

Online Annex 3.1. China: State-Owned Enterprises Remain Key Players

State-owned enterprises have been an integral component in China's economic model. Previous reforms to SOEs beginning in the late 1990s, along with other market-oriented reforms and the accession to the World Trade Organization, have brought economic transformation and two decades of high growth. The state reduced the role of SOEs and gave more space to market activity and private firms, contributing to more efficient resource allocation and substantial productivity gains during 2002–12 (Hsieh and Song 2015). As a result, the SOE share of total urban employment declined from 38 percent to less than 18 percent during 1999–2012, and another 4 percentage points from 2012–17. SOE assets as a ratio of GDP, however, have rapidly expanded since 2012, reversing the previous decline during the 2000s (Online Annex Figure 3.1.1). While China has continued to grow remarkably after 2012, some argue that the strong growth occurred despite, rather than because of, a resurgence of SOEs (Lardy 2019), or because of a substantial credit expansion in recent years (Bai and others 2016).

SOEs continue to play a significant role in the Chinese economy and have recently expanded globally:

- At US\$26 trillion in total assets in 2018 (equivalent to one third of global GDP or over 200 percent of China's GDP), China's nonfinancial SOEs were one of the largest globally, spreading across nearly 190,000 nonfinancial SOEs at central and local government levels. Similar to other countries, SOEs in China operate in energy, utilities, and transportation. A difference, however, is that more than half of China's nonfinancial SOEs (by assets) operate in the services sector, including real estate, telecommunications, and social services (Online Annex Figure 3.1.2). Nonfinancial SOEs accounted for an increasing share (more than two-thirds in 2018) of nonfinancial corporate credit over the last decade. Their market power, measured by the Herfindahl-Hirschman index on a consolidated basis, rose in many capital-intensive industries during the early 2010s (Hubbard 2015; Bai, Miao, and Zhang 2014; Online Annex Figure 3.1.3). SOEs also remain a key driver of domestic investment, supporting over three-quarters of infrastructure and half of coal and petroleum investment.
- Globally, there are about 20 Chinese SOEs in the top 100 largest global firms by revenues today compared to less than a handful in 2008.

Nonfinancial SOEs underperform relative to private firms on average, indicating resource misallocation and likely constraining growth. Studies find that nonfinancial SOEs have weaker profitability, lower productivity, and higher leverage than private firms (Hsieh and Song 2015 and Lam and Schipke 2017 Online Annex Figures 3.1.4). The difference in returns on assets between SOEs and private firms was large at 7½ percentage points during 2010–17, despite narrowing recently due to a deterioration in returns among private firms rather than a large improvement in SOEs. Although profitability improved for those partially privatized SOEs that introduced private shareholders, both partially privatized SOEs and fully state-owned SOEs still tend to underperform in terms of profitability relative to private firms (Harrison and others 2019). Firm-level data show that total factor productivity of industrial SOEs was about 15 percent lower than that of private firms during 1998–2013, after controlling for sectors and firm characteristics (Alvarez and others, forthcoming). The productivity differentials between SOEs and private firms are observed among all sectors. About one-quarter (by assets) or over a third (by number) of SOEs incur losses, many of which are nonviable and face persistent losses.

The government relies on SOEs as a policy lever to stabilize the economy during downturns in order to smooth the impact on employment and investment. Moreover, SOEs contribute to national development goals and provide public goods (infrastructure) and social services (e.g., local healthcare and pensions). Without clear, adequate compensation for carrying out those social services, SOEs are often compensated through derogations from obligations such as local fees and permits. Many SOEs face

persistent losses (accounting for about 10 percent of total corporate debt in 2017) but have not exited their markets owing to implicit guarantees, favorable regulatory treatment, connections with government officials, and possibly cross-subsidization by profit-making SOEs under a complex institutional structure.

If government support goes beyond compensating SOEs for carrying out non-economic mandates, it could also have implications for domestic and cross-border competition. Direct subsidies have been gradually reduced (to 0.1 percent of GDP in 2017 for listed companies). At the same time, SOEs benefit from preferential access to finance, land use at below-market cost, and sector-specific incentives (Bai and others 2014; IMF 2017). One evidence on the implicit guarantees that SOEs may benefit from is the lower borrowing costs that they face relative to private enterprises that are not justified by differences in other firm characteristics (Online Annex Figure 3.1.5; Maliszewski and others 2016). SOEs also tend to receive higher credit ratings and their borrowings are less sensitive to financing conditions than comparable private firms after controlling for firms' leverage, profitability and size. Moreover, outright defaults of SOE bonds remain rare (0.1 percent of total bond outstanding in 2018, compared with 1.4 percent for private firms).

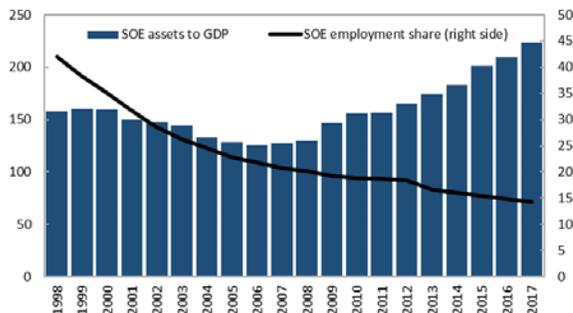
SOEs have other linkages to public finances that could pose fiscal risks.

- SOEs' financial performance is related to inter-governmental fiscal imbalances: provinces with less profitable SOEs tend to have higher revenue-spending imbalances (Online Annex Figure 3.1.6). SOEs are major contributors to fiscal revenues through taxes (accounting for one-third of total tax revenue of the general government) and dividends. When year-on-year growth of tax revenues falls in times of slowing economic growth, growth in nontax revenues (partly in the form of fees and dividends from SOEs) tends to rise, thereby mitigating a deterioration of local public finances. If SOE profits deteriorate, SOE transfers of dividends and fees may not be forthcoming.
- The eventual exit of nonviable SOEs or the debt restructuring of underperforming SOEs will likely entail fiscal costs to cover losses and to mitigate the adverse impact on local employment and output.
- Tackling the low efficiency in SOEs and managing fiscal risks arising from close linkages between SOEs and government is crucial. The announced SOE reforms since 2013 aim to better delineate the commercial and social functions of SOEs, achieve competitive neutrality, and contain the risks from rising corporate leverage (including through debt-equity swaps and restructuring of highly indebted SOEs). Although the aggregate SOE leverage ratio has stabilized recently, measures to date, such as pilots on mixed-ownership reforms and consolidation of SOEs through mergers and acquisitions, have not significantly improved SOE efficiency and corporate governance (Rosen and others 2019; IMF 2017). Achieving tangible progress toward competitive neutrality and sound corporate governance can boost SOE efficiency and improve resource allocation. This will benefit China as well as the global economy.

Online Annex Figure 3.1.1. SOE Assets and Share of Total Urban Employment

(Percent of GDP (LHS); Percent of Total Urban Employment)

The SOE presence in China remains large.

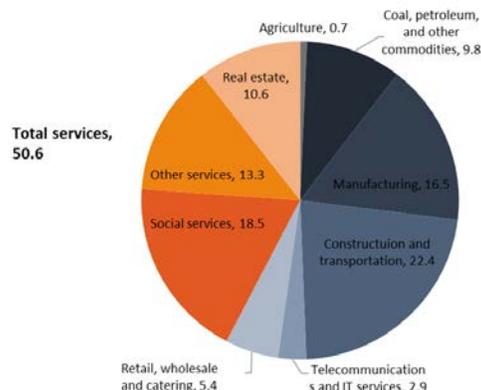


Sources: China Statistical Yearbook and Public Finance Yearbook 2017.

Online Annex Figure 3.1.2. Sectoral Decomposition of Nonfinancial SOEs

(Percent, by SOE assets in 2017)

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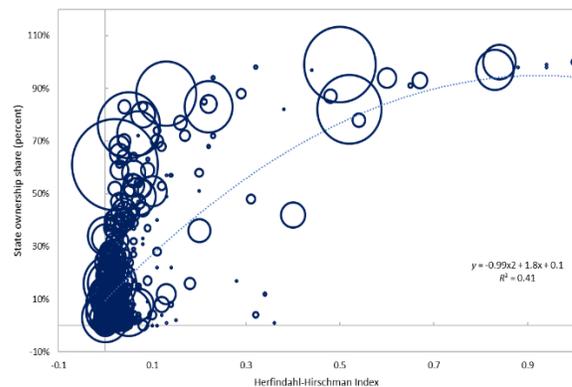


Source: China Public Finance Yearbook 2018.

Online Annex Figure 3.1.3 Market Concentration across Industries

(Percent)

Industries with higher state share tend to have greater market power.

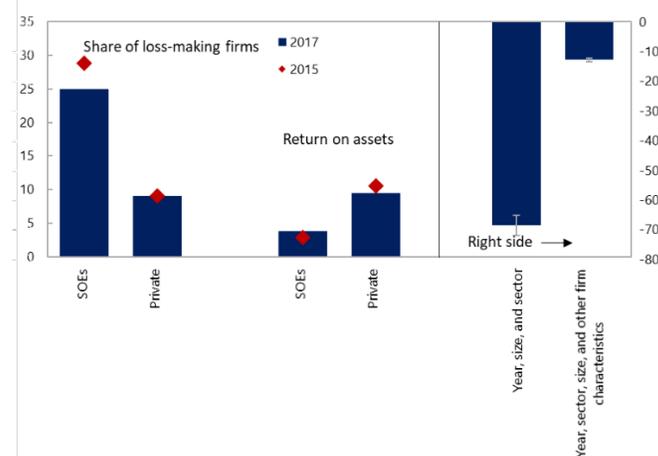


Sources: Hubbard 2015 and IMF staff calculations.
 Note: Bubbles indicate SOE sale revenues in the industry. The Herfindahl-Hirschman Index (HHI) is a measure of market concentration. The index is calculated by summing the square of the market share of each firm competing in a market. A lower index number indicates the market is more competitive, while a higher index indicates a more concentrated market (that is, firms are more monopolistic).

Online Annex Figure 3.1.4. Comparison of State-Owned and Private Enterprises

(Percent (LHS); Percent in deviation)

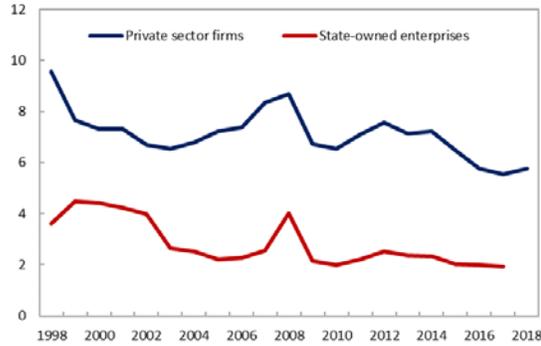
SOEs are less efficient than private firms in profitability and productivity, controlling for industries and firm characteristics.



Source: Alvarez, Chen, and Li (forthcoming).
 Note: Dots indicate data for 2015 and bars indicate data for 2017. The bars on the right indicate estimated coefficients of productivity differentials and the intervals show one standard deviation of the panel regression results.

Online Annex Figure 3.1.5. Interest Rates: State-Owned Enterprises and Private Firms
(Percent)

SOEs tend to face lower borrowing costs, partly reflecting the implicit government guarantees

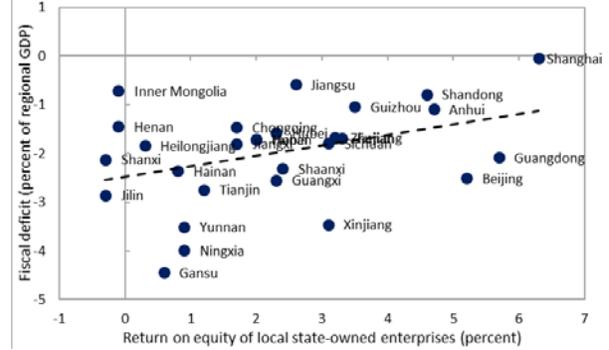


Sources: CEIC, China Public Finance Yearbook, and IMF staff estimates.

Note: For the interest cost chart, the private sector rate is the average borrowing rates estimated based on official monthly data on the benchmark lending rate and the share of corporates that borrows above it. The SOE interest bill cost is an effective interest rate calculated based on annual data on interest coverage ratio, operating profits, and the short-term and long-term debt level. The aggregate levels in the chart are consistent with the averages obtained from empirical studies using firm-level data.

Online Annex Figure 3.1.6. Fiscal deficit and SOE Profitability at Local Levels
(Percent)

Regions with less profitable SOEs tend to have higher fiscal imbalances.



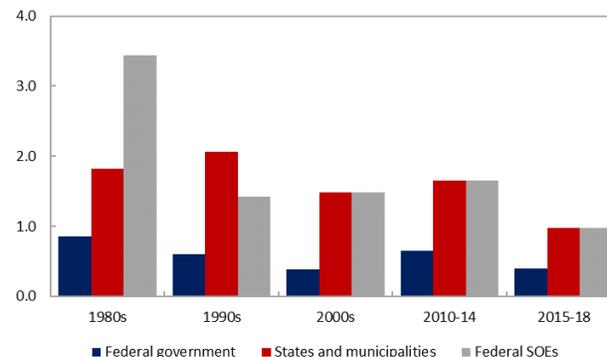
Sources: CEIC and Lam and Moreno-Badia (forthcoming).

Online Annex 3.2. Brazil: A Complex and, at Times, Turbulent Relationship between SOEs and the Government

The economic weight of state-owned enterprises has varied significantly in Brazil’s history reflecting changing views of the role of the state and fiscal pressures. The number and importance of SOEs expanded between 1930s and 1970s reflecting the heavy intervention of the state in the economy. The economic and fiscal crises of the 1980s led to a reversion of the importance of SOEs and opening of sectors that were state monopolies to private initiative (e.g. oil, telecommunications). A privatization process ensued in the 1990s was linked to both broader market-oriented reforms and a weak fiscal position. In some cases, the government opted for bringing in minority shareholders. Even so, state-owned enterprises remain an important tool for the government; for example, they represent around 40 percent of public investment (Online Annex Figure 3.2.1). Beginning in 2019, the federal government has initiated a renewed process of sales of assets and privatizations.

State ownership runs the gamut from wholly state-owned firms to entities in which the government holds indirectly (through SOEs) a share in a private-owned firm. The federal government is a shareholder in 637 companies, including the largest non-financial companies and banks in the country and some that operate internationally. At the federal level, there are 203 SOEs and the majority are subsidiaries of the two largest SOEs.¹ The government has direct control over 46 companies several of them conglomerates. For example, the Eletrobras group (power) has 71 subsidiaries and the Petrobras group (oil and gas) has 52.² The federal government has influence in several other companies, which are not classified as SOEs, through its public banks. For example, the government development bank (BNDES) has shares in 102 companies. Some are SOEs, such as Petrobras and Eletrobras, but others are private companies, including previously privatized companies such as Vale

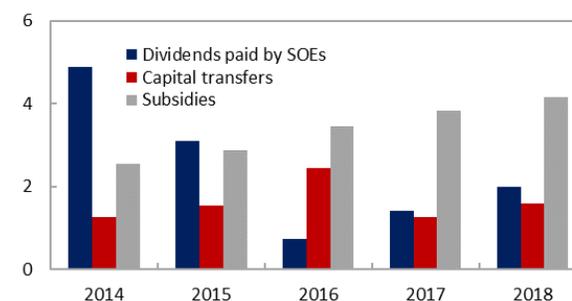
Online Annex Figure 3.2.1. Federal SOEs’ Share of Public Investment
(Yearly average; share of GDP)



Source: Fundação Getúlio Vargas

Note: The data does not include information on investment done by SOEs at state and municipal levels.

Online Annex Figure 3.2.2. Relations Between Federal SOEs and Government
(Billion \$ US)



Source: Brazilian National Treasury

¹ These statements are based on the report by the Ministry of Economy (Boletim de Empresas Estatais federais) issued in the third quarter of 2019.

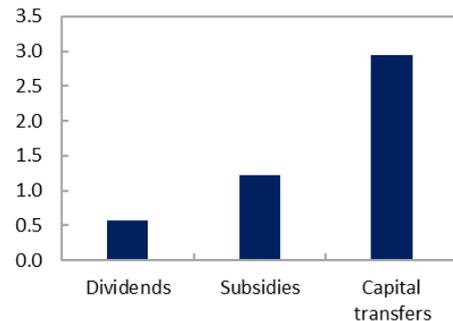
² Among the federal SOEs, 18 are classified as dependents—they rely on the government to cover most of their operational costs (more than 90 percent on average) and as such are included in the federal government budget.

(mining) and Embraer (aviation). At the subnational (state) level, there are 258 SOEs.³ Most are in the sectors of research and development, sanitation, and banking.

The contribution of SOEs to the federal budget has become increasingly negative in recent years, reflecting materialization of fiscal risks. The federal government has provided significant support to dependent companies (subsidies to cover recurrent expenses) and large capital transfers to other SOEs (Online Annex Figure 3.2.2)—partly as response to a deterioration in the finances of some large companies (e.g. Eletrobras). In addition, the government had to manage large volatility in dividends, which were significantly higher in the past, but have declined sharply in recent years. At the states level, almost a third of SOEs had losses (and some did not report). In 2018, state governments transferred US\$2.9 billion in capital transfers and an additional US\$1.2 billion in subsidies (Online Annex Figure 3.2.3).⁴

Online Annex Figure 3.2.3. Relations Between State-Level Governments and Their SOEs

(Billion \$ US, 2018)



Source: Brazilian National Treasury.

Another potential source of macroeconomic and fiscal risks is the complex network of links between non-financial SOEs, public banks, and subnational governments. Some of the largest SOEs accumulated significant debt in past years, partly by borrowing from public banks. Any distress in these companies could put pressure on the public banks, which in turn could affect their ability to provide credit to the rest of the economy and require financial support from the federal government. In addition, some subnational governments received significant loans from public banks and also depend on oil royalties from Petrobras.

