Exploring the Links between HIV/AIDS, Social Capital and Development

Abstract

This paper attempts to quantify the impact of the HIV/AIDS epidemic on social capital with cross-country data. Using data from the World Values Survey (WVS), we estimate reduced-form regressions of the main determinants of social capital controlling for HIV prevalence, institutional quality, social distance and economic indicators. The results obtained indicate that HIV prevalence affects social capital negatively. The empirical estimates suggest that a one standard deviation increase in HIV prevalence will lead to at least one percent decline in trust, controlling for other determinants of social capital. If one moves from a country with a relatively low level of HIV prevalence such as Estonia to a country with a relative high level such as Uganda, one would observe over 11% points decline in social capital. These results are robust in a number of dimensions and highlight the empirical importance of an additional mechanism through which HIV/AIDS hinders the development process.

Keywords: Social capital, HIV/AIDS, economic development.
JEL Classification: O11, O15, O57

1. Introduction

Putnam (1993, p.167) conceptualises social capital as "…features of social organisation, such as trust, norms, and networks that can improve the efficiency of society by facilitating co-ordinated actions." Although the concept of social capital is frequently used in rather vague ways by a large part of the social sciences literature, the key element is that 'relationships matter' (Field, 2003). Social interaction enables members to share values and build societies. Therefore, social networks (and the relations of trust, tolerance and cooperation arising from them) allow members to resolve their collective problems more easily, facilitate community progress and the achievement of goals.

The World Bank claims that "*Increasing evidence shows that social cohesion — social capital — is critical for poverty alleviation and sustainable human and economic development*[1]". In fact, there have been a growing number of efforts attempting to quantify the influence of social capital on economic development, as we discuss in the main text. Furthermore, several authors have linked the HIV/AIDS epidemic to social capital (see for instance Gaffeo, 2003), usually pointing out how factors related to the disease such as stigma, discrimination and the costs posed by care for the sick as well as orphans erode and put pressure on social capital.

The objective of this paper is to attempt to quantify the impact of the HIV/AIDS epidemic on social capital using cross-country data. For this purpose, we will estimate reduced form regressions of the main determinants, as identified in the literature, of social capital, using national levels of trust from the World Values Survey (WVS) as a proxy for social capital. To our knowledge, there have been no previous efforts to evaluate this empirical question. Establishing an empirical link between the HIV/AIDS epidemic and "trust" helps uncover another channel through which social capital affects development.

With this objective in mind, in section 2 we briefly examine the links between social capital, development and HIV/AIDS previously identified in the literature. In

[1] http://go.worldbank.org/C0QTRW4QF0

section 3 we present and discuss the data used in our cross-country regressions. Section 4 presents our empirical results and discusses the robustness of these results. Section 5 concludes the paper.

2. Brief literature review

2.1. Social capital and development

When one goes through the literature on social capital, it is immediately apparent that *trust, social networks, and social norms* are the main mechanisms through which social capital reduces uncertainty and transaction costs, discourages opportunistic behavior, fosters cooperation and increases the efficiency of markets and organizations, thus affecting economic development. Indeed, Alesina and La Ferrara (2002) argue that social capital is growth enhancing mainly because a) it improves the functioning of public institutions and b) it helps to offset the effects of market imperfections by reducing search costs and facilitating economic transactions. Routledge and von Amsberg (2003), for instance, present a theoretical model where social capital affects economic growth by facilitating cooperative trade.

The influential paper by Zak and Knack (2001) formalises the ideas previously outlined and develops a general equilibrium model with heterogeneous agents and moral hazard to determine how trust varies across societies. Agents decide how much to save and the time they will spend in investigating brokers who have an incentive to cheat their clients. Of course, cheaters are not trustworthy and face sanctions by formal institutions and informal institutions (e.g. social ties, religious institutions) which are modeled as 'distance' or similarities between people. This, in turn prevents cheating and affects the time agents spend in verifying cheaters' actions. In this set-up, trust enhances growth by increasing savings and lowering transaction costs. The model also implies that trust increases with both formal and informal institutions, homogenous population and more egalitarian societies. In addition, the model predicts that societies can get stuck in low-trust poverty traps.

As far as the empirical evidence on the link between social capital and development is concerned, Knack and Keefer (1997) using cross-country data find that trust and civic norms are significantly related to economic growth and investment. Knack

(2002) finds that social trust leads to better governance. Zak and Knack (2001) test empirically the predictions of their model described above by extending the Knack and Keefer sample using later waves of the WVS that includes a number of developing countries. They corroborate the conclusion that trust affects economic growth. Beugelsdijk et al. (2004) perform a robustness analysis of the relationship between trust and economic growth and conclude that the Zak and Knack results are highly robust in terms of statistical significance of the estimated coefficients and reasonably robust in terms of size of the estimated effects.

Another strand of the literature links social capital with financial development, as it identifies high levels of trust as one of the main determinants of financial depth. Guiso et al. (2004) measure variations in social capital within Italy through (anonymous) blood donation and (non-mandatory) electoral participation. They show that, after controlling for income and wealth, high social capital areas use more cheques, invest less in cash and more in stocks, have higher access to formal credit and borrow less from friends or relatives. Nonetheless, as well argued by Sabatini (2006), indicators such as blood donation and electoral participation might be outcomes of social capital rather than a measure of social capital itself. Garretsen et al. (2004) also show that, after controlling for legal norms, societal norms help to explain market capitalization and hence cross-country differences in financial development. They obtain their indicators for social norms from survey data about the values of people working in local subsidiaries of IBM in more than 50 countries.

In addition, social capital may influence social learning and information diffusion through reducing the cost of information acquisition, lessening the uncertainty regarding the reliability of the information and increasing the willingness to cooperate and share information. Barr (2000) presents a model where networks facilitate knowledge flows between firms and as a result, firm productivity increases which might lead to sustained growth. Her empirical analysis for the manufacturing sector in Ghana shows that entrepreneurs with large and more diverse networks have firms that are more productive because they benefit not only from their direct contacts but also from the networking of their contacts. Katungi and Smale (2006) draw attention to a gender twist in the way that social capital influences information exchanged among rural households in Uganda.

Male-headed households participate more in civic engagement and social institutions than their female counterparts do, so they have more access to information and an advantage on agricultural innovation to improve the productivity of bananas.

We will see next that unlike the large literature linking social capital and growth, research relating social capital and HIV/AIDS is still very scarce.

2.2. HIV/AIDS and development

There is an emerging consensus that HIV/AIDS (mortality and morbidity) is an impediment to growth. However, the specific channels through which HIV/AIDS affects growth are subject to recent research[2].

Most of the empirical simulations, like the one by Cuddington (1993) for Tanzania, are based in Solow type growth models where HIV/AIDS affects the size of the labour force, increases expenditure on health, decreases both public and private savings, decreases investment in physical capital and lowers productivity.

