

State-Owned Enterprises across Europe

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Abstract

We developed a dataset on state-owned enterprises across 27 European countries, over more than a decade (1999-2012). To achieve this, we relied on a representative firm-level dataset, AMADEUS. This dataset enables us to observe and identify state investors operating at several levels of government (local, province and federal), investing domestically and abroad. After documenting our identification procedure we present various examples pointing towards the accuracy of our dataset. We document a large presence of state firms in the Eastern part of Europe, in former Command Economies. State presence is heavily concentrated in certain sectors and we record differences in state orientation across the different Legal Origins present in our dataset. The extent to which states interfere in the economy correlates with several measures of general economic development, political freedom and corruption. Based on a simple regression framework, imposing a mixture of fixed effects, we present evidence that firms with a higher investment stake by state investors have a lower level of total factory productivity on average, employ more workers and pay higher wages, hereby reaffirming existing studies on the link state firms-efficiency and different firm objectives for a much larger cross-country panel.

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

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1 Introduction

In 2012, the weekly magazine *The Economist* devoted a series of articles on the increasing interference of governments into the private sector (*The Economist* (2012a); *The Economist* (2012b)). The former is an extensive report on state capitalism in emerging countries. Here *The Economist* asks herself whether, given the crisis of free market capitalism, this form of capitalism can pose a viable alternative to western capitalism. Whereas the former focussed on emerging countries, the latter article the magazine discusses the increase of state interference in Western countries, by shareholdings in German and French firms: Big Brother is back, not only in emerging countries, but also in the West.

For this paper, the goal is to examine 'Big Brother'. Our goal here is to investigate the extent to which state entities are involved in European firms. To what extent do states act as a shareholder in the economy? In which countries and industries are we most likely to find this type of shareholder in firms across the European continent? Does this shareholding of governments have any effect on firms? Looking at existing academic literature, a couple of articles investigate the ownership composition of firms but in a general manner, examples on this are Faccio and Lang (2002) and La Porta et al. (1999). Other articles on the contrary concentrate on specific forms of ownership. In Dahlquist and Robertsson (2001) the focus is on foreign investors and the type of firms targeted in Sweden. Lastly, the article by La Porta et al. (2002) is the most similar in spirit as the exercise we present in this article. Here the authors assess for 92 countries the extent to which the largest banks are owned by states, the institutional characteristics of countries with a large ownership interest and the consequences of political ownership at the country-level. In the present article we will examine ownership of firms across Europe relying on a comprehensive firm-level dataset, AUGAMA. But we will direct our focus on a specific type of ownership, government ownership, regardless of firms' size. Our article thus acts as a complement to the contribution by La Porta et al. (2002), as our orientation is on the business economy, and not on government intervention in the financial sector.¹ Up to this day there has been some work undertaken by various institutions to investigate the extent to which firms are owned by states, see Arnoldus et al. (2016a), Kowalski et al. (2013) and OECD (2010). But work to this date has not covered this issue to the same extent as is the case in this article. The article by Kowalski et al. (2013) uses Forbes500/2000 data and examines the extent to which state-owned enterprises participate in trade and FDI. In addition this study examines the importance of these state firms in the economy worldwide. In OECD (2010), the author relies on surveys oriented towards statistical agencies of OECD members, to get an idea of the amount of state ownership in listed firms by federal states. The most extensive study is a report conducted for the European Commission. In Arnoldus et al. (2016a) a database similar to our has been established, but for eight Eastern European countries. This is the most elaborate data-oriented study we know on state-ownership across countries.

¹We define the business economy as that part of the economy comprising firms active in sectors with codes 10-74 of the Nace revision 1.1 classification, without firms active in sectors with codes 65-69, as these firms are part of the financial sector.

When it comes to state intervention in the economy, one can distinguish four different theories. In Musacchio and Lazzarini (2014) the authors elaborate on these four views on state interventionism or *state capitalism*. The first view, the *industrial policy view* sees state interventionism as a necessity to correct market failures. In this sense governments can alleviate capital constraints for firms by establishing state-owned financial institutions.² Also state investors can orient investments towards activities yielding the highest benefits to the economy, or it can build up novel industries, and contribute hereby to the development of (new) industrial activities and the country as a whole Robinett (2006). The *social view* is the second broad reason on why states intervene directly in the economy. Here a state can invest in firms in order to change the focus towards other objectives than solely the objective of maximising profit or shareholder value. A state firm providing employment to disadvantaged groups or locates in illogical areas in an economic sense, acts in a non-profit maximising fashion, and therefore consistent with this view (Musacchio and Lazzarini, 2014, p60). The *political view* makes up the third view. This view is more negative in the sense that it stresses the fact of government failure. In this view politicians aim at maximising self-interest. The politician's objective function is a combination of social welfare and the politician's own personal utility, see Schleifer and Vishny (1994) and Yarrow (1999). Recently some empirical evidence on this view has emerged. A couple of articles concentrate on government's control of the banking sector in developing countries, Brazil Carvalho (2014) and India Cole (2009). While the latter provides evidence on increases in agricultural lending in an election year, the former finds that firms receiving loans from government controlled banks, expand employment far more in politically close-combat regions during election years. Moreover it appears that these effects persists over time within this region, negatively affecting other regions' economic development. For France Bertrand et al. (2007) find that CEOs of listed firms with connections with French politicians, change the employment decisions of their firms, in order to provide their political connections with benefits. Also here there appears to be a larger effect for close-combat regions. Finally, the last view on this matter, is the *path-dependence view*. This view takes a more aggregate stance than the previous ones. This due to the fact that it explains the extent of state interventionism by means of a country's institutional and historical process (Musacchio and Lazzarini (2014)). The fact, for instance, that despite several rounds of privatisation, see Megginson and Netter (2001), there still is a fair amount of state shareholdings in firms (or state firms), can be explained by this view. This is to say that the establishment of state shareholdings as well as the efforts to reduce these, all have to take into account the existing interests of various actors, some powerful actors might oppose privatisation for instance, Durant and Legge Jr (2002) for a case in France and (North, 1993, p7).

In this paper we construct a database comprising state firms across Europe. The constructed database relies on firm-level data stemming from ownership files provided by Bureau Van Dijk's (BvDEP) AMADEUS database. Relying on a word searching procedure outlined below we are able to derive state-ownership at the

²In the cited article above by La Porta et al. (2002) the authors do find a significant correlation between the level of financial development of a country and the presence of governments in top banks within their sample of countries.

firm-level for a twenty-seven European country panel over a ten-year period.³ When it comes to defining state involvement, by means of shareholdings within firms, we follow Jaslowitzre et al. (2016) and construct our procedure in this way as to take into account all levels of government and nationalities of these state investors. Moreover also we take into account that government-owned investment vehicles might act as an investor. In addition we keep our procedure flexible enough to be able to track the level, be it federal or regional or local, of state investors as well as their nationality and their type, be it Sovereign Wealth fund or general state investors. By following this procedure, we thus allow for a great amount of heterogeneity in state ownership for our database. In addition thanks to previous work undertaken on the database we have at our disposal, see Merlevede et al. (2015), we can match our observed government ownership within a specific firm with appropriate balance-sheet data. The next section gives an overview of this database/dataset and our procedure to identify state shareholders amongst firms. Before doing all this, first we will introduce the AMADEUS database. We elaborate on its capabilities and the information the database has. An indication on the representativeness is also part of this section. Secondly in that section we discuss the procedure on how we were able to identify state-ownership and what we consider to be a state-owned enterprise (SOE). We conclude the second section by giving some examples on state firms and use these to illustrate our procedure below. In the third part of this paper we present descriptive evidence on European state firms. We give an overview of some listed firms with state investors in Europe. Next we present statistics documenting the importance of state firms across our 27 countries and amongst the various industries we have in our dataset. We redo the latter exercise and examine the importance of state firms across the different Legal Origins in our dataset. In the fourth section we try to link various country variables to several measures of government interference in the economy by means of state firms. In a similar spirit as La Porta et al. (2002) we examine correlations between various institutional factors and government interference in the business economy. Section five digs into firm-level analysis. In this section we examine whether state firms differ with regard to others, regarding various characteristics: employment, wages, several financials. We dedicate a separate section to the difference in state firms' efficiency, as measured by Total Factor Productivity (TFP), since a fairly large portion of the academic literature concentrates on this issue. Lastly, section six concludes this article.

2 Database and Construction of the Dataset

2.a The AMADEUS database

Our paper relies on the AUGAMA (Augmented AMADEUS) database compiled by Merlevede et al. (2015). In the latter cited paper the construction of

³These 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).

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 BvDEP⁴, 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) and Kalemli-Ozcan et al. (2014)). To elaborate on the database, AMADEUS brings together a variety of information on firms: contact information, balance-sheet information, the activity of the firm, ownership of the firms through it's shareholder structure and international activity by means of foreign affiliates.⁵ BvDEP brings all this together through a variety of sources: amongst others, the company gathers information from statistical agencies, websites and annual reports.⁶ To get to the full database we relied on for our identification procedure, we have combined several versions of the database.⁷ Due to the fact that BvDEP gives each firm in the database a unique identifier which is fixed over versions, we are able to link the correct information over all the versions with each other. 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 great 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, this is the entity having ultimate control over the company after running through the shareholder control chain.

2.b Representativeness of AUGAMA

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 1. In order to get to this table we removed firms reporting missing values for the number of employees. To get an idea on the coverage of our data, AUGAMA is compared to the *Structural Business Statistics* (SBS) database from Eurostat.⁸

⁴The most familiar of these being the ORBIS database. This database is more internationally oriented than AMADEUS, as the latter 'only' covers Europe.

⁵Information 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.

⁶Sebnem et al. (2015) provides an overview on these sources.

⁷To be more specific, for this exercise versions 72, 84, 96, 108, 119, 124, 132, 144, 156, 168, 180, 192, 204 and 220 were combined.

⁸This 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

[Insert table 1 about here]

In general we can see that the coverage over the years for most countries included in the table is fairly high compared to Eurostat's SBS data. Also for many countries this coverage is pretty much constant throughout the years. But generally one sees the tendency that coverage improves over the years.⁹ The next table goes a little bit broader on this.

[Insert table 2 about here]

Looking at table 2 we see that coverage varies across countries with regard to the variables in the table. The ratio of the number of firms in our data compared to its counterpart by Eurostat varies to a great extent. 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%). Looking at the other variables than the number of firms we see that these percentages are higher in general. This is an indication for the fact that AUGAMA and hence AMADEUS might be able to better observe and include larger firms. Smaller firms might therefore be not as well represented in the database. 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 3 below gives information with regard to the coverage of AUGAMA across the size distribution of firms. This is done based on the number of employees.

[Insert table 3 about here]

For most countries considered the ranking of the 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 skewness varies across countries, and for some countries like e.g. Spain, Finland and Estonia amongst others, this bias is very small. When looking at the sample for which TFP can be estimated this bias tends to increase somewhat. But again as is the case for the comparison based on employment, this also varies across countries. Some countries record very small changes, like Finland, Spain and Estonia. Before we conclude this subsection on the AMADEUS database and its representativeness we give an indication on the coverage with regard to shareholder names we observe in the data. In the figure below we provide an indication on this. We relied amongst others on these shareholder names to identify a government investor in the firm.

[Insert figure 1 about here]

We see here as well that the coverage improves over time for firms. Over time we are able to observe for more firms in our dataset the names of their shareholders.

http://ec.europa.eu/eurostat/cache/metadata/en/sbs_esms.htm

⁹We restricted the comparison period from 1999-2008. This purely for illustrative purposes. We do not expect coverage to decrease from 2008 onwards as the method of constructing AUGAMA is very close to the one in Sebnem et al. (2015).

Though this is not reported here, the same applies for the names of the GUO and the type of the shareholder of the firms in our database. These series are linked one to one with the shareholder name graph in figure 1. On average over the whole time period about 20% of the firms in our dataset reports at minimum one shareholder. We see a steep increase in the extent to which we are able to identify shareholder names around the year 2002. For the last year for which we undertook the exercise, on average about 34% of the AMADEUS was able to identify at least one shareholder over all the countries. Since we have quite a large increase in 2002, we take this year as the first year for our sample for the exercises that follow below. We take 2011 as the last year for our sample. The last DVD used for dataset construction did not provide a thorough coverage for 2012, with regard to number of firms.

2.c Identification of State Firms

Before we outline our identification procedure, it might be appropriate to clarify what we mean by a state firm or an SOE.¹⁰ In this article we define a state firm as an enterprise in which the **combined** ownership of state entities within a certain firm exceeds 10%. Regarding state entities we take a broad view and follow Jaslowitzre et al. (2016) and look at all possible entities, regardless of the level (local, federal or regional) and the nationality of the state investor. We do not exclude investments undertaken by government pension funds or sovereign wealth funds. Regarding the ownership threshold, a similar border as international institutions is used to distinguish a foreign direct investment from a portfolio investment. Or put differently, to separate the desire for a lasting interest from an investment mere for financial reasons. See on this for instance the definition by UNCTAD¹¹. In the literature on state firms, there is no common definition and no advice on how high this threshold should be. For instance OECD (2010) in his overview is fairly general on this, and uses different definitions for different countries. In Arnoldus et al. (2016a) a 20% threshold is used. We thus apply a smaller border, but are flexible enough as we also make a distinction between majority-owned SOEs and their counterparts. Also we do not discard any of the constructed government ownership variables, even though they do not exceed the threshold.¹² To get to this share of 10% we sum up all the shares of government shareholders for each firm-year we have in our dataset.¹³ As we do not limit ourselves to a certain level of government nor to domestic state entities, we make sure that we are able to track these investors at different types of government level or nationality. We construct several variables allowing us to assess for each firm the extent to which this firm is owned by local-regional-federal governments, domestic or foreign governments, besides the general indicator for government ownership. And since some states are owners of investment vehicles, which are responsible for state assets, we also

¹⁰Throughout this text we will use these words interchangeably.

¹¹<http://unctad.org/en/Pages/DIAE/Foreign-Direct-Investment-%28FDI%29.aspx>

¹²For instance if there is only one government shareholder, e.g. City of Ghent, who owns 5% of the shares of firm X, we do not discard this state shareholder. We keep this shareholder and hence observe a total government ownership of 5% in this firm. What we do say is that this firm is not an SOE, since 5% is smaller than the threshold.

¹³A firm might therefore be state-owned but owned by multiple state investors, from separate countries or different levels of government, each having a share less than 10%.

try to identify these companies in our dataset and make a category for firms with sovereign wealth funds as a shareholder. See Stephen (2007) for an outline of these state-owned investment vehicles.