Some of the problems with SOEs reflected lack of clarity on policy mandates and weaknesses in governance. In some respects, Brazil has a high degree of transparency regarding its SOEs. It publishes reports on their financial performance and main relationships between SOEs and government. However, the experience of past years has highlighted significant weaknesses:

- **Lack of mandate clarity.** In most cases, SOEs policy mandates are vague and the cost unknown. For example, the audit agency (TCU 2018) found that the government had set no objectives or targets for Petrobras. This is also the case among public banks, where the information on the mandates and total cost remains limited (although some programs are explicitly on the subsidized rates). This prevents an evaluation of the performance of SOEs, relative to their policy mandates, with adverse effects for accountability.
- **Governance shortfalls.** Governance weaknesses led to widespread corruption involving the two largest non-financial SOEs (Petrobras and Eletrobras). This has contributed to the recent decline in the contribution of non-financial SOEs to public investment (Online Annex Figure 3.2.1).

Government interference in public banks has also raised concerns given the lack of transparency. For example, the use of the development bank (BNDES) during the global financial crises and subsequent years raised several issues. During the crisis, BNDES increased substantially credit in response to help stabilize the economy. However, the operation raised concerns because the bulk of the subsidized credit

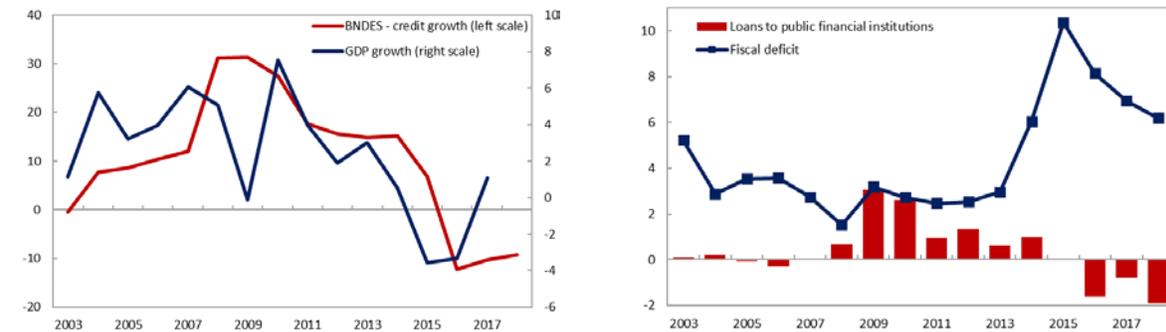
³ This estimate is based on the Brazilian National Treasury (2019). Some estimates put the number of SOEs at the state level at around 300 and at the local level at about 60.

⁴ This is based on the companies that provided data on these variables (slightly more than half)

benefitted mainly large firms and not the ones that faced greater credit constraints (World Bank 2013). BNDES continued to expand credit at a large pace during the strong post-crisis recovery. However, during the recession of 2014–16, public deficits and debt led the government to reduce its support to public banks. As a result, BNDES in turn had to curtail its own lending—sharply and procyclically (Online Annex Figure 3.2.4). There are also concerns that public banks may have extended loans under political pressures and not necessarily to achieve their policy mandates (Lazzarini and others 2011). In addition, nontransparent transactions between the government and public banks contributed to hide a deterioration of the fiscal accounts in the past.

Online Annex Figure 3.2.4. BNDES Credit and Brazil's Public Finances

- 1. BNDES credit growth declined sharply during the recent recession in 2014–16
- 2. As excessive fiscal deficits crowded out policy lending to public banks.

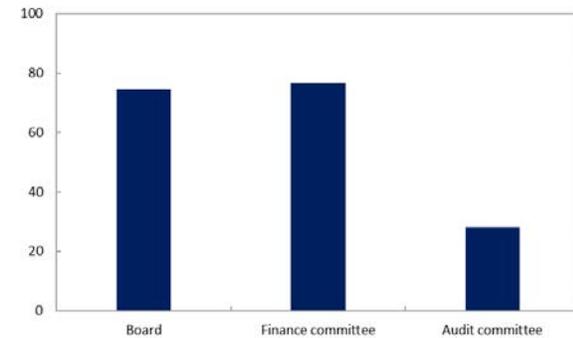


Source: BNDES, Brazilian Central Bank, and IMF staff estimates.

Brazil has undertaken several reforms over the last few years, partly as a response to the “Car wash” corruption scandal, that represent a step forward to promote greater governance. A new law for SOEs was passed in 2016 with a special focus to strengthen corporate governance—including requiring qualified board members and management, heighten internal controls, and enhanced protection of minority shareholders—and procurement processes. The federal government has also improved the reporting on the state of SOEs, including on the relationship with public banks. Still, further reforms would be beneficial. The lack of clarity on public mandates and a clear accountability framework (e.g. clear benchmarks) remains a significant weakness. In addition, more needs to be done to improve corporate governance, especially at the subnational level (Online Annex Figure 3.2.5).

Online Annex Figure 3.2.5. Governance Structure of State-Level SOEs

(Share of firms with indicated unit)



Source: Brazil National Treasury.

Online Annex 3.3. Public Banks: Revisiting Their Role and Financial Performance¹¹

This annex provides information on the data sources and empirical methodologies used in Chapter 2 to assess the stabilization role, sovereign bond holdings, and financial performance of public banks in the decades before and after the global financial crisis. It also includes a summary of the results and robustness checks of the analyses.

Data Sources and Definitions

The analyses mainly rely on cross-country bank-level data from Fitch Connect, which provides comprehensive information on bank balance sheets and income statements for the past 30+ years. The empirical analyses focus on 1999–2018, when data coverage is better, or, in some cases, after the global financial crisis (2010–18). Fitch Connect also provides data on (1) the sector specialization of banks, which makes it possible to differentiate between commercial and development banks, and (2) the shareholders of banks, including whether a bank is public or private.²²

Public banks are identified as those reported as “government sponsored entities” or “public entities” in the dataset, or those with state ownership share of over 25 percent.³ “Local and regional governments” providing banking services are excluded from the analysis as they are part of the general government, not state-owned banks or enterprises. National development banks, the majority of which do not have ownership data, are identified as public banks, as governments often have substantial influence on their operations and funding (for example, in the Philippines, see Aldaba 2011).

The sample is restricted to banks with total assets over USD 5 billion to avoid skewing the results by the large number of small banks in the dataset. Only the latest data from the original financial statements covering a 12-month period and reported at the end of the year are used. Nonconsolidated data are used when available, and consolidated data otherwise. Banks without at least two years of consecutive data are dropped from the analysis. After cleaning the data and eliminating the outliers, the sample contains more than 4,000 (3,000) banks from 45 advanced and 80 (75) developing economies for 1999–2018 (2010–18), of which around 7 (8.5) percent are public.⁴

Online Annex Table 3.3.1 reports descriptive statistics for the banks in our sample. For example, public banks tend to have more assets than private banks, especially in advanced economies, and tend to hold more government securities as a share of assets in developing economies.³⁵ They also have higher

¹ This annex is based on the forthcoming IMF working paper by Elif Türe.

² A caveat is that Fitch Connect provides shareholder data only for the latest year, precluding identification of the changes in bank ownership over time, for instance, from nationalizations or privatizations. IMF 2019 shows state ownership remained largely stable in the Central, Eastern, and Southeastern European economies during 2006–16 with only a few exceptions.

³ A public bank is often defined in the literature as (1) more than 20–25 percent government owned (La Porta and others 2002; Dinc 2005; Cornett and others 2009; Frigerio and Vandone 2018), which is seen as sufficient to control a company, or (2) more than 50 percent (majority) government owned (Brei and Schclarek 2013; Cull and others 2013; Bertay and others 2015). The former assumption allows for sufficient data to separately analyze the behavior of public commercial versus development banks in advanced versus emerging market economies.

⁴ Data cleaning includes eliminating banks with total equity or total employees less than zero, limiting relevant financial ratios (for example, deposits over total liabilities) to range between 0% and 100%, limiting financial returns (for example, return on average assets) to range between -100% and 100%, and limiting remaining financial indicators (for example, growth of net loans) to within the 1st and 99th percentiles of their distribution.

⁵ Another caveat is that Fitch Connect does not report the nationality of the issuer of government securities held by banks, which prevents identification of domestic versus foreign government bond holdings. The presumption in the literature is that the bulk of the sovereign debt banks hold is domestic due to strong home bias. Fitch Connect data have been shown to closely follow the country-level data from the IMF on banks’ net claim on the government, the bank-level stress-test data from EBA on

nonperforming loan ratios on average, particularly in developing economies, and lower profitability (measured by the returns on average assets).

Online Annex Table 3.3.1. Descriptive Statistics of the Banks in the Sample
(Averages over time for the median bank)

Financial Indicators	1999–2018								2010–2018							
	Advanced Economies				Developing Economies				Advanced Economies				Developing Economies			
	Private		Public		Private		Public		Private		Public		Private		Public	
	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median	Count	Median
<i>Asset Size (billions of US\$)</i>																
Total Assets	2,930	11.3	146	31.8	823	10.1	139	13.3	2,122	12.8	133	37.0	730	11.3	134	16.2
<i>Loan Size and Quality (%)</i>																
Net Loans / Total Assets	2,847	63.0	146	65.0	816	52.0	137	57.9	2,045	63.1	132	65.6	724	53.3	133	60.4
Net Loan Growth	2,751	8.7	144	7.2	763	15.3	134	15.0	1,967	3.8	129	3.8	673	11.5	130	12.2
Nonperforming / Gross Loans	2,276	1.8	106	2.0	737	3.1	126	6.2	1,732	2.2	91	1.8	672	2.7	122	5.0
<i>Liquidity (%)</i>																
Liquid / Total Assets	2,922	11.0	146	14.1	823	18.7	139	14.2	2,117	10.7	133	14.2	730	17.2	134	14.0
<i>Capitalization (%)</i>																
Equity / Total Assets	2,930	7.1	146	5.6	823	9.2	139	8.8	2,122	7.7	133	6.3	730	9.4	134	8.5
<i>Funding (%)</i>																
Deposits / Total Liabilities	2,771	84.3	122	61.5	813	84.9	126	83.3	1,995	89.7	112	61.1	722	85.1	122	84.0
<i>Profitability (%)</i>																
Return on Average Assets	2,901	0.5	145	0.3	817	1.1	139	1.0	2,102	0.5	132	0.3	725	1.1	134	0.9
<i>Sovereign Exposure (%)</i>																
Govt Securities / Total Assets	2,151	4.9	109	4.6	720	9.5	119	15.5	1,748	6.0	95	5.9	672	9.8	116	15.1

Sources: Fitch Connect; and IMF Staff estimates.

The country-level macro-fiscal data (GDP growth, public debt and so on) are from the IMF’s World Economic Outlook database, and the data on financial development are from the IMF’s Financial Development database.⁴ The data on sovereign bond spreads come from Bloomberg and the data on financial crises (including systemic banking, currency, and debt) come from Laeven and Valencia (2018).

Methodology and Results

A panel fixed effects model is used to estimate (1) bank lending behavior over the cycle and (2) bank holdings of government debt.⁵ This wipes out bank level fixed effects in the data, along with country level fixed effects (such as the level of development and the quality of institutions) as the host country of a bank is also fixed over time. Each model is estimated with robust standard errors.

Economies with general government debt levels higher than the 75th percentile of the distribution are identified as “high public debt” in exercises testing whether the cyclicality of bank lending or the holdings of government debt differ in countries with high public debt levels. The 75th percentile of the distribution roughly corresponds to a general government debt level of 100 percent of GDP for advanced and 60 percent of GDP for developing economies in our sample.

Equation (3.3.1) presents the baseline empirical model used to estimate the impact of bank ownership on bank lending over the cycle, in economies with high versus low public debt levels:

$$\Delta Net Loans_{i,t,j} = Cycle_{i,t} + Public Bank_{i,j} * Cycle_{i,t} + High Public Debt_{i,t} + Public Bank_{i,j} * Cycle_{i,t} * High Public Debt_{i,t} + Financial Development_{i,t-1} +$$

a subset of European countries, and from the Central Bank of Argentina on a subset of Argentine banks (see, for instance, Gennaioli and others 2018), validating the use of the Fitch Connect data as a proxy for domestic government bond holdings.

⁴The financial development index developed by IMF Staff summarizes how developed financial institutions and markets are in terms of their size, liquidity, access, and cost efficiency.

⁵ The Hausman test specifies that a fixed effects model is appropriate in both cases.

$$\Delta \text{Net Loans}_{i,t-1,j} + \text{Bank Controls}_{i,t-1,j} + \text{Bank Fixed Effects}_j + \text{Year Fixed Effects}_t + u_{i,t,j} \quad (3.3.1)$$

Accordingly, the growth rate of net loans in current US dollars in country i , year t , and bank j is set as the dependent variable, and the growth rate of GDP per capita relative to its average growth rate in the past 20 years is set as the baseline cyclical indicator. The model controls for the lagged values of the dependent variable (for persistency), the level of financial development, and various bank characteristics such as bank size (log of total assets), capitalization (equity over assets), liquidity (liquid over total assets), profitability (return on average assets), funding (deposits over liabilities), loan size (net loans over assets), and loan quality (non-performing loans over gross loans). Year fixed effects are also included.

Similarly, equation (2) below presents the baseline empirical model used to estimate the impact of bank ownership on holdings of government debt in economies with high versus low public debt levels:

$$\text{Govt Bonds}_{i,t,j} = \text{High Public Debt}_{i,t} + \text{Public Commercial Bank}_{i,j} * \text{High Public Debt}_{i,t} + \text{Fiscal Balance}_{i,t} + \text{Bond Spreads}_{i,t} + \text{Cycle}_{i,t} + \text{Crisis}_{i,t} + \text{Financial Development}_{i,t-1} + \text{Govt Bonds}_{i,t-1,j} + \text{Bank Controls}_{i,t-1,j} + \text{Bank Fixed Effects}_j + \text{Year Fixed Effects}_t + v_{i,t,j} \quad (3.3.2)$$

Accordingly, holdings of government securities as a share of assets in country i , year t , and bank j are set as the dependent variable, and a public commercial bank dummy is included to identify public bank holdings of government bonds in economies with high public debt (development banks are excluded from the analysis for comparability). The model controls for the supply of government securities (government net lending or borrowing—that is, fiscal balance—as a share of GDP), sovereign risk (spread over 10-year US bond yield), cyclical conditions (growth rate of GDP per capita), crises (systemic banking, currency, and debt), the lagged values of the dependent variable, central bank exposure (central bank deposits over assets), and the rest of the bank controls included in model (3.5.1), as well as the level of financial development. Year fixed effects are also included.

A panel random effects model, presented in equation (3.3.3), is instead used to estimate the financial performance of commercial banks, which enables us to identify the impact of being a public versus private bank (a fixed variable) on performance:

$$\text{Performance}_{i,t,j} = \text{Public Commercial Bank}_{i,j} + \text{Public Development Bank}_{i,j} + \text{Cycle}_{i,t-1} + \text{Financial Development}_{i,t-1} + \text{Performance}_{i,t-1,j} + \text{Govt Bonds}_{i,t-1,j} + \text{Bank Controls}_{i,t-1,j} + \text{Country Fixed Effects}_i + \text{Year Fixed Effects}_t + z_{i,t,j} \quad (3.3.3)$$

Bank profitability (return on average assets or net interest margin) and cost efficiency (operating cost to income ratio) in country i , year t , and bank j are set as dependent variables (performance indicators), and public commercial and development bank dummies are used to identify the performance differences among public versus private commercial banks. The model controls for the lagged dependent variables, lagged values of cyclical conditions (growth rate of GDP per capita), financial development index, sovereign debt holdings (government securities over assets), and the rest of the bank controls included in models (3.3.1) and (3.3.2), as well as country and year fixed effects.

Cyclicality of Lending by Public Banks

The empirical evidence suggests lending by public banks tend to be less procyclical than their private counterparts in developing economies, and even countercyclical in advanced economies.⁶ Our analysis confirms that lending by public banks has been less procyclical than private bank lending, but not in developing economies with high public debt levels. Online Annex Table 3.3.2 presents the estimation results from model (3.3.1). When growth rises relative to its trend, private banks increase lending procyclically in developing economies (coefficients for the “cycle” are positive and significant for developing economies), while keeping an acyclical lending behavior in advanced economies (coefficients for the “cycle” are small, negative, and insignificant for advanced economies). In contrast, public banks increase lending significantly less than private banks do, particularly in developing economies (coefficients for the interaction term “public bank * cycle” are negative in columns (1) to (2)). But averages mask heterogeneity. While lending by public banks is less procyclical than private bank lending in economies with low public debt (coefficients for the interaction term “public bank * cycle” are negative in columns (3) to (8)), this is not the case for lending by public banks in economies with high public debt, particularly in developing economies and outside of the GFC period (coefficients for the interaction term “public bank * cycle * high public debt” are positive in columns (5) to (8)).

In the decade after the global financial crisis (in columns (7) and (8)), for instance, the growth rate of private bank net lending increases by 2 (-0.4) percentage points in developing (advanced) economies in response to a 1 percentage point increase in the growth rate of GDP per capita relative to its trend. Public banks’ net lending, on the other hand, grows 1.5 (3.8) percentage points less in developing (advanced) economies with low public debt levels in this period, resulting in less procyclical (or countercyclical) lending by public banks in developing (advanced) economies with low public debt levels. When public debt is high, however, public bank net lending grows 2.5 (2.7) percentage points more in developing (advanced) economies compared to when public debt is low, pointing to a more procyclical public bank lending behavior in economies with high public debt, although the difference is statistically significant only for developing economies. Figure 3.12 in the main text summarizes the above findings.

The control variables in model (3.3.1) also affect bank lending behavior in expected directions, supporting the validity of the model specification. Net lending tends to grow faster in developing economies with higher levels of financial development and in banks with (1) lower lending size in the previous period, reflecting a base effect; (2) lower size (proxied by total assets), likely reflecting smaller banks taking on higher risk and expanding loans more aggressively; (3) higher capitalization rate, particularly in advanced economies, lower nonperforming loan ratios, and higher profitability, particularly in developing economies, reflecting financial health; (4) higher deposit funding ratios in developing economies, with banks in advanced economies likely having greater access to other funding sources; and (5) lower liquidity ratios in developing economies, with these banks expanding credit rather than holding more liquid assets.

