### Social Science & Medicine SSM-D-11-01110R5

### The Natural Resource Curse and the Spread of HIV/AIDS, 1990-2008

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**Acknowledgements:** We will like to thank the editor, five anonymous reviewers, Jacek Kugler, Geoff Dabelko, Hugh Ward, Han Dorussen, Alex Quiroz Flores & Dan Berger for their valuable comments. None of those mentioned are responsible for any errors.

**Keywords:** natural resources, oil rents, resource curse, governance, HIV/AIDS, epidemics

### Abstract

Experts suggest that effective public action can prevent the spread of HIV/AIDS. Countries dependent on natural resource wealth, such as oil, are likely to suffer from governance failures and thereby suffer lower quality public health. Since the cost of fighting disease redistributes income away from rulers, resource wealth is likely to lead to neglect of public action aimed at stemming a deadly disease. We test this proposition in 137 countries from 1990 until 2008 using oil wealth as a proxy for endogenous policy choices on the prevalence of HIV/AIDS, a proxy outcome for ineffective policy and neglect of public action. We find that the ‘resource curse’ seems to affect the spread of HIV/AIDS, even thoughoil-rich countries *ceteris paribus* should have more financial resources for effective public action. The results are robust to a host of controls, alternative indicators, and fixed effects estimation.

### Introduction

The spread of HIV/AIDS is a major public health and development challenge, particularly in Sub-Saharan Africa where public action to fight this deadly epidemic has been slow (Chen et al., 1999; Merson, 2006; Zacher, 1999). Independently of uniquely African problems, such as poverty and the lack of human skills and physical infrastructure, does Africa´s dependence on natural wealth also explain the high prevalence of HIV/AIDS? Although much research suggests that the ‘natural resource curse’ leads to problems of development through the mechanism of bad governance, the question of how natural resource dependence actually affects development is currently highly debated (van der Ploeg, 2011). Apparently, natural resources undermine development through economic and political institutions because rulers who rely on natural wealth lack incentives to invest in human capital (Auty, 2001; van der Ploeg 2011; Ross, 1999). Given the critical role that public action plays in disease prevention, we argue that the natural resource curse is also likely to influence the spread of HIV/AIDS.

Using the latest available estimates of HIV/AIDS prevalence rate per capita and death rates from AIDSInfo (2011), we find that countries with a higher share of national wealth from oil and gas extraction tend to have larger ratios of infected populations, even when controlling for per capita income and its growth rate, regime type, the average prevalence rate among neighboring states, and current and historical trends in political violence. The finding that oil wealth is associated with a higher prevalence rate of HIV and higher death rate from AIDS runs counter to the conventional wisdom that access to finance is the major problem poor countries face in confronting the AIDS epidemic through effective public action. We suggest that the resource curse affects the spread of disease because of the effect on rulers’ incentives, as rulers in resource-wealthy states are more likely to neglect public goods provision, such as health, and neglect effective public action. Our results show that oil wealth matters for HIV/AIDS through governance. However, we do find some evidence indicating that oil can also have an independent effect net of governance factors. We conclude that the fight against the disease requires not just the provision of medical and financial help, but also important political inducements to get governments to prioritize effective public action.

### HIV/AIDS and the Paradox of the Natural Resource Curse

The HIV/AIDS epidemic has stabilized in many countries since 2002; yet, in Sub-Saharan Africa the prevalence levels remain very high, reaching almost 30% in South-Eastern Africa (UNAIDS, 2010). In countries where the HIV epidemic is generalized, 40% of adults infected are between the ages of 15-24, and the prevalence rate exceeds 1% of the total population. Such infection rates can have debilitating effects on economic development due to low productivity of labor, decreased domestic and foreign investment, and low quality of services in the health and education sectors. Moreover, the high burden of disease-related expenditure might displace other development priorities (UNAIDS, 2010). Stemming HIV/AIDS is thus an important part of development, requiring concerted public action.

Estimating the extent of the HIV/AIDS epidemic can be problematic due to the complicated processes through which the disease develops and spreads, where local epidemiological, cultural, social, political, and economic conditions all contribute and interact (Buvé, Bishikwabo-Nsarhaza, & Mutangadura, 2002; Iqbal & Zorn, 2010; Osmanov et al., & WHO-UNAIDS, 2002). Poverty is often highlighted as a major determinant of a state’s ability to respond effectively to HIV/AIDS, leading to a vicious circle where high prevalence rates and underdevelopment further undermine the capacity of states to respond. The financial cost of HIV/AIDS can be interpreted as a future state liability that stretches the budgets of weak economies (CHG, 2008; Poku, 2005). Nevertheless, poverty alone does not fully explain the variance in outcomes when considering the fight against HIV/AIDS. In fact, some of the most impressive responses to HIV/AIDS have been recorded in very poor countries, such as Uganda, Namibia, and Zambia. Indeed, some resource-wealthy countries, such as Nigeria and Angola, are notable underachievers, according to the UNAIDS (2011a) data. Although the spread of HIV/AIDS is driven by many factors, effective responses fundamentally come down to governance, which is usually determined by the incentives of the political rulers who ultimately make and implement policy (Barnett & Whiteside, 1999; Whiteside et al., 2004).