To identify which firms have a state entity as a shareholder, we employ a procedure to look for certain words pointing towards a state entity. AMADEUS provides information on owners of the firms in the data, via the variables: `shhtype`, `legalform` or `GUO-type`. With these variables firms' owners are categorised in certain groups. To give an example on this, if there is a shareholder of a certain firm A named John Doe, AMADEUS might give this shareholder "Individual" as a type. Similarly if a shareholder is a certain firm B, a possible type is "Private Equity firm". In the same spirit some of these types point towards shareholders which are government entities. These categories are for instance: "State", "Public Authority" or combinations of these words. Moreover these shareholder types are the same across our country panel. Therefore whenever we encounter these words within the three variables outlined above, we label a firm as potentially state-owned. Unfortunately for many shareholders or GUOs the type was missing. In addition AMADEUS did not apply the same type for the same shareholders or GUOs, or it even applied the wrong type for some investors which were clearly government entities.

Therefore we had to resort to a more 'brutal' method and rely on the shareholder and GUO names of investors in each firm. We browsed through firm files having activities in countries we were familiar with the language and checked for shareholders/GUOs whose name might point towards state ownership. We translated the words of which we thought these pointed towards state ownership into the variants of all the languages present in our dataset.¹⁴ The next two tables, 4a and 4b, give an overview on the words we used in the described procedure.

[Insert table 4a about here]

[Insert table 4b about here]

In the end after using this method we end up with a dataset of *potential* state firms. To fully identify state firms, we rely on information capturing the direct or total ownership stake of this identified state shareholder. If this shareholder, or by summing over all state shareholders, holds a total stake of at least 10% within this company, this company is considered as being a state firm.¹⁵

Besides this application of the 10%-threshold, we also considered a firm to be state-owned if it's GUO is a state entity, irrespective of the amount of ownership.¹⁶ Our data also allows us to introduce some heterogeneity in the state

¹⁴To give an example on this: a potential name for a shareholder can be "City of C". The first word of this string, City, points towards a level of government. In Dutch the word for City is "Stad" and in French "Ville". So we made our procedure investigate whether "City of", "Ville de" or "Stad" appeared in our dataset.

¹⁵Again do note that we sum all the shares within the firm of state shareholders. A firm like in the example of Volkswagen, see the next part of this paper, will have a state-ownership of 37% in our database.

¹⁶In AMADEUS several definitions for the GUO can be used and applied. We opt for the one where the GUO owns at least 25% in the firm. If we only identify a government GUO and no other government shareholders, we say that this firm is state-owned, but not majority-owned.

shareholders we observe. The shareholder files provided by AMADEUS contain information on the nationality of the investor. By using this we are able to separate foreign and domestic shareholders. In addition for each of the state shareholders we have identified the level of government at which they operate. We make a distinction in three levels: federal, regional and the local level of government. To achieve this purpose we relied on a similar word searching procedure as we applied to identify state shareholders.¹⁷ So to sum up we have a dataset at our disposal which has the following information for each firm in our dataset: the extent of state-ownership, the nationality of the state investor, the level of the latter (federal, regional or local) and whether this investor is a Sovereign Wealth Fund. Moreover for each firm we have made ownership categories: the amount of state-ownership overall, the amount of foreign state-ownership and the amount of ownership separated by each level of government. Also whenever a firm is owned by a foreign and a domestic state entity, we label this firm as having a *Hybrid Nationality*. In the same spirit, if we observe a firm which is owned by a local and regional entity, we label this firm as a *Hybrid Level* state firm. A last category we added was whether the investor could be labelled as a Sovereign Wealth Fund (SWF)¹⁸ Also we have taken into account other government controlled funds managing SOEs, see Guberna (2014).

With regard to the ownership percentages of shareholders within firms, if we observed missing values for our ownership stakes of certain shareholders or GUOs for some years, we filled-out previous information by using Stata's *Carryforward* command. In the end of this procedure we end up with a database on private firms and state firms, operating in twenty-seven European countries, over a variety of industries over more than a decade, from 1999-2012. We have compared the identified state firms after our procedure to other sources: Bałtowski and Kozarzewski (2016), OECD (2010) and official government sources.¹⁹ Besides this we also performed manual checks for each country separately to make sure the database we have is reliable.

¹⁷For instance a shareholder with a name containing the words: 'City of' will be classified as a shareholder operating at the local level of government. In a similar vein a shareholder name containing 'State of' will be a federal state entity. We carefully checked for potential flaws in this procedure and we have therefore assigned some cases to the right level manually. Also note that we have used a similar procedure for the GUO of the firm.

¹⁸In order to do this we relied on information by the Sovereign Wealth Fund Institute: <https://www.swfinstitute.org/>. This institute gathers information on these kind of funds and their activities worldwide. Whenever we encountered an investor categorised by this institute a SWF, the investor is considered a SWF.

¹⁹Some countries publish annual reports with a clear overview of the firms in which they have invested in, the activities of the firm, it's realisations and the like. See for instance the website of the Dutch Ministry of Finance: <https://www.rijksoverheid.nl/onderwerpen/staatsdeelnemingen> For France the state participations are under the responsibility of l'Agence des Participations de l'État (APE), <https://www.economie.gouv.fr/agence-participations-etat>.

2.d Examples of state firms

After applying this procedure we illustrate the validity of our approach by presenting some examples on state firms we observe in our data.²⁰

The **first example** of a firm which we identify as being state-owned is the Belgian firm NMBS-SNCB <http://www.belgianrail.be/nl>. This is the Belgian public railway firm, responsible for the transportation of passengers. Based on our procedure this firm has been picked out as a state firm since by means of the type of Global Ultimate Owner, i.e.: State, Public Authority. Indeed looking at the name of this company's GUO: we see the Belgian state. On the other hand the shareholder of this firm is the NMBS Holding company, with a total ownership of 100%.

As a **second example** we consider the case of Proximus, until 2015 better known as Belgacom: <https://www.proximus.be/en/personal.html>. This is a major Belgian firm active in the telecommunication sector and listed on the national stock exchange, the Bel20 stock-exchange in Brussels. Our procedure identified Proximus as a state firm based on the `shsttype` variable in AMADEUS. For Proximus this variable takes the value: State, Public Authority. For this company the shareholding is far more dispersed. In 2007 for instance our ownership files from AMADEUS recorded 20 different shareholders.²¹ Here the state of Belgium appears as a shareholder, controlling about 53,5% of the shares in Proximus, corresponding to the share to be found in the financial report of 2007. The state of Belgium also acts as a GUO for this company.

Since we are also able to observe state firms at the local municipality level, as a **third example** on this we present the company FN Herstal, <http://www.fnherstal.com/>. FN Herstal is a Belgian company active in the defence and hunting industry. The firm is located in the city of Herstal in the Liège province in Belgium. Looking at the shareholder files from AMADEUS, we see two state shareholders on the basis of which we labeled FN Herstal as being a state firm: firstly the Walloon region and secondly the city of Herstal. The former also acts as the GUO of the company. Both shareholders were identified on the basis of their shareholder type.

For the **fourth example** we present a firm for which the state shareholders we identify stem from different countries. Here we look at the German global car manufacturer Volkswagen, <https://www.volkswagenag.com/>. As was the case for Proximus, this firm is controlled by a multitude of shareholders: domestic and foreign. Based on the information provided by AMADEUS, 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 its investment vehicle Qatar Holding. In 2009 the state of Qatar exercised its right to purchase a stake in the Volkswagen group. After using this the state of Qatar acquired 17% of the voting rights. This information is available to us in the database with shareholder information. We observe similar information

²⁰The AMADEUS database has already been used to a great extent to examine consequences of foreign ownership of firms in a variety of fields. Also has it been used to construct representative national firm-level datasets: see Merlevede et al. (2015) and Sebnem et al. (2015). In the appendix of Kalemli-Ozcan et al. (2014), the authors demonstrate the strength of AMADEUS in capturing foreign ownership links through a variety of examples. We believe that AMADEUS should be equally capable of detecting state ownership.

²¹The number of shareholders is much bigger. AMADEUS records ownership by the general public in the category public. About 40% of the shares falls under this category.

in the Zephyr database.²² According to the information in the latter database the state of Qatar undertook an operation increasing the stake in Volkswagen from 0 to 17%. BvDEP labelled the deal as an acquisition of a minority stake. With regard to the domestic state shareholder, Niedersachsen, AMADEUS informs us that in 2009 this shareholder has about 20% of the shares in the firm. This information confines with those mentioned in the annual reports of the Volkswagen Group.

3 State Firms across Europe

In this section we present additional material with regard to state firms in Europe. First we present a table comprising listed firms with at minimum one state shareholder amongst the investors in the firm in question. This exercise is somewhat similar as is the case in OECD (2010), only we start from our firm-level dataset and do not contact government agencies through surveys. The table below gives an overview on some listed firms that we observe in the data for the year 2009. In addition we have included information on the state shareholder(s) and some extra information on the firm.²³

[Insert table 5 about here]

For this table we have made a distinction in two categories, Listed State Firms and Listed Firms with a State Shareholder. The latter category gives some examples on listed firms for which we identified a state entity as a shareholder, but here the total level of ownership did not exceed 10%. The listed firms are active in a wide array of sectors, ranging from manufacturing of food products and medical equipment (15 and 33). Also companies active in the transporting sector (60, 62 and 63) and R&D (73) make up part of the list. When browsing through the state investors, we mainly see investors from the own country, but at varying levels of government. At the federal level, the Belgian state in Belgacom, and the local level government entity, e.g. Turun Kaupunki (the village of Turun). We also observe ministries, state agencies and pension funds as investors. Some companies in the list have multiple state investors: for the airport of Vienna (Flughafen Wien AG) these investors operate at different levels as well (province level and the local level). Also we observe that the investment of states does not appear to restrict itself to the own border. Some investors also go abroad, and are in a sense multinational. The Norwegian government for example in 2009 had 8.47% of the shares in the Axis-Shield Plc. We also observe an entity from the USA in the list, the state of New-Jersey pension fund. After

²²Zephyr is another database by BvDEP providing information on worldwide mergers and acquisitions, for instance the type of deal, the firms involved in the deal, the acquired stake, etc.

²³Do note that this list is far from complete. Due to space constraints we have restricted ourselves to two state shareholders at most for each firm. Some firms, like the Italian Iren Spa, recorded many state shareholders (here we observe more than 70 state shareholders at the city-level). Moreover for some countries the number of listed firms with a state investor, e.g. Bulgaria or Russia, was fairly large. Also for this reason we did not include all the listed firms, and restricted ourselves to two firms per country.

this extensive list of examples, we move on towards a more aggregate picture of state presence in the economy. In figure 2 we present a general picture on the share of employment generated due to SOEs in the first year of the retained sample (2002) and the last year (2011). In this spirit figure 2 can be looked as providing an overview on the evolution on state-ownership.

[Insert figure 2 about here]

In general we can see over the years in our data, countries which had a high level of state employment, tend to have a higher level as well in 2011. But overall the importance of state firms, expressed in the way as in figure 2, declines for most countries in our dataset. This points somewhat to the Path-Dependence view as discussed in the first part of this paper. For some countries, like Bulgaria for instance this decline is very strong and amounts to about 15% over this nine year period. Overall we see a tendency for countries in the eastern part of Europe to exhibit a higher fraction of state employment. For countries in Western-Europe these share are far more aligned and more or less constant, as countries' dots lie very closely to the 45-degree line. The next figure gives a more disaggregate picture of Europe and assesses to some extent the social view of state ownership. In this figure we compare the level of economic development (upper part) with the share of regional employment provided by state firms, at the NUTS2-level.

[Insert figure 3 about here]

According to one aspect of this social view the share of state-ownership should be higher in regions characterised by a lower level of development. According to this view, the state can act as a kind of development catalyst to orient and bring the region on a path for development. Therefore looking at this figure one would expect a negative correlation between these two variables. In the figure the upper part denotes the income of the region, expressed as a percentage of the average across European regions. The bottom figure presents the share of employment due to state firms out of the total employment we observe for that region-year in our dataset. This figure represents the average regional income/state share over the period 2002-2011. The pattern according to the social view is more vivid in the eastern part of Europe. On the other hand some of the regions with the highest extent of economic development, also show a high share of state employment. This figure alone presents a mixed picture regarding state involvement and development. This picture points to some extent to the social view (especially in Eastern Europe) and path-dependence. In the next section of this article we go more into depth on this issue and try to link several country's institutional characteristics with state ownership by means of correlations and a formal regression framework.

In the next table we go a little bit more in detail and provide some statistics on the importance for each country in our data, and the industries with the highest state employment share over all the years.

[Insert table 6 about here]

Column 2 and 3 give an overview of the total number of employees we observe for all the firms and for the state firms. In the next column we take the ratio of these numbers. This is a rough indicator on the importance of state firms in the economy. A couple of things mark out. For Ukraine and Bulgaria on average about 33% and 28% of the total employment is due to state firms for our dataset. This is quite an extensive amount. In general the presence of state firms tends to be higher for the eastern part of Europe. This is consistent with the Path-Dependence view. In (Musacchio and Lazzarini, 2014, p. 66-67) the authors present two figures pointing towards the significance of state firms in economies which they label as Command Economies.²⁴ Interestingly also for our data, Finland records an employment in state firms of about 13%. So our data is able to capture this phenomenon as recorded in the latter cited book chapter. A couple of other papers mention this high fraction of state firms across Finland, see OECD (2003) and Willner (2003). The fact that a high state sector emerged in this country has been due to the fact of a lack of private venture capital. This lacking of capital incentivised the state to initiate economic development. A second reason for this high share, vis-à-vis other high-income countries, stressed by OECD (2003) has to do with the establishment of 14 SOEs within the period 1989-2001.

