. doi:10.1371/journal.pone.0015677 (2010) http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0015677

8* Ghatnekar O, Hjortsberg C, Gisslén M, Lindbäck S, Löthgren M. : Medical resource utilization and cost of HIV-related care in the highly active antiretroviral therapy era at a University Clinic in Sweden, Pharmacoeconomics. 2010;28 Suppl 1:49-57

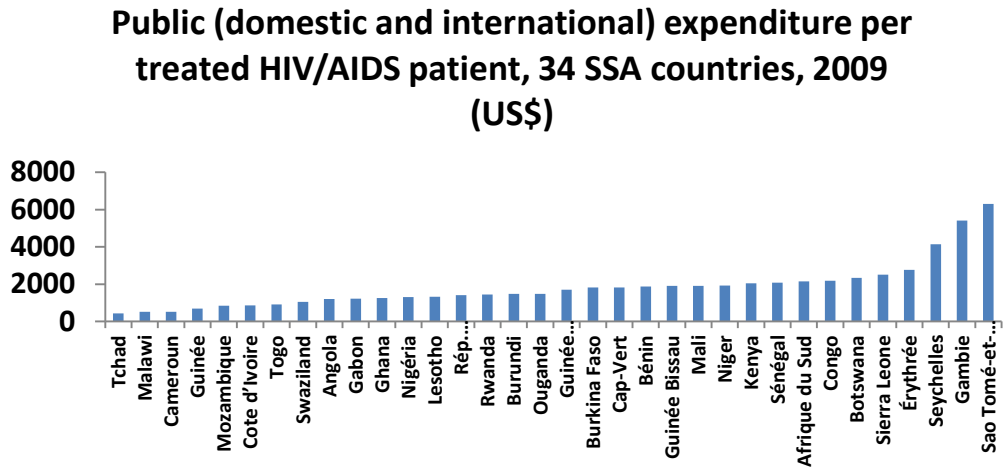
Considering the significant differences in the mean cost per treated patient between developed and African countries, it is possible that reallocation of some resources devoted to HIV/AIDS might be highly productive in terms of improving health outcomes. If technical efficiency is more or less achieved at local level (in developed countries on one hand, in African countries on the other, each group apart from the other due to quite different resources), the current global allocation seems to ignore that more resources given to the African countries would allow a higher proportion of treated

[19] Some FDA's approval dates : Stavudine 1994 ; Lamivudine 1995 ; Nevirapine 1996 ; Zidovudine 1987 ; Efavirenz 1998 ; Tenofovir 2006 ; Emtricitabine 2003 ; Ritonavir 1996 ; Atazanavir 2003 ; Darunavir 2006 ; Raltegravir 2007

[20] Scott Filler and al. : Characteristics of HIV Care and Treatment in PEPFAR Supported Sites, J Acquir Immune Defic Syndr. 2011 May ; 57(1): e1–e6. doi:10.1097/QAI.0b013e3182158980

patients among eligibles, and an increased prevention activity, with significant increases in global health outcomes.

The same may be true when considering the African countries themselves. The figures in the table show that the mean cost per treated patient in Southern Africa is twice that of Eastern Africa, this last region beeing the poorest in Africa. An analysis at country level even better shows how different are the mean costs (min = 178, max = 5429 ; mean =1600, median =1400) : their range is as wide as 1 to 30, and the coefficient of variation is about 3.3. Correcting for pricing differences not reflected in the exchange rate (using the price index for the health function of the National Accounts, as published by the African Development Bank)[21] results in an even higher coefficient of variation, up to 5.4.



Author's calculations using data in UNAIDS 2010 Global Report, feuille 4 (Madagascar, with an incredible mean of 56000, has been considered an outlier, and deleted)

The differences in mean public spending per treated patient are not explained simply by differences across African countries in the prices of health goods and services. Other features of the national strategies can impact on these costs, such as the role given to prevention activities, the share of general health administration costs payed by HIV/AIDS programmes, as well as factors attributable to the epidemiology of each country. From the global perspective, these determinants are controled or determined at national level. Nonetheless, it remains that the mean cost per treated patient in African countries, about US$ 1600 in 2009, is **one tenth** of the corresponding cost in most developed countries and **just two percent** of the corresponding cost in the United States.