As a robustness check, Online Annex Table 3.3.3 presents the estimation results using the growth rate of net loans in constant local currency terms as the dependent variable (instead of current US dollar terms). The main results for public bank lending behavior remain qualitatively unchanged. While lending by public banks in economies with low public debt are less procyclical than private bank lending (coefficients for the interaction term “public bank * cycle” are negative in columns (3) to (8)), this is not

⁶ See, for instance, Micco and Panizza 2006; Brei and Schclarek 2013; Cull and Martinez-Peria 2013; Bertay and others 2015; Allen and others 2017.

the case for lending by public banks in economies with high public debt, particularly in developing economies and before the global financial crisis (coefficients for the interaction term “public bank * cycle * high public debt” are positive in columns (5) to (8)). In the decade after the global financial crisis, however, the coefficients for developing economies (in column (8)) remain no longer statistically significant.

Various other robustness checks do not change the main results materially, thus are not reported here. These include: (1) dropping banks without eight years of consecutive (asset) data between 2005 and 2012 to make sure each bank was operational and had at least three years of data both before and after the global financial crisis, (2) relaxing the assumption that development banks are public banks, (3) identifying public banks as majority government owned (over 50 percent rather than over 25 percent), and (4) using the GDP per capita growth rate as the cyclical indicator (instead of the gap).

Public Commercial Bank Holdings of Government Debt

Public commercial banks are often “persuaded to” increase holdings of government securities. Ongena and others (2019), for instance, found that during the sovereign debt crisis in Europe, domestic—particularly state-owned—banks were more likely to increase government bond holdings in fiscally stressed economies; and this suggests a “moral suasion” mechanism, ruling out risk-return and regulatory considerations. Using a larger country sample, our analysis finds that public commercial banks tend to hold larger amounts of sovereign debt, particularly in developing economies with higher debt vulnerabilities.

Online Annex Table 3.3.4 presents the estimation results from model (3.3.2). Accordingly, public commercial banks in developing (advanced) economies with high public debt levels tend to hold 11.2 (1.2) percentage points more government bonds as a share of assets than the average bank in a low-debt economy, controlling for other factors that could affect government bond holdings, such as the supply of bonds (proxied by government net lending or borrowing) and their relative price (proxied by sovereign spreads). However, the estimate is significant only for developing economies. Figure 3.13 in the main text summarizes these findings.

To put the finding for developing economies into perspective, in Brazil and India, for instance, which are identified as economies with “high public debt” in the sample (general government debt over 60 percent of GDP), banking system assets amounted to around 100 and 70 percent of GDP in 2016, respectively.⁷ In turn, public banks held around 50 and 70 percent, respectively, of banking sector assets in these economies, amounting to about 50 percent of GDP in 2016 (World Bank, Bank Regulation and Supervision Survey 2019). Thus, our finding that public commercial banks in developing economies with high public debt levels hold 11.2 percentage points more government bonds as a share of assets would mean, for example, that public commercial banks hold 5.6 percent of GDP more government debt in Brazil and India compared to the average government bond holdings in developing economies with low public debt levels.

Financial Performance of Public Commercial Banks

The empirical evidence suggests that public commercial banks operating in developing economies tend to have lower profitability than that of private commercial banks, as well as lower interest margins, higher

⁷ The data on total assets held by deposit money banks as a share of GDP are retrieved from the Federal Reserve Economic Database.

overhead costs, and higher non-performing loans,⁸ although the latter would be expected given public banks' mandate of financing credit constrained (riskier) borrowers. No significant performance differences are found for public and private banks operating in advanced economies.⁹ Our analysis confirms these findings for the decade before the global financial crisis, but finds these performance differences to have narrowed for developing economies and widened for advanced economies in the decade after the global financial crisis.

Online Annex Table 3.3.5 shows that public commercial banks in developing economies had significantly lower returns on assets, lower net interest margins, and higher cost-to-income ratios between 1999 and 2007 than their private counterparts; but these differences were less (or no longer) significant between 2010 and 2018. However, public banks would have performed much weaker without the substantial state guarantees and subsidies they enjoy, which are not accounted for in the analysis. Indeed, the narrowing performance differences between public and private commercial banks in developing economies are mainly driven by a decline in private commercial bank profitability and cost efficiency, which likely reflects greater government support for public commercial banks in these economies. Conversely, public commercial banks in advanced economies were equally profitable and cost efficient as their private counterparts between 1999 and 2007; but their asset returns, and interest margins fell behind their private counterparts between 2010 and 2018. This is mainly driven by a decline in public commercial bank profitability in advanced economies, which likely reflects the ultra-loose monetary policy having a disproportionate effect on public commercial banks, as they tend to lend more locally than their private peers. Figure 3.2.1. in the main text summarizes these findings.

As a robustness check, Online Annex Table 3.3.6 presents the estimation results restricting the sample to those banks with at least eight years of consecutive (asset) data between 2005 and 2012 to make sure each bank was operational and had at least three years of data both before and after the global financial crisis. This addresses the survival bias that the results are driven by the weakest banks disappearing after the global financial crisis. The main results remain qualitatively unchanged. While differences in profitability (asset returns, interest margins, and operating costs) between public and private commercial banks have narrowed after the global financial crisis in developing economies, they have widened in advanced economies (in a favorable direction only for cost efficiency).

⁸ See for instance Iannotta and others 2007; Micco and others 2007; Berger and others 2009; Farazi and others 2013.

⁹ See for instance Altunbas and others 2001; Micco and others 2007.

Online Annex Table 3.3.2. Cyclical Behavior of Bank Lending before and after the Global Financial Crisis (in current US dollar terms)

Sample Period Country Group	1999-2018		1999-2018		1999-2007		2010-2018	
	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loan Growth								
GDP pc Growth Gap (Cycle)	-0.166 (0.202)	1.114*** (0.198)	-0.300 (0.196)	1.111*** (0.197)	-0.113 (0.434)	1.011** (0.465)	-0.416* (0.213)	1.978*** (0.384)
Public Bank * Cycle	-0.506 (0.529)	-1.088*** (0.312)	-0.686 (0.540)	-1.014*** (0.361)	-2.907* (1.486)	-3.813*** (1.188)	-3.780** (1.807)	-1.497* (0.806)
High Public Debt (HD)			0.0753*** (0.00952)	-0.0532* (0.0316)	-0.181*** (0.0382)	-0.125 (0.0989)	0.122*** (0.0127)	-0.0613* (0.0344)
Public Bank * Cycle * HD			0.704 (1.526)	-0.175 (0.572)	4.985 (4.074)	5.389*** (1.434)	2.678 (2.052)	2.530** (0.999)
Financial Development = L,	-0.0303 (0.0861)	0.434*** (0.117)	0.0304 (0.0864)	0.439*** (0.119)	-0.868*** (0.155)	1.314*** (0.358)	0.315** (0.155)	0.927*** (0.200)
Loan Growth = L,	0.0213 (0.0134)	0.0241 (0.0189)	0.0213 (0.0134)	0.0249 (0.0190)	0.0381* (0.0209)	0.0478 (0.0421)	-0.0353* (0.0188)	-0.00207 (0.0308)
Log of Total Assets = L,	-0.200*** (0.0115)	-0.189*** (0.0206)	-0.209*** (0.0116)	-0.191*** (0.0208)	-0.359*** (0.0272)	-0.242*** (0.0666)	-0.262*** (0.0208)	-0.250*** (0.0421)
Equity/ Total Assets = L,	0.381** (0.165)	-0.221 (0.223)	0.323* (0.167)	-0.211 (0.224)	0.375 (0.299)	0.0997 (0.610)	0.522* (0.288)	0.549 (0.375)
Liquid Assets/ Total Assets = L,	0.0663 (0.0563)	-0.227*** (0.0716)	0.0560 (0.0548)	-0.234*** (0.0719)	0.379*** (0.118)	-0.389* (0.197)	-0.00197 (0.0972)	-0.330*** (0.104)
Return on Average Assets = L,	0.474 (0.372)	1.431*** (0.484)	0.393 (0.368)	1.406*** (0.485)	0.765 (0.869)	0.439 (0.662)	-0.279 (0.367)	1.740** (0.755)
Deposits/ Total Liabilities = L,	-0.0193 (0.0325)	0.107** (0.0512)	-0.0612* (0.0339)	0.110** (0.0517)	-0.335*** (0.0999)	0.211 (0.164)	-0.0348 (0.0608)	0.0284 (0.0697)
Net Loans/ Total Assets = L,	-0.428*** (0.0521)	-0.722*** (0.0831)	-0.445*** (0.0508)	-0.736*** (0.0840)	-0.338*** (0.0974)	-0.953*** (0.266)	-0.665*** (0.0979)	-0.999*** (0.128)
Nonperforming/ Gross Loans = L,	-0.660*** (0.0874)	-0.524*** (0.122)	-0.667*** (0.0887)	-0.512*** (0.124)	-1.177*** (0.239)	-0.336 (0.266)	-0.379*** (0.134)	-0.282 (0.220)
Constant	0.888*** (0.0931)	0.739*** (0.0932)	0.895*** (0.0930)	0.762*** (0.0939)	2.207*** (0.195)	0.713*** (0.250)	0.957*** (0.177)	0.895*** (0.171)
Bank and Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,908	3,401	13,908	3,401	5,228	813	7,066	2,152
R-squared	0.176	0.284	0.182	0.285	0.185	0.213	0.199	0.295
Number of Banks	1,930	623	1,930	623	1,102	234	1,484	562

Sources: Fitch Connect; and IMF staff estimates.

Note: Robust standard errors are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Regressions use the growth rate of net loans in current US dollars as the dependent variable, and control for bank and year fixed effects as well as the lagged values of the dependent variable (growth rate of net loans), bank size (total assets), capitalization (equity over assets), liquidity (liquid over total assets), profitability (return on average assets), funding (deposits over liabilities), loan size (net loans over assets), loan quality (non-performing loans over gross loans), and level of financial development. Public banks are defined as those with more than 25 percent of equity owned by the government. Countries with high public debt are those above the 75th percentile of the distribution across the whole sample, roughly corresponding to 100 percent of GDP for AEs and 60 percent of GDP for EMDEs. AEs = advanced economies, EMDEs = emerging market and developing economies.

Online Annex Table 3.3.3. Cyclical Behavior of Bank Lending before and after the Global Financial Crisis (in constant local currency terms)

Sample Period Country Group	1999-2018		1999-2018		1999-2007		2010-2018	
	AEs (1)	EMDEs (2)	AEs (3)	EMDEs (4)	AEs (5)	EMDEs (6)	AEs (7)	EMDEs (8)
Loan Growth								
GDP pc Growth Gap (Cycle)	0.226 (0.207)	-0.181 (0.212)	0.189 (0.204)	-0.185 (0.212)	1.611*** (0.428)	0.233 (0.435)	-0.131 (0.215)	0.589 (0.399)
Public Bank * Cycle	-0.842 (0.578)	-1.398*** (0.366)	-1.101* (0.602)	-1.204** (0.482)	-2.816*** (0.969)	-3.345*** (1.075)	-4.253** (1.823)	-1.288 (1.200)
High Public Debt (HD)			0.0192** (0.00923)	-0.0413 (0.0289)	-0.106*** (0.0337)	-0.0740 (0.0780)	0.0387*** (0.0124)	-0.0845*** (0.0325)
Public Bank * Cycle * HD			1.319 (1.588)	-0.478 (0.658)	8.411 (5.541)	4.765*** (1.316)	3.208 (2.238)	2.017 (1.314)
Financial Development = L,	0.0472 (0.0796)	0.154 (0.121)	0.0601 (0.0806)	0.162 (0.123)	-0.608*** (0.142)	0.777** (0.336)	0.217 (0.163)	0.683*** (0.236)
Loan Growth = L,	-0.0279** (0.0138)	-0.0248 (0.0203)	-0.0272** (0.0138)	-0.0244 (0.0203)	0.000760 (0.0201)	0.00517 (0.0416)	-0.0853*** (0.0179)	0.000538 (0.0294)
Log of Total Assets = L,	-0.172*** (0.0107)	-0.160*** (0.0191)	-0.175*** (0.0108)	-0.161*** (0.0192)	-0.324*** (0.0245)	-0.192*** (0.0562)	-0.209*** (0.0200)	-0.205*** (0.0392)
Equity/ Total Assets = L,	0.476*** (0.166)	-0.208 (0.222)	0.461*** (0.166)	-0.201 (0.224)	0.601* (0.309)	0.567 (0.555)	0.680** (0.270)	0.506 (0.386)
Liquid Assets/ Total Assets = L,	0.0360 (0.0564)	-0.178** (0.0711)	0.0335 (0.0559)	-0.185*** (0.0715)	0.326*** (0.116)	-0.237 (0.177)	0.0135 (0.104)	-0.291*** (0.108)
Return on Average Assets = L,	0.654* (0.375)	1.595*** (0.481)	0.634* (0.374)	1.588*** (0.483)	1.570* (0.943)	0.186 (0.607)	-0.0822 (0.363)	2.484*** (0.781)
Deposits/ Total Liabilities = L,	-0.0331 (0.0322)	0.0385 (0.0502)	-0.0444 (0.0338)	0.0416 (0.0507)	-0.209** (0.0908)	0.181 (0.144)	-0.0141 (0.0656)	-0.0122 (0.0761)
Net Loans/ Total Assets = L,	-0.454*** (0.0525)	-0.606*** (0.0754)	-0.458*** (0.0518)	-0.619*** (0.0763)	-0.424*** (0.0933)	-0.979*** (0.215)	-0.679*** (0.104)	-0.909*** (0.135)
Nonperforming/ Gross Loans = L,	-0.517*** (0.0839)	-0.580*** (0.119)	-0.519*** (0.0842)	-0.568*** (0.121)	-0.744*** (0.195)	-0.541** (0.233)	-0.518*** (0.143)	-0.371 (0.237)
Constant	0.751*** (0.0868)	0.765*** (0.0903)	0.755*** (0.0871)	0.782*** (0.0912)	1.784*** (0.175)	0.737*** (0.208)	0.876*** (0.181)	0.781*** (0.181)
Bank and Year Fixed Effects	YES	YES						
Observations	13,913	3,411	13,913	3,411	5,225	817	7,074	2,156
R-squared	0.145	0.164	0.146	0.165	0.180	0.166	0.174	0.149
Number of Banks	1,931	625	1,931	625	1,101	235	1,485	562

Sources: Fitch Connect; and IMF staff estimates.

Note: Robust standard errors are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Regressions use the growth rate of net loans in constant local currency as the dependent variable, and control for bank and year fixed effects as well as the lagged values of the dependent variable (growth rate of net loans), bank size (total assets), capitalization (equity over assets), liquidity (liquid over total assets), profitability (return on average assets), funding (deposits over liabilities), loan size (net loans over assets), loan quality (non-performing loans over gross loans), and level of financial development. Public banks are defined as those with more than 25 percent of equity owned by the government. Countries with high public debt are those above the 75th percentile of the distribution across the whole sample, roughly corresponding to 100 percent of GDP for AEs and 60 percent of GDP for EMDEs. AEs = advanced economies; EMDEs = emerging market and developing economies.

Online Annex Table 3.3.4. Holding of Government Securities by Public and Private Commercial Banks in Economies with High Relative to Low Public Debt Levels

Sample period Country group	1999-2018	
	AEs (1)	EMDEs (2)
Government Securities/ Total Assets		
High Public Debt	0.00516 (0.00409)	0.0123 (0.0280)
Public Commercial Bank * High Public Debt	0.00656 (0.00835)	0.0996* (0.0527)
Fiscal Balance	-0.135** (0.0636)	0.0980 (0.172)
Spread over 10-year US Bond Yields	0.319*** (0.122)	0.0858 (0.223)
GDP per Capita Growth	0.121* (0.0659)	-0.0658 (0.113)
Crisis	0.00138 (0.00814)	-0.0256** (0.0126)
Financial Development = L,	0.0321 (0.0572)	0.0619 (0.0754)
Government Securities/ Total Assets = L,	0.490*** (0.0617)	0.398*** (0.0507)
Central Bank Exposure = L,	0.0215 (0.0394)	-0.158** (0.0620)
Log of Total Assets = L,	0.0105** (0.00501)	-0.0223*** (0.00811)
Equity/ Total Assets = L,	-0.0212 (0.0421)	0.0657 (0.131)
Liquid Assets/ Total Assets = L,	-0.0251 (0.0366)	-0.00274 (0.0448)
Return on Average Assets = L,	0.00884 (0.0682)	0.555* (0.290)
Deposits/ Total Liabilities = L,	0.0215 (0.0172)	-0.0228 (0.0328)
Net Loans/ Total Assets = L,	-0.0414 (0.0266)	-0.128*** (0.0400)
Nonperforming Loans/ Gross Loans = L,	0.0486* (0.0294)	0.228*** (0.0643)
Constant	0.0162 (0.0542)	0.110** (0.0560)
Bank and Year Fixed Effects	YES	YES
Observations	2,688	1,595
R-squared	0.328	0.427
Number of Banks	697	380

Sources: Fitch Connect; and IMF staff estimates.

Note: Robust standard errors are in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Regressions use holding of sovereign debt (government securities over assets) as the dependent variable, and control for supply of government securities (government net lending and borrowing), sovereign risk (spread over 10-year US bond yield), cyclical conditions (growth rate of GDP per capita), episodes of crisis (systemic banking, currency, and debt), bank and year level fixed effects, and the lagged values of the dependent variable, bank size (total assets), capitalization (equity over assets), liquidity (liquid over total assets), profitability (return on average assets), funding (deposits over liabilities), loan size (net loans over assets), loan quality (non-performing loans over gross loans), central bank exposure (central bank deposits over assets), and level of financial development. Public banks are defined as those with more than 25 percent of equity owned by the government. Countries with high public debt are those above the 75th percentile of the distribution across the whole sample, roughly corresponding to 100 percent of GDP for AEs and 60 percent of GDP for EMDEs. AEs = advanced economies; EMDEs = emerging market and developing economies.