When looking at the last three columns in the table, we show the sectors in the economy for which the ratio defined in column four is the highest on average over the years at the sector level. For example in Austria the ratio employment in state firms over total employment, averaged over all sectors and all years is the highest in the sector with code 40. This ratio is the second highest in sector 62 and the third highest in sector 41.²⁵ For Austria we thus find the highest presence in the energy sector, the sector of air transport and lastly sector 41 embraces all firms involved with activities involving collection and the purification of water. Looking at the other countries as well, we see quite a lot of cells with codes starting with a 6 or 4. To a smaller extent sector codes with 2-digit 10-14 appear in the table. These latter sectors involve mining activities.²⁶ The fact that we observe these findings in the table gives us confidence on the quality of the data. The OECD for instance assembles indicators on Product Market Regulation on a five year basis. For an overview on the procedure, see Wölfi et al. (2010). This indicator is composed out of several sub-indices. One of these sub-indices is an index of State Control, within certain sectors. In order to build this indicator, one thing the OECD does is assess whether there is a state firm present in a given sector.²⁷ We believe that this overlap is also a signal of the quality of our assembled database. The next figures give an alternative overview on this, but now we use the entire dataset after applying some measures to clean out the data.²⁸ In order to get to these figures we

²⁴The following countries are part of this group: China, the Czech Republic, Finland, India, Poland, Russia, the Slovak Republic and Vietnam.

²⁵For convenience we have included a table with the 2-digit codes of the Nace-sectors which we have in our data in the appendix.

²⁶We have constructed similar tables only including state firms with a minority state shareholding. Although sector codes change for these last three columns, the sectors are quite similar nature as in table 6 and consistent with OECD indicators.

²⁷For an overview on these sectors, see Wölfi et al. (2010). Do note that the OECD relies on a more recent Nace version for the sector codes.

²⁸These cleaning measures involve deleting firms reporting simultaneously missing values

constructed the following variable:

$$Stateshare_{jt} = \frac{\sum_{i, \forall i \in j} ShareState_{it} * L_{it}}{\sum_{i, \forall i \in j} L_{it}}, \forall c \in C \quad (1)$$

This measure is based on the article by Javorcik (2004), who constructs this to assess the extent to which the presence of foreign firms in Lithuania contributes to local development by means of productivity spillovers. Whereas the author relies on sales to construct the measure, we rely on the number of employees as in Aitken and Harrison (1999).²⁹ The state share for an industry j in year t is thus constructed by multiplying the shareholdings of a state investor in a certain firm i by its employment level. Afterwards this value is summed over all firms in the industry and divided by the total employment in industry j . We calculate this measure for every country c in our country set C . This variable therefore gives an indication of state presence within industries.³⁰

[Insert figure 4 about here]

[Insert figure 5 about here]

Note that at this stage of the article we have not yet investigated to a great extent the outliers. The figures above and below exclude outliers. This was done to keep the figures readable. The first figure gives an overview of the variable at the country-level. The red boxes in the figure present similar state share variables, but after excluding firms with consolidated accounts. To a large extent we see a similar pattern emerging as in table 5. The former Command Economies in general show a higher value for these variables. Looking at the same variables but now across industries, large boxes are present in sectors 10, 12, 40, 41 and sectors 60 to 64. Consistent with the earlier table. Some smaller peaks are found in sectors 22 (Media), 35 (Manufacturing of other transport equipment), sector 70 and 73-74. (Real estate, R&D and Other business activities).

3.a State presence amongst legal origins

Next we introduce some more homogeneity amongst the countries we have in our dataset. The goal of this section is to present some gentle evidence on how state interference by state firms is distributed across country groups. The best classification to achieve this goal is by means of subdividing the countries in our dataset according to their legal origin: English, German, French, Scandinavian

for total assets, operating revenue and employment. Also if a firm recorded negative values for these variables or sales or the variable age of the firm in one year, the respective firms were deleted entirely.

²⁹We have constructed an alternative indicator like Javorcik (2004), but based on operating revenue, since for some countries in our dataset a variable sales is missing for every firm. A simple correlation between these measures yields a value of about 0.87. In the figures we concentrate on domestic state owners, but the correlation between this measure for domestic state investors and the one including foreign state investors (all state investors) is even larger, 0.99.

³⁰The industry set J is composed out of the industries making up table A.2a and A.2b in the appendix.

and Socialist. In La Porta et al. (1999) the authors assess various theories of institutional performance by means of assessing the determinants of government quality across countries. In this article the authors go into a great amount of detail on the roots of legal origins. The legal origin/tradition of a country can be seen, they argue, as an approximation of the political orientation of governments (La Porta et al., 1999, p.19).³¹ The authors rely on this distinction in a later article on government intervention in the financial sector La Porta et al. (2002). This interventions is defined as the average ownership of states within the countries' top banks. Here on average countries with a Socialist legal tradition exhibit on average a higher ownership, vis-a-vis the other legal traditions. Indeed the English legal tradition takes on the other extreme with the lowest government ownership on average.³² We pursue a similar approach for our data. Our dataset excludes the financial sector, but includes many other activities. In that sense our article is complementary to the research by La Porta et al. (2002). In figure 6 we present a similar plot like figure 4, but now over legal origins.

[Insert figure 6 about here]

For our data we see that the English and the Socialist legal tradition are at both extremes of the state share variable. In between we have the Scandinavian legal origins exhibiting a higher box than the French and German tradition.³³

The next two figures give an overview of state firms across industries. Now we plot a separate figure for each Legal Origin.

[Insert figure 7a about here]

[Insert figure 7b about here]

The state share across industries is highest for countries in the Socialist legal tradition. In virtually every sector in this figure we see a box clearly appearing. But here we see the highest concentration in the mining, energy, transportation and services. Looking at the Scandinavian legal origin also here we see a concentration within sectors. But this to a lesser extent than top figure. Also sectors with codes 17-20, 27 and 31-32 show a high share of state investment,

³¹English 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. At the other extreme countries with a Socialist legal origin should have a higher government intervention, as the intent of this legal tradition was the maintenance of power and resource extraction (La Porta et al., 1999, p.17). The other legal origins take a middle position and here the distinction is more modest.

³²The other legal traditions take a middle position in the following order of decreasing ownership: French, Scandinavian and German. The applied t-tests do not always point to significant differences.

³³We also applied a t-test of equality of means between these legal traditions. Results show always a statistical significant difference between Socialist countries and the other origins. As well as the English origin vis-a-vis the others. Off course these results should be interpreted carefully. Also cross-sectionally our data is restricted to 27 observations at most, unlike as is the case in La Porta et al. (2002), who make use of worldwide data.

as compared to other sectors. For the French and German Legal origin state involvement is concentrated and is quite similar across industries. In the German legal tradition the involvement is somewhat more concentrated in the sectors with codes 60-64. For the French origin we see a spike in sector 35 (manufacturing of other transport equipment). Lastly in the English legal tradition (these are Ireland and the United Kingdom.) We see a large box in sector 40. Also in the sectors 60-62 we observe a larger government presence. But still the shares in these sectors are small comparing this to other legal origins looking at the scale of the y-axis.

In the figure below we have calculated for each country in our dataset the average shareholdings of domestic state shareholders within the countries' largest 10, 50 and 100 firm, with regard to number of employees. We did this for every year in our dataset. The figure presents an average of this exercise over the period 2002-2011.

[Insert figure 8 about here]

We see that the positioning of countries remains quite stable over the three figures. In general Eastern European countries show a higher shareholding in these largest firms. Bulgaria, Ukraine and Romania make up the top-three. Bulgarian state shareholders on average have a shareholding of 60% within the ten largest firms. This decreases to 40% for the hundred largest firms.

4 Countries' institutions and state involvement

In this section we try to link some country variables to the presence of state firms in the economy. We do this by two means, in one instance we calculate raw correlation coefficients between country variables and the variables we have defined above: state share and the share in the largest firms by state investors across countries. For our state variables we have calculated a country aggregate by using weights, defined as:

$$W_{jt} = \frac{\sum_{i \forall i \in j} OR_{it}}{\sum_i OR_{it}} \quad (2)$$

These weights are defined for each country separately. In this equation i stands for a firm, j for a certain sector and t for year. For the definition and source of all the variables used in tables 7 and 8, we revert the reader to the appendix table A.1. The table below gives simple correlation coefficients between various country-level variables and the different state variables:

[Insert table 7 about here]

We make a distinction between several categories of variables in the table above and below. Variables related to financial development of a country ATM, Bank Branches, S&P Global and Stocks Traded. Variables related to the general development of a country: Agricultural VA, Industry VA, Export of ICT, Manufacturing VA and Rural Population. The next category relates to R&D. The

last category combines variables related to political freedom: Corruption, Civil Liberties, Political Rights, Army and Military Expenditure. Also some variables relate to general government spending and activities: Subsidies, Tax Revenue, PMR, Contract enforcement and Cost of Business. When we look at table 7, quite a lot of variables are significant. The significance is also stable over the various variables measuring government involvement in the economy. Two out of four financial variables show that a higher financial development is negatively correlated with the amount of state firms. This is also the case for the general economic development. A higher share of value added of agricultural activities implies a positive correlation for our state firm variables. This is also the case for industry value added. A more sophisticated economy (measured by export of ICT and the R&D-variables) implies a lower amount of state intervention by state shareholdings. The variables measuring political freedom (army, political rights, civil liberties) present evidence towards political theories for state interference. In general it appears that the higher the score/value of these variables, the higher the amount of state shareholdings in the economy. With regard to corruption this correlation is negative. The lower the level of corruption, the less state shareholdings. The variables related to government activities (subsidies and taxes) share a negative sign. Since subsidies and taxes have as one goal to impact economic agents by stimulating certain activities, while deterring others, this correlation might indicate that governments might not need to intervene per se directly in the economy to reorient the market, since subsidies and taxes might have already achieve it's goal. The next table retakes this exercise but now we use a simple fixed-effects regression framework to investigate this:³⁴

[Insert table 8 about here]

Now the results of our simple correlation table changes. We find some evidence for economic development. Countries which are more developed in an economic sense have less state interference by means of state firms (GDP per Capita (PPP) and Agriculture VA). The variable which relates to tax revenue is significant, with the same sign as table 7. We also notice two significant variables with regard to political rights: Political Rights, Army and Military Expenditure.

³⁴Existing literature typically applies a cross-section framework. Since our data is limited with regard to the cross-sectional dimension, we make use of our panel dimension. Here, we impose fixed-effects per country and we allow for clustering of the standard-errors per country.

5 Differentials between state firms and private firms

The previous sections concentrated on a more aggregate level, the country and industry level. In this section we now move over to some analyses at the firm-level. In this section we present some gentle evidence regarding the difference between state firms and their counterparts on a variety of financial and firm variables. First we present two figures which provide an overview on the employment distribution of private firms and state firms. The first figure does this for the whole sample of firms, regardless of country, for the second we split out the kernel plots over the legal origin of the firms.

[Insert figure 9 about here]

[Insert figure 10 about here]

On average over all the data we have in our sample used in this section, we see that for state firms the employment distribution is to the right. The same is true when we redo the analysis for each legal origin country. A noticeable difference however is the kernel plot for the German legal tradition. Here both distributions closely coincide with each other, rendering only a small difference with regard to employment numbers between private and state firms.³⁵

A large fraction of the literature on state firms concentrates on efficiency differentials between these two types of firms. For this reason we devote a separate section of this article on the topic of state firms and efficiency. In what follows for all our regression we follow Bernard et al. (2007) and Geishecker et al. (2009), who focus on exporters and multinational firms respectively, and estimate the following regression:

$$\ln Y_{it} = \beta_0 + \beta_z Z_{it} + \beta_{for} FD_{it} + \beta_{soe} State_{it} + \eta_{ct} + \eta_{jt} + \epsilon_{it} \quad (3)$$

In every regression we control for firm-level characteristics (Z), the firm's age and the number of employees in the previous period.³⁶ Besides these variables, we control for a firm's foreign ownership status, by means of a foreign ownership dummy (FD). Regarding state ownership, we control for this by several means: one is by means of a simple dummy variable, indicating state-ownership or not. Secondly we explicitly take into account the extent of state-ownership by making use of the observed stake due to state shareholders within the firm. This allows us to calculate for instance explicitly the productivity differential for firms with for instance 50% state ownership, vis-à-vis firms with 65% ownership. In

³⁵Kolmogorov-Smirnov tests for the equality of these densities all reject the hypothesis that the distribution for private firms does *not* contain smaller values with regard to number of employees in the entire dataset, as for every legal origin.

³⁶In regressions for which the number of employees acts as a dependent, we control for the total assets during the previous period. We excluded outliers for these estimations. Firms with a value for a variable in the vector on the left-hand side below the first percentile or above the 99th percentile in a country-industry-year-size cell were excluded. Here four size categories are defined: micro (employment between 1-20), small (employment between 19 and 50), medium (employment between 49 and 250) and large employment above 249.

addition to the estimations we include several fixed effects, country-year and industry-year. As a robustness check we include country-industry-year fixed effects. We cluster standard errors at the country-industry level. Moreover we estimate this regressions only for firms which have a number of employees higher than 19, since AMADEUS tends to be somewhat more representative for these firms. The dependent variable includes several indicators: firm employment, wages, TFP, investment, profit, etc. An overview of these variables is given in table 9, in which summary statistics are presented divided by the type of firm, for the estimation sample.³⁷

[Insert table 9 about here]

Looking at the table above we see that state firms and private firms tend to differ to a great extent in several characteristics. State firms tend to be older, larger, less productive and more profitable on average in our sample. These statistics are unconditional and do not control for firm-level characteristics and fixed effects. The next tables do control for this. The next tables give an overview of a couple of regressions on differential with regard to employment (table 10), wages (table 11) and a multitude of other variables.

