WORKING PAPER

STATE-OWNED ENTERPRISES ACROSS EUROPE: STYLIZED FACTS FROM A LARGE FIRM-LEVEL DATASET*

Bram De Lange
Bruno Merlevede

Department of Economics

Faculty of Economics and Business Administration
Campus Tweekerken, St.-Pietersplein 5, 9000 Ghent -
BELGIUM

State-Owned Enterprises across Europe: Stylized Facts from a Large Firm-level Dataset[*]

Bram De Lange [†a] and Bruno Merlevede [‡a]

[a]Department of Economics, Ghent University

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Abstract

This paper constructs a firm-level dataset to document the prevalence of State-Owned Enterprises (SOEs) in 27 European countries over the period 2002-2012. We find government ownership of firms to be widespread over the European continent. On average we annually observe 35,596 firms with a state participation; 21,377 of these are majority-owned by the state. Notwithstanding an expected tendency towards concentration in the mining, energy, transport, postal and telecommunication sectors, we do detect non-negligible government ownership in all sectors of the business economy. Countries with a socialist legal origin show the highest number of SOEs and SOEs are present in almost all sectors. Countries with an English legal origin show the lowest numbers of SOEs. Lower levels of economic and financial development, and lower scores on institutional characteristics are associated with higher levels of government ownership at country-level. More collectivist societies also show higher levels of government ownership. While SOEs are on average larger than privately-owned firms (POEs), half of the SOEs employs less than 50 people. Through a matching exercise we show that SOEs are outperformed by POEs in terms of 16 real and financial firm level indicators. This is no longer the case when SOEs are listed or controlled by a foreign government. In countries with better scores on institutional characteristics SOEs are generally less outperformed by POEs. More collectivist societies are characterised by SOEs that employ more people and pay higher wages, but are less efficient. In terms of employment growth SOEs are outperformed by POEs, but SOEs are more resilient in times of crisis. Further SOEs have a lower propensity to exit which does not seem to vary with the political orientation of the country.

Keywords: Europe, State Ownership, Firm Heterogeneity, Firm-level data

JEL-Classification: H11 L32 O52

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1   Introduction

The Great Depression and World War II pushed governments into a more active role in the economy. Many politicians believed the state should not only own telecommunications and postal services, utilities, airlines and railroads, but also strategic manufacturing industries. Economic arguments for state ownership rested on market failures and the ability of state ownership to allow state-owned enterprises (SOEs) to pursue socially desirable objectives. This view changed from the 1980s onwards when both the perceived success of PM Thatcher's government in privatizing the state-dominated UK economy, and — especially — the collapse of the Soviet Union provided a powerful impetus towards private ownership. During the 1990s and early 2000s market-oriented policy-makers in the west also pushed the 'Washington Consensus' on developing countries. This blueprint prescription of 10 economic reforms included the immediate privatization of SOEs (see Megginson and Netter (2001) and Djankov and Murrell (2002) for literature reviews).

The last 15 years, however, have witnessed a resurgence of state ownership due to the rise of China and the Great Recession of the late 2000s, early 2010s. Though the overall level of state ownership in China has been declining for almost 40 years, in 2014 67 of the 69 Chinese companies in the list of the 500 largest companies in the world were state-owned (Hsieh and Song (2015)). The sheer scale of China's economic growth has raised the global profile and attraction of their 'state capitalism' model with the government controlling Chinese champions in globally competitive industries. Further, policy responses to the Great Recession involved nationalization of privately held firms. Figure 1 indeed confirms an increase in M&A transactions by governments/states in the 27 European countries in our dataset following the crisis in 2009. Even the US government employed record levels of state ownership and fiscal stimulus. Although much was reversed quickly, state ownership has remained considerably higher than before the crisis in key industries, particularly in the EU (Megginson (2017)). Estimates suggest that majority-owned SOEs account for about EUR 2 trillion of assets and more than six million jobs in OECD member countries (OECD (2011)) and state ownership of equity represents nearly 20% of stock market capitalization worldwide (Borisova et al. (2012)).[1]

Musacchio and Lazzarini (2014) put forward four rationales for state ownership of firms. The industrial policy view rationalises state ownership as a means to correct market failures. Government ownership in banks might for example alleviate credit constraints for firms by allocating capital towards firms, which meet particular requirements (La Porta et al. (2002)).[2] State investors may also steer investments towards activities that yield the highest return for society or the state may act as a catalyst for novel industries, hereby contributing to the development of new activities that benefit society (Robinett, 2006). Moreover thanks to the government's deep pockets, a

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[1] In 2012, The Economist also devoted two longer articles to the increasing interference of governments into the private sector (The Economist (2012a); The Economist (2012b)).

[2] The presumption that governments use banks to achieve political goals has been shown a number of papers in several contexts. Carvalho (2014) for instance shows that in exchange for funding by government banks, Brazilian firms expand employment during election periods. This behaviour is certainly not confined to developed countries, as Englmaier and Stowasser (2017) show increases in bank lending in election periods. These authors however do not examine effects on the behaviour of lenders.

Figure 1: M&As by government entities in 27 European countries
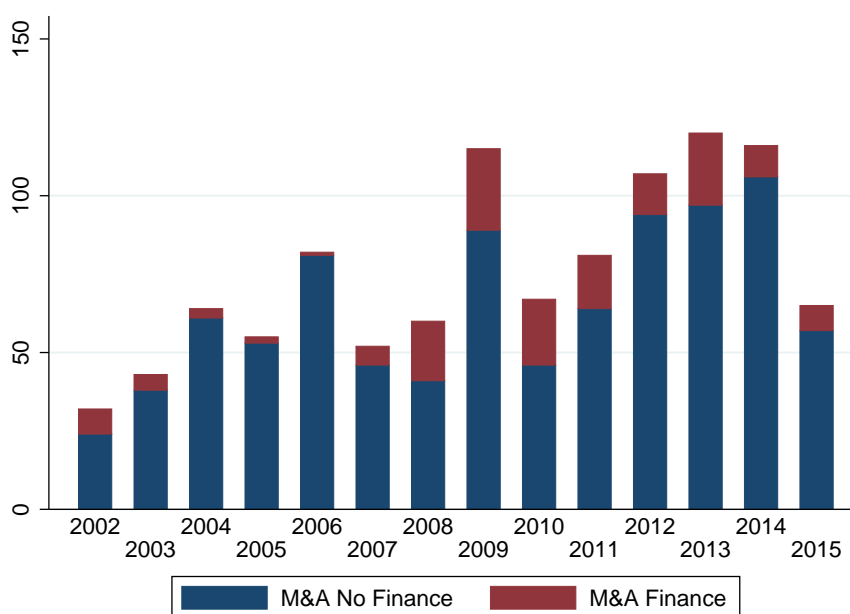
Data source: Zephyr. The figure plots the number of M&A transactions in the business economy for which the acquirer was listed as a government/state entity in Zephyr. We single out M&A transactions with targets in the financial sector as this sector is not covered in our final dataset. Transactions are restricted to those where the target's and acquiror's country is part of our dataset.

government-owned firm might be shielded away from bankruptcy and as such might be more eligible for bank funding (Boubakri and Saffar (2019)). Additionally these investors might shift a firm's focus from the maximization of profit towards the achievement of other goals; for instance the preservation of employment in general or provision of employment for certain societal groups (Schleifer and Vishny (1994)). This is the social view. The political view of state ownership emphasises government failure: politicians maximize self-interest rather than societal welfare.[3] Schleifer and Vishny (1994) introduce a bargaining model where politicians and state firms' managers bargain over excess employment and subsidies both in environments characterised by differential institutional strengths. Bennedsen (2000) suggest increased sensitivity to pressure groups in SOEs, rather than the wider population of constituents. Some papers suggest the use of government-owned banks for political gains in elections (Cole (2009); Carvalho (2014); Englmaier and Stowasser (2017)). Also government ownership in non-financial firms might be used to achieve political goals. Bertrand et al. (2018) find that CEOs of French listed firms alter employment decisions of their firms in order to support the re-election of connected politicians. For a broad European sample for firms, Borisova et al. (2012) provides evidence of inferior corporate governance performance accompanying firms with government owners, suggesting fewer monitoring mechanisms which can be put in position in case of pursuance of political goals. Finally, the path-dependence view explains the extent of state interventionism through

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[3]Moreover the fact that politicians, besides being the owners of the firm, also act as regulators might lead to a differential treatment in favour of state-owned firms.

a country's institutional and historical process (Musacchio and Lazzarini (2014)). The fact that despite several rounds of privatisation, a fair amount of state shareholdings still exist is in line with this view (see Megginson and Netter (2001)). Establishing state shareholdings or efforts to reduce these need take into account the existing interests of various actors. E.g. both Durant and Legge Jr (2002) and (North, 1993, p7) have found powerful actors to oppose privatisation for instance. Finally Megginson (2005) adds the protection of technology as a rationale for the government to actively pursue ownership in enterprises to the previous.

Academic research examining state ownership has evolved rapidly over the last ten years (Megginson (2017)). However, it is has largely done so in a particular direction: it has mainly focused on China and on a waver of indicators measuring financial performance of either Chinese SOEs or a limited set of high profile privatisations. This paper contributes to the literature by first building a large firm-level dataset which allows us to identify ownership stakes held by various government entities in 27 European countries. The constructed dataset relies on firm-level data from various versions of the Amadeus database published by Bureau Van Dijk (BvDEP). We use the ownership information in the database to identify state-ownership at firm-level in twenty-seven countries over the period 2002-2012.[4] We set up our procedure such that we are able to capture the broadest possible range of state ownership (see Borisova et al. (2015)). Hence we consider all levels of government, all nationalities of state investors, and also keep track of investments through Sovereign Wealth funds.[5] We further have a large set of balance-sheet data and other information available for the firms as constructed in Merlevede et al. (2015).

Various international institutions have also investigated the extent to which firms are owned by states: see Armoldus et al. (2016), Kowalski et al. (2013), OECD (2010) and more recently OECD (2017). Kowalski et al. (2013) uses Forbes 500/2000 data and examines the extent to which state-owned enterprises engage in international trade and Foreign Direct Investment (FDI). OECD (2010) and OECD (2017) rely on survey information obtained through national statistical agencies for a broad set of countries. Armoldus et al. (2016) is most similar to ours and uses the same underlying firm-level data to examine the relative performance of SOEs to private firms in the energy and railway sector and for a broader set of sectors in 8 CEEC-countries.. Our analysis is more wide-ranging and encompasses all industries in the business economy in 27 European countries. Further we rely on annual versions of the database which has a number of advantages discussed below.[6]

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[4]The countries are: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), the Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Great-Britain (GB), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), the Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Russia (RU), Spain (ES), Slovakia (SK), Slovenia (SI), Sweden (SE) and Ukraine (UA). We restrict our attention to the business economy, i.e. firms active in sectors with codes 10-74 of the NACE revision 1.1 classification, but exclude financial and insurance activities (i.e. sectors 65-67).

[5]Although one can think of the rationales outlined in this section to be solely attributable to domestic government entities, we do take into account a multitude of government owners. By the latter approach we can in fact examine heterogeneity in government ownership on firm outcomes. This allows us for example to examine the effect of ownership stakes of foreign government entities on firm performance, as we do below.

[6]Armoldus et al. (2016) seems to use a single version of the database, but this is not clearly indicated in their paper.

Faccio and Lang (2002) and La Porta et al. (1999) are examples of earlier academic work analysing corporate ownership structures. La Porta et al. (1999) find that large corporations are typically controlled by families or the state. Using a firm-level dataset spanning multiple countries, Faccio and Lang (2002) analyse ultimate ownership and control of 5,232 corporations in 13 Western European countries. La Porta et al. (2002) assess the extent to which the largest banks are owned by governments in 92 countries and relate this to the institutional characteristics of these countries and several macro-economic outcomes.

The rest of this paper is structured as follows. In the next section we dive into our procedure to identify SOEs. Next, section 3 documents a series of stylised facts with respect to SOEs in all industries and all countries in Europe. The section afterwards then relates state ownership to different country characteristics. In section 5 we analyse the financial and real performance of SOEs vis-à-vis their private counterparts through a matching exercise, taking into account heterogeneity in government entities. Finally section 6 concludes this paper.

2   Data source and identification of state-owned enterprises

We identify SOEs in the business economy[7] in a pan-European firm-level dataset that was constructed by compiling several annual versions of the Amadeus database by *Bureau Van Dijk*. We have extended the work of Merlevede et al. (2015) who provide more details on the procedure and representativeness of the data. In Appendix A we provide some summary information on the coverage and representativeness of the dataset. Compiling different versions of the database has a number of advantages. We are able to cover a longer time span than the most recent ten years of data a single issue of Amadeus contains. We are also able to properly account for the exit of firms. Firms that leave the market are dropped from the database after a short time period, introducing a survival bias in a single version. More importantly for our goal, a given version of Amadeus only includes the most recent ownership structure and therefore does not allow to track changes over time. Relying on a single issue is therefore suboptimal as it necessitates the assumption that the ownership structure of a given firm was stable over the previous ten years. Compiling different versions thus offers the possibility to obtain a time series of ownership information. We use annual versions for the period 2002-2012.[8] The ownership information section in the Amadeus database is our source for identifying state-owned enterprises (SOEs).[9] We consider a firm to be an SOE when state (government) entities hold at least 10% of shares. We interpret state entities as a broad concept and consider all possible entities, regardless of the nationality and level (local, federal or regional) of the state investor (see e.g. also Jaslowitzer et al. (2016)). We further include investments undertaken by government pension funds or sovereign wealth funds (see Jen (2007) for an overview on sovereign wealth funds).

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[7]We thus exclude hospitals, schools, ... We also exclude the financial sector as it is not covered in our primary database.

[8]The historical data product by Bureau Van Dijk starts ownership in 2007. We also have info for the period 1999-2002, but for most of the countries the number of available firms is changing dramatically. Therefore we opted to start our data in 2002.

[9]Throughout this paper we will use the terms SOE, government firm and 'state firm' interchangeably.

We use a broad definition as a starting point, but keep track of all information which allows us to easily narrow our definition where needed or relevant.[10] Regarding the ownership threshold, we did not find a common definition in the literature. For instance Armoldus et al. (2016) uses a 20% threshold, while on the other hand OECD (2010) uses different definitions according to the countries in the analysis. Our threshold of 10% is inspired by international institutions' threshold to discriminate between foreign direct investment and portfolio investment.[11]. As we retain the exact government share in the data we can straightforwardly change the threshold. This also allows us to make a distinction between majority-owned SOEs and minority-owned SOEs.[12]

In order to identify SOEs in the data we make maximal use of the different pieces of information Amadeus offers. First, the database offers information on direct and ultimate share holders through the items *shareholder type* and *GUO type* (Global Ultimate Owner)[13]. Within these items we find categories labelled as "State", "Public Authority", "Government" or a combination of these indicating SOE status. For direct shareholders we check whether the level of shareholdings meets the threshold.[14] A second piece of information is obtained through an analysis of shareholder and GUO names. Often information on the shareholder or GUO type is not available, but names are. To indicate potential SOE status we developed a lexicon with words referring to potential state-ownership in different languages.[15]. Appendix B contains the lexicon. Shareholders with a *shareholder name* or *global ultimate owner name* containing words from the lexicon were first flagged as potential SOEs and then manually confirmed. Again, for direct shareholders the exact ownership share was compared to the threshold of 10%. The final piece of information is the classification of firms by means of the item *legal form* in the database. In the appendix we show the list of legal forms indicating some form of state ownership. Adding the first two sources of information to the classification available in Amadeus substantially increases the number of SOE firm-year observations.

To illustrate and validate our identification procedure we first provide four examples of firms identified as SOEs. We then provide a cross-country overview of a number of listed firms with at least a single state shareholder which compares to the exercise in OECD (2010).

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[10]In a limited number of cases we detect gaps in annual information, most often with respect to ownership shares. If the information has not changed we simply fillout the gap. In case of a change in information we carry forward older information assuming the data provider is efficient in quickly detecting changes. If we have financial information that stretches back in time farther than we observe ownership information we carry the oldest information back in time.

[11]See for instance the definition by UNCTAD:http://unctad.org/en/Pages/DIAE/Foreign-Direct-Investment-%28FDI%29.aspx

[12]We do not discard info on government ownership that does not meet the threshold. For instance if a government shareholder owns 5% of the shares of a firm, we do not discard this information, but do not consider this firm to be an SOE, since 5% falls below the chosen threshold.

[13]A Global Ultimate Owner owns at least 25% of shares either directly or indirectly or through a combination of both and is itself not further controlled by another company. If the government as global ultimate owner controls less than 50%+1 of shares, we say that this firm is state-owned, but not majority-owned.

[14]We require at least one individual government shareholder to meet the threshold. To determine majority government ownership we sum over all government shareholders with more than 10% of shares.

[15]To give an example: a potential indication for a state shareholder can be "City". In Dutch the word for City is "Stad", in French "Ville", and so forth. So we made our procedure investigate whether shareholder names contain "City", "Ville", "Stad", ...

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- **Proximus.**[16] Proximus, until 2015 known as Belgacom, is a major Belgian firm active in the telecommunication sector and listed on the Bel20 stock-exchange in Brussels. Our procedure identifies Proximus as an SOE based on the *shareholder type* item. For Proximus this variable takes the value: 'State, Public Authority'. The state of Belgium appears as a shareholder, controlling 53,5% of shares in Proximus in 2007. This is confirmed in the company's financial report of 2007. Further shareholding is dispersed, with ownership information in Amadeus recording more than twenty different shareholders. The actual number of shareholders is even larger, but small (individual) shareholders are lumped together in the category 'Public'. The state of Belgium is recorded as the global ultimate owner of Proximus.

