INTERNATIONAL MONETARY FUND

The Financial Performance and Macrofinancial Implications of Large State-Owned Enterprises in Sub-Saharan Africa

Torsten Wezel and Naly Carvalho

WP/22/56

2022
MAR

WORKING PAPER

 WP/22/56

IMF Working Paper
Monetary and Captial Markets Department

The Financial Performance and Macrofinancial Implications of Large State-Owned Enterprises in Sub-Saharan Africa

Prepared by Torsten Wezel and Naly Carvalho

Authorized for distribution by Montfort Mlachila
March 2022

ABSTRACT: Using a newly-compiled dataset of state-owned enterprises in Sub-Saharan Africa, we present aggregate information about profitability, liquidity and leverage. We find that 40 percent of the close to 300 surveyed SOEs are unprofitable, while larger firms also tend to be illiquid and overleveraged. In cross-sectional regressions we find that SOE debt stock sustainability is impacted by firms' profitability and liquidity, while macroeconomic factors cannot be shown to matter, expect for some governance variables. Based on these findings and citing country examples, we also illustrate that weak SOE performance may have a macrofinancial impact affecting bank soundness through delinquent loan exposures.

JEL Classification Numbers:	L25, L32, N47
Keywords:	Firm Performance, State-Owned Enterprises, Sub-Saharan Africa
Author's E-Mail Address:	twezel@imf.org, nalycarvalho@outlook.com

Contents Page

I. INTRODUCTION

State-owned enterprises (SOEs) have long been the focus of attention for the burden and risk that the discharge of their essential services poses, particularly for public finances. It is widely recognized that SOEs are indispensable for the provision of certain public goods to the population, particularly in cases where no private operator would provide such services (e.g., natural monopolies) or could not at a price that is palatable for the population. At the same time, SOEs often fall victim to poor governance, lackluster control mechanisms and operational inefficiencies that ultimately imply high costs to the sovereign as owner in the form of subsidies, provision of liquidity, and coverage of operating losses via support payments and recapitalizations.

In addition, SOEs often accumulate a high debt load, including from the private sector, that is to be considered a contingent liability for government (for a detailed summary of SOE issues, see IMF, 2020b). Since many SOEs are not included in the central government accounts and may only appear in the general government sphere, their losses and possibly unsustainable debt may go unnoticed by the public for years until an ailing institution requires more immediate support that then prompts outright transfers from the central budget or, if government guarantees given to private creditors are invoked, payments to third parties.

Perhaps owed to the perceived inevitability of inefficient operations and corresponding losses, the financial performance of SOEs is generally taken for granted or not much examined at all, although there are some notable exceptions, particularly in Asia (see Park, 2017) and a few African countries.[1] Likely for this presumed lack of influence on financial results, research has tended to focus of operational issues of SOEs and fiscal implications but much less so on the financials of SOEs.

In fact, few studies have assessed the financial viability of SOEs in individual countries[2] and much less so in a cross-country setting. It is this evident void in the literature that our paper seeks to fill, notably to assess the financial performance of SOEs across an entire region, in our case Sub-Saharan Africa (SSA) whose performance is generally underreported. Citing an IMF survey, Baum and others (2020) report that non-financial public enterprises are covered in less than 10 percent of the IMF's 45 SSA countries. The scarcity of SOE studies in SSA may be due to difficulty in assessing their performance, particularly in low-income countries, due to limited availability of timely and reliable financial data. Yet it is evident that many SOEs in SSA are facing difficult financial conditions (even pre-pandemic; see Harris et al., 2020).

[1] For example, in Angola, Burundi, Ghana and Liberia; see Section IV for a short description of such reports.

[2] Firm-level studies on the financial performance of SOEs in individual countries using typical performance variables include analyses for Bosnia and Herzegovina (Cegar and Parodi, 2019), China (Ferrarini and Hinojales, 2018), Croatia (Bajo and others, 2018), Ghana (Bonney, 2015; Amo and Gyamerah, 2016), India (Batth and others, 2018), Indonesia (Assagaf and Ali, 2017; Chandra et al., 2019; Nugroho, 2019), Kenya (Kamau and Simiyu, 2019), Korea (Heo, 2018), Moldova (Hegazy and Navarro Lopez, 2021), Papua New Guinea (Asian Development Bank, 2012), and South Africa (Republic of South Africa, 2006; Kikeri, 2018).

The multi-country studies to date measure and test financial performance in different ways. Some studies recur on profitability,[4] while others scrutinize productivity and efficiency,[5] liquidity,[7] fiscal burden,[9] and, as in our study, SOE indebtedness.[10] However, none of the studies that consider indebtedness test directly for debt sustainability of SOEs as defined by debt stock or interest payments in relation to a measure of earnings strength. This may be because of the tacit assumption that the debt burden does not matter much due to state ownership, but, as we illustrate in several examples, SOE overindebtedness has had adverse macrofinancial consequences in terms of domestic arrears and defaults on bank loans.

These and other—single country—studies find that SOE financial performance is predicated, among other factors, on labor costs, depreciation in relation to investment, productivity, governance and oversight, payment arrears from buyers, and government support (or, conversely, uncompensated quasi-fiscal SOE activities). Reversing the perspective, some studies[11] gauge the impact of SOE performance on the economy and the fiscal accounts, including estimation of potential growth dividends from SOE and governance reform as well as privatization.

In the study perhaps closest to ours, Baum and others (2019) use a dataset of SOEs from 88 countries across the globe during 2000-16. The authors regress performance measures on governance variables (corruption, fiscal transparency and governance reforms), while also controlling for firm- and country-level drivers. They find that higher corruption is associated with lower return on equity, diminished labor productivity and higher labor costs. SOE reforms are shown to improve financial performance (e.g. IMF program conditionality on SOE reform). After controlling for country differences, SOE performance is weaker where corruption is high and fiscal transparency low.

In the only cross-country study for SSA, Trimble et al. (2016) examine the performance of electricity companies in 39 SSA countries during 2012-14. The authors find that only two firms had sustainable operations, whereas most SOEs were not able to cover operational costs and capital expenditure. They estimate the quasi-fiscal deficit (composed of revenue loss due to underpricing as well as transmission/distribution and bill collection losses) to be on average 1.5 percent of GDP but as high as 5 percent.

---

[4] Return on assets (ROA) or equity (ROE) as well as operating profit per sales—Baum et al., 2019 and 2020; Taghizadeh-Mesary et al., 2019, or return on capital employed (Böwer, 2017).

[5] Average profit, cost or sales per employee as well as, conversely, cost of employees-to-operating revenue—Böwer, 2017; IMF 2020b; Taghizadeh-Mesary et al., 2019; Baum et al., 2019 and 2020; Richmond et al., 2019.

[7] Current ratio, cash flow-to-operating revenue—Trimble et al., 2016; Baum et al., 2019; Taghizadeh-Mesary et al., 2019.

[9] Quasi-fiscal deficit—IMF, 2020b; Trimble et al., 2018; Baum et al., 2020.

[10] Non-current liabilities-to-assets, debt due days—Baum et al., 2019; Taghizadeh-Mesary et al., 2019.

[11] E.g., Amo and Gyamerah, 2016; Asian Development Bank, 2012; Böwer, 2017; Parodi and Cegar, 2019.

Our contribution to the relatively sparse literature on the financial performance aspect of SOE operations is the following. We have compiled a comprehensive and detailed dataset with financial information of close to 300 SOEs in SSA under majority public ownership—the first of its kind to our knowledge, with a coverage of SSA going well beyond what is available in commercial databases like Bloomberg or Orbis. Moreover, we put this novel dataset to the test by determining the macroeconomic, governance and firm-specific drivers of SOE performance in the region as measured by debt sustainability, and profitability. Since the dataset is somewhat unbalanced—in some countries we were able to find information only for a few SOEs—we created a core dataset with up to three of the largest SOEs per country and run separate regressions for the full and the more balanced core dataset. As the full dataset suffers from certain biases (see Section II), we focus on the core dataset in the econometric analysis and report results for the full set only as a robustness check in Annex I.

It is fair to mention several caveats upfront. First, we focus on a restricted set of financial performance indicators that are consistently published by SOEs in the region; other more efficiency-oriented indicators used in other studies such as operating costs relative to turnover, labor costs relative to revenue or turnover per employee, while interesting and relevant, could not be compiled consistently across the sample countries. Second, due to lack of data, we are unable to control for external, largely unobserved factors that influence SOEs' financial performance such as explicit government subsidies and transfers, recapitalizations, or other preferential treatment like guarantees and policies to keep prices of inputs (e.g., oil and electricity) artificially low. Lastly, while the dataset is quite comprehensive, we certainly do not claim that it covers the entire universe of SOEs in the region.[12]

The remainder of the paper is organized as follows. Section II provides details about the data collection process and the dataset; presents some descriptive statistics on the distribution of SOEs across sample countries, the share of main economic sectors and subsectors in the sample, and the main explanatory firm-level variables used in the regressions; and performs a correlation analysis between these variables. Section III introduces the main dependent variable of the study—the net debt-to-EBITDA ratio measuring SOEs' (excess) leverage—and presents the summary statistics of the set of dependent and explanatory variables as well as the correlation matrix. It also has the results of a cross-section econometric analysis of the determinants of debt sustainability and profitability based on a variety of specifications using firm-level, macroeconomic and governance variables; and presents sensitivity checks and a breakdown of results by countries' income status and resource intensity. Section IV analyzes the macrofinancial implications of SOE performance for SSA countries' banking sectors and illustrates the adverse linkages through a number of case studies. Lastly, section V concludes.

[12] We probably achieve a full sample in some countries that publish detailed SOE reports covering the entire sector, yet in other countries where we compiled the financial statements from public sources, including authorities' submissions, this is mostly likely not the case. Still, we are quite confident that we captured the largest or most important SOEs in each reporting country.

II. Data Collection, Descriptive Statistics, and Correlation Analysis

Data Collection

For the following quantitative analysis, we compiled a novel dataset with financial data for close to 300 SOEs in Sub-Saharan Africa in which government holds the majority of shares. This comprehensive dataset for SSA allows deriving conclusions about SOE financial performance across the region for the first time.

In the data compilation process, we were able to capture information for SOEs in 35 of the 45 SSA countries. In spite of our collection efforts, requisite SOE data was not available for ten countries (some of which are fragile states facing challenges in data collection and statistics).[13] In the end, we collected data for 287 SOEs that are active in a variety of economic sectors but mostly in the extractive industries and in the energy, services and transportation sectors. Importantly, we excluded SOEs from the bank and non-bank financial sectors because, by virtue of their business models, their leverage is very high and therefore applying the standard concept of debt sustainability would not make sense in these cases.