[Insert table 10 about here]

[Insert table 11 about here]

[Insert table 12 about here]

In the tables above we can see that state firms employ about 11.4% more people than private firms. For foreign firms this is also the case. Listed state firms, however do not show a significant differential with regard to the average employment level. Regarding wages, we also observe that state firms have higher wage costs on average. This is also the case for foreign firms, but for these firms this fact can be explained by their higher productivity level, this is not applicable to state firms (as shown below). These observed findings can be explained by the politician's focus and orientation towards benefits for its voters. In ? and Vickers and Yarrow (1991) excess employment/the politicians' private agenda is part of the politician's objective function, besides social welfare. Depending on the weight given to this excess labour/own agenda, the firm's inefficiencies might increase. As the politician is concerned with re-election, directly providing employment increases the odds of being re-elected, as potential constituents might return the favour. Also Bennedsen (2000) presents a model showing that ownership by politicians increases the potential for interest groups to influence that firm's policy, hereby contributing to excess labour, higher wages and firm-level inefficiencies. Moreover weak monitoring on behalf of the politician might contribute to this phenomena Vickers and Yarrow (1991). The last table of this section then evaluates the differences over a bunch of variables, sorted in the

³⁷Do note that for our estimation sample we have only included firms for which we were able to calculate the TFP. This means that some countries, six in total, drop out for the estimations entirely.

table according to the various fixed effects used in the estimations. as well as the type of state dummy applied. For almost every measure applied in our regressions, we see in the table a positive sign for our state dummy. For most cases this sign is also highly significant. This higher investment level by state firms might find its origin in preferential access to finance for these firms (Khwaja and Mian (2005)), due to a lower probability of bailout Faccio et al. (2006). Also a tendency towards over-investment (Chen et al. (2017); Firth et al. (2012)) might occur, as state firms' sensitivity to investment opportunities is weaker, see Chen et al. (2011) for Chinese listed firms. This might occur due to monitoring issues or for instance a politician's personal preference. (see the literature above). On two aspects the domestic state dummy and the '*normal*' state dummy deviate, the sign for profit and the sign for long term debt. This difference might be due to a different orientation of firms with a strong domestic state control and other type of state firms. The former might have a higher orientation towards value lowering investments, due to voter visibility, hereby decreasing the profit potential. For the latter dummy for state firms (State firm dummy), domestic state shareholders do not necessarily have a strong controlling stake in the firm, therefore foreign states might behave more like private firms and in this way increase profitability of the firm, by on the one hand more profitable investments. The differential for long term debt on the other hand might also be linked to the foreignness of the state investor and the lower likelihood of intervening if the firm runs into trouble. To clarify this, a foreign state investor does not lose any votes since the workers employed by the invested firm, do not belong to this investor's electorate.

5.a Efficiency of state firms

Research on the state firms has examined to a great extent how state ownership can impact performance and has looked at the consequences of privatisation, by assessing the change over a variety of indicators. A couple of empirical studies within a variety of settings on the matter are Claessens and Djankov (2002), Dewenter and Malatesta (2001), Omran (2004) and for an excellent overview, see Megginson and Netter (2001). All papers come more or less to the same conclusion: privatization increases sales, labour productivity and profitability.³⁸ The article by La Porta and López-de Silanes (1999) examines the consequences of privatisation episodes for a dataset comprising virtually every privatised Mexican firm. They find in line with the above evidence that profitability improves, firms downsize with respect to, blue- and white-collared, labour and investment increases.³⁹ For their panel of eight European countries, Arnoldus et al. (2016a) find that state firms are less productive and allocative efficiency tends to be lower in state-intensive industries. A couple of articles focus on Total Factory Productivity. By means of a Data Envelopment Analysis, the results in

³⁸A cautionary note however is given in Dewenter and Malatesta (2001). Even though privatisation is associated with increasing profitability, the majority of this increase took place before this transfer in ownership. So government managers are perfectly capable of running these companies in profitable manner.

³⁹The authors have survey responses at their disposal. When asked what the main reason was for the increase in profits after privatisation, respondents claimed the replacement of former management and new production processes.

Arocena and Oliveros (2012) uncover that Spanish SOEs are *not* the most inefficient companies within their respective industries, but that their productivity improves after privatization. In contrast Saygili et al. (2001) do not find any evidence on this for a small sample of firms within the Turkish cement industry. In Boardman et al. (2016) beneficial long run effects of privatisation Canadian firms are demonstrated. Productivity of privatised firms keeps on increasing, even in the long run, contributing to welfare gains for Canada worth amounting to billions of dollars.⁴⁰ Looking at the rationales as to why we should expect efficiency to be lower in state firms, we can have several explanations for this. Theoretically, several reasons can be given why we can expect differences in performance⁴¹ between these two categories of firms. As governments aim at maximising social welfare, for instance by assuring a low unemployment level, SOEs might operate with excess labour. Also the pressure of interest groups, e.g. labour unions, might contribute to this excess, and hence a lower productivity, (Bennedsen (2000); Cavaliere and Scabrosetti (2008)). A natural consequence of this is that it is against the interest of this government to let an SOE go bankrupt. Managers of SOEs therefore have lower incentives for cost-minimisation, since a threat of closure by state officials is simply not credible Cavaliere and Scabrosetti (2008) Also it might be difficult to set an objective for state firms, since elected officials may have changed during the existence of the firm Megginson and Netter (2001). A study by Faccio et al. (2006) presents evidence for a panel of 450 SOEs operating in 35 countries, that firms with more political connections have a higher probability of begin bailed-out^{42,43}. The fact that shares of many SOEs are non-traded does not allow the stock market to play its monitoring role and shields this SOEs from a takeover, thereby lowering managerial incentives to increase efficiency Sheshinski and López-Calva (2003). It can also be argued that SOEs achieve a higher efficiency than private firms. This due to the fact that governments also value a higher consumer surplus for their voters, thereby demanding low prices and an efficient functioning of SOEs Cavaliere and Scabrosetti (2008). The implicit bail-out guarantee can make SOEs more eligible for bank financing. Faccio et al. (2006) and Khwaja and Mian (2005) provide evidence on the link between political connections and bank loans in Pakistan. But this can alleviate financial constraints for these firms, and hence increase productivity. A couple of articles provide evidence on a negative association between financial constraints and (labour) productivity growth, see Ferrando and Ruggieri (2015); Musso and Schiavo (2007). In this section we wish to examine the difference in Total Factory Productivity between firms with a state shareholder and private firms. In order to estimate this TFP, we rely on the estimation method by Olley and Pakes (1996) who develop a semi-parametric estimation procedure to deal with two well known is-

⁴⁰In Boardman et al. (2009) a formal cost-benefit analysis is undertaken to investigate the welfare impact of the privatisation of Canadian National Railway (CN) in 1995. Estimates point to a welfare increase amounting to 4 billion dollar in the authors' conservative case. Their benchmark case estimates this increase to be far higher, as amounting to 15 billion dollar.

⁴¹Performance of course can be defined more broadly than productivity. For our purpose however, we choose to use this 'narrow' scope.

⁴²This is also known as the soft budget constraint

⁴³Note that this bailing-out of public firms to maintain a low level of unemployment can also trigger government intervention in the private sector. This is especially the case for firms which are so-called Systemically Important Agents, see ?

sues in the estimation of productivity, the endogeneity bias and selection bias. If we take a simple Cobb-Douglas production function in logs as a starting-point:

$$y_{it} = \alpha_0 + \alpha_l l_{it} + \alpha_k k_{it} + \omega_{it} + \epsilon_{it} \quad (4)$$

Typically the researcher interested in estimating production functions and productivity ($\alpha_0; \omega_{it}$) has to rely on balance-sheet information, reporting information on the use of labour (l) and capital (k) for each firm. The researcher has no information on the level of productivity of firms in the dataset. This productivity level is part of the error term. The endogeneity bias states that as productivity is part of the error term in this specification, the estimated elasticities ($\alpha_k; \alpha_l$) will be biased, because a firm will base its input use on its productivity. Therefore the error term and the inputs in the equation above will be correlated, see for an overview on this and estimation procedures Van Beveren (2012). As stated above, in Olley and Pakes (1996), the authors develop an estimation procedure which relies on firm investment. We use the method by Levinsohn and Petrin (2003) who advocate using an alternative proxy, material inputs. We draw on the method by Wooldridge (2009), who shows that the LP-estimator (Levinsohn-Petrin) can be estimated in a GMM-framework. If estimated in this way standard-errors are more convenient to obtain and the estimator is more efficient. If we again rewrite the equation above:

$$y_{it} = \alpha_0 + \alpha_l l_{it} + \alpha_k k_{it} + \omega_{it} + \epsilon_{it} \quad (5)$$

The y_{it} is the value added of the firm (operating revenue less material costs). The 'l' and 'k' stand for the number of employees and capital of the firm respectively. All variables in this equation are deflated by using the correct industry deflators. The production functions are estimated across country-industries. We also create a variable revenue productivity, defined as logarithm of sales (the same definition as in equation 3 and 4) over the number of employees. In the figure below we first present some box plots across countries/industries comparing TFP by type of firm: state versus no-state.⁴⁴

[Insert figure 11 about here]

Looking at figure 11a, for most countries we do not see any difference between private and state firms. For a few countries the boxes do not overlap, or overlap slightly: EE, LV and SE (Estonia, Latvia and Sweden). Looking at the industries (see figure 11b) the picture is rather similar (in sectors 30, 34 and 64 there is only a slight overlap). Of course these figures do not apply any controls. Next we estimate this difference by controlling for other firm factors, using the following specification:

$$\ln TFP_{it} = \beta_0 + \beta_z Z_{it} + \beta_{for} FD_{it} + \beta_{soe} State_{it} + \epsilon_{it} \quad (6)$$

In this equation the dependent variable is TFP or revenue productivity (defined as the natural log of sales over the number of employees). The vector \mathbf{Z} , as above, encompasses firm-level controls: the natural log of number of employees

⁴⁴Not all information is available for every country to estimate TFP. For some countries information on material inputs and/or a firm's operating revenue is missing entirely over the whole period.

of the previous period, the age and whether a firm is listed. The **FD** above is a dummy indicating the nationality of the firm (this is 1 if a firm has a foreign owner, who owns at least 10% of the firm). Then the vector **State** has a couple of state variables as it's members. A dummy to indicate if the firm is state-owned, a dummy if it's state-owned but the combined ownership of state investors does not exceed 50%. We also include two additional continuous state variables: the ownership percentage of domestic state firms and all state firms. The following table presents the results of these regressions.

[Insert table 13 about here]

The first thing to notice is that in every regression the dummy pointing towards foreign ownership is strongly significant. Indicating that on average foreign firms are more productive. Looking at our main variables of interest, the state variables: we see that in every regression the coefficients point towards a lower productivity level of state firms. Regression 1,2 and 5,6 use the direct ownership of state investors within the firm. Here the sign indicates that the higher the stake of a state shareholder, the lower the productivity level on average. Interestingly the dummy pointing towards state minority ownership is positively significant. Also coefficients are fairly stable across the various Fixed-Effects which have been applied. We also see that there is no robust evidence for a superior productivity level of listed state firms. Which is at odds with the fact that financial markets might put pressure on state firms to be more efficient. These results confirm the results by Arnoldus et al. (2016a), but here for a larger and more diverse sample of countries. The results in the table hold for a variety of specifications. In the next table we do the same exercise for revenue productivity, defined as the logarithm of sales over the number of employees of the firm.

[Insert table 14 about here]

Here it's also the case that foreign firms also have a higher revenue productivity on average. Also the same result as for TFP is established here. On average state firms thus also less productive in a revenue-based fashion than firms without states acting as a controlling shareholder. The fact that this result is established might point towards mechanisms at play as given in the overview of this separate subsection on state firms and efficiency. So interestingly even though state firms have a higher investment level and a higher level of intangible assets, this does not translate itself into a higher (revenue) productivity, signalling several flaws regarding state firms. In the next table we present evidence on the growth rates of employment, wages, TFP and revenue productivity.

[Insert table 15 about here]

Concentrating on the growth differential between various types of enterprises, we see that on average state firms exhibit a lower growth rate in firm employment, wages and revenue productivity. Looking at the crisis*state interaction one notices that the sign for wages is positive. It appears that in the period after the economic crisis wages in state firms grew faster on average. Providing some

subtle evidence on policy stickiness. Wage growth, however is higher in the period after the financial crisis, hereby compensating somewhat for harsh post-crisis conditions. The fact that growth rates are lower on average for this type of firms, might point towards a lower flexibility for this type of firms, and lower potential to adjust to new conditions. This is only the starting point for the analysis of potential differentials between state firms and private firms. In the direct future we wish to redo the analysis presented in this section with a formal matching procedure to assess if the results we have found in this section still hold for firms which present a twin for the state firms in our sample dataset.

6 Conclusion

In this article we have developed a procedure allowing us to identify state firms operating within Europe in twenty-seven countries in the business economy. In this sense we have expanded AUGAMA with far more heterogeneity on firms. This database is built by means of the representative firm-level AMADEUS database by BvDEP. Thanks to a procedure based on identifying certain words regarding the type of firm, shareholder names or the name of Global Ultimate Owners of the firms in our database, this paper presents evidence on state firms for a panel of 27 European countries over a decade.

We documented a fairly heterogeneous presence with regard to state firms across the European continent. A higher presence is recorded in former Command economies (the countries in Central and Eastern Europe). State interference in the economy is quite restricted to specific sectors in the economy: mining, energy, transportation and R&D. This concentration is fairly constant across the several Legal Origins we have in the dataset, excluding the countries with a Socialist Legal tradition. For this group state interference encompasses virtually every sector in the business economy to some extent. Next we have presented some general correlations and regression results by making use of the panel structure of our data. We examined correlations between various country factors and state firms in the economy: factors measuring (financial) development, R&D, political freedom, government intervention by means of subsidies or taxes and regulation in the economy. In general these correlations are significant over all our measures for the importance of state firms in the economy. In general the lesser (financial) developed a country, the higher the presence of state firms. Moreover countries with more political and civil rights tend to have lower levels of state firms in the economy. Also more corrupt countries, countries with larger military expenditures, have a higher fraction of state firms. When augmenting this and examining these results further by means of a fixed-effects panel regression, many results break down. But some mild evidence remains for the level of economic development of a country, military expenses and political rights. When we take the analysis to a more disaggregate level, we examine the difference between productivity by type of firm: state vis-a-vis private firms. Unconditionally there is no evidence of a difference in efficiency between these two types of firms. However after controlling for various firm-level variables, it appears that state firms are on average less productive. This results holds

for a variety of fixed effects and specifications. Our paper extends the evidence already put forward by Arnoldus et al. (2016a) and others, but for a larger sample of more diverse countries. We also find that state firms use more labour and have a higher employee cost on average. Moreover the investment/profit level is higher and these firms are less financially constrained (as the level of cash flow is higher on average). Moreover growth rates in employment, wages and revenue productivity are lower on average. Providing some subtle evidence on policy stickiness. Wage growth, however is higher in the period after the financial crisis, hereby compensating somewhat for harsh conditions.

In the future we would like to augment this article by presenting some more descriptive evidence on foreign state investors and we plan to present statistics regarding the distribution on the levels of government over the countries in our data and the activities of sovereign wealth funds. We would like to examine which states (European vs non-European) are active players in the European continent. Other plans concern the application of a matching procedure to redo the regressions in tables 10-15, providing more direct evidence on differential between state firms and their matched counterparts. Since we also have data on the number of patents for a large chunk of firms in our dataset, a Poisson type of regression will be estimated assessing the difference in innovative capacity. Similarly the extent of internationalisation with regard to the establishment of subsidiaries abroad will be estimated in a similar fashion.