Online Annex Table 3.3.5. Financial Performance of Public versus Private Commercial Banks before and after the Global Financial Crisis (whole sample)

Sample Period	1999–2018		1999–2007		2010–2018		1999–2018		1999–2007		2010–2018		1999–2018		1999–2007		2010–2018	
	(1) AEs ROAA	(2) EMDEs ROAA	(3) AEs ROAA	(4) EMDEs ROAA	(5) AEs ROAA	(6) EMDEs ROAA	(7) AEs NIM	(8) EMDEs NIM	(9) AEs NIM	(10) EMDEs NIM	(11) AEs NIM	(12) EMDEs NIM	(13) AEs CIR	(14) EMDEs CIR	(15) AEs CIR	(16) EMDEs CIR	(17) AEs CIR	(18) EMDEs CIR
Public Commercial Bank	-0.00202* (0.00108)	-0.00153* (0.000858)	0.00200 (0.00154)	-0.00442** (0.00184)	-0.00456*** (0.00125)	-0.00166* (0.000876)	-0.00437*** (0.00101)	-0.000105 (0.00107)	-0.000326 (0.000894)	-0.00539** (0.00253)	-0.00564*** (0.00127)	0.000487 (0.00109)	-0.0931*** (0.0356)	0.0384** (0.0156)	0.0462 (0.0312)	0.0887** (0.0358)	-0.0732 (0.0462)	0.0359** (0.0163)
Public Development Bank	-0.000415 (0.000965)	-0.000510 (0.000865)	-0.00271** (0.00132)	-0.000528 (0.00244)	0.000220 (0.000928)	-0.000439 (0.000949)	-0.00254*** (0.000608)	-0.000631 (0.00148)	-0.00373** (0.00147)	-0.00814 (0.00502)	-0.00224*** (0.000637)	-0.000747 (0.00144)	-0.0271 (0.0309)	-0.0333 (0.0220)	-0.0864*** (0.0228)	-0.0430 (0.0427)	-0.0224 (0.0399)	-0.0265 (0.0228)
Govt Securities / Total Assets = L	0.00321** (0.00125)	0.00901*** (0.00345)	-0.000255 (0.00239)	0.0178 (0.0109)	0.00457*** (0.00161)	0.00711** (0.00352)	-0.000729 (0.00105)	-0.00111 (0.00360)	0.00259 (0.00258)	0.000842 (0.00826)	9.25e-05 (0.00127)	-0.00521 (0.00493)	-0.0825** (0.0381)	-0.163*** (0.0476)	-0.184* (0.0994)	-0.238** (0.0941)	-0.125*** (0.0404)	-0.109** (0.0525)
GDP per Capita Growth = L	0.0469*** (0.0106)	0.000514 (0.00726)	0.0275** (0.0118)	0.0125 (0.0163)	0.0316** (0.0137)	-9.33e-05 (0.00884)	-0.00497 (0.00411)	-0.0202* (0.0116)	0.00484 (0.00938)	-0.0113 (0.0178)	-0.0189*** (0.00471)	-0.0183 (0.0142)	-1.567*** (0.273)	-0.234* (0.138)	-1.554*** (0.499)	-0.687* (0.358)	-0.753*** (0.279)	-0.316* (0.171)
Financial Development = L	0.00894*** (0.00344)	-0.0125** (0.00505)	0.0106*** (0.00375)	0.0373*** (0.0120)	-0.00993 (0.00648)	-0.0184*** (0.00704)	-0.00213 (0.00182)	-0.00103 (0.00605)	-0.00670* (0.00362)	0.0178 (0.0122)	-0.00631** (0.00256)	-0.0112* (0.00634)	-0.565*** (0.0937)	0.00584 (0.0988)	-0.730*** (0.165)	-0.642*** (0.215)	0.0811 (0.164)	0.374** (0.175)
Dependent Variable = L	0.153** (0.0772)	0.421*** (0.0507)	0.177*** (0.0415)	0.286*** (0.0504)	0.153 (0.112)	0.418*** (0.0762)	0.693*** (0.0401)	0.741*** (0.0934)	0.676*** (0.0755)	0.559*** (0.0693)	0.680*** (0.0466)	0.790*** (0.0918)	0.413*** (0.0197)	0.490*** (0.0373)	0.394*** (0.0360)	0.329*** (0.0618)	0.377*** (0.0254)	0.535*** (0.0468)
Log of Total Assets = L	-0.000550*** (0.000188)	5.85e-06 (0.000207)	9.68e-05 (0.000108)	-0.000992 (0.00129)	-0.000319 (0.000236)	0.000260 (0.000217)	-0.000277** (0.000114)	-0.000851** (0.000360)	-0.000664*** (0.000162)	0.00132 (0.00104)	-4.37e-05 (0.000145)	-0.000675 (0.000442)	0.00150 (0.00248)	-0.00296 (0.00368)	-0.00269 (0.00527)	-0.0345*** (0.0133)	-0.00461* (0.00266)	-0.00350 (0.00367)
Equity/ Total Assets = L	0.0160 (0.0193)	0.00935 (0.00666)	0.0322*** (0.00626)	0.0383** (0.0162)	0.0121 (0.0225)	0.0159** (0.00741)	0.0146*** (0.00542)	-0.00626 (0.0143)	0.0225** (0.00966)	0.0236 (0.0247)	0.0130** (0.00588)	-0.00120 (0.0142)	-0.375*** (0.0994)	-0.280*** (0.0837)	-0.326 (0.243)	-0.596* (0.352)	-0.406*** (0.120)	-0.281*** (0.0816)
Deposits/ Total Liabilities = L	-0.000209 (0.00138)	-0.000967 (0.00162)	1.24e-05 (0.00116)	-0.00959 (0.00602)	-0.000799 (0.00157)	0.00273* (0.00161)	-1.09e-05 (0.00127)	0.00647*** (0.00199)	0.000602 (0.00153)	0.00771 (0.00629)	-1.26e-06 (0.00182)	0.00455 (0.00287)	0.0457** (0.0205)	0.105*** (0.0301)	0.111** (0.0481)	0.0754 (0.0661)	0.0386 (0.0251)	0.0879** (0.0356)
Net Loans/ Total Assets = L	-0.00217** (0.00109)	-0.000195 (0.00194)	-0.00133 (0.000981)	-0.00412 (0.00588)	-0.000516 (0.00145)	-0.000348 (0.00253)	0.00206** (0.00100)	0.00162 (0.00383)	0.00374** (0.00167)	-0.00658 (0.00686)	0.00357*** (0.00128)	0.00204 (0.00560)	0.0282 (0.0205)	0.0767** (0.0389)	0.00947 (0.0508)	0.0652 (0.0923)	0.0174 (0.0245)	0.0379 (0.0448)
Nonperforming/ Gross Loans = L	-0.0194** (0.00910)	-0.0160 (0.0105)	-0.00754** (0.00350)	-0.00342 (0.0156)	-0.0130 (0.0133)	-0.00880 (0.0115)	0.00289* (0.00162)	-0.00489 (0.00468)	0.00370 (0.00284)	0.00893 (0.0126)	0.00777*** (0.00245)	0.00187 (0.00777)	0.227** (0.0997)	0.300* (0.160)	0.0900 (0.162)	0.273 (0.169)	0.242** (0.123)	0.274 (0.218)
Country and Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,360	3,148	2,181	635	6,310	2,138	9,360	3,148	2,182	635	6,309	2,138	9,658	3,373	2,342	695	6,434	2,281
Number of Banks	1,518	610	508	191	1,337	579	1,517	610	509	191	1,336	579	1,533	623	530	209	1,348	589

Sources: Fitch Connect; and IMF staff estimates.

Note: Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Regressions use return on average assets (ROAA), net interest margin (NIM), and operating cost to income ratio (CIR) as dependent variables and control for country and year fixed effects, as well as the lagged values of the dependent variable, bank size (total assets), capitalization (equity over assets), funding (deposits over liabilities), loan size (net loans over assets), loan quality (non-performing loans over gross loans), sovereign exposure (government securities over total assets), economic cycle (GDP per capita growth), and financial development. Public banks are defined as those with more than 25 percent of equity owned by the government. AEs = advanced economies; EMDEs = emerging market and developing economies.

Online Annex Table 3.3.6. Financial Performance of Public versus Private Commercial Banks Before and after the Global Financial Crisis (restricted sample)

Sample Period	1999–2018		1999–2007		2010–2018		1999–2018		1999–2007		2010–2018		1999–2018		1999–2007		2010–2018	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Country Group	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs	AEs	EMDEs
VARIABLES	ROAA	ROAA	ROAA	ROAA	ROAA	ROAA	NIM	NIM	NIM	NIM	NIM	NIM	CIR	CIR	CIR	CIR	CIR	CIR
Public Commercial Bank	-0.00226** (0.000886)	-0.00218*** (0.000825)	0.00206 (0.00203)	-0.00169 (0.00200)	-0.00347*** (0.000855)	-0.00120 (0.000946)	-0.00313*** (0.000793)	-0.00104 (0.00266)	6.76e-05 (0.000662)	-0.00622* (0.00372)	-0.00330*** (0.000814)	-0.000814 (0.00276)	-0.105*** (0.0375)	0.0326* (0.0175)	0.0822 (0.0586)	0.0710* (0.0421)	-0.0980** (0.0433)	0.0350 (0.0218)
Public Development Bank	-0.000518 (0.000822)	-0.00226** (0.000963)	-0.000539 (0.000708)	0.00174 (0.00416)	-0.000393 (0.000966)	-0.00229* (0.00123)	-0.00114*** (0.000432)	-0.00435* (0.00232)	-0.00385*** (0.00106)	-0.0130* (0.00782)	-0.00108** (0.000446)	-0.00446* (0.00263)	-0.00697 (0.0358)	-0.0192 (0.0320)	-0.0851*** (0.0208)	-0.0843* (0.0496)	0.00100 (0.0408)	-0.000695 (0.0289)
Govt Securities / Total Assets = L	0.00419*** (0.00134)	0.00548 (0.00497)	0.00142 (0.00353)	0.00826 (0.0128)	0.00539*** (0.00150)	0.00249 (0.00311)	-0.00182 (0.00120)	-0.00463 (0.00636)	-0.000637 (0.00138)	-0.00260 (0.0120)	-0.00160 (0.00139)	-0.0108 (0.00868)	-0.0884* (0.0460)	-0.0744 (0.0652)	-0.0157 (0.131)	-0.225* (0.123)	-0.133*** (0.0477)	-0.0689 (0.0673)
GDP per Capita Growth = L	0.0215*** (0.00771)	-0.00308 (0.00800)	0.0134 (0.0145)	0.0143 (0.0205)	0.00275 (0.00875)	0.000478 (0.00737)	-0.00303 (0.00579)	-0.0216** (0.0105)	0.00342 (0.0107)	-0.0352 (0.0293)	-0.00891 (0.00603)	-0.0106 (0.0109)	-1.201*** (0.296)	-0.261 (0.198)	-1.463** (0.726)	-0.297 (0.352)	-0.606* (0.328)	-0.473* (0.271)
Financial Development = L	0.00993*** (0.00381)	-0.0149** (0.00736)	0.0108** (0.00514)	0.0336* (0.0175)	-0.00851 (0.00566)	-0.0102 (0.00857)	-0.00552*** (0.00208)	0.00158 (0.00753)	-0.0112*** (0.00407)	0.0357** (0.0159)	-0.00802*** (0.00270)	-0.00342 (0.00872)	-0.520*** (0.139)	-0.0280 (0.142)	-0.875*** (0.235)	-0.215 (0.251)	0.0296 (0.194)	0.381 (0.302)
Dependent Variable = L	0.405*** (0.0716)	0.502*** (0.0566)	0.218*** (0.0651)	0.165* (0.0874)	0.436*** (0.0689)	0.552*** (0.0526)	0.843*** (0.0374)	0.670*** (0.104)	0.766*** (0.0749)	0.465*** (0.0825)	0.864*** (0.0357)	0.681*** (0.114)	0.442*** (0.0243)	0.507*** (0.0515)	0.389*** (0.0482)	0.358*** (0.101)	0.411*** (0.0299)	0.603*** (0.0673)
Log of Total Assets = L	-5.13e-05 (0.000108)	0.000107 (0.000295)	0.000220 (0.000157)	-0.00132 (0.00169)	5.30e-05 (0.000118)	0.000288 (0.000399)	-0.000154* (8.46e-05)	-0.00227*** (0.000630)	-0.000390*** (0.000132)	0.000611 (0.00166)	-6.88e-05 (9.69e-05)	-0.00188* (0.00102)	-0.00212 (0.00279)	0.00209 (0.00614)	-0.0194*** (0.00577)	-0.0187 (0.0122)	-0.00469* (0.00284)	-0.00250 (0.00672)
Equity/ Total Assets = L	0.0550*** (0.0164)	0.00976 (0.00915)	0.0244*** (0.00891)	0.0435 (0.0363)	0.0546*** (0.0157)	0.0174 (0.0131)	0.00350 (0.00625)	-0.0224 (0.0235)	0.0205** (0.0102)	0.0640 (0.0462)	0.000934 (0.00585)	-0.0147 (0.0287)	-0.353*** (0.133)	-0.251 (0.172)	-0.438 (0.274)	-0.825* (0.429)	-0.369*** (0.140)	-0.284 (0.208)
Deposits/ Total Liabilities = L	-0.00234* (0.00140)	-0.00297* (0.00156)	-0.000428 (0.00184)	-0.00908 (0.00560)	-0.00271* (0.00141)	-0.00101 (0.00183)	-0.000673 (0.00117)	0.00252 (0.00306)	0.00106 (0.00115)	0.0120 (0.00775)	-0.00102 (0.00123)	-0.00122 (0.00453)	0.0437* (0.0257)	0.155*** (0.0406)	0.123* (0.0666)	0.0589 (0.0908)	0.0427 (0.0297)	0.143*** (0.0524)
Net Loans/ Total Assets = L	-0.00130 (0.00110)	-0.00212 (0.00240)	0.000417 (0.00129)	-0.000981 (0.0102)	-0.000272 (0.00117)	-0.00262 (0.00267)	0.000558 (0.000913)	-0.00152 (0.00692)	0.00341** (0.00142)	-0.00428 (0.0118)	0.000772 (0.000979)	-0.00499 (0.0109)	0.00301 (0.0267)	0.161*** (0.0588)	0.00704 (0.0673)	0.0763 (0.104)	-0.0113 (0.0305)	0.0897 (0.0655)
Nonperforming/ Gross Loans = L	-0.00961* (0.00503)	0.000134 (0.00998)	-0.00254 (0.00470)	-0.0194 (0.0155)	-0.00547 (0.00633)	0.0105 (0.0124)	0.00211 (0.00235)	-0.00268 (0.00630)	0.00577* (0.00345)	-0.0180 (0.0171)	0.00637* (0.00367)	0.0139 (0.0119)	0.423*** (0.136)	0.199 (0.163)	0.0859 (0.250)	0.474** (0.217)	0.572*** (0.179)	0.0820 (0.201)
Country and Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,330	1,642	1,133	331	4,682	1,104	6,330	1,642	1,133	331	4,682	1,104	6,467	1,749	1,221	363	4,728	1,166
Number of Banks	906	246	239	95	874	241	906	246	239	95	874	241	908	249	246	105	875	242

Sources: Fitch Connect; and IMF staff estimates.

Note: Robust standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Regressions use return on average assets (ROAA), net interest margin (NIM), and operating cost to income ratio (CIR) as dependent variables and control for country and year fixed effects, as well as the lagged values of the dependent variable, bank size (total assets), capitalization (equity over assets), funding (deposits over liabilities), loan size (net loans over assets), loan quality (non-performing loans over gross loans), sovereign exposure (government securities over total assets), economic cycle (GDP per capita growth), and financial development. Public banks are defined as those with more than 25 percent of equity owned by the government. AEs = advanced economies; EMDEs = emerging market and developing economies.

Online Annex 3.4. Assessing the Determinants of SOEs' Performance

This annex provides details on data sources and empirical methodologies used in this chapter regarding the determinants of SOEs' performance. It also includes a summary of the results of the analysis.

Data Sources and Definitions

Data Sources

The data used in the chapter examining SOE performance is sourced primarily from ORBIS and the Natural Resource Governance Institute (NRGI) database on national oil companies (Online Annex Table 3.4.1.). The data sample covers SOEs from 102 countries¹ of which 28 are advanced, 53 emerging, and 18 developing (Online Annex Table 3.4.2.).

ORBIS Database

The Orbis database compiled by the Bureau van Dijk is the primary source for balance sheet data. The database: contains information on over 220 million firms—both state-owned (SOE) and private-owned (POE)—worldwide in more than 100 countries up to 15–20 years; provides both financial and real information (employment) about the firms; and includes historical information on firms' ownership. However, the coverage is uneven across countries. SOEs in ORBIS are identified through ownership as "organizations ultimately owned or de facto controlled by public sector entities".²

The raw Orbis data, while very rich, requires treatment to correct for some data issues or to adjust it for the objective of our study. In particular,

The analysis is based on unconsolidated financial data of domestically owned SOEs in sectors, excluding the financial sector, with a relatively higher incidence of SOEs and where SOEs compete with private firms: agriculture, electricity and gas, water and sewerage, mining (including oil) and quarrying, manufacturing, communication, and construction.³

The data cleaning process closely follows Kalemlı-Ozcan and others (2015) and Baum and others (2019). Observations that have negative assets, negative tangible assets, negative employees, or negative sales were dropped first. We then drop any observation that is missing data for any of the following variables: total assets, sales, numbers of employees, and total operating revenues. Finally, we drop companies that have two or less years of data available, and companies that do not have two consecutive years of data available. We also drop observations that: are duplicates; do not have an industry classification (either *nace2* or *nace4*); or are missing cost of employees and productivity.

Additional adjustments are made to address outliers. While the majority of return on average equity (ROE) observations lie within plus and minus 20 percent, we find a significant number of observations with very large values (positive and negative), which might either be indicative of misreporting, or of SOE equity close to zero. Therefore, we only include a company observation in the sample if the ROE is between -50 and 50 percent. We also exclude firms that have zero sales and sales above US\$1.5 million per employee, and/or zero labor costs per operating revenue.