In addition to these more evident effects, HIV/AIDS contributes to the persistence of poverty as it affects not only the stock, but also the accumulation of human capital. Bell et al. (2004) calibrate an overlapping generation model for South Africa where the level of human capital and the premature mortality in the present generation affect the human capital of the next generation. When parents die prematurely, orphans are threatened by financial distress and lack of care. This might increase the incidence of child labour and reduce both schooling and human capital[3]. Nevertheless, even when parents are alive, their perception of their children's possible premature death might lower the expected returns to education and reduce children's schooling. That is, adult premature mortality and the subjective assessment of children's mortality generate poverty and possibly, poverty traps. They predict that family income could be up to 23,000 Rand lower by 2050 compared with the No-AIDS scenario. Bell et al. (2006) perform a similar exercise for Kenya and conclude that by 2040, GDP per adult will be 11% less than it would have been in the No-AIDS Scenario for that country.

[2] See Haacker (2004) for a comprehensive review of the literature on the economic effects of HIV/AIDS.
[3] Wobst and Arndt (2004) show that the labour force in Tanzania in 2000-01 became younger compared to 1990-91 and that this trend coincided with lower enrolment and more exits in primary school as well as with the increase in HIV/AIDS infections and deaths.

According to the well-known literature of 'insurance' motives and fertility decisions, uncertainty of children survival may not only have an effect on school enrolment but also on fertility decisions. Kalemli-Ozcan (2006) examines the impact of the epidemic on fertility decisions in a panel of 44 Sub-Saharan African (SSA) countries and concludes that HIV/AIDS affects the total fertility rate positively and school enrolment rates negatively. She argues that those results are consistent with theoretical models of precautionary demand for children in the face of uncertainty about child survival. That is, in a high mortality environment, parents will choose to have more children and provide each child with less education. Hence, HIV/AIDS would contribute to reversing the fertility transition and accumulation of human capital leading to significant negative long-run effects on growth and welfare. In contrast, Young (2005) uses micro data from 27 SSA countries and finds that the HIV epidemic decreases fertility and has no systematic influence on human capital. He argues that this decline is associated with behavioural changes such as increased use of condoms. Young's regressions might be picking up a specific fertility pattern and response to the epidemic. This is more so if there are substantial variations within and across African countries in HIV prevalence that makes empirical results difficult to generalise (Beegle and de Walque, 2008). We are less convinced about Young's calculations that the decline in fertility brought about by the epidemic will create sufficient resources for medical care to fight the epidemic. He argues that a decline in fertility will lower dependency ratios, increase savings rates, provide future cohorts with more capital per person, and make it possible to allocate resources for medical care. However, resources are not only needed to fight the epidemic but to combat extreme poverty and malnutrition, which were already pervasive before the onset of the epidemic and have contributed to its transmission. This trade off and changes in labour force composition (as a consequence of the epidemic) should also be factored in his calculations.

Besides the direct health costs of the disease, the nature and the way HIV/AIDS is transmitted has mainly created: a) social stigma and discrimination frequently attached to infected individuals which threaten to break family and community ties (Gaffeo, 2003) and b) market failures because of asymmetric information and externalities (Gersovitz and Hammer, 2003). The scope for public intervention arises from the uncertainty

regarding individuals' infection status and the impossibility of verifying if one's partner is engaging in safe sex with someone that has a positive probability of being infected[4].

Recall that in Zak and Knack (2001), uncertainty, asymmetric information and moral hazard implies resources diverted in 'uncovering' cheaters instead of increasing output. They also show that discrimination ('dissimilar agents') lowers trust and consequently lowers growth. Similarly, in the case of HIV/AIDS, uncertainty and asymmetric information and the impossibility of monitoring sexual behaviour have both a direct effect on human lives (and output) and an indirect effect through trust. Moreover, the epidemic is also associated with stigma and discrimination, which also lowers trust. That is, there is a direct and indirect link between HIV/AIDS and development.

In addition, a number of authors argue that HIV/AIDS also poses a considerable burden on traditional networks and coping mechanisms, in particular in what concerns care for orphans and sick individuals. Foster (2006) for instance, argues that governments have been slow to react to the orphan crisis in Sub-Saharan Africa that is intimately linked to the epidemic causing families and communities to, in his words, "shoulder most of the effort and costs". This strain on social networks could lead to a negative impact on social capital or even to the disintegration of the existing informal mechanisms to cope with economic shocks.

Besides the impact of HIV/AIDS on households, Haacker (2004) posits that HIV/AIDS can also influence the 'social fabric' of the country (e.g. social coherence and governance), which in turn could affect economic development. He argues that the epidemic contributes to deteriorating security at the individual, community and national level, in particular as governments' capacities are eroded leading to increased crime and instability. This author also states that the epidemic could increase the vulnerability of a country to civil war.

Others instead, have studied the effect of social capital on health. For instance, Poortinga (2006) shows that for European countries, individual levels of social trust and civic participation were strongly correlated with self-rated health. Campbell et al. (2002) focus on the impact of social capital on health issues in a South African mining community. Social capital is defined in terms of people's membership of voluntary

[4] See Dasgupta (2005) for a discussion on trust and credibility and the role of an external enforcer.

community associations and they tested if members were less likely to have HIV. They found mixed results that varied across age and gender.

Overall, one can conclude that HIV/AIDS affects growth directly but also indirectly through fertility, human capital and social capital. In terms of social capital, the epidemic increases insecurity, stigma and discrimination and poses extra burdens on traditional social networks The question that we will attempt to answer in subsequent sections is how large and strong this effect is. This will allow us to assess the importance of this indirect channel through which HIV/AIDS affects the development process.

3. Regression framework and overview of the data

To explore if HIV determines social capital, we will present the results from a number of Ordinary Least Squares (OLS) regressions of the form

$$Social\ Capital_i = \alpha + \beta\ HIV_i + X_i^{/}\gamma + \varepsilon_i$$

where α is the constant, X_i is a vector containing other explanatory variables, and ε_i is a random error term. The estimated coefficient β measures how sensitive social capital is to HIV prevalence and it is of particular interest to us.

Firstly, to test the above model we need to have a reasonable measure of social capital. Durlauf (2002) and Sabatini (2006) discuss in detail the extensive challenges present in the empirical analysis of social capital, in particular, flaws in studies linking social capital to economic growth. Firstly, social capital is a multidimensional concept so it is not possible to have a single definition. There is agreement that social capital includes elements of trust, social norms, and social networks i.e. *all aspects* of social structure that makes groups work more efficiently. Secondly, a number of the indicators commonly used are measures of outcomes of social capital rather than social capital itself. Others rely on subjective perceptions that depend on the economic, social and historical context of the individuals being surveyed. Moreover, technical econometric difficulties abound such as identification problems, reverse causality, measurement error, among others.

