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Governance and State-Owned Enterprises:
How Costly is Corruption?

by Anja Baum, Clay Hackney, Paulo Medas, and Mouhamadou Sy

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Fiscal Affairs Department

Governance and State-Owned Enterprises: How Costly is Corruption?¹

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Abstract

State-owned enterprises (SOEs) are present in key sectors of the economies around the world. While they can provide an important public service, there is widespread concern that their activities are negatively affected by corruption. However, there is limited cross-country analysis on the costs of corruption for SOEs. We present new evidence on how corruption affects the performance of SOEs using firm level data across a large number of countries. One striking result is that SOEs perform as well as private firms in core sectors when corruption is low. Taking advantage of a novel database reforms, we also show that SOE governance reforms can generate significant performance gains.

JEL Classification Numbers: D20, D73, H00

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I. INTRODUCTION

State-owned enterprises (SOEs)² have a strong presence in the global economy and, in many advanced and developing economies, play a significant role in implementing public policy. SOEs are seen as a way to address market failures, such as natural monopolies, exert better control of natural resources, or promote other policy goals. In practice, public ownership continues to be important in many sectors, especially transportation, utilities (water, gas and electricity), and exploration of natural resources (oil and mining).

Concerns with poor governance, however, have fueled doubts about whether SOEs can achieve the desired goals or are the best option to address market failures. In particular, corruption, the abuse of public power for private gain, can negatively affect how firms operate. Firms may dedicate efforts and resources to rent-seeking activities, instead of focusing on using resources in the most efficient way.³ This may be particularly the case when these firms manage large natural resources and when there is weak transparency and scrutiny on the activities of these firms.

There are also reasons that could make corruption more prevalent in SOEs compared to private firms. It is easier for corrupt politicians to intervene in publicly-owned firms—especially when transparency and accountability are weak—and they have an incentive to do so, as they will benefit from the rents without bearing the cost (Boycko et al., 1996). However, empirical studies that attempt to assess the effect of weak governance on the performance of SOEs are limited, and most rely on specific country examples and do not always differentiate between private firms and SOEs (Fisman and Svensson, 2007, and Nguyen and Dijk, 2012, Kong et al., 2017, Richmond et al., 2019).⁴

In this paper, we provide new evidence that corruption impacts the financial performance of SOEs negatively for a large sample of firms across 88 countries. Our focus is on the sectors where SOEs are more prevalent, including utilities, natural resources, and transportation. These sectors are also where corruption tends to be more prevalent (OECD, 2018). We show that in more corrupt countries, the performance of SOEs, both in terms of profitability and productivity, is significantly worse relative to SOEs in other countries. The results are similar

² In this paper, SOEs are defined as *commercial* organizations that are ultimately *owned* by public sector entities. The ownership condition requires that that public authorities, central or subnational governments, must have the controlling share of the company of more than 50 percent. See detailed definition used in the empirical analysis in section III.

³ See, for example, Svensson (2003), Fisman and Svensson (2007), Rand and Tarp (2010), and Nguyen and Dijk (2012), among others. Some argue that bribes may “grease-the-wheel”, that is corruption can help firms overcome rigid bureaucracy and excessive regulations (Brooks et al., 2013). However, evidence on this channel is limited. Kong et al. (2017) presents some evidence for a sample of Chinese firms.

⁴ See Bower (2017). Richmond et al. (2019) find that better governance is associated with better SOE performance in countries of the Central, Eastern, and Southeastern European (CESEE) region.

when we study the impact of fiscal transparency in the public sector. That is, more transparency allows for greater accountability and contributes to better performance by state-owned enterprises.

Our analysis also contributes to the literature on how ownership affects performance. The majority of the empirical literature tends to find that private firms perform better (Dewenter and Malatesta, 2001, Shirley and Walsh, 2000, and Grünfeld et al., 2005).⁵ However, there is also some evidence that this is not always the case (UNDP, 2015), including on the area of health and sectors that are highly regulated or with monopolies (e.g. electricity). Our results suggest that, in general, private firms have better performance in such sectors, but this depends on the level of corruption in the country. One striking result is that SOEs perform as well as private firms in core sectors (mining, electricity and gas, water, and transport) when corruption is low.

In addition to studying the impact of the degree of corruption in the country, we also analyze the impact of specific governance reforms on the performance of SOEs, taking advantage of a novel database based on IMF programs.⁶ Close to 90 percent of IMF programs included structural conditionality on SOEs in the period 2002–17. Taking advantage of data from these programs, we analyze the impact of specific governance reforms at the sector level on SOE performance for 31 countries. The results show that these reforms have affected the performance of non-financial SOEs positively, especially on productivity.

The paper is structured as follows. Section II outlines the main channels through which weak governance can affect SOE performance. It then discusses the prevalence of corruption and other governance weaknesses in SOEs. Section III develops the empirical methodology and describes the data. Section IV analyses how corruption affects the performance of SOEs and compares the impact with private firms. Section V uses information from IMF programs to study the direct impact of SOE governance reforms on SOE performance. Section VI concludes.

II. CORRUPTION AND MISMANAGEMENT IN STATE OWNED ENTERPRISES

Corruption can affect economic growth by distorting the behavior of firms. Instead of focusing on being the most efficient, firms may put their efforts, including by paying bribes, to get privileged access to public contracts, public services or infrastructure (e.g. to obtain licenses), relaxing regulatory oversight, and avoid paying taxes (Svensson 2003, Fisman and

⁵ The difference in financial performance may be due to several factors and not just corruption. For example, governments may set policy objectives that constrain the profits of the SOE (e.g. provide electricity at prices below cost).

⁶ In this paper we are mainly focusing how weak institutions, poor governance, lead to corruption and end up affecting performance. However, improving governance may have broader impact than reducing corruption.

Svensson 2007). The concerns with these questions have led to a literature on politically connected firms and showing that these are significant and more prevalent in countries where corruption is higher (for example. Faccio, 2006, and Fisman, 2001).⁷ However, there is limited discussion on assessing the impact of corruption on the performance of private versus state-owned enterprises.

Corruption is likely to have a deeper impact on how state-owned enterprises operate given the close relationship between the state (bureaucrats, politicians) and the company. State-owned enterprises are oftentimes created to help address market failures and achieve economic and social policies at reasonable costs. However, there are many examples where SOEs prove to be inefficient, a considerable burden to taxpayers, or fail to achieve its objectives. These problems are likely exacerbated in an environment of weak local or national governance and when there is undue political influence (Shleifer and Vishny, 1994, Transparency International, 2018). For example, corrupt politicians or civil servants can use political influence and favoritism to influence the choice of management and hiring policies. Lack of effective monitoring by the government and weak reporting by the SOE can also undermine accountability.

The corruption risks associated with SOEs are also heightened as many of them operate in sectors with large economic rents or have monopoly power. SOEs tend to operate in sectors such as electricity and gas, water, areas of transportation, as well as management of natural resources (e.g. oil exploration) that countries perceive as being of national importance or that private entities might be less willing to undertake. The potential large rents, especially in an environment of weak transparency and regulatory oversight, makes these companies particularly exposed to corrupt public officials.

Institutional weakness and corruption

Vulnerabilities to corruption are usually associated with institutional weaknesses (IMF 2019). In the case of SOEs, some of the key weaknesses include lack of independent and professional boards and management, weak procurement processes, and lack of transparency.

The lack of independent and professional SOE board members weakens the ability for oversight of the companies' operations and management, facilitating bribe-taking and political or third-party influence over SOE resources. Inadequate scrutiny in the nomination process, oversight and unclear objectives make assessing managerial performance difficult. They also make it easier for government officials to interfere in company affairs for political gain. According to one OECD (2018) study of over 300 firms, nearly forty percent of SOEs

⁷ Politically connected firms may also get bailouts even if they have poorer performance (Faccio and others, 2006).

in which corruption or irregular practices were observed involved a board member, public official, or shareholders.

Some of the main vulnerabilities to corruption arise from:

- Conflict of interests. The appointment of board members by public officials might be driven by political motives, either financial or otherwise. For instance, the Petrobras scandal in Brazil (discussed below) was in part used as a financing vehicle for political activity. In the Philippines, cabinet secretaries are presidential appointees to SOE boards, and are expected to execute the orders of the President (OECD, 2015).
- Weakness in developing effective internal controls and audits. Many SOEs have weak internal controls and processes, inadequate accounting and auditing methods, and weak compliance and disclosure practices. Not only does such an environment undermine financial and nonfinancial competitiveness, it is also conducive to corruption. Further, some SOEs, such as the national oil company of the Philippines, have regulatory power (OECD, 2015).
- Lack of a culture of integrity and accountability. Board members are often in charge of integrity functions such as compliance, audit, and legal counsel. Nevertheless, the OECD (2018) reported that around 70 percent of bribes paid to public and non-public SOE officials were paid or authorized by management in all foreign bribery cases concluded between 1999 and 2014. Management might be less likely to report corrupt practices in order to maintain their positions, which helps to normalize such practices. In short, the tone at the top matters.

Procurement tends to be an area of high risk for corruption throughout the public sector, including SOEs. Public contracting is susceptible to political interference by government officials and employees. The sourcing, evaluation, awarding, and monitoring of contracts might be affected through bribes, kickbacks, patronage, bidding collusion by third parties, related-party trading, use of suppliers owned by public officials, or providing illegal insider information (Transparency International 2018).⁸

In some cases, SOEs have special procurement rules to grant more flexibility to make decisions, which can weaken controls. For instance, in Thailand, SOEs may accept or reject any or all bids and may modify the technical requirements during the bidding process if corruption is suspected. This policy grants leeway to the SOE while also denying bidders recourse to challenge procedures (US State Department, 2012). Similarly, when SOEs engage in projects such as public-private partnerships (PPPs), weaknesses in the PPP

⁸ Corruption in procurement can have a significant impact on the quality of investment of the firm. While this may not have an immediate impact on profitability, it will eventually be reflected in poorer efficiency.

governance framework could lead to opaque handling of sometimes large and complex projects, increasing the risks for corruption.

Lack of transparency leads to lower accountability and greater opportunities for corruption. For example, the lack of audited information on SOE operations (in line with international standards) will prevent the uncovering of financial and strategic weaknesses. This in turn will make it harder to ensure that the SOE is working in accordance with the public's best interest. Transparency regarding SOE financials is often weak, and many SOEs are not subject to reporting of ultimate ownership. A state's auditing apparatus can similarly be compromised. For instance, reportedly the State Commission on Audit in the Philippines took bribes and colluded with board officials to conceal corruption (De Ocampo Bantug 2011). Similarly, a lack of transparency regarding financial assistance or other transactions between the SOE and the government—including guarantees, arrears, contractual commitments and liabilities arising from PPPs—could result in large hidden costs associated with corruption.⁹

Weaknesses in SOEs governance remain a widespread challenge

Many countries continue to struggle with corruption in SOEs. In an OECD survey, 42 percent of SOE respondents reported that corrupt acts or other irregular practices occurred in their company during the past three years (OECD 2018). Other examples include:

- Andres et al. (2011) conclude through a study of forty-four water and electricity SOEs covering twenty-six countries in Latin America that those industries are particularly prone to performance losses through weaknesses in selection and composition of Board of Directors and inadequate performance-orientation.
- Construction firms in Eastern Europe believe that “a typical payoff made for securing a government contract in their industry is around seven per cent of the contract value” (Kenny 2010). Further, Kenny (2010) finds that costs paid per square meter of highway rehabilitation is 53 percent higher for countries in which the reported bribe payment for government contracts was above 2 percent of the total budget, as compared to the cost per square meter of those countries with less than 2 percent of the total budget reported as bribe payments.
- The 2012 anticorruption campaign announced in China created a “natural experiment” to assess the impact of corruption on SOEs. Lin et al. (2018) found that shares of Chinese SOEs noticeably rose relative to other listings in three- and five-

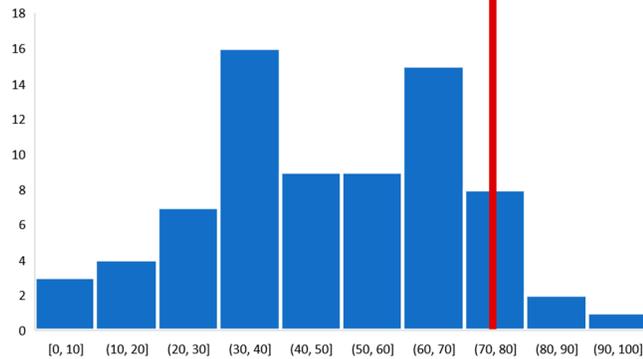
⁹ Other channels through which corruption can foster include below-market lending from the state, cross-lending between SOEs, tariff regulation, and other elements in the SOE investment cycle. For each of these elements, the better the monitoring systems and transparency, the smaller the risk for corruption.

day windows around the announcement of the campaign. Kong et al. (2017) also found evidence that the anti-corruption campaign contributed to an improvement in SOEs financial indicators, return on equity and return on sales, since 2013.