- **NMBS-SNCB.**[17] NMBS-SNCB is the Belgian public railway company. The firm is identified as an SOE through the *Global Ultimate Owner type* that reads 'State, Public Authority'. This is reflected in the name of the global ultimate owner, the Belgian state. The direct shareholder of this firm is the 'NMBS Holding Company' (ownership of 100%), which is ultimately owned by the Belgian state.

- **FN Herstal.**[18] FN Herstal is a Belgian company active in the defense and hunting industry, located in the city of Herstal in Belgium. It provides an example of multiple state shareholders and multiple levels of government. Looking at the shareholder information from Amadeus, we find two state shareholders on the basis of which we label FN Herstal as SOE. The first is the Walloon region (government) and the second the city of Herstal. Both shareholders are identified on the basis of the *shareholder type* item. The city of Herstal is an example of a local (municipal) government shareholder. The Walloon region is the global ultimate owner of the company.

- **Volkswagen.**[19] The German global car manufacturer Volkswagen is an example of a firm with state shareholders from different countries. As for Proximus above, we observe a multitude of (domestic and foreign) shareholders. We identify two main state shareholders. The first is linked to one of the German Länder, Niedersachsen. The second state shareholder is the State of Qatar through the investment vehicle 'Qatar Holding'. In 2009 the state of Qatar exercised a right to purchase a stake in the Volkswagen group. Doing so the state of Qatar increased its stake in Volkswagen from 0 to 17% (of voting rights). We observe this transaction in the data through the shareholder information. The information is confirmed in the Zephyr database[20] indicating that the state of Qatar acquired of a minority stake in Volkswagen. In 2009 the domestic state shareholder, Niedersachsen, held about 20% of shares. This information is confirmed in annual reports of the Volkswagen Group.

Table 1 provides examples of listed firms with at least one state shareholder in the different countries in our dataset. The table further includes information on the state

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[16]www.proximus.be

[17]www.belgianrail.be

[18]www.fnherstal.com

[19]www.volkswagenag.com

[20]Zephyr is a database by BvDEP providing information on worldwide mergers and acquisitions.

shareholder(s), the firms' industry and size, measured by the number of employees in 2009.[21] The top part of the table presents examples of listed SOEs. The table illustrates patterns that we generalise for the entire dataset in the next section. First, we observe SOEs in a wide array of sectors, ranging from manufacturing of food products and medical equipment (15 and 33) over the transporting sector (60, 62 and 63) and R&D (73). Second, we find varying levels of government among shareholders, ranging from the federal level, e.g. the Belgian federal government in Belgacom (Proximus), to the local level, e.g. Turun Kaupunki (village of Turun). We also observe ministries, state agencies and pension funds among the shareholders. Third, some companies have multiple state shareholders. E.g. the airport of Vienna (Flughafen Wien AG) has two government shareholders (at different levels, province and local level). Fourth, while state entities typically hold shares in domestic firms, cross-border holdings do exist, but mostly through investment funds and not necessarily controlling participations above 10%. The Norwegian government for example in 2009 held 8.47% of the shares in the British Axis-Shield PLC.

The resulting state ownership in our dataset matches with other sources quantifying state ownership in particular sectors or countries such as Bałtowski and Kozarzewski (2016), OECD (2010) and several official government sources.[22] Other papers, like e.g. Kalemli-Ozcan et al. (2015), demonstrate the strength of the ownership information in Amadeus (Orbis) in capturing foreign ownership. While different than our focus, this further testifies of the quality of ownership information that we find to apply to state ownership as well. In the next sections we first provide a summarising picture of SOEs in Europe, and then relate state ownership to country characteristics and end by comparing SOEs and privately held firms in terms of several performance indicators.

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[21]Due to space constraints we report two state shareholders for each firm at most. Some firms record many state shareholders. The Italian Iren SPA for example has more than 70 local state shareholders. For some countries, e.g. Bulgaria and Russia, the number of listed firms with a state investor is large. Again for space considerations we restricted ourselves to two firms per country.

[22]Some countries publish annual reports with a clear overview of the firms in which they have invested in, the activities of the firm, it's realizations and the like. See for instance the website of the Dutch Ministry of Finance: `https://www.rijksoverheid.nl/onderwerpen/staatsdeelnemingen` For France: `https://www.economie.gouv.fr/agence-participations-etat`. This is the website for l'Agence des Participations de l'État.

Table 1: Examples of listed state firms for the year 2009.

Country	Firm	NACE-Code	State-type Shareholder	Ownership Stake	Employees
AT	BURGENLAND HOLDING AG	74	wiener stadtwerke holding ag	10%	2
AT	FLUGHAFEN WIEN AG	63	province of lower austria	20%	3,000
		63	stadt wien	20.00%	
BE	BELGACOM	64	etat belge	53.50%	16,804
BE	ELIA SYSTEM OPERATOR	40	publi-t	33.01%	
CZ	CEZ, A.S.	40	state of czech republic (ministry of finance)	65.99%	7,500
CZ	MERO CR, A.S.	60	state of czech republic (ministry of finance)	100%	150
DE	BERCHTESGADENER BERGBAHN AG	60	Schönau am Königssee district	81.93%	30
DK	KØBENHAVNS LUFTHAVNE A/S	63	danish state	39.5%	1,898
DK	NUNAMINERALS A/S	73	grØnlands landsstyre	43%	16
EE	EESTI TELEKOM AS	74	estonian development fund	3%	14
			state of estonia (finance ministry)	24.17%	
ES	COMPANIA ESPANOLA DE PETROLEOS SA	23	international petroleum investment co.	47.06%	11,807
FR	AEROPORTS DE PARIS (A.D.P.)	63	Government of France	60.38%	12,096
FR	AIR FRANCE-KLM (AIR FRANCE)	74	Government of France	16%	104,721
HR	CROATIA AIRLINES D.D.	62	Republic of Croatia	94%	1,172
HR	DURO DAKOVIC HOLDING D.D.	74	Ministarstvo financija	18.83%	22
IE	AER LINGUS GROUP PUBLIC LIMITED COMPANY	62	Bank of Ireland nominees limited (nri)	3,12%	3,844
			Ministry of finance Republic of Ireland	25.35%	
IE	UNITED DRUG PUBLIC LIMITED COMPANY	51	Bank of Ireland nominees ltd.	19.84%	3,971
			Bank of Ireland asset management ltd.	3.83%	
IT	ACEA S.P.A.	40	comune di roma	51%	6,687
IT	ACSM S.P.A.	40	comune di como	24.76%	424
			comune di milano	2.00%	
LT	AB ALYTAUS TEKSTILE	17	state fund of property	69.56%	6
LT	AB KLAIPEDOS NAFTA	63	lietuvos respublikos ukio ministerija	70.63%	309
LV	LIEPAJAS AUTOBUSU PARKS AS	60	liepaja city council	34.85%	303
NL	BEURS ROTTERDAM N.V.	70	gemeente rotterdam	50%	39
NO	CERMAQ ASA	15	nÆrings- og handelsdepartementet	43.54%	
PL	BOGDANKA S.A. LUBELSKI WEGIEL	10	skarb panstwa / state treasury	65.5%	
PL	CIECH S.A.	51	skarb panstwa / state treasury	36.68%	6,972
RO	APOLLO SA	55	apaps (agency for privatization and management of state ownership)	70%	540
RO	ARCELORMITTAL TUBULAR PRODUCTS IASI SA	27	autoritatea pentru valorificarea activelor statului	17%	
RU	15-I TAKSOMOTORNYI PARK	60	departament imushchestva goroda moskvy	49%	77
RU	17 TAKSOMOTORNYI PARK	60	departament imushchestva goroda moskvy	49%	45
UA	APOSTOLIVSKIY KOMBIKORMOVIY ZAVOD	15	state of ukraine	100.00%	97

Listed firms with identified state shareholders. NACE-codes are revision 1.1. Percentages are direct ownership stakes by the listed shareholders. Names of firms/shareholders are directly taken from the database. As the information refers to the 2009 vintage of the database (as in OECD (2010)) names may have changed. Note that the table does not provide an exhaustive list of shareholders by firm, but only state participations.

Figure 2: SOE types as share of total number of firms.
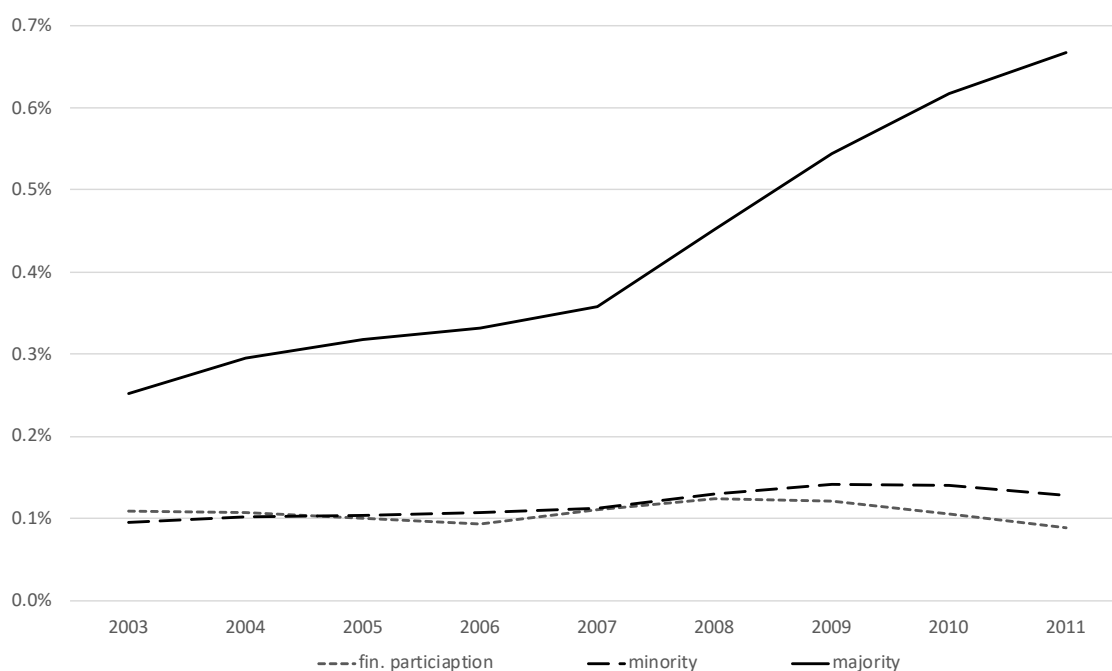
Note: Three year moving average from $t - 1$ to $t + 1$. Financial participation refers to a state share of less than 10% other than through sovereign wealth funds. Participations by foreign governments and sovereign wealth funds are excluded from the sample. Shares are calculated over all countries. The sample is restricted to firms that report output, employment and total assets.

3 State-owned enterprises across Europe

Going through our procedure we obtain a dataset for the business economy in 27 European countries for the period 2002-12. When we use all firms available in the database we observe on average 5,944,109 firms each year. Out of these, 21,377 are majority state-owned SOEs and 6,681 are minority state-owned SOEs. When we focus on firms that report output, employment and total assets (and clean for negative values of these) we retain 2,485,683 firms on average out of which 3,136 are at least minority state-owned on average. We focus on the latter sample for the remainder of the paper unless indicated otherwise. Figure 2 shows the evolution of the share of different types of state ownership. Financial participations of less than 10% and minority participations are reasonably stable around 0.1% of the total number of firms. There seems to be a slight increase just after the crisis, only to diminish shortly afterwards. These evolutions are dwarfed by the evolution of the number of majority participations for which we see a substantial increase after the crisis. Notwithstanding that we observe an upward move-

Figure 3: Type, level, and nationality of state owners - Distribution in the data.
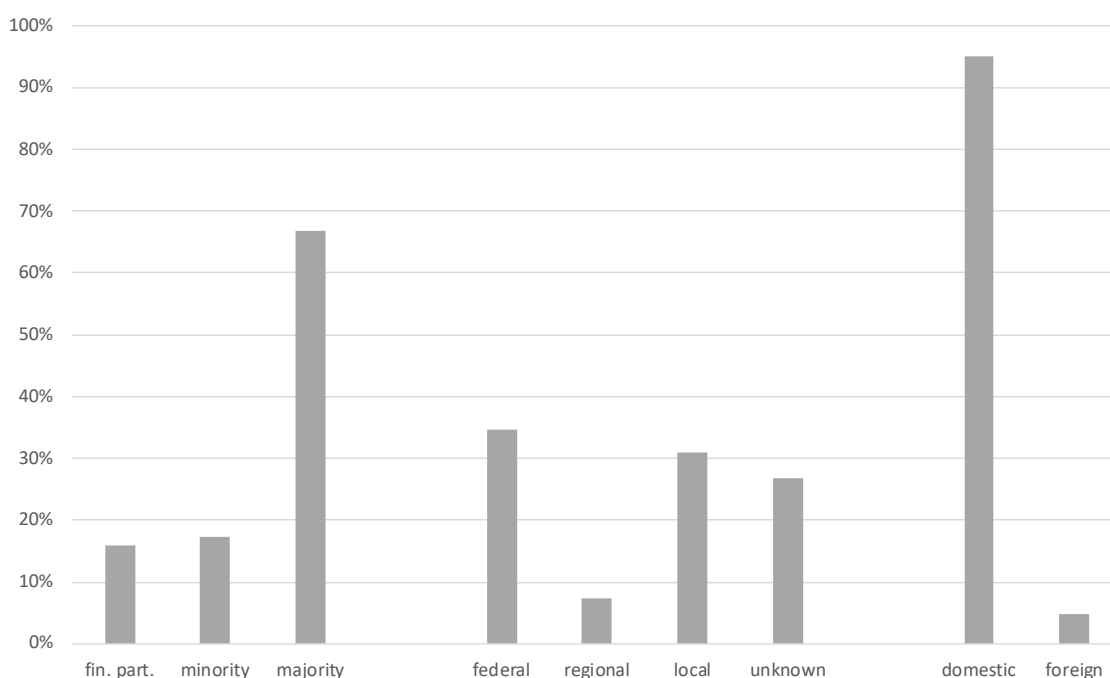
Note: Averages over years. The sample is all countries, restricted to SOES that report output, employment and total assets. Participations by sovereign wealth funds are excluded from the sample. Financial participations by governments (less than 10%) are excluded for level and nationality calculations.

ment before the crisis, there is a clear change in the trend. The share of majority participations increases from 0.35% on average in 2005-2007 to 0.64% in 2008-2012, a finding that confirms the observations made by Megginson (2017). Figure 2 further suggests that state investors typically hold majority positions when investing in firms. The left part of Figure 3 shows the distribution of government participation types. Roughly speaking, two thirds of government ownership come in the form of majority participations. Minority and financial participations account for about one sixth each.

Figure 3 further shows the distribution of state owners over different levels of government averaged over the period 2002-2012. For about 75% of state owners we are able to assign them to the federal, regional, or local level.[23] The federal and local levels are most important accounting for 34.7% and 31.1% respectively. The regional government level is much less common as investor, accounting for 7.4% on average. The regional government's share did increase in the later part of the period after the crisis. We also

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[23]In order to discriminate between these different levels, we browsed through our dataset of SOEs and assigned a level to the identified state entities. In case of doubt about the government level, we classified the government entity in the category 'unknown'.

Figure 4: State ownership across sectors.
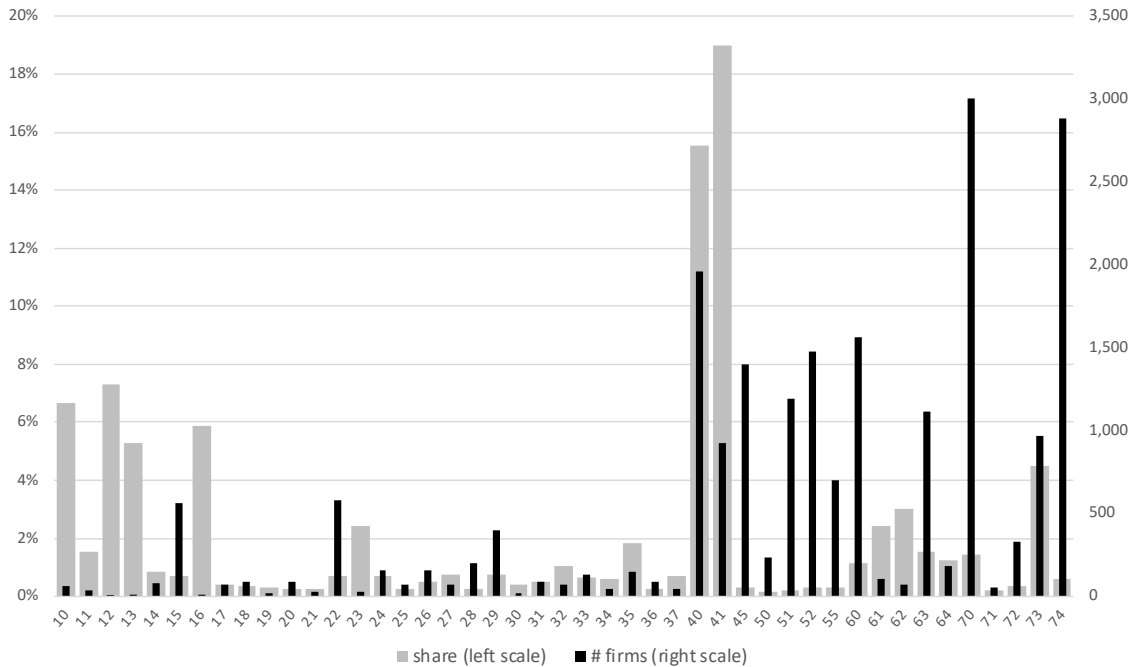
Note: LHS: Average share over years; RHS: #firms in 2010. The sample (all countries) is restricted to firms that report output, employment and total assets. Participations by governments of less than 10% and by sovereign wealth funds are excluded from the sample. SOEs are both majority and minority owned SOEs.

find 222 firm-year observations that relate to sovereign wealth funds, 90 of which in firms that report output, employment and total assets. In the remainder we exclude these from our sample. The second part of Figure 3 shows that state investment is very much a national operation. Only 5% of state investment is cross-border, this figure is stable throughout the period our sample covers and unaffected by the crisis.