The main dependent variable in our regressions is a measure of social capital obtained from cross-country data on national levels of trust from the World Values Survey (WVS). Using a nationally representative sample[5], the WVS provides a measure of "trust" given by the percentage of the population who answer yes to the question: "In general, do you think that most people can be trusted?" against the alternative that "you can't be too careful when dealing with people". We use data from the latest waves of the survey, which includes six Sub-Saharan African countries (only Nigeria and South Africa were available in previous surveys). We list all the countries included in this study in Appendix A.

An alternative aggregate measure of social capital proposed by Temple (1998) is the "social capability" index which is an assessment of a "society's suitability for institutional and economic development". Nonetheless, this measure was constructed in the early 1960s and therefore would not be suitable for our purposes because the first cases of AIDS where identified in the early 1980s. Another measure for social capital is participation in voluntary associations but it is inadequate for our objectives because they are not widely available across countries and they might be outcomes rather than indicators of social capital.

Furthermore, the empirical work by Bjonskov (2003) lends support to our choice of "trust". He applies principal component analysis on data provided by the World Value Survey (WVS) and shows that although trust, norms and networks tend to covary, there are distinct elements. More interestingly, he explores the sensitivity of these components by including each one as regressors in cross-country regressions and finds that only the social trust component is robust to different specifications. He obtains similar qualitative results when using the variable "trust" from the WVS, which was also used by Knack and Keefer (1997) and Zack and Knack (2001) in their growth regressions.

Nonetheless, one has to acknowledge that this particular measure of social capital has been subject to a number of criticisms in the literature. One concern relates to the fact that it reflects individual perceptions of society and that one needs to take into

[5] Sabatini (2006) observes that urban areas and better educated persons are usually overrepresented in the WVS but Delhey and Newton (2005) argue that these problems do not seriously affect the randomness of the sample. Knack and Keefer (1997) provides empirical validity for the use of WVS data when they found a strong correlation between WVS trust and the number of wallets that were 'lost' and returned intact in an experiment carried out in Europe and the United States.

account the social and historical context in which those perceptions are formed and the timing when the survey questions were asked. Other caveats relate to the different interpretations respondents might have of the question asked and their perception of trust given dissimilar risk preferences (i.e. those who are more risk averse may be less likely to trust others).

Secondly, we need to identify the other correlates of trust. We collected data on a number of determinants of trust that we identified in the existing literature and discussed in the previous section. Those include HIV prevalence rates, governance indexes, measures of the quality of institutions (in particular regarding the control of corruption) and measures of social distance such as income inequality, ethnic and linguistic fractionalization. We also control for population density because spatial distance may negatively affect the formation of networks and the flow of information. However, areas with high population density can overwhelm public services and are likely to display more heterogeneity and lower trust. What is more, population density has been associated with higher levels of crime. In addition, people living in rural areas are said to be more trusting than people living in large urban areas (Collier, 2002; Delhey and Newton, 2005). Note that Japan is a country with high population density, large urban areas and low levels of crime. Therefore, the strength and sign of the correlation between population density and trust are by no means clear. Like Alesina and La Ferrara (2002), we include measures of educational achievement as determinants of trust. Using individual level data for the United States, they find that "successful people" in terms of income and educational achievement tend to trust more.

We also included the log of initial GDP (as measured by Dollar and Kraay, 2002) as a possible determinant of trust in some specifications. In the Zak and Knack (2001) moral hazard model, trust is decreasing with wealth but increasing in wages[6]. Following this logic, the impact of the log of initial GDP (the proxy for those two economic factors at the national level) on trust is ambiguous.

Finally note that there is empirical evidence conducted for America (Glaeser et al, 2002) and Britain (Li et al, 2005) showing that generalised trust tends to increase with

[6] The intuition here is that investors have more incentives to monitor brokers' behavior to protect their wealth but in the model, wages are considered to be the opportunity cost of investigating a broker so if this cost is high, there are more incentives to trust the broker.

age. Younger adults seem to be less trusting than middle age or older because of lifecycle effects. As people get older, they have more experience, interact more with others and participate more in different organisations. This might imply that at the country level, countries with younger populations trust less than countries with older populations. On the other hand, there might also be a generational cohort effect because of their own experiences like wars, famines and political scandals resulting in new generations being less trusting[7].

Finally, given that our sample includes a mix of countries, we include a Scandinavian dummy variable and, when appropriate, a developing country dummy variable. The Scandinavian[8] countries rank top in social trust and are known to have a strong basis for trust because of their good governance and high levels of government transparency, their ethics and culture, and their universal high quality welfare state programme[9].

Appendix B provides more description of data and sources. Appendix C presents the correlation matrix between the main regressors as well as their descriptive statistics. Some variables are highly correlated and we should bear this in mind when performing our regression. This is particularly the case for variables measuring institutional quality. Note as well that the developing country indicator is negative and highly correlated with both the measures of institutional quality and initial income; an initial income is highly positively correlated with variables measuring institutional quality.

4. Empirical results

Many econometric difficulties are likely to arise when estimating cross-country regressions of the determinants of national levels of social capital (measured by trust) and might result in biased and inconsistent estimates.

It is clear that several of the variables included in the regressions might suffer from measurement error. The precise number of people living with HIV/AIDS is not

[7] Recently, Guiso et al (2007) build an overlapping generation model in which parents transmit their priors about trust to their children who then, will transmit it to their children after updating their beliefs according to what they experience in real world. This explains persistence and "low trust equilibrium" traps.

[8] By Scandinavian countries we mean Denmark, Norway and Sweden. We reserve the term Nordic countries for Norway, Sweden, Denmark, Finland, and Iceland.

[9] See Allum et al (2007) and Delhey and Newton (2005) and Rothstein and Uslaner (2005) for a discussion about why these countries are top in the trust ranking.

known with certainty. In particular, it is well-known that the quality of data concerning HIV prevalence rates is rather poor. The Joint United Nations Programme on HIV/AIDS (UNAIDS) uses different sets of data (e.g. surveys of pregnant women attending antenatal clinics, surveillance information, population based surveys, vital statistics, etc.) to calculate HIV prevalence. The Demographic and Health Surveys (DHS), one of UNAIDS data sources, have recently collected more accurate and reliable data on prevalence rates particularly in Africa, but the cross-country availability of such data is very limited. Measurement error can also be present in other variables (like the governance indicators) included in our regressions. However, in the case of our dependent variable (trust), OLS is suitable if the measurement error is uncorrelated with the explanatory variables.