In the extractive industry, a sector particularly prone to corruption due to large economic rents, most SOEs have relatively weak governance. Specifically, only nine of eighty-one SOEs assessed in the 2017 Resource Governance Index (RGI) achieved a good standard (scoring about 75 out of 100) on transparency and accountable governance (Figure 1). A well-publicized case has been the scandal surrounding the oil company—and largest company in Brazil—Petrobras, of which the Brazilian government owns a controlling interest. In 2014, public prosecutors and the Brazilian Federal Police began an investigation (“Car Wash”) that would reveal a major corruption scheme centered on Petrobras. It involved billions of dollars in kickbacks from large contracts paid by suppliers to executives of the oil company and politicians, a cartel of contractors that overcharged Petrobras, and Swiss bank accounts (Lima-de-Oliveira, 2019).

SOEs are also heavily involved in cross-border corruption. In fact, SOE officials are the main beneficiaries of foreign bribes. The 2014 *Foreign Bribery Report* from the OECD indicated that of the observed instances of bribery promised, offered, or given, 81 percent involved SOE officials.¹⁰ In addition, in some cases, SOEs are the ones bribing foreign officials. For example, Telia, a Sweden-based telecommunication company owned in part by the Swedish and Finnish governments, obtained contracts in Uzbekistan that generated over US\$2.5 billion through bribery from at least 2007 to 2010. Prosecuting the case involved complex international litigation. Ultimately the case was tried in a New York court and a settlement under the FCPA led to the fine of US\$1 billion.¹¹

Figure 1. Distribution of Extractive SOE Scores on Resource Governance Index



Source: Resource Governance Index 2017 from the Natural Resource Governance Institute.

¹⁰ Since the entry into force of the OECD Anti-Bribery Convention in 1999, 427 foreign bribery cases had been concluded by 2014. The report further concludes that such instances of bribery often were not the result of an employee operating independently. In fact, corporate leadership is often involved in, or aware of the bribes being paid.

¹¹ The Department of Justice’s statement (2017) indicated that although the telecommunications business was not American and had been developed in Uzbekistan, bribe payments were wired through US-based accounts.

(continued...)

The importance of SOEs, and related governance weaknesses, is also reflected in IMF programs—almost 90 percent of all programs between 2002 and 2017 included conditionality on SOEs.¹² Specifically, structural benchmarks (SBs) related to SOEs were set in 206 out of 240 programs, covering 91 out of 97 program countries. For example, in Ukraine from 2008 to 2017, the IMF set more than thirty structural benchmarks addressing SOEs governance in multiple sectors, notably gas and other utilities. These included audits of specific SOEs as well as the passing of legislature concerning regulation and transparency of SOE management. Similarly, 11 SOE benchmarks were set in the 2011–14 IMF program in Portugal alone, of which 10 were on non-financial SOEs and 5 targeted specific governance reforms.

III. EMPIRICAL STRATEGY AND DATA

A. Data

In this paper we study whether corruption affects the performance of SOEs and if the impact of corruption on private firms differs from that on SOE. Our main source of information comes from firm-level income statements and balance sheets from the ORBIS database, which we complement with additional information for some countries. SOEs in ORBIS are identified through ownership as "organizations ultimately owned or de facto controlled by public sector entities". Our analysis focuses on a few key performance indicators: profitability (return on equity and operating profit per sales), productivity and efficiency (sales per worker and labor costs).

The ORBIS database, while very rich, also requires treatment to correct for some data issues or adjust for the objective of this study. In particular,

- Our focus is on domestically owned SOEs. As such, we drop firms whose Global Ultimate Owner (GUO) and Immediate Shareholders (ISH) have a different country of origin with respect to the location of the firms. In most of the analysis, we focus on four sectors that have a high incidence of SOE presence: mining (including oil) and quarrying, electricity and gas, water and sewerage, and transport.¹³

Further, Telia was traded publicly in the New York Stock Exchange. These two facts led U.S. prosecutors to prosecute Telia under the Foreign Corrupt Practices Act (FCPA), as well as relevant Dutch laws, because Telia was deemed to conduct enough of their business on American soil as to require the Swedish SOE to abide by American laws.

¹² Programs included have an approval year of 2002 or later. Programs that were approved before 2002 but reached into 2002 or after were not considered.

¹³ To shorten terminology, the mining and quarrying sector will be called "mining", electricity and gas "electricity", and water and sewerage "water" in most of the rest of the paper.

- We follow the cleaning procedure suggested by Kalemli-Ozcan et al. (2015). We drop (SOEs or private firms): duplicates in terms of identifier and year; observations with missing years; company-years with missing information on total assets, operating revenue, sales and employment (simultaneously). We also exclude a company (all years) if total assets are negative in any year; employment (in persons) is negative in any year; and if labor cost is negative or missing. Finally, we retain only firms whose status is “Active”.
- We do additional adjustments to address outliers. While the majority of ROE observations lies within plus and minus 20 percent, we find a significant amount of observations with very high values (positive and negative), which might either be indicative of misreporting, or of SOE equity close to zero. We therefore exclude companies if the ROE is above/below 50 percent.¹⁴ We also exclude firms that have zero sales and sales above US\$1.5 million per employee,¹⁵ and/or zero labor costs per operating revenue.

The analysis includes 88 countries (Table.1) with SOEs data between 2000 and 2016 and 94 countries with private firm data between 2007 and 2016.¹⁶

To assess the degree of corruption in a country, we use the control of corruption (CC) indicator from the Worldwide Governance Index (WGI). The CC is mainly based on surveys of perception of corruption (see Kaufmann et al. 2007 and 2010), and available since 1996.¹⁷ In addition to corruption, we also test whether the degree of fiscal transparency has an impact on the performance of firms using an index based on IMF (2019). See also Appendix 1.

A second objective of this paper is to analyze if and how governance reforms improve SOE performance, given that corruption itself is difficult to target directly. For that, we built a novel dataset on SOE governance reforms based on IMF programs from 2002. These programs include conditionality, structural benchmarks (SBs), on targeted reforms of SOEs. It allows us to identify different types of SOE conditionality, split by sector, type of reform, and whether the reforms have been implemented or not. For example, we can study the

¹⁴ To give a concrete example, in 2018, the average ROE by sector in the US was 13.6% with more than 96% of sectors having firms with ROEs below 50% (see http://people.stern.nyu.edu/adamodar/New_Home_Page/data.html).

¹⁵ For comparison, one of the most profitable companies in the world, Facebook, as a sales-to-employee ratio of USD 1.9 million. Such large numbers are treated as outliers here.

¹⁶ Therefore, when the analysis focuses only on SOEs, the time dimension ranges from 2000 to 2016 while when comparing SOEs and POEs, we restrict both samples to ranges from 2000 to 2016.

¹⁷ Caution is needed in interpreting scores for any individual country given measurement error, because the quality of underlying data can vary across countries and data sources. Also, because the indicator is based on perceptions, care should be used when analyzing scores in any given year.

impact of being in IMF programs with any SOE conditionality, the impact of specific SOE reforms. The dataset is described in more detail in Section V.

For the analysis of the reforms, we include additional SOEs from two sectors that were targeted by IMF structural benchmarks for robustness – agriculture and construction. We continue to use the above baseline cleaning procedure for SOE data in ORBIS.

Table 2 presents descriptive statistics for SOE and POE performance series in the 4 main sectors after cleaning the data. The distribution does not change significantly if agriculture and construction are included. The number of SOEs and POEs across sectors is shown in Table 3.

B. Empirical specification

Measuring the impact of corruption on firms' performance

Our main objective is to estimate the impact of corruption on the performance of firms using panel data. In particular, we investigate the following relationship:

$$PER_{i,t} = \alpha_0 + \alpha_3 G_{k,t} + \alpha_4 X_{i,t} + \alpha_5 Y_{k,t} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (1)$$

where $PER_{i,t}$ represents a specific performance indicator of firm i at time t . Four variables are used to assess the financial performance of firms: returns on equity (ROE),¹⁸ operating profit per sales, cost of employees normalized by operating revenue, and sales per employee. ROE and operating allow to gauge the profitability of a firm, while the cost of employees and sales per employee provide an indication of productivity or efficiency.¹⁹

$G_{k,t}$ is a measure of corruption in country k . $X_{i,t}$ represents a set of time-varying firm-level characteristics. The regressors in $X_{i,t}$ include total assets, sales and other firm-level characteristics suggested in the literature, including liquidity (Guariglia et al., 2011) and leverage (Baker, 1973 and Pattitoni et al., 2014), proxied as the ratio of non-current liabilities to total assets. $Y_{k,t}$ represents some non-firm level controls such as real GDP growth, GDP per capita (PPP), natural resource endowment and quality of the business environment. We control for GDP per capita as the performance of firm may be correlated with the level of development. We control for natural resource endowment—proxied as the share of oil

¹⁸ ROE is defined as the ratio of net income (profit before tax) to total equity (capital plus other shareholders funds). Cost of employees is the cost of all employees in the companies while operating revenue includes net sales, other operating revenues, stock variations and excludes VAT.

¹⁹ Note these measures are based on financial indicators. They do not measure the actual productivity of workers comparing actual (physical) outputs and inputs. As such, our measure also captures the impact of government mandates. For example, a firm may be less *productive* with our measure because it is constrained by a government mandate (e.g. charge below-market prices or hire more than the needs of the firm).

exports as a share of total exports—because it can affect both the performance of firms and corruption. Indeed, the literature (see e.g. Brollo *et al.*, 2013) suggests that windfalls associated with natural resources may exacerbate corruption, while at the same time raising the profitability of firms, particularly in the extractive sectors. Finally, we also control for the quality of the business environment—proxied by the ease of starting a business²⁰ from the doing business indicators of the World Bank—because it can also affect the performance of firms. μ_i and μ_t are firms and time fixed effects, respectively.

However, because our measure of corruption is highly persistent (time invariant), we cannot use fixed effects regressions to estimate the impact, since the FE transformation eliminates all time-invariant regressors.²¹ To tackle this issue we follow a two-step estimation, proposed by Hsiao (2003).²² In the first step, equation (1) is estimated by using the *within* estimator (fixed effects) and including only time-varying regressors. Given heterogeneity and potential autocorrelation issues, the standard errors are clustered at the country level. We also include unit-specific effects that can be used to identify the effects of characteristics that are time invariant.

In the second step, the estimated unit effects of the first step are regressed on a constant and slowly-moving variables (equation 2), with a between regression estimator.²³ The combination of a between estimator and an unbalanced panel implies that the requirement of

²⁰ Starting a business is the only indicator that has experienced little methodological change since it was introduced. In addition, the methodology for obtaining this data is designed to isolate the impact of corruption and the payment of bribes to public officials (see <https://www.doingbusiness.org/en/methodology/starting-a-business>).

²¹ The control of corruption of the World Governance Indicator is a slowly changing variable over time. The between variation is 10 times higher than the within variation in our sample.

²² This methodology has been used, among others, by Alesina *et al.* (1999). The authors have used the methodology to study the effect of budget institutions (a time-invariant variable) on fiscal performance in Latin America. The random effect (RE) estimator could be used to avoid the two-step approach but it is based on strong assumptions that rarely hold. Plumper and Troeger (2007) proposed a similar approach to Hsiao (2003) to consider finite sample panel data but based on three steps. But Green (2011) suggested that the two steps approach is more appropriate given that the third step is based on incorrect covariance matrix.

²³ The approach proposed by Hsiao (2003) is a weighted combination of within and between estimators (see Krishnakumar, 2006). The two-step approach is preferred to the one-step approach if the goal is to identify both time-varying and time-invariant coefficients (Kripfganz and Schwarz, 2019). Using only the first step does not allow to identify the parameters of interest while focus only on the second step induces a loss of information. The two-step approach used is close to the methodology proposed by Pesaran and Zhou (2018) and Kripfganz and Schwarz (2019). In these two papers, the second step is based on the residuals of the first step. Pesaran H. and Q. Zhou (2018) is adapted to a static panel data while Kripfganz and Schwarz (2019) can also handle dynamic panel data.

a constant variance of model errors might not hold. Therefore, weighted least squares are used to correct for heteroskedasticity.²⁴

$$\mu_i = \beta_0 + \beta_1 GDP \text{ per capita} + \beta_2 Governance \text{ variable} + \beta_3 Business \text{ environment} + \xi_i \quad (2)$$

To analyze the different impact of corruption on SOEs and private firms (POEs), we expand equation (1) by building on a similar approach as Dewenter and Malatesta (2001), who focus on the effect of ownership on firm performance:

$$PER_{i,t} = \alpha_0 + \alpha_1 Ownership_i + \alpha_2 Ownership_i G_k + \alpha_3 G_{k,t} + \alpha_4 X_{i,t} + \alpha_5 Y_{k,t} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (3)$$

Ownership_i is a dummy variable taking the value of 1 if the firm is privately owned and 0 if it is a SOE. If ownership is included, we also add an interaction term between ownership and corruption. As explained below, we will use a two steps approach to estimate the impact of corruption.