In Figure 4 we illustrate the importance of state ownership across different industries in the business economy (see table D.1A and table D.1B in appendix D for a list of industry descriptions). The black bars indicate the total number of minority and majority SOEs in an industry in the year 2010, the grey bars indicate the share of SOEs out of total firms in the sample in an industry, averaged over the sample years. In terms of the number of firms most SOEs are observed in energy and water (codes 40-41) and services (codes 50-74). Since the latter are also the industries with the highest number of firms in general, the grey bars, indicating the share of SOEs to the number of firms in an industry, provide a different image. The share of SOEs in mining (codes 10-14) is also fairly high, while in manufacturing the share is typically small. The only excep-

Figure 5: Average SOE share in total assets, turnover, and employment across industries.
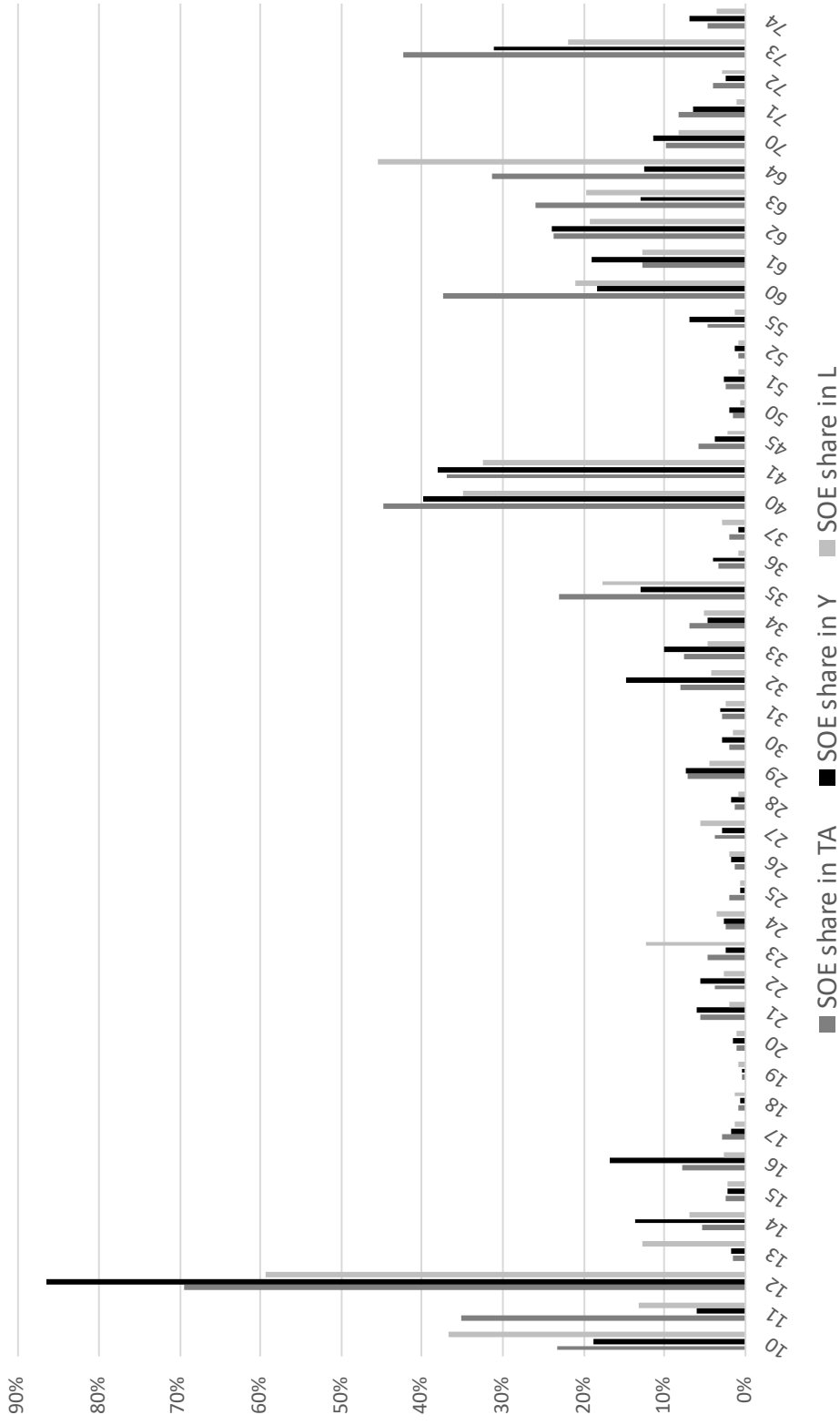
Note: Averages over 2002-12 and countries. The sample is restricted to firms that report output, employment and total assets. Participations by governments of less than 10% and by sovereign wealth funds are excluded from the sample. SOEs are both majority and minority owned SOEs.

Figure 6: Average SOE share in total assets, turnover, and employment of total business economy across countries.
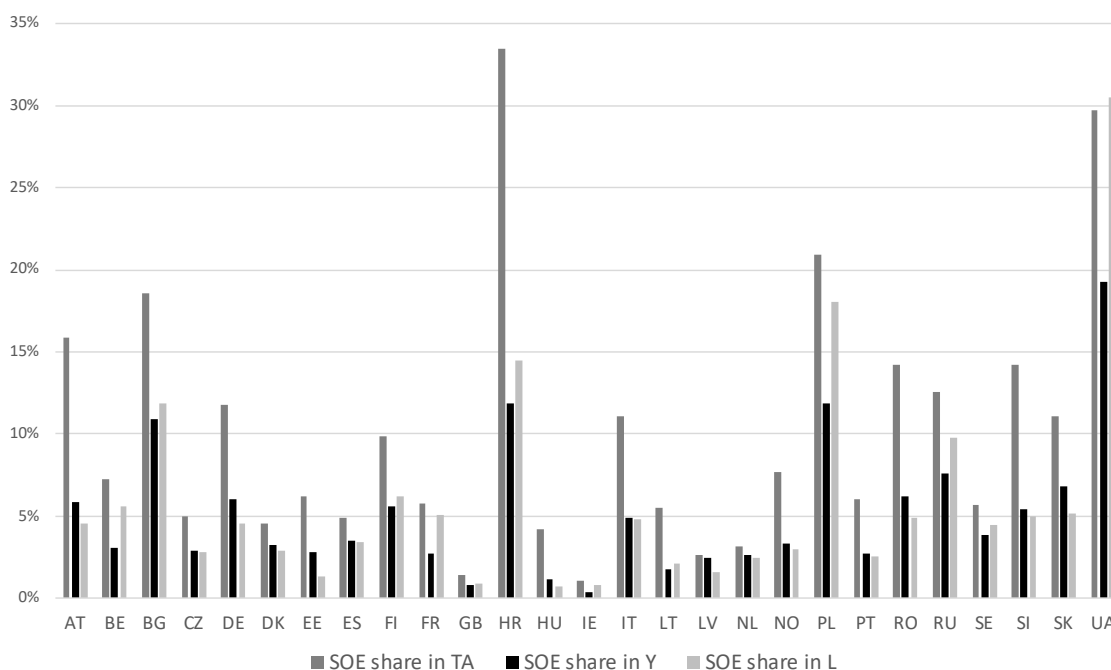
Note: Averages over 2002-12 and 2-digit industries. The sample is restricted to firms that report output, employment and total assets. Participations by governments of less than 10% and by sovereign wealth funds are excluded from the sample. SOEs are both majority and minority owned SOEs.

tions are the tobacco industry (code 16) and manufacturing of coke, refined petroleum products, and nuclear fuel (23), where we observe higher shares. In utilities (40-41) the large number of SOEs is also reflected in a high share of SOEs. Notwithstanding a high number of SOEs in services, the share of firms is typically not very high. The exceptions are *transport and communication* (codes 60-64) and *research and development* (code 73).

Figure 5 complements Figure 4, but measures the economic importance of SOEs more precisely. We do so by considering the share of SOEs in total industry assets, turnover, and employment calculated as in equation 1. This is a measure similar to the one used in e.g. Aitken and Harrison (1999) or Javorcik (2004) to measure foreign presence. SOE_{it} is a dummy variable indicating state ownership. For a given industry j in country c in year t we sum all assets, turnover, or employment (X) of SOEs and divide it by

total assets, turnover, or employment in industry j in country c in year t.

$$X\_SOEshare_{jct} = \frac{\sum_{i \in jc} SOE_{it} * X_{it}}{\sum_{i \in jc} X_{it}} \tag{1}$$

While SOE_{it} is a dummy variable indicating state ownership in equation 1, it can straightforwardly be split into majority-minority, federal-regional-local or domestic-foreign components to get a more detailed picture of (heterogeneous) government presence in different industries.

Figure 5 plots by industry the average over time and countries of equation 1. While there is some variation over the three measures, the overall findings in terms of the number of firms in Figure 4 are confirmed: we find the biggest state presence in mining, energy, transport and communication and research and development. Interesting to note is that in most sectors there is at least some government ownership. This is to a large extent driven by former communist countries. In Figure 6 we show the importance of state ownership across countries. We use the numbers obtained from the measure as given in equation 1, but now plot averages by country over industries and time. Generally, SOEs are more important in Eastern Europe, with the exception of the Baltic states and Hungary (see also Richmond et al. (2019)). Great Britain and Ireland on the other hand show the lowest levels of state ownership. In the next section we examine correlations between a variety of factors, financial/institutional, and state presence at the country-year level.

4 State ownership and country characteristics

Notwithstanding we focus on countries in Europe in the period 2002-2012, our sample still comprises a heterogeneous set of countries including former communist countries, countries from the 'core' and 'periphery' of Europe, large and small countries, etc. The already non-trivial heterogeneity among the 14 Western European countries is complemented and extended by 13 Eastern European countries that have been catching up at different speeds and to a different extent with the West. This variation allows us to relate SOE-presence at country level to other country characteristics. On the one hand we view this exercise a further elaboration of summary statistics on the dataset, on the other hand it serves as a raw validation of our exercise by analysing our dataset in terms of its cross-country distribution along the lines of some findings in previous literature.

La Porta et al. (1999) analyse how a country's legal origin affects its institutional and economic outcomes. They discriminate between different legal origins with English, German, French, Scandinavian and Socialist legal origins. Even though there sample is more international, these legal origins are present in our dataset.[24] According to La Porta et al. (1999) English common law countries should have a lower interventionist government. This based on the roots of this legal tradition, i.e. the desire of the political class to limit the power of the Crown. Countries with a socialist legal origin lie on the other side of the spectrum. They should have the highest government intervention, as the intent of groups within this legal tradition was the maintenance of power and resource extraction (La Porta et al., 1999, p.17). Other legal origins take a middle position between these extremes. In La Porta et al. (2002), the authors relate legal traditions to government intervention in the banking sector, defined as the average state ownership within a country's ten largest banks. Consistent with the historical outline provided in La Porta et al. (1999) the socialist legal origin records the highest government ownership in banks, while the English tradition lies on the other side of the spectrum, with the lowest government interference in large banks.

In figure 7 we show boxplots of SOE shares in total assets (calculated as in equation 1) over industry groups across legal traditions. While our dataset excludes the financial sector, it includes all other business activities. In that sense figure 7 is complementary to the analysis in La Porta et al. (2002). The top left and the bottom right panels show SOE shares in total assets for the socialist and English legal traditions. Figure 7 indeed confirms these two traditions as the extremes. For the socialist legal tradition we find considerably large SOE presence across all industry groups which is bigger than for any other legal tradition. For the English legal tradition on the other hand, we find only very limited SOE presence. *Transport and communication* (60-64) is the exception with at least some SOE presence but still considerably smaller than in other legal traditions. German, Scandinavian, and French hold the middle ground with larger participations in specific industry groups (specifically *Energy* (40-41) and *Transport and communication*), but not all industries as for the socialist legal tradition.

Table 2 presents the results of three regressions where 2-digit SOE shares in total industry assets, operating revenue, and employment are related to legal origin dummies.

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[24]English - GB, IE; German - AT, DE; French - BE, ES, FR, IT, NL, PT; Scandinavian - DK, FI, NO, SE; and Socialist - BG, CZ, EE, HR, HU, LT, LV, PL, RO, RU, SI, SK, UA.

Table 2: Legal origin and SOE shares at country level

	(1)	(2)	(3)
		SOE share in	
	total assets	operating revenue	employment
Socialist	13.004***	10.433***	13.009***
	[0.942]	[0.806]	[0.998]
German	10.794***	7.711***	8.689***
	[1.169]	[0.870]	[1.045]
Scandinavian	6.027***	4.688***	4.823***
	[0.880]	[0.695]	[0.737]
French	4.601***	3.009***	4.326***
	[0.747]	[0.619]	[0.693]
Observations	7,371	7,361	7,371
R-squared	0.390	0.385	0.416
Test for equality of coefficients			
Socialist=German	3.85*	10.47***	15.56***
Socialist=French	149.18***	162.13***	128.88***
Socialist=Scandinavian	70.87***	75.06***	102.42***
German=French	40.24***	49.62***	26.96***
German=Scandinavian	19.64***	16.61***	19.55***
French=Scandinavian	5.30**	15.03***	1.51

Excluded category is English legal origin; regressions include year and industry fixed effects. Bottom and top percentile for each legal tradition excluded. Standard errors are clustered at country-year level. */**/*** denote significance at the 10, 5 and 1% level respectively.

We control for industry and year fixed effects to account for business cycle effects and the fact that the nature of industries implies that they are historically more prone to government involvement (as is evident from figure 7). The excluded category is the English legal tradition. The table confirms the overall picture in figure 7: there is significantly less state ownership in English legal tradition countries than in countries with any other legal tradition. We find the highest point estimates for socialist legal tradition countries, F-tests reveal they are significantly different from the coefficients for other legal traditions. Further testing reveals the following ranking: socialist-German-Scandinavian-French-English. Note that the German legal tradition comprises only two countries, Austria and Germany. Coverage for both countries in the database is somewhat lower due to less stringent filing requirements. If SOEs are more likely to report than their private counterparts this might inflate SOE-presence compared to other countries. Nevertheless, the general result from figure 7 and table 2 is comforting in revealing the expected highest SOE presence for socialist legal origin countries and the lowest for English legal tradition countries with other traditions in between.

In table 3 we present regression results where we relate country-level SOE shares to other country-level characteristics. Each cell in the table refers to a regression with

Figure 7: SOE share in total assets over industry aggregates across legal origins.
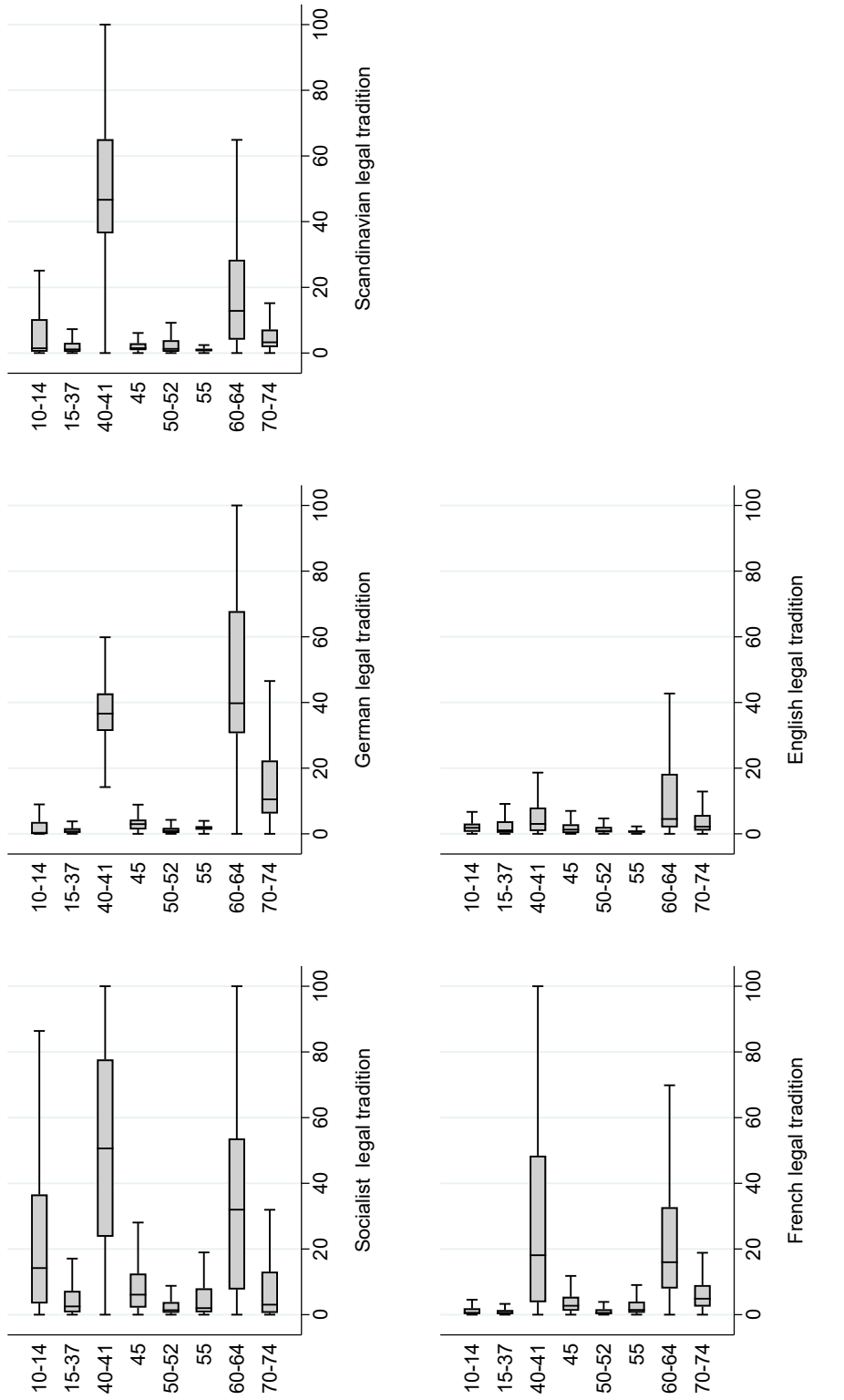
Note: Unit of observation is a country-year-NACE 2-digit combination. Industry legend: 10-14 Mining; 15-37 Manufacturing; 41-42 Electricity, gas, water; 45 Construction; 50-52 Wholesale and retail trade; 55 Hotels and restaurants; 60-64 Transport and communication; 70-74 Real estate, renting, R&D and other business activities. Legal origin classification based on La Porta et al. (2002). Boxplots: let x represent the variable of interest. The upper, middle and lower hinge of the box represents the 25th ($x_{[25]}$), 50th ($x_{[50]}$) and 75th ($x_{[75]}$) percentile, respectively. Define $x_{(i)}$ as the ith ordered value of x. The upper adjacent line has a value $x_{(i)}$ such that $x_{(i)} \leq U$ and $x_{(i+1)} > U$, where $U = x_{[75]} + 1.5(x_{[75]} - x_{[25]})$. The lower adjacent line has a value $x_{(i)}$ such that $x_{(i)} \geq L$ and $x_{(i+1)} < L$, where $L = x_{[25]} - 1.5(x_{[75]} - x_{[25]})$. Outside values excluded from graphs.

