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A Governance Dividend for Sub-Saharan Africa?

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A Governance Dividend for Sub-Saharan Africa?[1]

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Abstract

Countries in Sub-Saharan Africa (SSA) tend to lag those in most other regions in terms of governance and perceptions of corruption. Weak governance undermines economic performance through various channels, including deficiencies in government functions and distortions to economic incentives. It thus stands to reason that SSA countries could strengthen their economic performance by improving governance and reducing corruption. This paper estimates that strengthening governance and mitigating corruption in the region could be associated with large growth dividends in the long run. While the process would take considerable time and effort, moving the average SSA country governance level to the global average could increase the region's GDP per capita growth by about 1-2 percentage points.

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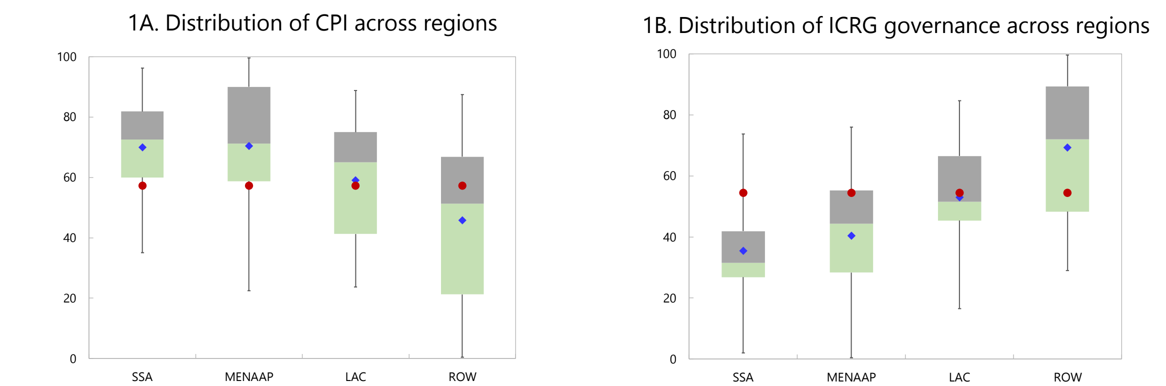
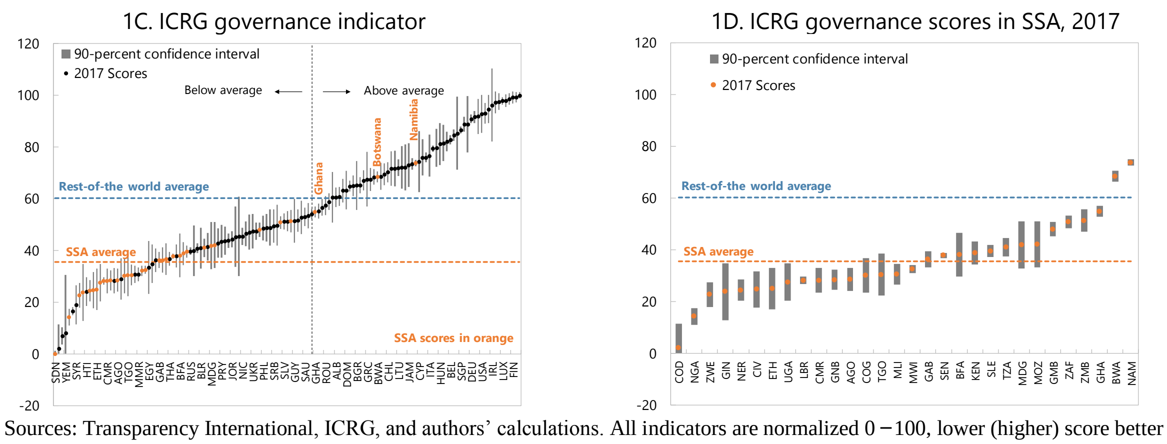
I. Introduction

There is a renewed interest in improving governance and accentuating the fight against corruption globally. The African Union’s aptly chosen theme for 2018 is “*Winning the fight against corruption*”. Similarly, the new leaders coming to power in Angola, Ethiopia and South Africa, among others, have placed the fight against corruption at the top of their agenda. These developments come against the backdrop where SSA countries generally lag those in most other regions in terms of corruption perceptions and governance. The average score of SSA on corruption and governance indicators is similar to the MENAAP but lower than other regions (Figures 1A and 1B). Eighty percent of SSA countries (36 out of 45) score below the global average in the Transparency International’s Corruption Perceptions Index (CPI) and only 3 of the 30 SSA countries included in the International Country Risk Guide’s (ICRG) governance indicator have above average scores (Figure 1C). There is, however, significant intra-regional variation in scores (Figure 1D).[2]

Figure 1: Corruption Perceptions and Governance in SSA and the World



The grey and green areas are middle quartiles. The blue diamond and red dot are regional and world averages, respectively. MENAAP, LAC, and ROW denote, respectively, Middle East/North Africa/Afghanistan/Pakistan, Latin America/Caribbean, and rest of the world.



Sources: Transparency International, ICRG, and authors’ calculations. All indicators are normalized 0 – 100, lower (higher) score better for corruption (governance). Confidence intervals are estimated around 2017 scores using std. deviations for the 5-year period 2012-17.

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[2] Similar results hold across a range of corruption and governance indicators. Following the literature, corruption is defined as “*the abuse of public office for private gain*”. Governance is defined as: “*institutions, mechanisms, and practices through which government power is exercised in a country, including for the management of public resources and regulation of the economy. This includes processes at the country level, including institutions-level structural arrangements*” (IMF, 2017). In this paper, governance indicators are normalized to 0 (worst) – 100 (best), and corruption perceptions indicators to 0 (best) – 100 (worst).

The “institutionalist view” posits that post-independence institutions and administrations in SSA are under-developed and that rent-seeking behaviors are intertwined with weak governance and corruption (Mulinge and Lesetedi, 1998). At the same time, the low scores of SSA countries are not necessarily due solely to a lack of legislative and institutional frameworks, as many countries have adopted legislation that criminalizes corruption and related offences, improved their AML/CFT frameworks, and established specialized anti-corruption agencies. Instead, one can argue that it is likely a combination of limited institutional capacities and weak enforcement of these frameworks that contribute to the heterogeneity in governance performance across SSA.

Weak governance, which is strongly and positively correlated with high corruption perceptions, has been associated with poor economic and social performance. Corruption and weak governance hinder economic performance more directly through various channels, including: higher tax evasion and lower tax revenue, as well as increased central bank financing of government deficits; a shift both in the composition and quality of government spending; potentially poor lending practices and weak financial supervision; and lower investment (IMF, 2016; IMF, 2018). Hence, corruption and weak governance have been put forward as some of the key factors holding back growth and economic development in SSA (e.g., Ndulu and O’Connell, 1999; Collier and Gunning, 1999; and Kilish et al, 2013).

This paper investigates the correlation between overall governance and one crucial dimension thereof, namely corruption, and economic performance in SSA. Our main goal is to test whether weak governance and corruption have any impact on SSA growth. At the same time, it is important to acknowledge that low corruption and good governance are not the sole drivers of growth. Indeed, there are various examples of countries perceived as being poorly governed that have had episodes of strong growth driven by other factors, for example natural resource wealth. In other cases, countries with good governance have not necessarily benefited from strong growth. Our conjecture is that corruption tends more often than not to undermine economic growth, thus behaving more like sand in the wheels rather than oiling the engine. While this paper looks at relationships across a sample of countries, examining exceptions to the trends could help reveal the combinations of factors including weak governance that hold back growth, as well as factors that could mitigate its effects.

We estimate a standard growth model augmented for governance and corruption to assess the impact on GDP per capita growth for 190 countries using 5-yearly observations over the period 1984-2015 in a system generalized method of moments (SGMM) model. In the baseline regressions, we use two measures of governance—ICRG’s Political Risk Rating (ICRG) and an aggregate measure of Kaufmann and Kraay’s (Kaufmann et al, 2010) Worldwide Governance Indicator (WGI), and two indicators of corruption perceptions—the Kaufmann and Kraay’s Control of Corruption Indicator (CCI) and Transparency International’s CPI.[3] We focus on SSA but also try to tease out whether growth in the region is impacted differently by weak governance and corruption relative to other regions and country groups. To the extent possible, we also account for the concerns relating to the

[3] Section IV justifies this choice and gives a detailed description of these indicators. Also see http://info.worldbank.org/governance/wgi/index.aspx#home.

definition of governance and corruption, non-linearities, and potential endogeneity problems. We conduct a range of sensitivity analysis to ascertain that the results remain robust to both changes in time periods and alternative governance indicators. We also split the sample to assess whether countries with weaker governance or higher corruption are any different from the rest.

The main findings point to an adverse correlation between weak governance/corruption and growth that is both statistically and economically meaningful and has a higher impact in SSA. These estimates are generally robust to various sensitivity checks, including to alternative measures of governance, sample period, country groupings, and specifications that control for omitted variables bias. Our baseline models also survive nearly all the tests performed to better control for endogeneity.

While the estimated correlations between governance/corruption and growth do not prove causation, they do suggest the following:

- *The impact of weak governance on GDP per capita growth is stronger in SSA relative to the rest of the world and bringing governance to the world average could increase GDP per capita by an estimated 1 to 2 percentage points*. An improvement in governance of about one-standard deviation in the SSA sample[4]—which for an average SSA country would result in governance converging to the world average—is associated with an increase in GDP per capita growth of about 1–2 percentage points, depending on the governance indicator. This observed impact is two to three times larger than for the average country in the rest of the world and stronger than the impact estimated for other regions like Latin American (LAC) and North Africa/Middle East/Afghanistan/Pakistan (MENAAP) that are also perceived to have weak governance. Admittedly, the process of institutional reforms will take considerable time and effort, but the results indicate a dividend from these efforts.[5] Results from other studies globally suggest a broadly similar impact from governance improvements in SSA.
- *Corruption also has a deleterious impact on SSA countries relative to the rest of the world and bringing corruption to the world average could increase GDP per capita by 1 percentage point*. An improvement in corruption perceptions in the average SSA country by about one standard deviation in the SSA sample—which would bring it to the world average—is associated with an increase in GDP per capita growth of about 1 percentage point. This impact is comparable to that estimated for other regions like MENAAP that are also perceived to have high corruption perceptions.

[4] One standard deviation in the SSA sample for both governance and corruption perceptions is equivalent to 10 percentage points if all scores are normalized to 0-100.

[5] All estimated growth dividends in this paper are long-term gains. Measuring the exact time that is required for these gains to materialize is beyond the scope of this paper, but it will depend to a large extent on the starting point of the countries and the overall political commitment to the process. Giavazzi and Tabellini (2005) estimate that economic and political liberalization, which is typically associated with improved governance, takes at least three years to affect governance and corruption perceptions.

- *There is a nonlinear correlation between governance/corruption and growth for both the overall and SSA samples, with stronger correlations with weaker governance or higher corruption perceptions.* Unsurprisingly, growth is more adversely affected in SSA countries with more acute governance and corruption problems. SSA countries with governance (corruption perceptions) scores below (above) 60—about 75 percent of SSA country-years in both samples—stand to benefit the most by addressing governance and corruption problems. The non-linear models suggest that growth gains could be twice as large as the baseline for those SSA countries with very low (high) governance (corruption) scores (e.g. at 5th and 95th percentile of the respective distributions).
- *Other specific dimensions of governance such as rule of law, regulatory quality and government accountability—which we see as proxies for transmission channels of governance—are also positively correlated with growth, and their improvement may also yield sizeable gains.* The estimated growth gains from a 10-point improvement in these specific components of governance range from ¾ percentage point for *rule of law* to about 1 percentage point for *voice and accountability*. These gains are non-additive, but the overall impact could be higher due to potential complementarities across the different channels.

Based on a review of the literature, this paper is probably among the first to exhaustively explore the link between governance and growth and provide comprehensive estimates of the correlation between multiple aspects of governance and growth for SSA. We also explore a wide set of governance indicators and rely on a comprehensive and updated sample to ensure robustness. Research has typically focused on selected dimensions of governance (e.g., political instability, as in Mo, 2001) and worldwide samples. More recently, Kilish et al (2013) found that the quality of regulation and the rule of law have a significant impact on SSA growth.

The evidence gathered in this paper suggests that the correlation between governance/corruption and growth in SSA could be stronger than in other regions. While not entirely conclusive, our non-linear results suggest that very low (high) levels of governance (corruption perceptions) are more detrimental to growth. Because corruption is perceived to be severe in SSA, our non-linear estimations point to a clear negative correlation between corruption and growth in most SSA countries. Saha et al (2017), among others, also provide similar findings.[6] We conjecture that there are unmeasured characteristics reflecting factors such as the capacity of the institutions and rent-seeking in resource-rich sectors that partly explain the amplified growth impact of corruption and governance in SSA. The study of exceptions to these patterns could help reveal these explanatory factors but is beyond the scope of this paper.

Our baseline corruption-growth nexus estimates are in the ballpark of other empirical investigations, including those using more advanced techniques to control for model uncertainty (IMF, 2018). Gyimah-Brempong (2002) estimate that a one standard deviation improvement in corruption in African countries would increase per capita income growth by

[6] Swaleheen (2011) also finds a non-linear relationship between corruption and growth but his evidence suggests that corruption is more beneficial to growth at higher levels.

about ¾ percentage point. Roughly identical estimate is also obtained from Gyimah-Brempong and de Camacho (2006) who estimate a model somewhat similar to ours and also find the impact of corruption on growth being stronger in SSA and LAC than in other regions. Similarly, Ugur and Dasgupta (2011) find that a one-unit improvement in corruption perceptions (equivalent to roughly one standard deviation if measured by CCI) would increase annual GDP per capita growth by about 0.6 percentage point in low-income countries (LICs), and almost 0.9 percentage point in a “mixed” sample of LICs and non-LICs.

