“Does the increase in foreign investments in HIV/AIDS interventions reduce out-of-pocket expenditure (OOPE) on health care in Africa?”

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Does the increase in foreign investments in HIV/AIDS interventions reduce out-of-pocket expenditure (OOPE) on health care in Africa?

Abstract

Current policy proposals about moving away from HIV/AIDS-specific funding towards responding to HIV/AIDS within a broader health system are taking place alongside policy proposals about abolishing OOPE as a source for financing health care. This implies however, a policy dilemma in the context of Africa for two reasons. First, the possibility that the response to HIV/AIDS within a broader health system is likely to result in a decrease in investments specific to HIV/AIDS interventions, which in turn is likely to cause an increase in OOPE on health care. Second, increasing the use of OOPE on health care is fundamentally in opposition to the international policy agenda of moving towards universal health coverage. To avoid the dilemma in policymaking, estimates of the relationships between foreign investments in HIV/AIDS interventions and OOPE, particularly in Africa, are needed to advise policy makers. To this end, this paper uses static and dynamic fixed-effect regression models on data collected over the period 2000-2012 to determine whether foreign investments in HIV/AIDS interventions in Africa have increased or decreased OOPE on health care. The results indicate that these investments have decreased OOPE on health care. Therefore, to be consistent with other international policy goals such as moving towards universal health care coverage, policies that target the response to HIV/AIDS and that contribute to the reduction of the need to use OOPE should be maintained.

Keywords: investments, HIV/AIDS, OOPE, health care Africa.
JEL Classification: I11.

Introduction

Following the Global Financial Crisis (GFC) of 2007-8 the dramatic increase in overseas spending on the HIV/AIDS epidemic in Africa, which had been evidenced over the previous 10 years, began to reverse. The GFC induced a squeeze on foreign governments and donors who began to question and reduce their financial commitments to all foreign aid including HIV/AIDS spending. This reduction in assistance also induced a mindset change and foreign governments and donors began to emphasize the 'mainstreaming' of HIV/AIDS by responding to testing and treatment needs within the broader health system (UNAIDS, 2013, p. 102). Alongside these policy changes, international health policy makers were championing universal health care coverage within public health systems.

This shift in emphasis to the method of funding HIV/AIDS changed its special treatment within health systems. A reduction in stand-alone HIV/AIDS program funding and its mainstreaming would be likely to increase the burden of disease on people living with HIV (PLHIV) given the already overwhelmed public health systems of almost all African countries. This mainstreaming change would also be likely to increase the likelihood that out of pocket payments (OOPE) by PLHIV would now be required for their treatment as OOPE is a common feature of many African public health care systems.

Unless it is shown that the decrease in the funding of HIV/AIDS interventions does not increase OOPE on health care, there is likely to be an international policy dilemma as a decrease in funding might contradict the need to reduce OOPE on health care. So, this paper aims to determine whether or not changes to the funding of HIV/AIDS interventions has resulted in a decrease of OOPE on general health care in Africa.

1. Background

HIV/AIDS has been one of the most significant causes of the burden of disease in Africa. In 2012, while the continent accounted for only 15% of the world population (United Nations, 2013), it suffered about 70% of world HIV/AIDS-related deaths (UNAIDS, 2013, p. A43). In absolute numbers, of the 1.7 million HIV/AIDS-related deaths in the world in 2012, about 1.2 million people who died in the epidemic were from Africa. Because there is very limited financial protection in African countries (Kankeu et al., 2013, p. 2), households mostly use OOPE to fund heath care (Onoka et al., 2011). This use has in turn been achieved through strategies such as selling assets, depleting savings, and borrowing, which has been impoverishing (Saksena et al., 2011, p. 1).

The good news is, however, that investments in HIV/AIDS interventions have been effective in decreasing morbidity and mortality. In Africa, investments in HIV/AIDS interventions increased from US$2.92 billion in 1996 to US$15.6 billion in 2008 (UNAIDS, 2010). Despite the recent financial crisis, these investments continued to increase, albeit modestly, such that US$18.9 billion were spent on HIV/AIDS interventions in 2012. This was a 10% increase over the amount invested in 2011 (UNAIDS, 2013). Furthermore, the share of

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investments in HIV/AIDS interventions in total health spending shows the importance of these investments. In 2007, for example, investments in HIV/AIDS interventions alone accounted for about 20% of total health spending (Amico, 2010). These investments in HIV/AIDS prevention and treatment have resulted in significant behavior change and reduction in viral infections, which in turn had a tremendous effect on morbidity and mortality (UNAIDS, 2013, p. 2). Undoubtedly, these investments have had an effect on OOPE, which is very high in Africa (Sambo et al., 2013).

Notwithstanding the last observation, the motivation for this study lies in the fact that the effect of foreign investments in HIV/AIDS interventions on OOPE in the whole of Africa is not obvious. The reason for this is that Africa is diverse in terms of the burden of HIV/AIDS with HIV prevalence ranging from 0.1% in North Africa to 25% in Southern Africa. In countries where HIV/AIDS constitutes a significant burden of disease, investments in HIV/AIDS interventions are expected to decrease OOPE on health care, while in countries where other diseases are more significant than HIV/AIDS, the effect of these investments is unknown. In the latter countries, for example, an increase in foreign investments in HIV/AIDS interventions could release financial pressure through the substitution effect between foreign investments and OOPE on health care or through a reduction of the burden of HIV/AIDS. The released income could, however, be spent on general household consumption or on other non-HIV/AIDS diseases. Thus, the effect of these investments on OOPE on health care in Africa is an empirical question.

The study is also motivated by the importance of this analysis for policymaking. In fact, international policy makers have been trying to achieve universal health coverage in developing countries. This consists of providing everyone with essential health services without the risk of impoverishment. Avoiding such risks involves reducing almost to zero the amount of OOPE at the point of health care service (World Health Organisation, 2013). Therefore, it follows that any policy on foreign investments in HIV/AIDS interventions that is likely to keep OOPE a principal source of health care usage, would contradict the move towards universal coverage. A policy such as responding to HIV/AIDS through broader health system-strengthening strategies is likely to increase OOPE because it would decrease direct investments in HIV/AIDS interventions. Therefore, a sound policy that affects foreign investments should be informed by estimates of the relationship between these investments and OOPE on health care.