¹ When the SOE database is appended with the POE database, we have a total of 109 countries in the total sample as reported in the main text. This is because there are 7 countries that are in the POE but not in the SOE database.

² This implies organizations not only directly but also indirectly controlled by a public entity.

³ Adding wholesale and retail trade doesn't change the main results,

FISCAL MONITOR

We follow Gopinath and others (2017) and drop observations that are below the 0.1 percentile or above the 99.9 percentile of the distribution of each variable (except for ROE).

National Oil Companies Database

The Natural Resource Governance Institute (NRGI, 2019) has assembled a comprehensive open database on National Oil Companies (NOC). The NOC database gathers detailed information derived from public sources and compiled according to a consistent methodology to facilitate benchmarking of companies and cross-cutting analysis. The database covers 71 NOCs headquartered in 61 countries worldwide. It provides data on 11 indicator groups, including NOC production, revenue generation, fiscal transfers to government and operational and financial performance, covering a seven-year time series (2011 to 2017).

Other Data

For a few countries, we complement the data from national authorities and data collected by IMF staff.

Online Annex Table 3.4.1. Data and Sources

Indicator	Source
GDP growth	IMF - World Economic Database
GDP per capita (PPP)	IMF - World Economic Database
Share of oil exports	IMF - World Economic Database
Transition economies (dummy)	IMF - World Economic Database
IMF program (dummy)	IMF staff compilation
Ease of starting a business	World Bank - Doing Business
Control of Corruption	World Bank - Worldwide Governance Indicators
Government effectiveness	World Bank - Worldwide Governance Indicators
Liquidity: current ratio	Orbis Database, NRGI, Authorities Annual Reports
Solvency: shareholders' funds/total assets	Orbis Database, Authorities Annual Reports
Total employment	Orbis Database, NRGI, Authorities Annual Reports
Sales	Orbis Database, NRGI, Authorities Annual Reports
Degree of public sector ownership	Orbis Database and IMF staff compilation
Return on equity	Orbis Database, NRGI, Authorities Annual Reports
Return on assets	Orbis Database, NRGI, Authorities Annual Reports
Total assets	Orbis Database, NRGI, Authorities Annual Reports
Operating profit to sales revenue	Orbis Database, Authorities Annual Reports
Costs of employees per operating revenue	Orbis Database, Authorities Annual Reports
Productivity: Sales per employee	IMF staff calculations based on Orbis Database, NRGI and Authorities Annual Reports
Value added per employee	IMF staff calculations based on Orbis Database and Authorities Annual Reports

Source: IMF staff compilation.

Online Annex Table 3.4.2 contains the list of 102 countries in the SOEs sample between 1999 and 2017 after the cleaning of the data.

Online Annex Table 3.4.2. Distribution of countries in the SOE sample by income level

Advanced Economies	Emerging Markets		Low-Income Countries
Austria	Algeria	Macedonia, FYR	Bangladesh
Belgium	Angola	Mexico	Cameroon
Cyprus	Argentina	Montenegro	Chad
Czech Republic	Azerbaijan	Namibia	Democratic Republic of Congo
Denmark	Bahrain	Oman	Republic of Congo
Estonia	Bolivia	Pakistan	Cote d'Ivoire
Finland	Bosnia & Herzegovina	Panama	Ethiopia
France	Brazil	Peru	Ghana
Germany	Brunei Darussalam	Philippines	Kenya
Greece	Bulgaria	Poland	Liberia
Iceland	Cabo Verde	Qatar	Moldova
Italy	Chile	Romania	Mozambique
Japan	China	Russia	Myanmar
Korea	Colombia	Saudi Arabia	Nepal
Latvia	Croatia	Serbia	Nigeria
Lithuania	Ecuador	South Africa	South Sudan
Luxembourg	Egypt	Suriname	Sudan
Malta	Equatorial Guinea	Thailand	Tanzania
Netherlands	Gabon	Trinidad and Tobago	Timor-Leste
Norway	Hungary	Tunisia	Yemen
Portugal	India	Turkmenistan	
Singapore	Indonesia	Ukraine	
Slovak Republic	Iran, I. Rep. Of	United Arab Emirates	
Slovenia	Iraq	Vietnam	
Spain	Jamaica	Venezuela	
Sweden	Kazakhstan		
Switzerland	Kosovo		
Taiwan: Province of China	Libya		
28 countries	53 countries		21 countries

Source: IMF staff compilation

Measurement of Governance

To assess the impact of governance on SOEs' performance, we use the control of corruption (CoC) indicator from the Worldwide Governance Index (WGI). The CoC is mainly based on surveys of perception of corruption (see Kaufmann and others 2007 and 2010), and available since 1996. In addition to corruption, we also test whether government effectiveness—also from the WGI—has an impact on SOEs' performance.

Methodology and Results

How does the degree of state ownership⁴ affect the performance of SOEs? To what extent does government governance affect the performance differential of SOEs compared to private firms?

⁴ To shorten the terminology, the degree of state ownership will be often called "ownership".

Formally, the relationship between the financial performance of SOEs and governance or ownership can be described as:

$$Performance_{i,t} = g(Variables\ of\ interest_{i,t}, X_{i,t}, \varepsilon_i), \quad (3.4.1)$$

where $Performance_{i,t}$ represents a specific performance indicator of a SOE i at time t . $X_{i,t}$ is a vector of observable covariates and ε_i is a vector of unobservables. $X_{i,t}$ includes liquidity, solvency and other firm-level characteristics suggested in the literature.

Several variables are used to gauge the performance of SOEs. Some assess their profitability (return on equity, return on assets, and operating margin) and others assess their productivity or efficiency (cost of employees per operating revenue, sales per employee, and value added per employee).

The explanatory variables of interest are ownership and governance. Ownership is a constant over time and varies across firms from 0 percent (private ownership) to 100 percent (full government ownership). We focus on a measure of governance at the country level, which allows examination of the broader governance environment's effects on SOEs' performance.⁵ As governance measures—including the CoC of the WGI—tend to be highly persistent (almost time invariant); therefore, estimating equation (3.4.1) using cross-country standard regression techniques such as the fixed-effect (FE) estimation is challenging. To tackle this issue, two alternative methodologies are employed. First, we use the classical pooled-cross section regression model while considering the heteroscedasticity in the sample and differences in performance between firms due to the fact that they are operating in different sectors. We also follow a two-step estimation to identify the effect of any constant (e.g. ownership and initial level of development) or almost time-invariant variables (e.g. CoC and business environment).⁶

In the first step, equation (3.4.1) is estimated by using the within estimator (fixed effects) and including only time-varying regressors. In the second step, the estimated unit effects of the first step are regressed on constant variables and on slowly-moving variables, with a between regression estimator. The second step also control for sector dummies to consider sectoral differences between firms. This approach has been first proposed by Hsiao (2003)⁷. More formally, the linear form of equation (3.4.1) can be written as:

$$PER_{i,t} = \alpha_0 + \alpha_1 G_{k,t} + \alpha_2 X_{i,t} + \alpha_3 Y_{k,t} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (3.4.2)$$

$G_{k,t}$ is a measure of the quality of governance in country k . $X_{i,t}$ represents a set of time-varying firm-level characteristics. $Y_{k,t}$ 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 natural resource endowment (share of oil exports to total exports) as it can affect both the performance of firms and corruption. Indeed, the literature (see e.g. Brollo and others, 2013) suggests that windfalls associated with natural resources may exacerbate corruption, while at the same time raising the profitability in the extractive sectors. We also include a dummy for transition economies given the importance of SOEs in these countries. Finally, we control for the quality of the business environment, proxied by the World Bank's ease of starting a business. μ_i and μ_t are firms and time fixed effects, respectively. In equation (3.4.2) the standard errors are clustered at the country level, given heterogeneity and potential autocorrelation issues.

⁵ There is also no database with a systematic measure of governance at the firm level.

⁶ As a measure of the business environment we use "starting a business" from the World Bank as it 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>).

⁷ See also Pesaran and Zhou (2018) and Kripfganz and Schwarz (2019) for other ways to handle time-invariant regressors.

In the second step, the estimated unit effects (μ_i) of the first step are regressed on a constant and slowly moving variables (equation 3.4.3), with a between regression estimator. Weighted least squares are used to correct for heteroskedasticity. In addition, given that the estimated unit effects might depend on sectors in which firms operate, we also control for sector dummies in the second step.

$$\mu_i = \beta_0 + \beta_1 \text{GDP per capita} + \beta_2 \text{Governance variable} + \beta_3 \text{Business environment} + \xi_i \quad (3.4.3)$$

To analyze the different impact of governance on SOEs and private firms, we expand equation (3.4.1) by building on a similar approach as Dewenter and Malatesta (2001), who focus on the effect of ownership on firm performance:

$$PER_{i,t} = \alpha_0 + \alpha_1 \text{Ownership}_i + \alpha_2 \text{Ownership}_i G_k + \alpha_3 G_{k,t} + \alpha_4 X_{i,t} + \alpha_5 Y_{k,t} + \mu_i + \mu_t + \varepsilon_{i,t} \quad (3.4.4)$$

Ownership_i is a dummy variable that identifies private firms and SOEs. In some specifications, we use the exact value of ownership instead of the dummy.

The Effect of Ownership of SOEs' Performance

What is the effect of the degree of state ownership on SOE performance? Table 3.4.3.a shows the results for the two-step estimation and Table 3.4.3.b show the results for pooled-OLS. The sample contains only SOEs. The estimated coefficient for the degree of state ownership has the expected sign and is statistically significant. That is, the higher the degree of state ownership, the lower are the profits (return on equity, return on assets or profit margins), the lower is labor productivity (sales per employee) and value added per employee and the higher is labor cost per operating revenue.

We now turn to a comparison between SOEs with government ownership below 50 percent, between 50 and 100 percent, and private firms (0 percent government ownership). To this end, we created dummies for each category of firm and use SOEs with government ownership between 50 percent and 100 percent as the reference group (the baseline). Online Annex Table 3.4.3.a shows that, for example, private firms and SOEs with government ownership below 50 percent have returns on equity that are higher than those of SOEs with government ownership above 50 percent, 7.9 percentage points and 0.7 percentage points, respectively. On average, private firms and SOEs with government ownership below 50 percent are much more productive than SOEs with ownership above 50 percent, 1.2 times and 2.9 times, respectively.

The Effect of Governance on SOEs' Performance

Weak governance affects the performance of SOEs through a variety of channels (see Baum and others, 2019). SOE's vulnerabilities to corruption operate on two-levels: through a direct link to the government and via corporate governance of the individual firm. The level of a country's governance is likely to have a larger impact on SOEs given the close relationship with government. We test this by using the above framework (equation (3.4.1)) and the WGI's control of corruption index.

Online Annex Tables 3.4.4.a and 3.4.4.b show the results for SOEs with majority government ownership. The estimated coefficients for governance always have the expected sign and are strongly significant, at the 1 percent level. Weak governance in a country is associated with lower profits (return of equity, return on assets and profit margins), lower productivity and value added per employee, and higher cost of employee per operating revenue in the majority government-owned SOEs.

How does the impact of corruption depend on the type of ownership? We use the framework above and create a dummy variable taking the value of 1 if the firm is privately owned and 0 if the public sector is the majority shareholder (the baseline). We also add an interaction between the type of ownership and our measure of governance (see equation (3.4.4)). Online Annex Tables 3.4.5.a and 3.4.5.b present the baseline results. The results confirm the previous results that private firms have better performance on average (see dummy on ownership). This result is in line with the literature (e.g. Dewenter and Malatesta, 2001). The control of corruption has the expected effects across all specifications as in Online Annex Tables 3.4.6.a and 3.4.6.b. Most importantly, the interaction terms are negative for profits, productivity and value added per employee, and positive for cost of employee per operating revenue. Taken together, these results imply that the differences in performance between private firms and SOEs can be large in countries with weak governance. However, the difference in performance decreases as governance improves. These results are graphically illustrated in Figure 3.23 in the main text of the chapter (section IV).

Robustness Checks

A number of robustness checks confirm the results—they are similar to those of the baseline regressions both qualitatively and quantitatively.⁸ So far, we have focused on the control of corruption indicator as a proxy for a country's governance. As an alternative, we use the government effectiveness indicator as a measure of quality of governance.⁹ In a second robustness check, we kept only countries with a coverage of at least 60 percent of the universe of firms in ORBIS, based on coverage ratios estimated by Kalemli-Ozcan and others (2015). We also tested the specification using a sample restricted to only include private firms within a sector that has at least one SOE. Finally, in a last robustness check we restricted the countries in the sample of POEs to be the same as those in the sample of SOEs.

⁸ The results are not shown due to limited space.

⁹ Which measures the quality of public services, civil service, policy formulation, policy implementation and credibility of the government's commitment to raise these qualities or keeping them high

Online Annex Table 3.4.3.a. The Effect of Ownership of SOEs' Performance

	Return on Equity		Return on Asset		Operating Profit per Sales		Labor Costs per Op. Revenue		Productivity: Sales per Empl. ^{Revenue}		Value Added per Empl.	
	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
GDP growth	-0.0177 (0.0408)		-0.0035 (0.0154)		0.0845 (0.0550)		-0.1957*** (0.0596)		0.1288 (0.3806)			-1.3127*** (0.2408)
Share of oil exports as a share of total exports	0.0523 (0.0788)		0.0249 (0.0316)		0.4063* (0.2052)		-0.1206 (0.1984)		-3.7170** (1.5246)			-1.0389 (0.9696)
Liquidity: current ratio	0.0006*** (0.0001)		0.0003*** (0.0000)		0.0012*** (0.0003)		-0.0003 (0.0003)		-0.0001 (0.0016)			0.0031* (0.0017)
Solvency (Shareholders funds/Total assets)	0.0579** (0.0222)		0.0384*** (0.0032)		0.0125 (0.0140)		0.0223*** (0.0057)		-0.2142*** (0.0467)			0.1022* (0.0542)
Total employment		0.0002 (0.0010)		-0.0012* (0.0007)		0.0405*** (0.0047)						
Sales	0.0306*** (0.0023)		0.0166*** (0.0009)		0.0452*** (0.0071)							0.2261*** (0.0289)
Total assets									0.1850*** (0.0288)			0.2999*** (0.0204)
Firm fixed effect	Yes		Yes		Yes		Yes		Yes			Yes
Initial GDP per capita		0.0049*** (0.0013)		0.0027*** (0.0006)		0.0349*** (0.0044)		-0.0318*** (0.0033)		0.9682*** (0.0144)		1.2659*** (0.0157)
Transition economies (dummy)		-0.0479*** (0.0019)		-0.0249*** (0.0009)		-0.0475*** (0.0064)		0.0568*** (0.0050)		-0.8347*** (0.0212)		-0.3327*** (0.0268)
Ease of starting a business		0.0618*** (0.0051)		0.0229*** (0.0025)		0.1291*** (0.0173)		-0.0437*** (0.0128)		0.4453*** (0.0563)		0.1723** (0.0686)
Exact ownership		-0.0047*** (0.0018)		-0.0033*** (0.0009)		-0.0076 (0.0061)		0.1054*** (0.0043)		-0.3132*** (0.0199)		-0.1494*** (0.0201)
Industry fixed effect		Yes		Yes		Yes		Yes	Yes			Yes
Constant	-0.0577*** (0.0147)	-0.2595*** (0.0204)	-0.0335*** (0.0046)	-0.0956*** (0.0098)	-0.2608*** (0.0369)	-0.8112*** (0.0684)	0.3312*** (0.0111)	0.3755*** (0.0517)	-3.5306*** (0.3265)	-10.0740*** (0.2245)	-4.4336*** (0.2181)	-12.8831*** (0.2381)
Observations	145,281	110,692	142,663	108,678	142,118	108,434	119,166	87,571	144,607	110,160	59,178	44,120
R ²	0.0275	0.1697	0.0395	0.1929	0.0134	0.0848	0.0360	0.3062	0.1998	0.7309	0.2452	0.8127
Number of firms	18,797	16,224	18,708	16,142	18,549	15,963	16,445	13,710	18,722	16,123	9,700	7,841

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residuals in the first step are clustered at the country level. 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 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.3.b. The Effect of Ownership of SOEs' Performance-Pooled

	Return on Equity	Return on Asset	Operating Profit per Sales	Labor Costs per Op. Revenue	Productivity: Sales per Employee	Value Added per Empl.
	[1]	[2]	[3]	[4]	[5]	[6]
GDP growth	0.1567*** (0.0379)	0.0549*** (0.0179)	0.1773 (0.1279)	-0.7807*** (0.0864)	1.8472*** (0.4069)	-2.0883*** (0.4125)
Share of oil exports as a share of total exports	-0.0511*** (0.0125)	-0.0210*** (0.0059)	-0.1109*** (0.0420)	0.3938*** (0.0300)	-2.1337*** (0.1332)	-0.7403*** (0.1434)
Liquidity: current ratio	0.0013*** (0.0001)	0.0007*** (0.0001)	0.0025*** (0.0005)	-0.0006* (0.0003)	0.0099*** (0.0014)	0.0096*** (0.0017)
Solvency (Shareholders funds/Total assets)	-0.0112*** (0.0030)	0.0198*** (0.0014)	-0.0273*** (0.0101)	0.0823*** (0.0068)	-0.6434*** (0.0313)	-0.0572* (0.0319)
Total employment	0.0040*** (0.0004)	0.0027*** (0.0002)	0.0175*** (0.0013)			
Sales	0.0323*** (0.0007)	0.0168*** (0.0004)	0.0641*** (0.0025)			-0.0001 (0.0101)
Total assets					0.2008*** (0.0031)	0.1918*** (0.0041)
Firm fixed effect						
Initial GDP per capita	0.0062*** (0.0015)	0.0050*** (0.0007)	0.0204*** (0.0050)	-0.0355*** (0.0036)	0.8985*** (0.0160)	1.2659*** (0.0165)
Transition economies (dummy)	-0.0297*** (0.0024)	-0.0155*** (0.0012)	-0.0748*** (0.0082)	0.0408*** (0.0055)	-0.7155*** (0.0263)	-0.3327*** (0.0276)
Ease of starting a business	0.0906*** (0.0067)	0.0394*** (0.0032)	0.1465*** (0.0225)	-0.1034*** (0.0158)	0.7979*** (0.0716)	0.1723** (0.0686)
Exact ownership	-0.0076*** (0.0019)	-0.0053*** (0.0009)	-0.0152** (0.0065)	0.1108*** (0.0045)	-0.3103*** (0.0204)	-0.1651*** (0.0195)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.4272*** (0.0322)	-0.2218*** (0.0152)	-0.9107*** (0.1081)	0.9722*** (0.0705)	-14.5098*** (0.3387)	-16.4764*** (0.3098)
Observations	110,692	108,678	108,434	87,571	110,160	44,120
R ²	0.2126	0.2380	0.1097	0.3250	0.8117	0.8636
Number of firms	16,224	16,142	15,963	13,710	16,123	7,841