Table 3: Country characteristics and SOE shares at country level

	(1)	(2)	(3)
		SOE share in	
	total assets	operating revenue	employment
A - Financial development			
Domestic credit to private (%GDP)	-0.053***	-0.047***	-0.053***
	[0.009]	[0.008]	[0.009]
Stock market capitalisation (%GDP)	-0.063***	-0.058***	-0.070***
	[0.016]	[0.013]	[0.017]
Value of traded stocks (%GDP)	-0.042***	-0.039***	-0.050***
	[0.012]	[0.010]	[0.012]
B - Economic development			
log GDP per capita	-8.279***	-6.984***	-8.740***
	[0.799]	[0.653]	[0.798]
Agriculture share in value added	1.688***	1.366***	1.710***
	[0.183]	[0.152]	[0.186]
Services share in value added	-0.507***	-0.344***	-0.409***
	[0.115]	[0.097]	[0.120]
High tech export (% manuf. exp.)	-0.298***	-0.243***	-0.307***
	[0.061]	[0.051]	[0.062]
R&D technicians per mln. inhabitants	-0.005***	-0.004***	-0.005***
	[0.001]	[0.001]	[0.001]
C - Institutional characteristics			
Quality of government	-16.739***	-10.559***	-12.958***
	[3.491]	[2.106]	[1.966]
High Court independence	-2.310***	-1.594***	-1.966***
	[0.450]	[0.376]	[0.463]
Days required to register property	0.008*	0.006*	0.009**
	[0.004]	[0.003]	[0.004]
Corruption (0=corrupt; 100=clean)	-0.251***	-0.186***	-0.235***
	[0.032]	[0.027]	[0.033]
# Procedures to start business	1.192***	1.022***	1.354***
	[0.175]	[0.145]	[0.175]
Product market regulation[†]	8.364***	6.048***	7.501***
	[1.158]	[0.954]	[1.123]
Intellectual Property Rights	-5.423***	-3.609**	-4.726***
	[1.720]	[1.441]	[1.751]
Collectivism	0.171***	0.126***	0.171***
	[0.021]	[0.017]	[0.021]

[†]A higher value implies *more* regulation.

Each coefficient results from a different regression where country-time SOE shares obtained as an average over NACE 2-digit industries are regressed on the variable indicated by the row header. Column headers indicate the base variable for calculating SOE shares. All regressions include year fixed effects. Regressions under *Economic development* and *Institutional characteristics* include legal origin dummies as additional controls. The number of observations varies between 208 and 296 depending on the availability of explanatory variables (see table 4). */**/*** denote significance at the 10, 5 and 1% level respectively. For definitions, description and the source, the reader is diverted to table C.1 in the appendix.

the SOE share based on the variable in the column header, row headers indicate the explanatory variable. All regressions include year fixed effects, regressions under *Economic development* and *Institutional characteristics* further include legal origin dummies as additional controls. Country-level SOE shares are obtained by averaging over NACE 2-digit industries.[25] We use this setup to indicate correlations controlling for year effects.

The first three rows in panel A of table 3 introduce variables that try to capture the development of financial markets as it comes to financing of businesses. In our sample we find higher levels of SOE presence in the business sector (excluding the financial sector) in countries where banks provide less credit to the private sector, where the stock market is smaller and less liquid (as indicated by trading values).[26] In less developed financial markets we thus detect more government ownership of non-financial assets in the business economy. These findings are confirmed for SOE shares in operating revenue and employment in the business economy. The differences between the highest and lowest in sample values for these variables are associated with a 7 to 10 percentage points higher SOE share of total business economy assets (see table 4). These findings are complementary to La Porta et al. (2002) who find a significant correlation between the level of financial development of a country and the presence of governments in top banks. When we control for legal origin in these regressions, the correlations become insignificant. This is not surprising as La Porta et al. (2002) find government ownership of banks and therefore also financial development to be related to legal traditions. The results reported in panels B and C of table 3 come from regressions that do include legal origin dummies as control variables.

Panel B switches attention to variables indicating general economic development. All correlations are significant and have the expected signs. In countries with a higher GDP per capita we find lower levels of SOE shares in assets, turnover and employment. This holds controlling for legal origin and is thus not driven by differences between Western and Eastern Europe. The effect is quite large, a one standard deviation higher GDP per capita is associated with a 6.8 percentage-points lower SOE share in total assets. Using agriculture and services shares in a country's value added as alternative indicators of economic development confirms the negative correlation between development and government ownership of firms. The last two lines of panel B capture the level of technological sophistication by focusing on high tech exports and the number of R&D technicians. Both variables are associated with lower SOE shares. Overall panel B thus suggests a negative association between state ownership and the level of development.

A large literature in economics has identified the crucial role of institutions for economic development (see e.g. Hall and Jones (1999); Rodrik et al. (2004)). In panel C, we look at a heterogeneous set of institutional characteristics and relate these to government presence in our dataset. We first look at the 'Quality of government', an aggregate indicator developed by the International Country Risk Guide (Teorell et al. (2020)). It is computed as the average of variables on 'Corruption', 'Law and Order' and 'Bureaucracy Quality' and aims to capture different aspects of institutional qual-

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[25]Focusing on shares averaged over industries rules out effects that potentially originate from cross-country differences in sectoral specialisation.

[26]Unreported results for ATMs per capita are not as strong, but provide a similar indication. As a metric for financial development relevant to firms ATMs per capita is however less appropriate.

Table 4: Summary statistics of country characteristics and impact on SOE share in total assets

	(1)	(2)	(3)	(4)	(5)
				increase by/from	
	# obs.	mean	St. Dev.	1 St.Dev	min to max
A - Financial development					
Domestic credit to private (%GDP)	272	85.10	43.79	-2.32	-10.66
Stock market capitalisation (%GDP)	208	45.03	29.79	-1.88	-8.61
Value of traded stocks (%GDP)	239	32.60	36.22	-1.52	-7.71
B - Economic development					
log GDP per capita	296	10.02	0.82	-6.78	-31.14
Agriculture share in value added	296	3.21	2.44	4.12	23.75
Services share in value added	277	60.10	5.54	-2.81	-12.85
High tech export (% manuf. exp.)	296	12.70	7.63	-2.27	-11.30
R&D technicians per mln. inhabitants	230	875.34	577.59	-2.89	-11.48
C - Institutional characteristics					
Quality of government	296	0.718	0.18	-3.00	-10.46
High Court independence	296	1.74	0.96	-2.21	-11.17
Days required to register property	234	66.95	111.82	0.89	7.64
Corruption (0=corrupt; 100=clean)	295	61.28	21.46	-5.39	-19.08
# Procedures to start business	260	6.92	2.68	3.19	15.50
Product market regulation	222	1.58	0.34	2.81	14.81
Intellectual Property Rights	252	4.28	0.41	-2.21	-9.27
Collectivism	274	39.52	16.90	2.89	10.60

Columns (4) and (5) indicate the impact on the SOE share in total assets using the results from column (1) of table 3. Column (4) is the percentage point change in the SOE share due to a one standard deviation increase in the characteristic indicated in the row header, column (5) the percentage point change resulting from going from the sample minimum to the sample maximum.

ity in a synthetic measure. In table 3 we find that a higher score, i.e. better quality, is associated with lower SOE shares. An increase from the lowest value (Russia in 2002) to the highest value (Finland in multiple years) is associated with a 10%-points lower share of SOEs in total assets. Acemoglu et al. (2005) argue that secure property rights and equality before the law positively affect long run growth by encouraging investments in physical capital, human capital and technology. We find that countries with a less independent high court and more cumbersome procedures to register property also show higher SOE shares. Conversely, this implies less private activity in less secure settings. Going from the lowest to the highest value in our sample is associated with a change of the SOE share in total assets of 11 and 7.6 percentage points respectively. We find a similar association for corruption. Mauro (1995) has shown corruption affects growth negatively through an investment channel. We find more corrupt environments to be associated with higher government involvement, i.e. lower private involvement in the business economy. Djankov and Murrell (2002) show that countries with more limited governments have lighter regulation of entry. Countries with heavier regulation are more corrupt and have larger unofficial economies, but they do not have better quality of public or private goods. This supports the public choice view

that entry regulation benefits politicians and bureaucrats, rather than public interest theories of regulation. In table 3 we use the number of days it takes to start a business as a proxy for the regulation of entry. We find that heavier regulation is associated with more state involvement. The more encompassing OECD Product Market Regulation indicator confirms the positive correlation between heavier regulation and the SOE share in total assets, turnover, and employment.[27] The difference between the highest and lowest values in our sample are associated with a 15 percentage point difference in the SOE share in total assets (see table 4). In table 3 we find that in our sample countries with better protection of intellectual property rights have lower SOE shares. This is consistent with the rationale provided in Megginson (2005), that governments make use of their ownership stakes to protect technology. Finally, Gorodnichenko and Roland (2011) and Gorodnichenko and Roland (2017) analyse culture as a determinant of growth. They find that the individualist-collectivist cleavage is an important driver of growth: an individualist culture leads to more innovation and higher growth because of the social status rewards associated with innovation in such cultures.[28] For our sample the Hofstede indicator of collectivism (Hofstede (1980)) is significantly associated with state involvement. More collectivist societies with a higher tendency to strive for common goals show higher SOE shares, pointing to the potential of more deeply rooted reasons for the prevalence of state ownership.

Overall our findings in section 4 show that on the basis of our firm-level dataset we are able to reproduce country-level correlations that are in line with a large body of literature on government involvement in the economy. It testifies of the quality of our dataset that we are able to reproduce 'macro' findings from our micro dataset. We now move to the analysis at the firm-level.

5   State-owned enterprises versus privately held firms

In this section we turn to firm-level differences between state-owned and private firms. Our goal is to offer large sample stylised facts on 'equilibrium' differences between SOEs and privately owned firms (POEs). This differs from most of the literature that uses smaller samples and focuses on performance differences pre- and post privatisation of former SOEs (e.g. Megginson et al. (1994); Dewenter and Malatesta (2001)) or literature using newly privatised firms that differ in remaining state shares or in the speed of privatisation (Borisova and Megginson (2011); Ben-Nasr and Cosset (2014); Chen et al. (2018); Boubakri and Saffar (2019)). Such studies suffer from the lack of a proper control group. Even diff-in-diff settings, such as La Porta and López-de Silanes (1999), provide evidence on the effect of *privatisation* but do not shed light on the differences in performance *levels*. Furthermore, as shown by Bortolotti and Faccio (2008) and Harrison et al. (2019) in lots of cases governments retain some form of control of privatised firms through different mechanisms. In this section we focus on the comparison between SOEs that record a government ownership of at least 10% during the

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[27]We have applied a mild correction to the OECD indicator, as one of the sub-indices of this index captures state ownership in the economy. We discarded this item and recalculated to form the index used in this paper.

[28]This result is robust to controlling for other institutions. Gorodnichenko and Roland (2011) further provide evidence consistent with two-way causality between culture and institutions.

Table 5: Summary statistics of firm level variables - Full sample and matched sample

| | Full sample | | | | | | | | | | Matched sample | | | | |
| | *private firms* | | | | | *state-owned enterprises* | | | | | | | | | |
	N	Mean	St.Dev.	Median	IQR	N	Mean	St.Dev.	Median	IQR	N	Mean	St.Dev.	Median	IQR
age	26,205,045	14.22	18.93	11.00	11.00	206,926	20.18	20.16	15.00	10.00	264,973	20.83	20.79	15.00	9.00
log total assets	26,583,613	8.10	2.23	8.11	2.64	206,843	10.48	2.72	10.57	3.59	266,330	10.44	2.62	10.54	3.49
log operating revenue	26,113,777	8.46	2.08	8.44	2.53	204,250	10.29	2.47	10.35	3.14	266,330	10.14	2.43	10.22	3.16
employees	27,066,742	27.68	379.89	5.00	12.00	207,971	291.76	2557.82	37.00	124.00	266,330	227.67	1654.56	38.00	120.00
log revenue efficiency	26,113,777	6.66	1.46	6.76	1.56	204,250	6.72	1.80	6.74	2.27	266,330	6.56	1.79	6.52	2.23
log TFP	15,197,725	6.09	1.25	6.21	1.39	107,752	6.49	1.49	6.60	1.83	135,304	6.37	1.51	6.43	1.88
patenter dummy	27,066,742	0.01	0.09	0.00	0.00	207,971	0.02	0.14	0.00	0.00	266,330	0.02	0.12	0.00	0.00
log patent citations	26,972,531	0.01	0.12	0.00	0.00	206,639	0.02	0.25	0.00	0.00	264,864	0.01	0.20	0.00	0.00
exporter dummy	4,264,361	0.26	0.44	0.00	1.00	18,493	0.43	0.49	0.00	1.00	15,440	0.42	0.49	0.00	1.00
log exports	4,203,414	1.91	3.51	0.00	2.43	18,419	4.02	5.03	0.00	9.03	15,415	3.79	4.88	0.00	8.59
log wage	20,925,649	5.08	1.31	5.45	1.59	146,651	5.42	1.27	5.83	1.80	178,535	5.18	1.29	5.39	2.02
leverage	26,085,944	0.75	0.56	0.73	0.48	203,377	0.62	0.45	0.60	0.52	260,308	0.60	0.41	0.59	0.55
interest rate	14,090,734	0.03	0.03	0.02	0.03	121,564	0.02	0.02	0.02	0.03	150,571	2.49	2.60	1.81	3.02
FinCon	14,648,102	2.29	1.15	2.00	2.00	121,149	2.73	0.94	3.00	1.00	154,958	2.81	0.92	3.00	1.00
current ratio	25,003,554	2.55	4.96	1.27	1.28	196,969	3.07	8.82	1.28	1.36	253,977	2.98	7.41	1.28	1.43
solvency ratio	10,692,267	5.40	32.21	0.29	1.08	76,171	12.15	85.03	0.25	1.08	93,750	8.21	55.39	0.25	1.02
ROA	24,897,139	0.01	0.24	0.02	0.10	196,302	0.00	0.17	0.01	0.07	251,735	0.01	0.15	0.01	0.07
gross profit margin	20,212,268	-0.01	0.29	0.02	0.09	143,063	-0.07	0.62	0.02	0.11	181,936	-0.05	0.63	0.02	0.11
implicit tax rate	18,559,829	0.15	0.13	0.16	0.26	144,742	0.15	0.14	0.16	0.28	187,817	0.15	0.13	0.16	0.25

Matched sample is all SOE-years for which at least strict positive values of employment, operating revenue, and total assets are reported. The table presents summary statistics for variables to be used for firm-level analyses. T-tests for equality of means between POEs and SOEs in the full sample all reject at 1%-level. Regarding data on exports, we only have data for France and Croatia.