To our knowledge, there has not been such evidence to inform policy makers. The available evidence in Africa has mainly been produced using household survey data. A more recent study using survey data in Tanzania (Brinda et al., 2014) found that economic inequality, gender disparity and prevalence of disability were the key factors determining OOPE. Onwujekwe et al. (2010) found similar results using household survey data in Nigeria. Noteworthy is that the evidence of the burden of illness as the most important determinant of OOPE from household surveys is not unique to Africa. In China, for example, You and Kobayashi (2011) found that illness and self-reported health were the key factors influencing OOPE. At a macro-level analysis, related studies analyzed determinants of health expenditure including OOPE as one type of these expenditures. The most recent of these studies is Xu et al. (2011). This study analyzed these determinants in 143 developing countries and found that demographics and health system characteristics were the most important factors influencing OOPE. The reviewed studies suggest that evidence either was at the household level or was irrelevant to Africa or did not focus specifically on the effect of foreign investments on OOPE. The gaps identified in the literature above warrant further research into the role of foreign investments in HIV/AIDS interventions on OOPE on health care in Africa and the legitimate contribution of this study to the literature.

The remainder of the discussion is organized as follows. Section 2 outlines the theoretical and conceptual framework, section 3 discusses the methodology used, section 4 presents the results, section 5 discusses the results, while the final section concludes the study.

2. Theoretical and conceptual framework

The relationship between foreign investments in HIV/AIDS interventions and OOPE on health care can be analyzed within the framework of the determinants of expenditure, which can be traced back to a theory of Keynes (1936). In his book *General Theory of Employment, Interest and Money,* Keynes explained that income was a key determinant of expenditure. He explained that as people get increments of income, they decide for each increment a proportion to be spent, which he termed the marginal propensity to consume. An important aspect of the theory is the explanation of factors likely to influence that proportion. The theory explained that factors as such wealth, goods or services-own prices, prices of substitutes and complements were important in explaining expenditures. Pigou (1943) more explicitly explained wealth as factors influencing expenditure. Other

determinants of expenditure modelled as autonomous in the Keynesian theory such as preferences, culture, location, and lifestyle, demographic characteristics were, at least implicitly, considered by Engel's (1895) and Becker's (1976) theories. In fact, Engel's theory on household's consumption referred to demographic characteristics such as the size of the household as an important variable influencing food consumption while Becker's (1976) theory expanded on earlier theoretical formulations focusing on environmental and other factors influencing the choice between time of work and leisure. The influence of these factors on expenditure lies in how the choice between time of work and leisure are related to income.

Both these incomes and non-income factors' theoretical formulations can be transposed to explain the link between foreign investments in HIV/AIDS interventions and OOPE. Foreign investments can be seen as an additional income, which households can use according to their preferences. Depending on their attitude towards these investments, there can be a negative effect on OOPE on health care or no effect. A negative effect on OOPE on health care can happen when households use a portion of foreign investments in HIV/AIDS interventions as a substitute for OOPE, diverting this OOPE towards non-health consumption. Another effect, happens when this OOPE is diverted towards health consumption for non-HIV diseases. Others non-economic factors exposed by the theories above such as location, preferences, environments can be extended to demographic and epidemiological characteristics such as life expectancy, the burden of diseases, health system organization used in this paper to control for the effect of foreign investments on OOPE on health care.

3. Methodology

3.1. Model specification. An analysis of whether foreign investments in HIV/AIDS interventions increase or decrease OOPE on health care requires a methodology that makes it possible to isolate the individual effect of these investments. To this end, the paper used panel data regression because of its advantages in making inferences that are more accurate and its greater capacity for capturing the complexity of human behavior than a single cross-section and time series (Hsiao, 2006, p. 3). For a detailed discussion of these advantages, see Baltagi (2008). Panel data regressions entail two broad specifications, the fixed-effect specification and the random-effect specification. The fixed-effect specification assumes that the members of the panel have time-invariant characteristics that might interfere with the relationship of interest, here, the relationship between foreign investments in HIV/AIDS interventions and OOPE on health care. The random effect in contrast, assumes that over time, there are no systematic differences in members of the panel that might affect that relationship.

This study adopted a fixed-effect specification due to African countries having different features that have not changed over time. For example, some countries have been politically unstable whilst others have had relative political stability over the years. Political stability has been found to be a factor in productivity, economic growth and hence income which is a major determinant of expenditure including OOPE on health care. The preference of the fixed-effect model was backed by previous successful use of the model (Xu et al., 2011) as well as the formal Haussmann specification test (Haussmann, 1978).

Taking account on the nature of the relationship between the variables of interest in the specification, we first assumed that foreign investments in HIV/AIDS interventions were independent of national income. This assumption resulted in the static fixed-effect model as follows.

$$y_{it} = \beta' x_{it} + u_i + e_{it}, \quad (1)$$

where x_{it} is a vector of explanatory variables including foreign HIV/AIDS expenditure, u_i is a variable reflecting time-invariant characteristics of each of the countries, while e_{it} is assumed to be the country effect that is varying with time. Estimation was done using the least square dummy variable method.