Confirmation that each mean corresponds, in each most-at-risk country, to the optimum allocation would need to be calculated on marginal conditions—for which there is not sufficent data. In each country, a combination of utility evaluations (including the implicit value given to a human life which could be saved by the HIV/AIDS treatment) and constraints (available resources, their relative prices) results in a given allocation. But what if a global programme to fight AIDS aims at controlling the epidemic in a truly global manner, based on the implicit principle that a human life has the same value all over the world ? Supposing that each country is able to achieve technical efficiency using the resources put at its disposal, what allocation should the global programme implement? Clearly, we are thinking of a two-level decision process, (i) at local (national) level, technical efficiency results from constraints imposed by the best medical and procurement practices, as ascertained by

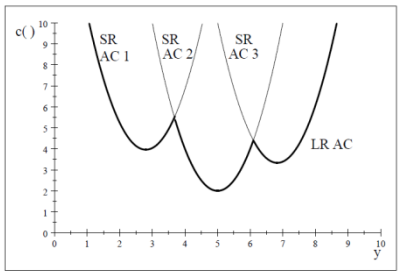
[21] http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/ICP%20Fr%20Full%20Document.pdf p27/07/2012 p. 50

professionnal standards and the compliance to technical requirements of the international donors, and from local (national) constraints (such as prices, and health manpower abilities), and from local (national) decisions; and (ii) at the global level which is primarily concerned with effective allocation of available funding.

Insofar as we can consider that technical efficiency is warranted at local (national) level, the allocation problem which is to be solved at the global level looks like a problem of multiplant production process. In each country, a given « plant » is able to produce health services, satisfying given quality and efficiency conditions, but the mean cost of the service differs from one country to the other. The global decision-maker is free to allocate an important subsidy to each country where the service is produced; the question is how much to allocate to each considered country, given the objective to get the maximum total number of lives saved or more precisely of DALYs gained ?[22] The constraint is the global amount of allocable funds. As technical efficiency is warranted at local level, the global decision-maker only has to maximise the quantity of services provided by the multiple (national) plants, under the constraint of the amount of funding available at the global level.

Suppose the global decision-maker considers each country as a plant, able to treat a certain number of patient at a given cost. He can sort out the plants according to mean observed cost. This observed mean is not necessarily the plant's minimum mean cost, for example because the plant does not work at full capacity. Nevertheless, each plant is characterised by its mean cost curve, and the observed mean cost is somewhere on this curve. As in the general case of multiplant industries[23], where the supply curve is piece-wise continuous, but with discontinuities, the countries' mean cost curves can be arranged to define a lower envelope of the mean costs.

Graph: Short-Run and Long-Run Average Cost Curves with Discrete Plant Sizes



Source : Jeffrey A. Miron
http://isites.harvard.edu/fs/docs/icb.topic635719.files/Lecture_17_Cost_Curves.pdf

However, the global HIV/AIDS decision-maker does not face a demand curve summing individual demands, because at local (national) level the patients does not pay for treatment. Neither do policy makers face demand curves purely dependent on political decisions taken at the governmental and international levels.[24] As such, global decision-makers have been tasked with maximising the number of treated people under the constraints of given local mean costs and of a given total amount of

[22] 23 millions people are living with HIV in 2010 en sub-Saharan Africa, 68% of the world total, the region having only 12% of the global population ; and 70% of all new HIV infections occurred in sub-Saharan Africa in 2010 cf. UNAIDS World Aids Day Report 2011 http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/JC2216_WorldAIDSday_report_2011_en.pdf ; See also the UNAIDS present formulation of its objectives : "zero new HIV infections, zero discrimination, and zero AIDS-related deaths" cf. AIDS Dependecy Crisis, Sourcing African Solutions, 2012 http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2012/JC2286_Sourcing-African-Solutions_en.pdf

[23] Thayer H. Watkins : In Multi-Plant Industries the Efficiency-Relevant Marginal Cost Is the Minimum Average Cost of the Marginal Plant, *Southern Economic Journal*, Vol. 48, No. 1 (Jul., 1981), pp. 149-155

[24] James Buchanan : Individual choice in voting and the market, *Journal of Political Economy*, 62, 54

subsidy to allocate to all countries (plants). An allocation rule with limited incentives would pay the mean local cost multipied by the number of treated patients up to the point where the number of treated patients equals the number of eligible patients, beginning with the country with the lowest mean cost and then subsidising the second one, and so on up to the point where all available funding has been allocated. An allocation rule with stronger incentives to reduce the mean cost would be for the global funder to pay a declining proportion of the mean cost : for example 100 % of the first decile, 90% of the second decile, etc. However the essential feature of the global funder allocation rule would be to develop the supply of services in the countries (plants) with the smallest mean costs, up to the point where all eligible patients in these countries are under treatment, and then to proceed to the next countries (plants with next higher mean cost), and so on.

Implementing such an allocation rule would imply that the global decision-makers also know how much funding is available at global level. In fact, as the National Aids Spending Assessment is limited to developing countries, the global decision-makers are blind to the equity concerns which have been the primary justification of the international strategy against HIV/AIDS. The Table 2 shows that the African countries, which bear the two-third of the burden of HIV/AIDS, get less than 11% of the world total of the aids spending.