Figure 8: Number of SOEs among the 100 largest employers.
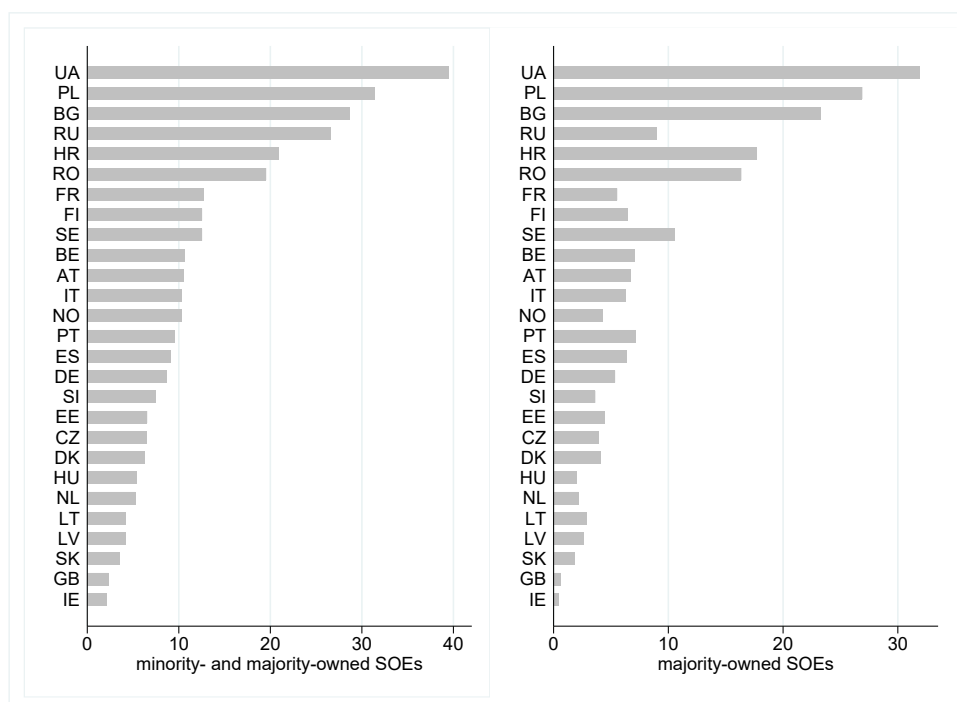
Note: Sample restricted to firms that report output, employment and total assets. Average over sample period. Participations by governments of less than 10% and by sovereign wealth funds were excluded.

entire sample period and POEs that never record any government ownership.

Tables 5 shows summary statistics for the full sample for SOEs and POEs separately and the matched sample. T-tests for equality of means between both types of firms firmly reject for all variables at conventional levels, which is not surprising given the number of observations. To avoid using the full sample where SOEs are number-wise less than one percent of the dataset, we have created a matched sample. In the matched sample SOEs are matched with POEs within country-year-two-digit-industry cells. We use total assets, firm age, foreign ownership and listed status dummies as explanatory variables in a probit estimation (estimated by country-broad industry categories). We then use nearest neighbour matching ensuring common support to obtain a dataset with more than 130,000 SOE-year observations and as much matched POE-year observations.[29] Depending on the exact variables used in the analyses the number of observations drop, but typically very proportional. For example, when we focus on total factor productivity we retain 135,311 observations of which 50.81 percent are SOEs. Since our dataset includes both SOEs and POEs and spans a wide variety of countries, industries and firm sizes, we believe it to be free from biases that may arise in samples that are limited in one or more of these dimensions and that are typically used in the

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[29]Note that the matching analysis is not aimed at causality claims, but is only there to make more meaningful comparisons.

Figure 9: Firm-level employment histogram - Private versus State owned enterprises.
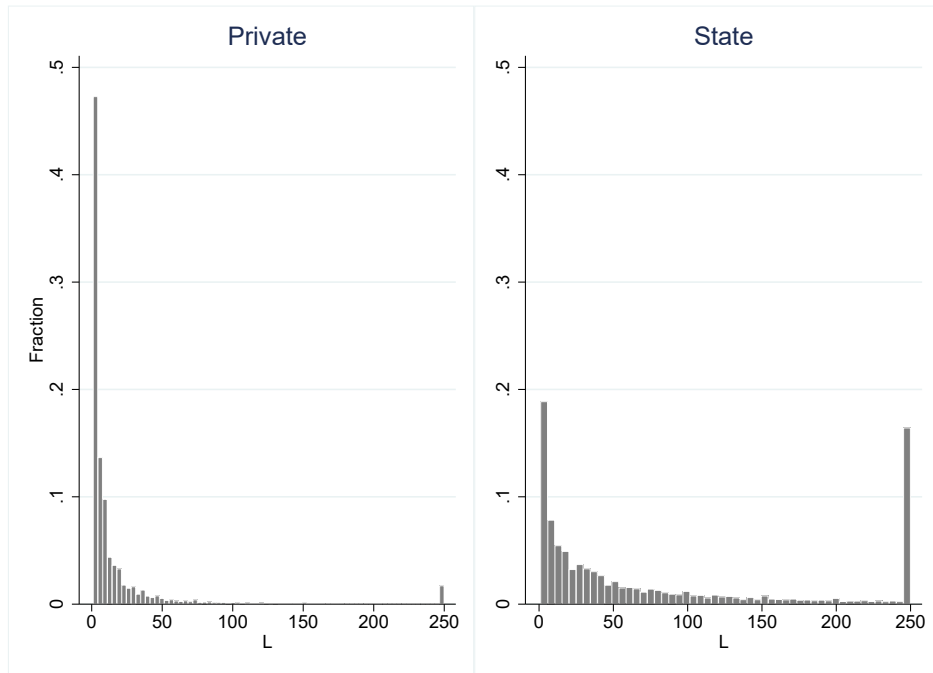

Note: Sample restricted to firms that report output, employment and total assets. Participations by governments of less than 10% and by sovereign wealth funds were excluded. SOEs are both majority and minority owned SOEs. Firms with more than 250 employees are added to the 250 employee bin.

literature.

Before proceeding with the regression analysis we draw the reader's attention to figures 8 and 9. Figure 8 seems to confirm the 'common knowledge' that SOEs are large. We find SOEs to be overrepresented among the top 100 employers. Whereas SOEs make up less than one percent of the total sample, we see a substantially higher SOE presence in the top 100 in most of the countries. It is noteworthy that also according to this metric the United Kingdom and Ireland show the lowest levels of SOE presence, while the list is topped by former communist countries with a socialist legal tradition. It does not fall within the scope of this paper, but the graph does suggest that — in the light of the literature on firm granularity (see Gabaix (2011))—- SOEs might well be important for aggregate outcomes. Figure 9, on the other hand, testifies of an under-appreciated fact. Notwithstanding the distribution of SOEs is skewed to the right compared to POEs, we do observe a substantial number of small SOEs, half of all SOEs employs less than 50 employees. While bigger firms are typically more relevant to macroeconomic outcomes, focusing on a limited number of large firms tends to under-appreciate how wide-spread and heterogeneous state ownership is.

We now examine differences between SOEs and POEs on the basis of the matched firms. To this end, we estimate equations along the following lines:

$$lnY_{ijct} = \beta_{jct} + \beta_1 SOE_{it} + \beta_2 lnAge_{it} + \beta_3 lnTA_{it-1} + \beta_4 lnRev_{it-1} + \beta_5 Foreign_{it} + \beta_6 Listed_{it} + \epsilon_{it}$$
(2)

here lnY_{ijct} is a specific firm characteristic of firm i in industry j in country c at time t. Firm characteristics are related to an SOE-indicator, SOE, which takes different forms (simple dummy, but also majority-minority split, and level of government split). β_1 is thus our coefficient of interest and indicates the correlation between government ownership and firm performance. We further control for firm age, lagged total assets, lagged real operating revenue[30], foreign ownership and listed status. Finally we include detailed country-2-digit-industry-year fixed effects β_{jct} that control for a wide range of possible confounding variables at different combinations of country, time, and industry levels (such as e.g. business cycle effects, competition effects, ...). Fixed effects control importantly for the competitive and regulatory setting that has been found to affect the difference between SOEs and POEs (see the review of Mühlenkamp (2015)).

Table 6 and table 7 present results for 16 indicators of real and financial performance of firms. Definitions of these variables can be found in table C.2 in the appendix. Both tables 6 and 7 contain three panels, the top panel A measures state ownership by a dummy variable set to one when state entities control at least ten percent of the shares. Panel B splits this dummy in a dummy for majority (more than 50%) and minority (between 10 and 50%) state participation.[31] Panel C looks at the level of government participation, SOEs with an unknown level and their matched POEs are excluded from the sample in this case.

SOEs are generally thought to prioritise social and political objectives over efficiency. Schleifer and Vishny (1994) stress that political interference results in excessive employment and lack of investment. Vickers and Yarrow (1991) argue for the lack of proper incentives and monitoring of managers as a source of the inefficiency of SOEs. Bertrand et al. (2018) find political connections to result in large amounts of resources being directed towards excessive job creation. Columns (1) and (2) of table 6 indeed suggest that SOEs on average employ more people and pay higher wages than their private counterparts in the same country-industry-year cell. Employment is about 22% higher and the average wage is about 2% higher. Dewenter and Malatesta (2001) expect SOEs to be technically less efficient than private firms because residual cash flow claims of SOEs are not transferable. This impairs residual claimant incentives to monitor managers. SOE employees indeed seem to be less productive as revenue efficiency, measured as real operating revenue per employee in column (3), is 26% lower than in POEs. Column (4) confirms this for a measure of total factor productivity, see Wooldridge (2009), that is about 25% lower in SOEs. Looking at panel B we see that qualitatively both majority and minority owned SOEs show significant differences with POEs in the same direction. Quantitatively, differences are larger for majority-owned SOEs. With respect to the level of government, federally-owned SOEs show the largest differences. Regionally and locally-owned SOEs show smaller but still sig-

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[30]We use country-2-digit-industry deflators.
[31]A state firm identified through the global ultimate owner is considered a majority-owned SOE.

nificant differences.[32] In the last 4 columns of table 6 we look at patenting and export behaviour, two types of activities that are strongly related to firm efficiency. Patent information considers applications at the European Patent Office (EPO). SOEs seem less likely to be patenting and the quality of patents measured by citations is also lower (Bortolotti et al. (2019)). Panel B and C suggest that these differences are driven by majority-owned SOEs and locally-owned SOEs. Minority-owned SOEs and federally owned SOEs do not seem to underperform POEs. These results might be consistent with the view of governments which are less keen to corporate risk-taking (Boubakri et al. (2013)). As innovation is risky, this higher aversion for risk might be one potential explanation. Moreover governments might strategically choose to (retain) hold minority stakes in strategic innovative firms to prevent leakage of knowledge. Whereas local governments might lack the financial capacity to aid owned firms into undertaking investments in R&D. In the last two columns we find that SOEs are also less likely to be exporters and the real value of exports is smaller. Majority or minority ownership does not seem to make a difference, both types are outperformed by POEs. Looking at panel C we find that federally-owned SOEs are not different from POEs when it comes to export behaviour. As we only have export data for France and Croatia, the sample is more limited compared to the other columns in table 6.

Table 7 shows the differences between SOEs and POEs in terms of a number of firm-level financial indicators. Again panel A considers all SOEs as a single category, and panels B and C focus on subtypes in terms of majority-minority and the level of government. Whereas other firms have to keep an eye on the costs, SOEs may enjoy implicit or even explicit state backing. States may interfere in case of a potential default because the fear of job losses urges politicians to act, in turn encouraging moral hazard. Managers of SOEs therefore have lower incentives for cost minimization and efficiency as the threat of closure by state officials is simply not credible Cavaliere and Scabrosetti (2008). Further it might be difficult to set objectives for state firms, since the owners, elected officials in government, change over time Megginson and Netter (2001). Such favourable conditions for SOEs were formally described by Kornai (1986) in the context of communist countries and since have been labelled 'soft budget constraints' (SBC).

Column 1 looks into leverage, measured as the ratio of outstanding debt to assets. We find SOEs to be less leveraged on average than POEs. The result is stable across types and level of government. This finding contrasts with much of the privatisation literature that finds a decrease in leverage post-privatisation (Dewenter and Malatesta (2001); Boubakri et al. (2012)). *We are however not investigating the effect of privatisation in a limited sample with high profile cases, but looking at the average difference between SOEs and POEs in absence of privatisation episodes. For our specific sample we do seem to find that SOEs are less leveraged. This finding holds across a battery of checks in appendix.* Column 2 looks into a direct indication of SBCs for SOEs by considering implicit interest rates (calculated as interests paid divided by the sum of short and long run debt).[33] SOEs enjoy on average a 39 basis points lower interest rates than POEs. This is largely driven by an effect for majority-owned SOEs and federally-owned SOEs. This suggests that

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[32]For all three categories about 81 to 82% of firms are majority owned by the federal/regional/local government.

[33]Borisova and Megginson (2011); Borisova et al. (2015) look into the effect of government ownership on the cost of debt for a privatised and a broad sample of SOEs, finding that SOEs are charged higher interest rates on issued bonds.

closer ties to the relevant level of government is likely to be associated with an SBC manifesting itself as a 50 basis points lower implicit interest rate. In column 3 we compare the indicator of financial constraints developed by Mulier et al. (2016) between firm types. This indicator has the benefit that it does not rely on stock market information, but only on accounting and other information that is more easily available. Therefore the indicator is well suited for our dataset with many unlisted firms. Results in column 3 suggest that SOEs are less financially constrained than POEs. Panels B and C reveal that this effect is mainly driven by majority and federally-owned SOEs. Locally-owned SOEs actually record a higher score than POEs.

Columns 4 and 5 look into firms' ability to cover their short and long term debt. The current ratio analyzed in column 4 identifies a firm's ability to cover its short-term debt with its current assets. The results in all three panels show that SOEs have a significantly lower current ratio on average than their private counterparts. This is consistent with the idea of SBCs with SOE managers being less worried about their firm's short term financial position because of state backing. Panels B and C indicate some quantitative differences between SOE types, but qualitatively the effect is similar. In column 5 we use solvency as a dependent variable to measure firms' ability to meet their long-term debts and financial obligations. In this case we do not find a difference between SOEs and POEs. A subdivision in minority-majority ownership neither seems to matter. The level of government reveals opposite effects of federal versus local ownership. Federally-owned SOEs have a higher score, whereas locally-owned SOEs on average have a lower score than POEs.

Models 6 and 7 of table 7 analyse the return on assets (ROA) and the profit margin. Return on assets is an indicator of how profitable a company is relative to its total assets, whereas the profit margin represents what percentage of sales has turned into profits. The extraction of corporate resources for political objectives is known to be a burden on a firm's profitability (Schleifer and Vishny (1994); Boubakri and Cosset (1998); Ben-Nasr et al. (2012)). This is what we find in columns 1 and 2 of panel A of Table 7 for the SOEs in our dataset. SOEs' return on assets are 3.6 percentage points lower than POEs' and their profit margin is on average about 9 percentage points lower. These effects seem 'universal' as panels B and C reveal that majority-minority or the level of government does not seem to matter. In column 8 we compare the effective tax rate (calculated as taxes paid over profits) of SOEs and POEs. The regression also controls for the profit margin in addition to the standard control variables listed in equation 2. SOEs do seem to enjoy a significantly lower tax rate on average, but given the average tax rate of 15%, a 0.4% seems a small effect. The result is fairly consistent between majority and minority-owned SOEs, the level of government (remember the sample is a smaller) reveals some heterogeneity with federally-owned SOEs paying higher taxes and regionally-owned SOEs paying lower taxes than POEs. Again, the effects are significant, but rather small.

In tables 8 and 9 we test whether the differences between SOEs and POEs found in tables 6 and 7 are different when SOEs are listed or owned by a foreign government. In the former case part of the shares floats on the stock market with non-government investors being present. This introduces additional monitoring and additional pressure on firm performance. In case the government participation is controlled by a foreign government, we expect this participation to be motivated by financial return rather

than the social reasons discussed above that mainly apply to national governments. In both cases we may thus expect the effects found in tables 6 and table 7 to be mitigated. This is exactly what we find in table 8. Most of the SOE effects in terms of real performance are undone for listed and foreign SOEs. Only with respect to wages and export behaviour this is not the case. Foreign SOEs actually pay even higher wages, but this is in line with the overall wage bonus in foreign firms. For listed SOEs the effect is not statistically different from non-listed SOEs. The same holds for export behaviour (recall the sample is limited to France and Croatia in this case). In case of financial performance, table 9 reveals a similar finding. The significant differences between SOEs and POEs found earlier in table 7 are mitigated or undone when SOEs are listed or owned by foreign governments.

In table 10 we investigate whether differences between SOEs and POEs are related to country-level characteristics. One may expect that countries oriented towards less government intervention may provide incentives for SOE managers to run their firms more like POEs. Castelnovo et al. (2019) find that in the telecommunications industry state ownership has a negative effect on firm-level TFP that is mitigated or even reversed by a favourable institutional environment. Table 10 considers in panels A, B, and C the quality of government, the number of procedures to start a business, and the indicator of collectivism (see also tables above) as indicators of the institutional environment. The column headings in table 10 refer to five representative firm-level characteristics: employment, TFP, wage, return on assets and the indicator of financial constraints. Panel A shows that a higher quality of government is associated with SOEs behaving more in line with POEs as can be seen from the opposite signs for the interaction term. A one standard deviation increase in the quality of government results in a 3.7%-points smaller employment difference, a 7.7%-points smaller TFP difference, a 4.2%-points smaller wage difference, a 0.7%-points smaller ROA difference, and a 0.05 smaller difference in financial constraints. Panel B uses the number of procedures to start a business as an indicator of government intervention. More procedures are associated with larger employment and TFP differences. A one standard deviation increase is associated with 8.3 and 9.4%-points larger differences between SOEs and POEs respectively. In countries with a higher number of procedures SOEs are less financially constrained, but quantitatively the effect is small. Finally we consider the Hofstede indicator of collectivism. In comparison to the previous two institutional features, one can think of this indicator as an even more deeply rooted characteristic of societies. Moreover in Collectivist societies one is more keen to achieving group outcomes. By using their stakes in firms governments might use these firms to act as a vessel into achieving these group outcomes. Panel C reveals that differences in collectivism are associated with differences in SOE-POE differences and thus in SOE performance. In more collectivist societies SOEs are bigger and pay higher wages, they are less performant in terms of TFP and return on assets, and considerably less financially constrained.

