The Impact of HIV on Total Factor Productivity

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Abstract

This study investigates whether HIV prevalence rates impacts TFP growth. We construct a panel of data on general macroeconomic indicators and HIV prevalence rates for over 100 countries, for the years 1994 through 2002, and estimate the impact of HIV on TFP growth rates for each country. We find that HIV can have a large negative impact on factor productivity growth in Southern African countries. For example, factor productivity growth in Lesotho falls by up to 23%, and for South Africa factor productivity growth falls by up to 15%. We then investigate the potential impact of the disease on the economic growth of Lesotho and South Africa by calibrating a single sector, neoclassical model of economic growth with endogenous savings to the two countries. The models show that TFP effects can have large, negative impacts on both per capita GDP and aggregate GDP.

JEL Classification: C21, E2, I0, O1, O3

I. Introduction

Since the early 1990s, economists have feared that eventually HIV and AIDS might have a significant, negative, impact on economic growth. This concern has lead to several studies on the likely impact of HIV and AIDS on economic growth, with most attention paid to sub-Saharan African countries. For example, Roe and Smith (2005) introduce HIV prevalence and death rates into a dynamic, three sector, general equilibrium model of South Africa with endogenous savings. In their model, TFP is the same in both their HIV and non-HIV models. One of their

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conclusions is that in the long run, per capita GDP growth is higher with HIV than without the disease. Arndt and Lewis (2000, 2001) use a multi-sector computable general equilibrium (CGE) model to examine the impact of HIV and AIDS on South African economic growth. Their model assumes TFP in the presence of HIV eventually drops to one half its' no-HIV level, and they predict by 2010 annual aggregate gross domestic product (GDP) in South Africa would be 17% smaller in the presence of AIDS. Regarding their TFP assumptions Arndt and Lewis (2001) write: "It must be emphasized that the TFP declines simulated are, in large measure, hypothetical since very little solid information is available on the implication of AIDS for overall factor productivity rates." This paper seeks to remedy this shortcoming by econometrically estimating the relationship between HIV/AIDS and factor productivity.

Cole and Neumayer (2005) examine the relationship between malaria, water born diseases, and malnutrition on TFP levels, and find that each malady has a negative impact on TFP levels. In their introduction, Cole and Neumayer note that, to their knowledge, no published studies link health and TFP. Certainly, studies have examined the relationship between health and economic growth (see Cole and Neumayer for a succinct summary of these studies). Aside from Cole and Neumayer, however, we too, are unaware of any such studies.

The major objective of this study is to measure the impact of HIV on TFP (actually, labor augmenting technical change). One reason for our interest in this issue we allude to above: TFP is a crucial ingredient in most CGE based or neoclassical/Ramsey growth models, and to date, analysts have little scientifically based guidance in setting the TFP values in their studies. Until such knowledge is available, dynamic neoclassical growth models admittedly have a potentially serious weak link in its analysis.

For the years 1994 through 2002, we construct a panel of data on general macroeconomic indicators and HIV prevalence rates for over 100 countries. We use this data to estimate the impact of HIV on TFP growth for each country. We find that HIV can have a large negative impact on factor productivity growth in Southern African countries. For example, factor productivity growth in Lesotho falls by up to 23%, and for South Africa factor productivity growth falls by up to 15%. We then investigate the potential impact of the disease on the economic growth of Lesotho and South Africa. This is accomplished by calibrating a single sector, neoclassical model of economic growth with endogenous savings to the two countries. The models show that TFP effects can have large, negative impacts on both per capital and aggregate GDP.

The rest of this paper is organized as follows: Section II develops the empirical model, Section III presents the results, Section IV concludes.

II. Empirical Model

Denote a typical country's aggregate real output at time t by

$$Y_t = B(A_t L_t)^{1-\alpha_1} K_t^{\alpha_1},$$

where the t subscript indexes time. The elasticity, α_1 can be interpreted as the cost share of capital in producing Y_t, A_t is labor augmenting technical change, L_t is labor, K_t is the stock of physical capital, and B is a scaling parameter. Labor augmenting technical change is specified as

$$A_t = e^{xt+\alpha_2 h_t+\alpha_3 I_t},$$

where h_t is the HIV prevalence rate, I_t is an index of institutional development, and x, α_1, α_2, and α_3 are scalar valued parameters.