Our findings emphasize the importance of buttressing the fight against corruption and striving to improve governance. However, how countries should go about doing this is very much a country-specific issue reflecting the interaction between the various players—government, institutions, civil society, media and the private sector—and the determination of the authorities to credibly advance these reforms, as well as the institutional capacities of the anti-corruption agencies, judicial system, and accountability and oversight entities.

Researchers have shown that there is no “one-size-fits-all” approach to improving governance and reducing corruption (e.g., Klitgaard, 1988; Mungiu-Pippidi and Johnston, 2017). The experience of countries like Botswana, Chile, Estonia, and Georgia, suggests that multiple factors may have contributed to their success, including political will, measures to reduce opportunities of corruption (e.g., lower red tape and trade barriers), and measures to increase constraints on corrupt behavior (e.g., independent judicial system, pressure from civil society) and improve fiscal institutions (greater fiscal transparency and controls). Further study of the transmission channels and the exceptions to the general tendencies could help shed light on what measures would yield the biggest impact.

Consistent with the lessons from the success stories, the process could be facilitated by putting in place independent and credible institutions that improve both transparency and accountability, while allowing for a better monitoring and prosecution of corrupt behavior. Moreover, enforcing laws that are in line with best practices—including those that level the playing field and thus reduce the scope for rent-seeking—and an independent judiciary can support the process. Additionally, there are some basic governance principles that apply across countries—including improving the regulatory quality and government effectiveness and strengthening fiscal institutions—that could deliver significant gains. Irrespective of the specific path countries choose, this paper suggests that the dividends from improving governance and reducing corruption are likely to be significant.

An in-depth examination of how to fight corruption or improve governance, as well as how long it takes to reap the growth gains, is largely beyond the scope of this paper. However, it is addressed to some extent by IMF (2016, 2017, 2018), amongst others.

The rest of this paper is structured as follows. Section II provides a brief literature review; section III looks at some stylized facts; section IV focuses on the empirics using aggregate indicators of governance; section V unbundles governance and looks at specific governance channels; section VI discusses potential non-linearities in the growth-governance (corruption) nexus; and section VII concludes.

II. Brief Literature Review

Multiple channels have been put forward to explain how corruption is detrimental to growth and development. Corruption is often the result of weak governance coupled with distorted economic incentives and weak institutions. Shleifer and Vishny (1993) argue that corruption is the result of multiple government agencies imposing independent bribes on private agents seeking public services (e.g., permits), and is akin to a distortionary tax on the private sector. Hence, corruption tends to divert resources from human capital-enhancing expenditures (e.g., education and health) into less-growth enhancing areas (e.g., defense) or areas with greater opportunity for graft (e.g., public procurement), while discouraging entry, competition, and innovation.

Empirically, Mauro (1995) found that corruption adds to the cost of business and introduces significant uncertainty in the decision-making process. Corruption can also undermine the efficiency of fiscal institutions and lead to sub-optimal budgetary processes and spending compositions, with broader spillovers on the economy. The main channels relate to (also see IMF, 2018):

- *weakened state capacity to mobilize revenue* by undermining tax compliance, for instance by avoiding paying taxes through bribes (Ghura, 1998; Baum et al, 2017);
- *distorted composition of government spending* towards items that are wasteful/allow for easier capture of rents and bribes (e.g., military spending), at the detriment of investment in human capital such as education and health care and other growth-enhancing spending (Tanzi and Davoodi, 1997; Mo, 2001); and
- *depressed private investment*—corruption increases uncertainty and acts as a distortionary tax on private investment (Mauro, 1995), while higher public investment, despite its positive impact on infrastructure, allows for the capture of more bribes and become highly inefficient when management practices are weak (Tanzi and Davoodi, 1997; also see Gupta et al, 2005, for a summary of earlier findings).

Corruption can also set in motion a vicious circle which further exacerbates economic and social vulnerabilities. For instance, by lowering spending on education and health, corruption disproportionately affects the poor who rely more on social services thus entrenching poverty and inequality (Gupta et al, 2002; Hindriks et al, 1998; Johnston, 1989; and Li et al, 2000). Corruption can also contribute to lax lending standards and weak supervision, which can contribute to poor lending practices, and lead to weakened bank portfolios and precipitate financial crises (IMF, 2016, 2018). In extreme cases, corruption exhausts fiscal capacity and the state can lose its legitimacy leading to fiscal and political crises (Mo, 2001). Similarly, disregard for property rights and expropriation of private capital could lead to collapse of investment and job creation, thus fueling social unrest.

The negative impact of corruption on growth is economically relevant. For instance, the elasticities estimated by Gyimah-Brempong (2002) using a sample of African countries imply that a one standard deviation improvement in corruption in Africa would increase per capita income growth by about ¾ percentage point annually. Gyimah-Brempong and de Camacho (2006), estimating a model somewhat like ours that interacts regional dummies with corruption, find that the impact of corruption on growth is stronger in SSA and LAC than in other regions. Ugur and Dasgupta (2011) conduct a meta-analysis of the impact of corruption on growth and find that a one-unit improvement in corruption perceptions—equivalent to a one standard deviation as measured by the CCI and ICRG corruption indicators—would increase annual GDP per capita growth by about 0.6 percentage point in low-income countries (LICs), and almost 0.9 percentage point in a “mixed” sample of LICs and non-LICs.

Poor governance or weaknesses stemming from specific aspects of governance have also been found to affect growth. Mauro (1995) finds a positive correlation between growth and a composite measure of bureaucratic efficiency (corruption, red tape, and efficiency of the judicial system). Kilish et al (2013) find that the quality of government regulation and the rule of law are positively correlated with economic performance in SSA. Weak governance associated with political instability, lack of political pluralism, and deficient public services have been long associated with low capital accumulation and growth in SSA (e.g., Collier and Gunning, 1999; and Ndulu and O’Connel, 1999).

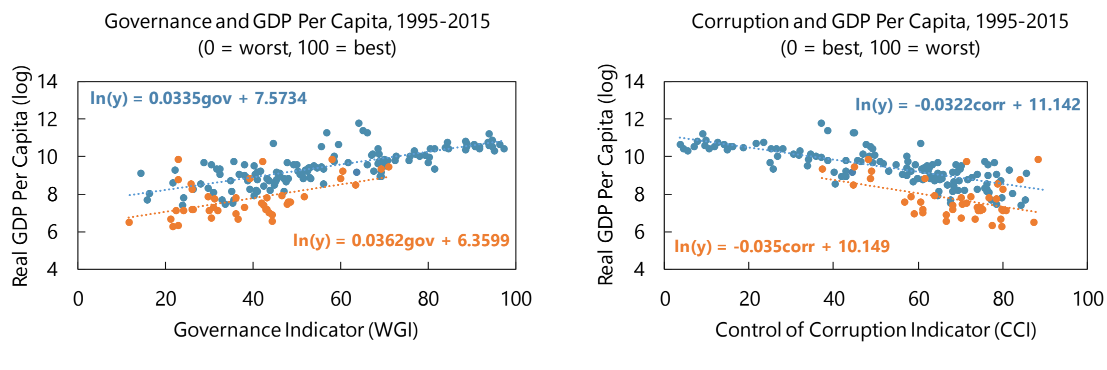
III. Stylized Facts

SSA countries tend to score unfavorably on corruption perceptions and governance. With many SSA countries also among the poorest, there is a natural question as regard causality: does weak governance stunt growth and development, or does lower development hinder countries' capacity to have the institutions needed to improve governance? In this section, we take a first look at these correlations and explore potential transmission channels at play.

Weaker governance and higher corruption are associated with lower levels of development

The data shows an unconditional positive (negative) correlation between governance (corruption perceptions) and real GDP per capita both in SSA and the rest of the world (Figure 2). The scatterplots confirm that on average SSA countries have weaker governance, higher corruption perceptions, and lower development. These facts would suggest that weak governance and corruption may partly explain the income differential between SSA and other regions.

Figure 2: Governance and Corruption Perceptions and Level of Development

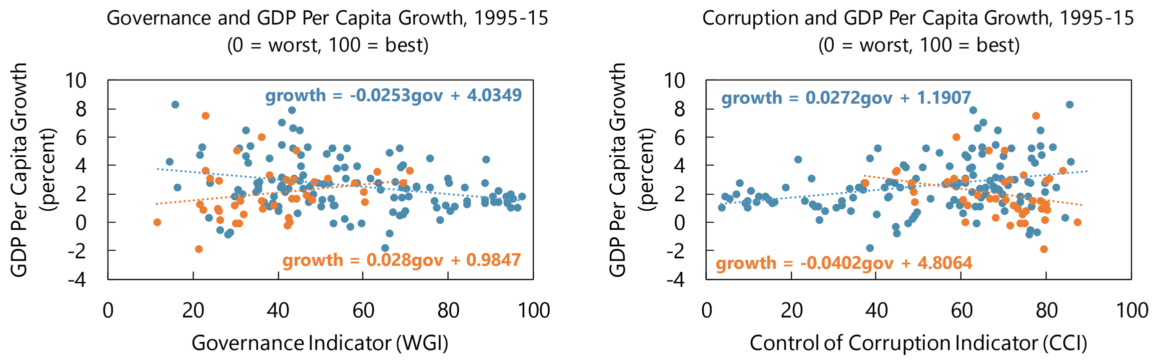


Sources: Kaufmann and Kraay, Penn World Tables, and authors' calculations. Orange dots denote SSA countries and blue dots denote the rest of the world. Dotted lines are fitted linear trends. Higher CCI scores mean higher levels of perceived corruption.

Weaker governance and higher corruption are associated with lower growth in SSA

The data show a positive (negative) unconditional correlation between governance (corruption perceptions) and growth in the SSA region (Figure 3). These correlations look weaker and even have the opposite sign for the rest of the sample. They also hold for SSA when controlling for income level but are about zero for the other countries. This suggests that weak governance (and corruption perceptions) may be preventing SSA from catching up with the rest of the world.

Figure 3: Governance and Corruption Perceptions and Growth

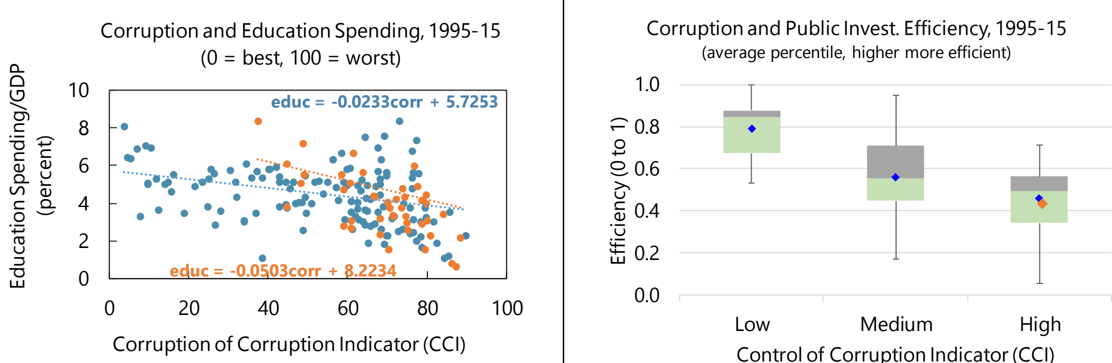


Sources: Kaufmann and Kraay, Penn World Tables, and authors' calculations. Orange dots denote SSA countries and blue dots denote the rest of the world. Dotted lines are fitted linear trends.

Higher corruption is associated with worsened fiscal performance

Higher corruption perceptions are negatively associated with education spending and lower quality of public investment in the overall sample and more so in SSA, in line with the literature (Figure 4). Our regression model, presented in the next section, includes schooling and total investment as drivers of growth. Hence, it would capture the indirect impact of corruption on growth through these two variables.

Figure 4: Corruption Perceptions and Fiscal Outcomes



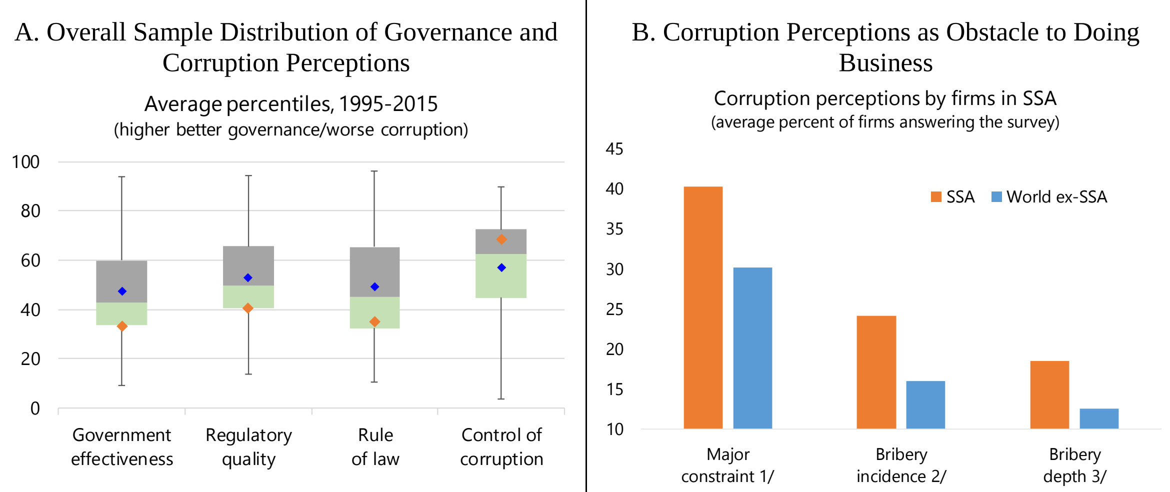
Sources: Kaufmann and Kraay, WEO, Fund staff, and authors' calculations. In the first panel, orange dots denote SSA, blue dots denote rest of the world. In the second panel, "low", "medium" and "high" denote the bottom, medium and top third of the distribution of CCI, respectively; green and gray areas are the second and third (from the bottom) quartiles of the sample distribution, respectively; and blue and orange diamonds denote the overall sample and the SSA average, respectively. The measure of public investment efficiency is described in IMF (2015a).