Measuring the impact of governance reforms

We also study the impact of governance reforms in SOEs. This is an important complement to the analysis of corruption, as it allows us to study the impact of SOE-specific governance reforms on their performance—while the previous section looked at an indicator of corruption of the public sector as a whole.²⁵ The challenge is that we cannot precisely identify the timing of the reforms, as the conditionality is met at some point during the IMF program. In addition, firms and governments may begin to work towards reforms during the program negotiation and reform preparation stage. These constraints, together with data limitations, make a specific year-on-year impact analysis difficult. The alternative is to study the average impact of governance reforms on performance over the sample period.

We follow a similar two-steps approach as for the analysis of the impact of corruption. In the first step, we regress the change in performance (first difference) on changes in time-varying

²⁴As the dependent variable in the second step is estimated, another type of heteroscedasticity is introduced. When the dependent variable is estimated, there are two types of components in $\xi_{i,t}$. The first is related to the fact that the unit effects are imperfectly measured. The second is related to the standard random shock that could happen even if the dependent variable is correctly measured. The weighted least squares estimation considers only one of the forms of heteroscedasticity. Therefore, as a robustness check, we also use the Feasible Generalized Least Square (FGLS) estimator to consider both forms of heteroscedasticity (see Lewis and Linzer, 2005) in the baseline and the results hold.

²⁵ This dual approach is also important because the degree of corruption in SOEs likely reflects both institutional/governance weaknesses in the specific firm and in the government more generally.

(continued...)

factors that drive changes in the performance of firms (as in equation 1).²⁶ We also include a unit-specific effect. This will allow us to capture the average change in performance that reflects changes in performance due to governance reforms (that would reduce corruption).

In the second step, we regress the unit effects on the adoption of reforms using the between estimator. The hypothesis we want to test is if in the sample period, firms that have on average more governance reforms have a higher unit effect. In particular, unit effects are likely smaller for cases without governance reforms than in countries with reforms, especially as the quality of institutions and governance is likely to be slow moving. The between estimator answers the question “what is the expected difference in performance improvements between SOEs X and Y if they differ in the number of reforms (structural benchmarks) by 1 during period t?” Or: did SOEs in countries with more governance reforms have a stronger improvement? The between estimation is done over the entire history of the SOE. The estimation can thus be interpreted as the effect of governance reforms on the improvement in SOE performance over time.

IV. THE IMPACT OF CORRUPTION ON SOES PERFORMANCE

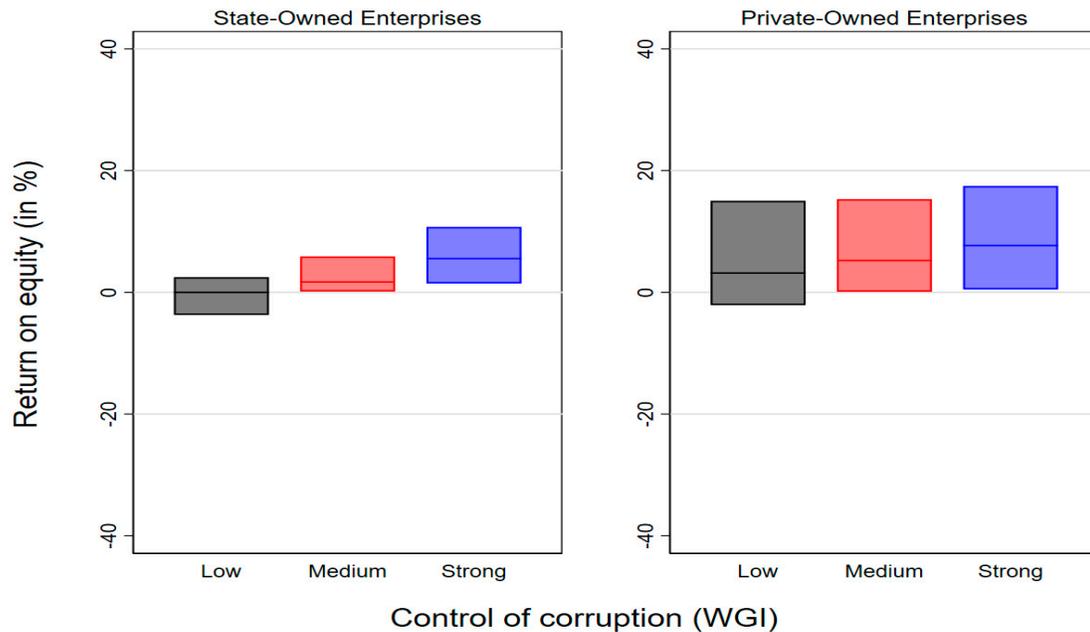
To compare the impact of corruption on SOE, and how it differs relative to private firms, we focus on four strategic sectors—mining (including oil) and quarrying, electricity and gas, transport, and water and sewerage.²⁷ They are the sectors where state ownership is highly prevalent in many economies (OECD, 2017) and where there are overlaps between the public and the private firms allowing a comparison between the two.

A. Stylized facts

We start with a simple descriptive analysis of the relationship between corruption and the financial performance of firms. Countries are divided in three groups across the control of corruption indicator: weak, medium and strong. Figure 2. shows the financial performance of POEs and SOEs for the four sectors relative to control of corruption. The evidence suggests that private firms are, on average, more profitable than SOEs. This is not surprising as SOEs may have policy goals beyond profitability. However, it may also reflect other factors, including a differentiated impact of corruption. Indeed, the data suggests that profitability tends to be higher in countries with higher control of corruption and the impact appears more pronounced for SOEs.

²⁶ By regressing the change in performance also helps avoid endogeneity issues, SOE reforms tend to be implemented when the performance in the sector is low. A level estimation would likely show IMF programs to have a negative impact on SOE performance.

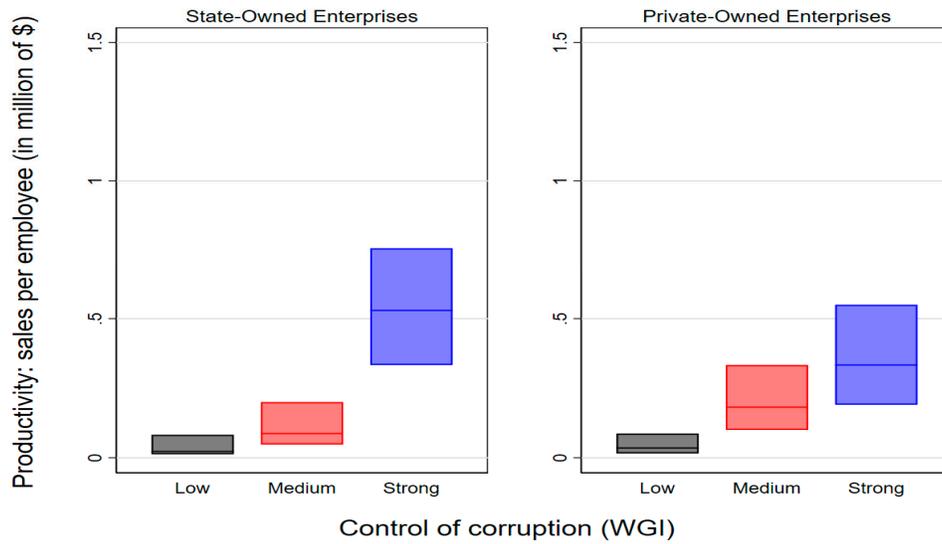
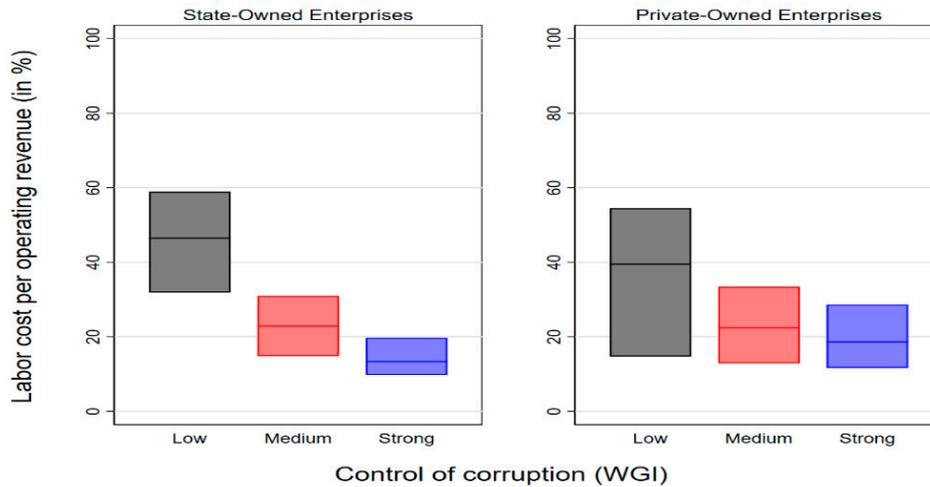
²⁷ To make the comparison meaningful, we use a narrower NACE 2-digit classification: we exclude mining support service activities from the mining and quarrying sector, only use water collection, treatment and supply, and sewerage in the water sector, and narrow the transport sector to land (including rail and freight), air, and water transport. All electricity classifications are kept. See Table 9 in the appendix for the list of countries.

Figure 2. Corruption and Profitability

Sources: IMF staff calculations using ORBIS and Worldwide Governance Indicators (WGI).

Note: The figure shows performance indicators for state-owned enterprises and the private-owned enterprises in the electricity and gas, mining, transport, and water and sewerage. The boxes show the median and the 25th and 75th percentiles. Countries are divided into high, medium, and low corruption, based on the Control of Corruption Index. The data ranges from 2007 to 2016.

The level of productivity of firms is also positively correlated with the degree of control of corruption (Figure 3). An interesting finding is that while private firms tend to be more productive than SOEs, this is not the case when control of corruption is high. This suggests that corruption may be a key driver in explaining differences in productivity. The correlation of the degree of corruption and labor costs is especially strong for SOEs. As Figure 4 shows, there is evidence that countries with greater control of corruption have lower labor costs. However, the differences are less pronounced for private firms. As for productivity measures, labor costs are usually higher among for SOEs, except when corruption is low.

Figure 3. Corruption and Labor Productivity**Figure 4. Corruption and Labor Costs**

Sources: IMF staff calculations using ORBIS and WGI.

Note: The figure shows performance indicators for state-owned enterprises and the private-owned enterprises in the electricity and gas, mining, transport, water and sewerage sectors. The boxes show the median and the 25th and 75th percentiles. Countries are divided into high, medium, and low corruption, based on the Control of Corruption Index. The data range from 2007 to 2016.

B. Results

We now turn to a more formal analysis of the relationship between corruption and SOE performance based on the methodology discussed in section III.B. Table 4. shows the results for the different measures of performance. The first step shows the estimated impact for traditional determinants of firm performance that we use as controls. These include firm-level indicators (for example, sales, size of assets) and economy-wide indicators (e.g. economic growth and terms of trade). The second step shows the results that concern us in this paper, the link between corruption and performance (after controlling for other factors that may influence performance). The estimated coefficient for the degree of control of corruption (CC) always has the expected signal and is statistically significant. That is, the higher the CC (lower corruption), the higher are profits (returns on equity or operating profits as share of sales), the higher is labor productivity and the lower are labor costs.

How large is the impact of reducing corruption? Table 5 provides a simple simulation to illustrate the quantitative of the impact by using the coefficients estimated. If the median country in the weakest governance group improves its control of corruption to the level of the median country in the group with medium corruption, it could, *ceteris paribus*, improve the average profitability from 0.4 percent to 1.6 percent and decrease their average cost of employee per operating revenue from 37.6 percent to 32.7 percent. Further, productivity would grow by about 10 times. These results show that corruption can have large effects.

We now turn to a comparison with private firms. Columns 1–4 in Table 6 shows the results for two alternative measures of profitability (ROE and operating profits). The control variables in the first step regressions are in columns 1 and 3. The effect of the size of total assets on performance tends to be positive and statistically significant in both specifications.²⁸ The coefficient of leverage is negative and significant. The coefficients associated to sales are both positive and strongly significant.

The estimated effect of the quality of business environment—proxied by the ease of starting a business—are positive and significant for profitability (ROE and operating profits) and productivity while the coefficient associated to labor costs per operating revenue is negative and significant (Table 6).