Table 2 : Estimating SSA share in the world total of HIV/AIDS funding

Country	Published total	Cost per treated patient	Number treated patients	Estimated total	Grand Total	SSA Share
UNAIDS-SSA	4908					
UNAIDS-Total	11409				11409	4908/11409 **=43 %**
United States	27200				27200	
Canada		20000	27000	540	540	
France	1850				1850	
Germany		25000	43000	1075	1075	
Spain		15000	79500	1192	1192	
Great Britain		22000	50000	1100	1100	
Sweden		22300	4200	94	94	
Grand Total					44460	4908/44460 **=11%**

Sources : see table 1

Implementing such an allocation rule would also imply that the global decision-makers know the mean local costs at plant level. But the estimation of treatment costs at local (plant, site) level has been neglected during the two past decades.

Productive efficiency and international inequity

Considering the various activities aiming at treating patients or preventing new infections with the objective of finding the most efficient combination is one way to promote productive efficiency in HIV/AIDS spending. Indeed, an important paper published in 2005 describes the cost and effectiveness of strategies specifically adapted to the situation of the Africa-E and Sear-D WHO Regions[25] using an adapted version of the Goals model.[26]

[25] Daniel R Hogan, Rob Baltussen, Chika Hayashi, Jeremy A Lauer, Joshua A Salomon : Cost effectiveness analysis of strategies to combat HIV/AIDS in developing countries, BMJ, 10 november 2005,

It is not the place here to discuss all hypotheses included in the model, nor the estimation methods, but simply to recall how the paper intends to help the decision-maker. As a first step, the cost-effectiveness of each intervention is estimated with reference to the no-intervention case. Then the interventions are combined using the ordering they would receive with increasing budgets if cost-effectiveness were the only consideration. Therefore, in this second step, the criterion now is the incremental cost-effectiveness ratio. The model converts the difference in incidence and mortality between the no-intervention case and the various considered interventions to get estimates of the DALYs averted by each strategy; it uses also the costs of implementing each intervention or combination of intervention[27] to estimate the incremental cost-effectiveness ratio.

Then the methodology outlined at the beginning of the 1990s by Dean Jamison, and later refined and updated by the CHOICE group in WHO,[28] defines an expansion path, along which the selected combination of interventions gives the "best value for money": choosing the interventions (and the combinations of interventions) that have the maximum impact on the number of DALYs saved, at each level of available resources devoted to the AIDS (prevention, treatment and care).

Even if the authors suggest that their results be viewed by broad bands of incremental cost effectiveness ratios, these results clearly are sufficient to inform the decision-maker on where really is the "best value for money" when the objective is to control the AIDS epidemics. As the best of the present knowledge of the costs and effectiveness of the various interventions is incorporated in models like this one, one wonders why it would not be possible to build a user-friendly version of the model, for use at country level, where more accurate data could be inserted, the cost data for example, while the more across countries comparable data would be taken from the base of knowledge existing at UNAIDS and WHO.

The paper concludes that antiretroviral therapy should be included in a package of interventions for HIV/AIDS on the basis of cost-effectiveness, in the context of the two groups of countries and at the time of the study. Treatment offers relatively good value for money in both regions in terms of broad measures of population health outcomes. Cost-effectiveness ratios for HAART are similar to those for school based education (as preventive strategy against HIV/AIDS), and some variant of HAART falls well below the threshold for very cost effective interventions. Addition of second line antiretrovirals seems relatively costly per added year of healthy life, but the authors expect their prices to fall, as did the costs of first line treatment, which would lower these cost effectiveness ratios accordingly. In sum, the best strategy is quite similar that which has already been adopted to date.

Of course, this discussion doesn't consider value for money optimization among broader health interventions, such as for example in the field of maternal mortality, or immunization. What would be a decision-process tending to get the same value for money across various domains of public health decisions? i.e. a decision process aiming at obtaining productive efficiency at health sector level ? and then at intersectoral level ? Indeed, the decision-maker can use a powerful methodology, but he faces the powerful opposition of pressure groups. And, as a result, nothing new has been posted on the WHO Choice site during the past eight years. In part, this can explain why the use of health resources remains suboptimal in terms of efficiency.

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http://www.who.int/choice/publications/p_2005_MDG_series_HIV_AIDS.pdf ; and http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1315644/bin/bmj_38643.368692.68_index.html

[26] UNAIDS, Goals models, version 3.0, March 2003, 129 p. http://gametlibrary.worldbank.org/FILES/928_Goals%20Manual.pdf

[27] See http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1315644/bin/bmj_38643.368692.68_2.html ; or www.who.int/choice

[28] See Philip Musgrove and Julia Fox-Rushby : Cost-Effectiveness Analysis for Priority Setting, chap. 15, *in* DCP2, http://files.dcp2.org/pdf/DCP/DCP15.pdf

What has been done ?