SSA lags behind relative to peers in most granular measures ('channels') of governance

Besides corruption, we also investigate the correlation between other granular measures of governance—*voice and accountability*, *government effectiveness*, *regulatory quality*, and *rule of law*—and GDP per capita growth.

SSA countries have low scores across most dimensions of governance may be suggesting some deeper region-specific driving force(s) at work, perhaps fragile institutions, or perhaps the fact that corruption might have become entrenched in everyday expectations (Figure 5).

Figure 5: Sample Distribution of Governance and Corruption Perceptions



Sources: WGI and authors' calculations.
Green and gray areas are the second and third (from the bottom) quartiles of the sample distribution, respectively. The blue diamond and orange dot are the sample and SSA averages, respectively.

Source: World Bank Enterprise Survey (most recent since 2010).
1/ Major or very severe constraint to doing business.
2/ Bribe payment request.
3/ Gift/informal payment request in public transactions.

We also note that these 'governance channels' are strongly correlated with measures of corruption perceptions (Table 1). Thus, improvements in specific aspects of governance that lead to lower corruption, would also mitigate the fiscal and social costs of corruption.[7]

Table 1: Correlation Between Governance and Corruption Perceptions in SSA, 1995-2015

	ICRG	WGI	Voice and accountability	Government effectiveness	Regulatory quality	Rule of law	CCI	CPI
ICRG	1.00							
WGI	0.93***	1.00						
Voice and accountability	0.81***	0.91***	1.00					
Government effectiveness	0.86***	0.94***	0.81***	1.00				
Regulatory quality	0.84***	0.91***	0.81***	0.91***	1.00			
Rule of law	0.89***	0.98***	0.83***	0.92***	0.87***	1.00		
CCI	-0.85***	-0.91***	-0.75***	-0.87***	-0.76***	-0.91***	1.00	
CPI	-0.79***	-0.91***	-0.79***	-0.88***	-0.76***	-0.89***	0.94***	1.00

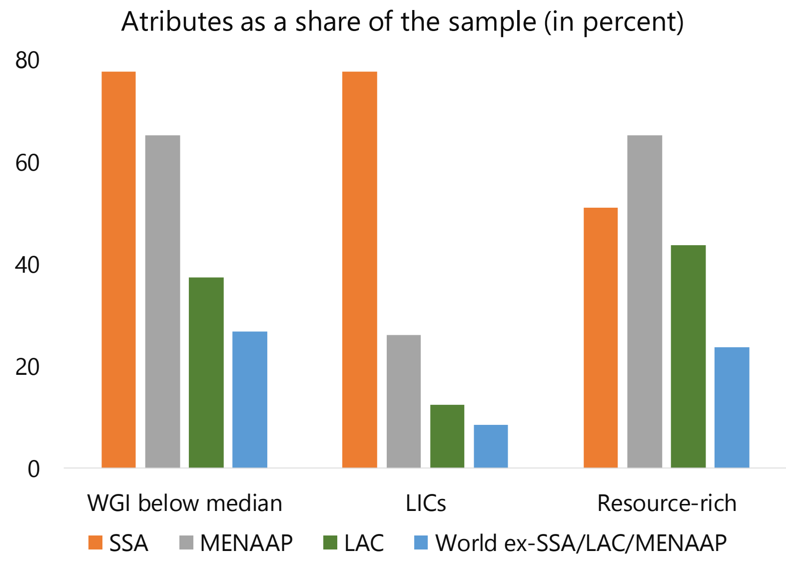
Sources: ICRG, Kaufmann and Kraay, Transparency International, and authors' calculations.
Note: ICRG = ICRG overall governance indicator, WGI = Worldwide governance indicator, CCI = Control of Corruption Indicator, and CPI = Corruption Perceptions Index. *** denotes significant at 1-percent level.

[7] The high correlation between corruption perceptions and overall measures of governance also arises by construction as corruption perceptions are included in most aggregate governance indices including ICRG and the WGI used in this paper (see further details in Section IV).

Other attributes, e.g., resource intensity, may be linked to higher incidence of corruption

Most SSA countries have weak governance scores and are LICs or resource intensive compared to other regions except for MENAAP and to a less extent LAC (Figure 6).[8] As proposed in the literature on "resource curse" (e.g., Sachs and Warner, 1995), countries with abundant natural resources tend to grow slower than resource-scarce economies. The large economic rents generated by resource-rich sectors such as oil—often controlled by state-owned companies subject to political interference—can expose resource-rich countries to higher levels of corruption, especially when institutions are weak (OECD, 2014, 2016).

Figure 6: SSA Sample Attributes



Sources: WEO, and authors' calculations. The country group description is provided in the Appendix.

[8] For a recent analysis of corruption problems and anti-corruption policies in Latin America see https://blogs.imf.org/2017/09/21/corruption-in-latin-america-taking-stock/.

IV. EMPIRICAL ANALYSIS

A. Identification Strategy

We follow the literature and estimate a standard growth regression, augmented for governance and using an unbalanced panel comprising of 190 countries over the period 1984-2015.[9] The baseline specification is the following:

$$g_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 GOV_{it} SSA + \beta_3 SSA + \boldsymbol{B}'\boldsymbol{X_{it}} + \boldsymbol{\tau}_t + \mu_i + v_{it} \qquad (1)$$

where g is real GDP per capita growth, *GOV* is governance (or corruption perceptions), *SSA* is a dummy variable for the SSA region, $\boldsymbol{X}$ is a column vector of country-specific explanatory variables that for now are assumed to be strictly exogenous, $\boldsymbol{\tau}$ denotes time-fixed effects, and μ and v denote unobserved country fixed effect and error term, respectively. Subscripts $i = 1, 2, \ldots, N$, and $t = 1, 2, \ldots, T$ index country and time, respectively.

Vector $\boldsymbol{X}$ includes controls that have been typically considered by similar studies in the literature: *initial GDP per capita, investment, schooling, inflation, and terms of trade.* But we also test the robustness of our model to alternative choices.

Because OLS does not account for potential endogeneity of the right-hand side variables, the baseline model was estimated using robust two-step SGMM (Blundell and Bond, 1998; Roodman, 2009). The system includes the level and difference versions of equation (1). We treat investment and lagged growth (included in alternative specifications) as endogenous and consider the remainder (initial income, education, inflation, terms of trade, governance/corruption, and time and regional dummies) as exogenous for the time being. For the differenced equation, the estimator uses as instruments lagged values of endogenous and predetermined variables and current and lagged values of differenced exogenous variables. For the level equation, it uses as instruments lagged values of differenced endogenous and predetermined variables and current and lagged values of exogenous variables.

In the above setup, endogenous regressors are valid instruments if their differences are uncorrelated with the fixed effects and the error term. Hence, for a variable x_{it} we assume that

$$E[\Delta x_{it-1}(\mu_i + v_{it})] = E(\Delta x_{it-1}\mu_i) + E(x_{it-1}v_{it}) - E(x_{it-2}v_{it}) = 0, \forall i, t,$$

where each of the three terms on the right-hand side is equal to zero. Since this is equivalent to assuming that the error term is not serially correlated, we test for the absence of second-order serial correlation of the error term. We also report the Hansen test of over-identifying restrictions, of whether the instruments, as a group, are valid.

The use of level and differenced instruments and a two-step estimator increase efficiency. The SGMM estimator is suitable for panel data like ours that has a short time dimension (small T) and a large country dimension (large N) and contains country fixed effects and idiosyncratic errors that are possibly heteroskedastic and correlated within but not across

[9] The number of observations in the regression sample varies depending on data availability and model specification. The baseline sample covers 1995-2015.

countries. We also conduct additional tests to check for endogeneity of governance and corruption perceptions.

The coefficients of interest are β_1 and β_2. Both are expected to be positive for governance and negative for corruption perceptions. The stylized facts discussed in Section III suggest that $\beta_1 + \beta_2 > \beta_1$ (in absolute terms) for SSA, that is, governance (corruption perceptions) could potentially have a stronger marginal effect on growth in the SSA region than in other regions.

Gyimah-Brempong and de Camacho (2006) argue that the likely differentiated impact of weak governance and corruption on growth in SSA (i.e., β_2 is statistically significant), and possibly in other regions like LAC and MENAAP that are also perceived to have acute governance and corruption problems, could be related to the way corruption is practiced. In some parts of the world, corruption tends to be centralized and paying the bribe once would suffice to get the needed government service. However, in much of SSA, corruption is decentralized and uncoordinated, a bribe must often be paid at each stage of a transaction and there is no guarantee that the service will be provided even after paying multiple bribes. Therefore, decentralized corruption practices would typically lead to longer delays, higher transaction costs, lower output and hence be more harmful to growth.[10]

In our view, the interaction term encapsulates in a parsimonious way this feature and the complex set of attributes discussed in Section III that look particularly relevant for the SSA region. However, we also test the robustness of the baseline specification by including some of these attributes directly into the regression model. We note that interaction terms including categorial variables have also been used in the literature in somewhat similar setup as ours (e.g., Gyimah-Brempong and de Camacho, 2006; Naceur et al, 2017). Unlike difference GMM, system GMM can accommodate time-invariant regressors like the SSA dummy and thus allows to identify β_3 and adhere to the good practice of including in the regression all constitutive terms of interaction (e.g., Brambor et al, 2006). Furthermore, it does not affect (asymptotically) the other coefficient estimates because all instruments for the equation in levels are assumed to be orthogonal to any time-invariant variable, nor does it affect the moment conditions (Roodman, 2009).[11]

Lastly, we note that because weak governance and high corruption lead to distorted social and capital spending and worse government policies overall, the covariates gross capital formation, education and inflation already capture some of the indirect impact of governance and corruption on growth. Therefore, coefficients β_1 and β_2 in our regression model should be interpreted as measuring only the direct effect of governance and corruption on growth,

[10] This argument clearly applies to the so-called "bureaucratic" corruption. However, other forms of corruption that are also observed in SSA such as state capture involving high-level government officials acting on behalf of private interests ("grand" corruption) or kleptocratic regimes are also damaging to growth, including because of their scale and persistence.

[11] While Roodman (2009) warns about considering time-invariant regressors in models like (1), the fact that the SSA dummy affects a significant fraction of our sample helps mitigate bias.

after controlling for human and physical capital, as well as the quality of the macroeconomic policies.

B. Data

The controls in vector ***X*** are measured as follows:

- *Initial GDP per capita*: real GDP per capita PPP (in log) in the year immediately before each five-year period, to control for income convergence.
- *Gross capital formation*: total investment, public and private (percent of GDP), to capture the contribution of capital accumulation to growth. To mitigate endogeneity problems, investment is measured in the first year of each five-year period.
- *Level of education*: per capita years of secondary and tertiary schooling for the population aged 15 and above, to capture the contribution of human capital.
- *Dummy variable for high inflation*: it takes value 1 if inflation is larger than 15 percent—at the top quartile of the sample distribution—and zero otherwise. It proxies for the quality of macroeconomic policies and macroeconomic volatility.
- *Terms of trade*: percentage change in terms of trade, to reflect external shocks.

In our baseline regressions we use two aggregate indicators of governance and two indicators of corruption perceptions:

- *ICRG's Political Risk Rating* (ICRG). It covers several aspects of governance, including government stability, internal and external conflicts, corruption, law and order, ethnic tensions, democratic accountability, and bureaucracy quality. The time dimension (available since 1984) is one advantage of this index but it only covers two thirds of SSA countries.
- *An aggregate measure of the Worldwide Governance Indicators* (WGI). This is constructed as the simple sum of the six WGI from Kaufmann and Kraay (see Kaufmann et al, 2010): *voice and accountability*, *political stability and absence of violence/terrorism*, *government effectiveness*, *regulatory quality*, *rule of law*, and *control of corruption*. It covers all SSA countries, but it is available only from 1996 (except for 1997, 1999, and 2001, where observations were interpolated).
- *Control of Corruption* (CCI). This indicator of corruption perceptions is one component of WGI, as mentioned above, and is also available from 1996.
- *Transparency International Corruption Perceptions Index* (CPI). This measures corruption perceptions from 1995, starting with a relatively small country coverage that was gradually expanded to cover all SSA countries more recently.

These indicators have been normalized to 0-100, with higher values denoting better governance or higher corruption perceptions.[12] Despite differences in methodology and sample, these indicators are highly correlated with each other (Table 1).

It is important to note that the measures of governance and corruption perceptions are not without caveats. For instance, subjective measures of corruption perceptions may not fully capture the actual corruption in a country. Moreover, the perception of corruption may have inherent cultural differences. For instance, a gift to a government official may be considered a bribe in one country but may be customary in another. Lastly, the indicators may be measuring distinct attributes of corruption (e.g., petty corruption in one country, grand corruption in another) that may not be readily comparable across-countries or across-regions (for a detailed discussion on these issues, see Gyimah-Brempong and de Camacho, 2006). However, Hamilton and Hammer (2018) argue that the corruption perceptions measured by CCI and CPI are sufficiently comprehensive to capture all elements of corruption and hence are a good starting point of empirical analyses (also see Background Note III of IMF, 2017).