Second, a plausible assumption was made that foreign country investments in HIV/AIDS interventions is determined in accordance with the host country's level of national income in the previous year. Given that current foreign investments can have some influence on current OOPE on health care and given the assumption that current foreign investments can be influenced by previous income (by previous OOPE on health care by inference), it can be deduced that previous OOPE on health care influence current OOPE on health care. Therefore, the possible effect of previous OOPE on health care on current OOPE on health care resulted in the use of a dynamic fixed-effect specification, that is, including a lagged variable of the dependent variable as in (2) below:

$$y_{it} = y_{it-1} + \beta' x_{it} + u_i + e_{it}. \quad (2)$$

While the least square dummy variable (LSDV) technique may produce unbiased estimates for the first specification in equation (1), it does not do so for the second specification in equation (2). The adding of a lagged dependent variable in the second

specification makes it correlated with the error term e_{it} because of its correlation with the dependent variable. The inclusion causes the time-invariant u_i to be correlated with the error term because it is correlated with the lagged dependent variable. This correlation leads to biased results particularly in panels where the time observations are smaller than panel members observation (Nickell, 1981), such as in this study. A re-specification, which eliminates the time-invariant term through first differencing, is done in (3),

$$\Delta y_{it} = \Delta y_{it-1} + \beta' \Delta x_{it} + \Delta e_{it}, \quad (3)$$

and an addition of an instrument (the second lag of the dependent variable y_{it-2}) is done in (4).

$$\Delta y_{it} = \Delta y_{it-1} + y_{it-2} + \beta' \Delta x_{it} + \Delta e_{it}, \quad (4)$$

to correct for the bias, as proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) in their generalized methods of moments (GMM) method.

3.2. Data collection. Data for these variables were available for 46 countries over the period 2000-2012. All countries with incomplete records on variables of interest to the study were excluded. These countries were Cape Verde, Libya, Somalia, South Sudan, Somalia, Seychelles and Zimbabwe. Table 1 indicates the variables used, and the sources of the data. A summary of the data collected are in Table 2 below.

Table 1. Variables and data sources

Nature and name of the variable	Meaning of the variable	Title	Source
Dependent variable			
Out-of-pocket expenditure on general health care	Percentage of out-of-pocket expenditure as a percentage of total health expenditure	Oop	World Development Indicators
Independent variables			
Income per capita	The average income per person per year measured in US$	GDP	World Development Indicators
Foreign HIV/AIDS expenditure	The amount of disbursement of HIV/AIDS to developing countries in US$	hive	Global Fund for HIV/AIDS, Tuberculosis and Malaria
Life expectancy	The average number of years a person in a given country is expected to live. The variable is used to measure the general burden of diseases	le	World Health Statistics
Insurance	The extent of the health insurance in term of prepayment for health care. Measured as the percentage of this contribution to private health care expenditure	insur	World Development Indicators

Table 2. Descriptive statistics of the variables

Variables	Mean	Standard deviation	Min	Maximum	Observations
OOPE					
Overall	73.70	24.27	5	100	322
Between		23.96	12.85	100	46
Within		5.08	50.42	96.42	7
Ln HIV expenditure					
Overall	43,900,000	90,000,000	257,152	803,000,000	322
Between		53,900,000	167,694	3,000,000	46
Within		72,400,000	231,000	541000,000	7
GDP per capita					
Overall	1561.60	2627.26	110	23432.00	322
Between		2029.35	168.85	9292.86	46
Within		1691.35	7529.68	15701.86	7
HIV prevalence rate %					
Overall	5.24	6.58	0.1	28.2	322
Between		6.50	0.1	25.6	46
Within		1.34	-13.80	8.89	7
Life expectancy					
Overall	59.20	6.98	47.5	75.2	322
Between		7.00	47.5	75.2	46
Within		0.81	56.72	72.06	7

Sources: World Bank (n.d.), World Health Organization (n.d), Global Fund for HIV/AIDS, Tuberculosis, and Malaria (n.d.).

The study would have liked to analyze the effect of total public investments in HIV/AIDS interventions in Africa combining foreign investments in HIV/AIDS interventions with national governments' investments. However because data from national governments were hard to come by, the study used foreign

investments in HIV/AIDS interventions as a variable of interest, to produce estimates relevant for current policy directions.

3.3. Data analysis. Because of the differences across African countries on a variety of perspectives, the analysis by groupings of these countries by income levels, HIV/AIDS prevalence levels, health system characteristics was necessary in order to see the difference in the impacts of investments in HIV/AIDS interventions on OOPE on health care across these groupings. Given that most of these groupings had insufficient observations, which would make them unsuitable for regression analysis, these relationships were analyzed using graphical analysis (Figures 1 to 4) and groupings' dummy variables (see Table 3).

Table 3. Dummy variables explanation

Dummy variable	Explanation
Income	
gdpdum1	Countries with a GDP per capita <US$400
gdpdum2	Countries with income per capita between US$400 and US$1000
gdpdum3	Countries with a GDP per capita greater than US$1000
HIV prevalence	
prevdum1	Countries with prevalence rate of <1% for people aged 15-59
prevdum2	Countries with prevalence rate between 1% and 5% for people aged 15-59
prevdum3	Countries with prevalence rate between 5% and 10% for people aged 15-59
prevdum4	Countries with prevalence rate above 10% for people aged 15-59
Health system	
hsdum1	Countries with prepayment for health care representing less than 5% of THE
hsdum2	Countries with prepayment for health care representing less than 5-10% of THE
hsdum3	Countries with prepayment for health care representing above 10% of THE

Finally, on the basis that the burden of diseases is an important determinant of OOPE on health care, but is associated in a complex manner with socioeconomic status, the impact of foreign HIV/AIDS expenditure on OOPE on health care was assessed by considering that it might be interacting with broader socioeconomic status. Using GDP per capita as the best proxy for socioeconomic status, the impact of investments in HIV/AIDS interventions was measured by adding to the baseline regression the interaction term between the investments in HIV/AIDS interventions variable and GDP (intGDP).

4. Results

4.1. Descriptive analysis. A preliminary exploration of the relationship between foreign investments in HIV/AIDS interventions and OOPE in health care is presented in Figure 1. It shows a negative relationship between the two variables, indicating that an increase in investments in HIV/AIDS interventions decreases OOPE on health care in Africa. The correlation coefficient r = -0.262, however, shows only a weak correlation between the two variables.