Countries such as Uganda, that have brought prevalence rates down, display a willingness and capacity to develop preventive policies together with strategic partners at the international and sub-state levels (Mayberry et al., 2008; Parkhurst, 2005; Rosenberg et al., 2008). Political will and the design of programs matter more than money spent because spending on public goods is often not reflected in commensurate desirable results and outcomes because of rent-seeking, corruption, and mismanagement (Keefer & Knack, 2007). Thus, money spent and the size of budgets alone do not fully capture effort extended towards achieving outcomes, but the effectiveness of public action can ultimately be measured by actual outcomes such as how diseases are effected by policy. If the availability of resource rents kills incentives for rulers to expend effort on improving human capital, then we should see oil-wealthy states, despite better access to finances, fairing worse compared to others, *ceteris paribus,* when it comes to fighting a disease such as HIV/AIDS. Since oil-wealthy states should have greater access to finance, the relative lack of success in the fight against this epidemic would be another indicator of how the so-called ‘resource curse’ operates through policy failure.

The natural ‘resource curse‘ is simply that wealth in the form of unearned income makes a country prone to failure economically, socially, and politically through a number of mechanisms (Humphreys et al., 2010; Papyrakis & Gerlagh, 2004; van der Ploeg, 2011). Arguably, rulers with access to natural wealth neglect human capital and generally fear development more than they cherish it because development threatens their future control over natural resource rents (Auty, 2001; Dietz et al., 2007; Karl, 1997; Ross, 1999; Sachs & Warner, 2001; Torvik, 2002). Empirical studies show that extractive activity tends to stymie development on a number of fronts, most importantly by lowering economic growth and socio-political development.

In the case of extractive economic activity and health outcomes, several studies document negative consequences stemming from mining. They show that HIV and co-morbidities like tuberculosis and silicosis are particularly problematic for mine workers due to the unique conditions associated with working in this industry, including neglect of workers by the corporate sector (Corno & de Walque, 2012; Churchyard et al., 2000). Numerous regional case studies, largely based on Southern Africa, show that the spread of HIV is unusually high among mine workers and that these countries have high prevalence rates due to the migration of labor. The issue is, however, why countries that do rely on this income fail to adopt successful public action and policy choices that would be effective against the spread of a debilitating disease. Failure in leadership, lack of corporate regulation by governments, competing stakeholders, and weak structures of the health systems in countries with extractive industry, even those that have established public health systems, such as South Africa, fail to implement effective health policies (Coovadia et al., 2009; Stuckler et al., 2011; Stuckler et al., 2010; Klovdah, 1985; McCulloch, 2009; Calain, 2008; Reddy & Swanepoel, 2006). Building on this literature, we argue that reliance on unearned income reduces the incentives of rulers to implement effective public policies because such ‘expensive’ interventions redistribute income away from the political elite.

Natural resources may fail to improve general welfare if rulers are dependent on rents from resources rather than taxes accruing from earned income. Thus, human capital is less relevant for the economic interests of rulers and public goods tend to be neglected (Gylfason, 2000; Moore et al., 1999). Health inputs are a vital part of human capital development since it has a direct bearing on labor productivity (Barro, 2001). Rentier states are unlikely to make broad social, political and economic development a priority because rulers prefer to invest in ways that allow their continued hold on power rather than insure sustained social progress (Bates, 1988; Robinson, 1998). In fact, resource wealth shapes the institutions of government to reflect the interest of political leaders to stay in power rather than to promote broad-based social welfare that might lead to future loss of rents (Acemoglu & Robinson, 2005; Evans, 1992; Fors & Olsson, 2007). The political process hampers social progress because efficiency and distributional outcomes are endogenously related.

We argue that the spread of HIV/AIDS is a good proxy for assessing to what extent a government fails to implement effective public policies. Dealing with epidemics such as HIV/AIDS depends on a government’s ability and willingness to implement and enforce the necessary policies of public education, social change, building values and norms, and other preventative measures, such as the use of condoms, which effectively address the long-term implications of HIV/AIDS (Gizelis, 2009). For example, rulers may not build the necessary institutions for public action targeting better health outcomes, or rulers can be slow when mobilizing resources and effort towards implementing effective responses for fighting an epidemic.

The resource curse hypothesis has not been accepted unequivocally. Some find a difference in the outcomes associated with the resource curse between natural resources dependence and abundance, for example (Brunnschweiler & Bulte, 2008b, 2009). These debates have addressed the question of valid measurement, where natural resource dependence measured as resource rents to GDP and the causes of underdevelopment might both be determined by some unmeasured factor(s). These scholars argue that resource wealth is best measured as the rents from resources on a per capita basis, an approach we follow here. Yet, despite the technical debate on how natural resource dependence ought to be measured, the evidence that institutions are affected adversely by natural resources is quite strong (Acemoglu & Robinson, 2008; Brunnschweiler & Bulte, 2008a; Mehlum et al., 2006; Calain, 2008). Institutional factors will naturally affect a host of other societal outcomes that can relate to the spread of disease.

In other words, natural resource dependence and social outcomes are often linked via institutional quality and state capacity (Fearon, 2005). Many find natural resources to be associated with higher corruption (Leite & Weidmann, 1999; Torvik, 2002), less democracy and political liberalization (Jensen & Wantchekon, 2004; Ross, 2001), increased risk of civil war (Collier, Hoeffler, & Rohner, 2009; de Soysa, 2002), income inequality, social dissent and political repression (de Soysa & Binningsbø, 2009; Kisangani & Nafziger, 2007), and social development, such as women’s rights (Ross, 2008). If the resource curse is an additional factor leading governments to underperform, net of other relevant factors, then we should see evidence that higher resource wealth goes together with a worse record on the spread of a deadly disease such as HIV/AIDS.