In line with the literature and to reflect the fact that changes in governance do not impact growth immediately, the annual data used in the baseline regressions and most robustness tests is averaged over nonoverlapping five-year periods. Table 2 below and Table A1 in the Appendix provide more details about the data used in the empirical analysis.

Table 2: Summary of Variables and Data Sources

Variable	Data description	Data sources	Sample period	Expected sign
		Dependent variable		
Growth[1]	GDP per capita growth rate, percent	Penn World Tables 9.0, WEO	1980-15	
		Right-hand side variables		
GDP per capita	Measured at PPP, log	Penn World Tables 9.0, WEO	1980-14	(-)
Investment	Gross capital formation, percent of GDP	Penn World Tables 9.0	1980-14	(+)
Education[2]	Secondary and tertiary education, years	Barro-Lee database	1980-15	(+)
Inflation[3]	1 if inflation > 15 percent, 0 otherwise	WEO	1980-15	(-)
Terms of trade	Annual percent change	WEO and WDI	1980-15	(+)
ICRG	Governance indicator, 0-100	ICRG	1984-15	(+)
WGI	Governance indicator, 0-100	Kaufmann and Kraay	1996-15	(+)
CCI	Corruption perceptions, 0-100	Kaufmann and Kraay	1996-15	(-)
CPI	Corruption perceptions, 0-100	Transparency International	1995-15	(-)

[1] Observations with average annual changes of ±20 percent or more over any five-year period are excluded.
[2] Observations for the 5-year period 2011-15 were obtained by extrapolating Barro-Lee data.
[3] The dummy variable takes value 1 if average annual inflation exceeds 15 percent over a given five-year period, and zero otherwise.

The first block of Table 3 presents summary statistics of the baseline sample data used in the governance regressions (results are similar for the sample based on corruption perceptions). For comparison, the second block depicts the same statistics for SSA. These show that most variables vary widely across countries in both samples, with some of the extreme values coming from SSA. There is also great variation in the governance and corruption perceptions

[12] The normalization of CPI ensures that there is no level shift due to the methodological change introduced by Transparency International in 2012.

indicators, with SSA having lower (higher) average scores on governance (corruption perceptions) than the overall sample (also see Figure 1). Note that one standard deviation in the SSA sample is just above 10 units for the four normalized indicators.

Table 3: Summary Statistics of Main Variables Used in the Regressions

Variable	Unit	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
		Overall sample (Obs = 470)				SSA sample (Obs = 91)			
Growth	Percent	2.3	2.6	-11.8	12.2	1.8	2.8	-11.8	8.1
GDP per capita	Log (2011 PPP$)	9.2	1.2	5.9	11.9	7.6	0.9	5.9	9.9
Investment	Percent of GDP	22.1	8.5	2.0	61.0	17.0	8.0	2.0	46.2
Education	Years	3.5	1.8	0.1	8.6	1.5	1.0	0.1	4.1
Inflation	Percent	6.8	9.0	-6.4	84.2	8.2	10.6	-6.4	84.2
Terms of trade	Percent	0.5	3.9	-15.9	18.0	0.7	5.3	-15.9	12.4
ICRG	0-100	67.0	14.4	25.5	96.4	55.9	11.1	25.7	78.7
WGI	0-100	55.5	21.9	3.2	99.1	39.7	13.5	3.2	70.4
CCI	0-100	53.4	22.8	1.9	95.5	68.6	11.9	35.1	95.5
CPI	0-100	57.7	22.8	1.9	91.8	72.2	10.6	41.0	84.8

C. Baseline Results

Before discussing the baseline, results using SGMM, we present OLS estimates. As expected, we find a positive correlation between governance and growth for the overall sample and, although the coefficient on the interaction term for SSA (β_2) is not statistically significant, we reject the null that both coefficients are jointly equal to zero (Table 4).[13] However, the OLS results do not account for potential endogeneity with the explanatory variables. Moreover, the sign on schooling contradicts theory and previous empirical evidence. Saha et al (2017) also find similar results for the correlation between corruption perceptions and growth and question the validity of a linear relationship. We address this issue later by testing a non-linear version of model (1).

[13] For presentational purposes, the tables only show the coefficients on the main covariates. To the extent possible, we use the same sample across governance indicators, but samples may vary due to data availability.

Table 4: Governance and Growth in SSA: OLS Regressions

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Real GDP per capita growth	No	ICRG		WGI	
	governance	No interaction	Interaction	No interaction	Interaction
Governance		0.087 **	0.054	0.134 ***	0.096 *
Governance x SSA			0.105		0.120
Initial income per capita (ln)	-7.664 ***	-7.862 ***	-7.871 ***	-8.080 ***	-7.954 ***
Investment (percent of GDP)	0.033	0.031	0.034 *	0.024	0.023
Education (years)	-0.238	-0.227	-0.248	-0.248	-0.230
High inflation dummy	-2.956 ***	-2.655 ***	-2.642 ***	-2.438 ***	-2.413 ***
Change in terms of trade (percent)	0.074 ***	0.083 ***	0.086 ***	0.077 ***	0.080 ***
Constant	74.25 ***	70.48 ***	71.63 ***	70.94 ***	70.87
Observations	470	470	470	470	470
R-squared	119	119	119	119	119
Number of countries	0.326	0.347	0.355	0.360	0.366
F-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$			4.451 **		7.722 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using OLS and include country and time fixed effects.
The F-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Table 5 presents our baseline estimations using system SGMM. All coefficients on the core controls have the expected sign and almost all are statistically significant. The coefficient on the interaction term for SSA (β_2) has the positive expected sign and is also statistically significant. The specifications pass the standard tests for absence of serial correlation and validity of instruments.[14] We also reject the null hypothesis that the coefficient β_1 and β_2 are jointly zero.

We note that these correlations should not be interpreted literally as causal effects. But mechanically, a 10-point improvement in governance—equivalent to a one standard deviation in the SSA sample and enough to move an SSA country from the bottom quartile to the median of the SSA distribution or bring the average SSA country to the world average—would be associated with higher growth by between 1¼ percentage point (WGI) and 2 percentage points (ICRG). This impact is about thrice and twice larger than for the overall sample, respectively.

As mentioned before, some of the covariates like education and inflation also capture some of the indirect effects of governance on growth. Therefore, the total impact of governance on growth—including the indirect effects through these variables—would be likely larger than $\beta_1 + \beta_2$.

[14] Throughout the estimations we have used a parsimonious number of instruments, restricted the number of lags to 2 and "collapsed" instruments to limit instrument proliferation (Roodman, 2009). To illustrate, the 17 instruments in the baseline model (columns 3 and 4 of Table 4) include: income, education, inflation, terms of trade, governance, interaction term on governance, SSA dummy, time dummies (3), lagged growth and investment (lags 1 and 2), and differenced lagged growth and investment (lag 1), and the constant term.

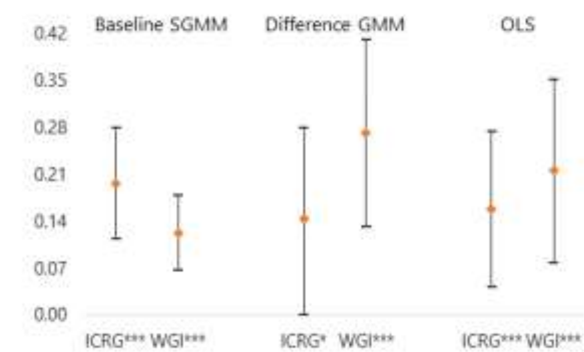
Table 5: Governance and Growth in SSA: Baseline System GMM Regressions

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Real GDP per capita growth	No	ICRG		WGI	
	governance	No interaction	Interaction	No interaction	Interaction
Governance		0.108 ***	0.107 ***	0.026 *	0.036 **
Governance x SSA			0.089 **		0.087 ***
Initial income per capita (ln)	-2.031 ***	-2.435 ***	-2.765 ***	-1.929 ***	-2.554 ***
Investment (percent of GDP)	0.225 ***	0.128	0.039	0.150 ***	0.134 ***
Education (years)	0.622 ***	0.440 ***	0.354 **	0.478 ***	0.361 **
High inflation dummy	-1.351 **	-1.244 **	-1.562 ***	-1.901 **	-1.760 **
Change in terms of trade (percent)	0.046	0.069 **	0.064 *	0.077 **	0.080 **
Constant	13.49 ***	13.27 ***	19.46 ***	13.27 ***	20.00 ***
Observations	470	470	470	470	470
Number of countries	119	119	119	119	119
Number of instruments	14	15	17	15	17
Serial correlation test (p-value)	0.003	0.141	0.456	0.41	0.458
Hansen test (p-value)	0.031	0.327	0.283	0.22	0.255
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$			47.44 ***		18.96 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

We also run model (1) using difference GMM, which as explained earlier does not allow to identify the SSA dummy. Like in the OLS estimation, the individual coefficients on governance have the expected sign but are not statistically significant. However, the coefficients are still jointly significant and larger than those obtained from system GMM but are estimated more imprecisely, as reflected by the larger confidence intervals (Figure 7).

Figure 7: Overall Effect of Governance on Growth in SSA



The chart shows $\beta_1+\beta_2$ (orange diamonds) and 95-percent confidence intervals.
***, **, * Significant at 1, 5, and 10 percent, respectively.

D. Mitigating endogeneity

Lagging governance

Until now we have considered contemporaneous values of governance in equation (1). We lag the governance indicators by one period to further mitigate endogeneity bias. The interaction term has the expected sign and is statistically significant but the overall effect, although statistically significant, is smaller (Figure 8, "Lagged governance" column).

Instrumental variables

Next, we explore several instrumental variables (IV) to further control for endogeneity. Because most IVs are time-invariant we average the data over the entire sample period and use these cross-sections using averages over 1984-2015 and IV estimations to estimate the correlation between governance and growth. The IVs relate to ethnic fractionalization, settler mortality, independence, and latitude. In all regressions, initial income (i.e. averages over 1980-1983), inflation, education, and terms of trade are treated as exogenous, and governance and investment as endogenous. Figure 8 presents the coefficients of interest and Table A2 summarizes the key estimation details.

Ethnic fractionalization

Mauro (1995) argued that using lagged governance and corruption on the right-hand side may not fully address endogeneity bias because these variables are autocorrelated. We follow Mauro (1995), Easterly and Levine (1997), and others, and use ethnic fractionalization as an instrument for governance. This variable measures the likelihood that two people drawn randomly from a country's population will not belong to the same ethnolinguistic group. The coefficients of interest have the expected sign and $\beta_1 + \beta_2$ is statistically significant for both ICRG and WGI (Figure 8, "Ethnic fractionalization" column).

Settler mortality

Acemoglu et al (2001) use settler mortality rate in colonial times as an instrument for expropriation risk. Higher expropriation risk tends to be associated with weaker rule of law and property rights and higher corruption. Hence, settler mortality would be a sensible instrument for governance. In our sample, however, it is informative for WGI only (Figure 8, column "Settler mortality"), with the overall marginal effect statistically significant at 5 percent (Table A2).

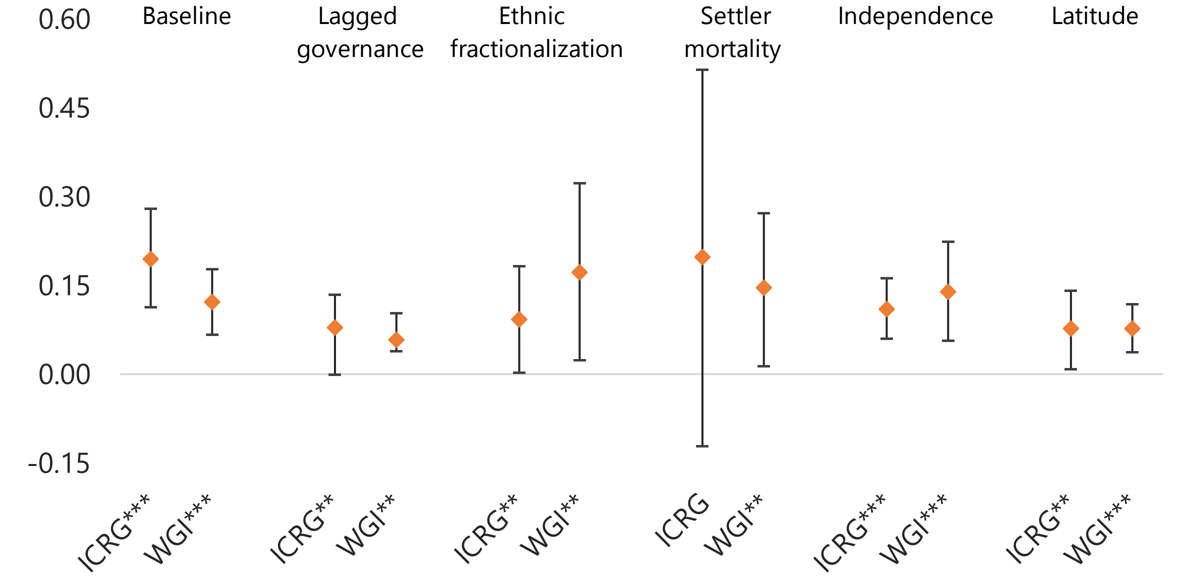
Independence

Another instrument is the fraction of years a country has been independent since 1776. This variable has been often used in the literature to measure the extent to which a country has had enough time to develop its own economic institutions (e.g., Easterly and Levine, 1997, 2016; Beck et al, 2003). The coefficients on governance have the expected sign, and the sum for SSA is relatively large and statistically significant for both ICRG and WGI (Figure 8, "Independence" column).