The most striking result from the available evaluation reports is that the most exposed and the most-at-risk populations often do not proportionally benifit by external funding[29] and that the Global Fund allocation mechanism results in an evident inequity with respect to funding per capita and per people living with HIV/AIDS: "*some countries received considerably more HIV per capita funding than others with similar epidemic and regional profiles*".[30] That allocation mechanism has been labelled « demand driven » : indeed, its basic principle was a « treatment first » option. Many of the major decisions of the HIV international strategy have been taken under the pressure of unprecedented public opinion campaigns organised by the patients associations and the communication specialists hired by them,[31] and then by so-called reference and specialised institutions.

As a consequence of the purely political decision process, it has always been "more important for countries to draft broad, comprehensive strategic plans in order to generate significant levels of resources" than to set clear priorities.[32] In 2007, out of 139 countries that had produced Resource Needs Estimates, only 65 had also a National HIV/AIDS Strategic Plan; among the 42 available National Strategic Plans, only 17 were presented with sufficient detail to allow comparison with the Resource Needs Estimates; and among those 17, only 7 were combined with a National Aids Spending Assessment.[33]

Some additional remarks can be derived from the analysis of statistical data released during the last few years.

- **Reduction in the dispersion of mean disbursement per patient**

As is apparent, the mean disbursement per case has been erratic during the first decade, with a dispersion peak in 1994 and another one in 1998. The second decade exhibits a sharp trend of decline of the coefficient of variation, meaning that the mean disbursements per case tend to be much less scattered.

Here we are using the UNAIDS chronological data (1990-2009) on the estimated number of adults and children living with HIV on one hand[34] and the IHME data summing (one row per country) year by year (one column per year, from 1991 to 2008) the DAH disbursements on current HIV/AIDS expenses as gathered by IHME. [35] These data make it possible to calculate the mean cost per people living with HIV per country per year; however, as some data are lacking for certain years, the results are given for a number of countries varying form a minimum of 72 in 1990 to a maximum of 105 in

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[29] Kerouedan D : Health and Development Financing in Africa. *Lancet* Vol 374, p. 435-436, August 8, 2009

[30] Macro International Inc. Global Fund 5-y Evaluation: Study Area 3. The Impact of Collective Efforts on the Reduction in Disease Burden. Executive Summary. March 2009. Presented to the GFATM Board Meeting in Geneva. 6 May 2009. www.theglobalfund.org/TERG online 16 May 2009.

[31] Dodier N. : *Leçons politiques de l'épidémie de sida*, Editions de l'Ecole des Hautes Etudes en Sciences Sociales, 2003, 359 p.

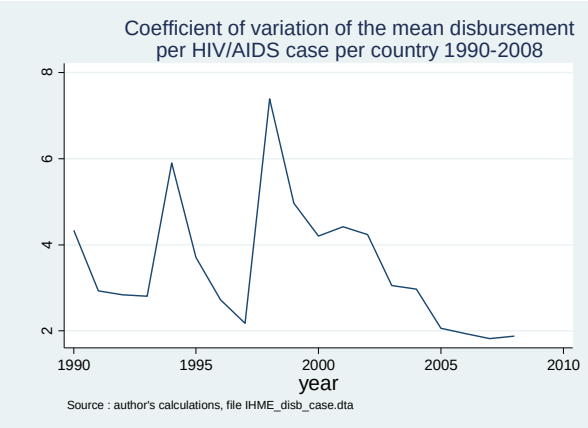
[32] Vaughn Hester, Bill McGreevey, Robert Hecht, Carlos Avila, Eric Gaillard : Assessing Costing and Prioritization in National AIDS Strategic Plans, Aids2031 Financing Working Group, (p. 5), http://www.aids2031.org/pdfs/assessing%20costing%20and%20prioritization%20in%20national%20aids%20strategic%20plans_26.pdf

[33] *Idem* p. 8

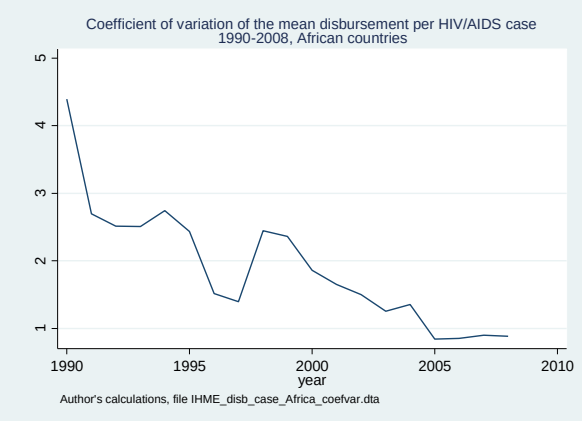
[34] HIV estimates with uncertainty bounds 1990-2009, UNAIDS Report on the Global Epidemic, 2010, http://www.unaids.org/en/media/unaids/contentassets/documents/dataanalysis/hivdataepidemiology/HIV_Estimates_GR2010_1990_2009_en.xls ; see also UNAIDS Global Report 2010, p. 178 sq, http://www.unaids.org/documents/20101123_globalreport_em.pdf

[35] file IHME\IHME DAH Database (Country and Regional Recipient Level) 2010.dta ; these data contain somme negative numbers, that are actually embedded within the OECD's Creditor Reporting System, meaning that donor countries actually report these negative net disbursements. An example of this would be a recipient country paid back a larger amount of debt from a concessionary loan than they received in that given year (thanks to Matt Schneider for this explanation).