### Data and Methods

We use time-series, cross-sectional data for 137 countries with over 500,000 inhabitants over the time period 1990 to 2008, of which 117 countries are less developed countries (LDCs); see web appendix A1 for country list [INSERT LINK TO ONLINE FILES]. Our dependent variables are the HIV/AIDS prevalence rate and death from AIDS per capita. Our data are taken from the AIDSInfo database, which combines WHO, UNICEF, UNAIDS and Measure DHS figures. Prevalence rate measures the percentage of HIV/AIDS prevalence among the ages 15 to 64 in a given population. In countries with generalized epidemic the data are based on antenatal information and nationally representative surveys, while the data for countries with low prevalence and/or concentrated epidemics are based on surveillance data collected from high risk populations and estimates of both low and high risk populations. The Estimation and Projection Package (EPP) is used to identify the best fitting curve to describe adult HIV prevalence over time. The logistic curve is calibrated using the prevalence rate found in national surveys (UNAIDS, 2011b). AIDSInfo covers a total of 141 countries from 1990 to 2010, but does not provide consistent information for some oil-rich countries such as Brazil, Ethiopia, Venezuela, and the Democratic Republic of Congo, which we have been unable to include in the analysis (see http://www.unaids.org/globalreport/AIDSinfo.htm). The prevalence rates and death rates for each country-year are normalized by population in millions (see web appendix A1 for summary statistics [INSERT LINK TO ONLINE FILES]). We log both variables to minimize the effects of extreme values since both variables are highly skewed. Although prevalence and death rates are highly correlated (r=0.93) in our sample, high death rates from AIDS in the absence of new infections should in the long run lead to lower prevalence. Thus, we use both measures as dependent variables to test the effect of resource rents on prevalence rates and deaths independently.

Our main independent variable is petroleum and natural gas rents per capita (de Soysa & Neumayer, 2007; Kunte et al., 1998). We also test oil rents as a share of GDP, and this does not change our basic findings (see web appendix A1 [INSERT LINK TO ONLINE FILES]). We focus on petroleum and natural gas as an example of the resource curse rather than other natural resources such as gems and minerals because petroleum and natural gas represent more than 90% of all the internationally-traded mineral wealth. Moreover, oil rents are relatively easier to observe, and many suggest that these act as a ‘point source’ rent that tends to dominate national production because of the high value of exports (Basedau & Lay, 2009; Fearon, 2005).

Rents are net profits from resource extraction, defined as price minus average cost times the amount of resources extracted. They measure the value of natural resources to an economy and provide a much less ambiguous measure of resource dependence than alternatives, such as primary commodity exports, oil exports, and reserves. The rents data indicate the value of resources in the open market relative to the productivity of the economy, and indirectly, the value of capturing them for rulers in power. The natural resource rents data are obtained from the World Bank Estimates based on sources and methods described in (World Bank 2010). The values are in current US dollars, divided by total population and logged to reduce the effects of extreme values (World Bank, 2010). In addition, we also use a dichotomous variable indicated whether oil exports exceed 33% of total export revenue (Fearon & Laitin, 2003) and the World Bank’s fuel exports as a percentage of total merchandise exports.

We control for several relevant factors that may be associated with both oil wealth and HIV/AIDS prevalence and deaths. First, we control for per capita income because oil wealth can increase income and wealthier countries (at least net of natural resources) should have more resources to devote to managing HIV/AIDS, better health facilities and effective prevention strategies as well as better institutional capacity and more educated populations. We use per capita GDP figures from the World Bank (2010), again logged to reduce the effect of extreme values. The correlation between per capita income and oil rents per capita is rather weak (r = 0.25). Secondly, democracies should be more responsive to citizen demands and less likely to neglect the health of citizens (Lake and Baum, 2001). Since oil wealth is often associated with autocratic regimes, we want to assess the net effect of oil holding constant the effect of political regimes. We use the Cheibub-Gandhi-Vreeland (2010) index, which defines democracy as: (1) the executive is directly elected or indirectly elected via the legislature; (2) the legislature is directly elected; (3) there are more than one political party contesting elections; (4) the executive power alternates between different parties under the same electoral rule.

We use a measure of the control of corruption and the degree of law and order to proxy good governance and effective public goods provision, using data supplied by the International Country Rick Guide (ICRG) (ICRG, 2006; World Bank, 2010). The International Country Rick Guide (ICRG) measures risk for international businesses working with foreign governments. They measure such aspects as the control of corruption, which is the effectiveness with which a government tackles patronage, nepotism, and job reservations that relate to rent-seeking on a 6 point decreasing scale from low (6) to high corruption (1). The six-point law and order index measures the effectiveness of legal systems and the general observance of law and attitudes towards legality. While these measures capture aspects of governance that are often seen as the effects of the resource curse, we wish to examine if there are any added effects of neglect beyond governance and the quality of state institutions. Law and order and corruption are highly correlated (r=0.76), and we use them here as alternative measures of the effectiveness of the system of governance.

Thirdly, since oil wealth is often associated with a higher risk of civil war, and conflict may increase HIV/AIDS (de Soysa & Neumayer, 2007; Fearon & Laitin, 2003), we control for the history of peace and ongoing civil war. We use data from the Uppsala Conflict Data Project (UCDP), which identifies armed conflicts between a state and an organized rebel group with at least 25 battle-related deaths in a year (Gleditsch et al., 2002). We use conflict incidence in the current year and cumulative years of peace since the last episode of a civil war or independence, whichever is shorter, for the entire post World War II period.

Fourth, many of our variables may be spatially clustered, and epidemics are more likely to spread where prevalence is higher in neighboring countries due to contact and proximity. We control for the average incidence of HIV/AIDS prevalence and deaths in neighboring countries. This is defined as a spatial lag of the weighted average of prevalence of HIV/AIDS per capita in all neighboring countries within a 950 km threshold of a country’s outer boundaries (Gleditsch & Ward, 2001). Moreover, our spatial clustering term also helps capture possible genetic and cultural factors that may explain faster spread of the disease unique to a particular group of people. Finally, we consider time trends since HIV/AIDS figures trend over time and some of our independent variables may display similar trends. We use year dummies to estimate a time fixed effects or separate slope for each year, so as to capture the remaining cross-national differences associated with oil wealth.