Latitude

We also use the absolute value of latitude, i.e., distance from the equator, as an instrument for governance (e.g., Acemoglu et al, 2001; Easterly and Levine, 2016). This variable has been found to be correlated with good institutions. Easterly and Levine (2016) claim that latitude was especially relevant for European settlers since they might have been more attracted to lands with the same temperate climate as in Europe. As with the other instruments, the coefficients of interest have the right sign, and the overall effect for SSA is statistically significant for both ICRG and WGI.

Figure 8: Overall Effect of Governance on Growth in SSA Controlling for Endogeneity



The chart shows $\beta_1+\beta_2$ (orange diamonds) and 95-percent confidence intervals.
***, **, * Significant at 1, 5, and 10 percent, respectively.

Other instruments

We also explored other instruments, including incidence of malaria, legal origins, and religious and language fractionalization, which have also been used in the literature as proxies for the quality of institutions. Results using these instruments are weaker and less reliably estimated, including because of small samples.

Summary of endogeneity tests

Our model withstands most tests when sample size is not an issue. Better controlling for potential endogeneity problems, we still find a strong correlation between governance on growth in the SSA region. Moreover, we typically reject the null hypothesis that the coefficients on governance are jointly equal to zero (Table A2). Therefore, the estimated correlation seems to be genuine and not an artifact of the data. Overall, our results point to a broadly robust correlation between governance and growth in SSA and the magnitude of this correlation appears to be larger for SSA than for the full sample.

E. Robustness

Regional benchmarking

In this section, we take a closer look at the link between governance and growth in other regions and compare with the findings for SSA. We split the sample in three distinct ways. First, we run the baseline model using the overall sample but including one region at a time (model 2 below). Second, we use only the samples for each region (model 3). Lastly, we introduce multiple regions in the specification (model 4). We thus generalize our baseline model as follows:

$$g_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 GOV_{it} REG_j + \beta_3 REG_j + \boldsymbol{B}'\boldsymbol{X_{it}} + \boldsymbol{\tau}_t + \mu_i + v_{it} \quad (2)$$

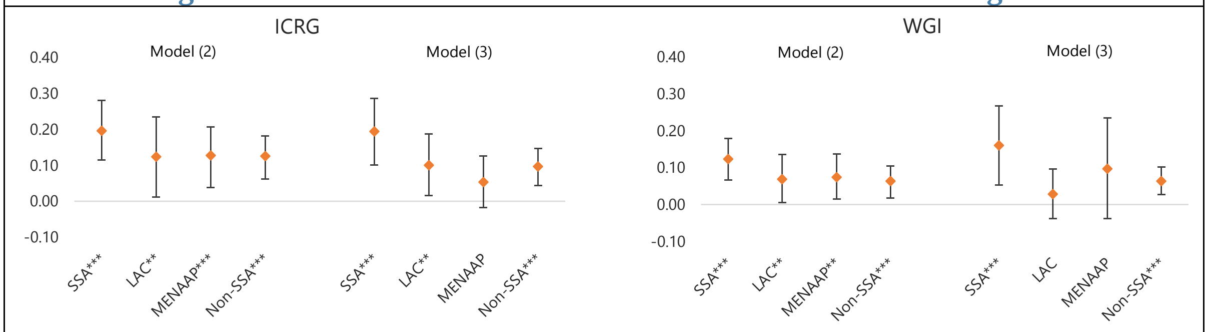
$$g_{ijt} = \beta_0 + \beta_1 GOV_{ijt} + \boldsymbol{B}'\boldsymbol{X_{ijt}} + \boldsymbol{\tau}_t + \mu_{ij} + v_{ijt} \quad (3)$$

$$g_{it} = \beta_0 + \beta_1 GOV_{it} + \sum_j \beta_{2j} GOV_{it} REG_j + \sum_j \beta_3 REG_j + \boldsymbol{B}'\boldsymbol{X_{it}} + \boldsymbol{\tau}_t + \mu_i + v_{it} \quad (4)$$

where REG_j is a dummy variable for region *j*. In line with the discussion in subsection B, we consider three relevant regional groupings: non-SSA developing and emerging countries (Non-SSA), LAC, and MENAAP. Table A1 in the Appendix describes all country groups.

Figure 9 and Table A3 present the results for models (2) and (3), while Table A4 shows the results for model (4). Most right-hand side controls have the expected sign and are statistically significant, and most models pass the standard statistical tests for autocorrelation and validity of instruments. Starting with model 2, we find a strong correlation between governance and growth for all regions considered. The evidence based on model (3) broadly holds but the precision of the estimates is affected by small sample sizes.

Figure 9: Overall Effect of Governance on Growth Across Regions



The charts show β1+β2 (orange diamonds) and 95-percent confidence intervals. ***, **, * Significant at 1, 5, and 10 percent, respectively. LAC = Latin American and and Caribbean; MENAAP = Middle East, North African and Afghanistan and Pakistan; Non-SSA = Developing and emerging non Sub-Saharan African countries.

The evidence for model (4) is somewhat mixed. Except for SSA, the coefficient on the interaction term (β_{2SSA}) is not statistically significant but it is for LAC and MENAAP when jointly considered with SSA in the case of WGI. However, we reject the null that all coefficients on governance are jointly equal to zero for both governance indicators. Overall, these findings suggest that weak governance also appears to hinder growth in other regions, but apparently to a lower extent than in SSA.

We also run two additional specifications that control for income group and quality of institutions to capture additional cross-country differences:

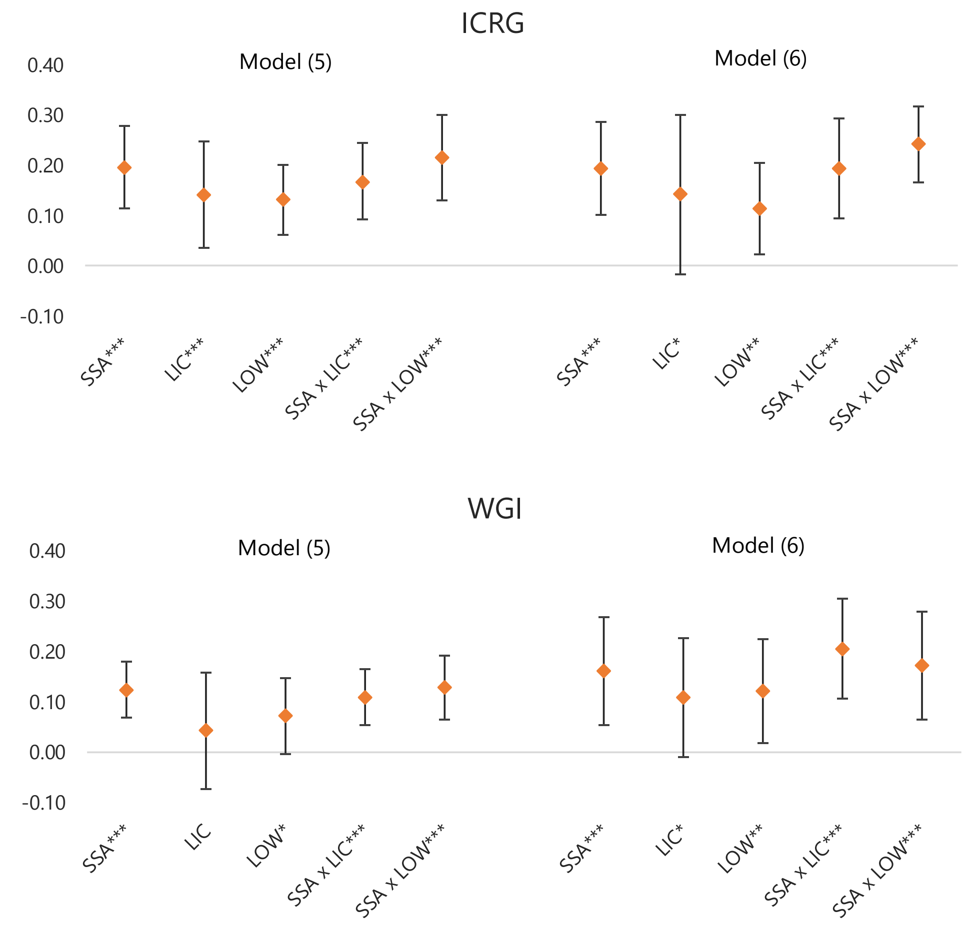
$$g_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 GOV_{it} GROUP_k + \beta_3 GROUP_k + \boldsymbol{B}'\boldsymbol{X_{it}} + \boldsymbol{\tau}_t + \mu_i + v_{it} \quad (5)$$

$$g_{ikt} = \beta_0 + \beta_1 GOV_{ikt} + \boldsymbol{B}'\boldsymbol{X_{ikt}} + \boldsymbol{\tau}_t + \mu_{ik} + v_{ikt} \quad (6)$$

where $GROUP_k$ is a dummy variable for group k. We consider the following country groups: LICs, LICs in SSA, LOW (countries with governance scores below the sample median), and LOW in SSA.

The overall effect of governance on growth is statistically strong across in almost all country groups and even more so for LICs in SSA or SSA countries with below-median governance (Figure 10 and Table A5).

Figure 10: Overall Effect of Governance on Growth Across Country Groups

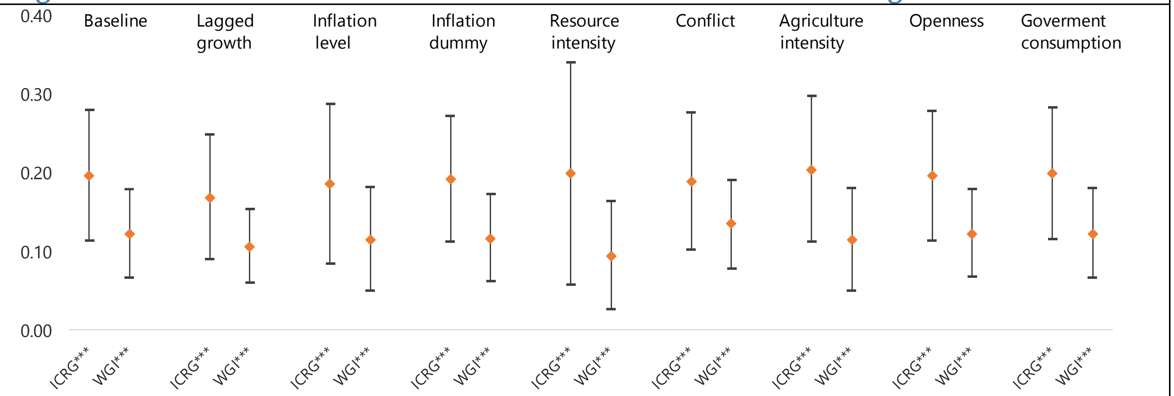


The charts show $\beta_1+\beta_2$ (orange diamonds) and 95-percent confidence intervals. ***, **, * Significant at 1, 5, and 10 percent. LIC = low-income country, LOW = countries with governance below the sample median.

Alternative control variables

We investigate whether the baseline model survives the inclusion of alternative controls. We test for lagged growth, the level of inflation, the inflation dummy with a higher (20 percent) threshold, resource intensity, conflict, agriculture intensity, openness, and government consumption. Results are shown in Figure 11 and Table A6 in the Appendix. The specifications pass the tests for serial correlation and validity of instruments, and the overall effect remains significant and with the expected sign in all specifications.

Figure 11: Overall Effect of Governance on Growth in SSA Controlling for Other Factors

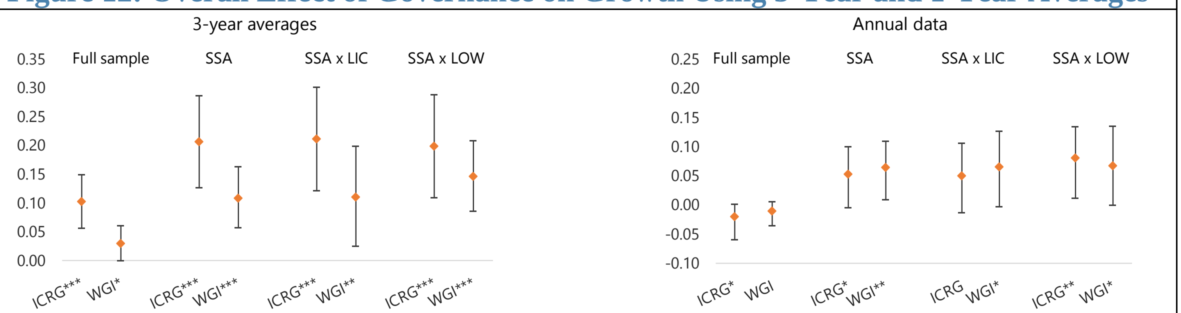


The chart shows $\beta_1+\beta_2$ (orange diamonds) and 95-percent confidence intervals. ***, **, * Significant at 1, 5, and 10 percent, respectively.

Other robustness tests

We also tested the sensitivity of the baseline model to the choice of the averaging period. We considered 3-year instead of 5-year periods, and yearly data. The overall effect for SSA remains statistically significant at conventional significance levels and with the right sign in most cases (Figure 12 and Tables A7-A8).