Note that UNAIDS has warned against comparing HIV/AIDS prevalence data across time because the assumptions, methodology and data used to produce the estimates change over time with improved knowledge of the disease and superior statistical methods[10] . For this reason and given problems of data availability, we are unable to use panel data (or at least specify our regression in first differences) to control for possible unobserved heterogeneity (i.e. correlation between unobserved and observed country characteristics).

Omitted variables could present another serious potential problem so we try to control for the different determinants of trust identified in the literature. Perhaps more worrying is the possible endogeneity of the HIV prevalence rate. We attempt to mitigate this problem by ensuring that whenever possible, this variable is pre-determined i.e. we include values for periods before the WVS surveys took place. In addition, we also estimate the model using instrumental variables (IV). Finally, among other difficulties, the presence of multiple regimes and non-linearities in the relationships studied is a clear possibility.

Bearing those caveats in mind, table 1 presents results from a number of Ordinary Least Squares (OLS) regressions. It is remarkable that the estimated coefficient of HIV prevalence has a negative and statistically significant (at conventional levels) impact on trust through all the specifications. Specifications (2) and (3) confirm that the control of

[10] See UNAIDS (2007).

corruption index and developing countries dummy variable are multicolinear, and because the institutional quality indices are highly and significant correlated, we do not include the developing country dummy in the following regressions.

Specification (5) includes as explanatory variables: HIV prevalence, the rule of law index constructed by Kaufmann et al. (2006) and data on ethnic fractionalization from Alesina et al. (2003). As expected, both the estimated coefficients for HIV prevalence and ethnic fractionalization present negative signs, although the latter is not statistically significant, whereas the rule of law index presents a positive and statistically significant coefficient. Under this specification, a one percentage point increase in HIV prevalence would result in a 0.76 percentage point decrease in trust. Alternatively, a one standard deviation increase in HIV prevalence will lead to just over 2.5 percentage point decline in trust. The RESET test rejects the null hypothesis (model is linear) at the 10% level but not at 5%, which is acceptable given the small sample size. Including linguistic instead of ethnic fractionalisation does not qualitatively change the results. We also tested the regressions including a quadratic term for ethnic or linguistic fractionalization because according to Zak and Knack (2001) in settings with a large number of small groups, no single group represents much of a threat to others; therefore, the effective social distance is greatest at an intermediate range of the fractionalization measure. The results were qualitatively similar[11] , the fractionalization variables were statistically insignificant but HIV prevalence and the rule of law variable are statistically significant at conventional levels.

Specifications (7) through (11) regress trust on HIV prevalence, rule of law index, the Gini coefficient for income inequality as a proxy for social distance, the log of initial income, population density and average age of the population. Rule of law has always a positive and significant effect on trust except in (9) when we include (the log of) initial income because, as stated earlier, both variables are highly correlated. Unexpectedly, the estimated coefficient of educational achievement has a negative sign although statistically insignificant. Similar to other studies, we find that the Gini

[11] Not reported in table1 for ease of exposition , but available upon request

coefficient is an important determinant of trust[12] (i.e. greater income inequality reduces trust). We find a significant and negative relation between population density and trust. But our results suggest that countries with older populations seem to trust less. This contrasts with the findings of researchers like Li et al (2005) who found that older people are more trusting than younger people because they have higher levels of neighborhood attachment and civic participation. On the other hand, it is possible that as people grow older, their life experience make them less naïve and less trusting.

We also report (but do not present in Table 1) that we estimated specifications that included the percentage of rural population in 1996 from the World Development Indicators as a regressor. In most cases, the estimated coefficient had the expected positive sign but was not statistically significant across different specifications. We also explore different measures of "age" such as the ratio of population below 30 years old to population above 30 years old. These results consistently suggested that older populations trust more but they were not statistically significant.

The RESET test for specifications (10) and (11) rejects the assumption that the model is linear but this assumption is not rejected when we include a dummy variable for Nordic countries instead of the Scandinavian dummy variable. Apart from that, the results are very similar and we only present (11a) in table 1. We check for normality of the predicted residuals by applying the inter-quartile range test[13] that assumes symmetry of the distribution. The presence of any severe outlier is sufficient evidence to reject normality at the 5% level. We found one severe outlier (Iran) and two middle outliers (Indonesia and The Netherlands). In Iran, the percentage of respondents who agree that most people can be trusted is 65.3% (one percentage less than Sweden) among the interviewees who answer yes/no to the trust question. Among the countries included in the WVS, the percentage of interviewees that did not answer the question or did not know is negligible except for Iran with 24.1% and Indonesia with 11.8%. Once we exclude Indonesia and Iran from the sample, we cannot reject the Shapiro-Wilk test for normality

[12] In specification (10), the estimated coefficient of Gini is statistically significant at the 12% significance level.
[13] The test was written by Lawrence C. Hamilton and it is available in the Stata software.

of the residuals at the 13% level[14]. The HIV prevalence variable presents a negative coefficient varying in size from -0.373 to -0.610 indicating that a one standard deviation increase in HIV prevalence will lead to at least one percentage point decline in trust after controlling for other determinants of social capital.

The regressions presented in table 1 provide some support to the empirical relation between HIV prevalence and trust. However, one has to bear in mind that the findings are subject to a number of caveats, including the possibility that the estimates are subject to endogeneity bias. Next, in table 2, we perform some additional tests to assess whether there is a fundamental change in the conclusions obtained, when we vary the specifications along various dimensions.

As argued by Beugelsdijk et al. (2004), robustness is a multi-dimensional concept that cannot be analysed using a single indicator. In this section, we will use the term "robustness" as referring to our attempt to assess whether the results obtained in the previous section are sensitive to how the dependent variable is measured, changes in the explanatory variables used, to changes in the sample composition, and to the use of different econometric techniques. We will concentrate in particular on the statistical significance and size of the estimated effect of HIV prevalence on trust.

First, using our most general specification (11), we include alternative measures of institutional quality. HIV prevalence is negative and statistically significant when including government effectiveness (12) or the voice and accountability variable (13) constructed by Kaufmann et al. (2006), but it is only statistically significant at the 13% level[15] when using the law and order index (14) constructed by ICRG in the period from 1960-1995. The size of the HIV estimated coefficient is similar to our previous results (10-11a).

Subsequently, we limit the sample included in the regressions to developing countries exclusively, in order to check whether by considering only this sub-sample, one would observe changes in the results previously obtained. In fact, specification (15)

[14] We report that changing the definition of the dependent variable from the percentage "among the interviewees who answered the trust question" to the percentage of trusting respondents among "all people interviewed including the don't know and missing" does not change the results qualitatively. The HIV estimated coefficient is -0.579 and statistically significant at the 2% level.