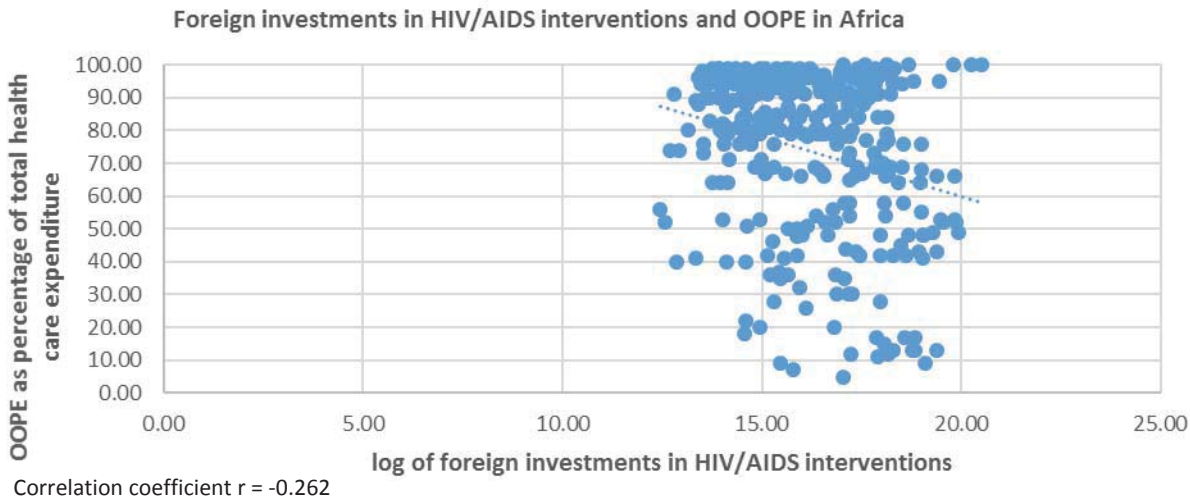
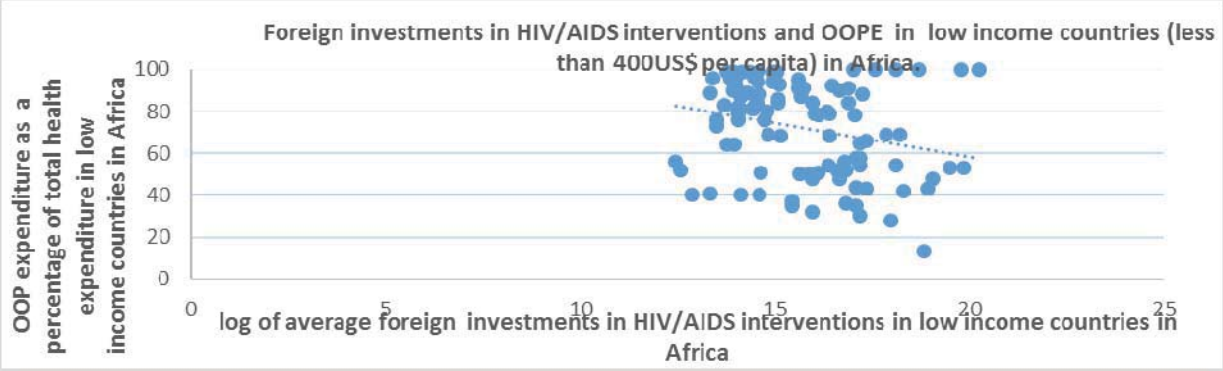


Fig. 1. Relationship between investments in HIV/AIDS interventions and OOPE on health care

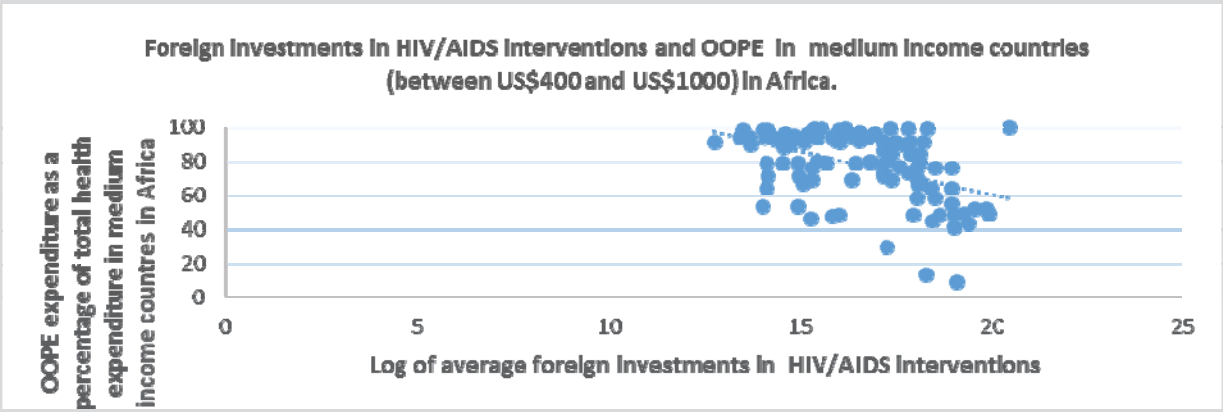
The negative relationship between the two variables is also found in different groupings of countries stratified according to average income (GDP per capita). Figure 2 shows that there are correlation differences even though they may not be marked. In countries with income per capita less than

US$400, the correlation between the two variables (-0.260) is not very different from the correlation for the whole of Africa.