We estimate our models using ordinary least squares (OLS). Time-series cross section data (TSCS) have complicated dependence structures between and within observations (Beck & Katz, 1995). To address serial correlation and heteroscedasticity we use the Newey-West (Newey & West, 1987) method, using robust standard errors and assuming an AR1 process. The reported results show very little change when using the PCSE method rather than Newey-West. Beck and Katz (2005) recommend OLS with panel corrected standard errors to avoid overconfidence often arising from generalized least squares (GLS) approaches, but this method is primarily appropriate when the number of time periods T is large relative to the number of units N. In our case, N is much greater than T, and we have an unbalanced panel where some countries have fewer observations over time than others. Thus, we prefer the Newey-West method, which provides robust standard errors and allows an AR1 process for autocorrelation. However, our main results do not change when using the PCSE method and a lagged dependent variable (LDV) for correcting autocorrelation. Using an LDV in the model however could soak up so much of the variance that it makes it difficult to interpret the effect of independent variables which are captured in the LDV already (Achen, 2000).

TSCS data are also sensitive to possible unit heterogeneity (Wilson & Butler, 2007). Since highly local idiosyncrasies, such as genetic factors, history, norms and values matter for how a disease, such as HIV/AIDS spreads, the fixed effects estimator gives us the net effect of oil wealth after individual country effects are computed. To address such concerns, we have also considered fixed effects estimates using the Newey-West standard errors.

### Results

Table 1 reports estimates for the effects of oil wealth on the prevalence of HIV/AIDS and on the death rate from AIDS. The results in column 1 indicate that the estimated prevalence of HIV/AIDS increases with higher oil rents per capita; and the effect is statistically significant. Substantively, increasing oil rents per capita by one standard deviation, holding all other variables at their means, increases the prevalence of HIV/AIDS by roughly 10% of the mean value of the prevalence of HIV/AIDS. Put more concretely, if a poor country with no oil rents reaches the highest level of oil rents per capita among the poor countries (Equatorial Guinea), the estimated HIV/AIDS prevalence increases by 44%. The results in column 2 indicate similar effects of oil wealth on death from AIDS per capita. In comparative terms, the estimated death rate for a country with oil rents at the level of Equatorial Guinea is 8% higher than a country without oil rents, all else being equal. As expected, the spatial lag, the term indicating the average HIV prevalence rate in neighboring states, has a positive and significant effect on prevalence and death rates from AIDS, while income has a negative effect. The presence of democratic institutions has no statistically significant effect on either the prevalence or death rate from AIDS. Of the other control variables, the presence of civil war is associated with lower HIV/AIDS prevalence and deaths, while years of peace predict to higher HIV/AIDS prevalence.

[INSERT TABLE 1 ABOUT THERE]

In columns 3 and 4, we report country fixed effects that account for local-level factors that may explain variance in the prevalence of HIV/AIDS. As can be seen, prevalence clearly remains much greater where rents from oil are higher, while the coefficient for the death rate remains positive albeit not statistically significant. When the within country variance is estimated, higher incomes seem to increase the prevalence rate, suggesting that the negative effects from high incomes in our original results may reflect unmeasured country-level effects (omitted variables). By contrast, there seems to be rather robust evidence that oil rents increase the prevalence of HIV/AIDS and deaths from AIDS. For further robustness, we excluded income from the fixed effects models, but there was no substantial change to our basic finding on oil´s positive effect on the prevalence rates of HIV/AIDS.

In Table 2, we explore the main channels through which we believe that neglect of public action takes place, namely effects of oil rents on the quality of governance. Columns 1 & 2 in Table 2 display the estimated results when we control for good governance in terms of the control of corruption and law and order. Countries with better governance and more law and order predict lower HIV/AIDS prevalence, while the effect of oil rents now becomes statistically not significant at conventional levels. However, as can be seen in column 3, oil rents retain a positive and significant effect when we include country fixed effects and account for local-level factors independently. The fact that oil rents have significant positive effects while good governance does not when we consider fixed effects suggest that the neglect of human capital and targeted public action that prevents bad health outcomes in states with high oil rent might be in part independent even of institutional quality and state capacity and all local level factors unobserved in the data. In columns 4, 5, 6, 7 & 8, we reproduce the results for a sample of less developed countries only (LDCs). Columns 4 to 7 show the random effects, while column 8 presents the fixed effects for LDCs only. The results are almost identical. We also test a variable measured as oil rents per GDP rather than oil rents per capita, and the results remain the same (see web appendix A2 [INSERT LINK TO ONLINE FILES]). Oil rents per capita and oil rents per GDP explain roughly 44% of the variance between them (p<.00001).

[INSERT TABLE 2 ABOUT THERE]

For further robustness tests we consider the economic growth rate. This has a negative effect on HIV/AIDS, but does not affect the reported result on oil (see web appendix A3 [INSERT LINK TO ONLINE FILES]). This suggests that the effect on disease of oil rents is not generated by conditions in oil-wealthy states that relate to faster economic growth. However, this result suggests that there are potentially also other direct effects from economic Dutch Disease on top of other resource curse effects. Next, we enter a dummy variable for Sub-Saharan African countries, and find that this does not alter our conclusions regarding the effect of oil rents on HIV/AIDS. The availability of data measuring the degree of health spending is still rather patchy. Instead, we use total education expenditure to proxy the general spending priorities of governments because these data are widely available with good coverage. Adding education spending does not affect our basic result on oil wealth. We tested several demographic variables such as population density, population size, and in-migration rates of labor obtained from the World Development Indicators, but found that these had little impact on HIV/AIDS or our basic results for oil rents.