To set up the empirical model, normalize output and capital by labor to get

$$y_t = B(e^{xt+\alpha_2 h_t+\alpha_3 I_t})^{1-\alpha_1}(k_t)^{\alpha_1}$$

where $y_t = Y_t / L_t$ and $k_t = K_t / L_t$. Next, take the natural log of y_t

$$\ln y_t = \ln B + (xt + \alpha_2 h_t + \alpha_3 I_t)(1-\alpha_1) + \alpha_1 \ln k_t;$$

observe that $\frac{\dot{y}_t}{y_t} \cong \ln \frac{y_t}{y_{t-1}}$ and $\frac{\dot{k}_t}{k_t} \approx \ln \frac{k_t}{k_{t-1}}$, and express the rate of output growth per worker as

$$\frac{\dot{y}_t}{y_t} = (x + \alpha_2 \dot{h}_t + \alpha_3 \dot{I}_t)(1-\alpha_1) + \alpha_1 \frac{\dot{k}_t}{k_t}, \tag{1}$$

where $\dot{h} = h_t - h_{t-1}$ and $\dot{I} = I_t - I_{t-1}$. Consider the linear regression model corresponding to (1):

$$\frac{\dot{y}_t}{y_t} = \hat{\alpha}_0 + \hat{\alpha}_1 \frac{\dot{k}_t}{k_t} + \hat{\alpha}_2 \dot{h}_t + \hat{\alpha}_3 \dot{I}_t + \varepsilon_t. \tag{2}$$

Here, $\hat{\alpha}_0$ is the estimate of $x \cdot (1-\alpha_1)$; each $\hat{\alpha}_j$, $j = 1,2,3$ is the estimated coefficient for the corresponding $\alpha_j(1-\alpha_1)$; and ε_t is an error term satisfying $\varepsilon_t \sim N(0,\sigma^2)$.

From (2), we define TFP as

$$TFP_t = \frac{\dot{\hat{y}}_t}{\hat{y}_t} - \hat{\alpha}_1 \frac{\dot{k}_t}{k_t} = (\hat{\alpha}_0 + \hat{\alpha}_2 \dot{h}_t + \hat{\alpha}_3 \dot{I}_t)(1-\hat{\alpha}_1)$$

where $\hat{y}_t$ is the estimated/predicted value of y_t and $\dot{\hat{y}}_t = \hat{y}_t - \hat{y}_{t-1}$. Note that TFP as defined here is simply the Solow residual, and is the rate of growth in output unexplained by the stocks of capital and labor. Here, $\hat{\alpha}_0$ is our estimate of average TFP, while $\hat{\alpha}_2 \dot{h}_t$ modifies this rate of growth according to the sign and level of both $\hat{\alpha}_2$ and $\dot{h}_t$. For example, if $\hat{\alpha}_2 < 0$ then TFP falls (increases) as prevalence rates increase (fall). Hence,

$$\frac{\partial TFP_t}{\partial \dot{h}_t} \frac{\dot{h}_t}{TFP_t} = \frac{\hat{\alpha}_2 \dot{h}_t}{TFP_t}$$

is a direct measure of the contribution of HIV (rate changes) to TFP, and is interpreted as the short run elasticity of TFP with respect to the rate of change in HIV prevalence rates.

With respect to the impact of HIV on TFP, the linear model (2) has an unattractive feature. To illustrate, consider two countries, A and B, with similar institutional indices and capital stock growth rates. Furthermore, assume both countries have the same rate of increase in new HIV infections, but country A has a 35% HIV prevalence rate, while B has a 1% HIV prevalence rate. The inference drawn from (2) is that productivity growth will be the same in both countries: i.e., the level of HIV infections has no rate effects on factor productivity growth. While TFP may be independent of HIV prevalence rates, there is no reason for building such a restriction directly into the estimating model.