How does the impact of corruption differ between private firms and SOEs? First, the results suggest that private firms have better performance on average (dummy on ownership, Table 6.) broadly in line with the literature (e.g. Dewenter and Malatesta, 2001). Second, while the control of corruption has the expected effect on performance (as in Table 4.), it is not

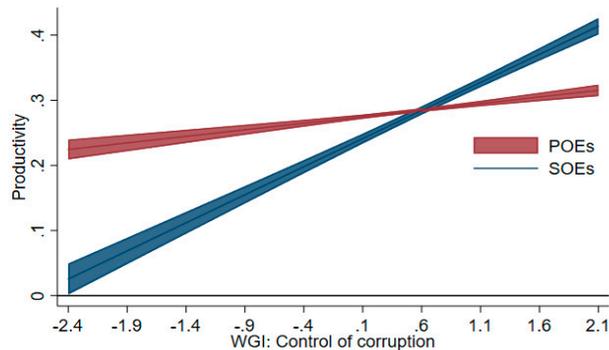
²⁸ Size can potentially have a negative or positive impact. A large size should induce greater differentiation and specialization, leading to better performance (Prescott and Vischer, 1980). On the other hand, a larger size can make the management of a firm more difficult, increasing the level of bureaucracy and negatively affecting firm performance (Downs, 1967). This is why a monopoly status can be associated with inefficiency (Scherer and Ross, 1990).

statistically significant for ROE, only for operating profits. The interaction term between the type of ownership and corruption helps assess if there is a difference in the impact on private firms. The results suggest that corruption may have a larger impact on the profitability of SOEs (interaction term is negative, meaning the control of corruption has less of an impact on private firms). As such, there is only partial evidence that the difference in profitability between private firms and SOEs depends on the severity of corruption.

The evidence in favor of a differentiated impact is stronger for productivity. Columns 5-6 in Table 6 show the effect of control of corruption on productivity. The direct effect of better control of corruption is positive and strongly significant for both private firms and SOEs, while ownership (column 6) shows a similar impact on profitability—private firms perform better than SOEs. For productivity, however, the interaction term is negative and strongly significant. This means that the difference in productivity between POEs and SOEs narrows as the control of corruption improves (or corruption declines). Columns 7-8 display the effect of control of corruption on total labor cost per operating revenue. The results are similar to productivity.

The results suggest that the difference in productivity between SOEs and private firms is largely driven by corruption. SOEs operating in countries with low levels of corruption (high CC), on average, have similar levels of productivity and labor costs. This can be seen by calculating the estimated level of productivity (or labor cost) for SOEs and POEs when control of corruption improves (Figure 5). For example, when the control of corruption is high, SOE performance tends to be even higher than in private firms.²⁹

Figure 5. Corruption and Productivity



Sources: IMF staff calculations using ORBIS and WGI.

Note: The figure shows the performance of SOEs and POEs when control of corruption improves. The graph is based on a between effect estimation in which the means (across units) of the time-dependent variables are added as control variables. The data range from 2007 to 2016.

²⁹ EC (2016) also analyzed the impact of governance. It found that higher governance is associated with lower productivity growth for all firms on average, but that it has a positive effect when interacted with state-owned firms. However, the study had some significant differences in approach as in our paper, we control for GDP per capita (which is highly correlated with governance), take into account governance indicators change slowly

(continued...)

Transparency and sectoral impacts

So far, we have focused on the control of corruption indicator as a proxy for a country's governance. However, governance includes multiple dimensions, such as transparency, quality of institutions, and rule of law. We now add a second indicator: fiscal transparency. Fiscal transparency is about providing a comprehensive, relevant, timely, and reliable overview of the government's financial position and performance, thereby limiting the options for illicit activities between the government and SOEs and increasing public scrutiny of SOE performance. We use a fiscal transparency index developed in the recent Fiscal Monitor (IMF 2019). Table 7 shows the results when the fiscal transparency index (FTI) is used instead of control of corruption. The main conclusions remain valid: weak fiscal transparency is associated with lower performance of firms, particularly when the firm is a SOE.

A second robustness test is done to reduce potential sample bias. If firms in the private sector primarily belong to countries with stronger governance than those in the public sector, we would bias the results towards the conclusion that weak governance hinders SOEs more than POEs. Therefore, we restrict countries in the sample of POEs to be the same as those in the sample of SOEs. The results are very close to those of the baseline regressions both qualitatively and quantitatively.³⁰

We also analyze whether some sectors are more prone to corruption than others (Table 8). For this, the control of corruption is interacted with sector dummies in the second step. The results show that the impact of corruption is robust across all sectors for productivity and is especially large for electricity and mining. Electricity and water are the sectors where the relationship between corruption and performance is robust across all indicators of performance. The mining sector is where the evidence is weaker, except for productivity.

V. THE IMPACT OF GOVERNANCE REFORMS

We now turn to the question of whether governance reforms in SOEs, or improvements in government oversight, help improve performance. As mentioned, we construct a new dataset on SOE governance reforms based on IMF programs. These programs include structural benchmarks on reforms of SOEs—that is, IMF support is conditional on implementing the reforms. The data can be split into different categories, for example a dummy variable for IMF programs that had any SOE conditionality, or series that count the numbers of reforms, for example on specific sectors, or on specific types of reforms (governance reforms versus others).

over time, and yearly movements in the governance indicators may not be sufficiently meaningful given measurement issues (e.g. perceptions may temporarily change due to a specific event).

³⁰ The results are not shown but are available upon request.

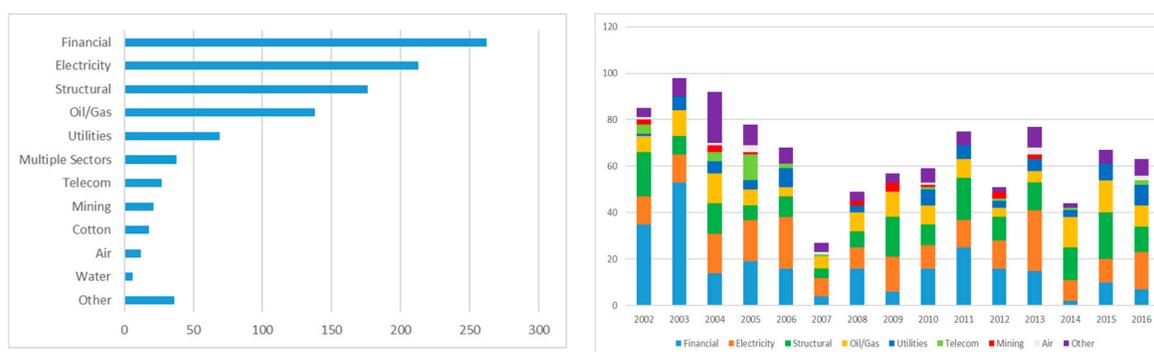
A. Data on IMF conditionality

IMF programs (2002–17) included 1015 structural benchmarks (including prior actions) for financial and non-financial SOEs, found in 206 out of 240 programs during this time. This is consistent with 4.3 SOE-related structural benchmarks per IMF program on average. 753 of those benchmarks covered non-financial SOEs and, of those, 428 were related to SOE governance.³¹ In total, 50 percent of structural benchmarks were found in low-income countries, 45 percent in emerging markets, and 5 percent in advanced economies, which broadly mirrors the distribution of IMF programs across these groups. Therefore, SOE program conditionality is as likely in advanced economies as it is in developing economies, once a program is in place.

Figure 6. Structural Benchmarks by Sector

A. Number of Observations (2002–17)

B. Observations per Year (2002–16) a



Notes: “Structural” includes all benchmarks that concern changes to SOE governance and other reforms that were not sector specific. “Utilities” includes SB combinations of electricity, oil/gas, and water, either when one SOE is responsible for water and electricity, electricity and oil/gas generation simultaneously, or two or more sectors were covered at once. “Multiple sectors” includes a combination of sectors, except for those exclusively related to utilities. “Other” covers SOEs operating in the industries of coffee, insurance, mail services, rail, agriculture, lumber, tourism, steel, fishing, cement, health, chemicals, and construction.

a) 2017 is excluded given not all 2017 SBs were reported at the time this document was produced.

The majority of structural benchmarks was set for public utilities and financial SOEs (Figure 6). Electricity, oil and gas, and water SOEs, as well as general utilities (which usually include a combination of oil, gas and electricity SOEs) amount to 417 structural benchmarks, led by those on electricity SOEs. “Structural” SBs cover general governance, fiscal relations

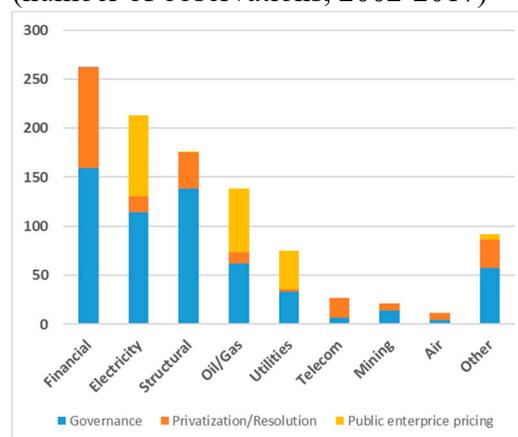
³¹ The latter translates to 0.93 non-financial governance SBs per country per year, with a maximum of 16 structural benchmarks on non-financial SOEs applied in Serbia’s 2015–18 IMF SBA Program. While 2017 is included in the discussions here, 2017 observations are not included in the below analysis given ORBIS data ends in 2016.

between the SOE sector and other entities, and are not sector-specific.³² They are the third most common SB type, indicating frequent governance and risk assessment weaknesses across the SOE sector. The distribution of SBs across sectors has changed little since 2002, with a noticeable decline only for SBs set for financial SOEs.

As shown in Figure 7, more than half of all structural benchmarks on non-financial SOEs were related to SOE governance. Governance SBs include monitoring and transparency, particularly auditing, management, arrears clearance, relations between the state and the SOE, structural reforms to a sector as a whole (if they are governance-related), and various other governance elements.³³ These reforms are used here as a proxy for SOE governance reforms. The other two broad categories are pricing (such as electricity tariff increases) and privatization.

The dataset also includes the outcomes of planned reforms. Specifically, which structural benchmarks were met or not met. The success of structural benchmarks was mixed, with about half fully met without delay (54 percent), including prior actions (Figure 8). Many structural benchmarks have been set as prior actions (218 total), either before programs were approved, or during programs to trigger the next disbursement or as a re-enforcement of SBs that were delayed. Prior actions are set most frequently on the oil and gas sector, for utilities and electricity SOEs (Figure 9). Most frequently, these prior actions are related to tariff and price setting, which can be implemented most rapidly. The share of SBs that were not met are largest in the mining, telecom and financial sectors. However, more than 20 percent of structural benchmarks were not met in all major sectors, which increases to more than 30 (and in the

Figure 7. Type of SOE Reform by Sector
(number of observations, 2002-2017)



Source: IMF data and authors' estimates.

“**Governance**” SBs include monitoring, particularly auditing, management, arrears clearance, relations between the state and the SOE, structural reforms to a sector as a whole (if they are governance-related), and various other governance elements. As for sectoral classification, “**structural**” includes all benchmarks that concern changes to SOE governance and other reforms that were not sector specific; “**other**” covers SOEs operating in the industries of coffee, insurance, mail services, rail, agriculture, lumber, tourism, steel, fishing, cement, health, chemicals, and construction.

³² Structural benchmarks classified as ‘structural’ include, for example: “Set performance contracts with key SOEs”, “Submit the new SOE Code of Governance to the National Assembly”, or “The Ministry of Finance will prepare a statement of fiscal risks emanating from SOEs”.

³³ Privatization played a strong role for state-owned banks, as well as SOEs in telecommunication, mining and airlines. SOE pricing was primarily discussed for utility companies, and often included automatic pricing formulas.

majority of sectors to more than 40) percent if partially met SBs, and those met with delays are included in the ‘not met’ category.

Figure 8. Implementation of Structural Benchmarks
(number of observations, 2002–17)

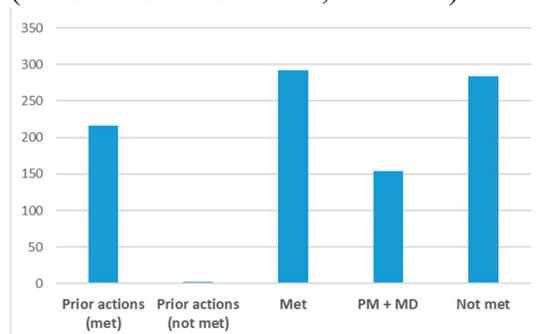
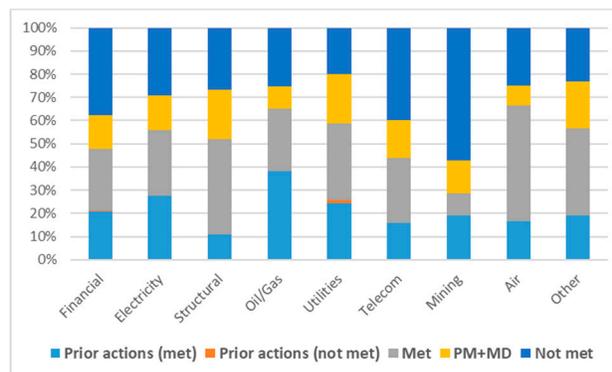


Figure 9. Implementation by Sector
(number of observations, 2002–17)



Notes: PM – Partially met; MD – Met with delay. Structural benchmarks without a final implementation outcome have been excluded. 2 prior actions were not met, and the program was approved. “**Structural**” includes all benchmarks that concern changes to SOE governance and other reforms that were not sector specific. “**Other**” covers SOEs operating in the industries of coffee, insurance, mail services, rail, agriculture, lumber, tourism, steel, fishing, cement, health, chemicals, and construction.