The estimates for the control variables remain relatively unchanged under several different model specifications, variable measures, and samples. To ensure that our results do not reflect multicollinearity among some of the regressors we computed variance inflation factor scores (VIF) for each variable, but none came close to problematic levels. We also tested whether the effect of oil rents might be masking countries with a larger Muslim population because of the close connection between oil and the Middle East and North Africa. However, we do not find that majority Muslim countries have any systematically different prevalence of HIV/AIDS when other factors are accounted for, and the effect of oil rents remains unchanged. We also included a squared term for oil rents per capita to account for possible non-linear effects of oil on HIV/AIDS (see Basedau and Lay 2009). These results suggest a slightly non-linear effect of oil wealth on HIV/AIDS, where oil rents increase the risk but at a diminishing rate at very high levels of oil rents. To test the robustness of oil wealth further, we use a dummy variable to flag countries where oil exports exceed 1/3rd of total export revenue. This variable also has a positive and statistically significant effect on HIV/AIDS as does a continuous measure of oil exports to total export revenue. These tests suggest that our result on oil is robust to a host of different operationalizations of oil wealth (see web appendix A3 [INSERT LINK TO ONLINE FILES]).

Finally, we examine whether observations with extreme values might influence our results. We identified two such observations with very high oil rents, namely Equatorial Guinea and the Republic of Congo (Brazzaville). Excluding each of these, however, had little effect on the basic results reported above. Finally, we test the effects of oil rents per capita on the prevalence rates of tuberculosis (TB) obtained from the World Development Indicators (2010) as an alternative indicator of the spread of disease. Using the same models reported above, we find very similar results (see web appendix B [INSERT TABLE 1 ABOUT THERE]). While we hope to focus future research precisely on the spread of TB, our preliminary analyses seem to support our general assertions about the links between natural resource dependence and the effectiveness of public action aimed at fighting disease.

### Discussion and Concluding Remarks

Most studies highlight the social and economic impact of epidemics and communicable diseases and argue that poverty and a lack of finance hamper the fight against epidemics, such as HIV/AIDS ([CHG, 2008](#_ENREF_16); [Poku, 2005](#_ENREF_47); UNAIDS, 2011a; Lule & Haacker, 2011). Experts on the HIV/AIDS epidemic suggest that governance and political will to regulate the corporate extractive sector also matter for designing and implementing effective policy and undertaking sustained public action (McCulloch, 2009; Calain, 2008). Fighting epidemics, however, is likely to redistribute income from rulers who might not prioritize welfare over other priorities that keep them in power. Rulers of resource wealthy countries are likely to downgrade effective public action aimed at broad-based welfare because their wealth comes independently of the productivity of people.

We have tested this proposition using oil wealth as a proxy for endogenous policy choices of the neglect of people on the prevalence and death rates of HIV/AIDS. We find that oil wealth is correlated with both higher prevalence and death rates by HIV/AIDS, even though higher death rates in principle could reduce prevalence rate. Controlling for institutions and several sundry controls, the resource curse seems to operate when predicting the spread of disease, despite the fact that, *ceteris paribus,* oil-wealthy countries should have better access to finance to insure effective public action, such as the use of anti-retrovirals, against a deadly epidemic because of their natural endowment. The results are robust to estimation method, alternative data, and sample size, excluding observations with high values, alternative measures and specifications.

Controlling for other social, economic and political factors, wealth reduces both prevalence and death rates, but unmeasured country-level factors may matter because higher wealth is associated with higher prevalence when fixed effects are estimated. Also, countries enjoying a longer period of peace and countries with a higher prevalence of HIV/AIDS in the neighborhood experience higher rates of prevalence and death. The results on civil war and peace years are counterintuitive and require more thorough examination in future work. Indeed, countries in relative peace, such as Lesotho, South Africa and Botswana generally have high rates of HIV/AIDS. The expert literature is still quite divided on the impact of civil wars on the spread of HIV (Elbe 2002; Mock et al., 2004; Spiegel 2004; Sagala, 2006; Strand et al., 2007; Iqbal & Zorn, 2010). On the one hand, it might be that war leads to the breakdown of detection infrastructure and misleading data. On the other hand, war may bring in relevant health infrastructure through humanitarian assistance.

Regime type, net of the other variables in the model, does not seem to matter for reducing the prevalence rate of HIV/AIDS. This finding demonstrates that public goods provision, such as in health, and effective public action do not stem from regime type alone. It might very well be that some democracies, such as India, cannot implement public action to similar degrees as some autocracies, such as China, that have the necessary tools of social control to police practices, such as prostitution, associated with the fast spread of HIV/AIDS. For our purposes, however, suffice it to say that oil wealth, possibly working through the resource curse effects of neglect, works independently of institutional effects captured by regime type. Governance, measured as law and order and control of corruption, independently reduces HIV/AIDS, which suggests that oil wealth is perhaps correlated with higher prevalence and deaths via its influence on governance ([Keefer & Knack, 2007](#_ENREF_35); [Torvik, 2002](#_ENREF_54)).

The most important factors, as our results show, are the socio-biological and behavioral causes that determine rapid spread in proximity due to the diffusion of the epidemic. Given the influence of the neighborhood effects through diffusion, the fact that oil has a net positive effect suggests that resource curse effects seem independent of cultural and biological factors, possibly supporting arguments that relate natural resources to endogenously-determined policies that neglect the welfare of people. These results are robust to local-level factors unobserved in the models, which we determine in country fixed effect estimations.