[15] This could be considered as acceptable given our small sample size.

shows that most regressors are no longer statistically significant; nonetheless, HIV prevalence continues to present a negative and significant estimated coefficient[16]. The estimates indicate that a one percentage point increase in HIV prevalence is associated with a half percentage point reduction in social capital.

Furthermore, we attempt to account for the fact that HIV prevalence might be endogenous to social capital by instrumenting for this variable using national data for male circumcision rates obtained from WHO (2007) and Drain et al. (2006) and a Sub-Saharan African dummy variable. A number of other papers for African countries, notably Kalemli-Ozcan (2006) and Werker et al. (2006) in regressions for total fertility, school enrolment and economic growth, have used circumcision rates as an instrumental variable for HIV in the light of new medical evidence that male circumcision substantially reduces the risk of HIV transmission.

When using circumcision rates as the only instrumental variable, diagnostics for the first stage regression show that circumcision rates are negatively but insignificantly related to HIV prevalence. One explanation for this is that the relation between circumcision and HIV is not as straightforward as predicted by clinical trials. Beegle and de Walque (2008) quote cases like Ethiopia and Cameroon where the difference in HIV between circumcised and uncircumcised males is very small. Another explanation is that omitted variables might be underestimating the negative effect of circumcision on HIV. We are aware that the use of weak instruments in two stage least squares can be very misleading because it biases the estimated coefficients and the standard errors (Murray, 2006) so we decided to add the geographic variable Sub-Saharan African country to the list of instruments. According to WHO and UNAIDS, SSA is the poorest and the most HIV/AIDS affected region in the world (more then 2/3 of people infected live in SSA, more than 3/4 of all deaths were AIDS related in 2007). Although the results controlling for Scandinavian or Nordic countries are very similar[17], we prefer to present the latter where the RESET test cannot reject the null of no misspecification at 10% level.

[16] We also tested the same specification but using government effectiveness or control of corruption instead of rule of law with similar results.

[17] The estimated coefficient of HIV prevalence is 9% smaller when controlling for Scandinavian instead of Nordic.

Specifications (16) and (17) are two-stage-least-squares (2SLS) regressions of trust on HIV prevalence, measures of institutional quality (rule of law and control of corruption), Gini coefficient and Nordic. All the explanatory variables are statistically significant (except for Gini) and all have the expected signs. The estimated coefficient for the instrumented HIV are -0.834 and -0.861, which are slightly higher than the ones presented so far.

Although the Shea first stage partial R^2 and the Cragg-Donaldson F test show that our instrumental variables are not weak, we are aware of the possibility that circumcision rates are endogenous to national trust levels for religious or cultural reasons. If so, circumcision rates might not be an adequate instrument because it may be related to trust. In (18) we use Sub-Saharan Africa as the only instrumental variable and we obtain similar qualitative results as in (17).

In addition, we follow a large strand of the literature on the impact of institutions on economic development by using the log of settler mortality as an instrument for institutional quality as suggested by Acemoglu et al. (2001). Specification (19) is a 3SLS regression of trust on HIV prevalence (instrumented by Sub-Saharan Africa), control of corruption (instrumented by settler mortality) and the Gini coefficient. The HIV prevalence and the Gini coefficient have the expected sign and are statistically significant whereas control of corruption is not. Nonetheless, one should interpret these results with caution given the very small sample size (we have data available for only 28 countries).

As a final check, we use instrumental variables on the sample of developing countries (20, 22). Similar to our OLS estimates, HIV prevalence remains statistically significant but the rule of law variable and Gini coefficient are not. It would have been desirable to test if HIV affects the change in the stock of social capital but unfortunately, our data is not rich enough to disentangle between stock and flows effects.

Lastly, we report that whilst income inequality appears to be insignificantly correlated to trust in our 2SLS estimations, inspection of all our first stage regressions show that Gini affects HIV prevalence positively and significantly. Other authors such as Drain et al (2004) for developing countries, Plot et al (2007) for Africa and Holtgrave and Crosby (2003) for the United States have also found that, among other variables, income inequality predicts HIV prevalence (or AIDS for the United States). That is, income

inequality might be affecting social capital indirectly through HIV/AIDS. This interesting relationship needs to be explained and explored further.

Overall and given the limitations in quality and availability of data, our exploratory analysis provide empirical support to the idea that HIV/AIDS has a harmful effect on social capital. Indeed, HIV/AIDS might considerably restrict development through this important channel.

5. Conclusion

The cross-country analysis performed in this study indicates that the notion that HIV/AIDS has deleterious effects on social capital at the country level has empirical support. Our preferred specifications suggest that the effect of HIV on social capital is of the order of 0.61 to 0.86 which, evaluated at the point of means, implies a predicted elasticity of 0.023 to 0.032. That is if one moves from a country with a relatively low level of HIV prevalence such as Estonia to a country with relatively high level such as Uganda, one would observe an approximate five-fold proportional increase in HIV prevalence and an 11% to 15% proportional decrease in trust. When we perform similar exercise between Estonia and South Africa (where the HIV epidemic has reached catastrophic proportions), the decline in trust amounts over 20%.

The estimates also suggest that measures of social distance, such as the Gini coefficient for income inequality, population density and measures of control of corruption, rule of law and government effectiveness are likely to be important determinants of social capital as well. The findings reported are subject to several caveats i.e. problems of data availability, measurement error, omitted variables and limitations of econometric techniques. Nonetheless, the negative impact of HIV prevalence on social capital is reasonably robust to changes in explanatory variables, estimation methods and sample composition.

The HIV/AIDS epidemic represents a significant barrier to development on a number of dimensions. The implications of the disease in terms of productivity, human capital, savings and fiscal policy among others, have been subject to significant empirical scrutiny. This study intended to fill a gap in terms of assessing and confirming the empirical importance of the impact of the disease on social capital. It provides another

reason to support the validity of efforts being undertaken to address the potentially large social impact of the HIV/AIDS epidemic on development. Therefore, it highlights an additional channel that needs to be considered in the policy debate and prompts the need for further work in this area. For instance, future research should concentrate on designing a theoretical model linking HIV/AIDS, social capital and economic growth as well as exploring further the association between income inequality, HIV/AIDS and social capital.