In order to study the impact of governance reforms in detail we construct four measures to capture the type of conditionality and whether it was met (the reform was fully implemented):

- The first is a dummy for IMF programs with any SOE conditionality (zero for no conditionality, 1 for any conditionality related to SOEs), including also financial SOEs, and beyond-governance related structural benchmarks. This allows us to capture the impact when a country has a plan to reform SOEs in general. The hypothesis is that the measures taken may go beyond the specific conditionality, which only captures part of the program efforts. It also allows for potential spillover effects from reforms in the financial sector to non-financial SOEs.
- The other three indicators refer to the number of structural benchmarks during a program. The first includes non-financial governance SBs only, and the second and third count those governance SBs that were met or not-met, respectively.³⁴ Given timing issues of when benchmarks are first set until when they are met (which could cover years), the number of structural benchmarks is split evenly across the years of a respective IMF

³⁴ “Met” includes SBs that were met with delay, given that reforms occurred eventually. The separation of benchmarks into “partially met” and “not met” is unlikely consistently applied over time. That is, it is likely that SBs that were partially met are frequently classified as not met, but that has not always been the case. Therefore, partially met benchmarks are added to the “not met” category to keep a higher degree of consistency.

program (which usually last between one and three years). For example, if there were 12 SBs total in a three-year program, each year lists 4 benchmarks.

Based the SOE data and coverage across sectors, we find IMF programs with any SOE conditionality in 31 countries, and non-financial SOE governance conditionality in 26 countries. Table 9 presents the numbers of firm observations that had overlaps with IMF program conditionality across the four specifications. Given that most firm-years overlapping with IMF program conditionality are found in Ukraine, Serbia, and Romania, the analysis is repeated without them for robustness.

B. Results

The baseline results show that SOE reforms improve firms' financial performance significantly (Table 10). All our indicators of reforms—being in an IMF program with any type of SOEs conditionality or having conditionality on SOE governance reforms—have a strong impact across the four measures of SOE performance. For example, each IMF program-year with SOE-related conditionality increases the rate of growth in ROE by more than 1.1 percentage points on average. One needs to be careful in interpreting this impact as it may reflect other factors of being in a program and other reforms that are not governance related (e.g. changes in electricity tariffs may be higher during program years). Nevertheless, when looking only at governance-related conditionality, there still is a robust impact. Each governance reform (additional structural benchmark) specifically increases ROE by about 0.5 percent, a sizeable improvement given the average annual change in ROE in our sample is about zero (see Table 2). Similarly, IMF programs with any SOE conditionality (a proxy for countries having reform plans) improve the operating profit margin by 1.4 percentage points, lead to larger reduction in costs (about 5 percent), and increase productivity growth by about USD 30,000 per employee on average. Results for each individual SOE governance reform are similar, albeit (expectedly) smaller.

We also test if there is a difference between when conditionality was met (reform was fully implemented) or not. We do not find a systematic difference between benchmarks that were met and not met, as the F-tests for significant differences in columns 4, 8, 12, and 16 show. This could be due to several reasons. First, partially met benchmarks are included in the “not met” category. Benchmarks that were not fully met might still have increased SOE performance but lacked one element of reform. Second, reforms that were not met might have been more ambitious on average, and while not met, progress towards them might still have contributed to performance improvement. Third, benchmarks that were met with delay are classified under “met” as those reforms were fully implemented eventually. Repeatedly delayed benchmarks might signal an overall lack of reform will, implying that the reform may not survive. These potential explanations are an area for future research.

Sectoral differences

Reforms might impact SOE performance differently depending on the sector it operates. We therefore split sectors into mining, electricity, water and transport and interact each of these sectors with the IMF program dummy, or the number of governance reforms. Table 11 presents the results. First stage regressions are omitted here given they do not change from the baseline estimation. The regressions are run with the first difference performance variables, so a systematic difference across sectors is less likely than if looking at levels. We include sector fixed effects in all the second stage regressions. Surprisingly, we find that electricity, water, and transport SOEs grow on average more than mining SOEs and reduce costs significantly more over the time horizon available. This result could be driven by higher volatility of mining outcomes, given the sample period is one where commodity prices went through large swings.

SOE reforms have positive returns across all sectors, but results tend to be less robust for the water sector (Table 11). Coefficients in the mining sector are the largest on average, but they are not always significantly different from other sectors. For example, the higher coefficients in the mining sector for ROE are not statistically different from those in transport. The positive impact of reforms is robust across all sectors for productivity and the sectoral coefficients are not statistically different—suggesting the quantitative impact is similar across sectors. The mining sector also shows the largest costs reductions following both IMF programs with any SOE conditionality and specific SBs, but this effect is statistically different only from transportation and water SOEs (and not electricity).

The data also allows us to analyze the effect of reforms that targeted specific sectors. This is very similar to analyzing the impact of firm-level reforms. For example, for the electricity sector, we choose structural benchmarks that are related to electricity, utilities in general, and overall structural changes to the SOE sector—and we then test if these have an effect on firms in the electricity sector. While estimations based on these splits can be done for all sectors, the overlap between mining and transport-related governance SBs with the respective SOE firms is too small for a meaningful separation. For example, only a total of 62 mining reforms can be matched with mining firms in the ROE regressions, of which most are found in two countries (Romania and Bosnia and Herzegovina). Similarly, for the transport sector less than 300 governance reforms are overlapping with transport SOEs, of which the absolute majority are general structural SOE reforms. Only 24 overlaps are found when the transport sector was targeted specifically. We therefore conduct the sectoral split matched with sectoral reforms for electricity and water. For those two, the overlap is significantly larger – 1063 overlaps in the water sector and 1182 for electricity.

The results for reforms on the electricity sector confirm the significant impact found in the previous regressions (Table 12). IMF programs with any SOE conditionality are added for comparison and are significant for electricity SOEs across the different performance criteria. Governance reforms targeted to electricity SOEs significantly increase average yearly change

in the ROE by 0.5 percentage points, and the operating profit margin by more than 1 percentage point on average. Costs decline by 2 percent on average, while productivity increases by more than USD 25,000 following governance reforms. The results are different for water SOEs (Table 13). While reforms in the overall SOE sector (IMF programs with any SOE conditionality) impact water SOEs significantly, specific water sector reforms had a less pronounced impact and are not significant. This could imply that other types of reform (e.g. increase in price of water or privatization) have a stronger impact on performance in the water sector.

Sample Outliers

Some countries, notably Ukraine, Serbia and Romania, are strongly represented in their overlaps with IMF conditionality. Similarly, Russia is represented disproportionately in our SOE dataset, even though overlaps with IMF program conditionality is small. We exclude each of these countries separately. Neither changes the results, which partly reflects the fact that many firms across those four countries are dropped in the baseline regression due to missing control variables (and are therefore not considered in the regressions).

Adding Agriculture and Construction

We also add agriculture and construction to the analysis as they tend to be reflected in IMF programs. Several program benchmarks refer to agricultural sectors, such as cotton, coffee, bananas, fishing, lumber, or general farming. Similarly, some benchmarks directly target construction SOEs, and linkages between construction SOEs and for example the transport sector are large. In addition, several structural benchmarks include agriculture and construction SOEs as sectors to be restructured during broader SOE reforms. We therefore add these two sectors to the estimation, which includes about 1500 agricultural SOEs, and 2500 SOEs operating in construction. Most results are comparable to the baseline and are not shown. When adding interaction terms for each sector, we find that the construction sector is persistently positively impacted by reforms, comparable to the impact in the transport sector. Agricultural SOEs, on the other hand, do not improve significantly following SOE reforms.

VI. CONCLUSION

SOEs can provide important goods and services in core sectors of the economy at a reasonable cost (in an efficient way). However, they are also vulnerable to the influence of corrupt politicians or civil servants. The impact on SOEs will reflect the overall corruption environment in the country, how pervasive it is, and firm-specific institutional weaknesses. In this paper, we analyze both aspects of governance weaknesses and their impact on SOEs financial performance.

The evidence shows that state-owned enterprise performance is severely undermined by corruption. When corruption in the country is high, or fiscal transparency is low, SOEs

performance is significantly weaker. This is true even after controlling for other country differences, including level of development (GDP per capita).

Our analysis also indicates that SOEs are more affected by a corrupt environment than private firms—in a low corruption environment, SOEs can be as, or more, productive than private firms. Our results support the view that when governance is weak, SOEs are more vulnerable likely due to the proximity to government officials and politicians and weaker oversight.

We also show evidence that reforms directed at improving governance of SOEs and oversight by governments can help. Taking advantage of country-specific experiences, we show that reforming SOEs governance improves their performance among core sectors. This underscores the importance of initiatives, including by Transparency International, the OECD, and others, to promote greater transparency and accountability in SOEs and strengthen the role of the government as supervisor.

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APPENDIX I. DATA

Fiscal transparency indicator

The fiscal transparency indicator (FTI) is a measure of the public access to key financial documents of the central government, including budgetary analysis of the Supreme Audit Institution, the holding of public hearings to gain citizen-input into the formulation of the annual budget, functioning of right-to-information laws, and the quality and timeliness of public budget reports. The data come from the Open Budget Survey, Open Data Barometer, and public expenditure and financial accountability (PEFA). To aggregate different sources with different scales and supplement variable coverage, we adapt the Kaufmann, Kraay, and Mastruzzi (2010) method using an unobserved components model.

Control of corruption

The Control of Corruption Index from the Worldwide Governance Indicators, available since 1996 and produced by Kaufmann, Kray, and Mastruzzi (2010), aggregates information from more than 30 different sources. The index provides a relative measure of perceived corruption that ranges from -2.5 (high corruption) to 2.5 (low corruption).

Covering over 300 million firms worldwide, the **ORBIS database** is a firm-level panel dataset on public and private companies' financial, productive, and ownership information. The ORBIS database is compiled by Bureau van Dijk and covers all major sectors of the economy. Data are collected from public sources and are standardized in a format that makes firms comparable across countries. Unlike other datasets which focus on large firms, ORBIS presents information on firms of all sizes. Nonetheless, some regions have fuller coverage due to national corporate reporting regulations. Europe is one such example in which all corporations must report certain financials. Further, what is reported varies from region to region. For instance, firms surpassing an employment threshold in the United States are only required to publish sales and employment figures. Thus, ORBIS is not necessarily representative of an individual company's economy. For instance, ORBIS is not the appropriate tool to compare the size of the manufacturing sector of Brazil to the manufacturing sector of Argentina. Rather, ORBIS is best used to compare firms, though country-specific controls can be incorporated.

Table 1. Number of SOEs in the final sample per country

| Country | Number of SOEs | Country | Number of SOEs |
|--------------------------|----------------|-----------------------------|----------------|
| Albania | 3 | Luxembourg | 4 |
| Argentina | 7 | Macedonia | 25 |
| Australia | 7 | Madagascar | 1 |
| Austria | 137 | Malawi | 1 |
| Bangladesh | 2 | Malaysia | 69 |
| Belgium | 47 | Malta | 3 |
| Bolivia | 10 | Martinique (France) | 2 |
| Bosnia and Herzegovina | 107 | Mauritius | 1 |
| Botswana | 1 | Mexico | 1 |
| Brazil | 74 | Mongolia | 19 |
| Bulgaria | 94 | Montenegro | 11 |
| Canary Islands (Spain) | 19 | Morocco | 6 |
| Ceuta (Spain) | 3 | Netherlands | 36 |
| Chile | 8 | New Zealand | 7 |
| China | 909 | Norway | 376 |
| Colombia | 15 | Oman | 1 |
| Costa Rica | 2 | Pakistan | 4 |
| Croatia | 91 | Panama | 1 |
| Czech Republic | 242 | Peru | 9 |
| Denmark | 230 | Poland | 1225 |
| Ecuador | 1 | Portugal | 56 |
| Egypt | 5 | Republic of Korea | 15 |
| Estonia | 71 | Republic of Moldova | 25 |
| Ethiopia | 1 | Reunion (France) | 5 |
| Finland | 302 | Romania | 193 |
| France | 846 | Russian Federation | 5,554 |
| French Guiana (France) | 4 | Saudi Arabia | 1 |
| Germany | 1277 | Serbia | 178 |
| Ghana | 1 | Singapore | 9 |
| Greece | 25 | Slovakia | 87 |
| Greenland (Denmark) | 1 | Slovenia | 98 |
| Guadeloupe (France) | 1 | South Africa | 2 |
| Hong Kong | 1 | Spain | 419 |
| Hungary | 10 | Svalbard (Norway) | 2 |
| Iceland | 8 | Sweden | 355 |
| India | 71 | Switzerland | 26 |
| Indonesia | 10 | Thailand | 9 |
| Ireland | 20 | Tunisia | 1 |
| Islamic Republic of Iran | 2 | Turkey | 16 |
| Israel | 1 | Ukraine | 1186 |
| Italy | 510 | United Arab Emirates | 2 |
| Japan | 2 | United Kingdom | 73 |
| Jordan | 2 | United Republic of Tanzania | 1 |
| Kazakhstan | 21 | United States of America | 1 |
| Kenya | 2 | Uruguay | 2 |
| Kuwait | 1 | Venezuela | 1 |
| Latvia | 110 | Vietnam | 44 |
| Lithuania | 31 | Zambia | 1 |