To circumvent this potential problem, define *J* HIV prevalence categories, $\eta_1 < \eta_2 < \cdots < \eta_J$, where the $\eta_j = [\bar{h}_j, \bar{h}_{j+1})$, is an interval with $\bar{h}_j < \bar{h}_{j+1}$. For example, define two categories, with $\eta_1 = [0, 10\%)$ and $\eta_2 = [10\%, 100\%)$. Consider, then, the following linear model:

$$\text{(3)} \qquad \frac{\dot{y}_t}{y_t} = \hat{\alpha}_{00} + \sum_{j=1}^{J-1} \alpha_{oj} D_j + \hat{\alpha}_1 \frac{\dot{k}_t}{k_t} + \hat{\alpha}_2 \dot{h}_t + \hat{\alpha}_3 \dot{I}_t + \varepsilon_t,$$

where each D_j is a dummy variable defined as

$$D_j = \begin{cases} 1 \text{ if } h_t \in \eta_j \\ 0 \text{ otherwise.} \end{cases}$$

This model has the feature that the share of HIV positive agents in the population potentially impacts average TFP.[7]

Introducing countries and time, (3) is written as:

$$\text{(4)} \qquad \begin{aligned} \frac{\dot{y}_t^i}{y_t^i} &= \hat{\alpha}_{00} + \sum_{j=1}^{J-1} \alpha_{oj} D_j^i + \hat{\alpha}_1 \frac{\dot{k}_t^i}{k_t^i} + \hat{\alpha}_2 \dot{h}_t^i + \hat{\alpha}_3 \dot{I}_t^i + \varepsilon_t^i, \\ TFP_t^i &= \hat{\alpha}_{00} + \sum_{j=1}^{J-1} \alpha_{oj} D_j^i + \hat{\alpha}_2 \dot{h}_t^i + \hat{\alpha}_3 \dot{I}_t^i. \end{aligned}$$

[7]Similar to HIV levels, the level of institutional development might also affect TFP. However,

Here y_t^i and k_t^i are the per worker output and capital stock levels for country i at time time t, while $\dot{h}_t^i = h_t^i - h_{t-1}^i$ and $\dot{I}_t^i = I_t^i - I_{t-1}^i$, where h_t^i and I_t^i are the HIV and institutional indices for country i at time t. Finally, D_j^i is the HIV dummy variable for country i at time t.

III. Data and Estimation Results

The primary data used in our estimations are: GDP Y_t, capital stock levels K_t, labor force levels L_t, HIV prevalence rates h_t, and an index of institutional development I_t. GDP, labor force levels, and investment levels come from the World Bank's *World Development Indicators 2004* (WDI). We construct capital stock data using the perpetual inventory method applied to gross domestic fixed investment series. Harrison (1996), Hall and Jones (1999), and others have used this method, which uses the formula:

$$K_{1989,\,i} = \frac{\text{investment}_{1989,\,i}}{g_i + \delta},$$

to estimate the initial stock of capital for country i, denoted $K_{1989,i}$. Here investment$_{1989,i}$ is the level of investment in country i during 1989, g_i is the average GDP growth for that country during the period 1989-2002, and δ is the depreciation rate which we assume is equal to 0.4 for each year, for all countries. The capital stock series for country i is calculated according to

$$K_{t,i} = K_{t-1,i} + Investment_{t,i} - \delta K_{t-1,i},$$

where the initial capital stock level is given by $K_{0,i} = K_{1989,i}$.

The severity of the AIDS epidemic is proxied by a country's HIV prevalence rates. These series are obtained from UNAIDS and the World Bank. The HIV prevalence rates are recorded for the years 1994, 1997, 1999, 2001 and 2003, and we interpolate the prevalence rates of the

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our focus is on the health impacts on TFP and we do not try to identify the impact of I_t on TFP.

missing years. The other series used in our analysis is an overall index of governance and institutions we developed by weighing 6 indices in Kaufmann et al (2003).

We defined four HIV prevalence categories, where η_1 = [0, 0.01), η_2 = [0.01, 0.05), η_3 = [0.05, 0.10), and η_4 = [0.10, 1). As discussed above, intercept dummies were defined for each group. For example, the first group η_1 includes countries with an HIV prevalence rate less than or equal to 1. Seventy five countries fall in this group. Sixteen of them are from Western Europe, fourteen from Latin America, fifteen from Eastern Europe, six from the Pacific Rim, eight from South East Asia, twelve from North Africa and the Middle East, and four from Sub Saharan Africa. Countries falling in the second category are primarily low income, developing countries like Benin, Cameroon, the Dominican Republic, Eritria, Senegal, and Sierra Leone. Countries falling in the third category are mainly Western and Central African countries, while the fourth category is composed of countries from southern Africa, namely: Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe, with Botswana, Lesotho, South Africa, and Zimbabwe reported to have HIV prevalence rates exceeding 29%.