Figure 12: Overall Effect of Governance on Growth Using 3-Year and 1-Year Averages



The chart shows $\beta_1+\beta_2$ (orange diamonds) and 95-percent confidence intervals. ***, **, * Significant at 1, 5, and 10 percent, respectively.
LIC = low-income country, LOW = countries with governance below the sample median.

Finally, we also checked whether outliers could be driving our baseline results. We run model (1) for ICRG and WGI using SGMM and dropping one country at a time (2 x 119 countries = 238 regressions). The model remained remarkably stable and the overall effect was significant in all regressions. Thus, no single country is driving the baseline results.

V. UNBUNDLING GOVERNANCE

So far, we have shown the correlation between aggregate measures of governance and growth. In this section, we unpack the governance indicators and analyze the correlation between their main components and growth. We devote special attention to corruption given its large economic and social costs (see Section I). Analyzing the components of governance may shed light on the key transmission channels through which governance affects growth. Therefore, we interpret these granular measures as 'governance channels'.

To start, we construct narrower variants of ICRG and WGI by excluding corruption perceptions—which in this section we will treat as a standalone measure of governance. We also exclude economic and social outcomes to mitigate endogeneity, *political stability*, and a few other components. Our measure of inflation already captures the political channel to some extent. For instance, inflation would likely be higher when there is high turnover of central bank officials reflecting weaknesses in monetary policy framework such as political interference, lack of central bank independence, and limited technical capacity.[15]

The narrower version of ICRG thus includes: *military in politics*, *religions tensions*, *ethnic tensions*, *law and order*, *democratic accountability*, and *bureaucracy quality*. The narrower WGI includes: *voice and accountability* (freedom of participation and expression, and free media), *government effectiveness* (quality of public policies and services), *regulatory quality* (ability of the government to formulate and implement business-friendly policies and regulations), and *rule of law* (respect for contract enforcement, property rights and law enforcement). In a nutshell, we see these components as proxies for the quality of political institutions and government regulations and policies. These measures are appropriately rescaled to reflect their weight in the original governance indicator.

The main properties of the estimated models based on these narrow measures (Table 6) are similar to their baseline counterparts (Table 5). The overall impact of narrower measures of governance on growth in SSA remains strong but the magnitude is slightly smaller than in the baseline. Because the exclusion of corruption would probably increase the correlation between the narrower measures of governance and growth (corruption is negatively correlated with governance, see Table 1) the smaller estimates are probably related to the exclusion of the other components of governance. However, these correlations though smaller are also less subject to concerns about endogeneity, as mentioned above.

[15] Another reason for excluding the political component is that stability and entrenched corruption have been prevalent in many long-lasting regimes in SSA. This is not to say that political stability (or the lack of) is irrelevant for explaining cross-country growth differentials. A large empirical literature—including Mo (2001), Aisen and Veiga (2006, 2013)—has found that political instability is associated with worse economic outcomes such as lower growth and higher inflation especially in developing countries.

Table 6: Alternative Measures of Governance: System GMM Regressions

Dependent variable: Real GDP per capita growth	(1) ICRG Baseline	(2) ICRG Baseline	(3) ICRG Narrow	(4) ICRG Narrow	(5) WGI Baseline	(6) WGI Baseline	(7) WGI Narrow	(8) WGI Narrow
Governance	0.108 ***	0.107 ***	0.043 ***	0.031 ***	0.026 *	0.036 **	0.022	0.027 *
Governance x SSA		0.089 **		0.117 **		0.087 ***		0.085 ***
Initial income per capita (ln)	-2.435 ***	-2.765 ***	-1.958 ***	-2.201 ***	-1.929 ***	-2.554 ***	-1.884 ***	-2.432 ***
Investment (percent of GDP)	0.128	0.039	0.114	0.024	0.150 ***	0.134 ***	0.151 ***	0.134 ***
Education (years)	0.440 ***	0.354 **	0.472 ***	0.460 ***	0.478 ***	0.361 **	0.478 ***	0.389 **
High inflation dummy	-1.244 **	-1.562 ***	-1.604 ***	-1.797 ***	-1.901 **	-1.760 **	-1.951 **	-1.879 **
Change in terms of trade (percent)	0.069 **	0.064 *	0.054 *	0.045	0.077 **	0.080 **	0.078 **	0.079 **
Constant	13.27 ***	19.46 ***	13.21 ***	18.96 ***	13.27 ***	20.00 ***	13.05 ***	19.20 ***
Observations	470	470	470	470	470	470	470	470
Number of countries	119	119	119	119	119	119	119	119
Number of instruments	15	17	15	17	15	17	15	17
Serial correlation test (p-value)	0.140	0.460	0.160	0.550	0.410	0.460	0.420	0.470
Hansen test (p-value)	0.330	0.280	0.180	0.230	0.220	0.260	0.210	0.230
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$		47.44 ***		16.07 ***		18.96 ***		19.92 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Table 7 shows that the WGI's four selected channels have a strong correlation with growth in SSA. The overall effect for SSA is in the range 0.07-0.1, comparable to that for the overall and narrow measures of the WGI (Table 6).[16] Because the four channels have similar weight on the WGI, these results suggest that improving even only one aspect of governance could be associated with higher growth. In practice, improving multiple aspects of governance could potentially yield larger payoffs, including because of complementarities across them (see Table 1).

Table 7: Governance Channels and Growth: System GMM Regressions

Dependent variable: Real GDP per capita growth	(1) Voice and Accountability	(2) Voice and Accountability	(3) Government Effectiveness	(4) Government Effectiveness	(5) Regulatory Quality	(6) Regulatory Quality	(7) Rule of Law	(8) Rule of Law
Governance	0.012	0.004	0.036 **	0.046 ***	0.034	0.036 *	0.006	0.017
Governance x SSA		0.099 ***		0.074 ***		0.085 ***		0.072 ***
Initial income per capita (ln)	-1.713 ***	-2.095 ***	-2.079 ***	-2.707 ***	-1.973 ***	-2.489 ***	-1.705 ***	-2.296 ***
Investment (percent of GDP)	0.147 **	0.119 **	0.155 ***	0.148 ***	0.159 **	0.145 ***	0.145 **	0.129 **
Education (years)	0.504 ***	0.495 ***	0.464 ***	0.338 *	0.464 ***	0.380 **	0.534 ***	0.434 **
High inflation dummy	-2.062 **	-2.130 **	-1.914 **	-1.835 **	-1.854 *	-1.796 **	-2.062 **	-2.014 **
Change in terms of trade (percent)	0.073 **	0.070 **	0.081 **	0.086 **	0.079 **	0.082 **	0.074 **	0.080 **
Constant	11.98 ***	17.15 ***	14.16 ***	20.74 ***	12.99 ***	18.84 ***	12.19 ***	18.44 ***
Observations	470	470	470	470	470	470	470	470
Number of countries	119	119	119	119	119	119	119	119
Number of instruments	15	17	15	17	15	17	15	17
Serial correlation test (p-value)	0.430	0.570	0.420	0.510	0.370	0.370	0.430	0.470
Hansen test (p-value)	0.170	0.200	0.260	0.280	0.210	0.210	0.160	0.200
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$		15.75 ***		23.91 ***		17.41 ***		15.15 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

[16] The overall effect of *Political Stability and Absence of Violence/Terrorism* on growth is also statistically significant but somewhat smaller than those presented in Table 6. Results are available upon request.

We now turn our attention to corruption. We estimate model (1) using CCI and CPI. The results for the core part of the model (Table 8) are roughly in line with those for the governance indicators. The specifications for corruption perceptions also pass the tests for serial correlation and validity of instruments, as well as most of the robustness tests (available upon request) that we run for the governance models.

Unlike the findings for governance, we do not find supporting evidence of a statistically significant correlation between corruption perceptions and growth for the average country in the overall sample. However, we do find evidence of a statistically strong correlation between corruption perceptions and growth for the MENAAP region (columns 4 and 7), consistent with the stylized facts discussed before. Moreover, both corruption perceptions indicators point to a stronger and negative correlation with economic performance in SSA. The results do not show a differentiated impact for LAC though.

While these correlations should not be interpreted literally as causation, a 10-point improvement in corruption perceptions or about one standard deviation in the SSA sample—enough to move an SSA country from the bottom quartile to the median of the SSA distribution or bring the average SSA country to the world average—would be associated with higher growth by 0.4-0.6 percentage points in the long run. These magnitudes are comparable to those estimated by Ugur and Dasgupta (2011).

Table 8: Corruption Perceptions and Growth in SSA: System GMM Regressions

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Real GDP per capita growth	No	WGI's CCI			Transparency International's CPI		
	corruption	No interaction	Interaction	Joint	No interaction	Interaction	Joint
Corruption		-0.012	-0.020 *	-0.002	-0.002	-0.012	0.0046
Corruption x SSA			-0.093 ***	-0.112 ***		-0.090 ***	-0.106 ***
Governance x LAC				-0.037			-0.031
Governance x MENAAP				-0.073 **			-0.057 **
Initial income per capita (ln)	-1.654 ***	-1.607 ***	-2.118 ***	-1.942 ***	-1.420 ***	-1.863 ***	-1.658 ***
Investment (percent of GDP)	0.117	0.096 *	0.096 *	0.094 **	0.094	0.061	0.053
Education (years)	0.594 ***	0.495 ***	0.417 ***	0.270 *	0.473 ***	0.391 ***	0.237 *
High inflation dummy	-1.249 *	-1.525 *	-1.567 **	-1.396 *	-1.278 *	-1.498 **	-1.503 **
Change in terms of trade (percent)	0.013	0.020	0.020	0.022	0.013	0.019	0.021
Constant	12.43 ***	13.54 ***	19.41 ***	17.97 ***	11.41 ***	17.60 ***	16.04 ***
Observations	489	489	489	489	489	489	489
Number of countries	136	136	136	136	136	136	136
Number of instruments	14	15	17	21	15	17	21
Serial correlation test (p-value)	0.001	0.372	0.369	0.335	0.062	0.039	0.040
Hansen test (p-value)	0.053	0.279	0.250	0.203	0.149	0.235	0.228
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$			11.63 ***	19.37 ***		8.71 **	16.5 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

VI. NON-LINEARITY

So far, we have made two key assumptions on the link between governance (or corruption perceptions) and growth: the relationship is linear, and the expected correlation is unambiguously positive (negative) for governance (corruption perceptions). These assumptions have been debated in the literature. For instance, the 'grease the wheels' view argues that some amount of corruption could increase bureaucratic efficiency and improve growth by mitigating red tape in developing countries.

Cerqueti et al (2012) show in a game theory setup that a non-linear relationship between corruption and growth could arise depending on the degree of ethnic fragmentation in a country.[17] Several empirical studies have also found a non-linear relationship between corruption and growth, including Swaleheen (2011), Saha and Gounder (2013), and Saha et al (2017). These studies typically find that a quadratic function fits the data well.

Accordingly, to test for a non-linear correlation between governance (or corruption perceptions) and growth we add a squared term as an additional explanatory variable in our baseline model:

$$g_{it} = \beta_0 + \beta_1 GOV_{it} + \beta_2 GOV_{it}^2 + \boldsymbol{B'X_{it}} + \boldsymbol{\tau}_t + \mu_i + v_{it} \qquad (7)$$

The coefficients of interest are β_1 and β_2, with the expected signs being positive and negative, respectively. The marginal impact of governance (or corruption perceptions) on growth is $\beta_1 + 2\beta_2 GOV_{it}$ and the level of governance (or corruption perceptions) above which growth declines is given by $GOV_{it}^* = -\beta_1/2\beta$. For parsimony, model (7) is estimated for the full and SSA samples separately.

Table 9 shows the results using the ICRG indicator of governance and the CCI indicator of corruption perceptions for both samples.[18] With a squared term and splitting the samples, some of the core regressors are estimated more imprecisely, even though all specifications pass the standard tests for validity of instruments and serial autocorrelation. As expected, the coefficient on the linear term (β_1) is positive and coefficient on the squared term (β_2) is negative. Moreover, in all models but one we reject the null that these two coefficients are jointly equal to zero.

[17] Intermediate levels of ethnic diversity would be more supportive of checks and balances, while extreme ethnic homogeneity or fragmentation would be associated with higher corruption and lower growth. Thus, their model predicts an inverted U-curve for the relationship between corruption and growth.

[18] The CPI is not statistically significant for the SSA sample. Results using the WGI governance indicator are roughly similar and hence are not reported.