Notes: number of firms in ORBIS after outlier cleaning, in the sectors agriculture, mining, electricity, water, transport, and construction. The time dimension ranges from 2000 to 2016

Table 2. Descriptive statistics for SOEs and POEs performance criteria

| SOEs | Level | Observations | Average | Std. Dev. | Minimum | Maximum |
|--|------------------|--------------|---------|-----------|---------|---------|
| | ROE | 28,907 | 0.0401 | 0.1257 | -0.4985 | 0.4998 |
| Operating profit | 28,093 | 0.0432 | 0.1119 | -0.6000 | 0.5000 | |
| Cost of employee per operating revenue | 24,550 | 0.2764 | 0.1716 | 0.0002 | 0.9884 | |
| Sales per employee | 28,907 | 0.2440 | 0.3033 | 0.0001 | 1.4982 | |
| SOEs | First difference | Observations | Average | Std. Dev. | Minimum | Maximum |
| | ROE | 19,266 | -0.0007 | 0.1286 | -0.9147 | 0.8675 |
| Operating profit | 19,107 | 0.0007 | 0.2863 | -0.9000 | 0.8000 | |
| Cost of employee per operating revenue | 16,500 | 0.0005 | 0.0639 | -0.8542 | 0.8455 | |
| Sales per employee | 19,266 | -0.0010 | 0.1191 | -1.2901 | 1.3054 | |
| POEs | Level | Observations | Average | Std. Dev. | Minimum | Maximum |
| | ROE | 126,884 | 0.0945 | 0.1704 | -0.4998 | 0.4999 |
| Operating profit | 111,250 | 0.0626 | 0.2890 | -0.5000 | 0.6000 | |
| Cost of employee per operating revenue | 76,620 | 0.2012 | 0.1483 | 0.0001 | 0.9967 | |
| Sales per employee | 126,884 | 0.2787 | 0.2986 | 0.0004 | 1.4987 | |

Notes: Sectors included are electricity and gas, mining, water and sewage, and transport. The time dimension ranges from 2000 to 2016 for SOEs and 2007 to 2016 for POEs.

Table 3. Number of firms by sector

| SOEs | Sectors | Agriculture | Construction | Electricity | Mining | Transport | Water |
|---------------------|-----------------|-------------|--------------|-------------|--------|-----------|-------|
| | Number of firms | 496 | 1142 | 2265 | 252 | 1170 | 1411 |
| Number of countries | 25 | 41 | 57 | 28 | 47 | 35 | |
| POEs | Sectors | Agriculture | Construction | Electricity | Mining | Transport | Water |
| | Number of firms | | | 10739 | 14561 | 4960 | 4381 |
| Number of countries | | | 77 | 76 | 73 | 51 | |

Notes: Number of firms after outlier cleaning. The time dimension ranges from 2000 to 2016 for SOEs and 2007 to 2016 for POEs.

Table 4. Corruption and SOEs' performance

| | Profitability Return on Equity | | Profitability Operating profit per sales | | Productivity | | Costs of employees per operating revenue | |
|--|-----------------------------------|----------------------|---|----------------------|---------------------|---------------------|---|----------------------|
| | 1st step | 2nd step | 1st step | 2nd step | 1st step | 2nd step | 1st step | 2nd step |
| GDP growth | -0.004 (0.019) | | 0.085 (0.056) | | -0.011 (0.020) | | -0.040** (0.018) | |
| Terms of trade (percent change) | 0.000 (0.000) | | -0.000 (0.000) | | 0.000 (0.000) | | -0.000 (0.000) | |
| Change in oil price | -0.000 (0.000) | | -0.000 (0.000) | | 0.000 (0.000) | | -0.000** (0.000) | |
| Share of oil exports as a share of total exports | 0.009 (0.069) | | -0.337 (0.224) | | -0.058 (0.047) | | -0.030 (0.036) | |
| Sales | 0.020*** (0.005) | | 0.020* (0.011) | | | | -0.020*** (0.006) | |
| Total assets | 0.006 (0.005) | | 0.057 (0.043) | | 0.040*** (0.011) | | -0.025*** (0.006) | |
| Liquidity: current ratio | 0.001*** (0.000) | | -0.000 (0.001) | | 0.000 (0.001) | | -0.000 (0.000) | |
| Leverage: long-term debt-to-assets | -0.015 (0.017) | | -0.139 (0.130) | | -0.037** (0.015) | | 0.015 (0.009) | |
| GDP (PPP) per capita | | 0.020*** (0.005) | | -0.046*** (0.012) | | 0.009 (0.013) | | -0.017* (0.009) |
| Ease of starting a business | | 0.041*** (0.013) | | 0.213*** (0.034) | | -0.038 (0.035) | | 0.155*** (0.026) |
| Control of Corruption (CC) | | 0.012*** (0.002) | | 0.032*** (0.007) | | 0.152*** (0.007) | | -0.049*** (0.005) |
| Constant | -0.002 (0.020) | -0.397*** (0.057) | -0.132 (0.120) | -0.495*** (0.152) | 0.131*** (0.033) | -0.024 (0.159) | 0.362*** (0.021) | -0.466*** (0.122) |
| Observations | 27,493 | 26,405 | 27,286 | 26,198 | 27,493 | 26,405 | 23,591 | 22,514 |
| R-squared | 0.006 | 0.095 | 0.011 | 0.019 | 0.020 | 0.318 | 0.025 | 0.102 |
| Number of firms | 4,884 | 4,710 | 4,838 | 4,664 | 4,884 | 4,710 | 4,037 | 3,864 |

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residual in the first step at clustered at the country level. The second step coefficients and standard errors are estimated on fixed-effect-averages. Weighted least squares are used in the second step to correct for heteroskedasticity. *** p< 0.01, **p<0.05, *p<0.1. The time dimension ranges from 2000 to 2016.

Table 5. Performance gains by improving governance

| | ROE (in percent) | | Productivity - Sales per employee (USD million) | | Cost of employees per operating revenue (in percent) | | |
|-------------------|---------------------|-------|---|-------|--|-------|------|
| | Before | After | Before | After | Before | After | |
| Low corruption | | 6.2 | 6.2 | 0.4 | 0.4 | 15.8 | 15.8 |
| Medium corruption | ↑ | 1.5 | 3.2 | 0.08 | 0.3 | 25.0 | 18.2 |
| High corruption | ↑ | 0.4 | 1.6 | 0.02 | 0.2 | 37.6 | 32.8 |

Sources: IMF staff estimates using ORBIS and WGI.

Table 6. Corruption and Firms performance – SOEs and POEs

| | ROE | | Operating profit per sales | | Productivity | | Labor costs | |
|--|----------------------|----------------------|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> |
| | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| GDP growth | 0.125** (0.052) | | 0.141*** (0.050) | | -0.012 (0.057) | | -0.057 (0.047) | |
| Terms of trade (percent change) | -0.000 (0.000) | | -0.001*** (0.000) | | 0.000 (0.000) | | 0.000 (0.000) | |
| Change in oil price | 0.001*** (0.000) | | 0.000 (0.000) | | 0.001*** (0.000) | | -0.000** (0.000) | |
| Share of oil exports as a share of total € | 0.092 (0.065) | | -0.015 (0.172) | | -0.119* (0.070) | | 0.039 (0.078) | |
| Sales | 0.042*** (0.011) | | 0.009** (0.004) | | | | -0.043*** (0.008) | |
| Total assets | 0.029*** (0.011) | | 0.037** (0.015) | | 0.050*** (0.006) | | -0.042*** (0.008) | |
| Liquidity: current ratio | 0.000 (0.000) | | -0.001 (0.001) | | -0.001*** (0.000) | | 0.001** (0.000) | |
| Leverage: long-term debt-to-assets | -0.021*** (0.006) | | -0.035 (0.026) | | -0.026*** (0.007) | | 0.006 (0.004) | |
| GDP per capita | | 0.016*** (0.002) | | 0.023*** (0.005) | | 0.152*** (0.004) | | -0.025*** (0.004) |
| Ease of starting a business | | 0.091*** (0.008) | | 0.040** (0.016) | | 0.089*** (0.015) | | -0.057*** (0.011) |
| Control of corruption (CC) | | 0.002 (0.002) | | 0.008** (0.004) | | 0.088*** (0.004) | | -0.029*** (0.003) |
| Ownership = 1 (POEs) | | 0.073*** (0.002) | | 0.064*** (0.004) | | 0.102*** (0.004) | | -0.108*** (0.003) |
| Ownership = 1 (POEs) x CC | | -0.008*** (0.002) | | -0.036*** (0.004) | | -0.068*** (0.003) | | 0.063*** (0.003) |
| Constant | 0.003 (0.036) | -0.616*** (0.028) | -0.021 (0.034) | -0.449*** (0.057) | 0.172*** (0.014) | -2.012*** (0.051) | 0.330*** (0.020) | 0.584*** (0.049) |
| Observations | 139,999 | 136,861 | 125,446 | 122,520 | 139,982 | 136,861 | 90,478 | 87,388 |
| R-squared | 0.037 | 0.050 | 0.005 | 0.009 | 0.035 | 0.245 | 0.088 | 0.071 |
| Number of firms | 36,210 | 35,518 | 31,859 | 31,249 | 36,206 | 35,518 | 18,701 | 18,017 |

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residual in the first step at clustered at the country level. The second step coefficients and standard errors are estimated on fixed-effect-averages. Weighted least squares are used in the second step to correct for heteroskedasticity. *** p< 0.01, **p<0.05, *p<0.1. The sample ranges from 2007 to 2016.

Table 7. Fiscal Transparency and firms' performance – SOEs and POEs

| | ROE | | Operating profit per sales | | Productivity | | Labor costs | |
|--|----------------------|----------------------|----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> | <i>First step</i> | <i>Second step</i> |
| | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| GDP growth | 0.125** (0.052) | | 0.141*** (0.050) | | -0.012 (0.057) | | -0.057 (0.047) | |
| Terms of trade (percent change) | -0.000 (0.000) | | -0.001*** (0.000) | | 0.000 (0.000) | | 0.000 (0.000) | |
| Change in oil price | 0.001*** (0.000) | | 0.000 (0.000) | | 0.001*** (0.000) | | -0.000** (0.000) | |
| Share of oil exports as a share of total | 0.092 (0.065) | | -0.015 (0.172) | | -0.119* (0.070) | | 0.039 (0.078) | |
| Sales | 0.042*** (0.011) | | 0.009** (0.004) | | | | -0.043*** (0.008) | |
| Total assets | 0.029*** (0.011) | | 0.037** (0.015) | | 0.050*** (0.006) | | -0.042*** (0.008) | |
| Liquidity: current ratio | 0.000 (0.000) | | -0.001 (0.001) | | -0.001*** (0.000) | | 0.001** (0.000) | |
| Leverage: long-term debt-to-assets | -0.021*** (0.006) | | -0.035 (0.026) | | -0.026*** (0.007) | | 0.006 (0.004) | |
| GDP per capita | | -0.003 (0.003) | | -0.046*** (0.006) | | 0.194*** (0.006) | | -0.018*** (0.004) |
| Ease of starting a business | | 0.114*** (0.011) | | 0.232*** (0.025) | | 0.078*** (0.023) | | -0.071*** (0.007) |
| Fiscal Transparency Index (FTI) | | 0.025*** (0.006) | | 0.084*** (0.013) | | 0.159*** (0.013) | | 0.005 (0.014) |
| Ownership = 1 (POEs) | | 0.070*** (0.002) | | 0.026*** (0.005) | | 0.038*** (0.005) | | -0.066*** (0.003) |
| Ownership = 1 (POEs) x FTI | | -0.008 (0.006) | | -0.081*** (0.014) | | -0.120*** (0.013) | | 0.062*** (0.008) |
| Constant | -0.000 (0.035) | -0.518*** (0.042) | -0.021 (0.034) | -0.584*** (0.095) | 0.172*** (0.014) | -2.317*** (0.086) | 0.330*** (0.020) | 0.212*** (0.053) |
| Observations | 139,982 | 90,985 | 125,446 | 81,915 | 139,982 | 90,985 | 90,478 | 69,090 |
| R-squared | 0.037 | 0.064 | 0.005 | 0.010 | 0.035 | 0.173 | 0.088 | 0.059 |
| Number of firms | 36,206 | 19,672 | 31,859 | 17,304 | 36,206 | 19,672 | 18,701 | 14,343 |

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residual in the first step at clustered at the country level. The second step coefficients and standard errors are estimated on fixed-effect-averages. Weighted least squares are used in the second step to correct for heteroskedasticity. *** p< 0.01, **p<0.05, *p<0.1. The sample ranges from 2007 to 2016.