Table 1 presents the results from estimating equation (4). This equation was first estimated by ordinary least squares with intercept and slope dummy variables. The slope dummies were created by interacting intercept dummies with changes in the HIV prevalence rates. The corresponding coefficients were insignificant, and eliminated after the first round of estimations. We then applied Weighted Least Squares to correct for heteroskedasticity problems in the final model.[8]

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[8] Analysts often use fixed effect (FE) and random effect (RE) techniques to analyze panel data. Although these models both assume residuals are serially uncorrelated, they differ in their assumptions on how the country specific error components (i.e. unobserved effects) and the regressors are correlated. FE models assume the unobserved effects and regressors are correlated, while RE models view the country specific effects as random drawings that are uncorrelated with

Table 1: The effect of HIV prevalence rate on Total Factor Productivity (TFP)

Dependent variable: $\dot{y}/y$		
Independent Variable	Coefficient	Estimated Value*
Intercept	$\hat{\alpha}_{00}$	0.012004
D_1	$\hat{\alpha}_{01}$	-0.000691
D_2	$\hat{\alpha}_{02}$	-0.011561
D_3	$\hat{\alpha}_{03}$	0.004514
$\dot{k}/k$	$\hat{\alpha}_1$	0.327929
$\dot{h}_{it}$	$\hat{\alpha}_2$	-0.000266
$\dot{I}_3$	$\hat{\alpha}_3$	0.006235
R^2	0.99	
Number of observations	896	

*All estimated coefficients are significant at the 1% level of significance.

Each intercept dummy is significant at the 1% level of significance. These coefficients measure the difference in the rate of average output growth (per unit of labor - PUL) across the four HIV groupings. The average rate of productivity growth PUL in the nine Southern African countries is 1.20% per year, while the rate of productivity growth PUL in the seventy-five countries with low or non-existent HIV levels is slightly lower at 1.19%. Recall that this group consists of a mix of both developed and developing countries, hence the slightly lower average rate of growth. The countries in the second group are primarily developing countries, and compared to the Southern African countries, on average have a slower rate of TFP.

Tables 2 through 9 summarize the TFP values for the countries in our panel. A close look at these tables reveal HIV has negligible effects on countries where HIV rates are less than 1%,

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the regressors. In practice, the choice between implementing a random verses fixed effect methodology depends on the problem at hand. Here, we expect the unobserved effects to be correlated with regressors, and that the countries included are not random drawings. If true, a FE model is appropriate. Typically, FE models with three or more time periods have problems with serial correlation. In such a case one often first-differences the data: this often eliminates the but more telling effects on TFP in countries with high HIV rates like South Africa and Lesotho. To understand the importance these differences on economic growth, we fit a simple single sector neoclassical growth model with endogenous savings to South Africa and Lesotho.

The growth model has a representative household with CES preferences and firms having constant returns to scale, Cobb-Douglas technologies defined as above, i.e., $Y_t = B\left(A_t L_t\right)^{1-\alpha_1} K_t^{\alpha_1}$. We take the following parameter values from the literature: The household's intertemporal elasticity of substitution is equal to 2, and it discounts the future at 2%; capital depreciates 4% each year. The estimated output elasticity of capital, $\hat{\alpha}_1$, is estimated equal to 0.3279. In this model, population growth and the rate of Harrod neutral technical change are crucial parameters.

From Table 2, the Harrod neutral rate of technical change for Lesotho without HIV is equal to $0.02151 = \frac{0.01446}{0.6721}$ and with HIV is equal to $0.01736 = \frac{0.01167}{0.6721}$. Similar calculations for South Africa yield Harrod rates of technical change equal to 0.01982 with HIV and 0.02276 without HIV. The final parameters needed are population growth rates for each country. From WDI 2004 we calculate the average rate of labor force growth for each country. Lesotho's workforce grew about 2.45% a year between 1995 and 2002, while South Africa's grew 2.6% a year over the same period. We used these values in the "no-HIV" simulations of these countries. With HIV, the Actuarial Society of South Africa (ASSA) project that annual population growth rates in South Africa could drop to less than 0.5% by 2010. We adopt a much more conservative assumption on labor force growth rates under HIV, and set this value equal to 1.9% for each country. For details of the neoclassical growth model with endogenous savings, see Barro and Sala-i-Martin (2004).