In table 10 we have analysed level differences between SOEs and POEs. Given the focus on institutional characteristics this seems appropriate. Government orientation is a further likely candidate to affect SOE performance, the idea being that left wing governments rather favour employment over efficiency compared to right wing governments.[34] As government orientation is clearly a dynamic characteristic, relating it

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[34]To define government orientation we make use of data by Cruz et al. (2018). Left is a dummy variable indicating a left orientation of the largest government party in a parliamentary system. If the system is

to level differences between SOEs and POEs seems not warranted. In tables 11 and 12 we therefore resort to a dynamic setting where we expect to be most likely observing the impact of government orientation. Table 11 analyses differences in employment *growth* between SOEs and POEs, table 12 differences in firm exit. We expect the effect of government orientation to be especially pronounced in times of crisis. This is exactly what we analyse in tables 11 and 12. The first column shows that employment *growth* is smaller in SOEs than POEs. This finding is confirmed in the other regressions in table 11. Columns 2 to 4 consider an interaction term to allow the difference between SOEs and POEs to vary across the business cycle. In column 2 we define a variable recession, which indicates the occurrence of a recession in a country*year cell.[35] Column 3 focuses on the Great Recession with GFC a dummy variable set to 1 in the years 2008 and 2009, in column 4 crisis is a dummy variable set to 1 from 2008 to 2012 taking into account the continuing crisis in Europe, especially in the Eurozone. This latter variable captures structural breaks in the dependent. As can be seen from column 2 to 4 the employment growth difference narrows in crisis times, likely due to SOEs responding less in terms of job cuts. Moreover model 4 shows that this appears to be a structural phenomena. This is confirmed in column 5 where we restrict the sample to majority-owned, non-foreign, non-listed SOEs (and their matches). In column 6 and 7 we add interaction effects with government orientation.[36] Results suggest that in the period after the outburst of the financial crisis, countries with left wing governments SOEs actually show higher (or less negative) employment growth rates than POEs. Finally, table 12 shows results for a linear probability model with firm exit as the dependent variable. Literature in the past has already shown that politically connected firms have a lower propensity to exit (Faccio (2006)). The structure of the table is the same as in table 11. SOEs are significantly less likely to exit the market than POEs, but quantitatively the effect is not large. In contrast to our findings on employment growth, government orientation does not seem to matter for the difference in exit probability between SOEs and POEs. This seems logical, since politicians irrespective of their orientation are very sensitive of firm closures.

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presidential, it is 1 if the country's president is left leaning.

[35]Quarterly, real and seasonally adjusted GDP data by the IMF was used to construct this binary indicator. A recession was defined as a period encompassing two executive quarters of negative real GDP growth.

[36]Level effects are absorbed by the high-dimensional fixed effects.

Table 6: Real performance of state-owned versus private enterprises - Matched sample evidence

	(1) employment	(2) wage	(3) rev. eff	(4) TFP	(5) patenter	(6) citations	(7) exporter	(8) exports
A - State-owned enterprises								
SOE	0.221***	0.023***	-0.264***	-0.247***	-0.004***	-0.002***	-0.027***	-0.276***
	[0.004]	[0.003]	[0.004]	[0.005]	[0.000]	[0.001]	[0.007]	[0.071]
n	243,173	157,832	241,886	120,441	243,173	241,673	12,166	12,152
R-sq.	0.739	0.771	0.673	0.710	0.221	0.245	0.405	0.474
B - Type of government participation								
Majority	0.253***	0.025***	-0.293***	-0.271***	-0.005***	-0.003***	-0.025***	-0.273***
	[0.004]	[0.003]	[0.005]	[0.005]	[0.000]	[0.001]	[0.008]	[0.074]
Minority	0.085***	0.017***	-0.142***	-0.165***	-0.001	0.001	-0.042***	-0.291**
	[0.007]	[0.005]	[0.008]	[0.008]	[0.001]	[0.001]	[0.014]	[0.134]
n	243,173	157,832	241,886	120,441	243,173	241,673	12,166	12,152
R-sq.	0.740	0.771	0.674	0.710	0.221	0.245	0.406	0.474
C - Level of government participation								
Federal	0.287***	0.048***	-0.345***	-0.299***	0.000	0.005***	0.012	0.068
	[0.006]	[0.005]	[0.007]	[0.007]	[0.001]	[0.001]	[0.009]	[0.086]
Regional	0.172***	0.052***	-0.210***	-0.184***	-0.001	0.001	-0.076***	-0.369*
	[0.010]	[0.009]	[0.011]	[0.014]	[0.001]	[0.002]	[0.021]	[0.203]
Local	0.182***	-0.003	-0.229***	-0.219***	-0.012***	-0.015***	-0.136***	-1.362***
	[0.006]	[0.005]	[0.007]	[0.008]	[0.001]	[0.001]	[0.012]	[0.112]
n	178,844	122,046	177,943	92,996	178,844	177,645	10,458	10,446
R-sq.	0.731	0.758	0.680	0.706	0.234	0.274	0.407	0.470

Panels A, B, and C are separate regressions. Dependent variables are in logs except patenter and exporter which are dummies. All regression are OLS with high dimensional fixed effects. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. */**/*** denote significance at the 10, 5 and 1% level respectively.

Table 7: Financial performance of state-owned versus private enterprises - Matched sample evidence

	(1) leverage	(2) interest rate	(3) FinCon	(4) current ratio	(5) solvency	(6) ROA	(7) profit margin	(8) tax rate
A - State-owned enterprises								
SOE	-0.024***	-0.392***	-0.101***	-0.637***	0.208	-0.036***	-0.089***	-0.004***
	[0.002]	[0.013]	[0.004]	[0.030]	[0.398]	[0.001]	[0.003]	[0.001]
n	238,052	137,919	138,514	232,045	82,320	229,376	161,198	114,108
R-sq.	0.130	0.174	0.355	0.075	0.076	0.090	0.118	0.271
B - Type of government participation								
Majority	-0.024***	-0.467***	-0.112***	-0.682***	0.317	-0.037***	-0.089***	-0.003***
	[0.002]	[0.014]	[0.004]	[0.032]	[0.426]	[0.001]	[0.003]	[0.001]
Minority	-0.023***	-0.123***	-0.058***	-0.450***	-0.177	-0.033***	-0.087***	-0.006***
	[0.003]	[0.022]	[0.007]	[0.053]	[0.667]	[0.001]	[0.005]	[0.001]
n	238,052	137,919	138,514	232,045	82,320	229,376	161,198	114,108
R-sq.	0.130	0.176	0.355	0.075	0.076	0.090	0.118	0.271
C - Level of government participation								
Federal	-0.028***	-0.545***	-0.187***	-0.368***	4.319***	-0.037***	-0.108***	0.002*
	[0.002]	[0.020]	[0.006]	[0.045]	[0.651]	[0.001]	[0.004]	[0.001]
Regional	-0.031***	-0.430***	-0.032***	-0.681***	0.872	-0.032***	-0.113***	-0.009***
	[0.004]	[0.034]	[0.011]	[0.076]	[1.015]	[0.002]	[0.009]	[0.003]
Local	-0.033***	-0.156***	0.014**	-0.854***	-3.233***	-0.032***	-0.059***	0.001
	[0.003]	[0.020]	[0.006]	[0.050]	[0.584]	[0.001]	[0.005]	[0.001]
n	175,240	103,612	112,172	170,010	66,355	168,439	127,152	88,493
R-sq.	0.137	0.193	0.347	0.080	0.084	0.103	0.130	0.275

Panels A, B, and C are separate regressions. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. Column (8) includes the profit margin as additional control. With the exception of column (3) the 1st and 99th percentile of the dependent variable were dropped from the estimation sample. */**/*** denote significance at the 10, 5 and 1% level respectively.

Table 8: Real performance of state-owned versus private enterprises: impact of foreign ownership and listed status

	(1) employment	(2) wage	(3) rev. eff	(4) TFP	(5) patenter	(6) citations	(7) exporter	(8) exports
	A - Listed state-owned enterprises							
SOE	0.222***	0.023***	-0.265***	-0.249***	-0.004***	-0.003***	-0.027***	-0.270***
	[0.004]	[0.003]	[0.004]	[0.005]	[0.000]	[0.001]	[0.008]	[0.072]
SOE*listed	-0.092**	-0.001	0.085*	0.182***	0.028***	0.071***	-0.043	-0.408
	[0.037]	[0.030]	[0.044]	[0.042]	[0.005]	[0.008]	[0.066]	[0.632]
n	243,173	157,832	241,886	120,441	243,173	241,673	12,166	12,152
R-sq.	0.739	0.771	0.673	0.710	0.221	0.245	0.406	0.474
	B - Foreign state-owned enterprises							
SOE	0.226***	0.021***	-0.272***	-0.261***	-0.004***	-0.003***	-0.030***	-0.331***
	[0.004]	[0.003]	[0.004]	[0.005]	[0.000]	[0.001]	[0.008]	[0.075]
SOE*foreign	-0.093***	0.029***	0.138***	0.221***	0.008***	0.011***	0.017	0.438**
	[0.014]	[0.011]	[0.016]	[0.017]	[0.002]	[0.003]	[0.020]	[0.190]
n	243,173	157,832	241,886	120,441	243,173	241,673	12,166	12,152
R-sq.	0.739	0.771	0.673	0.710	0.221	0.245	0.406	0.474

Panels A, B, and C are separate regressions. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. */**/*** denote significance at the 10, 5 and 1% level respectively.

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Table 9: Financial performance of state-owned versus private enterprises: Impact of foreign ownership and listed status

	(1) leverage	(2) interest rate	(3) FinCon	(4) current ratio	(5) solvency	(6) ROA	(7) profit margin	(8) tax rate
			A - Listed state-owned enterprises					
SOE	-0.024***	-0.396***	-0.101***	-0.642***	0.233	-0.036***	-0.088***	-0.004***
	[0.002]	[0.013]	[0.004]	[0.030]	[0.401]	[0.001]	[0.003]	[0.001]
SOE*listed	0.043***	0.264**	0.006	0.430	-2.054	0.023***	-0.037	0.013**
	[0.016]	[0.121]	[0.043]	[0.298]	[3.752]	[0.006]	[0.028]	[0.006]
n	238,052	137,919	138,514	232,045	82,320	229,376	161,198	114,108
R-sq.	0.130	0.174	0.355	0.075	0.076	0.090	0.118	0.271
			B - Foreign state-owned enterprises					
SOE	-0.027***	-0.396***	-0.091***	-0.681***	0.030	-0.037***	-0.091***	-0.003***
	[0.002]	[0.014]	[0.004]	[0.030]	[0.408]	[0.001]	[0.003]	[0.001]
SOE*foreign	0.056***	0.054	-0.138***	0.815***	2.718**	0.011***	0.033***	-0.008***
	[0.006]	[0.044]	[0.014]	[0.111]	[1.358]	[0.002]	[0.010]	[0.002]
n	238,052	137,919	138,514	232,045	82,320	229,376	161,198	114,108
R-sq.	0.131	0.174	0.355	0.075	0.076	0.090	0.118	0.271

Panels A, B, and C are separate regressions. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. Column (8) includes the profit margin as additional control. With the exception of column (3) the 1st and 99th percentile of the dependent variable were dropped from the estimation sample. */**/*** denote significance at the 10, 5 and 1% level respectively.

Table 10: Performance of state-owned versus private enterprises: Impact of country characteristics

	(1) employment	(2) TFP	(3) wage	(4) ROA	(5) FinCon
A - Quality of government					
SOE	0.347***	-0.524***	0.177***	-0.060***	-0.287***
	[0.011]	[0.019]	[0.012]	[0.002]	[0.014]
interaction	-0.207***	0.430***	-0.231***	0.040***	0.283***
	[0.018]	[0.027]	[0.018]	[0.003]	[0.020]
n	243,173	120,441	157,832	229,376	138,514
R-sq.	0.739	0.711	0.771	0.091	0.355
B - # Procedures to start a business					
SOE	0.003	0.045***	0.018*	-0.028***	-0.036***
	[0.013]	[0.015]	[0.010]	[0.002]	[0.012]
interaction	0.031***	-0.035***	0.001	-0.000	-0.008***
	[0.002]	[0.002]	[0.001]	[0.000]	[0.001]
n	184,857	120,441	157,827	174,336	138,514
R-sq.	0.756	0.711	0.771	0.108	0.355
C - Collectivism					
SOE	0.153***	-0.180***	-0.075***	-0.006**	0.086***
	[0.013]	[0.015]	[0.010]	[0.002]	[0.013]
interaction	0.049**	-0.068**	0.214***	-0.074***	-0.449***
	[0.025]	[0.034]	[0.022]	[0.005]	[0.029]
n	208,329	100,114	129,078	195,948	106,533
R-sq.	0.726	0.715	0.757	0.095	0.383

Dependent variables in logs. Monetary values in real terms. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), lagged operating revenue, foreign ownership dummy, listed firm dummy. Collectivism has been transformed to vary between 0 and 1. Level effects of country characteristics are absorbed by fixed effects. */**/*** denote significance at the 10, 5 and 1% level respectively.

Table 11: SOEs and firm-level employment growth: Impact of crisis and government orientation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	-0.022***	-0.020***	-0.027***	-0.031***	-0.027***	-0.020***	-0.015***
	[0.002]	[0.002]	[0.002]	[0.003]	[0.003]	[0.004]	[0.005]
SOE*recession		0.006***					
		[0.002]					
SOE*GFC			0.021***				
			[0.004]				
SOE*crisis				0.013***	0.010***	0.004	-0.003
				[0.003]	[0.004]	[0.005]	[0.006]
SOE*left						0.015***	0.003
						[0.005]	[0.007]
SOE*crisis*left							0.021**
							[0.010]
n	247,101	150,633	247,101	247,101	189,123	148,245	148,245
R-sq.	0.072	0.059	0.072	0.072	0.074	0.060	0.060

Dependent variable is the change in log employment. Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. Columns (1)-(4) use the full sample of firms, columns (5)-(7) focus on majority-owned, non-foreign, non-listed SOEs only. */**/*** denote significance at the 10, 5 and 1% level respectively.

6 Conclusion

In this article we have used raw data from the Amadeus database to develop a large firm-level dataset to analyse government presence in Europe. We use different pieces of information from the database, including a name/type text searching algorithm to identify potential indications of state ownership. The dataset covers 27 European countries over the period 2002-2012. On average, in our full dataset, we annually observe 35,596 firms with a state participation; 21,377 of these are majority-owned by the state. From 2008 onwards the share of majority-owned SOEs in the total number of firms increases substantially from about 0.35% to 0.65%. For about 75% of SOEs we are able to assign them to the federal, regional, or local government level. Federal and local governments are most important accounting for 34.7% and 31.1% respectively. The regional government level is much less common as investor, accounting for only 7.4% on average. We also find 222 firm-year observations that relate to sovereign wealth funds.

Government ownership of firms is widespread over the European continent. Countries with a socialist legal origin show the highest number of SOEs and SOEs are present in almost all sectors. Countries with an English legal origin show the lowest numbers of SOEs. Notwithstanding an expected tendency towards concentration in the mining, energy, transport, postal and telecommunication sectors, we do detect non-negligible government ownership in all sectors of the business economy. When we take a broader view and examine characteristics which correlate with government presence in the

Table 12: SOEs and exit: Impact of crisis and government orientation- Linear probability model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	-0.004***	-0.012***	-0.004**	0.000	-0.000	-0.020***	-0.018***
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]	[0.004]	[0.005]
SOE*recession		-0.003					
		[0.002]					
SOE*GFC			-0.002				
			[0.003]				
SOE*crisis				-0.010***	-0.011***	-0.008*	-0.013**
				[0.003]	[0.003]	[0.005]	[0.006]
SOE*left						0.007	0.002
						[0.005]	[0.006]
SOE*crisis*left							0.013
							[0.010]
n	96,563	75,052	96,563	96,563	70,621	44,822	44,822
R-sq.	0.070	0.072	0.070	0.070	0.078	0.087	0.087

Dependent variable is firm exit, a dummy variable equalling 1 if the firm exits the sample in the next year. Included control variables in all regressions: country#industry#year fixed effects, firm age, TFP, firm employment, return on assets; and if applicable to the sample foreign ownership and listed firm dummies. Columns (1)-(4) use the full sample of firms, columns (5)-(7) focus on majority-owned, non-foreign, non-listed SOEs. */**/*** denote significance at the 10, 5 and 1% level respectively.

business sector, we find that lower levels of economic and financial development, and lower scores on institutional characteristics are associated with higher levels of government ownership at country-level. More collectivist societies also show higher levels of government ownership. These findings all concord with the variety of theories — industrial, social, rent extraction — put forth on state ownership (La Porta et al. (2002); Megginson (2005); Musacchio and Lazzarini (2014)).

Zooming in to the firm-level, we notice several interesting facts. While SOEs are on average larger than privately-owned firms (POEs), half of the SOEs employs less than 50 people. Which contradicts the widespread perception that SOEs are always large sluggish conglomerates. Through a matching exercise we show that SOEs are outperformed by POEs in terms of 16 real and financial firm level indicators. On average SOEs employ more workers, are less profitable and less productive. These real and financial performance differentials are not set in stone however. In our analyses we find significant counteracting forces exercised by foreign government shareholders, the institutional environment and quotation on a stock exchange. In general these forces do not seem to fully counteract the effect of governments, and thus the performance differential between SOEs and POEs. Consistent with the idea that societies tend to use stakes in firms in order to achieve beneficial effects for society as a whole, we find that the effect varies along the spectrum collectivist vs individualistic society.