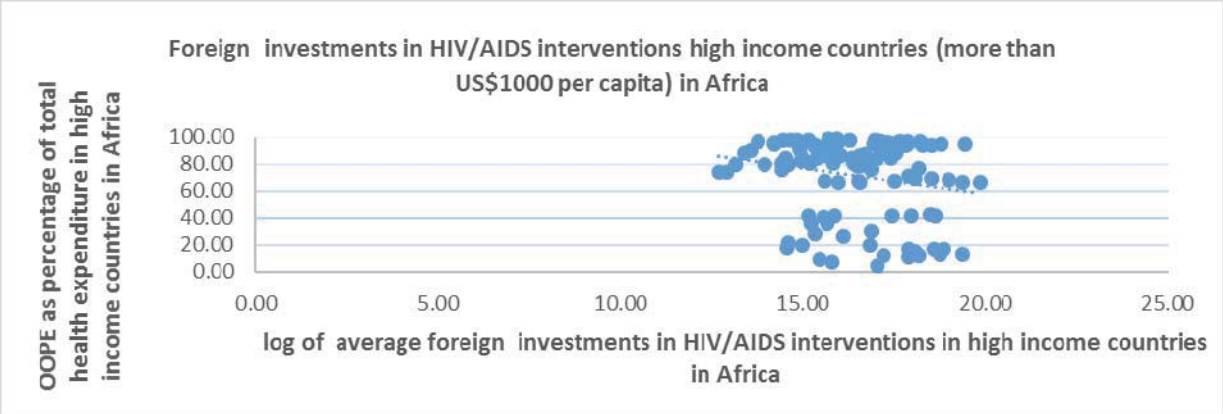
African countries however differ with respect to other factors likely to influence OOPE, such as income levels, HIV/AIDS prevalence, and health systems. Next, an analysis was undertaken to see whether the pattern of correlation differed across these groupings. Figure 2 shows that the correlation between OOPE on health care and investments in HIV/AIDS interventions in the poorest countries (less than US$400) and the correlation between the two variables in the richest countries is not different (-0.260 and -0.207, respectively). The correlation seems to be high (-0.446), however, in countries with income per capita between US400 and US$1000.



Correlation coefficient r = -0.260



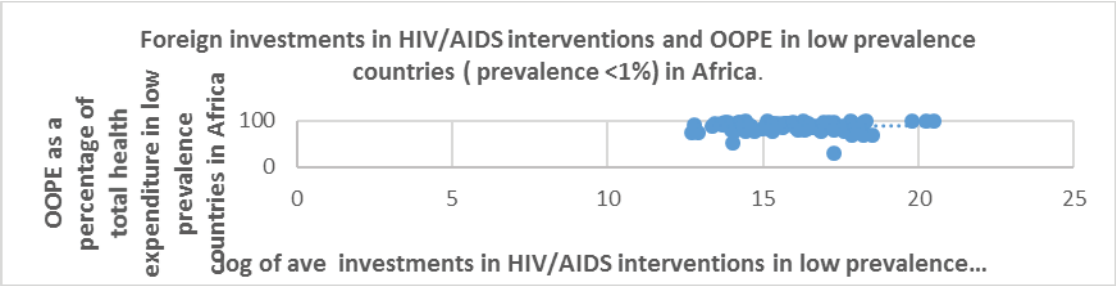
Correlation coefficient r = -0.446



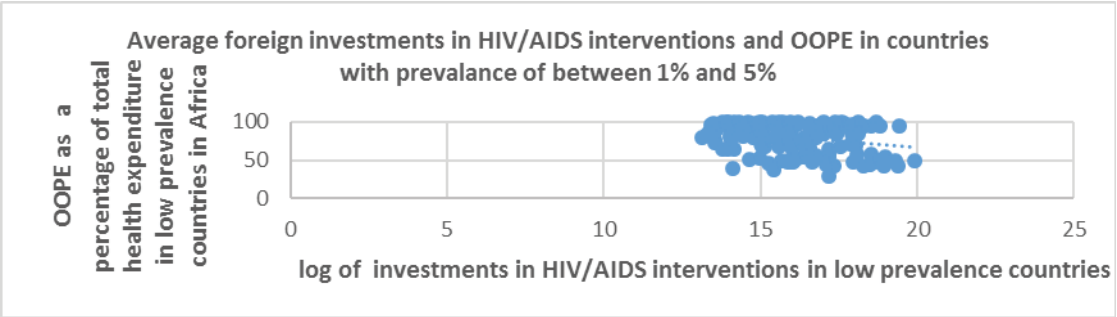
Correlation coefficient r = -0.207

Fig. 2. Comparison of the relationship between foreign investments in HIV/AIDS interventions on OOPE by income grouping

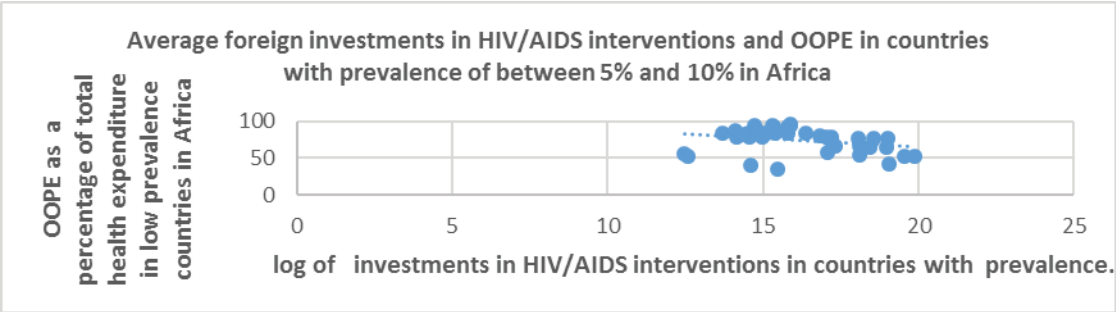
Across HIV prevalance groupings, the correlation is also generally negative with a tendency to have no correlation in countries with low prevalence. The correlation seems to be higher in countries with medium income.