The data we collected were either publicly available and could be accessed via the respective websites of the SOEs or were reported by the country authorities in different ways. SOEs typically publish a standard set of audited financial statements, and in most cases, we gathered information from full or simplified balance sheets, income statements and, to a lesser extent, cash flow statements (e.g., to obtain depreciation and amortization expenses when not already supplied in the income statement).

This said, a substantial number of financial reports were provided by country authorities only upon request. In some cases, ratios derived from financial statements (i.e., EBITDA, see below) were made available directly, i.e. we did not need to compile them from the financial statements. In several countries such as Angola, Burundi, Ghana and Liberia, the SOE information was obtained from official sector-wide public reports that have been published with greater transparency and accountability in mind (see Section IV).

The SOE dataset includes firm-level information on SOEs' revenue and expenses, notably depreciation and amortization, net interest expense, profit before and after taxes, net taxes paid as well as total assets, total liabilities and equity, current assets and current liabilities (hence, working capital), and cash and cash equivalents. The sample is somewhat unbalanced, i.e., these variables are not uniformly reported across countries, and even within countries less than the full 287 observations exist for some variables. From these variables

[13] The list of countries where sufficiently detailed SOE financial statements could not be obtained for this dataset encompass Democratic Republic of Congo, Equatorial Guinea, Eritrea, Eswatini, Gabon, Guinea, Malawi, Sierra Leone, South Sudan, and Togo. To be sure, the government of Equatorial Guinea has published an SOE report which informs about income and expenses per firm but unfortunately not the balance sheet items needed for this study.

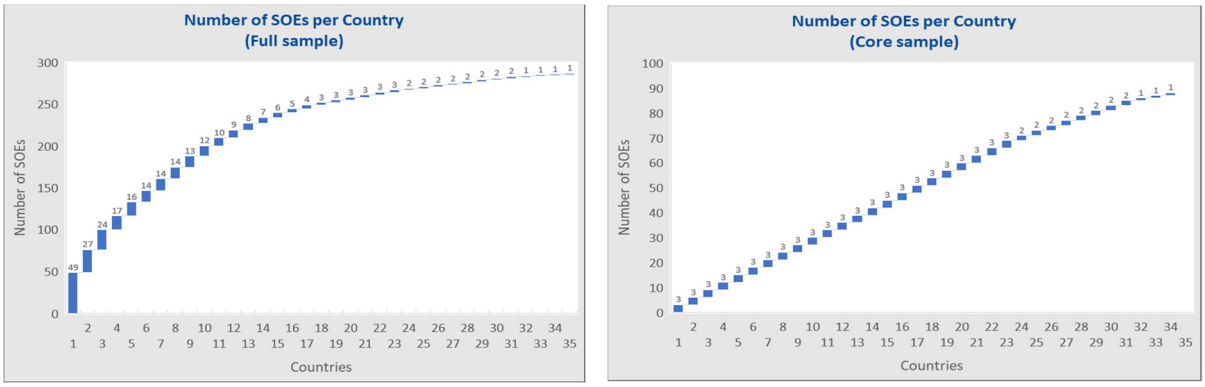
we derived the following key performance ratios that could be computed across sample countries: earnings before interest, taxes, depreciation, and amortization (EBITDA),[14] return on (average) assets (ROA), leverage (debt-to-asset ratio) and liquidity (ratio of current assets to current liabilities).

Descriptive Statistics

This sub-section presents the descriptive statistics of the main financial ratios collected from the balance sheet and income statement information.

The data sample shows a skewed distribution of the number of SOEs reported by each of the 35 countries, ranging from 49 SOEs in one country to a single entity in a few cases. To reduce the evident country bias in the sample, we created a core sample with only up to the three largest SOEs in each country case (measured primarily by assets, but in case of doubt also by revenue), which rendered the distribution much more even. The reduced sample has two-thirds of the countries with exactly 3 SOEs per country (Figure 1).[15] Although this reduced the sample size and by more than two-thirds, it was arguably the best way to reduce the bias.

Figure 1. Distribution of Number of SOEs per Country



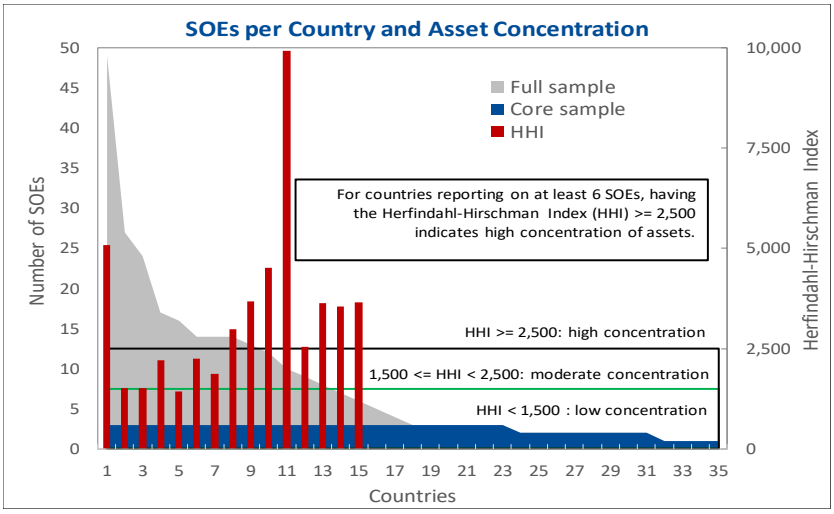
Source: Authors' calculations based on SOE reports.

In addition to the country bias, the full sample also suffers from a small firm bias, as Figure 2 illustrates. In the countries with at least three additional firms beyond the core sample (i.e. at least six SOEs, in a total of 15 countries), calculation of the Herfindahl-Hirschman (HHI) indicates that many SOE sectors are highly concentrated. In turn, this implies the presence of quite a number of smaller firms in such country cases.

[14] Only some SOEs report EBITDA directly; in many cases the authors had to calculate EBITDA from the bottom up, by adding depreciation and amortization, net interest payments and taxes paid to after-tax profits.

[15] It cannot be ruled out that in cases with only one or two entries, firms of smaller size entered into the core sample given that there was not a sufficiently large peer group of reporting SOEs within the country.

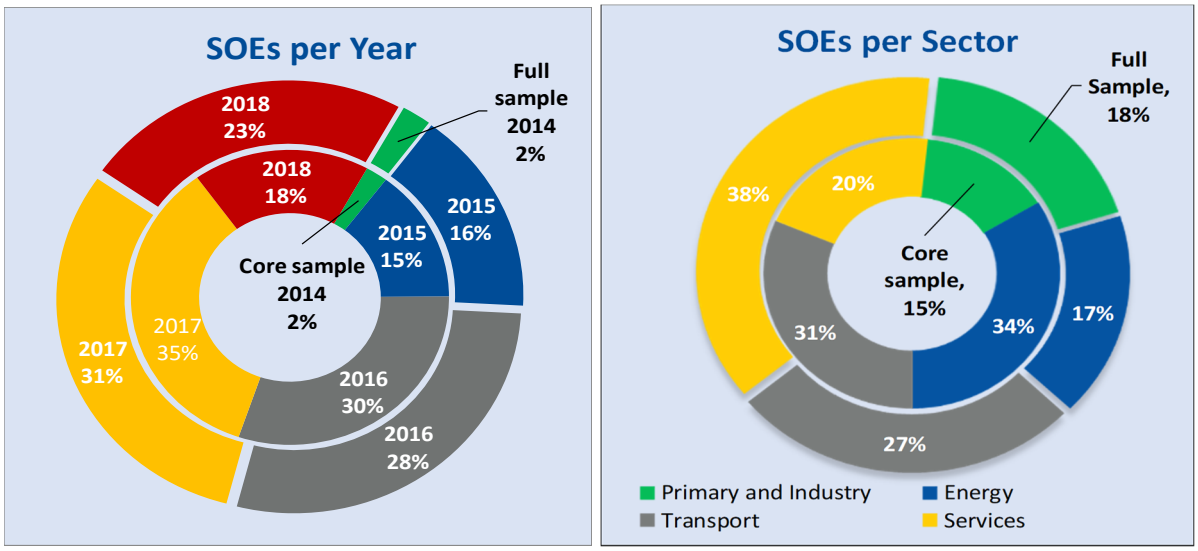
Figure 2. Market Concentration and Small Firm Bias in Full Sample



Source: Authors' calculations based on SOE reports.

In both samples, about half of the firms have relatively recent data from 2017 and 2018 but there are also some records from earlier years which were the latest available in these cases (Figure 3). Generally, it may take anywhere from 6 months to 2 years for SOEs' financial statements to be published. Disaggregating by major sector, we see that in the full sample more than one-third of the SOEs operate in the services sector, followed by transport. In the core sample, the largest sectors, energy and transport, are slightly less dominant than in the full sample. In both samples, electricity is the largest sub-sector (Figure 4), while within the transport sector port and airline/airport operations also have a large weight in both samples.

Figure 3. Distribution of Units Across Years and Sectors



Source: Authors' calculations based on SOE reports.

Table 1. Breakdown of Units by Sub-Sector

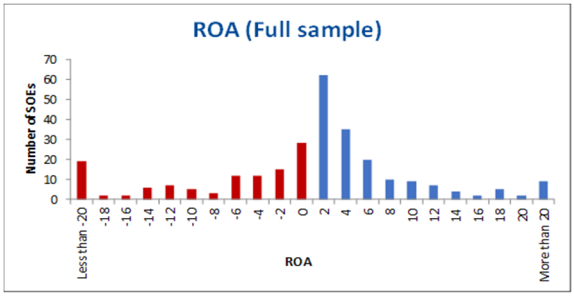
	Full sample		Core sample	
Sector/Sub-sector	SOE	% sample	SOE	% sample
Primary sector	**53**	**18%**	**13**	**15%**
Agriculture and Industry/Forestr	*21*	*40%*	*4*	*31%*
Mining	*12*	*23%*	*1*	*8%*
Industry	*12*	*23%*	*2*	*15%*
Oil	*8*	*15%*	*6*	*46%*
Energy sector	**49**	**17%**	**30**	**34%**
Electricity	*33*	*67%*	*23*	*77%*
Water	*16*	*33%*	*7*	*23%*
Transport sector	**77**	**27%**	**28**	**31%**
Port authorities	*29*	*38%*	*12*	*43%*
Air	*27*	*35%*	*13*	*46%*
Rail	*14*	*18%*	*3*	*11%*
Postal	*7*	*9%*	*0*	*0%*
Services sector	**108**	**38%**	**18**	**20%**
Miscellaneous services	*59*	*55%*	*4*	*22%*
Telecom	*28*	*26%*	*7*	*39%*
Oil refinery	*13*	*12%*	*7*	*39%*
Wholesale	*8*	*7%*	*0*	*0%*
Sum total	**287**	**100%**	**89**	**100%**

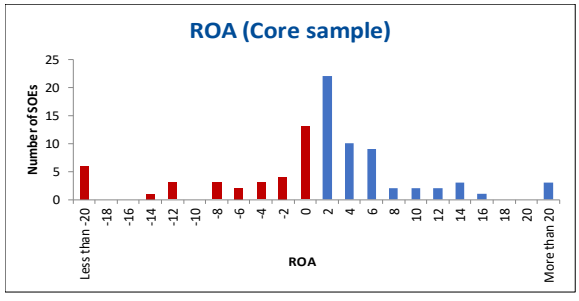
Source: Authors' calculations based on SOE reports.