Table 1: HIV/AIDS and Social Capital OLS Estimates

	1	2	3	4	5	6	7	8	9	10	11	11a	11b
HIV	-0.734***	-0.771***	-0.851***	-0.766***	-0.760**	-0.986*	-0.483**	-0.605**	-0.424*	-0.507**	-0.575**	-0.610**	-0.373**
	(0.200)	(0.199)	0.200	0.193	0.241	0.357	0.250	0.311	0.229	0.254	0.272	0.272	0.165
Control corruption		1.977	4.665**										
		2.171	1.624										
Rule of law				5.248**	5.216***	5.740***	4.650***	7.010**	3.963	5.402**	7.424***	6.486***	6.928***
				1.625	1.467	1.596	1.567	2.168	3.909	1.642	1.870	1.729	1.683
Ethnic fraction					-0.394								
					6.889								
Linguistic fraction						9.247							
						6.823							
GINI							-11.148*	-12.953**	-12.981***	-10.253	-17.999***	-15.045***	-15.277***
							6.485	6.170	6.689	6.553	7.177	6.761	5.921
Education								-5.788					
								4.255					
Initial income									0.812				
									3.608				
Population dens										-2.565***	-3.017***	-2.646***	-2.434***
										0.671	0.621	0.594	0.674
Age											-0.629**	-0.550**	-0.334
											0.324	0.312	0.284
Scandinavian	29.027***	27.737***	27.443***	27.301***	27.255***	28.254***	25.467***	23.237***	24.840***	23.989***	22.246***		
	3.445	4.009	4.011	3.753	4.063	4.026	4.182	4.630	4.361	4.299	4.324		
Nordic												25.428***	24.468***
												3.715	3.420
LDC	-10.853***	-7.068**											
	3.163	3.635											
Constant	34.341	31.365	25.865	25.212	25.361	22.302	64.474	80.201	64.660	61.622	106.433	93.566	86.719
	2.613	3.376	1.655	1.696	2.605	1.988	22.838	23.057	39.414	23.101	30.656	28.663	25.927
N	79	78	78	78	78	76	75	65	72	73	72	72	70
R-squared	0.381	0.385	0.358	0.37	0.390	0.412	0.425	0.466	0.435	0.444	0.466	0.508	0.643
RESET	0.6535	0.039	0.0382	0.087	0.081	0.472	0.044	0.3271	0.115	0.020	0.019	0.111	0.080

The dependent variable is trust. White-corrected standard errors in parentheses. *** , ** and * denote statistical significance at the 1%, 5% and 10% level. N is the number of observations. RESET refers to p-values for the Ramsey's RESET (Ho is that the model is linear). 11b excludes Iran and Indonesia .

Table 2: HIV/AIDS and Social Capital Sensitivity Analysis

	12	13	14	15	16	17	18	19	20	21
	OLS	OLS	OLS	OLS(LDC)	2SLS	2SLS	2SLS[a]	3SLS	2SLS(LDC)	2SLS[a](LDC)
HIV	-0.513**	-0.604**	-0.503	-0.548**	-0.834**	-0.861*	-0.690*	-1.066*	-1.024*	-0.815*
	(0.258)	(0.284)	(0.325	(0.271	(0.500)	(0.492)	(0.416)	(0.576)	(0.572)	(0.466)
						4.291**	3.724**	1.991		
						(1.486)	(1.456)	(2.288)		
Rule of law				-2.236	4.438**				-2.476	-2.212
				(2.563)	(1.518)				(2.495)	(2.415)
Govt Effectiv	8.522***									
	(1.906)									
Voice & Account		4.251*								
		(2.528)								
Law & Order			3.395*							
			(1.794)							
GINI	-22.565**	-15.845*	-13.766	-6.283	-7.483	-7.816	-8.451	-39.432***	-4.9673	-4.871
	(7.138)	(8.332)	(9.928)	(6.059)	(7.120)	(7.206)	(6.343)	(9.230)	(7.074)	(6.303)
Population dens	-3.722***	-0.903	-1.624**							
	(0.701)	(0.560)	(0.729)							
Age	-0.846**	-0.302	-0.258							
	(0.375)	(0.332)	(0.447)							
Scandinavian	21.092***	27.713***	26.339***							
	(3.835)	(4.744)	(4.908)							
Nordic					27.359***	26.698***	28.212***			
					(3.735)	(4.011)	(3.876)			
Constant	128.079***	90.394***	70.987*	44.857**	51.912**	53.496***	55.248***	172.138***	40.889*	40.193*
	(31.603)	(35.514)	(39.460)	(21.127)	(24.681)	(25.006)	(22.092	(34.161)	(24.302)	(21.782)
Observations	72	73	59	50	70	70	75	26	47	50
R-squared	0.509	0.373	0.420	0.091	0.489	0.484	0.471	0.454	0.072	0.083
RESET	0.037	0.268	0.314	0.527	0.136	0.195	0.280		0.0510	0.157
Shea partial R^2					0.595	0.600	0.566		0.609	0.569
Cragg-Donaldson					0.004	0.004	0.002		0.004	0.003
Hansen J					0.167	0.221			0.195	

The dependent variables is trust. White -corrrected standard errors in parentheses. *** , ** and * denote statistical significance at the 1%, 5% and 10% level. N is the number of observations. RESET refers to p-values for the Ramsey RESET test for OLS or the Ramsey/Pesaran-Taylor RESET test for 2SLS. HIV instrumented by circumcision rate and Sub-Saharan African dummy except in [a] where only the latter is used as instrument. In 3SLS, HIV instrumented by Sub-Saharan Africa and rule of law instrumented by settler mortality. Cragg-Donaldson refers to p- values for validity of excluded instruments in the first stage regression. Hansen J refers to p-values for testing overidentifying restrictions

References

Acemoglu, D., Johnson S. and Robinson J.A. (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation," *The American Economic Review*, Vol. 91, No. 5, December, pp1369-1401.

Alesina, A. and La Ferrara, E. (2002) "Who Trusts Others?" *Journal of Public Economics*, 85, pp207-234.

Alesina, A., Devleeschauwer A., Easterly W. and Kurlat S. (2003) "Fractionalization", *Journal of Economic Growth*, vol. 8, no. 2, June, pp. 155-194.

Allum N., Patulny R, and Sturgis P (2007) "Re-evaluating the Links Between Social Trust, Instituional Trust and Civic Association", Social an Political Trust Briefing paper No 2, Department of Sociology, University of Surrey,. UK

Barr, A. (2000) "Social capital and Technical Information Flows in the Ghanaian Manufacturing Sector", Oxford Economic Papers, Vol.52, pp 539-559.

Barro, R.and J. Lee (2000) "International Data on Educational Attainment: Updates and Implications", CID Harvard University, Working Paper 42, April, Cambridge: MA.

Beegle K and de Walque D, (2008) "The Study of Socioeconomic Status and HIV/AIDS Incidence and Prevalence in Africa", World Bank, mimeo, Washington, DC.

Bell C., Devarajan S. and H. Gersbach (2004) "Thinking about the Long-Run Economic Costs of AIDS" " in Haacker, M (ed.) "*The Macroeconomics of HIV/AIDS*" International Monetary Fund, Washington: DC.

Bell, C., Bruhns R. and Gersbach H. (2006) "Economic Growth, Education and AIDS in Kenya: A Long-Run Analysis", World Bank Policy Research Working Paper 4025, October, Washington: DC.