2005. The following graph depicts the value of the coefficient of variation of the mean expenditure per people living with HIV/AIDS per country from 1990 to 2008.



This is a stride in the right direction. The progress towards reducing the dispersion of the spending per case is also present in the subsample of African countries.



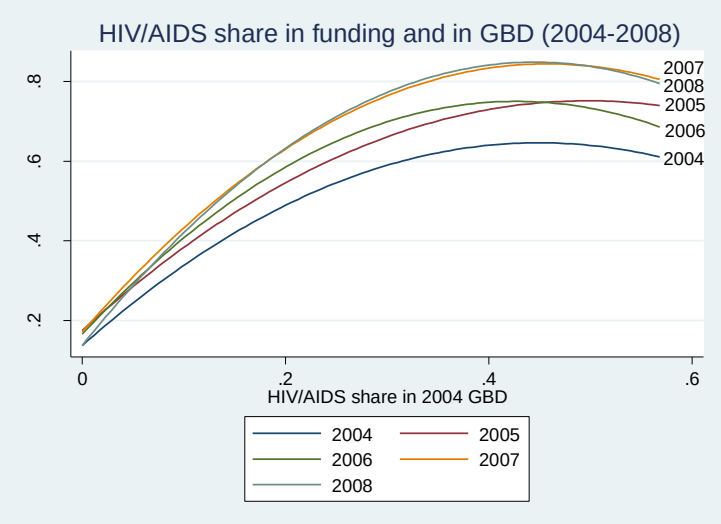
The mean HIV/AIDS expenditure per HIV case is only a proxy to the mean HIV/AIDS treatment and care expenditure, depending on the proportion of treated patients among eligible, the proportion of funding devoted to prevention and management, and other factors. The reduction of its dispersion is only indicative of the efforts to increase the proportion of treated patients and to implement the international recommendations concerning the treatment. However, this dispersion is still such that the hypothesis according to which technical efficiency is achieved at local level is not plausible : the global donors are only on the way to control technical efficiency at country level.

- **Exceptionalism with respect to relative burden of disease**

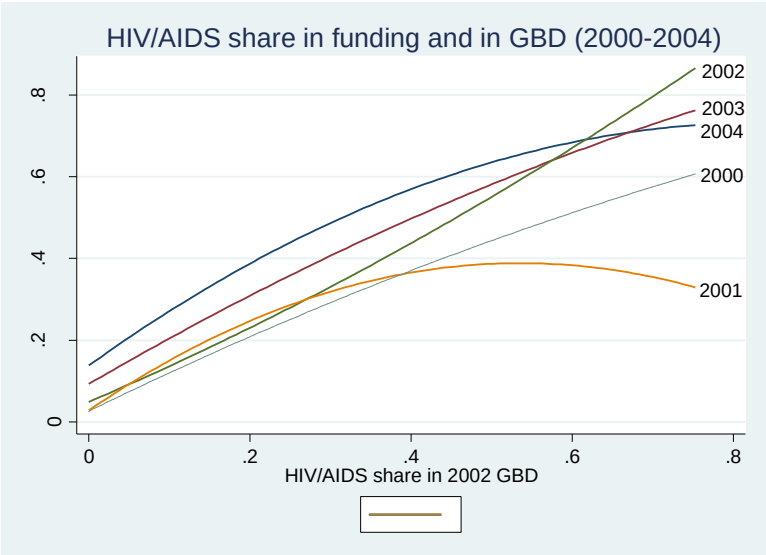
Nattrass and Gonsalves asserted that AIDS spending from all sources (domestic and foreign) in 2006/7 as a percentage of total health spending was on average lower than the share of disability adjusted life years (DALYs) lost to AIDS. [36] They don't say which of the two available global burden of

[36] Nattrass N, Gonsalves G. : Economics and the Backlash against AIDS-Specific Funding, CSSR Working Paper No. 254, july 2009, 28 p. available at http://www.cssr.uct.ac.za/sites/cssr.uct.ac.za/files/pubs/WP254.pdf (accessed oct 16th, 2012) ; see also http://ebookbrowse.com/gdoc.php?id=116155412&url=d60ee2e897f3fa85ad7faf3a714dcd5c and

disease estimates (2002 or 2004) they use. Nevertheless, it is tempting to extend the analysis on a wider time span and also to try with non linear fits. To test the hypothesis that the information on the GBD is a determinant of the allocation for the following years, we use the IHME data on external health funding (to get the share devoted to HIV/AIDS for each year between 2004 and 2008) and the 2004 GBD data (to get the HIV/AIDS share in the global DALYs lost). The following graph depicts the quadratic fits, which proved to be slighly better than the linear ones.