To measure SOE performance, we define several firm-level variables: (i) the return on assets (ROA); (ii) a liquidity ratio; (iii) a leverage ratio; and (iv) a debt sustainability variable.

Return on Assets: The return on assets is the principal measure of a firm's profitability (more so than the return on equity which is influenced by different levels of capitalization). We use the return on average assets, i.e., relate after tax profits to the simple average of assets at the balance sheet date and one year prior. While relatively evenly distributed, about 40 percent of SOEs show negative profitability in both the full and the core sample.

Figure 4. Distribution of Return on Assets

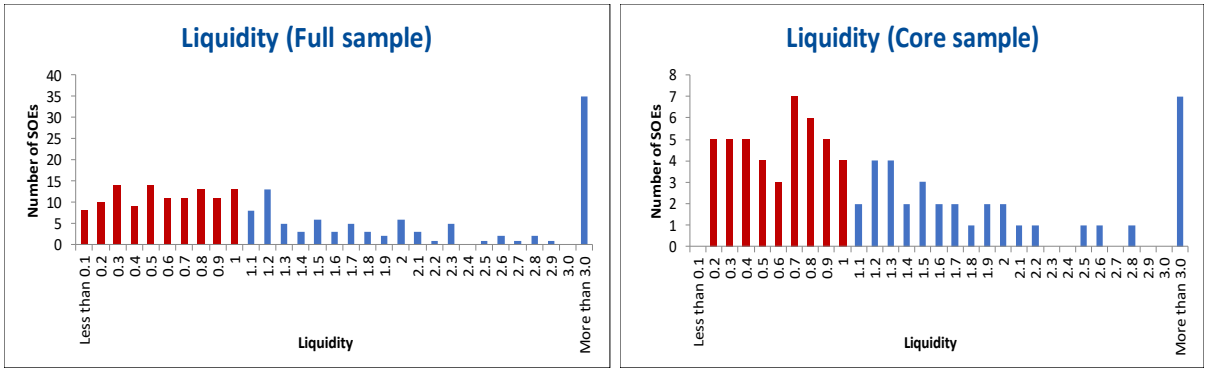




Source: Authors' calculations based on SOE reports.

Liquidity Ratio: We measure liquidity using the "current ratio", which is defined as the ratio of current assets to current liabilities (the absolute difference between the two is also known as working capital). The ratio assesses the ability of a firm to cover its short-term obligations by liquid assets. A ratio of more than one suggests that the firm is relatively liquid. In both samples, many firms have ample liquidity, with ratios well above 1.[16] However, in the core sample, half of the SOEs show ratios below the threshold.

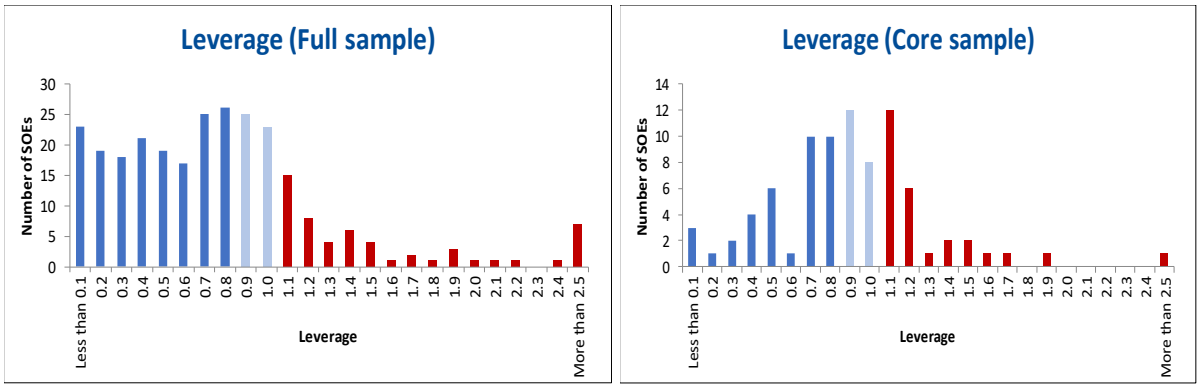
Figure 5. Distribution of Liquidity Ratio



Source: Authors' calculations based on SOE reports.

Leverage Ratio: Leverage is measured here as the debt-to-assets ratio. Many of the (small) firms in the full sample display low leverage but more than half of (larger) firms in the core sample have a capital-to-assets ratio of less than 20 percent (as shown by the light blue bars in Figure 6), which is already very little for a non-financial firm, or they are technically insolvent with debt exceeding the value of assets.

Figure 6. Distribution of Leverage Ratio



Source: Authors' calculations based on SOE reports.

[16] Note that if the ratio is very high, it may indicate that a firm does not have good investment opportunities, and in this case, it may be better to use the excess liquidity to pay down debt.

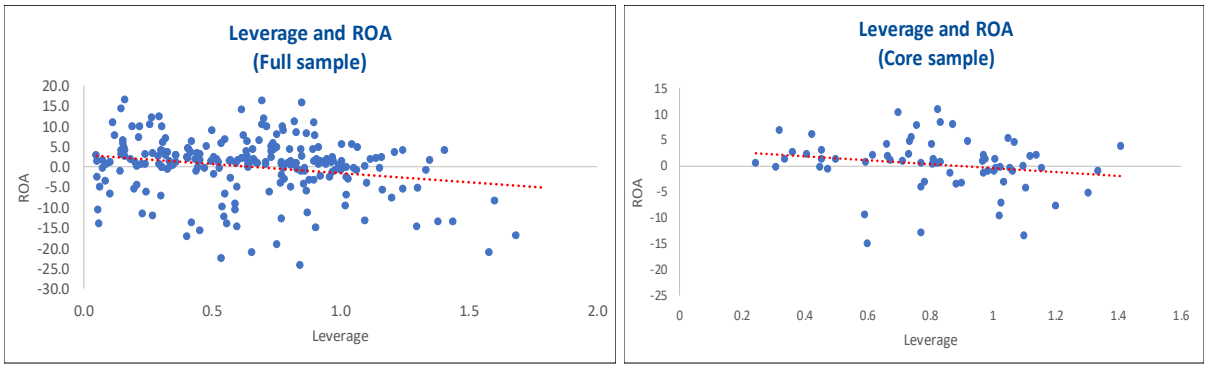
In addition, we define a fourth performance variable aimed at measuring an SOE's debt sustainability, the net debt-to-EBITDA ratio. This popular ratio measures the viability of an SOE's debt stock in relation to its operative earnings. Importantly, we include all SOE liabilities in the definition of debt, including accounts payable. We consider this necessary because in SSA, contrary to practices in advanced countries, liabilities to suppliers are not always transitory but often turn into domestic arrears (see IMF, 2019). As a result, this type of current liabilities may not be much different in nature and effective tenor to other firm liabilities. The definition and descriptive statistics of the debt-to-EBITDA ratio are presented in detail in Section III.

Correlation Analysis

Turning to the interaction between the performance variables, we conduct a pair-wise correlation analysis for the full and the core sample. The three variables show a considerable degree of correlation, particularly in the core sample.

First, we find a moderately negative correlation between leverage and profitability in both samples. Importantly, it is evident from the scatter plots that highly-levered firms that have negative capital or a capital ratio of less than 20 percent (corresponding to a debt-to-assets ratio of greater than 0.8) tend to be loss-making (have a negative ROA).

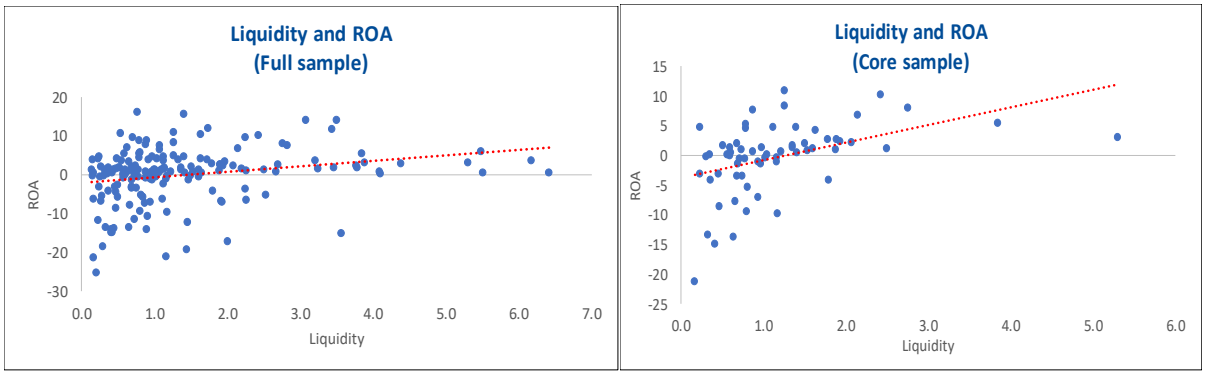
Figure 7. Correlation between Leverage and Profitability



Source: Authors' calculations based on SOE reports.

Next, we find a moderately positive correlation between liquidity and profitability in the full sample and a stronger correlation between the two in the core sample. This indicates that profitable firms tend to have other sound fundaments like a comfortable liquidity position and vice versa, although we do not make inferences about causality. In the core sample, almost all firms with a liquidity ratio of greater than one are profit-making.

