

Estimating fiscal space for health: pitfalls and solutions



In *The Lancet HIV*, Annie Haakenstad and colleagues¹ report how much fiscal space for HIV/AIDS could be created in 137 low-income and middle-income countries. The research is timely and extremely important. Given substantial cuts in development assistance for HIV/AIDS,² domestic financing is essential to sustain the response to the epidemic.

To answer their research question, Haakenstad and colleagues created a new dataset of HIV/AIDS spending by domestic source (government, pre-paid private, and out-of-pocket) and spending category (prevention, and care and treatment) from 2000 to 2016 for 137 low-income and middle-income countries. Such a data-gathering effort is extremely valuable and should be praised. The dataset constitutes a public good that should inform both researchers and policy makers.

The authors then applied stochastic frontier analysis to estimate potential government spending on HIV/AIDS. Use of stochastic frontier analysis rather than quantile regression is a very interesting methodological choice; although previous research has shown that stochastic frontier analysis is not necessarily superior to quantile regression.² However, I argue that their analysis has two fundamental problems, and consequently their fiscal space estimates are difficult to interpret and their conclusions are potentially misleading.

The first problem is that estimates of potential government spending on HIV/AIDS are not compared with the amount countries would actually need to pay to efficiently confront the HIV/AIDS epidemic.³ For example, Haakenstad and colleagues estimate that China's Government could increase its annual contribution to HIV/AIDS by US\$6.8 billion, from \$1.1 billion to \$7.9 billion. However, Stover and colleagues calculated that China would need to spend a maximum of \$2.7 billion annually to end the epidemic.⁴ In a world of scarce resources, it seems misleading to conclude that China could or should mobilise more than necessary. A more nuanced conclusion is that China's Government could increase its contribution by \$1.6 billion to cover its needs. This estimate is 77% lower than that estimated by Haakenstad and colleagues' estimate of \$6.8 billion. The problem is not only observed for China, but also when comparing Stover and colleagues' estimates with Haakenstad

and colleagues' for Costa Rica (–92%), Panama (–95%), Malaysia (–30%), Nicaragua (–49%), Cambodia (–10%), Lebanon (–42%), Sri Lanka (–16%), Dominican Republic (–1%), Timor-Leste (–52%), and Libya (–12%; appendix). Globally, I calculate that an additional \$6.7 billion could be mobilised by governments of low-income and middle-income countries to finance the response to HIV/AIDS (41% lower than Haakenstad and colleagues' global estimate of \$12.1 billion).

The second problem is that the input variables included in the stochastic frontier analysis have been poorly chosen. The input list is, however, crucial; it not only affects fiscal space estimates, but also determines which policies can be used by inefficient governments to create this fiscal space.

I propose four general rules that should guide researchers when selecting input variables to estimate an efficiency frontier (future research could refine this list). First, inputs that decision makers (here, governments) cannot directly affect should be included. Second, inputs determined by decision makers should be excluded. These variables are indeed differentiating efficient decision makers from inefficient ones and should therefore be part of the technical inefficiency term. Importantly, policy recommendations to decrease inefficiency should target these excluded inputs. Third, inputs should include contextual factors that affect inefficiency but are not directly determined by decision makers. Finally, outputs should be excluded to avoid reverse causality bias. If potential outputs are included, an instrumental variable approach should be adopted.

Before applying these rules, the production process should be accurately modelled. In the appendix, I show that government spending on HIV/AIDS can be decomposed into five terms: the ratio of the HIV budget to the health budget, the ratio of the health budget to the total government budget, the total government budget as a share of national income, past national income per capita, and recent economic growth per capita. The first three terms are variables that governments can directly affect: increasing taxes and prioritising health and HIV/AIDS spending are what distinguishes governments that are efficient at tackling HIV/AIDS from those that are inefficient. According to the second rule, these variables should be excluded

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from the input list. The fourth variable (past national income per capita) is not affected by current policies and should therefore be included in the list of inputs. The fifth variable (recent economic growth per capita) can be included or excluded depending on whether one assumes that economic growth is the responsibility of governments or not. Following the third and fourth rules, variables that are affecting a government's ability to increase taxes and prioritise HIV/AIDS should be included, provided they are not outputs of the production process. HIV prevalence, for example, can be included. The problem of reverse causality is expected to be minor, because HIV prevalence is a stock variable not much affected by policies in the short run. By contrast, HIV/AIDS incidence and mortality should be excluded because these flow variables are directly affected by government spending in the short run, creating a risk of reverse causality bias.

The list of inputs used by Haakenstad and colleagues¹ includes many variables that should be excluded according to the above rules (eg, HIV/AIDS incidence and mortality, general government spending per capita, total domestic health spending per capita). Consequently, estimates of the fiscal space potentially available for HIV/AIDS are biased and artificially decreased.

The two problems bias estimates in opposite directions. The fiscal space estimates obtained by Haakenstad and colleagues are therefore difficult to interpret. Future research should use the rich dataset gathered by these authors to re-estimate the potential for additional government spending on HIV/AIDS in low-income and middle-income countries, taking into account the problems and solutions described in this Comment.

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I declare no competing interests.

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- 1 Haakenstad A, Moses MW, Tao T, et al. Potential for additional government spending on HIV/AIDS in 137 low-income and middle-income countries: an economic modelling study. *Lancet HIV* 2019; published online April 25. [http://dx.doi.org/10.1016/S2352-3018\(19\)30038-4](http://dx.doi.org/10.1016/S2352-3018(19)30038-4).
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- 3 Sterck OC. What goes wrong with the allocation of domestic and international resources for HIV? *Health Econ* 2018; **27**: 320–32.
- 4 Stover J, Bollinger L, Ijazola JA, et al. What is required to end the AIDS epidemic as a public health threat by 2030? The cost and impact of the fast-track approach. *PLoS One* 2016; **11**: e0154893.