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serial correlation problem. Such was the case here. As an aside, the random effect estimation yielded unsatisfactory results.

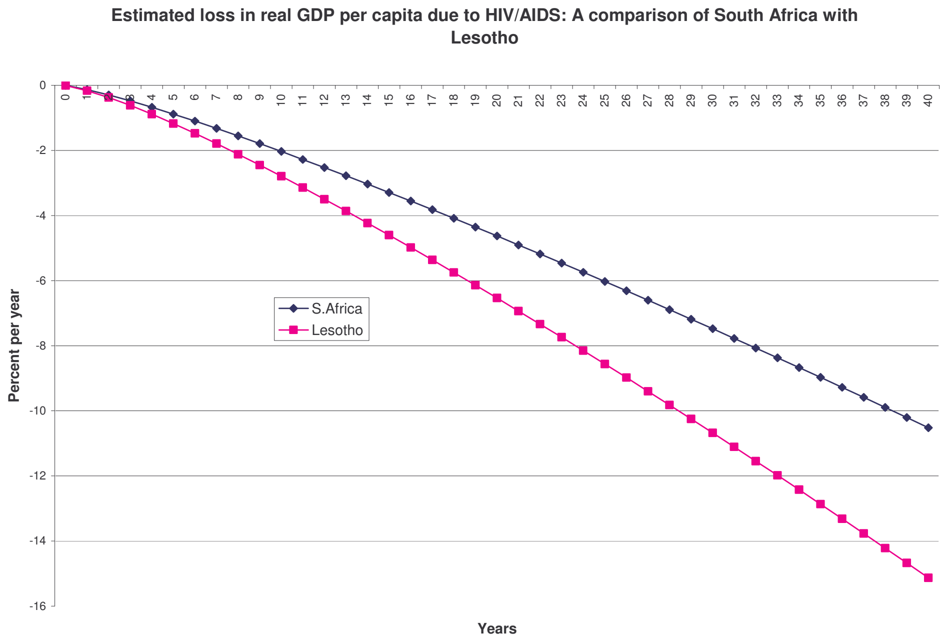

Figure 1.

Figure 1 plots the estimated loss in GDP per capita due to HIV/AIDS for Lesotho and South Africa. Within two generations GDP per capita in South Africa is more than 10% smaller under the HIV scenario than under the no-HIV scenario. For Lesotho, the difference is over 15% smaller. Note that Lesotho looses 23% in productivity growth due to HIV while South Africa looses 14.8% in productivity growth. Although not shown here, the difference in productivity losses is due to higher rates of change in South Africa's institutional index relative to Lesotho.

Also, not reported below are the following results: (i) Wages in the no-HIV scenarios increase more slowly than those without HIV, reflecting the lower productivity of labor in the presence of the disease. (ii) Capital accumulates faster with HIV during the first ten years, but then accumulates faster in the no-HIV model. These two results lead to incentives to invest less in capital, which in turn makes the marginal product of labor smaller under HIV, and output per capita falls.

Figure 2 plots the effect of HIV and AIDS on the level of aggregate GDP for each economy (relative to a no-HIV scenario). Within two generations aggregate GDP is between 30% - 35% smaller with HIV and AIDS, compared to the projected levels obtained without the