In societies characterised by a higher degree of collectivism, we find that SOEs employ more workers, have a higher wage cost per worker and are less efficient (profitable). In times characterised by economic crises, SOEs take on a stabilising role and show a higher employment growth than POEs. This effect holds for a variety of crisis dummies and in addition this effect appears to be higher for countries with left leaning politicians in power. Even though on average employment growth is lower for SOEs vis-à-vis POEs, we find evidence of a structural brake for the period 2008-2012, where this gap in employment growth becomes smaller, or even is higher for countries with leftish politicians. When looking at the propensity to exit the dataset, we find that SOEs are less likely to exit and that this effect is independent of the orientation — left vs right — of politicians.

References

Acemoglu, D., S. Johnson, and J. A. Robinson (2005). *Institutions as a Fundamental Cause of Long-Run Growth. Published in Handbook of Economic Growth*, Chapter 6. Elsevier.

Aitken, B. J. and A. E. Harrison (1999). Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. *American Economic Review 89*(3), 605–618.

Armoldus, P., M. Brons, E. Canton, and P. Pontuch (2016). State-Owned Enterprises in the EU: Lessons Learnt and Ways Forward in a Post-Crisis Context. Institutional paper, European Commission.

Bałtowski, M. and P. Kozarzewski (2016). Formal and real ownership structure of the Polish economy: state-owned versus state-controlled enterprises. *Post-Communist Economies 28*(3), 405–419.

Ben-Nasr, H., N. Boubakri, and J.-C. Cosset (2012). The Political Determinants of the Cost of Equity: Evidence from Newly Privatized Firms. *Journal of Accounting Research 50*(3), 605–646.

Ben-Nasr, H. and J.-C. Cosset (2014). State Ownership, Political Institutions, and Stock Price Informativeness: Evidence from Privatization. *Journal of Corporate Finance 29*, 179–199.

Bennedsen, M. (2000). Political Ownership. *Journal of Public Economics 76*(3), 559–581.

Bertrand, M., F. Kramarz, A. Schoar, and D. Thesmar (2018). The Cost of Political Connections. *Review of Finance 22*(3), 849–876.

Borisova, G., P. Brockman, J. M. Salas, and A. Zagorchev (2012). Government ownership and corporate governance: Evidence from the EU. *Journal of Banking & Finance 36*(11), 2917–2934.

Borisova, G., V. Fotak, K. Holland, and W. L. Megginson (2015). Government ownership and the cost of debt: Evidence from government investments in publicly traded firms. *Journal of Financial Economics 118*(1), 168–191.

Borisova, G. and W. L. Megginson (2011). Does Government Ownership Affect the Cost of Debt? Evidence from Privatization. *The Review of Financial Studies 24*(8), 2693–2737.

Bortolotti, B. and M. Faccio (2008). Government Control of Privatized Firms. *The Review of Financial Studies 22*(8), 2907–2939.

Bortolotti, B., V. Fotak, and B. Wolfe (2019). Innovation at State-Owned Enterprises. *BAFFI CAREFIN Centre Research Paper No. 2018-72* (2018-72).

Boubakri, N. and J.-C. Cosset (1998). The Financial and Operating Performance of Newly Privatized Firms: Evidence from Developing Countries. *The Journal of Finance 53*(3), 1081–1110.

Boubakri, N., J.-C. Cosset, and W. Saffar (2012). The impact of political connections on firms'operating performance and financing decisions. *Journal of Financial Research 35*(3), 397–423.

Boubakri, N., J.-C. Cosset, and W. Saffar (2013). The role of state and foreign owners in corporate risk-taking: Evidence from privatization. *Journal of Financial Economics 108*(3), 641–658.

Boubakri, N. and W. Saffar (2019). State Owwnership and Debt Choice: Evidence from Privatization. *Journal of Financial and Quantitative Analysis 54*(3), 1313–1346.

Budd, J. W., J. Konings, and M. J. Slaughter (2005). Wages and International Rent Sharing in Multinational Frms. *The Review of Economics and Statistics 87*(1), 73–84.

Carvalho, D. (2014). The Real Effects of Government-Owned Banks: Evidence from an Emerging Market. *The Journal of Finance 69*(2), 577–609.

Castelnovo, P., C. F. Del Bo, and M. Florio (2019). Quality of institutions and productivity of State-Invested Enterprises: International evidence from major telecom companies. *European Journal of Political Economy 58*, 102 – 117.

Cavaliere, A. and S. Scabrosetti (2008). Privatization and efficiency: From principals and agents to political economy. *Journal of Economic Surveys 22*(4), 685–710.

Chen, R. R., S. El Ghoul, O. Guedhami, and R. Nash (2018). State ownership and corporate cash holdings. *Journal of Financial and Quantitative Analysis 53*(5), 2293–2334.

Cole, S. (2009, January). Fixing market failures or fixing elections? agricultural credit in india. *American Economic Journal: Applied Economics 1*(1), 219–50.

Cruz, C., P. Keefer, and C. Scartascini (2018). Database of Political Institutions 2017 (DPI2017). Technical report, Inter-American Development Bank.

Desai, M., P. Gompers, and J. Lerner (2003). Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe. Technical Report 10165, National Bureau of Economic Research.

Dewenter, K. L. and P. H. Malatesta (2001). State-Owned and Privately Owned Firms: An empirical Analysis of Profitability, Leverage, and Labor Intensity. *American Economic Review 91*(1), 320–334.

Djankov, S. and P. Murrell (2002). Enterprise Restructuring in Transition: A Quantitative Survey. *Journal of Economic Literature 40*(3), 739–792.

Durant, R. F. and J. S. Legge Jr (2002). Politics, public opinion, and privatization in France: Assessing the calculus of consent for market reforms. *Public Administration Review 62*(3), 307–323.

Englmaier, F. and T. Stowasser (2017, 04). Electoral Cycles in Savings Bank Lending. *Journal of the European Economic Association 15*(2), 296–354.

Faccio, M. (2006). Politically Connected Firms. *American Economic Review 96*(1), 369–386.

Faccio, M. and L. H. Lang (2002). The ultimate ownership of Western European corporations. *Journal of Financial Economics 65*(3), 365 – 395.

Ferrando, A. and A. Ruggieri (2015). Financial constraints and productivity: Evidence from euro area companies. *International Journal of Finance & Economics 23*(3), 257–282.

Gabaix, X. (2011). The Granular Origins of Aggregate Fluctuations. *Econometrica 79*(3), 733–772.

Gorodnichenko, Y. and G. Roland (2011). Which Dimensions of Culture Matter for Long-Run Growth? *American Economic Review 101*(3), 492–98.

Gorodnichenko, Y. and G. Roland (2017). Culture, Institutions, and the Wealth of Nations. *The Review of Economics and Statistics 99*(3), 402–416.

Hall, R. E. and C. I. Jones (1999). Why do Some Countries Produce So Much More Output Per Worker than Others? *The Quarterly Journal of Economics 114*(1), 83–116.

Harrison, A., M. Meyer, P. Wang, L. Zhao, and M. Zhao (2019). Can a Tiger Change Its Stripes? Reform of Chinese State-Owned Enterprises in the Penumbra of the State. Working Paper 25475, National Bureau of Economic Research.

Hofstede, G. (1980). *Culture's Consequences*. Sage.

Hsieh, C.-T. and Z. M. Song (2015). Grasp the Large, Let Go of the Small:: The Transformation of the State Sector in China. *Brookings Papers on Economic Activity*, 295–346.

Jaslowitzer, P., W. L. Megginson, and M. S. Rapp (2016). Disentangling the Effects of State Ownership on Investment - Evidence from Europe.

Javorcik, B. S. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review 94*(3), 605–627.

Jen, S. (2007). Sovereign Wealth Funds: What they are and what's happening. *World Economics 8*(4), 1–7.

Kalemli-Ozcan, S., B. Sorensen, Villegas-Sanchez, V. Volosovych, and S. Yesiltas (2015). How to Construct Nationally Representative Firm Level Data from the Orbis Gobal Database. Working Paper 21558, National Bureau of Economic Research.

Klapper, L., L. Laeven, and R. Rajan (2006). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics 82*(3), 591–629.

Kornai, J. (1986). The Soft Budget Constraint. *Kyklos 39*(1), 3–30.

Kowalski, P., M. Büge, M. Sztajerowska, and M. Egeland (2013). State-Owned Enterprises Trade Effects and Policy Implications. OECD Trade Ploicy Papers 147, OECD.

La Porta, R., F. Lopez-De-Silanes, and A. Shleifer (1999). Corporate Ownership Around the World. *The Journal of Finance 54*(2), 471–517.

La Porta, R., F. Lopez-De-Silanes, and A. Shleifer (2002). Government Ownership of Banks. *The Journal of Finance 57*(1), 265–301.

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. Vishny (1999). The Quality of Government. *The Journal of Law, Economics, and Organization 15*(1), 222–279.

La Porta, R. and F. López-de Silanes (1999). The Benefits of Privatization: Evidence from Mexico. *The Quarterly Journal of Economics 114*(4), 1193–1242.

Lenaerts, K. and B. Merlevede (2015). Firm size and spillover effects from foreign direct investment: the case of Romania. *Small Business Economics 45*(3), 595–611.

Mauro, P. (1995). Corruption and Growth. *The Quarterly Journal of Economics 110*(3), 681–712.

Megginson, W. L. (2005). *The Financial Economics of Privatization*. Oxford University Press.

Megginson, W. L. (2017). Privatization, state capitalism, and state ownership of business in the 21st century. *Foundations and Trends® in Finance 11*(1-2), 1–153.

Megginson, W. L., R. C. Nash, and M. Van Randenborgh (1994). The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis. *The Journal of Finance 49*(2), 403–452.

Megginson, W. L. and J. M. Netter (2001). From State to Market: A Survey of Empirical Studies on Privatization. *Journal of Economic Literature 39*(2), 321–389.

Merlevede, B., M. De Zwaan, K. Leanaerts, and V. Purice (2015). Multinational Networks, Domestic, and Foreign Firms in Europe. Working Paper 2015/900, Universiteit Gent.

Mühlenkamp, H. (2015). From state to market revisited: A reassessment of the empirical evidence on the efficiency of public (and privately-owned) enterprises. *Annals of Public and Cooperative Economics 86*(4), 535–557.

Mulier, K., K. Schoors, and B. Merlevede (2016). Investment-cash flow sensitivity and financial constraints: Evidence from unquoted European SMEs. *Journal of Banking & Finance 73*, 182 – 197.

Musacchio, A. and S. G. Lazzarini (2014). *Reinventing State Capitalism Leviathan in Business, Brazil and Beyond*. Harvard University Press.

North, D. C. (1993). *Institutional Change: Theory and Empirical Findings*, Chapter Instiutional Change: A Framework of Analysis, pp. 35–46. M.E. Sharpe, Armonk.

OECD (2010). The Size and Composition of the SOE sector in OECD countries. Technical Report 5, OECD Coporate Governance Working Papers.

OECD (2011). State-Owned Enterprise Governance Reform: An Inventory of Recent Change.

OECD (2017). *The Size and Sectoral Distribution of State-Owned Enterprises*. OECD Publishing Paris.

Park, W. G. (2008). International patent protection: 1960–2005. *Research policy 37*(4), 761–766.

Richmond, C. J., M. D. Benedek, B. Cegar, M. P. Dohlman, M. Hassine, B. Jajko, P. Kopyrski, M. Markevych, and M. J. A. Miniane (2019). *Reassessing the Role of State-Owned Enterprises in Central, Eastern and Southeastern Europe*. International Monetary Fund.

Robinett, D. (2006). Held by the Visible Hand: The Challenge of State-Owned Enterprise Corporate Governance for Emerging Markets. Working Paper 37711, The World Bank.

Rodrik, D., A. Subramanian, and F. Trebbi (2004). Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development. *Journal of Economic Growth 9*(2), 131–165.

Schleifer, A. and R. W. Vishny (1994). Politicians and Firms. *The Quarterly Journal of Economics 109*(4), 995–1025.

Teorell, J., S. Dahlberg, S. Holmberg, B. Rothstein, F. Hartmann, and R. Svensson (2020). The Quality of Government Standard Dataset, version jan20. *University of Gothenburg: The Quality of Government Institute,*.

The Economist (2012a). The Rise of State Capitalism.

The Economist (2012b). State Capitalism: Big Brother is Back.

Vickers, J. and G. Yarrow (1991). Economic Perspectives on Privatization. *Journal of Economic Perspectives 5*(2), 1.

Wooldridge, J. M. (2009). On estimating firm-level production functions using proxy variables to control for unobservables. *Economics Letters 104*(3), 112 – 114.

Appendix A. Firm-level data and representativeness

Our paper relies on the AUGAMA (Augmented Amadeus) database compiled by Merlevede et al. (2015). In the latter paper the construction of AUGAMA is outlined in detail as is the coverage and representativeness. This AUGAMA database on itself is constructed by making use of several version of the Amadeus database by Bureau Van Dijk Electronic Publishing (BvDEP). This database, as well as other databases by BvDEP[37], have been used extensively in the past by researchers trying to investigate a variety of subjects, both within a certain country (e.g. Javorcik (2004) and Lenaerts and Merlevede (2015)) as well as over countries (e.g. Budd et al. (2005); Ferrando and Ruggieri (2015), Kalemli-Ozcan et al. (2015) and Klapper et al. (2006)). To elaborate on the database, Amadeus brings together a variety of information on firms: a firm's general contact info, balance-sheet information, the activity, ownership of the firms through it's shareholder structure and domestic or foreign affiliates.[38] BvDEP brings all this together trough a variety of sources: among others, the company gathers information from statistical agencies, websites and annual reports.[39] To get to the full database we relied on for our identification procedure, we have combined several versions of the database.[40] Due to the fact that BvDEP gives each firm in the database a unique identifier, we are able to link the correct information over all the versions. Several reasons can be given why we did not restrict ourselves to the most recent version of the database. Firstly a single issue of Amadeus includes at most ten years of data. Also with regard to ownership links between entities, a single issue of the Amadeus database only includes a static ownership structure (Merlevede et al. (2015)). For our purposes reliance on a single issue of the database would prove to be insufficient. Our procedure relied to a great extent on ownership information files provided by Amadeus. For a vast amount of firms in the database, Amadeus is able to outline the shareholders of firms in a specific year. In addition the database provides information on the Global Ultimate Owner (GUO) of the firm in question.

In this section we provide some information on the representativeness of the constructed AUGAMA database by Merlevede et al. (2015). A first indication on this can be found in table A.1. To get an idea on the coverage of our data, AUGAMA is compared to the Structural Business Statistics database by Eurostat.[41] Table A.1 compares coverage with regard to SBS over a couple of variables and broad economic sectors.

Looking at table A.1 we see that coverage varies across countries with regard to the

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[37]The most familiar of these being the Orbis database. This database is more internationally oriented than Amadeus, as the latter 'only' covers European enterprises.

[38]Information on exports is lacking for most countries in our data. The only exceptions on this are France and the Czech Republic. Also do note that Amadeus' main focus is oriented towards the business economy. The banking sector is not the main focus of this BvDEP product. To get a view on the financial sector, one should rely on Bankscope.

[39]Desai et al. (2003) and Kalemli-Ozcan et al. (2015) provide an overview on these sources.

[40]To be more specific, for this exercise versions 72, 84, 96, 108, 119, 124, 132, 144, 156, 168, 180, 192, 204, 220, and 228 were combined.

[41]This database collects a variety of information on firms operating in the European Union, across a range of sectors. This information relates to business demographics, costs related to inputs and variables related to outputs. In order to assemble the database, Eurostat relies on several sources: surveys, the official business register and other administrative sources. See `http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm`

Table A.1: *AUGAMA* versus Eurostat Structural Business Statistics (SBS): Representativeness.