Beugelsdijk, S., de Goort H. And van Shaik A.. (2004) "Trust and Economic Growth: a Robustness Analysis", Oxford *Economic Papers*, 56, 118-134.

Bjornskov, C. (2006) "The Multiple Facets of Social Capital",*European Journal of Political Economy*, Vol.22, 22-40.

Campbell, C.., Williams B. and Gilgen D. (2002) "Is Social Capital a Useful Conceptual Tool for Exploring Community Level Influences on HIV Infection? An Exploratory Case Study from South Africa." , *AIDS Care*, Vol. 14, Issue 1, February, pp 41 – 54.

Collier, P. (2002) "Social Capital and Poverty: a Microeconomic Perspective" in Grootaert C., Van Bastelaer T and R. Putman (eds) *"The Role of Social Capital in Development: An Empirical Assessment"*, Cambridge University Press.

Crosby, R A and Holtgrave, D R (2003) "HIV/AIDS and Inequality: What Do We Know?" *Sexually Transmitted Infections*; Vol.79, pp:62–64

Cuddington J.T. (1993) "Modeling the Macroeconomic Effects of AIDS, with an Application to Tanzania", *The World Bank Economic Review*, Vol . 7, No.2, pp 173-189.

Dasgupta, P. (2005) "The Economics of Social Capital", *The Economic Record*, Vol. 81, No. 255, August, S2–S21.

Drain P K, Smith J S, Hughes J P, Halperin D T, Holmes KK (2004) "Correlates of National HIV Seroprevalence:. An Ecologic Analysis of 122 Developing Countries" Journal *of Acquired Immunodeficiency Syndrome,* Vol 35, No.4, April, pp 407-420
.

Delhey ,J. and Newton, K(2005) "Predicting Cross-National Levels of Social Trust: Global Pattern or Nordic Exceptionalism? ", *European Sociological Review* **,** Vol 21, Number 4, September, pp311-327

Dollar, D. and Kraay, A. (2002) "Institutions, Trade and Growth", Carnegie Rochester Conference Series on Public Policy, July.

Drain, P., Halperin D., Hughes J., Klausner J. and Bailey R. (2006) "Male Circumcision, Religion and Infectious Disease: an Ecology Analysis for 118 Developing Countries", *BMC Infectious Disease*, 6: 172.

Durlauf, S. (2002) "On the Empirics of Social Capital", *Economic Journal*, 112, F459-79.

Field, J (2003) "*Social Capital*", Routledge, London and New York.

Foster, G. (2006) "Children who Live in Communities Affected by AIDS", *The Lancet*, 367, 700-01.

Gaffeo, E. (2003) "The Economics of HIV/AIDS: a Survey", *Development Policy Review*, 21 (1), pp.27-49.

Garretsen H., Lensink R. and Sterken E. (2004) "Growth, financial development, societal norms and legal institutions", *Journal of International Financial Markets, Institutions and Money*, 14, 165-183.

Gersovitz M. and Hammer J.S. (2003)" Infectious Diseases, Public Policy and the Marriage of Economics and Epidemiology", *The World Bank Research Observer***,** Vol 18, No2, pp129-157

Glaeser E.L., Laibson D. and Sacerdote B. (2002) "An Economic Approach to Social Capital", *The Economic Journal*, Vol 112, November, F437-F458.

Guiso, L., Sapienza P. and Xingales L. (2004) "The Role of Social Capital in Financial Development", The American Economic Review. Vol. 94, No. 3: 526-556.

Guiso, L., Sapienza P. and Xingales L. (2007) "Social Capital as Good Culture", NBER Working Paper 13712, Cambridge MA.

Haacker, M. (2004) "HIV/AIDS: The Impact on the Social Fabric and the Economy" in Haacker, M (ed.) "*The Macroeconomics of HIV/AIDS*" International Monetary Fund, Washington: DC.

Holtgrave, D.R. and R.A. Crosby (2003) "Social Capital, Poverty, and Income Inequality as Predictors of of Gonorrhoea, Syphilis, Chlamydia and AIDS case rates in the United States", *Sexually Transmitted Infections*, Vol 79, pp 62-64.

Kalemli-Ozcan, S. (2006) "AIDS, Reversal of the Demographic Transition and Economic Development: Evidence from Africa", NBER Working Paper No.12181, April, Cambridge: MA.

Katungi , E. Edmeades S. and Samle M. (2006) "Gender, Social Capital and Information Exchange in Rural Uganda", Collective Actions and Property Rights (CAPRI) Working Paper No 59, Washington DC.

Kaufmann, D., Kraay A. and Mastruzzi M. (2006) "Governance Matters V: Aggregate and Individual Governance Indicators 1996-2005", World Bank Policy Research Working Paper No. 4012, September, Washington, DC.

Knack, S. and Keefer, P. (1997) "Does Social Capital Have an Economic Payoff? A cross-country investigation", *Quarterly Journal of Economics*, 107, 1252-1288.

Knack, S. (2002) "Social Capital and the Quality of Government: Evidence from US States", Journal *of Political Science,* 46, 772-785.

Li Y, Pickles A. and Savage M.(2005), "Social Capital and Social Trust in Britain", *European Sociological Review*, Vol. 21, No. 2, April, pp 109-123.

Murray M.P. (2006) "Avoiding Invalid Instruments and Coping with Weak Instruments", *Journal of economic Perspectives*, Vol. 20, No.4, Fall, pp111-132.

Plot P., Greener R and Russell S, 2007, "Squaring the Circle: Aids, Poverty and Human Development", PLoS Medicine, Vol. 4, No 4, pp.1571-1575.

Poortinga, W (2006) "Social Capital : An Individual or Collective Resource for Health?" *Social Science & Medicine*, Vol.62, pp292-302.

Putnam, L. (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, N J.

Routledge, B. and von Amsberg, J. (2003) "Social Capital and Growth", *Journal of Monetary Economics*, Vol. 50, 167–193.

Rothstein B.and Uslaner E. M (2005) "All for ALL: Equality, Corruption and Social Trust", *World Politics*, Vol 58, pp41-79

Sabatini, F. (2006) "The Empirics of Social Capital and Economic Development: a Critical Perspective", Fondazione Eni Enrico Mattei Nota di Lavoro 15.2006, January.

Temple, J. (1998) "Initial Conditions, Social Capital and Growth in Africa", Journal *of African Economies*, Vol. 7, N.3, 309-347.

Werker et al. (2006) "Male Circumcision and AIDS: The Macroeconomic Impact of a Health Crisis." Harvard Business School Working Paper, No. 07-025, Cambridge: MA.