Table 8. Sectoral Split – Interaction between Control of Corruption and Sectors

| | ROE | Operating profit per sales | Productivity | Labor costs |
|---|----------------------|-------------------------------|----------------------|----------------------|
| 2nd step | (1) | (2) | (3) | (4) |
| GDP (PPP) per capita | 0.027*** (0.005) | -0.040*** (0.012) | 0.051*** (0.011) | -0.038*** (0.007) |
| Ease of starting a business | 0.057*** (0.013) | 0.237*** (0.033) | 0.030 (0.030) | 0.032 (0.020) |
| Electricity and gas (Sector FE) | -0.031*** (0.007) | 0.149*** (0.019) | 0.110*** (0.018) | -0.152*** (0.014) |
| Water and Sewage (Sector FE) | -0.052*** (0.007) | 0.161*** (0.019) | -0.006 (0.018) | 0.004 (0.014) |
| Transport (Sector FE) | -0.061*** (0.008) | 0.058*** (0.020) | -0.029 (0.019) | 0.084*** (0.015) |
| <i>Interaction terms (CC and Sectors)</i> | | | | |
| Electricity and gas | 0.005* (0.003) | 0.023*** (0.007) | 0.161*** (0.006) | -0.005 (0.004) |
| Water and Sewage | 0.011*** (0.003) | 0.036*** (0.009) | 0.067*** (0.008) | -0.063*** (0.005) |
| Transport | 0.020*** (0.004) | 0.034*** (0.009) | 0.016* (0.009) | 0.009 (0.006) |
| Mining | -0.029*** (0.009) | -0.069*** (0.025) | 0.125*** (0.022) | -0.005 (0.015) |
| Constant | -0.483*** (0.058) | -0.779*** (0.154) | -0.761*** (0.139) | 0.299*** (0.095) |
| Observations | 26,405 | 26,198 | 26,405 | 22,514 |
| R-squared | 0.123 | 0.060 | 0.506 | 0.486 |
| Number of firms | 4,710 | 4,664 | 4,710 | 3,864 |

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. Residual in the first step at clustered at the country level. The estimation of the first-step is not shown. The second step coefficients and standard errors are estimated on fixed-effect-averages. Weighted least squares are used in the second step to correct for heteroskedasticity. *** p< 0.01, **p<0.05, *p<0.1. Sample ranges from 2000 to 2016.

Table 9. Overlaps of firm years with IMF program conditionality

| Country | Number of observations (firm years) with: | | | |
|------------------------|---|------------------------------|----------------------------------|--------------------------------------|
| | IMF Program | Non-financial governance SBs | Met non-financial governance SBs | Not met non-financial governance SBs |
| Albania | 4 | 4 | 4 | 3 |
| Bangladesh | 8 | 8 | 8 | 8 |
| Bosnia and Herzegovina | 301 | 299 | 299 | 35 |
| Bulgaria | 8 | 8 | 8 | 0 |
| Colombia | 4 | 0 | 0 | 0 |
| Croatia | 5 | 5 | 5 | 0 |
| Egypt | 1 | 1 | 1 | 1 |
| Ethiopia | 2 | 2 | 2 | 0 |
| Ghana | 6 | 6 | 4 | 2 |
| Greece | 96 | 60 | 60 | 0 |
| Hungary | 23 | 23 | 23 | 0 |
| Ireland | 59 | 0 | 0 | 0 |
| Iceland | 10 | 0 | 0 | 0 |
| Jordan | 6 | 6 | 6 | 0 |
| Kenya | 11 | 3 | 0 | 3 |
| Kyrgyz Republic | 2 | 2 | 2 | 2 |
| Latvia | 305 | 305 | 305 | 305 |
| Macedonia | 19 | 0 | 0 | 0 |
| Moldova | 152 | 152 | 76 | 141 |
| Mongolia | 4 | 4 | 4 | 0 |
| Malawi | 2 | 2 | 0 | 2 |
| Pakistan | 22 | 12 | 12 | 0 |
| Portugal | 178 | 178 | 178 | 178 |
| Romania | 766 | 766 | 766 | 472 |
| Serbia | 967 | 967 | 280 | 967 |
| Tunisia | 2 | 2 | 2 | 2 |
| Turkey | 12 | 12 | 12 | 12 |
| Tanzania | 2 | 2 | 1 | 2 |
| Ukraine | 4,753 | 4,753 | 4,503 | 768 |
| Uruguay | 1 | 0 | 0 | 0 |
| Zambia | 5 | 5 | 0 | 5 |

Notes: Observation period 2002-2016. Counted are numbers of overlaps between IMF programs with any SOE conditionality or with governance conditionality and firms across all years. The table does not count the number of benchmarks during programs. Benchmarks that were met with delay are classified as “met”. Partially met benchmarks are classified as “not met”. Financial benchmarks are included in IMF Program observations but excluded from non-financial governance SBs.

Table 10. The Impact of IMF programs and SOE conditionality on SOE performance

| Dependent variable | ROE | | | | Operating profit per sales | | | | Labor cost per operating revenue | | | | Sales per employee | | | | |
|---|-------------------|-------------------|-------------------|-------------------|----------------------------|----------------------|----------------------|----------------------|----------------------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| | 1st Step D.ROE | 2nd Step D.ROE | 2nd Step D.ROE | 2nd Step D.ROE | 1st Step D.Profit | 2nd Step D.Profit | 2nd Step D.Profit | 2nd Step D.Profit | 1st Step D.Cost | 2nd Step D.Cost | 2nd Step D.Cost | 2nd Step D.Cost | 1st Step D.Sales | 2nd Step D.Sales | 2nd Step D.Sales | 2nd Step D.Sales | |
| GDP growth | -0.0666 | | | | -0.0195 | | | | 0.0051 | | | | -0.0303 | | | | |
| S.E. | (0.0460) | | | | (0.0564) | | | | (0.0297) | | | | (0.0286) | | | | |
| Terms of trade (percent change) | 0.0002 | | | | 0.0000 | | | | 0.0002 | | | | -0.0000 | | | | |
| S.E. | (0.0002) | | | | (0.0002) | | | | (0.0002) | | | | (0.0001) | | | | |
| USD nominal exchange rate (change) | -0.0000 | | | | 0.0000 | | | | 0.0000 | | | | 0.0000 | | | | |
| S.E. | (0.0000) | | | | (0.0000) | | | | (0.0000) | | | | (0.0000) | | | | |
| Public investment growth | 0.0016 | | | | -0.0064 | | | | -0.0050* | | | | 0.0051*** | | | | |
| S.E. | (0.0047) | | | | (0.0051) | | | | (0.0029) | | | | (0.0017) | | | | |
| Inflation (period average, change) | 0.0282*** | | | | -0.0181 | | | | 0.0177*** | | | | 0.0051 | | | | |
| S.E. | (0.0074) | | | | (0.0115) | | | | (0.0054) | | | | (0.0076) | | | | |
| Lagged change in unemployment rate | -0.0020*** | | | | -0.0001 | | | | -0.0001 | | | | -0.0003 | | | | |
| S.E. | (0.0005) | | | | (0.0005) | | | | (0.0003) | | | | (0.0004) | | | | |
| Change in oil price | 0.0001 | | | | 0.0002 | | | | -0.0001 | | | | 0.0006 | | | | |
| S.E. | (0.0007) | | | | (0.0003) | | | | (0.0002) | | | | (0.0005) | | | | |
| Sales | 0.0322*** | | | | | | | | -0.0403*** | | | | | | | | |
| S.E. | (0.0048) | | | | | | | | (0.0083) | | | | | | | | |
| Total assets | -0.0160** | | | | 0.0084 | | | | 0.0017 | | | | 0.0252*** | | | | |
| S.E. | (0.0070) | | | | (0.0089) | | | | (0.0050) | | | | (0.0087) | | | | |
| Liquidity: current ratio | 0.0010*** | | | | 0.0006 | | | | 0.0001 | | | | 0.0001 | | | | |
| S.E. | (0.0004) | | | | (0.0008) | | | | (0.0002) | | | | (0.0004) | | | | |
| Leverage: long-term debt-to-assets | -0.0081 | | | | -0.0071 | | | | 0.0032 | | | | -0.0127* | | | | |
| S.E. | (0.0062) | | | | (0.0136) | | | | (0.0076) | | | | (0.0064) | | | | |
| D.GDP ppp per capita | | -0.0368 | -0.0611* | -0.0610* | | -0.0002 | -0.0332 | -0.0309 | | -0.3484*** | -0.1713*** | -0.1636*** | | -0.1578*** | -0.2386*** | -0.2446*** | |
| S.E. | | (0.0345) | (0.0333) | (0.0336) | | (0.0277) | (0.0267) | (0.0269) | | (0.0633) | (0.0616) | (0.0621) | | (0.0401) | (0.0388) | (0.0391) | |
| IMF program with any SOE conditionality | | 0.0111*** | | | | 0.0137*** | | | | -0.0491*** | | | | 0.0313*** | | | |
| S.E. | | (0.0034) | | | | (0.0026) | | | | (0.0046) | | | | (0.0036) | | | |
| # Non-financial governance SBs | | | 0.0053*** | | | | 0.0064*** | | | | | -0.0165*** | | | 0.0146*** | | |
| S.E. | | | (0.0022) | | | | (0.0017) | | | | | (0.0029) | | | (0.0023) | | |
| # Non-financial governance SBs (met) | | | | 0.0054 | | | | 0.0079*** | | | | | -0.0131*** | | | 0.0112*** | |
| S.E. | | | | (0.0034) | | | | (0.0025) | | | | | (0.0044) | | | (0.0035) | |
| # Non-financial governance SBs (not met) | | | | 0.0051 | | | | 0.0039 | | | | | -0.0225*** | | | 0.0206*** | |
| S.E. | | | | (0.0049) | | | | (0.0038) | | | | | (0.0065) | | | (0.0052) | |
| Constant | -0.0301 | -0.0404*** | -0.0382*** | -0.0382*** | -0.0146 | -0.0227*** | -0.0197*** | -0.0200*** | 0.0852*** | 0.1047*** | 0.0898*** | 0.0890*** | -0.0584* | -0.0469*** | -0.0392*** | -0.0385*** | |
| S.E. | (0.0276) | (0.0047) | (0.0047) | (0.0047) | (0.0333) | (0.0037) | (0.0036) | (0.0036) | (0.0216) | (0.0086) | (0.0085) | (0.0085) | (0.0304) | (0.0057) | (0.0056) | (0.0056) | |
| F-Test for difference between met and not met SBs | | | | 0.9659 | | | | 0.4491 | | | | 0.3042 | | | | 0.1984 | |
| Observations | 27,941 | 27,941 | 27,941 | 27,941 | 30,088 | 30,088 | 30,088 | 30,088 | 24,751 | 24,751 | 24,751 | 24,751 | 24,635 | 24,635 | 24,635 | 24,635 | |
| R-squared | 0.0066 | 0.0901 | 0.0891 | 0.0891 | 0.0012 | 0.0209 | 0.0182 | 0.0183 | 0.0268 | 0.1554 | 0.1371 | 0.1373 | 0.0066 | 0.0760 | 0.0680 | 0.0684 | |
| Number of firms | 4,582 | 4,582 | 4,582 | 4,582 | 4,874 | 4,874 | 4,874 | 4,874 | 3,778 | 3,778 | 3,778 | 3,778 | 4,087 | 4,087 | 4,087 | 4,087 | |

Notes: Observation period 2002-2016. Clustered at the country level and time dummies are included in first stage regressions. Sector fixed effects included in second stage regression. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Benchmarks that were met with delay are classified as “met”. Partially met benchmarks are classified as “not met”. Financial benchmarks are excluded from non-financial governance SBs.