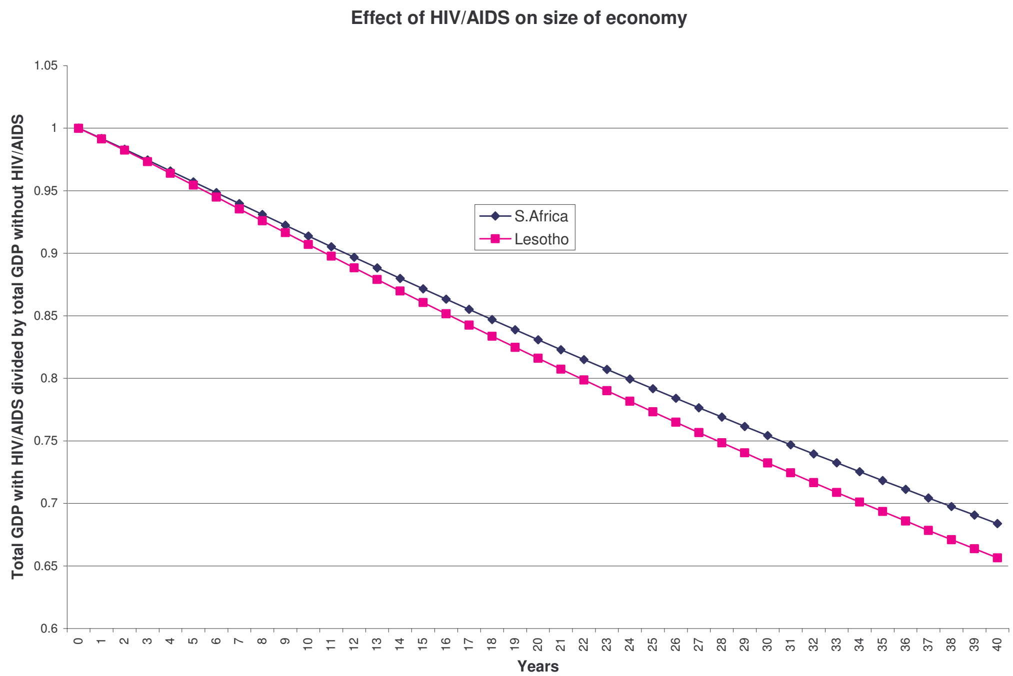

Figure 2.

disease. The loss in GDP is of course due to the combination of there being fewer people to generate output, and the fact that each person working is less productive.

To compare these results with prior studies, Over (1992) performs a cross country regression study across 30 sub-Saharan African countries. His results suggest AIDS could lead to a 0.35% drop in per capita GDP, whereas the results here suggest the disease could lead to 18% drop in per capita GDP in Lesotho and a 12% drop in South Africa. Bonnel (2000) specifies a macroeconomic model with more structural features of an economy than Over, as well as a more complete data set for the period 1990-97. Bonnel's results suggest, relative to a no-AIDS case, over a twenty year period a typical sub-Saharan country with a prevalence rate of 20% would realize a 67% drop in aggregate GDP levels. Our results suggest, after a twenty-year period, GDP levels in Lesotho and South Africa would drop 52% and 48% respectively.

IV. Conclusion

This paper examined the potential effects of HIV on factor productivity growth. Using panel data for over 100 countries and nine years, we employ a fixed effect estimation procedure to estimate the impact of HIV on total factor productivity growth. We calculate TFP values for over 100 countries. For many countries, HIV poses no current threat to its economic performance, as over 75 countries have HIV prevalence rates less than 1%. For most Southern African countries, however, HIV can have a large negative impact on factor productivity growth. For example, factor productivity growth in Lesotho falls by up to 23%, and for South Africa factor productivity growth falls by up to 15%.

Given the impact of HIV on the Southern African countries, we calculated the Harrod neutral rates of technical change for two of these countries – Lesotho and South Africa – and calibrated each country to a single sector, neoclassical growth model with endogenous savings. The models show that, indeed, such TFP effects can have large, negative impacts on the economic performance of these countries. For example, in the presence of HIV, after two generations, per capita GDP in Lesotho is 15% smaller than it would have been if there was no HIV – South Africa per capital GDP would be 10% smaller because of the disease. We also show the impact of the disease on aggregate GDP. Within two generations, Lesotho's level of aggregate GDP is projected to be 35% smaller in the presence of the disease compared to the no-HIV case – South Africa is projected to be 30% smaller.

This study is the first we are aware of that measures the impact of HIV on total factor productivity. One shortcoming of this study is we did not incorporate country level education data, due to the lack of a complete cross country data series matching the periods of our study.

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APPENDIX:

Table 2. TFP with and without HIV for African counries

Countries	TFP with HIV	TFP without HIV
Benin	-0.002038999	-0.00201
Botswana	0.012308546	0.01447
Burkina Faso	0.017431076	0.017298
Cameroon	0.009942099	0.010573
Congo	0.015397228	0.015206
Eritrea	-0.001728073	-0.00177
Ethiopia	0.014617703	0.015091
Gabon	0.005763746	0.006176
Gambia	-0.000554042	-0.00062
Ghana	0.000669252	0.000764
Guinea	0.000519659	0.000716
Guinea-Bissau	6.66346E-05	2.89E-06
Kenya	0.011533076	0.011097
Lesotho	0.011673675	0.014457
Madagascar	0.011670341	0.011758
Malawi	0.012030546	0.012174
Mali	-0.000387732	-0.00032
Mauritania	0.012070675	0.012054
Mauritius	0.011654008	0.011653
Mozambique	0.013212915	0.014026
Namibia	0.010642802	0.012357
Rwanda	0.0129995	0.013093
Senegal	0.004183767	0.004133
Sierra Leone	0.005934974	0.006257
South Africa	0.01332403	0.015295
Swaziland	0.010543158	0.013946
Tanzania	0.016890123	0.017123
Togo	0.016600645	0.016237
Uganda	0.010854235	0.009816
Zambia	0.011148583	0.011357
Zimbabue	0.006697659	0.007883