Tables and Figures

Table 1: Coverage of AUGAMA vs Structural Business Statistics (SBS)

YEAR	AT	BE	BG	CZ	DE	EE	ES	FI	FR	HU	IT	LT	LV	NO	PL	PT	RO	SI	SK
1999	62.59%	76.26%	76.17%	34.47%	87.39%	71.04%	52.27%	91.43%	90.32%	34.27%	48.32%	19.21%	38.76%	75.23%	43.38%	15.81%	77.2%	15.15%	30.08%
2000	56.87%	74.48%	80.64%	36.31%		73.13%	57.95%	94.10%	93.62%	28.57%	53.31%	24.54%	38.07%	82.25%	46.02%	15.76%	68.98%	32.55%	32.43%
2001	59.65%	81.79%	76.93%	42.63%	99.58%	69.98%	61.92%	92.44%	81.94%	16.94%	54.00%	22.84%	40.53%	71.81%	44.95%	17.16%	67.44%	30.15%	35.92%
2002	66.16%		77.01%	45.26%		72.52%	65.73%	93.18%	84.25%	38.15%		35.59%	39.22%		45.39%	15.76%	62.16%	44.31%	38.56%
2003	51.08%	85.29%	73.57%	50.52%	94.99%	73.33%	67.00%		84.97%	13.37%	51.64%	45.74%	44.02%		43.95%	16.58%	62.7%	48.2%	45.06%
2004	62.60%	87.73%	86.43%	59.96%	95.41%	77.40%	71.26%	98.28%	83.96%	12.15%	54.33%	41.22%	75.43%		42.46%	16.17%	64.75%	50.19%	48.75%
2005	61.85%	77.32%	76.23%	56.06%	96.48%	76.97%	72.74%	94.69%	85.28%	28.27%	47.08%	40.53%	76.56%	78.68%	43.15%	13.30%	69.05%	49.98%	59.39%
2006	58.02%	77.32%	81.34%	56.02%	95.43%	73.94%	74.48%		80.51%	29.12%	57.72%	44.34%	80.33%	79.52%	49.58%	63.95%	59.61%	51.70%	63.14%
2007	59.35%	77.62%	87.85%	58.60%	96.17%	75.17%	75.66%		81.78%	58.85%	60.55%	82.85%	86.61%	73.49%	38.70%	64.65%	74.79%	51.44%	64.64%
2008	59.80%	89.38%	87.45%	66.48%	97.51%	72.79%	80.87%		90.34%	43.26%	66.83%	81.37%	96.80%	66.97%	42.73%	65.77%	73.14%	51.53%	

Note: This table gives an overview of the coverage of AUGAMA compared to SBS over the years. Sectors covered are the business economy (sectors 10-74 according to Nace 1.1). For each country-year in the table the total number of employees was calculated in AUGAMA and this value was compared to the corresponding total number of employees recorded by Eurostat.

Table 2: *AUGAMA* versus Eurostat Structural Business Statistics (SBS): Representativeness.

	SBS 2002-2007		AUGAMA as share of SBS 2002-2007			SBS 2007		AUGAMA 2007	
	# 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%	82.8%
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.

Table 3: *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+	250+	1–19	20–49	50–249	250+	250+	1–19	20–49	50–249	250+	
AT	94.3%	3.7%	1.7%	0.3%	0.3%	52.1%	21.6%	20.4%	20.4%	5.9%	17.8%	14.4%	42.8%	25.1%	
BE	96.3%	2.5%	0.9%	0.2%	0.2%	87.6%	8.1%	3.5%	3.5%	0.7%	36.3%	30.2%	27.5%	6.0%	
BG	94.9%	3.1%	1.7%	0.3%	0.3%	75.3%	12.3%	10.0%	10.0%	2.4%	60.4%	19.2%	16.6%	3.9%	
CZ	97.5%	1.4%	0.8%	0.2%	0.2%	69.1%	14.6%	13.0%	13.0%	3.3%	65.8%	15.8%	14.7%	3.8%	
DE	92.6%	4.4%	2.3%	0.5%	0.5%	69.3%	15.6%	12.2%	12.2%	3.0%	40.7%	19.5%	28.9%	10.9%	
DK	93.6%	4.2%	1.9%	0.3%	0.3%	80.2%	11.8%	6.6%	6.6%	1.4%					
EE	91.0%	5.7%	2.9%	0.4%	0.4%	86.1%	8.8%	4.5%	4.5%	0.6%	85.8%	9.2%	4.4%	0.6%	
ES	96.7%	2.3%	0.8%	0.1%	0.1%	86.6%	9.5%	3.4%	3.4%	0.5%	84.7%	10.8%	3.9%	0.6%	
FI	96.2%	2.3%	1.2%	0.3%	0.3%	88.9%	7.2%	3.2%	3.2%	0.7%	88.3%	7.7%	3.3%	0.6%	
FR	96.2%	2.5%	1.0%	0.2%	0.2%	84.7%	9.7%	4.6%	4.6%	1.1%	83.4%	10.4%	4.9%	1.2%	
GB	94.6%	3.3%	1.7%	0.4%	0.4%	40.3%	18.3%	31.0%	31.0%	10.5%					
HU	96.0%	1.5%	0.7%	0.1%	0.1%	74.1%	13.1%	10.0%	10.0%	2.9%	73.4%	13.4%	10.2%	2.9%	
IT	98.2%	1.3%	0.5%	0.1%	0.1%	75.6%	15.2%	8.1%	8.1%	1.1%	74.3%	16.0%	8.5%	1.1%	
LT	93.2%	4.6%	2.6%	0.3%	0.3%	52.1%	24.8%	19.8%	19.8%	3.2%					
LV	91.8%	5.2%	2.7%	0.4%	0.4%	64.2%	19.2%	14.4%	14.4%	2.2%	47.1%	16.9%	27.7%	8.4%	
NL	94.7%	3.4%	1.6%	0.3%	0.3%	43.6%	19.1%	30.2%	30.2%	7.0%	55.8%	16.6%	21.5%	6.1%	
NO	99.0%	2.7%	1.2%	0.2%	0.2%	87.6%	8.4%	3.3%	3.3%	0.6%	85.8%	9.7%	3.8%	0.7%	
PL	97.6%	1.3%	0.9%	0.2%	0.2%	35.9%	21.7%	33.3%	33.3%	9.2%	36.2%	22.9%	32.7%	8.2%	
PT	97.1%	1.8%	0.8%	0.1%	0.1%	90.7%	6.0%	2.8%	2.8%	0.5%	89.2%	7.0%	3.3%	0.5%	
RO	93.6%	3.7%	2.3%	0.5%	0.5%	88.9%	6.4%	3.9%	3.9%	0.8%	88.1%	6.8%	4.1%	0.9%	
SE	97.2%	1.8%	0.8%	0.2%	0.2%	92.1%	5.2%	2.2%	2.2%	0.5%	91.4%	6.1%	2.2%	0.3%	
SI	96.2%	2.1%	1.3%	0.3%	0.3%	78.0%	10.8%	8.5%	8.5%	2.7%	76.5%	11.6%	9.1%	2.8%	
SK	89.0%	4.9%	4.7%	1.1%	1.1%	66.2%	11.4%	17.3%	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. 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.

Table 4a: Words used for Identifying State shareholders or state GUOs

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	provincja	varos
auktorit	grofstva	minister	regering	varos
authority	grófstva	ministère	regeringskanslet	vároš
autoridad	gubernija	ministrija	regiao	videk
autorit	guvern	ministrstvo	região	vidék
autorizacao	hallitus	ministry	regierung	ville
autorização	hatalom	miniszterium	region	vlaams
autorytet	hatosag	minisztérium	région	vlada
avtoriteta	hatóság	municipal	regiune	vláda
ayuntamunt	hrabstvi	municipio	regjeringen	volitused
behörde	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	repubblica	
cetate	jurisdicao	oblast	republika	
cidade	jurisdição	okres	rzeczpospolita	
circoscrizione	jurisdicción	okrug	riik	
citta	jurisdicción	omavalitsus	royaume	
città	kaupunginhallitus	omrade	rzad	

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

Table 4b: Words used for Identifying State Shareholders or State GUOs
(*Cont'd*)

city	kaupunki	område	savivaldybe
ciudad	kommun	opcina	savivaldybe
comarca	kompetence	opcina	sfera
comitat	kormany	opraveni	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	tartomány
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.

Table 5: Examples of listed state firms

Country	Firm	Nace Code	State Shareholder	Ownership Stake	State Shareholder	Ownership Stake	Employees
Listed State firms							
AT	BURGENLAND HOLDING AKTIENGESELLSCHAFT	74	wiener stadtwerte holding ag	10%	stadt wien	20,00%	2
AT	FLUGHAFEN WIEN AKTIENGESELLSCHAFT	63	province of lower austria	30%			3,000
BE	BELGACOM	64	ciat belg	53,50%			16,804
BE	ELIA SYSTEM OPERATOR	40	publ-t	33,01%			7,500
CZ	CEZ A.S.	40	state of czech republic (ministry of finance)	65,99%			150
DE	BERCHTESGADENER BERGBAHN AKTIENGESELLSCHAFT	60	schönan am koblenz district	81,98%			30
DK	KØBENHAVNS LUFTHAVNE A/S	63	danish state	39,5%			1,898
DK	NUNAMNERALS A/S	73	grönlands landsstyre	43%			16
EE	EESTI TELEKOM AS	74	estonian development fund	3%	state of estonia (finance ministry)	24,17%	14
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 (nrl)	3,12%	minister of finance republic of ireland	25,33%	3,844
IT	ACEA S.P.A.	40	comune di roma	51%			6,087
IT	ACSM S.P.A.	40	comune di como	24,76%	comune di milano	2,00%	424
LT	AB ALYTAUS TEKSTILE	17	state fund of property	69,56%			6
LT	AB KLIPEDOS NAFTA	63	lietuvas respublikos ulko ministerija	70,63%			319
LV	LIEPAJAS AUTOBUSU PAKKS AS	60	lepaja city council	34,85%			313
NL	BEURS ROTTERDAM N.V.	70	gemeente rotterdam	50%			39
NO	CERMAQ ASA	15	nærings- og handelsdepartementet	45,54%			6,972
PL	BOGDANKA S.A. LUBELSKI WEGIEL	10	skarb paustwa / state treasury	65,5%			540
PL	CIECH S.A.	51	skarb paustwa / state treasury	36,68%			77
RO	APOLLO SA	55	apara (agency for privatization and management of state ownership)	70%			45
RO	ARCELORMITTAL TUBULAR PRODUCTS IASI SA	27	autoritatea pentru valorificarea activelor statului	17%			77
RU	15-J TAKSOMOTORNYI PARK	60	departament inzhinestwa goroda moskvy	49%			45
RU	17 TAKSOMOTORNYI PARK	60	departament inzhinestwa goroda moskvy	49%			45
UA	APOSTOLNISKYI KOMBIKORMOVNYI ZAYOD	15	state of ukraine	100,00%			97
Listed firms with state shareholder							
BG	ALBENA AD	55	obshchina balchik	7,13%			1,652
BG	ALFA WOOD BULGARIA AD	20	state of bulgaria	0,12%			230
DE	BOGHUM-GELSENKIRCHENER STRAHLENBAHNEN AKTIENGESELLSCHAFT	60	stadt gelsenkirchen	3,36%			2,136
ES	CINTRA CONCESIONES DE INFRAESTRUCTURAS DE TRANSPORTE S.A.	63	state of new jersey common pension fund	3,06%			108,117
FI	AMER SPORTS OYJ	33	op finland value fund	0,3%	the local government pensions institution	0,23%	6,262
FI	ASPOCOMP GROUP OYJ	32	turun kaupunki	0,65%			101
GB	ADVANCE DEVELOPING MARKETS TRUST PLC	74	derbyshire county council	4,52%			517
GB	AXIS-SHIELD PUBLIC LIMITED COMPANY	33	government of norway	8,47%	bank of ireland nominees limited	3,83%	3,971
IE	UNITED DRUG PUBLIC LIMITED COMPANY	51	bank of ireland nominees limited	19,84%			734
LV	GRUNDEKS AS	24	state social insurance agency	2,29%			32
NL	EUROPEAN AERONAUTIC DEFENCE AND SPACE COMPANY EADS N.V.	35	government of france	0,06%			1,566
NO	AKER BIOMARINE ASA	73	state of new jersey pension fund	0,17%			2,131
PT	BRISA-AUTO ESTRADAS DE PORTUGAL S.A.	45	state of new jersey pension fund	2,08%			50,633
PT	EDP - ENERGIAS DE PORTUGAL S.A. (EDP)	40	international petroleum investment co.	2,00%	societe nationale pour la recherche d exploitation de transport par canalisation de transpo	2,04%	40,049
SE	AARHUSKARLSHAMN AB (PUBL)	51	government of norway	0,70%			2,131
SE	AB ELECTROLUX	29	national swedish pension fund	2,20%	fourth swedish national pension fund	1,50%	30,633
UA	ARSELORMITTAL KRIVYI RIG	27	state of ukraine	0,10%			40,049

The table above gives information on a number of listed firms for whom we identified state shareholders. The Nace 2-digit number is based on revision 1.1. The percentages in the columns are direct ownership percentages in the firms by the respective shareholder. The names of the firms/shareholders are the names as we observe them in the AUGAMA database. This table is for 2009 as in OECD (2010). The names of the firm in the second column might therefore have changed in the meantime. Also note that this list is not exhaustive as explained in the text.