Table 11. Sectoral Split – Interaction between Reforms and Sectors

| | ROE | | Operating profit per sales | | Labor cost per operating revenue | | Sales per employee | |
|--|---|--|---|--|---|--|---|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Dependent variable | 2nd Step D.ROE | 2nd Step D.ROE | 2nd Step D.Profit | 2nd Step D.Profit | 2nd Step D.Cost | 2nd Step D.Cost | 2nd Step D.Sales | 2nd Step D.Sales |
| D.GDP ppp per capita S.E. | -0.0363 (0.0348) | -0.0625* (0.0334) | 0.0017 (0.0280) | -0.0322 (0.0269) | -0.3301*** (0.0638) | -0.1503** (0.0620) | -0.1500*** (0.0405) | -0.2376*** (0.0390) |
| Electricity (Sector FE) S.E. | 0.0376*** (0.0049) | 0.0357*** (0.0046) | 0.0198*** (0.0038) | 0.0199*** (0.0036) | -0.0855*** (0.0103) | -0.0734*** (0.0094) | 0.0426*** (0.0061) | 0.0379*** (0.0057) |
| Water (Sector FE) S.E. | 0.0701*** (0.0049) | 0.0677*** (0.0047) | 0.0264*** (0.0039) | 0.0277*** (0.0037) | -0.1424*** (0.0104) | -0.1319*** (0.0094) | 0.0641*** (0.0063) | 0.0608*** (0.0059) |
| Transport (Sector FE) S.E. | 0.0335*** (0.0051) | 0.0315*** (0.0049) | 0.0237*** (0.0040) | 0.0233*** (0.0038) | -0.0953*** (0.0104) | -0.0811*** (0.0095) | 0.0569*** (0.0063) | 0.0501*** (0.0059) |
| Interaction Terms (Reforms and Sector) | IMF program with any SOE conditionality | # Non- financial governance SBs |
| Mining S.E. | 0.0490*** (0.0163) | 0.0315*** (0.0109) | 0.0182 (0.0118) | 0.0216*** (0.0077) | -0.1034*** (0.0234) | -0.0459*** (0.0141) | 0.0469*** (0.0168) | 0.0231** (0.0108) |
| Electricity and gas S.E. | 0.0112** (0.0053) | 0.0036 (0.0040) | 0.0140*** (0.0039) | 0.0076*** (0.0028) | -0.0639*** (0.0072) | -0.0231*** (0.0050) | 0.0401*** (0.0055) | 0.0206*** (0.0039) |
| Water and sewage S.E. | 0.0011 (0.0052) | 0.0004 (0.0034) | 0.0141*** (0.0041) | 0.0035 (0.0026) | -0.0276*** (0.0072) | -0.0048 (0.0046) | 0.0253*** (0.0059) | 0.0086** (0.0037) |
| Transport S.E. | 0.0252*** (0.0077) | 0.0125*** (0.0048) | 0.0115** (0.0058) | 0.0068* (0.0035) | -0.0526*** (0.0101) | -0.0220*** (0.0062) | 0.0212*** (0.0081) | 0.0137*** (0.0050) |
| Constant S.E. | -0.0447*** (0.0052) | -0.0413*** (0.0049) | -0.0234*** (0.0040) | -0.0219*** (0.0038) | 0.1182*** (0.0105) | 0.0978*** (0.0094) | -0.0500*** (0.0064) | -0.0408*** (0.0060) |
| Observations | 27,941 | 27,941 | 30,088 | 30,088 | 24,751 | 24,751 | 24,635 | 24,635 |
| R-squared | 0.0927 | 0.0912 | 0.0210 | 0.0193 | 0.1597 | 0.1401 | 0.0774 | 0.0692 |
| Number of firms | 4,582 | 4,582 | 4,874 | 4,874 | 3,778 | 3,778 | 4,087 | 4,087 |

Notes: FE – Fixed Effect. Clustered at the country level and time dummies are included in first stage regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Observation period 2002-2016. Financial benchmarks are included in IMF Program observations but excluded from non-financial governance SBs.

Table 12. Targeted Sectoral Reforms – Electricity SOEs and Reforms in the Electricity Sector

| | ROE | | | Operating profit per sales | | | Labor cost per operating revenue | | | Sales per employee | | |
|---|-------------------|-------------------|-------------------|----------------------------|----------------------|----------------------|----------------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Dependent variable | 1st Step D.ROE | 2nd Step D.ROE | 2nd Step D.ROE | 1st Step D.Profit | 2nd Step D.Profit | 2nd Step D.Profit | 1st Step D.Cost | 2nd Step D.Cost | 2nd Step D.Cost | 1st Step D.Sales | 2nd Step D.Sales | 2nd Step D.Sales |
| GDP growth | 0.0087 | | | 0.1107 | | | -0.0023 | | | -0.0307 | | |
| S.E. | (0.0642) | | | (0.0773) | | | (0.0446) | | | (0.0559) | | |
| Terms of trade (percent change) | -0.0001 | | | -0.0003 | | | 0.0001 | | | -0.0000 | | |
| S.E. | (0.0003) | | | (0.0002) | | | (0.0003) | | | (0.0002) | | |
| USD nominal exchange rate (change) | 0.0000 | | | 0.0000 | | | -0.0001 | | | -0.0017*** | | |
| S.E. | (0.0001) | | | (0.0000) | | | (0.0000) | | | (0.0001) | | |
| Public investment growth | 0.0108** | | | -0.0179** | | | -0.0074** | | | 0.0071** | | |
| S.E. | (0.0042) | | | (0.0068) | | | (0.0028) | | | (0.0035) | | |
| Inflation (period average, change) | 0.0496*** | | | -0.0142 | | | -0.0199*** | | | 0.0125 | | |
| S.E. | (0.0164) | | | (0.0165) | | | (0.0068) | | | (0.0164) | | |
| Lagged change in unemployment rate | -0.0013 | | | 0.0006 | | | -0.0001 | | | 0.0000 | | |
| S.E. | (0.0008) | | | (0.0009) | | | (0.0005) | | | (0.0009) | | |
| Change in oil price | 0.0007 | | | -0.0011 | | | -0.0003 | | | 0.0014 | | |
| S.E. | (0.0008) | | | (0.0011) | | | (0.0002) | | | (0.0014) | | |
| Sales | 0.0451*** | | | | | | -0.0624*** | | | | | |
| S.E. | (0.0063) | | | | | | (0.0071) | | | | | |
| Total assets | -0.0215*** | | | 0.0174* | | | 0.0108 | | | 0.0551*** | | |
| S.E. | (0.0067) | | | (0.0100) | | | (0.0072) | | | (0.0178) | | |
| Liquidity: current ratio | 0.0007** | | | 0.0009 | | | 0.0001 | | | 0.0002 | | |
| S.E. | (0.0003) | | | (0.0008) | | | (0.0002) | | | (0.0006) | | |
| Leverage: long-term debt-to-assets | -0.0137*** | | | 0.0073 | | | 0.0116* | | | -0.0061 | | |
| S.E. | (0.0046) | | | (0.0127) | | | (0.0063) | | | (0.0093) | | |
| D.GDP ppp per capita | | -0.3444*** | -0.3582*** | | -0.1964*** | -0.2354*** | | -0.3666** | -0.1538 | | -0.6117*** | -0.7363*** |
| S.E. | | (0.0598) | (0.0588) | | (0.0484) | (0.0476) | | (0.1528) | (0.1512) | | (0.1142) | (0.1123) |
| IMF program with any SOE conditionality | | 0.0138** | | | 0.0337*** | | | -0.0833*** | | | 0.0889*** | |
| S.E. | | (0.0069) | | | (0.0050) | | | (0.0109) | | | (0.0117) | |
| # Electricity and gas governance SBs | | | 0.0046* | | | 0.0117*** | | | -0.0199*** | | | 0.0268*** |
| S.E. | | | (0.0027) | | | (0.0019) | | | (0.0039) | | | (0.0043) |
| Constant | -0.0246 | 0.0100*** | 0.0107*** | -0.1082** | 0.0029 | 0.0048** | 0.1281*** | 0.0179*** | 0.0087* | -0.1382* | 0.0095* | 0.0164*** |
| S.E. | (0.0505) | (0.0026) | (0.0026) | (0.0495) | (0.0020) | (0.0019) | (0.0273) | (0.0051) | (0.0049) | (0.0718) | (0.0050) | (0.0048) |
| Observations | 12,383 | 12,383 | 12,383 | 13,352 | 13,352 | 13,352 | 10,297 | 10,297 | 10,297 | 11,027 | 11,027 | 11,027 |
| R-squared | 0.0130 | 0.0208 | 0.0203 | 0.0047 | 0.0333 | 0.0309 | 0.0906 | 0.0371 | 0.0167 | 0.0143 | 0.0576 | 0.0480 |
| Number of firms | 2,094 | 2,094 | 2,094 | 2,223 | 2,223 | 2,223 | 1,543 | 1,543 | 1,543 | 1,818 | 1,818 | 1,818 |

Notes: FE – Fixed Effect. Clustered at the country level and time dummies are included in first stage regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Observation period 2002-2016. Financial benchmarks are included in IMF Program observations. Electricity and gas-specific SBs include SBs on general utilities and structural SBs (SBs governing the entire SOE sector).

Table 13. Targeted Sectoral Reforms – Water SOEs and Reforms in the Water Sector

| | ROE | | | Operating profit per sales | | | Labor cost per operating revenue | | | Sales per employee | | |
|--|-------------------|-------------------|-------------------|----------------------------|----------------------|----------------------|----------------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Dependent variable | 1st Step D.ROE | 2nd Step D.ROE | 2nd Step D.ROE | 1st Step D.Profit | 2nd Step D.Profit | 2nd Step D.Profit | 1st Step D.Cost | 2nd Step D.Cost | 2nd Step D.Cost | 1st Step D.Sales | 2nd Step D.Sales | 2nd Step D.Sales |
| GDP growth | -0.0803 | | | -0.0530 | | | 0.0189 | | | -0.0023 | | |
| S.E. | (0.0503) | | | (0.0878) | | | (0.0290) | | | (0.0558) | | |
| Terms of trade (percent change) | -0.0001 | | | 0.0003 | | | 0.0005** | | | -0.0002 | | |
| S.E. | (0.0005) | | | (0.0005) | | | (0.0002) | | | (0.0005) | | |
| USD nominal exchange rate (change) | -0.0000 | | | 0.0000*** | | | 0.0010*** | | | -0.0000* | | |
| S.E. | (0.0000) | | | (0.0000) | | | (0.0003) | | | (0.0000) | | |
| Public investment growth | 0.0075 | | | 0.0030 | | | -0.0084** | | | 0.0021 | | |
| S.E. | (0.0048) | | | (0.0045) | | | (0.0031) | | | (0.0016) | | |
| Inflation (period average, change) | -0.0277*** | | | -0.0140 | | | 0.0414*** | | | -0.0055 | | |
| S.E. | (0.0088) | | | (0.0176) | | | (0.0085) | | | (0.0075) | | |
| Lagged change in unemployment rate | -0.0013*** | | | 0.0002 | | | 0.0004 | | | -0.0009* | | |
| S.E. | (0.0005) | | | (0.0016) | | | (0.0006) | | | (0.0005) | | |
| Change in oil price | 0.0015 | | | 0.0015 | | | -0.0011** | | | -0.0003 | | |
| S.E. | (0.0031) | | | (0.0021) | | | (0.0004) | | | (0.0004) | | |
| Sales | 0.0333*** | | | | | | -0.0282* | | | | | |
| S.E. | (0.0070) | | | | | | (0.0153) | | | | | |
| Total assets | -0.0024 | | | 0.0088 | | | -0.0072* | | | 0.0066 | | |
| S.E. | (0.0043) | | | (0.0100) | | | (0.0041) | | | (0.0050) | | |
| Liquidity: current ratio | 0.0015*** | | | 0.0002 | | | 0.0002 | | | 0.0012 | | |
| S.E. | (0.0003) | | | (0.0005) | | | (0.0004) | | | (0.0014) | | |
| Leverage: long-term debt-to-assets | 0.0051 | | | -0.0246 | | | -0.0311** | | | -0.0139 | | |
| S.E. | (0.0256) | | | (0.0817) | | | (0.0149) | | | (0.0086) | | |
| D.GDP ppp per capita | | 0.1744*** | 0.0607 | | -0.0027 | -0.0721* | | -0.4227*** | -0.2114*** | | -0.0308 | -0.0659*** |
| S.E. | | (0.0673) | (0.0615) | | (0.0436) | (0.0400) | | (0.0835) | (0.0771) | | (0.0265) | (0.0248) |
| IMF program with any SOE conditionality | | 0.0170*** | | | 0.0130*** | | | -0.0318*** | | | 0.0071*** | |
| S.E. | | (0.0050) | | | (0.0032) | | | (0.0057) | | | (0.0019) | |
| # Water governance SBs | | | -0.0040 | | | 0.0025 | | | 0.0058 | | | 0.0017 |
| S.E. | | | (0.0037) | | | (0.0024) | | | (0.0042) | | | (0.0014) |
| Constant | 0.0220 | -0.0090*** | -0.0014 | 0.0535 | -0.0022 | 0.0021 | 0.0095 | 0.0197*** | 0.0059* | -0.0320 | -0.0007 | 0.0016 |
| S.E. | (0.1311) | (0.0031) | (0.0027) | (0.1067) | (0.0020) | (0.0017) | (0.0297) | (0.0037) | (0.0032) | (0.0214) | (0.0012) | (0.0010) |
| Observations | 8,146 | 8,146 | 8,146 | 8,262 | 8,262 | 8,262 | 7,276 | 7,276 | 7,276 | 6,385 | 6,385 | 6,385 |
| R-squared | 0.0098 | 0.0107 | 0.0022 | 0.0037 | 0.0163 | 0.0041 | 0.0264 | 0.0361 | 0.0098 | 0.0072 | 0.0217 | 0.0092 |
| Number of firms | 1,205 | 1,205 | 1,205 | 1,219 | 1,219 | 1,219 | 1,071 | 1,071 | 1,071 | 991 | 991 | 991 |

Notes: FE – Fixed Effect. Clustered at the country level and time dummies are included in first stage regressions. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Observation period 2002-2016. Financial benchmarks are included in IMF Program observations. Water-specific SBs include SBs on general utilities and structural SBs (SBs governing the entire SOE sector).