Likewise, the following graph relates the share devoted to HIV/AIDS in the total current external health funding for the years 2000 to 2004 and the share of HIV/AIDS in the 2002 GBD. The question of the choice between 2002 BGD and 2004 GBD is in fact of secondary importance : the two series are highly correlated (R^2 = 0,89).



http://photos.pih.org/inforesources/IHSJ_Stony_Point_Conference_2009/Economics_and_the_Backlash_Against_AIDS-Specific_Funding_N.Nattrass_&_G.Gonsalves.pdf

Striking also is the fact that the quality of the fit is increasing from one year to the other after 2004 (see table).

Adjustment	Linear		Quadratic		Number of countries
	R^2	Coef D_GBD	R^2	Coef D-GBD	
H_D00 on D_GBD02	0,41	0,82	0,41	0,96	144
H_D01 on D_GBD02	0,31	0,67	0,36	1,34	141
H_D02 on D_GBD02	0,40	1,01	0,41	0,84	139
H_D03 on D_GBD02	0,31	0,96	1,15	0,31	145
H_D04 on D_GBD02	0,25	0,96	0,26	1,41	147
H_D04 on D_GBD04	0,22	1,11	0,25	2,26	147
H_D05 on D_GBD04	0,27	1,25	0,30	2,32	147
H_D06 on D_GBD04	0,29	1,27	0,34	2,74	143
H_D07 on D_GBD04	0,37	1,47	0,41	2,94	140
H_D08 on D_GBD04	0,43	1,55	0,49	3,19	139

H_D means HIV/AIDS disbursements as percentage of total health Disbursements, the two following figures identifying the year ; D_GBD means Dalys lost due to HIV/AIDS as percentage of Global Burden of Disease, the two following figures identifying the year

Even if the results for the first years seem erratic, beginning in 2004 the R^2 is continuously growing, and so does the coefficient of the explanatory variable. And such is the case for both types of adjustments. As a matter of fact, the data on the 2002 global burden of disease have been released only in 2004, and this probably explains why the relation of the GBD variables with the disbursement variable seems so instable during the first years of the decade. In the second half of the decade, as time goes on : i) the relative share of HIV/AIDS in the total of health disbursements by international donors is better and better correlated with the share of HIV/AIDS in the Global Burden of Disease ; and ii) the slope of the curve is more sleepy, and greater than unity. The share of HIV/AIDS in the international funding is more and more explained by the share of HIV/AIDS in the GBD, and increases more than proportionnately to this last variable. As can be seen on the graphs, all curves except those of 2000 and 2001 are above the line of equality : therefore the conclusions of Nattrass and Gonsalvez does not hold.

Significant is also the fact that HIV-disbursements are better explained by the absolute number of HIV-related Dalys than by the share of HIV-related DALYs in the Global Burden of Disease (see table).

Correlation between HIV-Disbursements and HIV-related Dalys

	2002 HIV-related Dalys	2004 HIV-related Dalys
2002	0,595	
2003	0,675	
2004	0,561	0,554
2005	0,640	0,647
2006	0,710	0,686
2007	0,790	0,796
2008	0,716	0,724

Therefore, when considering all countries in the world, and all annual disbursements devoted to HIV/AIDS from 2002 to 2008, the last decade has been characterized by : i) a reduction of the dispersion of the mean disbursement per case ; ii) an increasing linkage between the disbursements and the HIV-related absolute number of DALYs. Seemingly, no consideration has been given to the relative weight of the disease in the global burden of disease.

- **Death-induced country allocation**

Combining the IHME 1990-2008 disbursement data and the UNAIDS epidemiological data for the same years, it is possible to test whether the global disbursement effort is more responsive to some of the explanatory variables, among the short available set : annual AIDS deaths, number of HIV cases (adults and children), new infections among 15-49, new infections among <15, prevalence among adults (15-49), incidence among the 15-49. Prevalence and incidence are basic variables in epidemiological models, able to determine and describe the epidemic dynamics, whereas deaths appears as a demographic variable, defining the present state of the epidemic more than its dynamic path, but also the most able to move the public opinion and the political decision-makers.