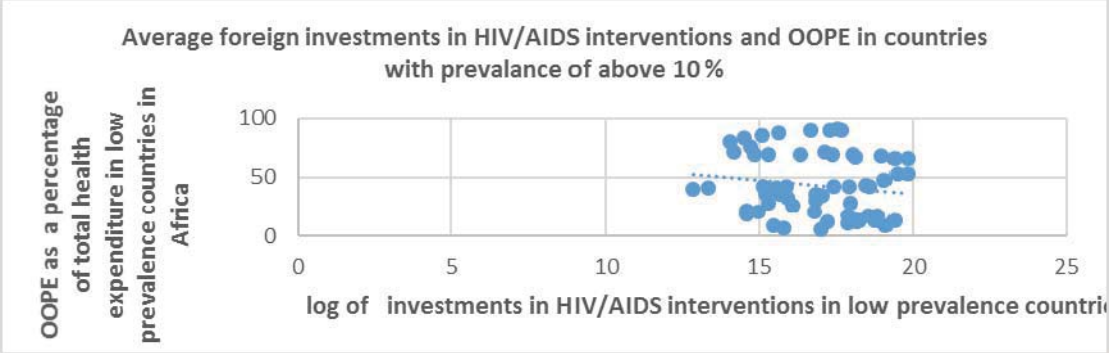
Correlation coefficient r = 0.025



Correlation coefficient r = -0.04



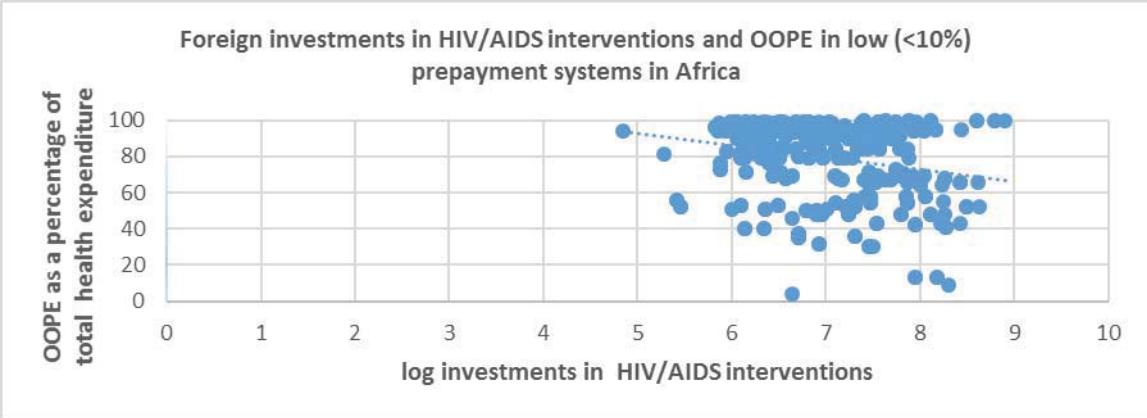
Correlation coefficient r = -0.292



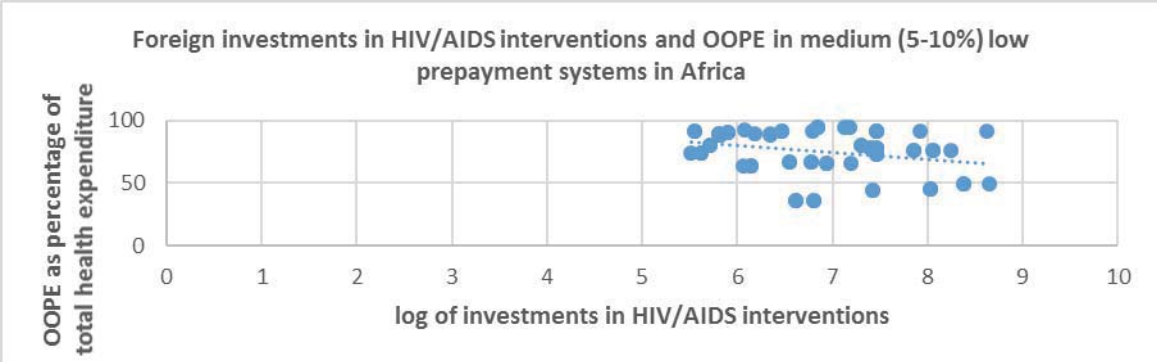
Correlation coefficient r = -0.151

Fig. 3. Relationship between HIV/AIDS expenditure and OOPE in countries with different levels of prevalence

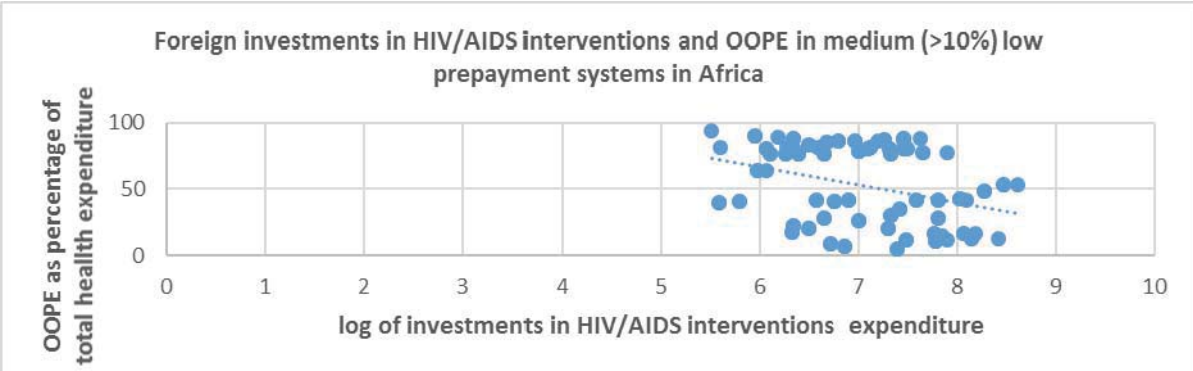
Across health care system characteristics, it is found that in countries in which there is a high level of prepayment, there seems to be no problem. The analysis above shows that there is generally a negative relationship between HIV/AIDS expenditure on OOPE on health care.



Correlation coefficient r = -0.24



Correlation coefficient r = -0.27



Correlation coefficient r = -0.34

Fig. 4. Relationship between HIV/AIDS expenditure and OOPE on health care in systems with different levels of prepayment for health care

4.2. Econometric results. Table 4 reports the first set of results in which the effect of the main variables are considered. The table shows that the elasticity of OOPE (variable oop) on health care relative to a change in foreign investments in HIV/AIDS interventions (lnHIV) ranges from 0.012 to 0.020 across the two models used. The result matches the a priori expectation that an increase in HIV/AIDS expenditure decreases OOPE on health care. This result suggests that HIV/AIDS constitutes one of the most important burdens of diseases causing OOPE on health care to increase.