Note: Standard-errors in parentheses. Weighted least squares are used to correct for heteroskedasticity. *** p<0.01, **p<0.05, *p<0.1. The time dimension ranges from 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.4.a. The Relative Performance of SOEs with Government Majority Ownership

	Return on Equity		Return on Asset		Operating Profit per Sales		Labor Costs per Op. Revenue		Productivity: Sales per Employee		Value Added per Empl.	
	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
GDP growth	0.2462 (0.1708)		0.0934 (0.0679)		0.1549** (0.0755)		-0.1812** (0.0785)		0.4058 (0.3851)		0.0223 (0.0364)	
Share of oil exports as a share of total exports	-0.0987 (0.2150)		-0.0686 (0.0926)		-0.0661 (0.0972)		0.1338 (0.1407)		-2.3483 (1.5315)		-0.0187 (0.0552)	
Liquidity: current ratio	-0.0003 (0.0002)		-0.0005*** (0.0001)		-0.0005 (0.0004)		0.0008** (0.0002)		-0.0051*** (0.0017)		-0.0003*** (0.0001)	
Solvency (Shareholders funds/Total assets)	-0.0030 (0.0216)		0.0863*** (0.0140)		0.0478*** (0.0105)		0.0296*** (0.0101)		-0.0036 (0.0572)		0.0249*** (0.0021)	
Total employment	0.0082*** (0.0026)		0.0042*** (0.0012)		0.0123*** (0.0023)							
Sales	0.0409*** (0.0036)		0.0175*** (0.0013)		0.0034** (0.0016)						0.0054*** (0.0003)	
Total assets									0.3105*** (0.0270)		0.0186*** (0.0011)	
Firm fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Initial GDP per capita		-0.0134*** (0.0002)		-0.0061*** (0.0001)		-0.0025*** (0.0002)		0.0670*** (0.0004)		0.8314*** (0.0014)		0.0399*** (0.0002)
Ease of starting a business		0.1983*** (0.0009)		0.0929*** (0.0004)		0.1128*** (0.0008)		-0.1078*** (0.0015)		0.5504*** (0.0065)		0.0350*** (0.0007)
SOEs with ownership below 50%		0.0067*** (0.0017)		0.0088*** (0.0007)		0.0167*** (0.0015)		-0.1116*** (0.0029)		0.2069*** (0.0125)		0.0131*** (0.0013)
POEs		0.0788*** (0.0009)		0.0483*** (0.0004)		0.1247*** (0.0008)		-0.1541*** (0.0015)		1.0599*** (0.0066)		0.0231*** (0.0008)
Industry fixed effect		Yes		Yes		Yes		Yes		Yes		Yes
Constant	0.0638*** (0.0160)	-0.7855*** (0.0034)	-0.0192*** (0.0088)	-0.3819*** (0.0014)	0.0073 (0.0045)	-0.5509*** (0.0029)	0.2388*** (0.0109)	-0.0813*** (0.0063)	-2.3136*** (0.0676)	-11.7415*** (0.0249)	0.0375*** (0.0048)	-0.5669*** (0.0031)
Observations	5,082,735	4,127,834	4,993,185	4,051,078	4,974,646	4,035,089	4,477,495	3,571,875	5,036,426	4,087,402	3,173,598	2,477,466
R ²	0.0699	0.0799	0.0883	0.1079	0.0152	0.0927	0.0348	0.0735	0.1293	0.4853	0.0457	0.1233
Number of firms	947,118	862,393	940,194	856,094	934,570	850,391	803,594	720,218	944,593	858,854	568,507	500,585

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residuals in the first step are clustered at the country level. 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 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.4.b. The Relative Performance of SOEs with Government Majority Ownership-Pooled

	Return on Equity		Return on Asset		Operating Profit per Sales		Labor Costs per Op. Revenue		Productivity: Sales per Employee		Value Added per Empl.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
GDP growth	0.6092*** (0.0061)		0.2862*** (0.0025)		0.3730*** (0.0052)		-0.4885*** (0.0139)		5.9720*** (0.0426)		0.1013*** (0.0068)	
Share of oil exports as a share of total exports	-0.0381*** (0.0027)		-0.0122*** (0.0011)		0.0093*** (0.0023)		0.2716*** (0.0048)		-1.6999*** (0.0195)		0.0185*** (0.0024)	
Liquidity: current ratio	0.0007*** (0.0000)		0.0000*** (0.0000)		0.0013*** (0.0000)		-0.0020*** (0.0000)		-0.0084*** (0.0002)		0.0006*** (0.0000)	
Solvency (Shareholders funds/Total assets)	-0.0302*** (0.0005)		0.0796*** (0.0002)		0.0264*** (0.0005)		0.1060*** (0.0009)		-0.1851*** (0.0039)		0.0234*** (0.0004)	
Total employment	0.0021*** (0.0001)		0.0006*** (0.0000)		0.0024*** (0.0001)							
Sales	0.0262*** (0.0001)		0.0117*** (0.0001)		-0.0087*** (0.0001)						-0.0027*** (0.0001)	
Total assets									0.2618*** (0.0005)		0.0123*** (0.0001)	
Firm fixed effect												
Initial GDP per capita		-0.0108*** (0.0002)		-0.0041*** (0.0001)		-0.0036*** (0.0002)		0.0667*** (0.0004)		0.9574*** (0.0017)		0.0474*** (0.0002)
Ease of starting a business		0.1778*** (0.0010)		0.0861*** (0.0004)		0.0983*** (0.0008)		-0.0948*** (0.0016)		0.6012*** (0.0070)		0.0316*** (0.0007)
SOEs with ownership below 50%		0.0068*** (0.0017)		0.0093*** (0.0007)		0.0160*** (0.0015)		-0.1125*** (0.0029)		0.2223*** (-0.0124)		0.0122*** (0.0001)
POEs		0.0600*** (0.0009)		0.0384*** (0.0004)		0.1072*** (0.0008)		-0.1482*** (0.0015)		0.8454*** (0.0066)		0.0081*** (0.0008)
Industry fixed effect		Yes		Yes		Yes		Yes		Yes		Yes
Constant	-0.6674*** (0.0044)		-0.3876*** (0.0018)		-0.4471*** (0.0038)		0.0969*** (0.0069)		-15.2013*** (-0.0308)		-0.5680*** (0.0037)	
Observations	4,127,834		4,051,078		4,035,089		3,571,875		4,087,402		2,477,466	
R ²	0.1217		0.2567		0.0778		0.0846		0.5156		0.2240	
Number of firms	862,393		856,094		850,391		720,218		858,854		500,583	

Note: Standard-errors in parentheses. Weighted least squares are used to correct for heteroskedasticity. *** p< 0.01, **p<0.05, *p<0.1. The time dimension ranges from 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.5.a. The Effect of Governance on SOEs Performance

	Return on Equity		Return on Asset		Operating Profit per Sales		Labor Costs per Op. Revenue		Productivity: Sales per Employee		Value Added per Empl.	
	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
GDP growth	-0.0192 (0.0346)		-0.0021 (0.0138)		0.1131** (0.0553)		-0.2257*** (0.0600)		0.1668 (0.3953)		-1.3081*** (0.2630)	
Share of oil exports as a share of total exports	0.0790 (0.0799)		0.0411 (0.0321)		0.4494* (0.2566)		-0.0993 (0.2188)		-3.7670** (1.6095)		-1.1887 (1.1123)	
Liquidity: current ratio	0.0005*** (0.0001)		0.0003*** (0.0000)		0.0013*** (0.0003)		-0.0005 (0.0004)		-0.0002 (0.0017)		0.0030* (0.0018)	
Solvency (Shareholders funds/Total assets)	0.0573** (0.0255)		0.0384*** (0.0045)		0.0194 (0.0196)		0.0150** (0.0071)		-0.1869*** (0.0478)		0.1009** (0.0475)	
Total employment	-0.0006 (0.0008)		-0.0019*** (0.0005)		0.0372*** (0.0042)							
Sales	0.0262*** (0.0016)		0.0145*** (0.0008)		0.0380*** (0.0084)						0.2261*** (0.0320)	
Total assets									0.1731*** (0.0288)		0.2959*** (0.0227)	
Firm fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Initial GDP per capita	-0.0060*** (0.0021)		-0.0048*** (0.0010)		0.0194*** (0.0073)		-0.0114** (0.0056)		0.6103*** (0.0238)		1.0816*** (0.0246)	
Transition economies (dummy)	-0.0426*** (0.0022)		-0.0226*** (0.0011)		-0.0451*** (0.0077)		0.0512*** (0.0060)		-0.7508*** (0.0250)		-0.3447*** (0.0323)	
Ease of starting a business	0.0741*** (0.0057)		0.0296*** (0.0027)		0.1438*** (0.0193)		-0.0677*** (0.0144)		0.5434*** (0.0622)		0.4378*** (0.0684)	
Control of Corruption, Estimate	0.0131*** (0.0017)		0.0082*** (0.0008)		0.0178*** (0.0057)		-0.0314*** (0.0038)		0.3857*** (0.0187)		0.1877*** (0.0152)	
Industry fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Constant	-0.0503*** (0.0169)	-0.2145*** (0.0267)	-0.0298*** (0.0035)	-0.0571*** (0.0127)	-0.2462*** (0.0404)	-0.7398*** (0.0912)	0.3512*** (0.0110)	0.3776*** (0.0687)	-3.5905*** (0.3322)	-7.4790*** (0.2968)	-4.3529*** (0.2426)	-12.1576*** (0.2994)
Observations	113,923	87,860	111,919	86,316	111,457	86,078	93,596	69,215	113,309	87,360	43,839	32,696
R ²	0.0340	0.1896	0.0357	0.2216	0.0119	0.0911	0.0452	0.3234	0.2072	0.7520	0.2541	0.8340
Number of firms	14,747	12,729	14,681	12,670	14,558	12,525	13,082	10,888	14,683	12,638	7,282	5,858

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residuals in the first step are clustered at the country level. 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 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.5.b. The Effect of Governance on SOEs Performance-Pooled

	Return on Equity	Return on Asset	Operating Profit per Sales	Labor Costs per Op. Revenue	Productivity: Sales per Employee	Value Added per Empl.
	[1]	[2]	[3]	[4]	[5]	[6]
GDP growth	0.0370 (0.0425)	-0.0132 (0.0198)	0.3362** (0.1457)	-0.7255*** (0.0959)	-0.0948 (0.4612)	-3.3954*** (0.4560)
Share of oil exports as a share of total exports	-0.0590*** (0.0140)	-0.0227*** (0.0066)	-0.1463*** (0.0481)	0.4182*** (0.0353)	-1.8946*** (0.1518)	-1.1053*** (0.1732)
Liquidity: current ratio	0.0010*** (0.0002)	0.0006*** (0.0001)	0.0021*** (0.0005)	-0.0004 (0.0004)	0.0091*** (0.0016)	0.0062*** (0.0020)
Solvency (Shareholders funds/Total assets)	-0.0127*** (0.0032)	0.0187*** (0.0015)	-0.0200* (0.0110)	0.0724*** (0.0076)	-0.6654*** (0.0342)	-0.1401*** (0.0349)
Total employment	0.0032*** (0.0004)	0.0024*** (0.0002)	0.0155*** (0.0014)			
Sales	0.0314*** (0.0008)	0.0165*** (0.0004)	0.0609*** (0.0027)			-0.0095 (0.0111)
Total assets					0.1797*** (0.0034)	0.1668*** (0.0046)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Initial GDP per capita	-0.0055** (0.0025)	-0.0020* (0.0012)	0.0036 (0.0085)	-0.0133** (0.0061)	0.5433*** (0.0268)	0.9859*** (0.0261)
Transition economies (dummy)	-0.0251*** (0.0027)	-0.0134*** (0.0013)	-0.0680*** (0.0094)	0.0348*** (0.0065)	-0.7177*** (0.0300)	-0.3241*** (0.0323)
Ease of starting a business	0.0879*** (0.0073)	0.0376*** (0.0034)	0.1783*** (0.0252)	-0.1069*** (0.0177)	0.6320*** (0.0802)	0.2696*** (0.0749)
Control of Corruption, Estimate	0.0147*** (0.0018)	0.0086*** (0.0009)	0.0201*** (0.0063)	-0.0341*** (0.0041)	0.3677*** (0.0201)	0.2848*** (0.0157)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.3073*** (0.0419)	-0.1520*** (0.0196)	-0.9056*** (0.1430)	0.8987*** (0.0925)	-10.7956*** (0.4509)	-14.3814*** (0.3935)
Observations	87,860	86,316	86,078	69,215	87,360	32,696
R ²	0.2370	0.2675	0.1153	0.3376	0.8229	0.8820
Number of firms	12,729	12,670	12,525	10,888	12,638	5,858

Note: Standard-errors in parentheses. Weighted least squares are used to correct for heteroskedasticity. ***p<0.01, **p<0.05, *p<0.1. The time dimension ranges from 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.6.a. The Nexus between Governance and Ownership on Firms' Performance

	Return on Equity		Return on Asset		Operating Profit per Sales		Labor Costs per Op. Revenue		Productivity: Sales per Employee		Value Added per Empl.	
	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage	1st Stage	2nd Stage
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
GDP growth	0.2528 (0.1709)		0.0968 (0.0678)		0.1585** (0.0753)		-0.1842** (0.0785)		0.4332 (0.3898)		-0.2779 (0.5679)	
Share of oil exports as a share of total exports	-0.0884 (0.2113)		-0.0631 (0.0904)		-0.0621 (0.0941)		0.1325 (0.1411)		-2.2574 (1.4834)		-1.5667 (1.1196)	
Liquidity: current ratio	-0.0003 (0.0002)		-0.0005*** (0.0001)		-0.0005 (0.0004)		0.0004* (0.0002)		-0.0051*** (0.0017)		-0.0051*** (0.0012)	
Solvency (Shareholders funds/Total assets)	-0.0027 (0.0218)		0.0871*** (0.0142)		0.0486*** (0.0106)		0.0293*** (0.0102)		0.0045 (0.0535)		0.3498*** (0.0327)	
Total employment	0.0085*** (0.0025)		0.0044*** (0.0011)		0.0120*** (0.0024)				0.3127*** (0.0272)		0.2864*** (0.0245)	
Sales	0.0408*** (0.0036)		0.0174*** (0.0013)		0.0031** (0.0015)							
Total assets												
Firm fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Initial GDP per capita		-0.0054*** (0.0003)		-0.0059*** (0.0001)		0.0046*** (0.0002)		0.0372*** (0.0006)		0.6421*** (0.0020)		1.1076*** (0.0025)
Ease of starting a business		0.2023*** (0.0009)		0.0944*** (0.0004)		0.1170*** (0.0007)		-0.1232*** (0.0015)		0.5383*** (0.0065)		0.2859*** (0.0061)
Control of Corruption, Estimate		0.0156*** (0.0008)		0.0183*** (0.0003)		0.0431*** (0.0007)		-0.0842*** (0.0013)		0.5011*** (0.0058)		0.2634*** (0.0064)
Ownership = 1 (POEs)		0.0780*** (0.0009)		0.0471*** (0.0004)		0.1200*** (0.0007)		-0.1583*** (0.0015)		1.0018*** (0.0066)		0.6497*** (0.0079)
Ownership = 1 (POEs) x Governance		-0.0260*** (0.0008)		-0.0193*** (0.0003)		-0.0543*** (0.0007)		0.1230*** (0.0013)		-0.2964*** (0.0057)		-0.0964*** (0.0063)
Industry fixed effect		Yes		Yes		Yes		Yes		Yes		Yes
Constant	0.0637*** (0.0159)	-0.8737*** (0.0040)	-0.0195** (0.0088)	-0.3888*** (0.0017)	0.0092** (0.0044)	-0.6260*** (0.0033)	0.2389*** (0.0108)	0.2492*** (0.0075)	-2.3077*** (0.0673)	-9.9413*** (0.0287)	-3.3122*** (0.0594)	-13.0525*** (0.0315)
Observations	5,051,377	4,105,002	4,962,441	4,028,716	4,943,985	4,012,733	4,451,925	3,553,519	5,005,128	4,064,628	3,149,008	2,456,261
R ²	0.0703	0.0818	0.0889	0.1099	0.0160	0.0991	0.0352	0.0971	0.1296	0.4911	0.1784	0.5219
Number of firms	943,068	858,898	936,167	852,622	930,579	846,953	800,231	717,396	940,554	855,377	566,136	498,605

Note: Standard-errors in parentheses. The regression in the first step includes firms and year dummies. The estimations of these effects are not reported. Residuals in the first step are clustered at the country level. 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 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex Table 3.4.6.b. The Nexus between Governance and Ownership on Firms' Performance-Pooled