In order to disentangle a likely time-trend in the data (increased disbursement during the period) from the role of each other individual explanatory variable, we add a time variable (t=1 in 1991, 2 in 1993, and so on). As a matter of fact, the number of deaths is highly correlated with the number of cases, the number of new infections and the number of new infections under 14 : it is difficult to separate their respective roles and it does not help to include them simulteanously in the regression. On the contrary, even if prevalence and incidence are moderately correlated one with the other, each of them is only weakly correlated with the preceding set of variables.

```
. pwcorr HIV_DISBURSEMENT_CURR n_hiv prev deaths new_infect new_infect_14 incid_15
t, star(.01) print (.05)

             | HIV_DI~R    n_hiv     prev   deaths new_in~t new_i~14 incid_15
-------------+------------------------------------------------------------------
HIV_DISBUR~R |   1.0000
       n_hiv |   0.5125*  1.0000
        prev |   0.1696*  0.3645*  1.0000
      deaths |   0.5520*  0.9622*  0.3378*  1.0000
  new_infect |   0.3002*  0.8878*  0.2813*  0.7567*  1.0000
new_infec~14 |   0.3706*  0.9133*  0.1915*  0.9050*  0.8214*  1.0000
    incid_15 |            0.1265*  0.7601*           0.2587*           1.0000
           t |   0.4107*  0.1018            0.1804*                   -0.2345*
```

NB : coefficients not significant at 0.05 level are not printed ; starred coefficients are significant at 0.01 level

Now, the best fit is the simplest one, where the annual current disbursement per country per year is explained by the time and the number of deaths :

```
. reg  HIV_DISBURSEMENT_CURR  n_hiv  t

      Source |       SS       df       MS              Number of obs =     594
-------------+------------------------------           F(  2,   591) =  189.61
       Model |  4.9945e+17     2  2.4972e+17           Prob > F      =  0.0000
    Residual |  7.7838e+17   591  1.3171e+15           R-squared     =  0.3909
-------------+------------------------------           Adj R-squared =  0.3888
       Total |  1.2778e+18   593  2.1549e+15           Root MSE      =  3.6e+07

------------------------------------------------------------------------------
HIV_DISBUR~R |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       n_hiv |   26.43184   1.797233    14.71   0.000      22.9021    29.96158
           t |    3219517   288725.5    11.15   0.000      2652464     3786570
       _cons |  -2.33e+07    3055317    -7.64   0.000    -2.94e+07   -1.73e+07
------------------------------------------------------------------------------
```

A similar fit of HIV_DISBURSEMENT_CURR on prev and t only has R^2adjusted = 0.187 and F = 69.91. And introducing prev along with deaths and t in stepwise regression generally results in a negative

unexpected coefficient for prev (results not shown). Therefore, there is no sound basis for the claim that : « Donors' HIV-related spending is higher in countries with high HIV prevalence ».[37] On the contrary, our interpretation is that the main determinant of the decision-maker has been to allocate funding according to the number of cases/deaths, a number able to move the public opinion, and hence giving the disease its political weight ; the international intervention has been guided by the immediate toll taken by the epidemic, not by a strategy to control it by focusing on its dynamic and acting on the determinants of the infection.

- **No role for epidemic variables in explaining the share of domestic funding or prevention**

The data gathered by UNAIDS from the countries annual reports contain the percent of domestic funding in the total reported domestic public and international expenditure and the percentages of that expenditure devoted to prevention and to program and management support respectively. Prevention is meant as the sum of expenditures for voluntary counseling and testing, programs for sex workers and their clients for MSM and programme for harm reduction for IDUs, prevention of mother to child transmission ; program and management support is meant as the sum of expenditures for programme management, planning and coordination, and monitoring and evaluation. Those percentages are highly variable from one country to the other (the share of domestic funding spanning from 0 to 100 %, mean=51% ; that of prevention also from 0,25 to 100 %, with mean=48 %). This type of data is useful to detect the empowerment of the national decision-makers. One obvious hypothesis would be that the characteristics of the national epidemic are among the determinants of the decisions made concerning the domestic participation to the HIV/AIDS programmes funding, and of the decisions on the share to be given to prevention activities. However, data on the total reported domestic public and international expenditure and its components is limited to recent years (2005-2007) and to about a hundred of countries, including numerous small islands.

The main feature in these data is that no obvious trend appears neither in the per cent of domestic funding in the total public funding, nor in the percent of the public funding devoted to prevention.

Conclusion

The definitions of technical and productive efficiency have been recalled to insist on the progressive extension of the problem they address --beginning with a purely technological aspect of the production process (the minimum quantities of input nedded to get a unit of output) and extending it to a first-step economic aspect (introducing prices of the inputs in place of their physical quantities, and then discussing the minimum cost of inputs to get a unit of product), then to a second step where productive efficiency is at stake (with two or more products), which at the end opens to the general equilibrium. Similarly, in producing health services, one has to consider not only technical, but also productive efficiency, which implies comparisons and trade-offs in health system inputs, and ultimately in the economy at large. Hence the value for money for global health financing institutions question is to be solved within the context of the entire health sector.