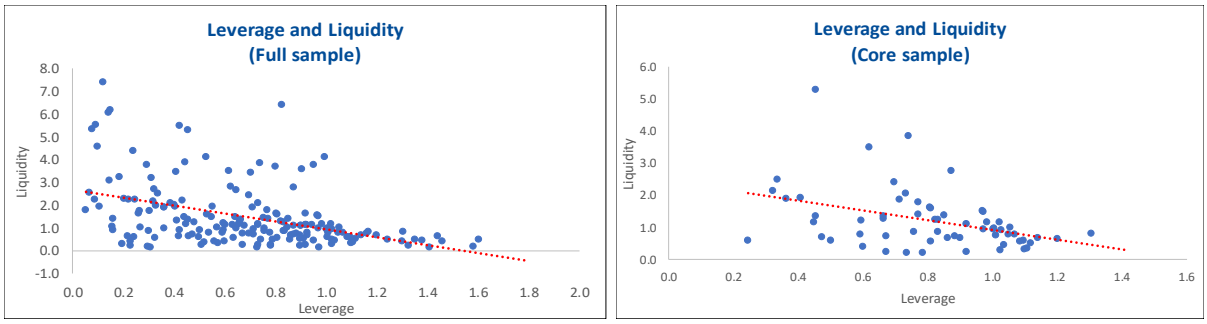
Figure 8. Correlation Between Liquidity and Profitability



Source: Authors' calculations based on SOE reports.

Lastly, the correlation between the remaining pair of variables, leverage and liquidity, is moderately to strongly negative in both samples. The result can be rationalized as follows: illiquid enterprises routinely need to resort to short-term trade and bank financing to compensate for insufficient cash flow. Over time, this leads a build-up of SOE liabilities and leverage.

Figure 9. Correlation between Leverage and Liquidity



Source: Authors' calculations based on SOE reports.

III. Econometric Analysis of SOE Debt Sustainability and Profitability

Next, we assess the sustainability of SOEs' liabilities in light of their earnings or, more precisely, earnings before interest, taxes, depreciation and amortization (EBITDA). In corporate valuation, EBITDA is a commonly used metric that is considered a cash flow proxy adding back depreciation and amortization costs as non-cash expense items. EBITDA has been criticized at times for not adequately representing a firm's earnings capacity (for its pros and cons, see, for example, Gray, 2021), yet it is still the principal yardstick for assessing the earnings power of corporates across various industries. Typically, a threshold of debt not exceeding five times EBITDA is assumed since higher ratios may alarm analysts due to a company being less able to handle the debt burden or assume additional debt

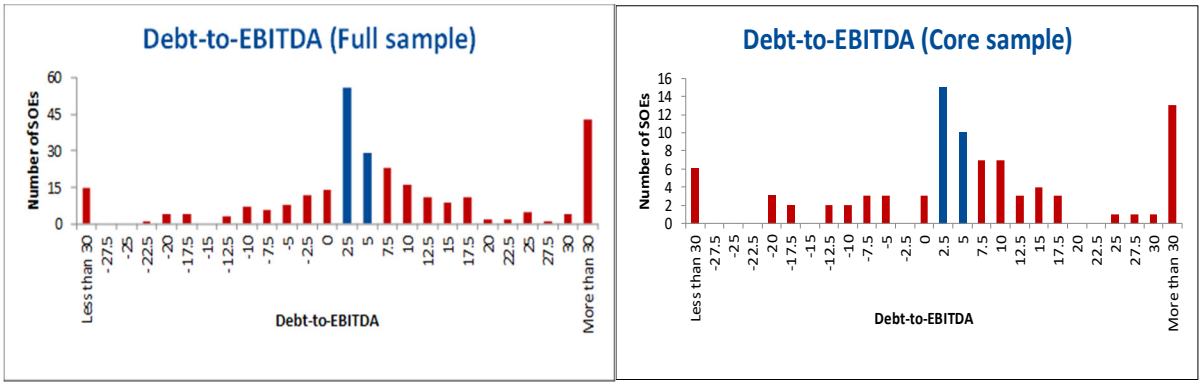
(Kenton, 2020). The threshold for capital-intensive industries may be higher (e.g., net debt 7 times EBITDA).

While the debt-to-EBITDA ratio refers to the sustainability of the debt *stock*, another metric, the interest coverage ratio (ICR, defined as earnings before interest and taxes (EBIT) over net interest payments), assesses the viability of firms' debt *service*, with the critical value typically assumed to be in the range of 1.5 (Chow, 2015) to 1.0 (Tressel and Ding, 2021). In this study, only the debt *stock* metric is used because we do not have sufficient data coverage to compute the ICR (in a number of cases, reports only list EBITDA but not the necessary subcomponents, notably interest payments).

Analysis of the core sample illustrates that more than two-thirds of the surveyed large SOEs in SSA (64 of 89 firms, or 72 percent) display unsustainable debt, i.e., a debt-to-EBITDA ratio (*DTE5*) either greater than 5 (40 cases) or smaller than zero because of negative EBITDA (24 cases).[17] If raising the critical value to 7 to accommodate capital-intensive industries and some possible measurement error (*DTE7*), the share of SOEs with unsustainable debt decreases to 64 percent (57 out of 87 firms, implying seven firms have a *DTE* ratio between 5 and 7). Still, the majority of SOEs should be considered overindebted by this metric, which not only has fiscal and but also macrofinancial implications (see Section IV).

Figure 10 shows the full distribution of debt-to-EBITDA ratios (note that extreme ratio readings, e.g., greater than 100 or smaller than -100, can arise from the denominator being relatively close to zero).

Figure 10. Distribution of Debt-to-EBITDA Ratio



Source: Authors' calculations based on SOE reports.
Note: DTE5 definition used as reference point; red bars indicate unsustainable debt-to-EBITDA ratios.

[17] There were a few cases among the firms with sustainable debt where the ratio EBITDA was positive, but the ratio resulted negative because of net debt being smaller than zero (due to cash holdings exceeding liabilities). In these cases, the (net) debt-to-EBITDA ratio was manually set to zero, indicating sustainable debt.

We conduct a cross-sectional econometric analysis of the determinants of SOE debt sustainability or over-indebtedness. Possible drivers include both firm-level variables and macroeconomic factors, including governance indicators.

The firm-specific variables include, as mentioned, return on (average) assets, *ROA*, as a profitability indicator, and the ratio of current assets to current liabilities as a liquidity indicator (*LIQUID*). We expect higher profitability and liquidity to buttress EBITDA and limit the need to take up debt, respectively, and thus safeguard debt sustainability. We chose not to include the leverage ratio (debt-to-assets ratio) in the regressions for possible endogeneity issues.

The macroeconomic variables include real GDP growth (*RGDPG*), the change in the real exchange rate (*REER*) and the current account (*CURACT),* private sector credit growth (*PSCRED*), the fiscal balance (*FISBAL*), and inflation (*INFLTN*). We also considered interest rates and other macro variables, but the coverage across SSA countries turned out to be insufficient. The set of macro variables also has several governance variables taken from the World Bank's World Governance Indicators database, notably political stability (*POLSTB*), government effectiveness (*GOVEFF*), regulatory quality (*REGQTY*), rule of law (*RLAW*), and control of corruption (*CORRPT*). Table 2 summarizes the variables with their statistical properties, data sources and definitions.

Table 2. Summary Statistics, Data Sources and Definitions of Variables

Variable	Mean	Std. Dev.	Minimum	Maximum	Data Source	Definition
DTE5	0.72	0.45	0	1	Authors' Calc.	Debt-to-EBITDA, Threshold 5 times
DTE7	0.64	0.48	0	1	Authors' Calc.	Debt-to-EBITDA, Threshold 7 times
ROA	0.68	23.65	-66.1	181.5	SOE fin. statemts.	Return on Average Assets
LIQUID	1.40	1.64	0.10	8.97	SOE fin. statemts.	Current Assets to Current Liabilities
RGDPG	3.52	2.52	-2.50	10.35	IMF-IFS	Real GDP growth
REER	-0.18	5.53	-19.52	9.06	IIMF-IFS	Real Effective Exchange Rate, change
CURACT	-8.10	9.12	-39.65	7.75	IMF-IFS	Current Account, change
PSCRED	8.71	9.55	-16.04	51.31	IMF-IFS	Credit to Private Sector, growth
FISBAL	-6.83	4.54	-20.68	-0.33	IMF-IFS	Fiscal Balance, change
INFLTN	5.52	5.79	-1.98	24.73	IMF-IFS	Inflation Rate
POLSTB	-0.36	0.79	-2.03	1.02	World Bank	Perceived likelihood of political instability
GOVEFF	-0.61	0.65	-1.77	0.93	World Bank	Perceived quality of public services
REGQTY	-0.54	0.56	-1.78	1.01	World Bank	Ability to pursue sound policies/regulations
RLAW	-0.53	0.60	-1.77	0.72	World Bank	Confidence in contracts/property rights
CORRPT	-0.49	0.69	-1.56	0.91	World Bank	Use of public power for private gain

Source: Authors' calculations based on SOE reports.

As econometric approach, we choose probit estimation with robust standard errors, since OLS estimation was not feasible because of the dual range of debt non-sustainability producing a discontinuity (i.e., for debt to be considered non-sustainable, the ratio needs to be greater than the critical value or negative). The dependent variable (*DTE*) assumes a value of one if the debt-to-EBITDA ratio is either greater than 5 (alternatively, 7) or is negative, and a value of zero otherwise.

We proceed by first regressing the dependent variable using a threshold of 5, *DTE5*, separately on the macroeconomic and firm-specific variables and then each of the governance indicators given that they are strongly correlated with one another (see Table 3). By contrast, the correlations among the economic and firm-level variables[18] and with the dependent variables for the two-year average are weak to moderate. We use two-year averages for the explanatory variables (i.e., average of the year of the balance sheet date and the previous year) to accommodate the possibility of a delayed impact of macroeconomic and governance developments on SOE performance. In alternative regressions, we even use five-year averages to account for potentially larger lags.