Table 4. Fixed-effect static and dynamic estimates on baseline variables

Explanatory variables	Statistic model No dummies	Dynamic model No dummies
oop		-0.19 (0.14)
lnHIV	-0.020 (0.00)*	-0.012 (0.01)*
lnGDP	0.02 (0.00)*	0.030 (0.03)*
hivp	-0.09 (0.01)	-0.045 (0.08)
lnle	0.011 (0.08)	0.013 (0.05)
insur	-0.04 (0.00)	-0.05 (0.00)
Constant	4.55765 (0.36)	

Note: the dependent variable is oop. * Significant at 1%, standard errors in parenthesis. Logarithm not calculated for variables expressed as percentage, notably the proportion of expenditure covered by insurance (insur) and HIV prevalence rate (hivp) and the percentage of expenditure as OOPE (oop).

One of the most important control variables in the analysis is income per capita, which has been theoretically indicated as the main determinant of expenditure. As Table 4 indicates, the income per capita (lnGDP) positively influences OOPE on health care (variable oop). This is as expected. The income elasticity of OOPE on health care ranges from 0.020 to 0.030 depending on the model used. The income could have a negative effect on OOPE on health care where it is positively correlated with better health status. The fact that this is not the case is not surprising since average incomes in Africa are generally too small to influence positively health status to a sufficient extent.

Another variable of policy interest is HIV/AIDS prevalence (hivp). The results show that the increase in HIV/AIDS prevalence decreases HIV/AIDS expenditure. The elasticity of OOPE on health care (variable oop) to the change in the HIV/AIDS prevalence rate (variable hivp) ranges from 0.045 to 0.09 in Africa depending on the model used. While HIV/AIDS prevalence was expected to correlate positively with OOPE on health care (variable oop), because it reflects the burden of HIV/AIDS disease, the result observed is against expectation. The observed negative relationship may be because HIV/AIDS prevalence includes a large number of people who seem to be relatively healthy.

Life expectancy (lnle) is expected to be positively related to OOPE on health care (oop) and the result observed is as per expectation. Table 4 shows that the elasticity of OOPE on health care (variable oop) to a change in life expectancy (variable lne) ranges from 0.011 to 0.013. This implies that the longer people live, the more health care expenditure they incur. This result may reflect the fact that survival in Africa is correlated with poor quality of health and hence with more OOPE on health care.

Prepayment for health care has been advanced as one of the ways to improve health care while improving welfare through a reduction in OOPE on health care when illness occurs. The results here show that the higher the prepayment, the lower the OOPE on health care (oop). The elasticity of OOPE on health care (oop) to prepayment ranges from 0.004 to 0.005. Although low, these elasticities indicate that the move to prepayment systems can reduce OOPE on health care, a reduction that would increase the welfare of the population.

The extent to which different groupings of African countries by income levels, prevalence levels or even by health system characteristics, differ in determining the OOPE on health care is analyzed using dummy variables for different groupings of countries. These results are shown in Table 5.

Table 5 shows that being in a medium income group (US$400 < income per capita< US$1000) and in a high-income group (income per capita >= US$1000) according to the African income classification used in this study (variables gdpdum2, gdpdum3), decreases OOPE on health care relatively to a low-income group (income per capita less than US$400). This result has policy implications in that the relatively poor pay more OOPE on health care probably because of their poorer health status.

Furthermore, across prevalence groups, being in a higher prevalence group that is in blocks of countries in Africa where the prevalence rate is greater than 10%, decreases OOPE on health care (oop) compared to being in blocks of countries where the prevalence rate is lower. This result is consistent with the result presented above, as people who are HIV positive do not necessarily have to pay for health care.

Table 5. Analysis of OOPE across countries

Explanatory variables	Static model with dummies	Dynamic model with dummies
oop		-0.23 (0.13)
lnHIV	-0.07 (0.01)	-0.01 (0.01)
hivp	-0.05 (0.03)***	-0.088 (0.13)
lnle	0.016 (0.01)	0.004 (0.05)
lnGDP	0.001 (0.002)	0.007 (0.04)
insur	-0.003 (0.00)**	-0.003 (0.00)*
gdpdum1	0 (base)	0 (base)
gdpdum2	-0.07 (0.02)**	-0.114 (0.03)*
gdpdum3	-0.05 (0.00)	-0.110 (0.05)*
prevdum1	0 (base)	0 (base)
prevdum2	-0.015 (0.04)	0.015 (0.07)
prevdum3	-0.007 (0.07)	0.034 (0.11)
prevdum4	-0.05 (0.01)*	0.097 (0.02)
hsdum1	0 (base)	0 (base)
hsdum2	0.045 (0.05)	0.010 (0.06)
hsdum3	-0.01 (0.08)*	-0.056 (0.01)
constant	4.503 (0.377)	

Note: The dependent variable is OOP expenditure. * significant at 1%, *** significant at 5%, *** significant at 10%.

While there is a discernable pattern across blocks of countries with different income and prevalence, there is no such a pattern across blocks of countries with differing levels of prepayment. In relation to the low prepayment block of countries represented by variable hsdum1, the next higher prepayment block, represented by the variable hsdum1, pays more OOPE on health care (oop). In contrast, the highest prepayment group (hsdum 3) pays less OOPE on health care compared to low-level prepayment blocks. This implies that prepayment might have a limited impact on health care depending on its level, although some other factors may be at the centre of this observation. The income factor could be the reason whereby the middle group would respond to illness with OOPE because they have relatively more income than the first group while the third block pays less because they are less ill because better health status and therefore less need to pay OOPE as a result of them being less frequently ill.

Finally, it is important to understand that OOPE on health care in Africa is likely to be driven by the burden of disease (HIV-specific or other diseases), income and myriad other factors. With income being the most important of these factors, the paper used interaction of income per capita as a measure reflecting socioeconomic status and HIV/AIDS expenditure reflecting the burden of disease (intGDP) to gauge the relative influence of the burden due to HIV/AIDS versus the burden due to other diseases. The interaction was guided by the fact that these are the most important variables and that individually they have a different influence from previous analyses. The results including an interaction term are reported in Table 6.