Table 3: TFP with and without HIV for Oceania

Country	TFP with	TFP without
Dominican	0.000457337	0.000594
Haiti	0.009786866	0.009931
Trinidad and Tobago	0.004275683	0.004451

Table 4: TFP with and without HIV for North Africa and the Middle East

Countries	TFP with HIV	TFP without HIV
Algeria	0.012056532	0.012061
Egypt	0.010493236	0.010499
Iran	0.011475053	0.011484
Jordan	0.010942374	0.010949
Lebanon	0.010206877	0.010207
Morocco	0.011666517	0.011671
Oman	0.012232209	0.012233
Saudi Arabia	0.011944948	0.011945
Syrian Arab Republic	0.011620096	0.011625
Tunisia	0.011681156	0.011684
Turkey	0.010847955	0.010857
Yemen	0.01032653	0.010334

Table 5: TFP with and without HIV for South East Asia

Country	TFP with HIV	TFP without HIV
Bangladesh	0.009953556	0.009959
India	0.011110535	0.01116
Indonesia	0.008873631	0.008878
Malaysia	0.010546914	0.010561
Pakistan	0.010650161	0.010655
Philippines	0.010227101	0.010232
Sri Lanka	0.012076531	0.012081
Thailand	0.00078864	0.00075
Vietnam	0.011123598	0.011153

Table 6: TFP with and without HIV for Western Europe

Countries	TFP with HIV	TFP without HIV
Austria	0.012061317	0.012075
Belgium	0.012343355	0.012225
Denmark	0.012178281	0.01219
Finland	0.012769533	0.01278
France	0.01133445	0.011332
Germany	0.011733727	0.011736
Greece	0.012471909	0.012481
Italy	0.01226316	0.012289
Netherlands	0.011907285	0.011912
Norway	0.011721233	0.011728
Portugal	0.012012486	0.011966
Spain	0.012719838	0.012732
Sweden	0.012167798	0.012172
Switzerland	0.012128883	0.01214
UK	0.0118573	0.011871

Table 7: TFP with and without HIV for Pacific Rim

Country	TFP with	TFP without
Australia	0.012047375	0.012041
China	0.010846267	0.010857
Hong Kong	0.011203792	0.011207
Japan	0.011584643	0.011594
Korea R.	0.011978067	0.011986
Mongolia	0.011489489	0.011497

Table 8: TFP with and without HIV for Eastern Europe

Country	TFP with	TFP without
Albania	0.009382368	0.009382
Armenia	0.011176285	0.011189
Belarus	0.010525003	0.010564
Bulgaria	0.013233797	0.013241
Estonia	0.012944206	0.013035
Hungary	0.012815737	0.012819
Kazakhstan	0.010919828	0.010941
Poland	0.012118601	0.012123
Romania	0.01200967	0.012019
Russian	0.01142318	0.011515
Slovak Republic	0.012952829	0.01296
Tajikistan	0.0136882	0.013697
Ukrain	0.009570507	0.0097
Uzbekistan	0.009743709	0.009753

Table 9: TFP with and without HIV for Latin America

Country	TFP with	TFP without
Argentina	0.006925482	0.00696
Bolivia	0.010684579	0.010684
Brazil	0.01157956	0.011576
Chile	0.012461631	0.012482
Colombia	0.009359529	0.009395
Costa Rica	0.012019738	0.01203
Ecuador	0.010129388	0.010129
El Salvador	0.011454627	0.011459
Guatemala	0.00892364	0.009003
Honduras	0.000946307	0.000962
Mexico	0.012447844	0.012436
Nicaragua	0.01143539	0.011447
Panama	0.006258799	0.006327
Peru	0.011485022	0.011504
Uruguay	0.011783574	0.011784
Venezuela	0.009097376	0.009132