Table 9: Governance and Corruption Perceptions: Non-linear Models

Dependent variable:	Governance (ICRG)		Corruption (CCI)	
Real GDP per capita growth	Full sample	SSA sample	Full sample	SSA sample
Governance or Corruption	0.284 ***	0.743 **	0.057 *	0.442 **
Governance or Corruption squared	-0.0017 ***	-0.0053 *	-0.0006 *	-0.0040 **
Initial income per capita (ln)	-1.831 ***	-2.326 **	-1.498 ***	-1.785 **
Investment (percent of GDP)	0.088	0.156 ***	0.092 *	0.251 *
Education (years)	0.554 ***	0.895	0.526 ***	0.556
High inflation dummy	-1.255 **	-1.100	-1.523 *	-1.680
Change in terms of trade (percent)	0.048	0.061	0.019	-0.043
Constant	4.560	-9.113	10.95 ***	-1.811
Observations	470	91	489	119
Number of countries	119	23	136	30
Number of instruments	16	16	16	16
Serial correlation test (p-value)	0.400	0.220	0.350	0.740
Hansen test (p-value)	0.130	0.520	0.240	0.380
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	16.21 ***	16.50 ***	3.574	12.17 ***

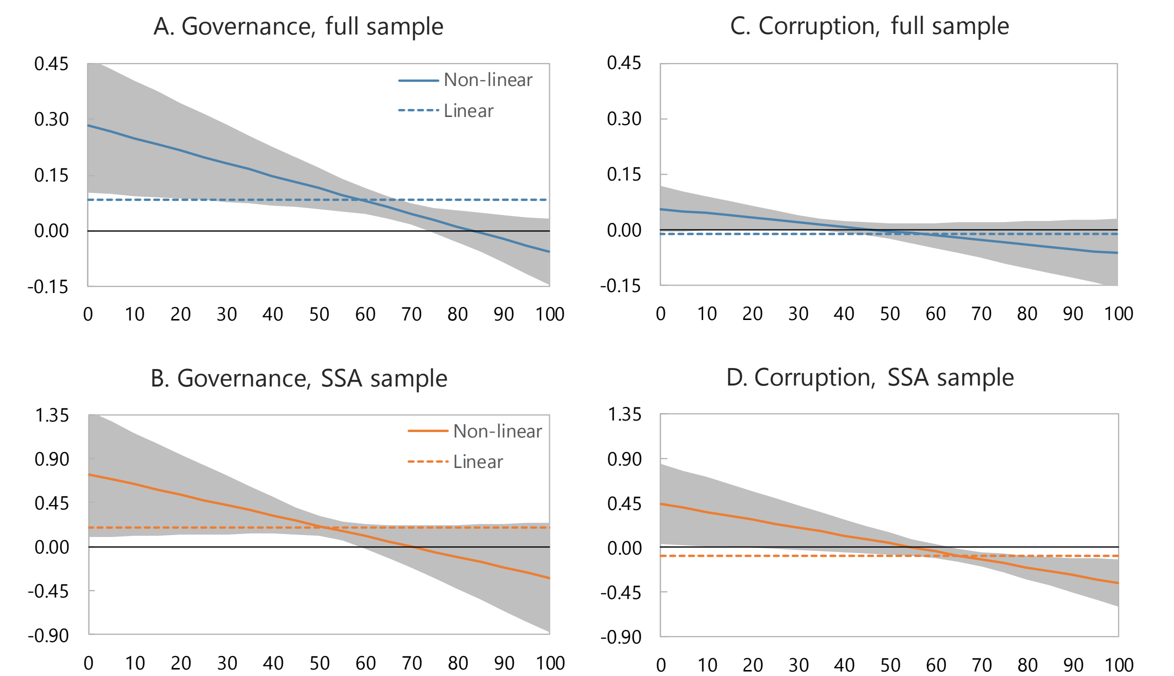
***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Figure 13 plots the overall marginal effect on growth. For any given level of governance, the effect for SSA is positive and stronger relative to the overall sample. Comparing the non-linear and linear estimates suggests that imposing linearity could lead to underestimation of the correlation between governance and growth for countries with low governance (governance is below 60 for over 75 percent of SSA country-years in the sample). Similarly, corruption seems to be particularly harmful to growth for countries with corruption perceptions above 60 (about 75 percent of all SSA country-years in the sample). The impact of corruption perceptions on growth would be less of a problem when corruption is moderate or small, in line with the findings of Saha et al (2017).

The non-linear models suggest that growth gains for SSA countries could be larger than those implied by the linear model, especially for SSA countries with very low (high) governance (corruption perceptions) scores. For instance, the overall effect for a country at 5th (95th) percentile of the SSA distribution of governance (corruption perceptions)—equivalent to normalized scores around 30 and 85 respectively—would be about twice as large as that implied by the linear model.

Weak performers in the overall sample also stand to benefit from improving governance but the size of the growth gains is smaller compared to that for SSA countries. In the case of corruption, these gains would be around zero irrespective of a country's starting position.

Figure 13: Overall Effect of Governance and Corruption Perceptions on Growth



VII. CONCLUDING REMARKS

In this paper, we have found a strong correlation between governance/corruption perceptions and growth in sub-Saharan Africa. This finding remains largely robust to various specifications and sample choices, notwithstanding concerns about potential endogeneity problems, which we have sought to mitigate throughout. While these correlations do not necessarily imply causation, they suggest that there could potentially be significant economic gains to be achieved by improving governance and reducing corruption in SSA. While a demanding process, most SSA countries, particularly SSA LICs and those with the lowest performance in governance and perceived corruption, would likely gain the most from these improvements.

We expect the focus on reducing corruption and improving governance to remain high on the agenda of policymakers, particularly in SSA, as illustrated by the high-level discussions in the 2018 African Union Summit. Strengthening governance and fighting corruption are not easy tasks—and the process is often time-consuming and requires considerable political effort—but they are worth pursuing given the potentially large payoffs.

Appendix

Sample period

The baseline regressions are based on data spanning 20 years (1995–2015) from several commonly used macroeconomic databases. To mitigate the issue of data availability, the data used in the baseline regressions in annual frequency was averaged out to five (nonoverlapping) five-year periods.

Country coverage

The raw sample covers 190 countries, including advanced and emerging economies, and low-income countries. However, the regression samples are somewhat smaller depending on data availability and econometric specification. The main country groups are listed below, where SSA, EMDE, MENAAP, CIS, LIC stand for sub-Saharan Africa, emerging and developing, Middle East North African and Afghanistan and Pakistan, Commonwealth of Independent States, and Low-Income Country, respectively.

Table A1. Country and Regional Samples

Country	ISO code	IFS code	SSA	SSA LIC	Resource-Rich	LIC
Angola	AGO	614	1		1	
Benin	BEN	638	1	1		1
Botswana	BWA	616	1		1	
Burkina Faso	BFA	748	1	1	1	1
Burundi	BDI	618	1	1	1	1
Cabo Verde	CPV	624	1			
Cameroon	CMR	622	1	1	1	1
Central African Republic	CAF	626	1	1	1	1
Chad	TCD	628	1	1	1	1
Comoros	COM	632	1	1		1
Congo, Dem. Rep. of the	COD	636	1	1	1	1
Congo, Republic of	COG	634	1	1	1	1
Côte d'Ivoire	CIV	662	1	1	1	1
Equatorial Guinea	GNQ	642	1		1	
Eritrea	ERI	643	1	1	1	1
Ethiopia	ETH	644	1	1		1
Gabon	GAB	646	1		1	
Gambia, The	GMB	648	1	1		1
Ghana	GHA	652	1	1	1	1
Guinea	GIN	656	1	1	1	1
Guinea-Bissau	GNB	654	1	1	1	1
Kenya	KEN	664	1	1		1
Lesotho	LSO	666	1	1		1
Liberia	LBR	668	1	1	1	1
Madagascar	MDG	674	1	1		1
Malawi	MWI	676	1	1	1	1
Mali	MLI	678	1	1	1	1
Mauritius	MUS	684	1			
Mozambique	MOZ	688	1	1		1
Namibia	NAM	728	1			
Niger	NER	692	1	1		1
Nigeria	NGA	694	1	1	1	1
Rwanda	RWA	714	1	1		1
São Tomé and Príncipe	STP	716	1	1		1
Senegal	SEN	722	1	1		1
Seychelles	SYC	718	1			
Sierra Leone	SLE	724	1	1	1	1
South Africa	ZAF	199	1		1	
South Sudan	SSD	733	1	1		1
Swaziland	SWZ	734	1			
Tanzania	TZA	738	1	1		1
Togo	TGO	742	1	1		1
Uganda	UGA	746	1	1		1
Zambia	ZMB	754	1	1	1	1
Zimbabwe	ZWE	698	1	1		1

Country	ISO code	IFS code	EMDE America	Resource-Rich	LIC
Antigua and Barbuda	ATG	311	1		
Argentina	ARG	213	1	1	
Bahamas, The	BHS	313	1		
Barbados	BRB	316	1		
Belize	BLZ	339	1		
Bolivia	BOL	218	1	1	1
Brazil	BRA	223	1		
Chile	CHL	228	1	1	
Colombia	COL	233	1	1	
Costa Rica	CRI	238	1		
Dominica	DMA	321	1		
Dominican Republic	DOM	243	1		
Ecuador	ECU	248	1	1	
El Salvador	SLV	253	1		
Grenada	GRD	328	1		
Guatemala	GTM	258	1		
Guyana	GUY	336	1	1	
Haiti	HTI	263	1		1
Honduras	HND	268	1	1	1
Jamaica	JAM	343	1		
Mexico	MEX	273	1	1	
Nicaragua	NIC	278	1		1
Panama	PAN	283	1		
Paraguay	PRY	288	1	1	
Peru	PER	293	1	1	
St. Kitts and Nevis	KNA	361	1		
St. Lucia	LCA	362	1		
St. Vincent and the Grenadines	VCT	364	1		
Suriname	SUR	366	1	1	
Trinidad and Tobago	TTO	369	1	1	
Uruguay	URY	298	1	1	
Venezuela	VEN	299	1	1	

Country	ISO code	IFS code	EMDE Europe & CIS	Resource-Rich	LIC
Albania	ALB	914	1		
Bosnia and Herzegovina	BIH	963	1		
Bulgaria	BGR	918	1		
Croatia	HRV	960	1		
Hungary	HUN	944	1		
Kosovo	XKX	967	1		
Macedonia, FYR	MKD	962	1		
Montenegro, Rep. of	MNE	943	1		
Poland	POL	964	1		
Romania	ROU	968	1		
Serbia	SRB	942	1		
Turkey	TUR	186	1		
Belarus	BLR	913	1		
Moldova	MDA	921	1		1
Russia	RUS	922	1	1	
Ukraine	UKR	926	1		
Armenia	ARM	911	1		
Azerbaijan	AZE	912	1	1	
Georgia	GEO	915	1		
Kazakhstan	KAZ	916	1	1	
Kyrgyz Republic	KGZ	917	1		1
Tajikistan	TJK	923	1		1
Turkmenistan	TKM	925	1	1	
Uzbekistan	UZB	927	1	1	1

Country	ISO code	IFS code	EMDE MENAAP	Resource-Rich	LIC
Somalia	SOM	726	1		1
Afghanistan	AFG	512	1	1	1
Algeria	DZA	612	1	1	
Bahrain	BHR	419	1	1	
Djibouti	DJI	611	1		1
Egypt	EGY	469	1		
Iran	IRN	429	1	1	
Iraq	IRQ	433	1	1	
Jordan	JOR	439	1		
Kuwait	KWT	443	1	1	
Lebanon	LBN	446	1		
Libya	LBY	672	1	1	
Mauritania	MRT	682	1	1	1
Morocco	MAR	686	1		
Oman	OMN	449	1	1	
Pakistan	PAK	564	1		
Qatar	QAT	453	1	1	
Saudi Arabia	SAU	456	1	1	
Sudan	SDN	732	1	1	1
Syria	SYR	463	1	1	
Tunisia	TUN	744	1		
United Arab Emirates	ARE	466	1	1	
Yemen	YEM	474	1	1	1

Country	ISO code	IFS code	Advanced	Resource-Rich	LIC
Australia	AUS	193	1	1	
Hong Kong SAR	HKG	532	1		
Japan	JPN	158	1		
Korea	KOR	542	1		
New Zealand	NZL	196	1		
Singapore	SGP	576	1		
Taiwan Province of China	TWN	528	1		
Austria	AUT	122	1		
Belgium	BEL	124	1		
Cyprus	CYP	423	1		
Czech Republic	CZE	935	1		
Denmark	DNK	128	1		
Estonia	EST	939	1		
Finland	FIN	172	1		
France	FRA	132	1		
Germany	DEU	134	1		
Greece	GRC	174	1		
Iceland	ISL	176	1		
Ireland	IRL	178	1		
Israel	ISR	436	1		
Italy	ITA	136	1		
Latvia	LVA	941	1		
Lithuania	LTU	946	1		
Luxembourg	LUX	137	1		
Malta	MLT	181	1		
Netherlands	NLD	138	1		
Norway	NOR	142	1	1	
Portugal	PRT	182	1		
San Marino	SMR	135	1		
Slovak Republic	SVK	936	1		
Slovenia	SVN	961	1		
Spain	ESP	184	1		
Sweden	SWE	144	1		
Switzerland	CHE	146	1		
United Kingdom	GBR	112	1		
Canada	CAN	156	1	1	
United States	USA	111	1		

Country	ISO code	IFS code	EMDE Asia	Resource-Rich	LIC
Bangladesh	BGD	513	1		1
Bhutan	BTN	514	1		1
Brunei Darussalam	BRN	516	1	1	
Cambodia	KHM	522	1		1
China	CHN	924	1		
Fiji	FJI	819	1		
India	IND	534	1		
Indonesia	IDN	536	1	1	
Lao P.D.R.	LAO	544	1		1
Malaysia	MYS	548	1		
Maldives	MDV	556	1		
Marshall Islands	MHL	867	1	1	
Micronesia	FSM	868	1		
Mongolia	MNG	948	1	1	1
Myanmar	MMR	518	1		1
Nepal	NPL	558	1		1
Palau	PLW	565	1		
Papua New Guinea	PNG	853	1	1	1
Philippines	PHL	566	1		
Samoa	WSM	862	1		
Solomon Islands	SLB	813	1	1	1
Sri Lanka	LKA	524	1		
Thailand	THA	578	1		
Timor-Leste	TLS	537	1	1	
Tonga	TON	866	1		
Tuvalu	TUV	869	1	1	
Vanuatu	VUT	846	1		
Vietnam	VNM	582	1		1
Kiribati	KIR	826	1		1