WHO (2007) "Information Package on Male Circumcision and HIV Prevention: Insert 2" available at www.who.org

Wobst, P.and Arndt C. (2004) "HIV/AIDS and Labor Force Upgrading in Tanzania", *World Development*, Vol 32, No.11, pp831-1847

Young, A. (2005) "In Sorrow to Bring Forth Children: Fertility amidst the Plague of HIV", Graduate School of Business, University of Chicago, manuscript.

Zak, P. and Knack, S. (2001) "Trust and Growth", *The Economic Journal* , 111, April 295-321.

UNAIDS (2007) "Q&A on HIV\AIDS Estimates", in http://data.unaids.org/pub/EPISlides/2007/071118_qa_methodology_backgrounder_en.pdf

Appendix A

List of Countries Included in Regressions

Albania	Ecuador	Korea	Saudi Arabia
Algeria	Egypt	Latvia	Serbia/Montenegro
Argentina	El Salvador	Lithuania	Singapore
Armenia	Estonia	Luxembourg	Slovakia
Australia	Finland	Macedonia	Slovenia
Austria	France	Malta	South Africa
Azerbaijan	Georgia	Mexico	Spain
Bangladesh	Germany	Moldova	Sweden
Belarus	Ghana	Morocco	Switzerland
Belgium	Greece	Netherlands	Tanzania
Bosnia	Hungary	New Zealand	Turkey
Bulgaria	Iceland	Nigeria	Uganda
Brazil	India	Norway	Ukraine
Canada	Indonesia	Pakistan	United Kingdom
Chile	Iran	Peru	United States
Colombia	Ireland	Philippines	Uruguay
Croatia	Israel	Poland	Venezuela
Czech Rep	Italy	Portugal	Vietnam
Denmark	Japan	Romania	Zimbabwe
Dominican Rep	Jordan	Russia	

Appendix B
Data Description and Sources

Variable	Description	Source
HIV	HIV prevalence rate (%) in 2003 or HIV prevalence from pregnant women from 1990-1998 or earliest available thereafter.	World Bank (WDI, World Development Indicators), UNAIDS, US Census Bureau.
Trust	% of valid respondents answering that most persons can be trusted. Latest available data (1996-2003), but also estimates performed with earliest available for each country and averages over different survey waves. .	World Value Survey
Control of corruption	Estimate for 1996 or earliest available.	Governance Matters V dataset, Kaufmann et al. (2006).
Rule of law	Estimate for 1996 or earliest available.	Governance Matters V dataset, Kaufmann et al. (2006).
Government effectiveness	Estimate for 1996 or earliest available.	Governance Matters V dataset, Kaufmann et al. (2006).
Voice & Accountability	Estimate for 1996 or earliest available.	Governance Matters V dataset, Kaufmann et al. (2006).
Law and Order	Average score 1960-1995	ICRG
Ethnic fractionalisation	Various years (1983 to 2001)	Alesina et al. (2003).
Linguistic fractionalisation	Various years (1983 to 2001)	Alesina et al. (2003).
Gini	In logs, average for the period 1980-1997 or earliest available data thereafter.	WDI
Education	In logs, years of education attained for population aged 25 and over in 1985 or earliest available thereafter.	Barro and Lee (2000) and WDI
Initial income	Log of real per capita GDP in 1985, USD at PPP We also tried using 1996 data.	Dollar and Kraay (2000).
Population density	1996 population density (1000 people per sq km)	US Census Bureau
Age	Average age of population in 1996	US Census Bureau
Settler Mortality	In logs, mortality rates by first European settlers in the colonies.	Acemoglu et al. (2001)
Circumcision Prevalence Rate	In logs, percentage of male circumcision (several years)	Drain et al. (2006) and WHO (2007)

Appendix C

Descriptive Statistics

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
Trust	81	27.610	14.885	2.830	66.530
HIV	79	1.035	3.342	0.05	22.11
Rule of Law	80	0.442	1.021	-1.205	2.169
Control Corruption	80	0.377	1.050	-1.200	2.238
Govt Effectiv	80	0.518	1.060	-1.217	2.505
Voice&Acc	81	0.339	0.965	-1.490	1.760
Ethnic Fract	80	0.356	0.228	0.002	0.930
Ling Fract	79	0.313	0.266	0.002	0.923
Law&Order	66	3.941	1.486	1.271	6.000
Gini	76	3.554	0.246	3.073	4.081
Education	69	1.830	0.446	0.631	2.448
Initial Income	78	8.429	0.975	6.263	9.854
Populat dens	78	0.208	0.692	0.002	6.016
Age	78	28.470	6.072	16.610	36.460
Settler Mort	29	4.154	1.196	2.146	7.603
Circumcision	73	0.305	0.174	0.140	0.588

Correlation Matrix

	HIV	Rule of Law	Control Corrupt	Govt Effectiv	Voice & Acc	Ethnic Fract	Ling Fract	Law & Order	Gini	Education	Initial income	Populat dens	Age	Settler Mortal	Circumc	LDC
HIV	1															
Rule of Law	-0.16	1														
Control Corruption	-0.12	0.96*	1													
Govt Effectiv	-0.17	0.96*	0.95*	1												
Voice&Acc	-0.12	0.87*	0.87*	0.88*	1											
Ethnic Fract	0.29*	-0.44*	-0.43*	-0.40*	-0.47*	1										
Ling Fract	0.34*	-0.25	-0.25	-0.21	-0.31*	0.69*	1									
Law&Order	-0.26	0.82*	0.78*	0.77*	0.77*	-0.41*	-0.29	1								
Gini	0.36*	-0.23	-0.23	-0.18	-0.22	0.35*	0.10	-0.51*	1							
Education	-0.33*	0.61*	0.60*	0.62*	0.70*	-0.35*	-0.29	0.70*	-0.43*	1						
Initial Income	-0.29	0.87*	0.85*	0.88*	0.83*	-0.44*	-0.39*	0.77*	-0.23	0.70*	1					
Populat dens	-0.06	0.18	0.20	0.24	0.04	-0.07	0.01	0.06	0.05	-0.03	0.17	1				
Age	-0.31*	0.58*	0.56*	0.60*	0.67*	-0.44*	-0.28	0.77*	-0.64*	0.79*	0.65*	0.02	1			
Settler Mort	0.06	-0.73*	-0.74*	-0.73*	-0.75*	0.40	0.32	-0.59	0.07	-0.66	-0.75	-0.22	-0.71	1		
Circumcision	-0.06	-0.26	-0.26	-0.29	-0.46*	0.22	0.30	-0.42	0.09	-0.34	-0.28	0.13	-0.53	0.20	1	
LDC	0.17	-0.85*	-0.83*	-0.86*	-0.77*	0.43*	0.20	-0.70*	0.22	-0.47*	-0.81*	-0.21	-0.58*	0.69*	0.21	1

*****statistically significant at 1% for two tailed test.