Table 3. Correlation Matrix

	DTE5	DTE7	ROA	RGDP	REER	CURACT	PSCRED	FISBAL	INFLTN	POLSTB	GOVEFF	REGQTY	RLAW	CORRPT
DTE5	1.00													
DTE7	0.83	1.00												
ROA	-0.36	-0.35	1.00											
RGDPG	-0.12	-0.11	0.14	1.00										
REER	-0.12	-0.11	0.02	-0.12	1.00									
CURACT	0.02	-0.03	-0.12	0.02	0.44	1.00								
PSCRED	0.03	-0.02	0.12	0.40	-0.21	-0.12	1.00							
FISBAL	-0.02	-0.06	-0.11	0.16	-0.02	0.48	0.11	1.00						
INFLTN	0.02	-0.03	-0.11	-0.31	-0.12	0.02	0.17	-0.02	1.00					
POLSTB	-0.14	-0.10	-0.11	-0.06	0.03	0.22	-0.12	0.21	-0.10	1.00				
GOVEFF	-0.16	-0.10	0.01	0.06	0.08	0.07	0.04	0.33	-0.14	0.65	1.00			
REGQTY	-0.26	-0.20	0.02	-0.01	0.15	0.09	0.01	0.18	-0.07	0.56	0.88	1.00		
RLAW	-0.19	-0.16	0.02	0.06	0.12	0.14	0.04	0.24	-0.12	0.72	0.94	0.89	1.00	
CORRPT	-0.17	-0.13	-0.02	-0.04	0.12	0.02	0.01	0.11	-0.22	0.74	0.83	0.73	0.89	1.00

Source: Authors' calculations based on SOE reports

[18] The liquidity variable is omitted, as including it would exclude 9 SOEs from the correlation analysis. The correlation of *LIQUID* with the other covariates is generally low: the correlation with *ROA* is 0.14, with the macroeconomic variables it ranges between 0.18 (*REER* and *RGDPG*) and -0.20 (*FISBAL*) and with the governance indicators between 0.03 and -0.04.

Table 4 shows that both firm-level variables are highly significant (in regression (1), *ROA* at the 1 percent and *LIQUID* at the 5 percent level), whereas the macroeconomic covariates are non-significant or only marginally significant (the change in the REER and real GDP growth close to the 10 percent level in regression (2)), Among the governance indicators only the measure of regulatory quality, *REGQTY*, is significant at the 5 percent level.

Table 4. Results: Determinants of SOE Debt Sustainability (1)

Dep. Var.: DTE5	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.190***						
	(0.045)						
LIQUID	-0.189**						
	(0.093)						
RGDPG		-0.108					
		(0.071)					
REER		-0.053*					
		(0.031)					
CURACT		0.026					
		(0.023)					
PSCRED		0.016					
		(0.018)					
FISBAL		-0.025					
		(0.042)					
INFLTN		-0.025					
		(0.026)					
POLSTAB			-0.245				
			(0.185)				
GOVEFF				-0.319			
				(0.223)			
REGQTY					-0.633**		
					(0.272)		
RLAW						-0.416*	
						(0.236)	
CORRPT							-0.322
							(0.202)
No. firms	80	89	89	89	89	89	89
No. countries	32	35	35	35	35	35	35
Pseudo R^2	0.38	0.05	0.02	0.02	0.06	0.03	0.02

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

Table 5 shows the outcome for a combined estimation of all three sets of variables. Note that the first two regressions only contain one micro variable, *ROA*, because inclusion of *LIQUID* reduces the sample size from 89 to 80 firms, as SOEs in some countries do not report a breakdown by current assets and liabilities. While regression (2) includes all six macro variables, only regulatory quality, being the most significant in isolation, is selected as the main governance indicator.

Regressions (1) and (2) corroborate the importance of the profitability variable that yields a Pseudo R-squared of 0.37 and 0.41, when combined with *REGQTY*, and also the macro variables, respectively. In regression (3), adding the liquidity indicator improves the fit further from to R^2=0.44, compared to 0.37 in (1). By contrast, adding the macro variables in regression (4) improves the fit only marginally to R^2=0.47, which is not surprising given their general lack of statistical significance. Lastly, we add each of the sector variables to the full specification. Regressions (5) through (7) suggest that firms in the primary sector are more likely to the overindebted, while the opposite may be true for firms in the transportation sector. Results came out insignificant for the energy and services sectors (not shown), implying a mix of viable and overleveraged firms in these sectors.

Table 5. Results: Determinants of SOE Debt Sustainability (2)

Dep. Var.: DTE5	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.166***	-0.174***	-0.179***	-0.175***	-0.211***	-0.221***	-0.185***
	(0.040)	(0.037)	(0.038)	(0.037)	(0.047)	(0.054)	(0.034)
LIQUID			-0.218**	-0.292***	-0.226**	-0.249**	-0.249**
			(0.091)	(0.099)	(0.114)	(0.109)	(0.109)
REGQTY	-0.719**	-0.952**	-0.811**	-1.066**	-0.968**	-0.949**	-1.100**
	(0.317)	(0.407)	(0.369)	(0.444)	(0.415)	(0.426)	(0.449)
RGDPG		-0.088		-0.134	-0.056	-0.080	-0.090
		(0.102)		(0.095)	(0.102)	(0.100)	(0.097)
REER		-0.037		0.021	0.038	0.053	0.008
		(0.041)		(0.043)	(0.049)	(0.053)	(0.040)
CURACT		0.024		0.006	0.002	-0.098	0.019
		(0.029)		(0.029)	(0.029)	(0.031)	(0.026)
PSCRED		0.024		0.035	0.036	0.031	0.042
		(0.033)		(0.035)	(0.034)	(0.033)	(0.035)
FISBAL		0.006		-0.019	-0.028	-0.005	-0.044
		(0.045)		(0.055)	(0.060)	(0.061)	(0.056)
INFLTN		-0.065*		-0.055	-0.058	-0.048	-0.068
		(0.035)		(0.041)	(0.050)	(0.049)	(0.044)
PRIMARY					5.836***	6.223***	
					(0.644)	(0.699)	
TRANSPT					-0.511		-0.781*
					(0.411)		(0.415)
No. firms	89	89	80	80	80	80	80
No. countries	35	35	32	32	32	32	32
Pseudo R^2	0.37	0.41	0.44	0.47	0.55	0.54	0.50

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

To corroborate these findings, we perform sensitivity checks by altering the threshold of the dependent variable and, separately, the time horizon for the averages of the independent macro variables. First, we apply a higher threshold of 7 for the debt-to-EBITDA ratio (*DTE7*), mindful of the existence of more capital-intensive firms in the sample and the possibility of measurement error. As Table 6 shows, the two firm-level variables and the

governance indicator are robust to this change in the dependent variable, albeit at a somewhat lower level of significance, whereas none of the macro variables are significant. Importantly, the two sector dummies lose their significance in regression (3), calling their robustness into question. Overall, the fit of the regressions is reduced, reflected in R-squared being lower by between 0.05 and 0.18. Second, we use five-year instead of two-year averages for the macro variables and the selected governance indicator (while reverting to using *DTE5*). The rationale is that it could take time for unfavorable macroeconomic and political conditions to affect SOE performance. For example, persistently high fiscal deficits may lead to lack of support for SOEs only over time, which would not necessarily be captured by the latest fiscal outturn. However, Table 6 shows that the longer time horizon does not change the results, since the macro variables remain generally non-significant. Inclusion of the two sector dummies in regression (6) unexpectedly turns GDP growth and the *REER* significant with the wrong sign, but when dropping the primary sector dummy in (7) the previous state of significance is restored among the covariates. Overall, the regression fit is similar to the one in Table 5.

Table 6. Sensitivity Checks Using Alternative Variable Definitions

DV: DTE7 (1)-(3) 5-yr. Avg. (4)-(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.174***	-0.141***	-0.141***	-0.198***	-0.214***	-0.378***	-0.232***
	(0.045)	(0.042)	(0.042)	(0.052)	(0.068)	(0.077)	(0.071)
LIQUID		-0.191*	-0.191*		-0.248**	-0.174	-0.200*
		(0.104)	(0.104)		(0.098)	(0.138)	(0.118)
REGQTY	-0.497	-0.517*	-0.517*	-0.848**	-0.713*	-0.827	-0.805*
	(0.307)	(0.296)	(0.296)	(0.439)	(0.430)	(0.570)	(0.478)
RGDPG	-0.055	-0.054	-0.054	0.153*	0.067	0.312**	0.160
	(0.090)	(0.086)	(0.086)	(0.090)	(0.098)	(0.123	(0.109)
REER	-0.033	0.008	0.008	0.030	0.109	0.214**	0.105
	(0.036)	(0.036)	(0.036)	(0.067)	(0.080)	(0.084)	(0.079)
CURACT	0.012	-0.003	-0.003	0.016	0.009	0.015	0.018
	(0.025)	(0.023)	(0.023)	(0.026)	(0.026)	(0.028)	(0.025)
PSCRED	0.006	0.008	0.008	-0.032	-0.009	-0.052	-0.021
	(0.022)	(0.021)	(0.021)	(0.026)	(0.032)	(0.043)	(0.034)
FISBAL	-0.015	-0.031	-0.031	0.034	0.011	0.066	0.007
	(0.040)	(0.043)	(0.050)	(0.055)	(0.063)	(0.073)	(0.062)
INFLTN	-0.057*	-0.050	-0.050	-0.035	-0.027	-0.028	-0.046
	(0.030)	(0.034)	(0.034)	(0.039)	(0.043)	(0.056)	(0.044)
PRIMARY			0.559			8.606***	
			(0.382)			(0.842)	
TRANSPT			-0.205			-0.831*	-0.989**
			(0.383)			(0.485)	(0.405)
No. firms	89	80	80	89	80	80	80
No. countries	35	32	32	35	32	32	32
Pseudo R^2	0.37	0.37	0.38	0.41	0.48	0.63	0.52

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

Next, we split the core sample in half, separating by income into middle-income (MIC) and low-income (LIC) countries and, separately, by export structure into resource-intensive and non-resource-intensive countries (according to the IMF's classification, see IMF (2020a)).