Table 6. The impact of foreign funding of HIV/AIDS interventions in Africa

Explanatory variables	Static model with interaction variables	Dynamic model with interaction variables
oop		-0.116 (0.14)
lnHIV	-0.053 (0.03)**	-0.000 (0.03)
hivp	-0.001 (0.03)	-0.008 (0.05)
lnle	0.021 (0.08)	0.025 (0.09)
lnGDP	0.185 (0.08)**	0.002 (0.00)
insur	-0.004 (0.00)**	-0.001 (0.00)
intGDP	-0.011 (0.00)**	-0.001 (0.00)***
constant	3.288866 (0.67)	

Note: the dependent variable is OOP, ** significant at 5%, ** significant at 10%, significant.

The results show that an interaction term (intGDP) is significant and negative, while individually GDP increased the OOPE on health care (variable oop), and HIV/AIDS expenditure (lnHIV) decreased OOPE on health care (variable oop). As HIV/AIDS expenditure and national income grow together, the OOPE on health care decreases, indicating a dominant impact of HIV/AIDS expenditure on OOPE on health care.

5. Discussion

Assisting developing countries progress towards universal health care coverage has become a priority on the international policy agenda (UNAIDS, 2013), and success in this respect requires that policy makers act appropriately on factors related to universal coverage. This paper points to foreign investments in HIV/AIDS interventions as being one of the factors likely to influence progress towards universal coverage via its potential effect on OOPE on health care. Whether or not foreign investments in HIV/AIDS interventions in Africa increased or decreased OOPE on health care has however remained an empirical question.

This paper was an attempt to provide such estimates and suggest policy implications. Using dynamic and statistic panel fixed-effect regression and the data collected in over 46 African countries, the paper produced evidence showing that an increase in foreign investments in HIV/AIDS interventions decreased OOPE on health care. These results make sense if one refers them to the framework underpinning this analysis. In fact, foreign investments in HIV/AIDS interventions in Africa act as an additional income for households that can then increase their consumption, in line with economic theory. The increase in this consumption can, however be done in two ways, namely, by increasing expenditure on health care for other non-HIV diseases or on other household items. In the context of this analytical framework, the evidence that an increase in foreign investments in HIV/AIDS interventions decreases OOPE on health care indicates that households increase their consumption of other household goods. Other literature has linked this phenomenon to the fact that people substitute foreign funding for their current spending in a way that is consistent with the behavior of other economic agents reported in the literature. For instance, a study by Farag et al. (2009) found that donor funding for health substituted health financing by recipient governments in low- and middle-income countries. In a closely related study in Canada, Stabile (2001, p. 991) found that government subsidies to holders of private insurance, resulted in these holders purchasing more insurance policies.

An implication of these results is that HIV/AIDS remains the most significant burden of disease on the continent, to an extent that any income released as a result of foreign funding is used to fund other

non-health care household items. From a policy perspective, this result means that an increase in foreign funding would not only improve households' circumstances as funds are released for more general household consumption, but it would also be consistent with the progress towards universal health coverage given the fact that OOPE on health care has been seen as a deterrent to this progress. The results suggest that decreasing foreign investments would lead to a policy dilemma, as this would influence OOPE on health care in a manner that is inconsistent with the need to progress towards universal health coverage.

While the methodology used was meant to report a controlled influence of foreign investments in HIV/AIDS interventions on OOPE on health care, the study yielded other interesting results that are worth discussing. As predicted by economic theory, the study found that income (GDP) increased OOPE on health care. The elasticity of OOPE on health care to change in GDP per capita ranged from 0.001 to 0.007. Higher income can, however, have a negative effect on OOPE on health care. Because most of the people are poor, this income effect was not observed. In relation to this finding, other studies found that socioeconomic status is negatively associated with OOPE on health care (Brinda et al., 2014, p. 6), yet others found evidence for an opposite effect (see for example, Schellenberg et al., 2003). Briefly, although the income effect on OOPE on health care might vary across contexts, this effect is on average positive in Africa.

Unexpectedly, the results showed that an increase in HIV/AIDS prevalence by 1% results in a decrease in OOPE on health care by between 0.05% and 0.08%. An explanation of this result is that most of the people who live with HIV/AIDS may not be paying OOPE on health care as a result of being HIV positive. In fact, it is known that health care is needed only several years after HIV infection. Furthermore, the finding that the elasticity of OOPE on health care relative to change in life expectancy ranged between 0.004 and 0.016 as was expected. This result implied that as people live longer in Africa, they spend more on health care on average. This can be explained by the fact that this survival takes place in a context where there is poor quality of health. The level of prepayment influenced negatively OOPE on health care, as expected, with an increase in 1% in prepayment resulting in a decrease in OOPE on health care by 0.003. Other findings were that the higher the levels of HIV/AIDS prevalence in a country, the lower the OOPE on health care.

The remaining question is how these results compare to the results of related studies that have been conducted previously. In fact, most of the previous analyses of the impact of OOPE on health care relative to income, HIV/AIDS prevalence and life expectancy, found similar results. Therefore, this study expanded on the available evidence. The study contributed to the literature though, by providing evidence crucial to policy making, on how foreign investments in HIV/AIDS interventions relate to OOPE on health care. This evidence has not been produced before.

Before concluding, limitations of the study should be noted. It would have been better to report relationships of interest in the context of blocks of countries grouped according to the prevalence level of HIV/AIDS, health system characteristics, and prepayment levels. The methodology adopted could not be used for most blocks because of insufficiency of data. Furthermore, limited access to data related to government investments in HIV/AIDS interventions in countries studied confined the study to an analysis of the effects of foreign investments. While such analyses would have improved the results, the approach adopted in this study was the best possible approach to bring up this evidence that is important for policymaking. These shortcomings are referred to for future research.

Conclusion

The rationale behind this study was to provide policy makers with a basis on which to make sound policy decisions that are devoid of the dilemmas associated with various aspects of international development. In particular, the dilemma whether or not to propose a decrease in foreign investments in HIV/AIDS interventions is addressed. The evidence in this study shows that policies resulting in a decrease in investments in HIV/AIDS interventions would be detrimental to the principle of reaching universal coverage for health care in developing countries.

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