Mitigating endogeneity problems

Table A2. Overall Effect of Governance on Growth Controlling for Endogeneity

Dependent variable:	(1)	(2)	(3)	(4)	(5)
Real GDP per capita growth	Lagged	Ethnic	Settler Mortality	Independence	Latitude
			ICRG		
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.079 **	0.093 **	0.199	0.111 ***	0.078 ***
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	20.61 ***	5.272 *	1.485	30.14 ***	16.46 ***
Observations	460	115	115	115	132
Number of countries	119	115	115	115	132
Data structure	Panel	Cross-section	Cross-section	Cross-section	Cross-section
Estimation method	SGMM	IV	IV	IV	IV
			WGI		
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.059 **	0.173 **	0.147 **	0.141 ***	0.078 ***
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	6.411 **	10.65 ***	5.233 *	17.19 ***	16.46 ***
Observations	407	132	132	132	132
Number of countries	136	132	132	132	132
Data structure	Panel	Cross-section	Cross-section	Cross-section	Cross-section
Estimation method	SGMM	IV	IV	IV	IV

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The system GMM (SGMM) regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instrumental variables (IV) regressions are estimated using robust two-stage least square estimator.
The z-test shows the sum of coefficients and significance level from testing the null hypothesis that the sum of the coefficients on governance is zero.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Benchmarking against regions and country groups

Table A3. Overall Effect of Governance on Growth Across Regions (Models 2 and 3)

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP per capita growth	SSA	Non-SSA	LAC	MENAAP	SSA	Non-SSA	LAC	MENAAP
	ICRG Model (2)				ICRG Model (3)			
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.196 ***	0.126 ***	0.123 **	0.128 ***	0.194 ***	0.096 ***	0.101 **	0.054
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	47.44 ***	58.46 ***	27.89 ***	29.07 ***	16.74 ***	13.54 ***	5.261 **	2.200
Observations	470	470	470	470	91	243	84	62
Number of countries	119	119	119	119	23	62	21	16
Number of instruments	17	17	17	17	15	15	15	15
Serial correlation test (p-value)	0.456	0.275	0.129	0.127	0.597	0.811	0.131	0.438
Hansen test (p-value)	0.283	0.344	0.322	0.344	0.328	0.280	0.062	0.186
	WGI Model (2)				WGI Model (3)			
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.123 ***	0.063 ***	0.068 **	0.074 **	0.16 ***	0.063 ***	0.028	0.097
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	18.96 ***	19.92 ***	5.858 *	6.835 **	8.561 ***	10.74 ***	0.703	1.967
Observations	470	470	470	470	119	282	92	66
Number of countries	119	119	119	119	30	72	23	17
Number of instruments	17	17	17	17	15	15	15	15
Serial correlation test (p-value)	0.458	0.367	0.386	0.364	0.552	0.496	0.347	0.882
Hansen test (p-value)	0.255	0.261	0.212	0.247	0.368	0.129	0.019	0.035

The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The z-test shows the sum of coefficients and significance level from testing the null hypothesis that the sum of the coefficients on governance is zero.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Table A4. Overall Effect of Governance on Growth Across Regions (Model 4)

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP per capita growth	ICRG			WGI		
	SSA	Non-SSA	LAC & MENAAP	SSA	Non-SSA	LAC & MENAAP
Governance	0.107 ***	0.163 ***	0.097 ***	0.036 **	0.054 ***	0.008
Governance x SSA	0.089 **		0.099 **	0.087 ***		0.107 ***
Governance x Non-SSA		0.026			0.005	
Governance x LAC			0.029			0.088 **
Governance x MENAAP			0.029			0.089 ***
Observations	470	470	470	470	470	470
Number of countries	119	119	119	119	119	119
Number of instruments	17	19	21	17	19	21
Serial correlation test (p-value)	0.456	0.329	0.408	0.458	0.385	0.380
Hansen test (p-value)	0.283	0.343	0.254	0.255	0.242	0.164
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_{2SSA} = 0$	47.44 ***			18.96 ***		
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_{2NSSA} = 0$		53.25 ***			23.16 ***	
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_{2SSA} = 0$ and $\beta_{2LAC} = 0$ and $\beta_{2MENAAP} = 0$			38.47 ***			26.34 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Table A5. Overall Effect of Governance on Growth Across Groups (Models 5 and 6)

Dependent variable:	(1)	(2)	(3)		(4)	(5)	(6)	(7)		(8)
Real GDP per capita growth	SSA	LIC	SSA x LIC	LOW	SSA x LOW	SSA	LIC	SSA x LIC	LOW	SSA x LOW
	ICRG Model (5)					ICRG Model (6)				
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.197 ***	0.142 ***	0.168 ***	0.132 ***	0.216 ***	0.194 ***	0.143 *	0.195 ***	0.115 **	0.243 ***
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	47.44 ***	12.61 ***	26.16 ***	14.05 ***	26.59 ***	16.74 ***	3.123 *	14.68 ***	13.33 ***	40.25 ***
Observations	470	470	470	470	470	91	118	75	180	68
Number of countries	119	119	119	119	119	23	30	19	59	20
Number of instruments	17	17	17	17	17	15	15	15	17	17
Serial correlation test (p-value)	0.456	0.347	0.399	0.127	0.313	0.597	0.554	0.058	0.536	0.130
Hansen test (p-value)	0.283	0.207	0.249	0.173	0.176	0.328	0.0647	0.256	0.472	0.705
	WGI Model (5)					WGI Model (6)				
z-test for H_0: $\beta_1 + \beta_2 = 0$	0.123 ***	0.042	0.109 ***	0.072 *	0.128 ***	0.16 ***	0.109 *	0.205 ***	0.120 **	0.172 ***
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	18.96 ***	1.193	15.02 ***	4.045	15.92 ***	8.561 ***	3.222 *	16.34 ***	9.502 ***	10.530 ***
Observations	470	470	470	470	470	119	161	95	259	90
Number of countries	119	119	119	119	119	30	41	24	73	24
Number of instruments	17	17	17	17	17	15	15	15	17	17
Serial correlation test (p-value)	0.458	0.438	0.453	0.376	0.473	0.552	0.433	4.06e-05	0.516	0.369
Hansen test (p-value)	0.255	0.131	0.209	0.184	0.201	0.368	0.158	0.302	0.272	0.180

The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The z-test shows the sum of coefficients and significance level from testing the null hypothesis that the sum of the coefficients on governance is zero.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Testing additional control variables

The overall effect of governance on growth for SSA survives the inclusion of additional controls and remains significant and with the expected sign (Table A6). First, we include lagged growth in equation (1) and find weak evidence of persistence. The coefficient on lagged growth is positive but its significance is weak (Table A6, column 1). Next, we replace the inflation dummy by the level of inflation (column 2) and by a dummy that considers a higher (20 percent) threshold for inflation (column 3). The coefficient on inflation in both cases has the right sign and is statistically significant.

We also test the hypothesis that SSA countries with abundant natural resources tend to grow more slowly than natural-resource-scarce economies (column 4). Perhaps the governance indicator in our regressions is capturing differences in natural resource intensity rather than differences in institutions. We therefore test this conjecture by interacting governance with a dummy variable for natural resource intensity. We identify resource-rich countries where 20 percent of exports or more are comprised by primary products such as oil, gas, minerals and agricultural commodities.

Controlling for resource intensity does not change the baseline results and the correlation between governance and growth remains statistically significant for SSA (column 5). The coefficient on the dummy for resource intensity is negative, suggesting that undiversified economies grow less rapidly in the long run.

Another possibility is that our indicators of governance may be instead capturing deeper problems such as state fragility or incomplete state formation. We test this conjecture by controlling for the extent to which these countries have been exposed or experienced armed conflicts in the past, using data on conflicts from the UCD/PRIO Armed Conflict Dataset v4 2015. Africa has a disproportionate number of fragile states, or half of the countries identified by the Fund as fragile states (IMF 2015b). Controlling for conflicts, which are known to undermine basic institutions such as the rule of law, we continue to find a statistically valid correlation between governance and SSA growth (column 5).

We also test the robustness of the model by including other traditional controls such as share of agriculture in value added, trade openness, and government consumption. The baseline results remain virtually unchanged (columns 6 to 8).

Table A6. Overall Effect of Governance on Growth Controlling for Additional Factors

Dependent variable: Real GDP per capita growth	(1) Lagged Growth	(2) Inflation Level	(3) Inflation Dummy	(4) Resource Intensity	(5) Conflict	(6) Agriculture Intensity	(7) Openness	(8) Government Consumption
				ICRG				
Governance	0.101 ***	0.107 ***	0.108 ***	0.070 ***	0.114 ***	0.112 ***	0.105 ***	0.108 ***
Governance x SSA	0.068 *	0.079	0.084 *	0.129 *	0.075	0.092 **	0.091 **	0.091 **
Alternative control variable	0.107 *	-0.041 ***	-1.942 ***	-9.38 **	0.389	-0.106 ***	0.002	0.020
Observations	469	468	470	470	362	451	470	470
Number of countries	119	119	119	119	92	117	119	119
Number of instruments	17	17	17	18	18	18	18	18
Serial correlation test (p-value)	0.941	0.636	0.529	0.668	0.827	0.101	0.468	0.442
Hansen test (p-value)	0.624	0.161	0.143	0.01	0.343	0.011	0.282	0.276
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	45.59 ***	31.62 ***	39.75 ***	19.95 *	28.06 ***	25.4 ***	46.68 ***	48.43 ***
				WGI				
Governance	0.034 ***	0.036 **	0.039 **	0.017	0.051 **	0.028	0.035 **	0.036 **
Governance x SSA	0.072 ***	0.079 ***	0.078 ***	0.077 **	0.084 ***	0.087 ***	0.088 ***	0.087 ***
Alternative control variable	0.107	-0.051 **	-2.044 *	-4.89 ***	-1.068	-0.056	0.001	0.022
Observations	469	468	470	470	362	451	470	470
Number of countries	119	119	119	119	92	117	119	119
Number of instruments	17	17	17	18	18	18	18	18
Serial correlation test (p-value)	0.716	0.416	0.477	0.469	0.698	0.610	0.467	0.431
Hansen test (p-value)	0.379	0.157	0.130	0.064	0.351	0.001	0.253	0.220
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$	21.08 ***	12.51 ***	17.58 ***	7.482 **	23.07 ***	12.3 ***	18.87 ***	17.8 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Testing alternative sample frequencies

Using 3-year averages allows to nearly double the number of observations. Most controls remain statistically significant and with the expected sign (not shown). Like in the baseline model, the overall effect of governance on growth is strong in the full sample and more so in the SSA sample regardless of how we slice the data (Table A7). Using annual data yields similar result for SSA but not for the overall sample (Table A8).[19]

These results should be taken with caution because we could not completely remove the presence of serial autocorrelation. In our view, using 5-year averages seems to be a reasonable choice given the data available, and it is also in line with the practice in the literature (e.g., and Gyimah-Brempong and de Camacho, 2006; Heckelman and Powell, 2010; Swaleheen, 2011; and Saha et al, 2017).

[19] For the 3-year regressions we interpolated Barro and Lee data on schooling, available at every five years, to mitigate the problem of missing observations. For yearly regressions we lag all control variables, except the inflation dummy, to mitigate endogeneity problems.

Table A7. Overall Effect of Governance on Growth Using 3-Year Averages

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP per capita growth	ICRG				WGI			
	ALL	SSA	SSA x LIC	SSA x LOW	ALL	SSA	SSA x LIC	SSA x LOW
Governance	0.103 ***	0.099 ***	0.104 ***	0.050 ***	0.030 *	0.038 **	0.038 **	0.032 ***
Governance x SSA		0.108 ***	0.108 **	0.149 ***		0.071 **	0.073	0.115 ***
Observations	822	822	822	822	822	822	822	822
Number of countries	119	119	119	119	119	119	119	119
Number of instruments	16	18	18	18	16	18	18	18
Serial correlation test (p-value)	0.0193	0.0192	0.0221	0.0187	0.0396	0.0385	0.0384	0.0370
Hansen test (p-value)	0.316	0.392	0.417	0.253	0.685	0.741	0.695	0.730
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$		29.73 ***	28.95 ***	19.12 ***		23.30 ***	17.73 ***	24.11 ***

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

Table A8. Overall Effect of Governance on Growth Using Annual Data

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP per capita growth	ICRG				WGI			
	ALL	SSA	SSA x LIC	SSA x LOW	ALL	SSA	SSA x LIC	SSA x LOW
Governance	-0.02 *	-0.02 *	-0.02	-0.03	-0.01	-0.00	-0.00	-0.01 *
Governance x SSA		0.073 ***	0.070 **	0.111 ***		0.065 ***	0.066 **	0.078 **
Observations	2,197	2,197	2,197	2,197	2,197	2,197	2,197	2,197
Number of countries	119	119	119	119	119	119	119	119
Number of instruments	31	33	33	33	30	32	32	32
Serial correlation test (p-value)	0.779	0.787	0.799	0.781	0.268	0.330	0.269	0.281
Hansen test (p-value)	0.00107	0.100	0.106	0.135	0.00572	0.110	0.127	0.136
χ^2-test for H_0: $\beta_1 = 0$ and $\beta_2 = 0$		9.736 ***	6.609 **	13.99 ***		8.174 **	4.457	5.674 *

***, **, * significant at 1, 5, and 10 percent, respectively. P-values are estimated with robust standard errors.
The regressions are estimated using robust two-step system GMM estimator and include country and time fixed effects.
The instruments are the right-hand side controls shown above, lagged values of the dependent variable, and a dummy for resource intensity.
The serial correlation test is for second-order serial correlation and the Hansen test is for overidentifying restrictions.
The χ^2-test shows the test statistics and significance level from testing the null hypothesis that the coefficients on governance are jointly zero.

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