Re-running regressions for the two sub-samples, we find that some covariates that tested significant for the core sample only matter for one of the sub-samples (Table 7). For the MICs, the regulatory quality and liquidity variables lose their significance, while *ROA* remains robust. However, instead of *REGQTY*, the control of corruption variable *CORRPT* results significant at the 5 percent level. The reverse is true for the LICs for which we find that liquidity and regulatory quality matter. Importantly, for the first time, two macro variables, *REER* and *FISBAL*, gain significance in the MIC sub-sample, indicating that country group's greater sensitivity to real depreciations and fiscal deficits. As to the sectoral variables, we find that only *PRIMARY* is significant for the LIC sub-sample (it drops out in the MIC sub-sample for lack of degrees of freedom when added to (3)).[20]

Table 7. Results by Income Status

MICs (1)-(3) LICs (4)-(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.213***	-0.336***	-0.318***	-0.141***	-0.156***	-0.261**	-0.484*
	(0.082)	(0.095)	(0.111)	(0.045)	(0.035)	(0.106)	(0.273)
LIQUID			-0.077			-0.510**	-0.575*
			(0.211)			(0.251)	(0.337)
CORRPT /	-0.784**	-1.912**	-1.920*	-0.793	-1.073	-2.319**	-2.727**
REGQTY	(0.351)	(0.974)	(1.006)	(0.566)	(0.748)	(1.036)	(1.277)
RGDPG		-0.069	-0.070		-0.158	-0.203	-0.216
		(0.227)	(0.223)		(0.152)	(0.236)	(0.261)
REER		-0.252**	-0.235*		-0.045	0.126	0.114
		(0.110)	(0.036)		(0.060)	(0.103)	(0.091)
CURACT		0.012	0.010		0.005	-0.069	
		(0.051)	(0.053)		(0.049)	(0.075)	
PSCRED		0.039	0.043		0.035	0.054	0.070
		(0.087)	(0.090)		(0.038)	(0.041)	(0.052)
FISBAL		-0.196**	-0.195*		0.072	-0.026	-0.078
		(0.100)	(0.103)		(0.073)	(0.109)	(0.103)
INFLTN		-0.159	-0.158		-0.165*	-0.084	0.138
		(0.113)	(0.115)		(0.087)	(0.128)	(0.152)
PRIMARY							7.659**
							(1.483)
No. firms	45	45	43	44	44	37	37
No. countries	35	32	32	35	32	32	32
Pseudo R^2	0.37	0.54	0.53	0.39	0.50	0.64	0.72

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

[20] One insignificant variable, *CURACT*, was dropped for the sector variable to enter, given low degrees of freedom.

Similarly, we also segment by resource intensity. Analogous to the MIC sub-sample in the previous regressions, the debt-to-EBITDA ratio of resource-intensive countries (i.e. both oil and other commodities producers) displays a strong linkage to a macro variable (inflation in this case) and to *REGQTY* as governance indicator. As for MICs, the liquidity variable also turns out to be insignificant. This is even though only about half of the resource-rich economies in the sample are also middle-income countries. The sector variable, *PRIMARY*, enters significant in (3), while keeping the other outcomes the same. For non-resource-intensive countries, we find that like in the LIC sub-sample, regulatory quality does not seem to matter, which, by contrast, does not change when the liquidity variable is added in (7).

Table 8. Results by Resource Intensity

Resource (1)-(4) Non-res. (5)-(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.273***	-0.498***	-0.684***	-0.681***	-0.130***	-0.131***	-0.156***
	(0.076)	(0.145)	(0.255)	(0.235)	(0.042)	(0.057)	(0.071)
LIQUID			-0.581				-0.276**
			(0.519)				(0.112)
REGQTY	-1.745**	-5.161***	-7.680***	-8.330**	-0.351	-0.406	-0.358
	(0.716)	(1.385)	(2.493)	(2.794)	(0.369)	(0.435)	(0.446)
RGDPG		-0.430	-0.738	-0.630*		-0.040	-0.076
		(0.294)	(0.478)	(0.365)		(0.127)	(0.121)
REER		-0.099	-0.139	-0.075		-0.057	0.033
		(0.185)	(0.162)	(0.153)		(0.042)	(0.051)
CURACT						0.049	0.018
						(0.030)	(0.032)
PSCRED						0.020	0.026
						(0.037)	(0.030)
FISBAL		0.235**	0.228	0.385***		-0.024	-0.020
		(0.112)	(0.172)	(0.055)		(0.078)	(0.091)
INFLTN		-0.232***	-0.492***	-0.498***		-0.061	0.023
		(0.070)	(0.173)	(0.1789)		(0.059)	(0.070)
PRIMARY			7.274***				
			(1.268)				
No. firms	40	40	39	40	49	49	41
No. countries	17	17	16	17	18	18	18
Pseudo R^2	0.61	0.75	0.79	0.80	0.27	0.35	0.42

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

Lastly, we test the hypothesis derived from the descriptive statistical analysis that bottom-line SOE performance, as measured by the return on assets, is negatively affected by leverage. For this, we regress *ROA* on the other two firm-specific variables but this time we use the average leverage ratio (debt-to-assets ratio, *LEVER*) instead of the binary debt-to-EBITDA variable in regression (1) plus the macroeconomic drivers and a governance variable as well as a sector dummy in alternative regressions (2) and (3). We repeat these

regressions for the full sample in regressions (4) to (6). By necessity, we switch from probit to cross-sectional OLS estimation, again with robust standard errors.

The regression outcome shows that the leverage variable is highly significant at the 1 percent level for both the core and full sample and robust to the inclusion of the macro/governance variables, which confirms the notion that highly leveraged firms tend to be less profitable. By contrast and somewhat surprisingly, the liquidity ratio is not significant throughout, implying that a short-term debt overhang does not necessarily affect profitability. Some significance can be attested to real GDP growth (and inflation in the full sample) but, once again, not to the other economic factors. None of the governance variables enter significantly, and only the dummy variable for the transportation sector shows strong significance in just one model and with a negative sign, indicating that the sector is prone to low profitability. It is noteworthy that the regression fit is generally lower than in the debt sustainability regressions, not least due to fewer highly significant regressors.

Table 9. Results: Impact of Leverage on Profitability

DV: ROA Core (1)-(3), Full (4)-(6)	(1)	(2)	(3)	(4)	(5)	(6)
LEVER	-14.443***	-15.049***	-14.549***	2.691***	2.630***	-14.041***
	(4.569)	(4.069)	(6.388)	(0.849)	(0.868)	(3.016)
LIQUID			1.234			-0.015
			(0.757)			(0.071)
REGQTY		0.789	0.696		2.504	2.420
		(1.951)	(2.071)		(2.641)	(1.834)
RGDPG		2.023*	2.107*		0.966	1.626**
		(1.107)	(1.095)		(0.845)	(0.809)
REER		0.115	-0.004		0.201	-0.137
		(0.317)	(0.382)		(0.325)	(0.281)
CURACT		-0.081	-0.033		0.289	0.014
		(0.162)	(0.159)		(0.242)	(0.173)
PSCRED		-0.098	-0.132		0.040	-0.118
		(0.147)	(0.144)		(0.136)	(0.128)
FISBAL		-0.677	-0.627		-0.319	-0.274
		(0.809)	(0.846)		(0.535)	(0.467)
INFLTN		-0.354	-0.367		0.039	0.364**
		(0.362)	(0.402)		(0.236)	(0.158)
TRANSPT		-8.089*	-10.653**		-1.212	-2.183
		(4.624)	(4.888)		(3.151)	(2.980)
No. firms	84	84	79	271	271	218
No. countries	33	33	32	32	32	32
Pseudo R^2	0.09	0.19	0.21	0.09	0.11	0.19

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

IV. MACROFINANCIAL IMPLICATIONS

Having shown the detrimental impact of weak SOE performance on debt sustainability, we shed light on the implications of SOE underperformance for the financial sector, since the consequences for the government budget and the economy at large have already been documented elsewhere.[21] Domestic arrears from SOEs can cause financial sector vulnerabilities to the extent that arrears prevent the private sector, especially government suppliers, from adequately servicing their loans. This ultimately may lead to the emergence of non-performing loans (NPLs) and impair the banking sector's ability to supply credit to the economy, thereby affecting investment and fiscal revenue (IMF, 2019).

More specifically, there are two types of macrofinancial linkages involving SOEs. A direct linkage consists in the loan exposures of banks and other lenders to SOEs.[22] Overindebted and, particularly, illiquid SOEs run the risk of defaulting on their loan obligations, and the bank may resort to invoking a government guarantee that the SOE has posted as collateral, as has happened in the case of The Gambia (see Box 1). In addition, there is the aforementioned indirect linkage of an illiquid SOE accumulating arrears to a supplier (at times through the central government) that is eventually forced to default on its bank debt. There are other indirect channels, e.g., depressed activity, weaker balance sheets and investor risk aversion. An analysis of NPL issues in SSA during the last decade (see Eyraud et al., 2021) found that in several countries NPL hikes were associated, at least in part, with rampant domestic arrears, mostly run by central government but also including SOEs (correlation of about 0.5).

In addition, domestic arrears can cause liquidity shortages at SOEs and, consequently, at suppliers. Using our dataset, we ascertain whether the liquidity ratio of SOEs with domestic arrears emanating from SOEs is worse than on average. In three out of five such countries for which arrears *from* SOEs were reported, large SOEs in the core sample had below-average liquidity ratios ranging from 74 to 105 percent against an average of 139 percent for the entire core sample. When widening the perspective by including countries where arrears *to* SOEs were recorded (assuming some may have passed them on to suppliers), the result is similar: the average SOE had a below average liquidity ratio in eight out of 13 countries, with a range of 37 to 115 percent, though the group means were almost identical. Arguably, SOE difficulties may have contributed to domestic arrears (including in cases not captured by our sample) or were intensified by them and may ultimately have impacted NPLs in some cases. However, the impact of such macrofinancial linkages on the banks is not always visible as supervisory data such as NPLs to SOEs are rarely disclosed.

---

[21] For a detailed assessment of SOE-related risks for the fiscal accounts see IMF (2020b). This burden stemming from SOE underperformance includes significant support to SOEs (e.g., recapitalizations, recurring subsidies, and assumption of SOE debt), a high public sector debt stock curtailing fiscal space in case of adverse shocks (e.g., fall in oil prices for oil exporters, or vice versa), SOE's obligations to private parties through joint ventures or public-private partnerships that the sovereign may have to honor in case of SOE payment default, and lower employment and investment leading to lower growth and therefore tax revenue.

[22] In some countries domestic nonbank financial institutions are the main holders of domestic SOE debt.

Stress tests or similar sensitivity analysis can help make the potential macrofinancial impact of SOE payment difficulties more transparent. Even exposures to SOEs enjoying a state guarantee can become non-performing due to delayed payment and would ideally require provisioning. Whether the banks are forced to provision SOE exposures depends on the resolve of the supervisory agency and pertinent regulation that may exempt the provisioning requirement due to the SOE's public sector identity or existence of a state guarantee.