Our findings are at the aggregate level and do not allow us to tease out in much detail the possible causal mechanisms that link oil wealth with both higher prevalence and death rates. Future research, particularly employing the comparative case method, might identify the exact mechanisms through which resource-wealthy countries neglect effective public action on HIV/AIDS. How might neglect be observed more directly? Future research can take advantage of recent developments in disaggregated empirical studies and examine the hypothesized links between oil wealth and the HIV/AIDS epidemic at the sub-state level, allowing for regional variation in changing behavioral patterns and in investing in new anti-retroviral medicines (WHO, 2012). Even though it is beyond the scope of this study further exploration on the type of political institutions and how they interact with oil resources is required in order to fully assess the impact of political regime and institutions on epidemics. The theoretical framework and empirical analysis of the study can be expanded to include other cases of epidemics and communicable diseases, such as malaria and Tuberculosis (TB), which also have significant development implications for poor countries and interact with HIV/AIDS to create co-morbidities in vulnerable populations.

The implications of a connection between the resource curse and the spread of a deadly disease are many. For maximum impact of development interventions, the fight against disease should be undertaken with a proper understanding of the endogenous factors that drive the incentives of the ruling elite (Easterly, 2006). The donor community might have to build mechanisms that hold policymakers directly responsible for the effectiveness of public action aimed at life-and-death matters, such as epidemics. Transparency schemes already in operation in many extractive industries might also flag health as a critical component of holding governments responsible for how they invest natural resource rents for securing better health outcomes among their citizens.

### References

Acemoglu, D., & Robinson, J. (2005). *Economic Origins of Dictatorship and Democracy*. Oxford: Oxford University Press.

Acemoglu, D., & Robinson, J. A. (2008). Paths of Economic and Political Development. In B. R. Weingast & D. A. Wittmann (Eds.), *The Handbook of Political Economy* (pp. 673–692). Oxford: Oxford University Press.

Achen, C. (2000). Why Lagged Dependent Variables Can Suppress the Explanatory Power of Other Independent Variables. Presented at the Annual Meeting of the Political Methodology Section of the American Political Science Association, UCLA, July 20-22, 2000.

AIDSInfo. (2011). http://www.aidsinfo.nih.gov/(Accessed on 17-04-2011).

Auty, R. (2001*). Resource Abundance and Economic Development*. Oxford: Oxford University Press.

Barnett, T., & Whiteside, A. (1999). Guidelines for the Preparation and Execution of Studies of the Social and Economic Impact of HIV/AIDS. UNAIDS Best Practice Collection. Geneva: UNAIDS.

Barro, R. (2001). Quantity and Quality of Economic Growth. Fifth Annual Conference of the Central Bank of Chile, November 29–30, 2001. Santiago, Chile.

Basedau, M., & Lay, J. (2009). Resource Curse or Rentier Peace? The Ambiguous Effects of Oil Wealth and Oil Dependence on Violent Conflict. *Journal of Peace Research,* 46(6), 757-776.

Bates, R. H. (Ed.) (1988). *Toward a Political Economy of Development: A Rational Choice Perspective.* Berkeley: University of California Press.

Beck, N., & Katz, J. N. (1995). What To Do (and Not To Do) with Time-Series Cross-Section Data. *American Political Science Review,* 89(3), 634-647.

Brunnschweiler, C., & Bulte, E. (2008a). Cursing the Blessings? Natural Resource Abundance, Institutions and Economic Growth. *World Development,* 36, 399–419.

Brunnschweiler, C., & Bulte, E. (2008b). The Resource Curse Revisited and Revised: A Tale of Pradoxes and Red Herrings. *Journal of Environmental Economics and Management,* 55(3), 248–264.

Brunnschweiler, C., & Bulte, E. (2009). Natural Resources and Violent Conflict: Resource Abundance, Dependence, and the Onset of Civil Wars. *Oxford Economic Papers,* 61, 651–674.

Buvé, A., Bishikwabo-Nsarhaza, K., & Mutangadura, G. (2002). The Spread and Effect of HIV-1 Infection in sub-Saharan Africa. *The Lancet,* 359(9322), 2011–2017.

Calain, P. (2008). Oil for Health in sub-Saharan Africa: Health Systems in a 'resource curse' Environment. *Globalization and Health*, 4(10). http://www.globalizationandhealth.com/content/4/1/10 (Accesed on 28-10-2012).

Chen, L. C., Evans, T. G., & Cash, R. A. (1999). Health as a Global Public Good. In I. Kaul, I. Grunberg & M. A. Stern (Eds.), *Global Public Goods: International Cooperation in the 21st Century* (pp. 284–304). Oxford: Oxford University Press.

CHG, C. f. H. A. a. G. i. A. (2008). Securing Our Future: Report of the Commission on HIV/AIDS and Governance in Africa. Addis Ababa: United Nations Economic Commission for Africa (UNECA).

Cheibub, J. A., Gandhi, J., Vreeland, J. R. (2010). Democracy and Dictatorship Revisited. *Public Choice*, 143(1-2), 67-101.

Churchyard G., Kleinschmidt, I., Corbett, E.L., Murray, J., Smit, J., De Cock, K.M. (2000) Factors associated with an increased case-fatality rate in HIV-infected and non-infected South African gold miners with pulmonary tuberculosis. *Int J Tuberc Lung Dis* 4(8), 705-12.

Collier, P., Hoeffler, A., & Rohner, D. (2009). Beyond Greed and Grievance: Feasibility and Civil War. *Oxford Economic Papers,* 61(1), 1–27.