Global health strategies are dependent on the knowledge of available resources at global level and the disaggregated amounts of global expenditures among various activities. The National Aids Spending Assessments are clearly insufficient in that they are limited to the countries benefiting from development aid to finance their HIV/AIDS activities, and ignore the amounts spent in the most

[37] UNAIDS Global Report 2010, p. 146, http://www.unaids.org/documents/20101123_GlobalReport_Chap6_em.pdf

developed (and less-at-risk) countries.[38] The distinction between technical and productive efficiency leads to the idea of a two-step decison process : one where the technical efficiency results from local level decisions and constraints imposed on the producers, and another one where the global decision-maker is in charge of allocating a subsidy to get the maximum number of patient treated. This last point is an application of multiplant industry model, with some adaptations to the particular case of fully subsidised production.

Then the main question is that of the dispersion of the production costs of the treatment. Is it really the case that the technical efficiency is achieved at local level, due to the international diffusion of best pratice recommendations, and account being taken of local economic conditions ? The data exhibit incredible differentials between developed and poor countries, as well as between most-at-risk countries. However, the dispersion of mean expenditure per HIV case has been sharply decreasing after year 2000, as well in African countries as in the whole sample of countries where needed data are available. But, as evidenced by the PEPFAR experience, neither the recommandations nor the guidelines enacted by WHO are sufficient to implement in practice the technical efficiency we supposed to be achieved at local level. The most recent studies using the data collected on PEFAR sites only give piecemeal evidence of cost dispersion,[39] but no measure of it. As Filler and coll. write in their conclusion : « the present study revealed the heterogeneity of program designs, highlighting the opportunity for further operational research to identify and promote best practices. Ultimately, through refining the package of services that patients receive and the methods used to provide them, strategies can be identified that maximize the effectiveness and efficiency of treatment programs, and in this way promote the universal access goals for treatment programs ».[40] The process now implemented by PEPFAR to understand costs at facility level and rapidly adapt cost estimates could probably be more widely spread,[41] adapted and extended to all subsidised facilities.

The main criterion of allocation for the global decision-maker is still to be found. In practice, it appears that the implicit criterion has been the number of deaths (for which annual estimations have been released) or the number of DALYs (with estimates for 2002 and 2004). The number of deaths is easily understood by public opinion and the politicians. But it is not a good criterion : the resulting allocation decisions are unrelated to the variables defining the epidemic dynamics (incidence, prevalence). The Domestic Investment Priority Index is flawed by the fact that it simply describes the empirical behavior of the countries, as if they could behave similarly when they face highly different costs and probably cost-effectiveness ratios. Therefore, there is no ground to conclude that, as the Priority Index of a large majority of countries (70%) falls below its average, many countries need to invest more in their AIDS responses.[42] Achieving a better control over the costs of services with given quality (i.e. satisfying the WHO recommendations in the local context) is a prerequisite to the adoption of a criterion of minimum mean cost.

Concluding their study of PEPFAR experience in extending HIV/AIDS treatment, Menzies and coll. write as their last sentence : « Programs need to weigh the trade-offs between focusing resources on improved regimens and services for current patients and extending coverage to those not yet receiving care. »[43] The same is perfectly true between developed less-at-risk and developing most-at-

[38] In 2010 the United States spent US$ 26 billions (including 6.7 billions for global activities, i.e. funding across international agencies and international research at NIH, cf. http://www.kff.org/hivaids/upload/7029-06.pdf) whereas UNAIDS recorded 15.9 billions as the total of domestic and international resources (http://www.unaids.org/documents/20101123_GlobalReport_Chap6_em.pdf p. 146)

[39] See PEPFAR : Report on Pilot Expenditure Analysis of PEPFAR Programs in Six Countries, July 2012, 14 p. http://www.pepfar.gov/documents/organization/195700.pdf

[40] Scott Filler and al., op. cit.

[41] See also Recommendations by the Data Working Group (DWG) to the PEPFAR Scientific Advisory Board (SAB) Presented October 3, 2012

[42] UNAIDS 2010 Global Report, p. 146, http://www.unaids.org/documents/20101123_GlobalReport_Chap6_em.pdf

[43] Menzies et al.: The Cost of Providing Comprehensive HIV Treatment in PEPFAR-Supported Programs

risk countries, as some comparisons of mean expenditure per case between European countries and the US, on one hand, and the most affected countries, one the other hand, have shown. Reducing these gaps by a better global allocation of available global funding is a first step in getting the best value for money for global health financing institutions.

AIDS. 2011 September 10; 25(14): 1753–1760. doi:10.1097/QAD.0b013e3283463ee