In a stress test, additional provisioning may reasonably be assumed, not least because the delayed payment contributes to lower cash inflows at banks—and thus liquidity risk—and may affect profitability if interest revenue on NPLs to SOEs cannot be accrued (or must be fully provisioned). Studies applying stress tests of banks' exposures to the SOE sectors of The Gambia, and of Mozambique (Wezel 2018a, and Mansilla et al., 2018) show that explicit provisioning for SOE-related risks would affect bank capitalization significantly (see also Box 1). Similarly, corporate stress tests of SOEs themselves may render vulnerabilities more evident. Such stress testing methodology as developed by the IMF[23] can also be applied to SOEs as was done in IMF surveillance (e.g., IMF, 2016), although the notion of long-run viability may have to be nuanced given state ownership.

Beyond SOE reforms aimed at improving governance, pricing as well as payments and performance discipline (see IMF, 2020b, for detail), transparency about the performance of and risks from SOEs can also be enhanced by better reporting and accountability (Harris et al., 2020). This includes publication, not just submission to auditors, of SOEs' annual reports, including the detailed financial statements (balance sheet, income statement, and cash flow statement). Even so, such publications in gazettes or on company websites may not sufficiently be in the public eye. Given the extent of SOE over-indebtedness as found in this paper, there is a clear need for benchmarking outcomes to pre-defined budget targets or performance objectives and for comprehensive reporting of SOE performance.

As a result, several SSA countries have published aggregate SOE reports (e.g., Republic of Ghana, 2016; Republic of Liberia, 2017; IDEC, 2018, for Burundi; and IGAPE, 2019, for Angola). At times an effort to improve governance and to rein in corruption, these reports are aimed to improve transparency, disclosing not only summary financial statements or ratios of the SOEs, including subsidies received, but also governance-related information (e.g., in Angola, name of auditor or lack of audit; in Ghana, board composition; in Liberia, name and picture of the CEO). While financial information is disclosed, the results are typically not benchmarked against explicit performance goals. Application of new IMF benchmarking methodology for SOEs[24] (see Baum et al., 2021) may help further increase accountability of SOE managers and help the government better identify lackluster performance.

[23] E.g., Baum et al., 2021; Tressel and Ding, 2021; Wezel and Synak, 2021; Caceres et al., 2020; Chow, 2015.

[24] Benchmarks derived from quartile distributions of four financial indicators for about 22,000 SOEs worldwide.

Box 1. Country Examples of Adverse Macrofinancial Linkages in SSA

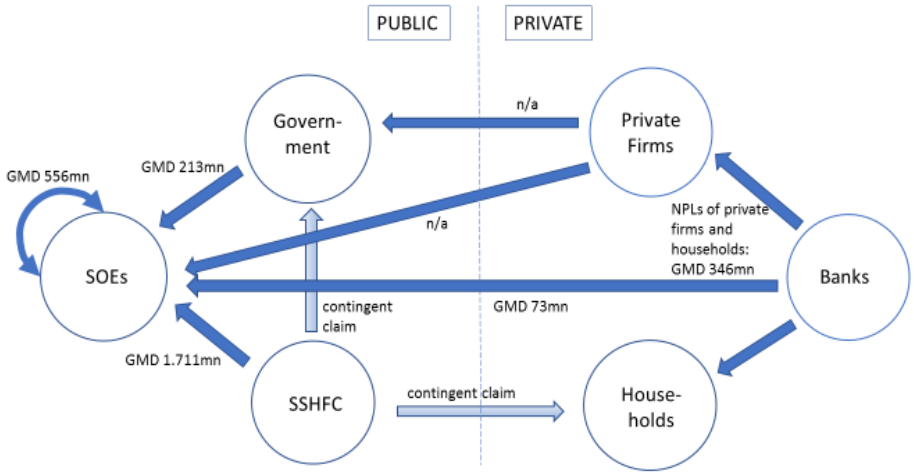
In The Gambia, the state-owned electricity company, NAWEC, with a history of accumulating losses, resorted to borrowing from banks. Upon payment problems the loans were restructured into a state-guaranteed bond on which NAWEC eventually defaulted, triggering the guarantee to be called and NAWEC's long term debt to be transferred to the government (Harris et al., 2020). Part of the problem, as illustrated in the figure below, was the existence of arrears among SOEs. Such arrears tend to be associated with persistent mismanagement or unresolved legacy issues and can cripple SOEs' capacity to service debt or provide returns to the government. In The Gambia, a special audit conducted in 2019 revealed that trade arrears to NAWEC (water and electricity company) amounted to 0.6 percent of GDP, which was equivalent to the current share of its long-term borrowings and half its trade payables (Baum et al., 2020).

In São Tomé and Príncipe, a similar web of payment arrears amounting to close to 20 percent of GDP emerged as a result of SOE underperformance and weak governance. Banks were exposed directly to SOEs or indirectly through private sector suppliers, although no default on such loans was recorded (Wezel, 2018b). Still, the large arrears of SOEs constitute significant contingent liabilities for the government.

In Ghana, during 2013-14 energy-sector SOEs suffered cash flow difficulties from a combination of adverse factors (exchange rate depreciation, higher oil prices, and a draught-related switch to higher-cost thermal electricity generation). To deal with this situation, the SOEs borrowed short-term from banks while also postponing payments to fuel suppliers. Notwithstanding these steps, eventually a quarter of bank loans to the energy sector became non-performing (IMF, 2020b).

In the case of Mozambique, cash-strapped SOEs increasingly turned to bank financing to cover operational costs, with the debt and interest load ballooning in many cases. In an IMF simulation, the cost of a hypothetical restructuring/provisioning of an SOE's debt overhang (obtained via the excess of the debt-to-EBITDA ratio) was shown to lead to a significant reduction in banks' profitability and capitalization (Mansilla et al., 2018).

Cross- and Intra-Sectoral Claims in The Gambia



Source: Wezel (2018a), data supplied by authorities as of 2017.

V. CONCLUSIONS

This study has examined the performance of large state-owned enterprises in Sub-Saharan African countries, accounting for close to 300 firms in 35 of the 45 SSA countries, which we condense to a core sample of about 90 large firms to reduce country bias. We find that around 40 percent of SOEs are unprofitable, while the majority of the large firms in the core sample are found to be illiquid and overleveraged as well.

We also conduct an econometric analysis on the drivers of debt sustainability and profitability. The set of main and alternative regressions suggests that firm performance, represented by return on assets and the liquidity ratio, is the main driver of debt sustainability, largely independent of macroeconomic conditions that are shown to have a marginal impact on indebtedness at best. The exception is the institutional setting as represented by the quality of policies and regulations that tend to affect SOE debt sustainability. As for SOE profitability, high leverage is found to be the main driver of low or negative profits, while liquidity cannot be shown to have an effect.

While the general lack of significance of the macro variables is somewhat surprising, it does not mean that economic policies and outcomes do not matter for SOE debt sustainability across the board. In fact, some macro factors appear to matter for certain country groups (e.g., middle-income and resource-intensive countries). Specifically, the econometric outcome suggests that some SOEs have devised ways to operate efficiently even under difficult economic conditions, generating profits and thus cash flows that preempt the need to borrow excessively, whereas others perform poorly despite operating in a favorable environment. This capacity or inability is also borne out by the strong significance of the two firm-level variables that are robust to the inclusion of the other macro variables.

It is fair to mention that while the regression fit is arguably quite good when accounting for the firm-level characteristics, we are clearly not able to capture some idiosyncratic or hard-to-measure determinants such as restrictive rules and regulations or other inefficiencies like high overhead costs causing dead-weight losses at some SOEs.

As we further illustrate, poor performance of SOEs may also have a macrofinancial effect, exposing banks to specific credit and liquidity risks, which may lead to cash flow problems and, in the extreme, to loan defaults affecting bank soundness. Over and above SOE reforms aimed at addressing operational and governance deficiencies, some governments have attempted to improve transparency and accountability by publishing aggregate SOE reports that allow the public to assess the SOE sector's performance at a glance. With the findings of our paper in mind, it is recommended that more jurisdictions adopt such comprehensive reporting on SOE performance and benchmark outcomes more explicitly to pre-defined budgets or performance objectives.

REFERENCES

Amo, H.F. and S. Gyamerah (2016), "The Pre and Post Financial Performance of Privatized State-Owned Enterprises in Ghana", *Research Journal of Finance and Accounting*, Vol. 7, No. 19, pp. 100-107.

Asian Development Bank (2012), "Finding Balance – Benchmarking the Performance of State-Owned Enterprises in Papua New Guinea".

Assagaf, A. and H. Ali (2017), "Determinants of Financial Performance of State-Owned Enterprises with Government Subsidy as Moderator", *International Journal of Economics and Financial Issues*, 7(4), p. 330-342.

Bajo, A., M. Primorac and L. Zuber (2018), "Financial performance of state-owned enterprises", Croatia Institute of Public Finance, No. 5, January.

Batth, V., B. Nayak and S. Subbarao Pasumarti (2018), "The Study of Financial Performance of Indian Public Sector Undertakings", *Global Journal of Finance and Management*, Vol. 10(1), pp. 21-43.

Baum, A., C. Hackney, P. Medas and M. Sy (2019), "Governance and State-Owned Enterprises: How Costly is Corruption?", IMF Working Paper No. 19/253.

Baum, A., P. Medas, A. Soler and M. Sy (2020), "Managing Fiscal Risks from State-Owned Enterprises", IMF Working Paper No. 20/213.

_____ (2021), "How to Assess Fiscal Risks from State-Owned Enterprises—Benchmarking and Stress Testing", International Monetary Fund Fiscal Affairs Department, How To Note, 21/09.

Bonney, S. (2015), "Strategies to Improve the Financial Performance of State-Owned Enterprises in Ghana", Walden University Dissertations and Doctoral Studies Collection.

Böwer, U. (2017). "State-Owned Enterprises in Emerging Europe: The Good, the Bad, and the Ugly", IMF Working Paper No. 17/221.

Caceres, C., D.A. Cerdeiro, D. Pan and S. Tambunlertchai (2020), "Stress Testing U.S. Leveraged Corporates in a COVID-19 World", IMF Working Paper No. 20/238.

Cegar, B. and F.J. Parodi (2019), "State-Owned Enterprises in Bosnia and Herzegovina: Assessing Performance and Oversight", IMF Working Paper No. 19/201.

Chandra, Y.A., H. Paramu, and Nurhayati, S.M. (2019), "Empirical Investigation of Factors that Affect SOE Financial Performance other than Financial and Insurance Services", *International Journal of Economics and Business*, December.

Chow, J. (2015), "Stress Testing Corporate Balance Sheets in Emerging Economies", IMF Working Paper No. 15/216.

Eyraud, L., I. Bunda, J. Jack, T. Jardak, R. Ouedraogo, Z. Wang and T. Wezel (2021), "Resolving Nonperforming Loans in Sub-Saharan Africa in the Aftermath of the COVID-19 Crisis", International Monetary Fund Departmental Paper No. 21/14, African Department.