Table 6: Share of employment in state firms and top state sectors

Country	Total employment in data	Employment in State firms	(2)/(3)	Sector 1	Sector 2	Sector 3
AT	1,547,439	121,868	7.87%	40	62	41
BE	2,167,994	159,721	7.36%	64	35	40
BG	966,757	275,207	28.47%	41	40	10
CZ	2,156,819	108,334	5.02%	62	64	40
DE	24,579,369	2,072,853	8.43%	12	64	41
DK	2,323,558	39,331	1.69%	40	64	19
EE	345,060	14,766	4.28%	64	40	11
ES	8,551,472	208,980	2.44%	16	23	10
FI	1,635,534	208,516	12.75%	62	23	27
FR	14,069,283	1,375,891	9.78%	64	40	34
GB	20,483,166	501,131	2.45%	64	40	13
HR	730,750	89,712	12.28%	40	62	64
HU	1,047,158	24,297	2.32%	23	62	24
IE	505,941	43,893	8.68%	61	64	62
IT	13,422,624	559,935	4.17%	11	41	64
LT	486,702	31,409	6.45%	23	41	63
LV	463,700	27,175	5.86%	74	73	62
NL	5,593,396	323,302	5.78%	41	40	64
NO	1,072,610	60,432	5.63%	41	40	27
PL	3,677,300	764,980	20.80%	13	40	73
PT	1,459,708	66,400	4.54%	62	40	63
RO	3,625,352	313,607	8.65%	12	10	13
RU	16,476,557	2,020,492	12.26%	41	40	62
SE	3,817,810	238,256	6.24%	64	40	13
SI	348,545	39,787	11.42%	10	64	40
SK	643,023	59,401	9.24%	64	41	60
UA	7,292,349	2,396,761	32.87%	12	41	64

The table above shows the total number of employees in all firms for every country in the database (column 2), and the total number of employees working in state firms (column 3). The columns with header Sector 1 to 3 show the 2-digit sector codes (Nace Rev. 1.1) for which the ratio as in column 4, calculated at the country-sector-year-level, was the highest (column 5), the second largest (column 6) and the third largest (column 7). All values in the table are averages for over the years 2002-2011.

Table 7: Correlation between state presence and institutional variables

	(1)		(2)		(3)		(4)	
	State share L	State share OR	rho	N	rho	N	rho	N
Financial Variables								
ATM	-0.23008***	0.23046***	0.18803***	215	-0.18803***	224	-0.15835**	224
Bank Branches	0.04679	-0.11190*	0.02309	218	0.02309	227	0.04575	227
S&P Global	0.08494	0.07557	0.14173***	343	0.14173***	357	0.13846***	357
Stocks Traded	-0.30775***	-0.26993***	-0.31682***	279	-0.31682***	293	-0.32133***	293
Economic Development								
Agriculture VA	0.61492***	0.53587***	0.53157***	343	0.53157***	357	0.59114***	357
Rural Population	0.21589***	0.18555***	0.26254***	343	0.26254***	357	0.28014***	357
Export of ICT	-0.32751***	-0.34873***	-0.25844***	320	-0.25844***	333	-0.29502***	333
Industry VA	0.20011***	0.28877***	0.14792***	343	0.14792***	357	0.12899**	357
Manufacturing VA	0.05652	-0.03777	0.11550**	341	0.11550**	355	0.09186*	355
Innovation								
R&D Technicians	-0.31568***	-0.30801***	-0.22829***	249	-0.22829***	263	-0.27647***	263
R&D Expenses	-0.25771***	-0.22271***	-0.25581***	339	-0.25581***	353	-0.29274***	353
R&D Researchers	-0.26497***	-0.17510***	-0.30418***	329	-0.30418***	343	-0.34612***	343
Patents to Population	-0.18129***	-0.14555***	-0.19843***	336	-0.19843***	350	-0.22290***	350
Government and regulatory variables								
Contract Enforce (days)	0.13088**	0.09243	0.11845*	237	0.11845*	247	0.10555*	247
Cost of Business	0.36203***	0.34839***	0.11496*	237	0.11496*	247	0.14294**	247
PMR	0.48439***	0.40862***	0.14397**	240	0.14397**	254	0.20692***	254
Subsidies	-0.23020***	-0.16282***	-0.25810***	334	-0.25810***	348	-0.28409***	348
Tax Revenue	-0.12549**	-0.11026**	-0.08301	343	-0.08301	357	-0.08919*	357
Political Variables								
Corruption	-0.40578***	-0.34417***	-0.44212***	320	-0.44212***	334	-0.47368***	334
Army	0.44312***	0.34657***	0.32011***	343	0.32011***	357	0.35092***	357
Military Expenditure	0.41138***	0.37016***	0.22393***	316	0.22393***	330	0.25046***	330
Political Rights	0.27840***	0.29433***	0.27879***	343	0.27879***	357	0.28649***	357
Civil Liberties	0.38370***	0.35034***	0.26457***	343	0.26457***	357	0.27418***	357

This table presents simple correlation coefficients between the variables listed in the rows and various definitions of state presence in our dataset. Columns with names "N" denote the number of observations for which these correlations are calculated. For definitions and sources of the variables in this table, see the appendix at the end of this paper. *, ** and *** point to significance of the correlation coefficients at the 10%, 5% and 1% respectively.

Table 8: State involvement and country characteristics

	State share L	State share OR	GC10L	GC50L
GDP per Capita (PPP)	-0.161*** [-3.50]	-0.122** [-2.60]	8.758 [0.69]	3.805 [0.40]
Financial Variables				
ATM	0.000 [0.06]	0.000 [0.26]	0.000 [0.00]	0.016 [0.29]
Bank Branches	-0.000 [-0.52]	0.000 [0.18]	-0.049 [-0.31]	-0.009 [-0.08]
S&P Global	-0.000* [-1.88]	-0.000 [-1.52]	0.041** [2.42]	0.027** [2.11]
Stocks Traded	-0.000 [-1.53]	-0.000 [-1.06]	-0.017 [-0.43]	-0.014 [-0.62]
Economic Development				
Agriculture VA	0.013* [1.81]	0.016** [2.23]	-0.671 [-0.23]	-0.042 [-0.02]
Rural Population	-0.005 [1.30]	0.004 [1.32]	0.685 [1.04]	0.559 [1.16]
Export of ICT	-0.000 [-0.08]	-0.000 [-0.42]	0.191 [0.94]	0.025 [0.25]
Industry VA	-0.002 [-1.02]	-0.002 [-1.27]	-0.157 [-0.27]	-0.274 [-0.66]
Manufacturing VA	-0.003 [-1.62]	-0.004** [-2.48]	0.288 [0.59]	0.035 [0.11]
R&D Technicians	0.000 [0.25]	0.000 [0.32]	0.002 [0.31]	-0.001 [-0.46]
R&D Expenditure	0.017 [1.22]	0.023 [1.37]	-9.219* [-1.97]	-5.755* [-1.73]
R&D Researchers	-0.000 [-0.07]	0.000 [0.16]	-0.001 [-0.70]	-0.001 [-0.83]
Patents to Population	-92.634 [-0.76]	-125.245 [-1.25]	-1.29e+04 [-0.73]	-1.13e+04 [-1.12]
Government and regulatory variables				
Subsidies	0.001 [1.03]	0.000 [0.27]	0.530** [2.29]	0.406** [2.22]
Tax Revenue	-0.010*** [-3.30]	-0.011*** [-2.91]	0.996 [0.81]	0.707 [0.79]
Government Consumption	0.002 [1.02]	0.004 [1.55]	-0.415 [-0.50]	-0.102 [-0.18]
PMR	0.007 [0.64]	0.002 [0.26]	-1.251 [-0.30]	-0.553 [-0.19]
Contract Enforce (days)	0.000 [1.51]	0.000 [0.67]	0.067* [1.99]	0.044** [2.16]
Cost of Business	0.002 [1.13]	0.002 [1.06]	-0.379 [-0.87]	-0.274 [-0.9039]
Political Variables				
Army	0.020* [1.75]	0.018 [1.56]	-3.412 [-1.04]	-1.848 [-0.77]
Military Expenditure	0.007 [1.34]	0.008** [2.11]	-1.876 [-1.14]	-0.791 [-0.68]
Corruption	0.001* [1.83]	0.000 [1.32]	-0.054 [-0.28]	-0.067 [-0.51]
Political Rights	0.030* [1.92]	0.038* [1.84]	-3.621 [-0.89]	-3.130 [-0.93]
Civil Liberties	0.016 [1.01]	0.022 [1.20]	-6.259** [-2.07]	-4.850* [-1.97]

T statistics between square brackets.

T-statistics based on robust standard errors.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: this table presents the results of several fixed effects regressions. The following regression was run:

$$Y_{it} = \alpha_i + \beta \mathbf{X}_{it} + \gamma \ln \text{GDPcap}_{it-1}$$

The names in the table rows make up the elements in the vector \mathbf{X} . We run each regression in a separate manner, by including each row element only in one estimation. Every time we control for lag of GDP per capita. For a definition of the variables see the appendix. The period of estimation is the whole period for which we have data on government firms: 1999-2012. Although the number of observations is not reported here, the minimum amount of observations was 224.

Table 9: Summary statistics state firms vs private firms in sample.

	N	Mean	Median	SD	Min	Max
Private firm						
Age	2,479,392	19.90	16.00	16.75	0.00	1985.00
ln Employees	2,479,392	3.87	3.66	0.79	3.00	12.32
ln Wage	2,471,038	14.23	14.01	1.42	0.73	25.68
ln TFP	2,479,392	10.26	10.44	1.25	-7.23	20.06
ln Revenue Prod.	2,467,040	11.98	11.85	1.42	0.00	24.03
ln Profit before tax	1,926,785	12.44	12.39	2.11	-5.81	26.20
ln Total Assets	2,479,384	15.43	15.30	1.71	0.00	28.37
ln Value Added	2,133,520	14.57	14.35	1.40	0.00	27.39
ln Investment	2,072,173	14.08	13.97	1.96	0.00	28.22
ln Cash Flow	2,140,405	12.84	12.70	1.88	0.00	26.42
ln Debt (LT)	2,326,375	7.06	9.94	6.66	-5.31	25.88
ln Intangibles	2,469,869	8.31	9.41	4.29	1.10	26.70
Patents Request	2,479,392	0.01	0.00	0.25	0.00	90.00
Patents Stock	2,479,392	0.03	0.00	1.21	0.00	1173.17
ln Exports*	266,074	13.49	13.59	3.13	-0.10	29.75
Foreign Subs	2,479,392	0.04	0.00	0.88	0.00	698.00
HHI	1,996,725	0.01	0.00	0.04	0.00	1.00
State firm						
Age	45,944	26.18	17.00	25.36	0.00	301.00
ln Employees	45,944	4.67	4.52	1.11	3.00	11.53
ln Wage	45,220	15.03	14.96	1.56	1.42	25.23
ln TFP	45,944	10.16	10.22	1.47	-0.05	17.68
ln Revenue Prod.	45,348	11.74	11.71	1.67	0.00	21.98
ln Profit before tax	32,089	13.38	13.43	2.41	0.00	24.65
ln Total Assets	45,944	16.72	16.66	1.94	3.62	27.86
ln Value Added	34,170	15.53	15.52	1.68	0.00	24.81
ln Investment	38,058	15.94	15.98	2.28	5.68	26.04
ln Cash Flow	37,632	14.08	14.13	2.12	0.00	24.73
ln Debt (LT)	41,852	7.45	8.47	7.55	0.00	24.33
ln Intangibles	45,564	9.53	10.29	4.37	1.30	23.98
Patents Request	45,944	0.02	0.00	0.33	0.00	35.00
Patents Stock	45,944	0.07	0.00	1.77	0.00	214.03
ln Exports*	2,95	14.37	14.71	3.26	1.72	29.05
Foreign Subs	45,944	0.05	0.00	0.69	0.00	46.00
HHI	30,488	0.03	0.00	0.09	0.00	1.00

Note: This table presents some descriptive statistics on the sample used for estimation of some exploratory regressions. *For this variable, the revenue of a firms due to export activities, the only countries for which we have data in AMADEUS are France (FR) and Croatia (HR). In this table there are still outliers for the respective variables. We control, and drop, for these in the estimated regressions.

Table 10: State firms and private firms employment differential.

	In Employees	In Employees	In Employees	In Employees	In Employees	In Employees	In Employees	In Employees	In Employees
Foreign firm	0.051*** (9.84)	0.051*** (9.85)	0.052*** (9.93)	0.051*** (9.86)	0.035*** (7.56)	0.035*** (7.57)	0.035*** (7.67)	0.035*** (7.61)	0.035*** (7.61)
Listed firm	0.262*** (14.47)	0.261*** (14.47)	0.266*** (14.68)	0.263*** (14.60)	0.235*** (13.73)	0.235*** (13.73)	0.240*** (13.95)	0.238*** (13.87)	0.238*** (13.87)
Listed state firm	0.069 (1.26)	0.072 (1.30)	-0.018 (-0.32)	0.056 (1.04)	0.031 (0.58)	0.033 (0.61)	-0.051 (-0.92)	0.020 (0.39)	0.020 (0.39)
State*crisis	0.080*** (3.17)	0.082*** (3.27)	-0.032 (-1.00)	-0.006 (-0.20)	0.099*** (5.02)	0.100*** (5.13)	-0.018 (-0.71)	0.001 (0.04)	0.001 (0.04)
State shh	0.114*** (4.24)				0.102*** (4.94)				
Domestic state shh		0.115*** (4.16)				0.104*** (4.95)			
State firm dummy			0.164*** (8.19)				0.160*** (10.46)		
State minority dummy				-0.152*** (-7.63)				-0.157*** (-10.54)	
<i>N</i>	1,975,835	1,975,835	1,976,102	1,976,102	1,975,835	1,975,835	1,976,102	1,976,102	1,976,102
adj. <i>R</i> ²	0.453	0.453	0.453	0.453	0.480	0.480	0.481	0.481	0.481
<i>Fixed Effects</i>									
<i>Country * Industry</i>	Y	Y	Y	Y	N	N	N	N	N
<i>Country * Industry * Year</i>	N	N	N	N	Y	Y	Y	Y	Y

t statistics in parentheses

Standard errors clustered at the country-industry level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: For the regressions in this table we have deleted firms having an employment number lower (higher) than the 1st or 99th percentile within the country-industry-year-size cell. The firms retained for these regressions are larger than 19 employees. Results are robust to the inclusion of outliers and after including the micro firms (firms smaller than 20 employees). Inclusion of these micro firms increased the sample size with a factor of five.