	Return on Equity	Return on Asset	Operating Profit per Sales	Labor Costs per Op. Revenue	Productivity: Sales per Employee	Value Added per Empl.
	[1]	[2]	[3]	[4]	[5]	[6]
GDP growth	0.6067*** (0.0067)	0.2528*** (0.0028)	0.3773*** (0.0056)	-0.7871*** (0.0145)	3.7098*** (0.0472)	-1.2921*** (0.0603)
Share of oil exports as a share of total exports	-0.0365*** (0.0027)	-0.0163*** (0.0012)	0.0153*** (0.0023)	0.1888*** (0.0049)	-2.0579*** (0.0197)	-1.1746*** (0.0209)
Liquidity: current ratio	0.0006*** (0.000)	0.0000 (0.0000)	0.0012*** (0.0000)	-0.0016*** (0.0000)	-0.0081*** (0.0002)	-0.0006*** (0.0002)
Solvency (Shareholders funds/Total assets)	-0.0292*** (0.0005)	0.0800*** (0.0002)	0.0303*** (0.0005)	0.0913*** (0.0009)	-0.2275*** (0.0040)	0.2824*** (0.0034)
Total employment	0.0019*** (0.0000)	0.0005*** (0.0000)	0.0019*** (0.0001)		0.2609*** (0.0005)	0.1852*** (0.0005)
Sales	0.0263*** (0.0001)	0.0116*** (0.0001)	-0.0084*** (0.0001)			
Total assets						
Firm fixed effect						
Initial GDP per capita	-0.0099*** (0.000)	-0.0067*** (0.0002)	-0.0005 (0.0003)	0.0343*** (0.0007)	0.7370*** (0.0027)	1.1061*** (0.0029)
Ease of starting a business	0.1785*** (0.0009)	0.0847*** (0.0004)	0.1003*** (0.0008)	-0.1121*** (0.0016)	0.4591*** (0.0071)	0.0331*** (0.0060)
Control of Corruption, Estimate	0.0169*** (0.000)	0.0180*** (0.0003)	0.0470*** (0.0007)	-0.0834*** (0.0014)	0.4509*** (0.0060)	0.3016*** (0.0062)
Ownership = 1 (POEs)	0.0584*** (0.0009)	0.0372*** (0.0004)	0.1019*** (0.0008)	-0.1520*** (0.0015)	0.8261*** (0.0066)	0.3741*** (0.0076)
Ownership = 1 (POEs) x Governance	-0.0188*** (0.000)	-0.0167*** (0.0003)	-0.0531*** (0.0007)	0.1194*** (0.0013)	-0.2630*** (0.0057)	-0.0973*** (0.0060)
Industry fixed effect		Yes	Yes	Yes	Yes	Yes
Constant	-0.6755*** (0.005)	-0.3551*** (0.0024)	-0.4770*** (0.0047)	0.4763*** (0.0089)	-12.4869*** (0.0400)	-14.8943*** (0.0372)
Observations	4,105,002	4,028,716	4,012,733	3,553,519	4,064,628	2,456,261
R ²	0.1205	0.2592	0.0869	0.1039	0.6060	0.6178
Number of firms	858,898.0	852,622	846,953	717,396	855,377	498,605

Note: Standard-errors in parentheses. Weighted least squares are used to correct for heteroskedasticity. *** p<0.01, **p<0.05, *p<0.1. The time dimension ranges from 1999 to 2017. Productivity and value added per capita are in logarithms.

Online Annex 3.5. Ghana: Risks in SOEs Can Spill Over to Other Sectors and the Budget

This case study provides an example of how financial vulnerabilities in state-owned enterprises can negatively impact the banks' balance sheets, the government budget, and competitiveness. Following an external shock in 2013–14, realization of these vulnerabilities has added 4 percent of GDP to government debt.

Ghana's state-owned energy companies are critical to Ghana's economy. The central government owns wholly or partially 86 enterprises (Online Annex Table 3.5.1) whose liabilities were equivalent to at least 20 percent of GDP in 2017. Energy sector SOEs are dominant. The energy firms account for 60–70 percent of the reported assets and liabilities of wholly-owned state enterprises in the 2017 State Ownership Report (Government of Ghana 2017). In the power sector, two SOEs distribute 99 percent of electricity and one SOE (Gridco) is responsible for all power transmission.

In 2019, the state-owned Volta River Authority (VRA) accounted for 43 percent of dependable power generation capacity and independent power producers the rest.

Ghana's energy sector SOEs are highly vulnerable to external shocks. Efficiency and cash flow problems have plagued the power sector SOEs since at least the early 2000s (IMF 2005; Chivakul and York 2006). The core power SOEs (the electricity distribution company (ECG), Gridco and VRA) have generated a negative average return on equity since 2014 and have accumulated arrears as a result. In 2018, SOE arrears in the energy sector reached US\$2.7 billion (4 percent of GDP), most of which were cross-arrears among public sector entities. Arrears also include US\$800 million owed to private fuel suppliers and independent power plants (IPPs). Absent reforms, the total financing shortfall from 2019–23 for energy SOEs, could reach US\$12.5 billion (about 20 percent of 2019 GDP) (IMF 2019a).

Energy SOE vulnerabilities stem from structural and governance issues. As the government noted in its 2017 State Ownership Report (Government of Ghana 2018), the problems reflect multiple and often conflicting objectives, lack of a clear framework for oversight of the SOE sector, ineffective SOE boards and management, inappropriate political interference in day-to-day decision making, and low levels of transparency and disclosure. (See Box 3 in IMF (2019) for a summary of the factors behind the energy SOE financial difficulties.)

SOE vulnerabilities and inefficiencies have impacted bank balance sheets and competitiveness. Starting in 2013–14, a steep loss in value of the Ghana cedi, higher crude oil prices, and a drought-induced shift away

Online Annex Table 3.5.1. Ghana: Central Government-Owned Enterprises
(Number)

Type		Sector	
Total	86	Total	86
Wholly state owned	45	Infrastructure	14
Commercial	36	Communication	8
Limited liability companies	26	Manufacturing	8
Statutory corporations	10	Financial	16
Subvented agencies	9	Agriculture	16
Partially state-owned	41	Energy	8
o/w mining companies	10	Water	1
o/w publicly traded	8	Unspecified	15

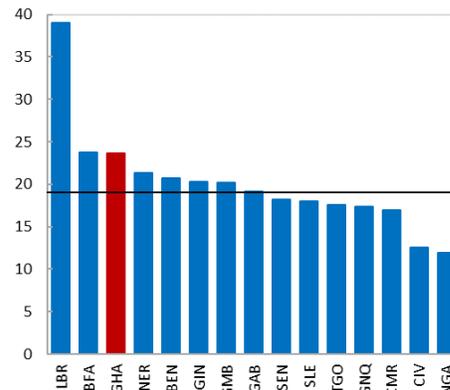
Source: 2017 State Ownership Report; IMF staff calculations.

from low-cost hydro to higher-cost thermal electricity generation aggravated existing cash flow difficulties for energy SOEs. To cover cash shortfalls, the SOEs borrowed working capital from banks and delayed payments to fuel suppliers, both state-owned and private ones. Eventually, a quarter of energy sector bank loans became non-performing. In addition, arrears to state-owned fuel suppliers led them to accumulate arrears to the government. Moreover, gas fuel supply problems led to temporary power outages and the contracting of emergency power purchase agreements (PPAs) with high charges (Online Annex Figure 3.5.2). The high cost of emergency PPAs, plus the uncoordinated contracting of further PPAs and the general inefficiency of some energy SOEs, contributes to Ghana’s relatively high electricity costs compared to regional competitors which undermines competitiveness and job creation (Online Annex Figure 3.5.1).

The government has sought to contain the financial hemorrhaging of energy SOEs. In 2016, the government introduced a levy on end-consumer fuel purchases. Initially, the levy proceeds were paid directly to energy SOE creditors to reduce outstanding SOE debt. However, in 2017 the government assigned the levies to a government-sponsored entity (ESLA) to facilitate the restructuring of the energy SOE bank and supplier debt into long-term bonds.¹ In 2019, the central government budget also covered \$1 billion of the energy SOE cash shortfall.

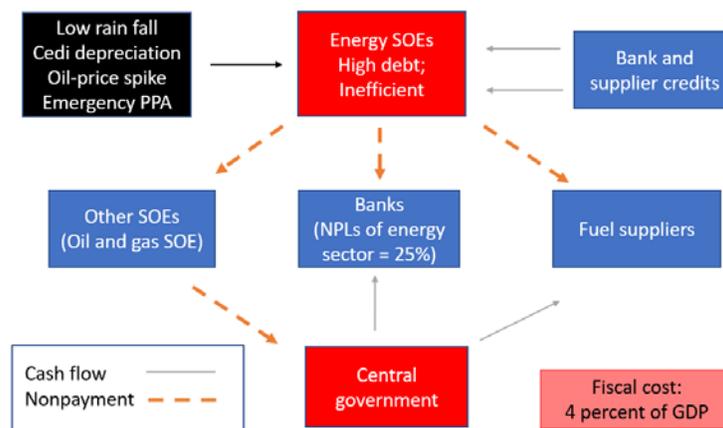
The impact on Ghana’s public sector balance sheet has been significant. Government debt has risen at least 4 percent of GDP since 2016 with the realization of fiscal risks from energy SOEs. In 2020, IMF staff anticipates the central government will cover another 1 percent of GDP of the SOEs’ projected financial shortfall (IMF 2019a). More broadly, the liabilities of state-owned enterprises are significant at about 50 percent of GDP on a gross basis (Agou and Ralyea 2019), compared to a central government debt stock (excluding ESLA bonds) of

Online Annex Figure 3.5.1. Electricity Prices in West Africa
(US cents per kWh, 2018)



Sources: World Bank doing business database and IMF staff calculations.
Note: A monthly electricity consumption is assumed, for which a bill is then computed for a warehouse based in the largest business city of the economy for the month of March.

Online Annex Figure 3.5.2. Spillover of SOE Vulnerabilities



Source: IMF staff
Note: The fiscal cost is composed of the following items: allocations from levies on fuel products (ESLA levies) to pay energy SOE debt of 0.5 percent of GDP in 2016 and 2017; issuance of ESLA bonds backed by ESLA levies (1.7 percent of GDP) in 2017–19; and further budget support of 1.5 percent of GDP in 2019.
PPA = Power Purchase Agreement

¹ ESLA plc issues long-term bonds (7 and 10-year tenure), which are backed by revenue from ESLA levies. The proceeds from the bonds are used to pay down the debts of the power utilities and the state-owned oil refinery.

about 62 percent of GDP at end-2019.

The authorities are taking further steps to move the energy sector toward financial health. In addition to recent increases in electricity tariffs, the authorities have developed a multiyear Energy Sector Recovery Program (ESRP) with assistance from the World Bank. The ESRP contains a series of measures to be implemented over the next five years which would bring greater balance between Ghana's power and gas supply and demand. It also addresses structural issues in the sector that have undermined SOE financial performance.

The authorities are also making efforts to improve oversight and transparency of the SOE sector more generally. A June 2019 law, the State Interests and Governance Authority Act, creates an entity to oversee, administer, and improve corporate governance in public corporations (SOEs). The law complements the new Public Financial Management law and regulations that contain provisions for financial disclosure by SOEs, though compliance needs to improve (Government of Ghana 2018). An upgrade in transparency and disclosure of SOE financial performance, including all the major energy SOEs, began in 2016 with the initial publication of an aggregate SOE report.

Online Annex 3.6. The Impact of SOE Reforms

This annex provides details on data sources and empirical methodologies used in this chapter regarding the impact of SOE reforms. It also includes a summary of the results of the analysis.

Data Sources and Definitions

Only majority ownership SOEs (with public ownership above 50 percent) are used in this analysis. State-owned enterprise (SOE) reforms are proxied by measures implemented according to conditionality under IMF-supported programs. Implemented reforms are reforms that have been fully met, met with delay, or partially met. Reforms that were not met, or where the program ended before the reform was met have been excluded.¹ Included are reforms with the status of either quantitative performance criteria (QPCs) or structural benchmarks (SBs) as part of the programs. QPCs are used primarily for financial target setting, such as specific profit goals or reductions in employment costs and debt. Structural benchmarks include a broader set of reforms. The main categories are:

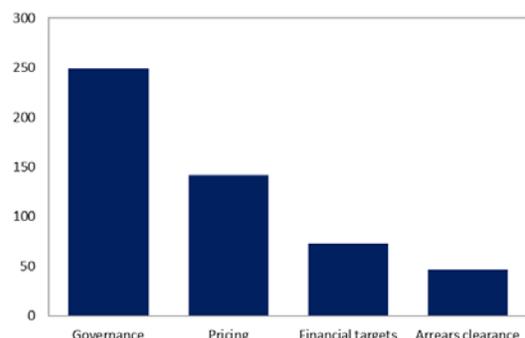
- **Governance:** these span a wide array of reforms related to monitoring, auditing, or management of SOEs, structural reforms that apply to the sector as a whole (if they are governance-related), and others. Examples include: “Set up an oversight institutional and reporting framework for SOEs”, “Collect data on the debt of state-owned enterprises and adopt a monitoring mechanism”, “Completion of independent audits” for specific firms, and “Preparation of strategic action plans for key SOEs”.
- **Pricing:** Public enterprise pricing primarily concerns SOEs in the electricity, gas, oil, heating and water sectors. Tariff changes and automatic fuel price mechanisms are common and are included as SOE reforms if the underlying motivation is the health of SOEs. Examples include: “Implement an electricity tariff increase”, and “Reinstatement of automatic bi-weekly price adjustments for petroleum products”.
- **Financial targets:** These include the QPC and SBs if the objective of the conditionality is to achieve a specific financial goal without specifying the precise reforms needed to achieve them. Examples include: “Take measures to reduce the quasi-fiscal losses of state-owned electricity company to x percent of GDP”, and “Eliminate central government transfers to firm x”. Given these SBs have been met, it is likely that the SOE has undertaken reforms. Compared to governance and pricing reforms, accompanying efforts to reach financial targets could be of shorter-term nature, especially if the targets are set as a one-off.
- **Arrears clearance:** Clearance of arrears to SOEs improves the SOEs liquidity situation. Arrears clearance by SOEs to the private or public sector usually benefits the economy, the public sector budget, or triggers reforms that will show results in the longer-term. However, a short- to medium-term impact might not be visible. Examples include: “Verify claims of government and firm x on each other and draw up a timetable for settlement of net claims” and “Establish a timetable for the reduction of outstanding arrears to the water and electricity company”.

We identify a total of 621 SOE reforms, which cover 172 out of 240 IMF programs (86 out of 97 program countries) between 2002 and 2017. Of those, 110 are reforms related to state-owned banks and the other 511 related to non-financial SOEs. About half of the non-financial reforms cover SOE governance, followed by pricing and financial target setting (Online Annex Figure 3.6.1). Most of the

¹ An extended analysis that includes reforms that were unsuccessful (“not met”) can be found in Baum and others (2019).

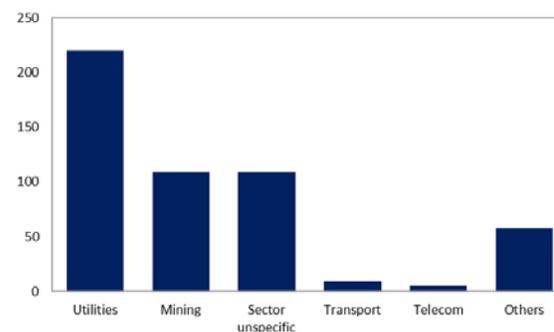
reforms are in the utilities sector, followed by mining and reforms that are not sector specific (Online Annex Figure 3.6.2). The latter include reforms that did not pertain to any specific sector, but often target SOE governance structures as a whole (such as transparency requirements, public management laws, or sectoral monitoring arrangements).

Online Annex Figure 3.6.1. Number of SOE Reforms, by Type (2002–17)



Source: IMF programs.
Notes: Reforms are collected based on IMF program conditionality.

Online Annex Figure 3.6.2. Number of SOE Reforms, by Sector (2002–17)



Source: IMF programs.
Notes: Reforms are collected based on IMF program conditionality. “Sector Unspecific” includes reforms that did not pertain to any specific sector. “Others” covers SOEs operating in agriculture, insurance, mail services, tourism, health, chemicals, construction, and others.

Non-financial SOE reforms and SOE financial data in ORBIS and National Oil Company (NOC) databases (and Authorities’ Annual Reports on SOEs for a few countries) overlap for 35 countries, of which 14 are low-income, 17 emerging, and 4 advanced economies.² These allow to study the impact of the reforms on the performance of SOEs.

Methodology and Results

This annex follows a similar two-step regression approach as in Online Annex 3.4. One challenge is that the timing of the reforms cannot precisely be identified, as the conditionality is met at some point during the IMF program, or reforms are continuous (such as financial target setting and pricing reforms). In addition, firms and governments may begin to work towards reforms during the program negotiation and reform preparation stage. Finally, on average only 7 years are available for each firm. These constraints, together with other data limitations, make a specific year-on-year impact, for example by employing event studies or impulse response function analysis difficult. The alternative is to study the average impact of SOE-related reforms on performance over the sample period.

In the first step, the change in performance (first difference) is regressed on time-varying factors that drive changes in the performance of firms, including both SOE financial and macroeconomic variables. Given that the reforms (IMF program conditionality) are expected to lead to improvements, the above analysis is done in first differences rather than in levels. A firm-specific fixed effect is included. This allows capturing the average change in performance that reflects changes due to a reform or other slow

² LIDCs: Bangladesh, Cote d’Ivoire, Cameroon, Chad, Congo, Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Moldova, Mozambique, Nigeria, and Tanzania. EMs: Angola, Argentina, Bulgaria, Bosnia and Herzegovina, Croatia, Ecuador, Egypt, Gabon, Hungary, Iraq, Jamaica, Pakistan, Romania, Serbia, Suriname, Tunisia, and Ukraine. AEs: Cyprus, Greece, Latvia, and Portugal.

moving or constant variables. In order to isolate the impact of SOE reforms, a variety of additional economic variables are added, including GDP growth, the share of oil in exports, terms of trade, the exchange rate, public investment growth, inflation, and the unemployment rate.³

In the second step, the firm-specific fixed effects are regressed on the adoption of reforms and other controls using the between estimator. The hypothesis to test is if in the sample period countries or firms that have on average undertaken more SOE-related reforms have a higher firm-specific effect; i.e., higher changes/improvements on average. In particular, firm-specific fixed effects are likely smaller for cases without reforms than in countries with reforms, especially as the quality of institutions tends to be slow changing. The between estimator thus answers the question “did SOEs in countries with more reforms have a stronger improvement than SOEs in countries without reforms?” The estimation is done over the entire history of the SOE and can be interpreted as the effect of governance reforms on the improvement in SOE performance over time.