Ferrarini, B. and M. Hinojales (2018), "State-Owned Enterprises Leverage as a Contingency in Public Debt Sustainability analysis: The Case of the People's Republic of China", ADB Economics Working Paper Series No. 534, January.

Gray, S. (2021), "Understanding the Pros and Cons of EBITDA", The Balance, available at: Understanding the Pros and Cons of EBITDA (thebalance.com)

Harris, J., B. Imbert, P. Medas, J. Ralyea and A. Singh (2020), "Government Support to State-Owned Enterprises: Options for Sub-Saharan Africa", International Monetary Fund Fiscal Affairs Department, Special Series on COVID-19, June.

Hegazy, A. and A. Navarro Lopez (2021), "Republic of Moldova: Selected Issues—The Nexus Between Public Enterprise Performance, Financial Performance, and Macroeconomic Vulnerabilities: An Application to Moldova", IMF Country Paper, forthcoming.

Heo, K. (2018), "Effects of Corporate Governance on the Performance of State-Owned Enterprises", World Bank Policy Research Working Paper No. 8555, August.

Institut de Developpement Economique du Burundi (IDEC, 2018), "Analyse de la Sante financiere des Societes a Participation Publique au Burundi pour les Cinq Dernieres Annees (2012-2016) et Strategies d'Amelioration de leurs Performances", February.

Instituto de Gestão de Activos y Participações (IGAPE, 2019), "Relatório Agregado do Sector Empresarial Público", Ministerio das Finanças Angola.

International Monetary Fund (IMF, 2016), "Republic of Belarus—Financial System Stability Assessment", IMF Country Report No. 16/299.

_____ (IMF, 2019), "Regional Economic Outlook: Sub-Saharan Africa—Domestic Arrears in Sub-Saharan Africa: Causes, Symptoms, and Cures", Chapter 3, October.

_____ (IMF, 2020a), "Regional Economic Outlook: Sub-Saharan Africa—COVID-19: An Unprecedented Threat to Development", April.

_____ (IMF, 2020b), "State-Owned Enterprises: The Other Government", Fiscal Monitor, Chapter 3, April.

Jakob, B. (2017), "Performance in Strategic Sectors: A Comparison of Profitability and Efficiency of State-Owned Enterprises and Private Corporations", The Park Place Economist, Vol. 25, Article 8.

Kamau, W.A. and E. Simiyu (2019), "Financial Management and Performance of Commercial State-Owned Enterprises in Kenya", *International Academic Journal of Economics and Finance*, Vol. 3(3), pp. 322-342.

Kenton, W. (2020), "Net Debt-to-EBITDA Ratio", available at: www.investopedia.com/terms/n/net-debt-to-ebitda-ratio.asp

Kikeri, S. (2018), "Corporate Governance in South African State-Owned Enterprises", World Bank Background Note.

Mansilla, M., T. Wezel and H. Zavarce (2018), "Macrofinancial Linkages and Bank Vulnerabilities", Republic of Mozambique—Selected Issues, IMF Country Report No. 18/66, pp. 34-50.

Nugroho, H. (2019), "The Impact of Government Support on the Performance of Indonesia's State-Owned Enterprises", ADBI Working Paper No. 983.

Park, H. (2017), "SOE Performance Evaluation in Asia", *The Hawkamah Journal*, Issue 09, pp. 32-35.

Republic of Ghana (2016), "SOE Annual Aggregate Report", Ministry of Finance.

Republic of Liberia (2017), "State-owned Enterprises—FY 2016/2017 Consolidated Annual Financial Performance Report".

Republic of South Africa (2006), "An Analysis of the Financial Performance of State-Owned Enterprises", Department of Public Enterprises.

Richmond, C., P. Dohlman, J. Miniane, J. Roaf (2019), "Reassessing the Role of State-Owned Enterprises in Central, Eastern, and Southeastern Europe", International Monetary Fund Departmental Paper No. 19/11, European Department

Taghizadeh-Hesary, F., N. Yoshino, C.J. Kim and A. Mortha (2019), "A Comprehensive Evaluation Framework on the Economic Performance of State-Owned Enterprises", ADB Institute Working Paper No. 949.

Tressel, T. and X. Ding (2021), "Global Corporate Stress Tests—Impact of the COVID-19 Pandemic and Policy Responses", IMF Working Paper No. 21/212.

Trimble, C., M. Kojima, I. Perez Arroyo and F. Mohammadzadeh (2016), "Financial Viability of Electricity Sectors in Sub-Saharan Africa—Quasi-Fiscal Deficits and Hidden Costs", World Bank Policy Research Working Paper No. 7788.

Wezel, T. (2018a), "Assessment of Macrofinancial Linkages", The Gambia—Selected Issues, IMF Country Report No. 18/100, pp. 3-15.

Wezel, T. (2018b), "The Financial Performance of State Owned Enterprises and Risk Spillovers", Democratic Republic of São Tomé and Príncipe—Selected Issues, IMF Country Report No. 18/322, pp. 32-39.

Wezel, T. and W. Synak (2021), "Nigeria—Corporate Performance, Investment and Financing", Nigeria—Selected Issues, IMF Country Report No. 21/34, pp. 49-64.

ANNEX I. ESTIMATION RESULTS FOR DEBT SUSTAINABILITY USING THE FULL SAMPLE

In the following, we re-estimate some of the previous models for the full sample of 287 SOEs. Note that some firms drop out because of insufficient firm-level information on profitability and, in particular, liquidity.

As mentioned in Section II, the full sample is biased because (i) a few countries dominate, with one country having close to 50 observations and others only one; (ii) the services sector represents close to 40 percent of the sample; and (iii) many smaller firms are included. Nevertheless, it appears worthwhile to re-run the regressions for this comprehensive sample, including the sensitivity checks shown in Annex I. Table 1. We follow the order of regressions in Section III but show only selected parsimonious models that had significant determinants in the core sample.

First, we estimate the impact on *DTE5* of just *ROA* and the regulatory quality variable, *REGQTY* in (1). As before, *REGQTY* is significant at the 5%-level (while the other governance variables are not) but somewhat surprisingly, *ROA* is not at all. The results do not change in (2) when adding the macro variables and two of the sector dummies for the primary and the energy sector as the latter turns out to be significant, while *PRIMARY* loses its robustness compared to the core sample. In both cases, the R-squared is very low at around 0.1, in line with low significance of the regressors, first and foremost the macro variables. Adding the liquidity indicator in (3) changes the picture considerably, with *ROA* regaining significance and *LIQUID* losing its, compared to the core sample regressions, while *REGQTY* stays robust and the energy sector dummy turns insignificant.

These swings in significance, particularly when moving from regression (2) to (3), point to the bias of the full sample and why it does not serve to make inferences about the SOE universe in Sub-Saharan Africa. In (3) nearly 60 SOEs that are clustered in just four countries drop out due to lack of firm-level data on current assets and liabilities. Apparently, the profitability of these omitted SOEs runs counter to the rest of the full sample, helping explain the stark difference in significance of *ROA*. It must also be kept in mind that because of the large number of SOEs in some countries there is much less variation in the explanatory variables compared to the more balanced core sample.

As before (Table 6), we also perform sensitivity checks in Annex I. Table 1., replacing *DTE5* by *DTE7* in regressions (4) and (5), and testing the 5-year averages of the macro variables in (6) and (7). Overall, the picture is unchanged when using the higher debt sustainability threshold of *DTE7*: *ROA* remains insignificant as do the macro variables, while the sector dummy becomes highly significant in (5). Using the five-year averages does not make much of a difference, either, and if anything, the quality of the results worsens, with only the sector dummy marginally significant in (7).

The few interesting takeaways from this supplemental analysis are therefore that the main governance indicator used here still matters when enlarging the sample in this relatively unsystematic way (i.e. compiling all SOE statements that we happened to locate). The other finding is that firms in the energy sector, comprising about one-fifth of the full sample tend to be more overindebted that the rest. This compares to the finding of the core sample, where particularly firms in the primary sector are found to have an unsustainable debt overhang. Lastly, the varying degree of significance of the main driver in the core sample, *ROA*, suggests that any results from such a "random" full sample need to be taken with a grain of salt and that conclusions should only be drawn from the more balanced core sample with mostly large, and hence systemic, enterprises.

Annex I. Table 1. Results for the Full Sample: Determinants of SOE Debt Sustainability

DTE5 (1)-(3), (6)-(7) DTE7 (4)-(5); 5-yr Avg. (6)-(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ROA	-0.019	-0.020	-0.162***	-0.020	-0.021	-0.019	-0.020
	(0.015)	(0.015)	(0.029)	(0.015)	(0.014)	(0.015)	(0.143)
LIQUID			-0.008				
			(0.009)				
REGQTY	-0.306**	-0.353**	-0.415*	-0.287*	-0.281*	-0.242	-0.263
	(0.152)	(0.169)	(0.218)	(0.150)	(0.166)	(0.151)	(0.161)
RGDPG		-0.032	0.021		-0.029		0.077
		(0.056)	(0.074)		(0.055)		(0.065)
REER		-0.002	0.015		-0.013		-0.018
		(0.021)	(0.030)		(0.020)		(0.031)
CURACT		0.011	0.014		0.014		0.013
		(0.013)	(0.019)		(0.013)		(0.011)
PSCRED		0.012	0.020		0.001		-0.018
		(0.015)	(0.020)		(0.015)		(0.014)
FISBAL		0.001	0.008		-0.016		-0.017
		(0.023)	(0.029)		(0.022)		(0.026)
INFLTN		-0.014	-0.012		-0.010		0.009
		(0.015)	(0.021)		(0.014)		(0.019)
PRIMARY		0.149	0.482		0.046		0.154
		(0.218)	(0.337)		(0.210)		(0.221)
ENERGY		0.387*	0.058		0.600***		0.396*
		(0.224)	(0.274)		(0.224)		(0.226)
No. firms	276	276	219	276	276	276	276
No. countries	35	35	32	35	35	35	35
Pseudo R^2	0.09	0.10	0.38	0.09	0.11	0.08	0.10

Note: Authors' calculations. Robust standard errors in parentheses; ***, **, * denote significance at the 1, 5, 10 percent level, respectively. Constant term included but not reported.

PUBLICATIONS

The Financial Performance and Macrofinancial Implications of Large State-Owned Enterprises in Sub-Saharan Africa
Working Paper No. **WP/22/56**