Coovadia, H., Jewkes, R., Barron, P., Sanders, D., McIntyre, D. (2009). The health and Health System of South Africa: Historical Roots of Current Public Health Challenges. *Lancet*, 374(9692): 817-834.

Corbett E.L., Churchyard, G.J., Clayton, T.C., Williams, B.G., Mulder, D., Hayes, R.J. (2000). HIV infection and silicosis: the impact of two potent risk factors on the incidence of mycobacterial disease in South African miners. *AIDS* 14(17), 2759-68.

Corno, L., & de Walque, D. (2012). Mines, Migration, and HIV/AIDS in Southern Africa. World Bank Policy Research working paper. Washington, DC: The World Bank.

de Soysa, I. (2002). Paradise is a Bazaar? Greed, Creed, and Governance in Civil War, 1989-1999. *Journal of Peace Research,* 39(4), 395–416.

de Soysa, I., & Binningsbø, H. M. (2009). Devil's Excrement or Social Cement? Oil Wealth and Repression, 1980–2004. *International Social Science Journal,* 57(1), 21–32.

de Soysa, I., & Neumayer, E. (2007). Resource Wealth and the Risk of Civil War Onset: Results from a New Dataset of Natural Resource Rents, 1970–1999. *Conflict Management and Peace Science,* 24(3), 201–218.

Dietz, S., Neumayer, E., & de Soysa, I. (2007). Corruption, the Resource Curse and Genuine Savings. *Environment and Development Economics,* 12(1), 33–53.

Easterly, W. (2006). The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good. Oxford: Oxford University Press.

Elbe, S. (2002). HIV/AIDS and the Changing Landscape of War in Africa. *International Security*,27,159–177.

Evans, P. B. (1992). The State as Problem and Solution: Predation, Embedded Autonomy, and Structural Change. In S. Haggard & R. R. Kaufman (Eds.), *The Politics of Economic Adjustment* pp. 139–181). Princeton, NJ: Princeton University Press.

Fearon, J. D. (2005). Primary Commodities Exports and Civil War. *Journal of Conflict Resolution,* 49(4), 483–507.

Fearon, J. D., & Laitin, D. (2003). Ethnicity, Insurgency, and Civil War. *American Political Science Review,* 97(1), 1–16.

Fors, H. C., & Olsson, O. (2007). Endogenous Institutional Change After Independence. *European Economic Review,* 51(8), 1896–1921.

Gizelis, T.-I. (2009). Wealth Alone Does Not Buy Health: State Capacity, Democracy, and the Spread of AIDS. *Political Geography*, 28(2), 121-131.

Gleditsch, K. S., & Ward, M. D. (2001). Measuring Space: A Minimum Distance Database. *Journal of Peace Research,* 38(6), 749–768.

Gleditsch, N. P., Wallensteen, P., Eriksson, M., Sollenberg, M., & Strand, H. (2002). Armed Conflict 1946-2001: A New Dataset. *Journal of Peace Research,* 39(5), 615–637.

Gylfason, T. (2000). *Natural Resources, Education, and Economic Development.* London: Center for Economic Policy Research.

Humphreys, M., Sachs, J. D., & Stiglitz, J. E. (Eds.) (2010). Escaping the Resource Curse. New York: Columbia University Press.

ICRG, I. C. R. G. (2006). ICRG, Researcher Data. The Political Risk Services Group.

Iqbal, Z., & Zorn, C. (2010). Violent Conflict and the Spread of HIV/AIDS in Africa. *Journal of Politics,* 72, 149–162.

Jensen, N., & Wantchekon, L. (2004). Resource Wealth and Political Regimes in Africa. *Comparative Political Studies,* 37(7), 816–841.

Karl, T. L. (1997). *The Paradox of Plenty: Oil Booms and Petro-States.* Berkeley, CA: University of California Press.

Keefer, P., & Knack, S. (2007). Boondoggles, Rent-seeking, and Political Checks and Balances: Public Investment Under Unaccountable Governments. *The Review of Economics and Statistics,* 89(3), 566–572.

Kisangani, E., & Nafziger, W. E. (2007). The Political Economy of State Terror. *Defence and Peace Economics,* 18(5), 405–414.

Klovdah, Alden S. (1985). Social Networks and the Spread of Infectious Diseases: The AIDS Example. *Social Science and Medicine*, 21(11),1203-1216.

Kunte, A., Hamilton, K., Dixon, J., & Clemens, M. (1998). *Estimating National Wealth: Methodology and Results.* Washington, DC: World Bank.

Lake, D. A., and M. A. Baum. (2001). The Invisible Hand of Democracy: Political Control and the Provision of Public Services. *Comparative Political Studies*, 34(6), 587-621.

Leite, C., & Weidmann, J. (1999). *Does Mother Nature Corrupt? Natural Resources, Corruption, and Economic Growth.* Washington, DC: International Monetary Fund.

Lule, E. and M. Haacker. (2011). *The Fiscal Dimension of HIV/AIDS in Botswana, South Africa, Swaziland, and Uganda.* Washington: The World Bank.

Mayberry, R. M., Daniels, P., Akintobi, P. H., Yancey, E. M., Berry, J., & Clark, N. (2008). Community-based Organizations’ Capacity to Plan, Implement, and Evaluate Success. *Journal of Community Health,* 33(5), 285–292.

McCulloch J. (2009). Counting the cost: Gold mining and occupational disease in contemporary South Africa. *African Affairs*, 108(431), 1-20.

Mehlum, H., Moene, K., & Torvik, R. (2006). Cursed by Resources or Institutions? *The World Economy,* 10, 1117–1131.