	SBS 2002–2007	AUGAMA as share of SBS 2002–2007				SBS 2007 share of firms in		AUGAMA 2007 share of firms in	
	# firms	# firms	# empl.	turnover	costs of empl.	manufacturing	services	manufacturing	services
AT	269,426	11.0%	46.5%	40.8%	34.6%	10.0%	90.0%	22.2%	77.8%
BE*	333,564	42.3%	85.0%	81.3%	87.7%	9.1%	90.9%	14.2%	85.8%
BG	221,116	17.6%	60.3%	83.5%	66.4%	11.8%	88.2%	15.2%	84.8%
CZ	871,067	11.4%	74.7%	76.0%	72.5%	16.9%	83.1%	19.7%	80.3%
DE	1,714,904	14.6%	32.4%	42.0%	36.1%	11.0%	89.0%	21.0%	79.0%
DK	198,369	18.4%	41.9%	36.7%	45.8%	8.7%	91.3%	14.2%	85.8%
EE	38,270	86.9%	98.6%	97.7%	62.1%	12.2%	87.8%	16.2%	83.8%
ES	2,499,620	36.9%	71.3%	75.1%	72.1%	7.9%	92.1%	17.2%	82.7%
FI	186,972	28.2%	49.1%	47.1%	39.9%	12.0%	88.0%	17.3%	82.7%
FR	2,158,887	23.6%	62.1%	63.9%	62.9%	10.2%	89.8%	14.0%	86.0%
GB	1,571,916	10.0%	80.0%	65.8%	67.1%	8.9%	91.1%	22.0%	78.0%
HU*	551,119	8.5%	35.2%	38.7%	35.7%	10.4%	89.6%	19.2%	80.8%
IT	3,790,324	15.0%	55.8%	58.8%	57.8%	13.1%	86.9%	30.7%	69.3%
LT	88,187	22.8%	52.5%	61.9%		11.6%	88.4%	20.4%	79.6%
LV	60,581	18.7%	54.9%	57.1%	7.0%	11.1%	88.9%	16.5%	83.5%
NL**	497,613	5.2%	54.5%	42.9%	39.0%	8.6%	91.4%	18.4%	81.6%
NO	198,926	38.6%	72.5%	65.8%	72.5%	12.0%	88.0%	11.9%	88.1%
PL	1,452,512	6.5%	46.8%	50.3%	27.9%	13.3%	86.7%	30.9%	69.1%
PT	711,778	34.0%	30.9%	34.9%	33.6%	10.9%	89.1%	16.0%	84.0%
RO	389,286	67.6%	87.7%	36.1%	34.6%	12.6%	87.4%	15.8%	84.2%
SE	514,925	32.2%	64.5%	78.6%	79.2%	10.9%	89.1%	13.6%	86.4%
SI	91,065	24.2%	80.8%	80.2%	79.6%	17.8%	82.2%	30.6%	69.4%
SK	42,525	40.7%	78.4%	89.3%	89.2%	14.3%	85.7%	21.4%	78.6%

Note: source, Merlevede et al. (2015). *For BE and HU the period under consideration is 2003–2007. *For NL, some firms were removed after manual inspection. This due to the fact that these were outliers. For HR, RU and UA unfortunately there was no SBS-data available. Firms in our database were assigned to a specific country-industry-year cell and this was aggregated. Afterwards ratios comparing the respective AUGAMA cells with SBS are calculated. Lastly averages were calculated for each country over the period in the table.

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variables in the table. For instance in Estonia on average we observe 86.9% of the firms recorded by Eurostat. This figure is even higher for employment and turnover (98.6% and 97.7%). Regarding the number of firms in comparison with financials, we notice that the coverage for these financials are higher in general. This is an indication that AUGAMA (Amadeus) might be able to better observe and include larger firms.[42] Looking at the last four columns we compare the distribution of firms within AUGAMA across two broad sectors with SBS. Here we notice that our database is more oriented towards manufacturing. Table A.2 below gives information with regard to the coverage of AUGAMA over the size distribution of firms.

For most countries considered the ranking of various size classes coincide with that of SBS (the first group has the largest percentage, then the second...). The comparison of the corresponding cells of AUGAMA with that of SBS, however indicate that AUGAMA is somewhat skewed towards larger firms in terms of the number of employees. This is something we already indicated above. Again this varies over the various countries for which there is data. For some, like e.g. Spain, Finland and Estonia, this bias is very small. When looking at the sample for which TFP can be estimated this bias tends to increase somewhat, but again varies across countries.

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[42]This is somewhat logical as larger firms are obliged to by law to hand over their annual accounts to official agencies, hence information on these firms is more easy to obtain.

Table A.2: *AUGAMA* versus Eurostat Structural Business Statistics (SBS): Firm Size Distribution.

	SBS (2002–2007 average)				AUGAMA (firms with employment) (2002–2007 average)				AUGAMA (firms with TFP) (2002–2007 average)			
	1–19	20–49	50–249	250+	1–19	20–49	50–249	250+	1–19	20–49	50–249	250+
AT	94.3%	3.7%	1.7%	0.3%	52.1%	21.6%	20.4%	5.9%	17.8%	14.4%	42.8%	25.1%
BE	96.3%	2.5%	0.9%	0.2%	87.6%	8.1%	3.5%	0.7%	36.3%	30.2%	27.5%	6.0%
BG	94.9%	3.1%	1.7%	0.3%	75.3%	12.3%	10.0%	2.4%	60.4%	19.2%	16.6%	3.9%
CZ	97.5%	1.4%	0.8%	0.2%	69.1%	14.6%	13.0%	3.3%	65.8%	15.8%	14.7%	3.8%
DE	92.6%	4.4%	2.3%	0.5%	69.3%	15.6%	12.2%	3.0%	40.7%	19.5%	28.9%	10.9%
DK	93.6%	4.2%	1.9%	0.3%	80.2%	11.8%	6.6%	1.4%				
EE	91.0%	5.7%	2.9%	0.4%	86.1%	8.8%	4.5%	0.6%	85.8%	9.2%	4.4%	0.6%
ES	96.7%	2.3%	0.8%	0.1%	86.6%	9.5%	3.4%	0.5%	84.7%	10.8%	3.9%	0.6%
FI	96.2%	2.3%	1.2%	0.3%	88.9%	7.2%	3.2%	0.7%	88.3%	7.7%	3.3%	0.6%
FR	96.2%	2.5%	1.0%	0.2%	84.7%	9.7%	4.6%	1.1%	83.4%	10.4%	4.9%	1.2%
GB	94.6%	3.3%	1.7%	0.4%	40.3%	18.3%	31.0%	10.5%				
HU	96.0%	1.5%	0.7%	0.1%	74.1%	13.1%	10.0%	2.9%	73.4%	13.4%	10.2%	2.9%
IT	98.2%	1.3%	0.5%	0.1%	75.6%	15.2%	8.1%	1.1%	74.3%	16.0%	8.5%	1.1%
LT	93.2%	4.6%	2.6%	0.3%	52.1%	24.8%	19.8%	3.2%				
LV	91.8%	5.2%	2.7%	0.4%	64.2%	19.2%	14.4%	2.2%	47.1%	16.9%	27.7%	8.4%
NL	94.7%	3.4%	1.6%	0.3%	43.6%	19.1%	30.2%	7.0%	55.8%	16.6%	21.5%	6.1%
NO	99.0%	2.7%	1.2%	0.2%	87.6%	8.4%	3.3%	0.6%	85.8%	9.7%	3.8%	0.7%
PL	97.6%	1.3%	0.9%	0.2%	35.9%	21.7%	33.3%	9.2%	36.2%	22.9%	32.7%	8.2%
PT	97.1%	1.8%	0.8%	0.1%	90.7%	6.0%	2.8%	0.5%	89.2%	7.0%	3.3%	0.5%
RO	93.6%	3.7%	2.3%	0.5%	88.9%	6.4%	3.9%	0.8%	88.1%	6.8%	4.1%	0.9%
SE	97.2%	1.8%	0.8%	0.2%	92.1%	5.2%	2.2%	0.5%	91.4%	6.1%	2.2%	0.3%
SI	96.2%	2.1%	1.3%	0.3%	78.0%	10.8%	8.5%	2.7%	76.5%	11.6%	9.1%	2.8%
SK	89.0%	4.9%	4.7%	1.1%	66.2%	11.4%	17.3%	5.2%	63.1%	12.0%	19.1%	5.8%

Note: source, Merlevede et al. (2015). In this table the representativeness of AUGAMA is compared with Eurostat's SBS-database according to firm size categories. For each country-year firms were classified according to the four size categories: micro, small, medium and large firms. Next, the number of firms in each category was counted and divided by the total number of firms in a country-year. Lastly, this value was averaged over the period 2002-2007.

Appendix B. Corpus used to identify government ownership

Table B.1: Words used to identifying potential state-type shareholders or state-type GUOs on the basis of owner names.

afdeling	gobierno	mestská samospráva	província	valstija
ajuntament	gmina	mestsky urad	provincie	valsts
allam	gouvernement	mestský úřad	provincija	valstybe
alue	government	miasto	provins	valstybe
apgabals	governo	miestas	provints	valta
apygarda	grad	ministarstvo	provinz	valtio
arrondissement	grevskap	ministeerium	prowincja	varos
auktorit	grofstva	minister	regering	varos
authority	grófstva	ministère	regeringskanslet	város
autoridad	gubernija	ministrija	regiao	videk
autorit	guvern	ministrstvo	região	vidék
autorizacao	hallitus	ministry	regierung	ville
autorização	hatalom	miniszsterium	region	vlaams
autorytet	hatosag	minisztérium	région	vlada
avtoriteta	hatóság	municipal	regiune	vláda
ayuntamunt	hrabstvi	municipio	regjeringen	volitused
behorde	hrabství	municipiu	republiek	vyriausybe
behörde	hrabstwo	myndighe	republic	wladza
bezirk	investeringsfonden	nazione	república	wojewodztwo
bundesland	investment fund	nozare	republika	województwo
bundesrepublik	igaliojimai	obcina	republiken	xunta de
bundesregierung	judet	obcina	republikk	
by	junta de	obec	respubblica	
cetate	jurisdicao	oblast	respublika	
cidade	jurisdição	okres	rzeczpospolita	
circoscrizione	jurisdiccion	okrug	riik	
citta	jurisdicción	omavalitsus	royaume	
città	kaupunginhallitus	omrade	rzad	

Note: see the notes under the table on the next page.

Table B.1 continued: Words used to identifying potential state-type shareholders or state-type GUOs on the basis of owner names (*Cont'd.*)

city	kaupunki	område	savivaldybe
ciudad	kommun	opcina	savivaldybe
comarca	kompetence	opcina	sfera
comitat	kormany	opravneni	sovereign
comune	kormány	oprávnění	sritis
condado	kozseg	oras	staat
county	község	oraš	stad
departament	krahvkond	organ	stat
departemang	kraj	osakond	stát
departement	kunnanhallitus	overheid	state
département	kunta	pais	state-owned
didmiestis	laani	panstvo	stedelijk
diputacion	lääni	panstwo	tartomany
distrito	lan	parlamento foral	tartomány
drzava	län	piirikunta	the state
država	land	pilnvaras	tinut
duchovni urad	landeskreis	pilseta	tinut
duchovní úrad	linn	pilseta	uprava
estado	maakond	pilsetas pasval	urad
etat	maakunta	pilsetas pasvaldiba	úrad
état	magistrat	pokrajina	urbe
fylke	megye	principado	valdiba
gemeente	mesto	provinca	valdzia
gemeinde	město	province	valdžia
gewest	mestska samos	provincia	valitsus

This table and the previous one gives information on the words used to identify potential shareholders. These words were used in the Stata procedure.

Appendix C. Definitions and sources of varaibles

Table C.1: Definition and sources of variables used.

Variable	Description	Source
Domestic credit to private (%GDP)	Total credit extended to private sector (% of GDP)	Worldbank
Stock market capitalisation (%GDP)	Market cap of listed domestic companies	Worldbank
Value of traded stocks	Stocks traded, total value (% of GDP)	Worldbank
log GDP per capita	GDP per capita (constant 2010 US$)	Worldbank
Agriculture share in value added	Agriculture, value added (% of GDP)	Worldbank
Services share in value added	Services, value added (% of GDP)	Worldbank
High tech export (% manuf. exp.)	Export of High Tech Products (% of manufacturing exports)	Worldbank
R&D technicians per mln. inhabitants	Technicians in R&D (per million people)	Worldbank
Quality of government	Quality of governance and institutions	Teorell et al. (2020)
High court independence	High Court independence v2juhind	V-DEM
# Days required to register property	Time required to register property (days)	Worldbank
Corruption	Corruption Perceptions Index. Values 0 (=highly corrupt) to 100 (= clean)	Transparancy International
Procedures to start business	Time required to start a business (days)	Worldbank
Product market regulation	Index of Product Market Regulation in the economy, scale 0 to 6, with 6 most regulation	OECD
Intellectual property rights	Strength of the protection of intellectual property rights	Park (2008)
Collectivism	Extent of group thinking (100-idv index)	Hofstede (1980)

Table C.2: Description of variables used for the firm-level analyses

Variable	Description	Source
employment	number of employees (log)	Amadeus
wage	Average employee costs (log)	Amadeus
rev. eff	operating revenue per worker (log)	Amadeus
TFP	Total Factor Productivity (log), based on Wooldridge (2009)	Amadeus
patentr	Patents? Yes/No	European Patent Office
citations	No. of citations of patents	European Patent Office
exporter	Exporter Yes/No	Amadeus
exports	Total exports (log)	Amadeus
leverage	Total debt to assets	Amadeus
interest rate	interest paid over total debt outstanding	Amadeus
FinCon	ASCL index of financial constraints, see Mulier et al. (2016)	Amadeus
current ratio	Current assets over short term liabilities	Amadeus
solvency	profit/loss over long term debt and current liabilities	Amadeus
ROA	Profit/loss before tax over assets	Amadeus
profit margin	Sales to profit/loss	Amadeus
tax rate	Taxes paid over profits	Amadeus
left	Left wing government/president Yes/No	Cruz et al. (2018)
recessions	Recession in country c, year t; Yes/No	IMF Quarterly GDP data
GFC	Global Financial Crisis Dummy, 1 if year is 2008 or 2009	
crisis	1 for the period after 2007	

Appendix D. Industry classification

Table D.1A: List of the NACE 2-digit industries included in the data.

Broad category	NACE 2-digit	Description
C		**Mining and quarrying**
C	10	Mining of coal and lignite; extraction of peat
C	11	Extraction of crude petroleum and natural gas
C	12	Mining of uranium and thorium ores
C	13	Mining of metal ores
C	14	Other mining and quarrying
D		**Manufacturing**
DA	15	Manufacture of food products and beverages
DA	16	Manufacture of tobacco products
DB	17	Manufacture of textiles
DB	18	Manufacture of wearing apparel; dressing and dyeing of fur
DC	19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
DD	20	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
DE	21	Manufacture of pulp, paper and paper products
DE	22	Publishing, printing and reproduction of recorded media
DF	23	Manufacture of coke, refined petroleum products and nuclear fuel
DG	24	Manufacture of chemicals and chemical products
DH	25	Manufacture of rubber and plastic products
DI	26	Manufacture of other non-metallic mineral products
DJ	27	Manufacture of basic metals
DJ	28	Manufacture of fabricated metal products, exc. machinery/equipment
DK	29	Manufacture of machinery and equipment n.e.c.
DL	30	Manufacture of office machinery and computers
DL	31	Manufacture of electrical machinery and apparatus n.e.c.
DL	32	Manufacture of radio/television/communication equipment/apparatus
DL	33	Manufacture of medical/precision/optical instruments, watches/clocks
DM	34	Manufacture of motor vehicles, trailers and semi-trailers
DM	35	Manufacture of other transport equipment
DN	36	Manufacture of furniture; manufacturing n.e.c.
DN	37	Recycling

Table D.1B: List of the NACE 2-digit industries included in the data (Continued).

Broad category	NACE 2-digit	Description
E		**Electricity, gas and water supply**
E	40	Electricity, gas, steam and hot water supply
E	41	Collection, purification and distribution of water
F		**Construction**
F	45	Construction
G		**Wholesale and retail trade;** **repair of motor vehicles, motorcycles and personal and household goods**
G	50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
G	51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
G	52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods.
H		**Hotels and restaurants**
H	55	Hotels and restaurants
I		**Transport, storage and communication**
I	60	Land transport; transport via pipelines
I	61	Water transport
I	62	Air transport
I	63	Supporting and auxiliary transport activities; activities of travel agencies
I	64	Post and telecommunications
K		**Real estate, renting and business activities**
K	70	Real estate activities
K	71	Renting of machinery and equipment without operator and of personal and household goods
K	72	Computer and related activities
K	73	Research and development
K	74	Other business activities

Appendix E. Additional results for firm leverage

Table E.1: Financial performance of SOEs vs POEs: leverage

	(1) leverage	(2) leverage* equity	(3) leverage* sales	(4) leverage	(5) leverage	(6) leverage
SOE	-0.024***	-2.530***	-0.814***	-0.026***	-0.012***	-0.027***
	(-14.51)	(-40.76)	(-18.65)	(-15.98)	(-6.27)	(-10.78)
GOV*Traditional Sector Dummy					-0.042***	
					(-11.46)	
GOV*Socialist Legal Origin Dummy						0.006*
						(1.94)
n	238,085	214,572	234,592	232,635	238,085	238,085
R-sq	0.131	0.059	0.194	0.144	0.131	0.131

Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. Model 1 is the baseline effect as in table 7. In models 2-3 we adjust the dependent and scale the debt to equity and sales respectively. In model 4 we estimate model 1, but on a smaller sample, the sample for which model 3 is estimated. Models 5 and 6 rely on interactions. Model 5 interacts GOV with a dummy signalling if the firm operates in industry 40-41 (utilities), industry 60-64 (transport, postal services and telecom). In model 6 we interact our variable of interest with a dummy signalling socialist legal origin. */**/*** indicate significance at the 10, 5 and 1% level respectively.

Table E.2: Financial performance of SOEs vs POEs: leverage heterogeneous effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				leverage			
	GFC	Recession	Crisis	Left	QoG	Start up Procedures	Collectivism
SOE	-0.021***	-0.020***	-0.016***	-0.031***	0.001	0.018***	-0.068***
	(-10.94)	(-9.59)	(-5.67)	(-15.63)	(0.29)	(3.27)	(-13.01)
GOV*GFC	-0.013***						
	(-3.36)						
GOV*recession		0.001					
		(0.90)					
GOV*crisis			-0.011***				
			(-3.11)				
GOV*Left				0.027***			
				(6.71)			
GOV*QoG					-0.042***		
					(-5.31)		
GOV*no. start up Procedures						-0.005***	
						(-7.47)	
GOV*Collectivism							0.001***
							(9.17)
n	238,085	146,206	238,085	183,689	2380,85	180,486	203,601
R-sq	0.131	0.182	0.131	0.122	0.131	0.174	0.126

Included control variables in all regressions: country#industry#year fixed effects, firm age, firm size (lagged total assets), foreign ownership dummy, listed firm dummy. The dependent is total debt scaled to assets. */**/*** indicate significance at the 10, 5 and 1% level respectively.