Table 11: State firms and private firms wage differential.

	ln Wage	ln Wage	ln Wage	ln Wage	ln Wage	ln Wage	ln Wage	ln Wage	ln Wage
Foreign firm	0.467*** (72.70)	0.467*** (72.71)	0.467*** (72.79)	1.020*** (38.52)	0.455*** (72.25)	0.455*** (72.27)	0.455*** (72.37)	0.455*** (72.33)	0.455*** (72.33)
Listed firm	0.494*** (26.16)	0.494*** (26.15)	0.502*** (26.44)	0.708*** (4.35)	0.479*** (26.84)	0.478*** (26.83)	0.488*** (27.11)	0.482*** (27.01)	0.482*** (27.01)
Listed state firm	-0.104** (-2.38)	-0.101** (-2.31)	-0.258*** (-5.72)	0.389 (0.98)	-0.094** (-2.21)	-0.091** (-2.14)	-0.239*** (-5.40)	-0.104** (-2.55)	-0.104** (-2.55)
State*crisis	0.156*** (8.64)	0.162*** (8.95)	-0.034* (-1.66)	-0.022 (-0.18)	0.189*** (10.34)	0.194*** (10.63)	-0.005 (-0.26)	0.035* (1.82)	0.035* (1.82)
State shh	0.166*** (9.35)				0.158*** (9.57)				
Domestic state shh		0.160*** (8.79)				0.153*** (9.10)			
State firm dummy			0.269*** (20.85)				0.264*** (22.42)		
State minority dummy				-0.316*** (-3.17)				-0.249*** (-20.23)	
<i>N</i>	2,298,660	2,298,660	2,298,970	43,171	2,298,660	2,298,660	2,298,970	2,298,970	2,298,970
adj. <i>R</i> ²	0.784	0.784	0.784	0.522	0.790	0.790	0.790	0.790	0.790
<i>Fixed Effects</i>									
<i>Country * Industry * Year</i>	Y	Y	Y	Y	N	N	N	N	N
<i>Country * Industry * Year</i>	N	N	N	N	Y	Y	Y	Y	Y

t statistics in parentheses

Standard errors clustered at the country-industry level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: See the notes below table 10.

Table 12: State firms and private firms differential

	ln Investment	ln Total Assets	ln Value Added	ln Intangibles	ln Debt (LT)	ln Cash Flow	ln Profit before tax	ln Exports
Country*Year Industry*Year FE								
listed	1.157*** (29.46)	0.965*** (32.32)	0.476*** (17.62)	1.924*** (32.29)	0.925*** (9.08)	0.687*** (19.64)	0.630*** (15.00)	1.113*** (11.30)
listed state firm	-0.901*** (-11.85)	-0.686*** (-10.53)	-0.234*** (-3.43)	-1.207*** (-8.65)	-0.030 (-0.12)	-0.355*** (-4.06)	-0.242** (-1.97)	0.172 (0.81)
crisis*state firm	-0.045 (-0.66)	-0.095** (-2.03)	-0.026 (-0.93)	0.342*** (3.93)	-0.206 (-1.07)	-0.060 (-1.30)	-0.080 (-1.51)	-0.167 (-1.29)
State firm dummy	0.656*** (14.52)	0.495*** (14.57)	0.226*** (11.69)	0.509*** (9.16)	-0.613*** (-4.98)	0.329*** (9.99)	0.091*** (2.66)	0.352*** (4.85)
N	1,938,800	2,315,005	2,007,634	2,312,085	2,188,846	2,019,241	1,803,663	256,102
adj. R ²	0.493	0.621	0.677	0.270	0.245	0.514	0.430	0.482
Country*Year*Industry FE								
listed	1.143*** (35.27)	0.929*** (37.56)	0.490*** (18.70)	1.804*** (32.92)	0.884*** (9.33)	0.733*** (22.41)	0.654*** (16.30)	1.004*** (15.65)
listed state firm	-0.705*** (-10.74)	-0.506*** (-9.24)	-0.139** (-2.05)	-0.943*** (-7.07)	0.168 (0.68)	-0.270*** (-3.17)	-0.115 (-0.96)	0.157 (0.78)
crisis*state firm	-0.006 (-0.11)	-0.044 (-1.11)	0.024 (1.04)	0.310*** (3.65)	-0.267 (-1.60)	0.013 (0.35)	0.019 (0.40)	-0.166 (-1.28)
State firm dummy	0.552*** (16.10)	0.437*** (15.71)	0.215*** (13.69)	0.472*** (9.48)	-0.731*** (-6.94)	0.294*** (11.06)	0.063** (2.04)	0.371*** (4.99)
N	1,938,800	2,315,005	2,007,634	2,312,085	2,188,846	2,019,241	1,803,663	256,102
adj. R ²	0.513	0.638	0.686	0.287	0.257	0.528	0.445	0.496
listed	1.137*** (35.27)	0.919*** (37.40)	0.484*** (18.54)	1.789*** (32.69)	0.934*** (9.87)	0.724*** (22.21)	0.640*** (16.02)	1.004*** (15.65)
listed state firm	-0.645*** (-9.76)	-0.387*** (-7.00)	-0.057 (-0.84)	-0.763*** (-5.70)	-0.462* (-1.91)	-0.139 (-1.63)	0.102 (0.86)	0.157 (0.78)
crisis*state firm	0.272*** (6.89)	0.245*** (7.89)	0.182*** (9.27)	0.673*** (8.80)	-1.134*** (-7.93)	0.250*** (8.19)	0.248*** (6.68)	-0.166 (-1.28)
Domestic State firm dummy	0.512*** (12.68)	0.271*** (8.29)	0.101*** (5.48)	0.199*** (3.61)	0.270** (2.33)	0.101*** (3.22)	-0.314*** (-9.42)	
N	1,938,800	2,315,005	2,007,634	2,312,085	2,188,846	2,019,241	1,803,663	256,102
adj. R ²	0.513	0.638	0.686	0.287	0.257	0.528	0.445	0.496
Country*Year*Industry FE								
listed	1.137*** (35.27)	0.919*** (37.40)	0.484*** (18.54)	1.789*** (32.69)	0.934*** (9.87)	0.724*** (22.21)	0.640*** (16.02)	1.004*** (15.65)
listed state firm	-0.645*** (-9.76)	-0.387*** (-7.00)	-0.057 (-0.84)	-0.763*** (-5.70)	-0.462* (-1.91)	-0.139 (-1.63)	0.102 (0.86)	0.157 (0.78)
crisis*state firm	0.272*** (6.89)	0.245*** (7.89)	0.182*** (9.27)	0.673*** (8.80)	-1.134*** (-7.93)	0.250*** (8.19)	0.248*** (6.68)	-0.166 (-1.28)
Domestic State firm dummy	0.512*** (12.68)	0.271*** (8.29)	0.101*** (5.48)	0.199*** (3.61)	0.270** (2.33)	0.101*** (3.22)	-0.314*** (-9.42)	
N	1,938,800	2,315,005	2,007,634	2,312,085	2,188,846	2,019,241	1,803,663	256,102
adj. R ²	0.513	0.638	0.686	0.287	0.257	0.528	0.445	0.496

t statistics in parentheses

Standard errors clustered at the country-industry level.

* p < 0.10, ** p < 0.05, *** p < 0.01

Table 13: State firms and private firms productivity differential.

	ln TFP	ln TFP	ln TFP	ln TFP	ln TFP	ln TFP	ln TFP	ln TFP	ln TFP
Foreign firm	0.413*** (57.94)	0.412*** (57.94)	0.415*** (57.99)	0.415*** (58.05)	0.414*** (61.14)	0.414*** (61.12)	0.416*** (61.28)	0.416*** (61.33)	0.416*** (61.33)
Listed firm	-0.044** (-2.46)	-0.044** (-2.47)	-0.040** (-2.22)	-0.037** (-2.07)	0.036*** (2.63)	0.036*** (2.61)	0.039*** (2.87)	0.041*** (3.02)	0.041*** (3.02)
Listed state firm	-0.246*** (-3.35)	-0.250*** (-3.41)	-0.222*** (-3.03)	-0.277*** (-3.66)	-0.042 (-0.92)	-0.045 (-0.98)	-0.041 (-0.89)	-0.070 (-1.53)	-0.070 (-1.53)
State*crisis	0.068*** (3.38)	0.068*** (3.46)	0.015 (0.56)	-0.032 (-1.29)	0.073*** (3.92)	0.073*** (3.99)	0.006 (0.23)	-0.023 (-1.03)	-0.023 (-1.03)
State shh	-0.322*** (-14.71)				-0.269*** (-14.40)				
Domestic state shh		-0.338*** (-15.05)							-0.284*** (-14.83)
State firm dummy			-0.095*** (-5.31)						-0.052*** (-3.51)
State minority dummy				0.053*** (3.21)					0.025* (1.76)
<i>N</i>	2,307,446	2,307,446	2,307,731	2,307,731	2,307,446	2,307,446	2,307,731	2,307,731	2,307,731
adj. <i>R</i> ²	0.720	0.720	0.719	0.719	0.741	0.741	0.741	0.741	0.741
<i>Fixed Effects</i>									
<i>Country * Industry * Year</i>	Y	Y	Y	Y	N	N	N	N	N
<i>Country * Industry * Year</i>	N	N	N	N	Y	Y	Y	Y	Y

t statistics in parentheses

Standard errors clustered at the country-industry level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: See the notes below table 10.

Table 14: State firms and private firms revenue productivity differential.

	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.	In Revenue Prod.
Foreign firm	0.416*** (59.30)	0.416*** (59.29)	0.418*** (59.25)	0.419*** (59.43)	0.426*** (66.12)	0.426*** (66.09)	0.429*** (66.13)	0.429*** (66.31)	0.429*** (66.31)
Listed firm	-0.002 (-0.11)	-0.002 (-0.12)	0.002 (0.11)	0.006 (0.27)	0.012 (0.60)	0.012 (0.59)	0.015 (0.74)	0.019 (0.94)	0.019 (0.94)
Listed state firm	-0.049 (-0.93)	-0.054 (-1.03)	-0.021 (-0.38)	-0.083 (-1.55)	0.037 (0.76)	0.032 (0.66)	0.072 (1.45)	0.002 (0.04)	0.002 (0.04)
State*crisis	0.039 (1.50)	0.037 (1.43)	-0.026 (-0.78)	-0.077** (-2.45)	0.057*** (2.63)	0.054** (2.53)	0.007 (0.24)	-0.045* (-1.68)	-0.045* (-1.68)
State shh	-0.375*** (-12.10)				-0.400*** (-15.27)				
Domestic state shh		-0.388*** (-12.14)				-0.414*** (-15.36)			
State firm dummy			-0.110*** (-4.78)				-0.130*** (-6.77)		
State minority dummy				0.065*** (2.89)				0.087*** (4.65)	
<i>N</i>	2,334,649	2,334,649	2,334,960	2,334,960	2,334,649	2,334,649	2,334,960	2,334,960	2,334,960
adj. <i>R</i> ²	0.581	0.581	0.581	0.581	0.599	0.599	0.598	0.598	0.598
<i>Fixed Effects</i>									
<i>Country * Industry * Year</i>	Y	Y	Y	Y	N	N	N	N	N
<i>Country * Industry * Year</i>	N	N	N	N	Y	Y	Y	Y	Y

t statistics in parentheses

Standard errors clustered at the country-industry level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: See the notes below table 10.

Table 15: State firms and private firms growth differential.

	Employment	Employment	Wage	Wage	TFP	TFP	Revenue Prod.	Revenue Prod.
<i>Country*Year Industry*Year FE</i>								
Listed State firm	0.022 (1.06)	0.009 (0.43)	0.029 (0.74)	0.032 (0.83)	0.018 (0.53)	0.020 (0.57)	0.275*** (4.92)	0.285*** (5.13)
Crisis*state	-0.004 (-0.26)	-0.027 (-1.58)	0.018*** (2.81)	0.016*** (3.19)	-0.003 (-0.35)	0.002 (0.31)	0.027 (0.86)	-0.102*** (-4.11)
State firm dummy	-0.028*** (-5.61)		-0.017*** (-3.31)		0.008 (1.57)		-0.400*** (-20.85)	
Domestic State firm dummy		-0.008 (-1.02)		-0.026*** (-5.13)	0.007 (1.43)			-0.486*** (-23.74)
<i>N</i>	1,976,102	1,976,102	1,840,578	1,840,578	1,848,650	1,848,650	1,959,271	1,959,271
adj. <i>R</i> ²	0.169	0.169	0.180	0.180	0.080	0.080	0.709	0.709
<i>Country*Year*Industry FE</i>								
Listed State firm	0.024 (1.10)	0.010 (0.44)	0.034 (0.92)	0.037 (1.00)	0.015 (0.42)	0.015 (0.43)	0.292*** (5.48)	0.314*** (5.91)
Crisis*state	0.006 (0.40)	-0.021 (-1.15)	0.024*** (3.68)	0.019*** (3.93)	0.005 (0.84)	0.007 (1.47)	0.034 (1.35)	-0.096*** (-4.88)
State firm dummy	-0.034*** (-6.77)		-0.019*** (-3.51)		0.005 (1.24)		-0.388*** (-25.43)	
Domestic State firm dummy		-0.011 (-1.28)		-0.026*** (-4.68)	0.006 (1.28)			-0.479*** (-27.96)
<i>N</i>	1,976,102	1,976,102	1,840,578	1,840,578	1,848,650	1,848,650	1,959,271	1,959,271
adj. <i>R</i> ²	0.170	0.170	0.199	0.199	0.130	0.130	0.724	0.724

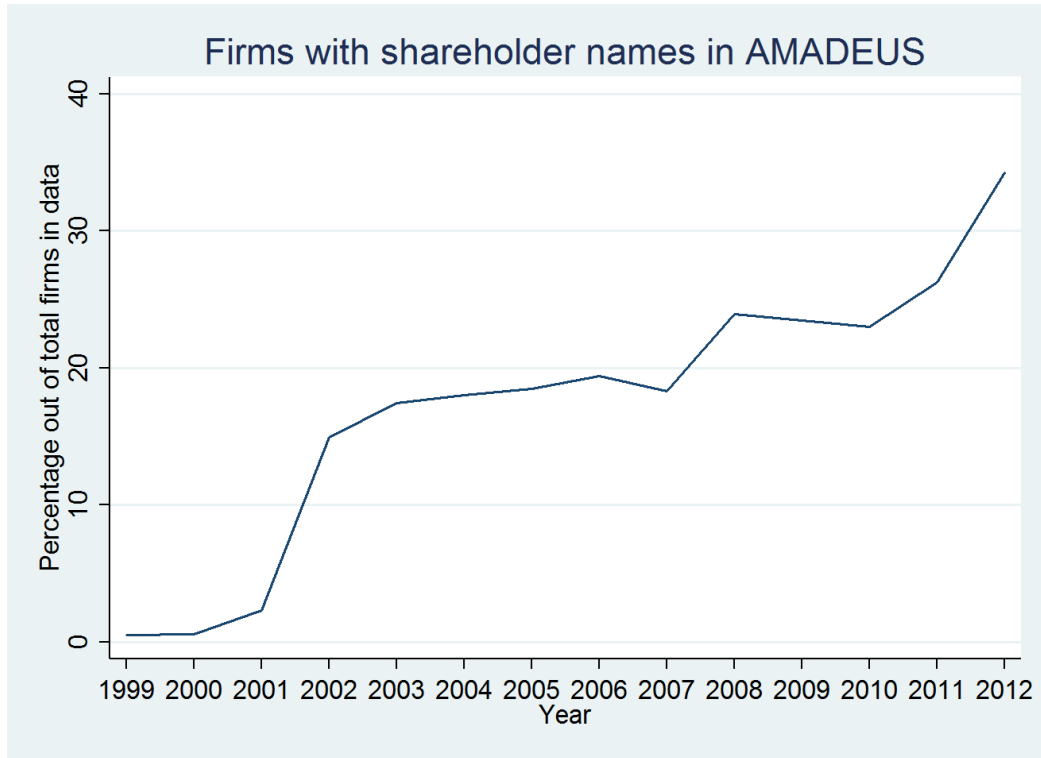
t statistics in parentheses

Standard errors clustered at the country-industry level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: These regressions have the year to year growth rates of the respective column header as a dependent variable. These regressions also drop out firms with less than 20 employees. Regressions control for outliers in levels in a similar spirit as in tables 10-13.