Merson, M. H. (2006). The HIV–AIDS Pandemic at 25 — The Global Response. *The New England Journal of Medicine,* 354(June), 2414–2417.

Mock, N.B., Duale, S., Brown, L.F., Mathys, E., O’Maonaigh, H.C., Abul-Husn, N.K.L. (2004). Conflict and HIV: A framework for risk assessment to prevent HIV in conflictaffected settings in Africa. *Emerging Themes in Epidemiology*, 1, 1-16.

Moore, M., Leavy, J., Houtzager, P., & White, H. (1999). *Polity Qualities: How Governance Affects Poverty.* (p. 34). Brighton: The Institute for Development Studies, University of Sussex.

Newey, W. K., & West, K. D. (1987). A Simple, Positive, Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica,* 55(3), 703–708.

Osmanov, S., Pattou, C., Walker, N., Schwardländer, B., Esparza, J., & WHO-UNAIDS, N. f. H. I. a. C. (2002). Estimated Global Distribution and Regional Spread of HIV-1 Genetic Subtypes in the Year 2000. *JAIDS Journal of Acquired Immune Deficiency Syndromes,* 29(2), 184–190.

Papyrakis, E., & Gerlagh, R. (2004). The Resource Curse Hypothesis and its Transmission Channels. *Journal of Comparative Economics,* 32(1), 181–193.

Parkhurst, J. O. (2005). The Response to HIV/AIDS and the Construction of National Legitimacy: Lessons from Uganda. *Development and Change,* 36(3), 571–590.

Poku, N. K. (2005). Poverty, Debt, and Africa’s HIV/AIDS Crisis. *International Affairs,* 78(3), 531–546.

Reddy, M. & Swanepoel, B. (2006). Cutting the Cost of HIV/AIDS. *Harvard Business Review* (September), 1-2. Http://www.deloitte.com/assets/Dcom-SouthAfrica/Local%20Assets/Documents/HIVAIDS\_Deloitte.pdf (Accessed on 28-10-2012).

Robinson, J. A. (1998). Theories of 'Bad Policy'. *Policy Reform,* 1, 1–46.

Rosenberg, A., Hartwig, K., & Merson, M. (2008). Government-NGO Collaboration and Sustainability of Orphans and Vulnerable Children Projects in Southern Africa. *Evaluation and Program Planning,* 31(1), 51–60.

Ross, M. L. (1999). The Political Economy of the Resource Curse. *World Politics,* 51(2), 297–332.

Ross, M. L. (2001). Does Oil Hinder Democracy? *World Politics,* 53(3), 325–361.

Ross, M. L. (2008). Oil, Islam, and Women. *American Political Science Review,* 102(1), 107–123.

Roehr, B. (2011). New South African HIV Strategy Targets Condom Use and Miners. *BMJ*, 342, d2159.

Sachs, J. D., & Warner, A. (2001). The Curse of Natural Resources. *European Economic Review,* 45(4-6), 827–838.

Sagala, J. K. (2006). HIV/AIDS and the Military in Sub-Saharan Africa: Impact on

Military Organizational Effectiveness*. Africa Today*, 53, 54-77.

Spiegel, P. B. (2004). HIV/AIDS among Conflict-affected and Displaced Populations:

Dispelling Myths and taking Action. *Disasters*, 28, 322-339.

Strand, R.T., Dias, L. F., Bergstrom, S., Andersson. S. (2007). Unexpected Low Prevalence of HIV among Fertile Women in Rwanda, Angola. Does War Prevent the Spread of HIV? *International Journal of STD & AIDS*, 18, 467-471.

Stuckler, D., Basu, S., McKee, M., and Lurie. M. (2011). Mining and Risk of Tuberculosis in Sub-Saharan Africa. *American Journal of Public Health*, 101(3), 524-530.

Stucklet, D., Basu, S., McKee, M. (2010). Governance of Mining, HIV and Tuberculosis in Southern Africa. *Global Health Governance*, IV(1). http://blogs.shu.edu/ghg/2010/12/20/governance-of-mining-hiv-and-tuberculosis-in-southern-africa/ (Accessed 28-10-2012).

Torvik, R. (2002). Natural Resources, Rent Seeking and Welfare. *Journal of Development Economics,* 67, 455–470.

UNAIDS. (2010). Report on the Global AIDS Epidemic. Geneva: UNAIDS.

UNAIDS. (2011a). World AIDS Day Report. Geneva: UNAIDS.

UNAIDS. (2011b).Methods and assumptions for estimates. http://www.unaids.org/en/dataanalysis/epidemiology/ (Accessed on 17-04-2011).

van der Ploeg, F. (2011). Natural Resources: Curse or Blessing? *Journal of Economic Literature,* 49(2), 366-420.

Whiteside, A., Mattes, R., Willan, S., & Manning, R. (2004). What People Really Believe About HIV/AIDS in Southern Africa. In N. K. Poku & A. Whiteside (Eds.), The Political Economy of AIDS in Africa. Hants: Ashgate.

Wilson, S. E., & Butler, D. M. (2007). A Lot More to Do: The Sensitivity of Time-Series Cross-Section Analyses to Simple Alternative Specifications. *Political Analysis,* 15, 101–123.

World Bank (2010). World Development Indicators CD Rom. Washington, DC: The World Bank.

World Health Organization (2012). The Strategic Use of Anti-retrovirals to Help End the HIV Epidemic. Switzerland: World Health Organization.

Zacher, M. (1999). Global Epidemiological Surveillance: International Cooperation to Monitorn Infectious Diseases. In I. Kaul, I. Grunberg & M. A. Stern (Eds.), *Global Public Goods: International Cooperation in the 21st Century* (pp. 266–283). Oxford: Oxford University Press.

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