The following additional controls are added to the second stage estimation: The World Bank’s Doing Business Indicator, GDP per capita (both in first differences), sectoral dummies, an IMF program dummy that captures the impact of all other non-SOE related reforms on the SOE, and a dummy for former Soviet countries, as in these countries SOE reforms usually went hand in hand with other structural economic changes, including rapid privatization. In addition, we add the level first observation of each dependent variable per firm. For example, firms with low productivity could see overall higher productivity changes in the following years than already highly productive firms.

Online Annex Tables 3.6.1 and 3.6.2 present the first and second stage results for ROE, profits, productivity and costs. Online Annex Table 3.6.2 finds that SOE reforms on governance, pricing, and financial targets affect all main performance indicators positively on average. These reforms have a statistically significant impact on utilities, transportation, manufacturing and construction. Results on communication are somewhat mixed. Governance reforms and financial target setting have no significant impact on the mining sector. This could reflect higher volatility in financial performance due to oil price dependence, and corruption may be more difficult to fight due to high economic rents in the sector. The impact of arrears clearance is mixed, with some financials worsening in SOEs following its implementation.

³ Additional country-level controls have been tested for but did not change the results, including the public debt to GDP ratio, as well as its change to control for fiscal space and volatility.

Online Annex Table 3.6.1. First-Stage Estimation Results—SOE Reforms

		Δ ROE	Δ Profits	Δ Cost of employees	Δ Productivity
Country-level variables	GDP growth	-0.0502** (0.0196)	0.0551 (0.0505)	0.0910*** (0.0260)	-0.1508* (0.0786)
	Δ share of oil in exports	-0.1196* (0.0696)	0.2036 (0.1201)	-0.0001 (0.0814)	0.1074 (0.0917)
	Terms of trade (percentage change)	0.0005*** (0.0002)	0.0008*** (0.0003)	0.0002 (0.0002)	0.0003 (0.0003)
	Δ exchange rate (national currency per PPP dollar)	-0.0016 (0.0017)	-0.0051 (0.0032)	-0.0030 (0.0044)	0.0004 (0.0016)
	Public investment growth	0.0015 (0.0010)	0.0027 (0.0043)	-0.0032 (0.0023)	0.0033** (0.0014)
	Δ inflation, period average	0.0326*** (0.0046)	0.0810*** (0.0074)	0.0141 (0.0130)	0.0150** (0.0061)
	Change in the unemployment rate	-0.0001 (0.0007)	0.0019 (0.0011)	0.0006 (0.0007)	-0.0007 (0.0007)
Firm-specific variables	Total firm employment	-0.0088*** (0.0025)	-0.0038 (0.0029)		
	Sales	0.0155*** (0.0009)	0.0218*** (0.0025)		
	Liquidity: current ratio (Shareholders' funds / Total assets) * 100	-0.0002*** (0.0001)	-0.0006** (0.0002)	-0.0001 (0.0001)	-0.0001 (0.0001)
	Total assets	0.0001 (0.0001)	-0.0001 (0.0002)	0.0002** (0.0001)	-0.0001* (0.0000)
					0.0012 (0.0011)
	Constant	0.0135** (0.0055)	-0.0040 (0.0062)	0.0099 (0.0103)	0.0145** (0.0064)
	Observations	80,464	78,896	63,888	80,039
	R ²	0.0060	0.0040	0.0054	0.0253
	Number of SOEs	10,136	9,939	8,556	10,072

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Time dummies are included.

Online Annex Table 3.6.2. Second Stage Estimation Results—SOE Reforms

	Governance Reforms				Pricing Reforms				Financial Targets				Arrears Clearance			
	Δ ROE	Δ Profits	Δ Cost of employees	Δ Productivity	Δ ROE	Δ Profits	Δ Cost of employees	Δ Productivity	Δ ROE	Δ Profits	Δ Cost of employees	Δ Productivity	Δ ROE	Δ Profits	Δ Cost of employees	Δ Productivity
ROE in T0	-0.1173*** (0.0028)				-0.1177*** (0.0028)				-0.1169*** (0.0028)				-0.1169*** (0.0028)			
Profits in T0		-0.0981*** (0.0021)				-0.0979*** (0.0021)				-0.0980*** (0.0021)				-0.0978*** (0.0021)		
Cost in T0			-0.0587*** (0.0020)				-0.0600*** (0.0020)				-0.0576*** (0.0020)				-0.0568*** (0.0020)	
Productivity in T0				-0.0394*** (0.0013)				-0.0393*** (0.0013)				-0.0396*** (0.0013)				-0.0398*** (0.0013)
GDP per capita growth	0.1355*** (0.0198)	-0.0717 (0.0473)	-0.0439** (0.0210)	0.0222* (0.0124)	0.2204*** (0.0236)	0.0418 (0.0563)	-0.1301*** (0.0274)	0.0637*** (0.0149)		-0.1370*** (0.0188)	-0.0079 (0.0449)	0.0021 (0.0201)	0.1104*** (0.0186)	-0.1554*** (0.0444)	0.0067 (0.0199)	-0.0011 (0.0116)
Change in doing business indicator	0.1064*** (0.0276)	0.2928*** (0.0657)	-0.1895*** (0.0305)	0.0073 (0.0166)	0.0403 (0.0290)	0.1932*** (0.0690)	-0.1420*** (0.0313)	-0.0377** (0.0175)	0.1192*** (0.0277)	0.3284*** (0.0661)	-0.2057*** (0.0307)	0.0159 (0.0168)	0.1157*** (0.0277)	0.2947*** (0.0661)	-0.1860*** (0.0308)	0.0058 (0.0168)
Former Soviet Union dummy	-0.0197*** (0.0012)	-0.0319*** (0.0028)	0.0118*** (0.0011)	-0.0033*** (0.0007)	-0.0290*** (0.0017)	-0.0455*** (0.0042)	0.0191*** (0.0017)	-0.0085*** (0.0010)	-0.0188*** (0.0011)	-0.0294*** (0.0027)	0.0107*** (0.0011)	-0.0024*** (0.0007)	-0.0167*** (0.0012)	-0.0265*** (0.0029)	0.0120*** (0.0012)	-0.0027*** (0.0007)
IMF program	-0.0012 (0.0017)	-0.0015 (0.0041)	0.0130*** (0.0019)	-0.0094*** (0.0011)	-0.0029* (0.0017)	-0.0025 (0.0041)	0.0135*** (0.0019)	-0.0095*** (0.0011)	-0.0011 (0.0018)	-0.0010 (0.0042)	0.0121*** (0.0019)	-0.0088*** (0.0011)	-0.0016 (0.0018)	0.0010 (0.0043)	0.0069*** (0.0019)	-0.0065*** (0.0011)
Mining * # of reforms by type	-0.0028 (0.0119)	0.0284 (0.0295)	0.0028 (0.0129)	0.0111 (0.0074)	0.0133** (0.0062)	0.0204 (0.0150)	-0.0150** (0.0070)	0.0115*** (0.0039)	-0.0215 (0.0469)	0.1206 (0.1159)	-0.1169** (0.0556)	0.0291 (0.0288)	-0.5536* (0.3208)	-0.3271 (0.7614)	0.4903* (0.2978)	-0.0100 (0.1931)
Utilities * # of reforms by type	0.0043** (0.0021)	0.0118** (0.0051)	-0.0130*** (0.0031)	0.0068*** (0.0013)	0.0149*** (0.0021)	0.0239*** (0.0050)	-0.0097*** (0.0026)	0.0095*** (0.0013)	0.0100 (0.0079)	0.0181 (0.0189)	-0.0356*** (0.0118)	0.0135*** (0.0047)	0.0910*** (0.0257)	0.1142* (0.0611)	0.0406* (0.0243)	-0.0409*** (0.0156)
Transportation * # of reforms by type	0.0252*** (0.0054)	0.0435*** (0.0129)	-0.0268*** (0.0059)	0.0139*** (0.0032)	0.0256*** (0.0031)	0.0301*** (0.0075)	-0.0250*** (0.0034)	0.0137*** (0.0019)	0.0676*** (0.0196)	0.1381*** (0.0470)	-0.0680*** (0.0199)	0.0330*** (0.0120)	0.0871 (0.0608)	0.1179 (0.1444)	-0.0335 (0.0565)	-0.0051 (0.0381)
Manufacturing * # of reforms by type	0.0135*** (0.0037)	0.0492*** (0.0090)	-0.0169*** (0.0040)	0.0039* (0.0022)	0.0200*** (0.0028)	0.0407*** (0.0067)	-0.0244*** (0.0029)	0.0078*** (0.0017)	0.0318** (0.0130)	0.1434*** (0.0309)	-0.0310** (0.0145)	0.0041 (0.0079)	0.0745 (0.0624)	0.0809 (0.1481)	0.1040* (0.0578)	-0.0307 (0.0375)
Communication * # of reforms by type	0.0005 (0.0047)	0.0081 (0.0111)	-0.0276*** (0.0093)	0.0115*** (0.0027)	0.0081** (0.0033)	0.0119 (0.0078)	-0.0262*** (0.0045)	0.0139*** (0.0019)	-0.0092 (0.0181)	-0.0341 (0.0434)	-0.0978*** (0.0375)	0.0278*** (0.0107)	0.1220 (0.0757)	-0.1229 (0.1872)	-0.1835** (0.0819)	0.0089 (0.0449)
Construction * # of reforms by type	0.0110** (0.0043)	0.0194* (0.0105)	-0.0275*** (0.0060)	0.0104*** (0.0026)	0.0170*** (0.0029)	0.0257*** (0.0070)	-0.0190*** (0.0035)	0.0117*** (0.0017)	0.0501*** (0.0154)	0.0698* (0.0366)	-0.0511*** (0.0186)	0.0222** (0.0093)	0.0083 (0.0464)	0.0999 (0.1135)	0.1710*** (0.0439)	-0.0245 (0.0279)
Constant	0.0030*** (0.0010)	0.0127*** (0.0024)	0.0131*** (0.0011)	0.0083*** (0.0008)	0.0008 (0.0011)	0.0095*** (0.0025)	0.0145*** (0.0012)	0.0075*** (0.0008)	0.0035*** (0.0010)	0.0143*** (0.0023)	0.0122*** (0.0011)	0.0089*** (0.0007)	0.0030*** (0.0010)	0.0141*** (0.0023)	0.0116*** (0.0011)	0.0092*** (0.0007)
Observations	63,633	62,571	48,471	63,284	63,633	62,571	48,471	63,284	63,633	62,571	48,471	63,284	63,633	62,571	48,471	63,284
R ²	0.2431	0.2145	0.1216	0.1090	0.2475	0.2148	0.1271	0.1124	0.2424	0.2140	0.1182	0.1055	0.2418	0.2115	0.1169	0.1038
Number of firms	8,911	8,742	7,331	8,845	8,911	8,742	7,331	8,845	8,911	8,742	7,331	8,845	8,911	8,742	7,331	8,845

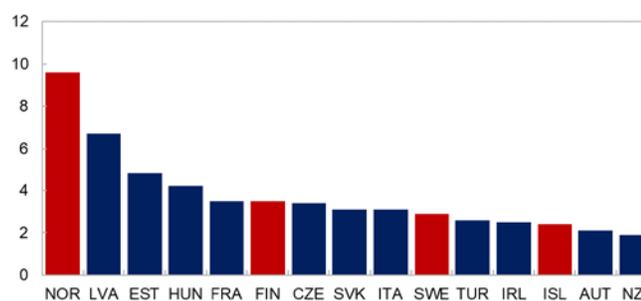
Notes: The dependent variables are firm-specific fixed effects from the first stage regression. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Sector dummies are included. "T0" is the first observation of each variable (in levels) for a firm. Blue highlighted cells indicate significantly positive reform outcomes. Red highlighted cells indicate significantly negative reform outcomes.

Online Annex 3.7. How to Get the Most Out of SOEs: The Nordic Example

Nordic national SOEs are important actors in their economies (Online Annex Figure 3.7.1).¹ SOEs are for example active in the utilities, transportation, and communication sectors. However, they also include opera houses and alcohol retailing monopolies. Nordic SOEs tend to be more profitable and efficient compared to their peers in similar industries in other advanced economies (Online Annex Figure 3.7.2). Several common factors contribute to their relatively good performance:

- *Clarity on ownership objectives* is critical to ensure accountability. All of the Nordic states specify their objectives and review their framework, including the rationale for ownership or changes in ownership policy, on a regular basis (Finansministeriet 2018 and OECD, 2018a). All have renewed their ownership policies in recent years (2014–17).²
- *Ownership in Sweden and Finland is generally*³ *centralized in one entity within the government* to ensure consistency and concentration of expertise. Keeping the ownership function separate from other policy functions, such as regulation, reduces the risk of conflict of interests. In Sweden, the centralized unit is in the Ministry of Enterprise and Innovation. In Finland, ownership is centralized in the Prime Minister’s office.
- *Professional and empowered SOE boards.* Government representation on SOE boards is limited, reducing the likelihood of inappropriate political intervention. Denmark and Norway do not have state representatives on the SOE boards (OECD 2018a). In Sweden only the government employees responsible for the company are allowed on boards. In Finland, up to two state representatives can be on an SOE’s board. Board authority to appoint and remove the CEO (as is the case in the Nordic states), further reduces the scope of government interference in operations.
- *Financial targets for effective governance of the commercial SOEs.* All Nordic countries generally set targets for the financing structure and return of the commercial SOEs. For Swedish SOEs the cost of capital is set as the return one could get from an alternative investment with the same risk and duration and is used as the floor for the profitability target. When assessing the companies’ value creation, Norway specifies that the return targets provide a basis for the discussion and that this assessment must also take into account ongoing financial performance and the performance of other comparable companies.

Online Annex Figure 3.7.1. SOE Employees as a Percentage of Non-Agricultural Employees: OECD Top 15
(Percent, end-2015)



Source: OECD (2017).

Note: The statistics cover SOEs under the control of the central level of government and do not include minority-owned companies.

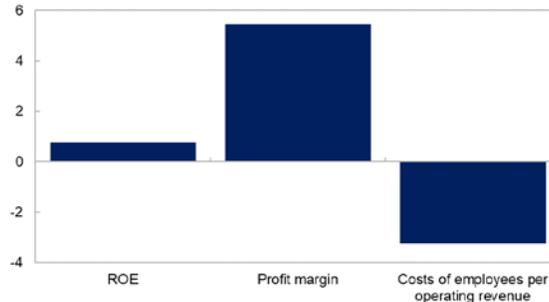
¹ In this box we focus on Denmark, Finland, Norway and Sweden.

² The recent ownership policies include: Statens ejerskabspolitik 2015 in Denmark, Government Resolution on State Ownership Policy (13 May 2016) in Finland, Diverse and value creating ownership, Meld. St. 27 (2013–14) Report to the Storting (white paper) in Norway and The state’s ownership policy and guidelines for state-owned enterprises 2017 in Sweden.

³ In both countries ownership of companies with special policy objectives can also be found in other ministries.

- Consistency between financial and policy targets.* For the Swedish SOEs with public policy assignments, one of the purposes of setting targets is to clarify the associated cost. As policy targets and financial targets are mutually dependent these are normally prepared in unison, which allows one to weigh the ambition of the public policy targets against the cost in terms of financial return. When economic objectives are established for Finnish SOEs due consideration is also given to the costs associated with their special assignments. For the Norwegian SOEs with sectoral policy objectives return targets are not generally set; the goal is to fulfill the objectives and operate efficiently. For instance, for Norwegian Bane NOR (railway), one of the most important performance indicators is punctuality of trains. Operational efficiency is reviewed as part of the ownership dialogue.

Online Annex Figure 3.7.2. Performance of Nordic SOEs as Compared to Other SOEs in Advanced Economies
(Percentage point difference)



Sources: ORBIS, and IMF staff estimates.

Note: Return on equity, ROE, is estimated using net income. Profit margin corresponds to operating profit to sales revenue. The shown coefficients measure the impact of the SOE being Nordic as compared with being from another advanced economy. Regressions include controls for sector. Sample period is 1999–2017.

- Achieving balance in government and SOE management interactions.* One of the challenges of owning a SOE is striking the right balance between effective oversight and limiting political interference. In Sweden and Norway, the state uses the owner dialogue—regular meetings between the owner and the company—to track financial and public policy targets. The Norwegian ownership policy clarifies that opinions conveyed by the state during these meetings are suggestions and the board makes the decisions. The Danish ownership policy also qualifies that government communication with company management must not imply that the minister de facto leads the corporation. Rather, the dialogue should contribute to aligning expectations between the owner and the company.
- Transparency towards the owner and citizens.* Transparency can strengthen public confidence in state ownership. All Nordic states publish an annual aggregate report on SOEs. These include, for example, reporting on individual SOEs, to which extent policy targets were reached, financial performance, and significant events. In Norway the report also features a list summarizing all the public procurements/subsidies from the state to each SOE with sectoral policy objectives.
- Aligning executives' incentives with the state.* For Swedish SOEs, senior executives do not receive bonuses, whereas the board may offer bonuses in Finland, Denmark, and Norway. The latter three stress that beneficiaries must be able to influence goal attainment through their activities. For both Finland and Norway, the guidelines stipulate that the variable salary should not exceed a maximum percentage of the fixed salary. For the Danish SOEs, share-based remuneration should be linked to realized results over multiple years, to discourage short term behavior.
- Controlling corruption.* Norway's and Sweden's ownership policies set clear expectations regarding integrity and anti-corruption procedures. In Sweden, SOEs are required to behave in a manner that promotes public confidence and should work towards high standards of business ethics and actively prevent corruption. In Norway, companies are expected to establish procedures to prevent corruption. SOEs are also expected to avoid activities that could lead to the perception of corruption. These efforts do not fully eliminate corruption vulnerabilities. For example, in 2017 Swedish Telia reached a global settlement with authorities to pay \$965 million for making bribes involving operations in Uzbekistan (Telia 2017).