Figure 1: Coverage of shareholder name in AUGAMA/AMADEUS



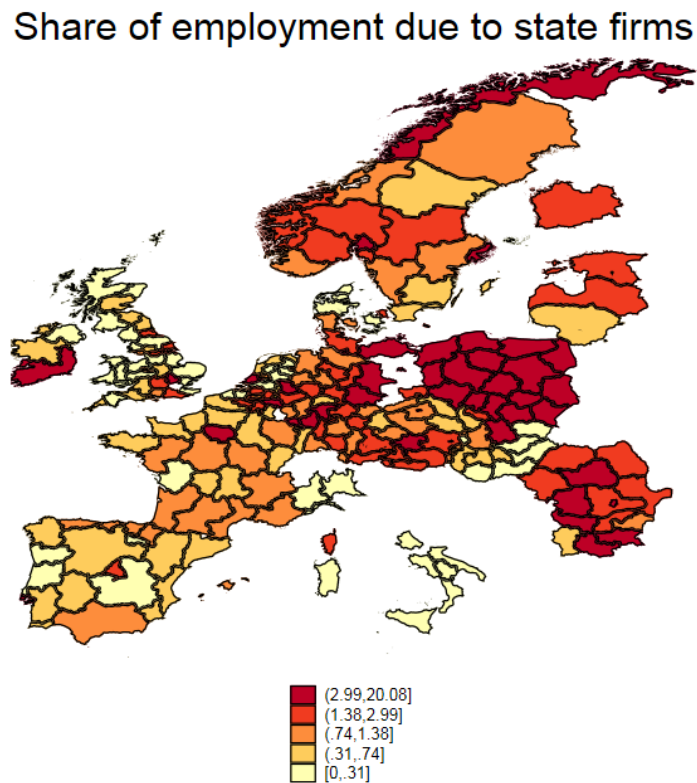
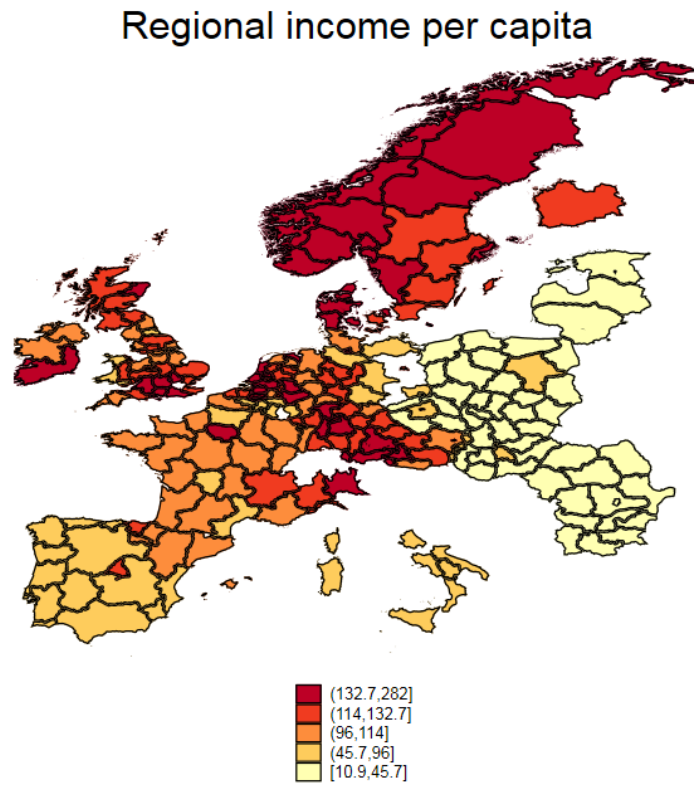
Note: this figure shows on average over all the countries the percentage of firms for which we are able to observe at least one shareholder name.

Figure 2: State firms across countries



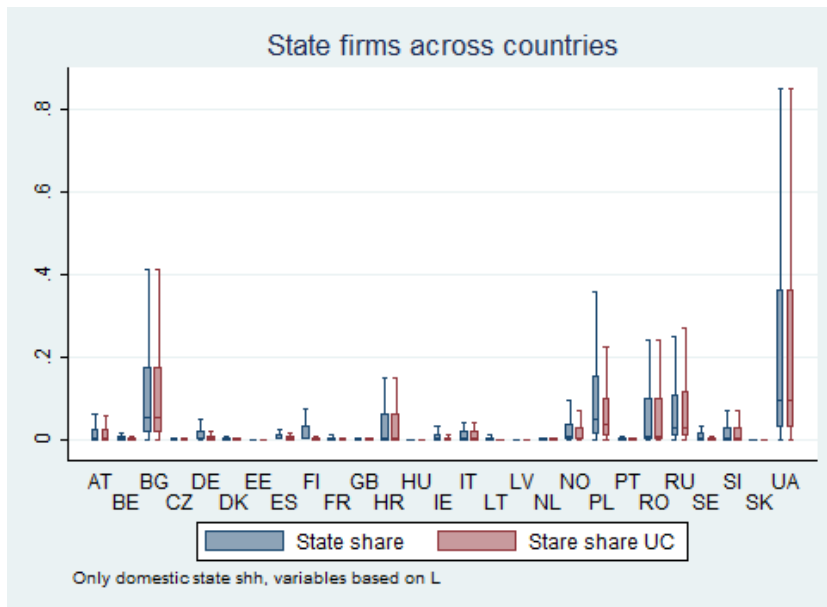
Note: For all countries in the dataset, this figure gives the share of employment in state firms out of the total employment in our dataset for 2002 and 2011. In this figure we only take into account firms with at least 10% of domestic state ownership. The United Kingdom (GB) is excluded in this figure, because the firm ownership files did not allow us to identify state firms in 2011.

Figure 3: Regional income per capita and state firms' regional employment share



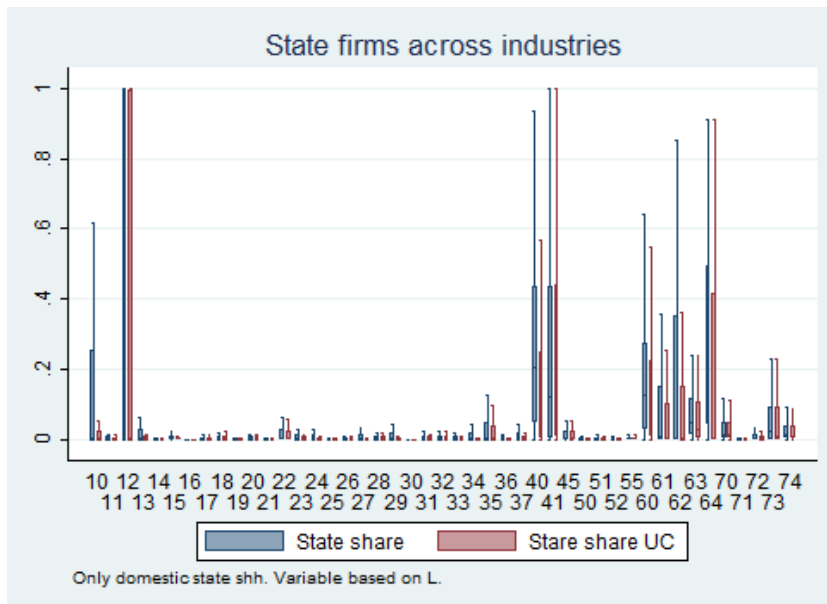
Note: The top figure denotes the income per capita, expressed as a percentage of the EU-average for each region (Source Eurostat, NUTS- level). The bottom figure represents the share of employment due to state firms out of total regional employment in the data. The figures are averaged over the years 2002-2011. The raw correlation between these variables is about -0.35.

Figure 4: Share of state firms across countries



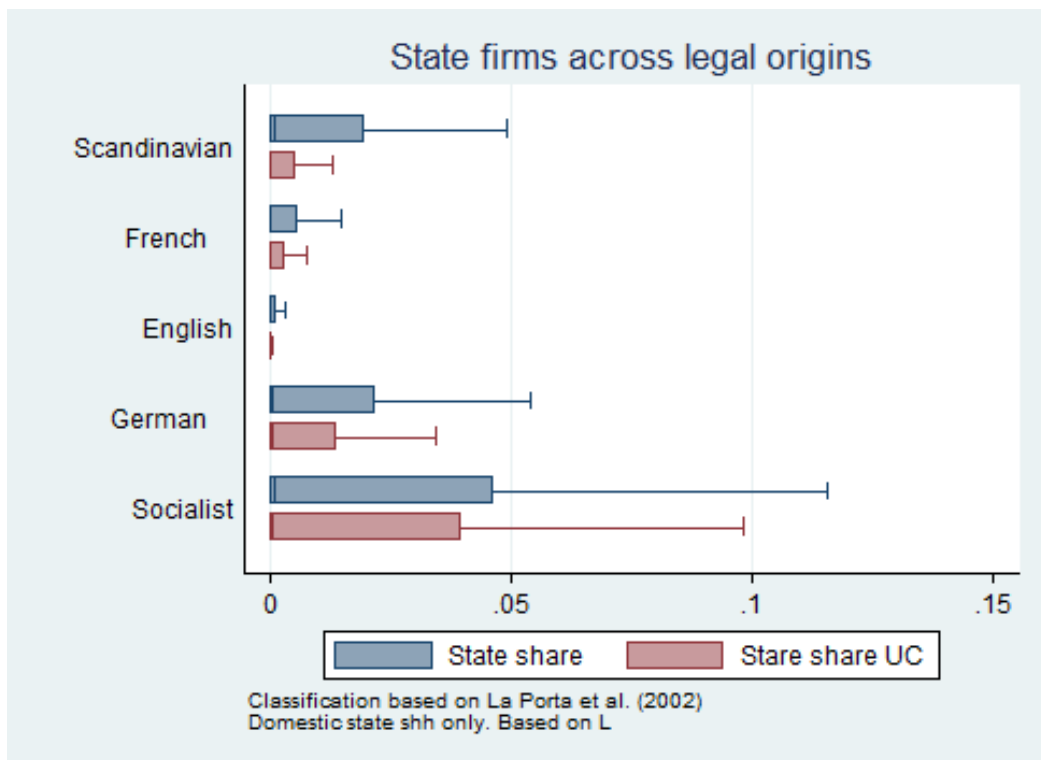
Note: the boxes present the distribution of the calculated index as in formula 1. The red boxes denote the calculated index excluding firms with consolidated financial accounts.

Figure 5: Share of state firms across industries



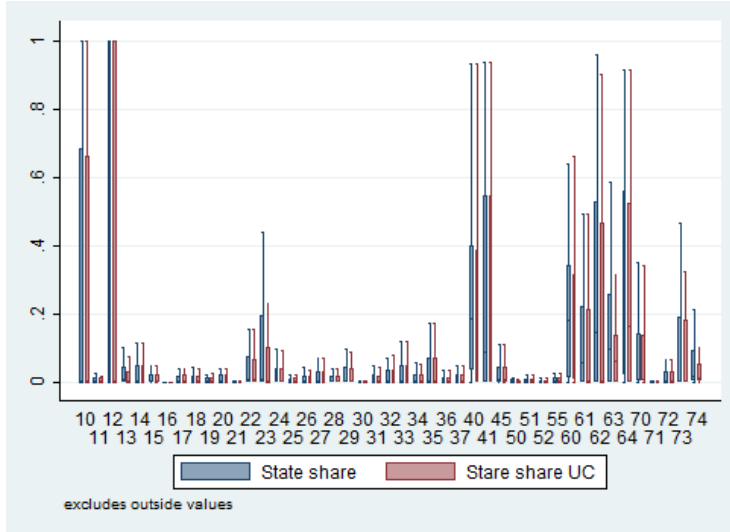
Note: Sectoral classification is based on Nace revision 1.1. Years 2002-2011. Only domestic state firms are included.

Figure 6: Share of state firms across Legal Origins

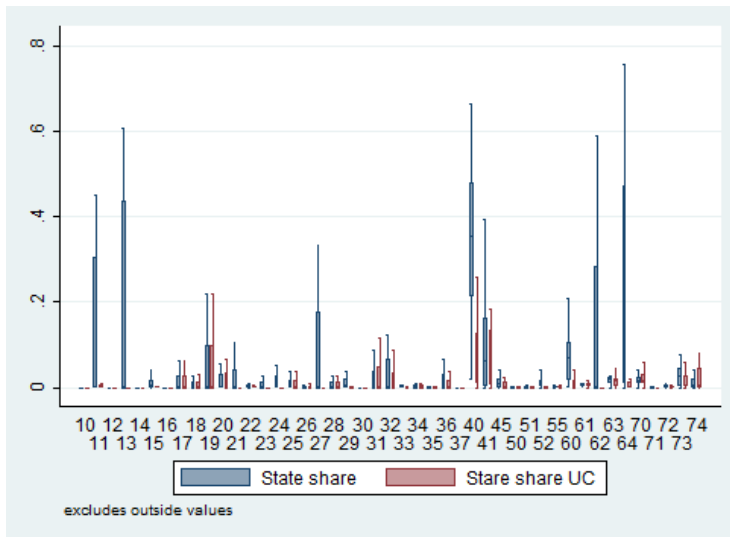


Note: Classification based on La Porta et al. (2002). Figures computed for the years 2002-2011. Sectoral classification based on 2-digit Nace revision 1.1.

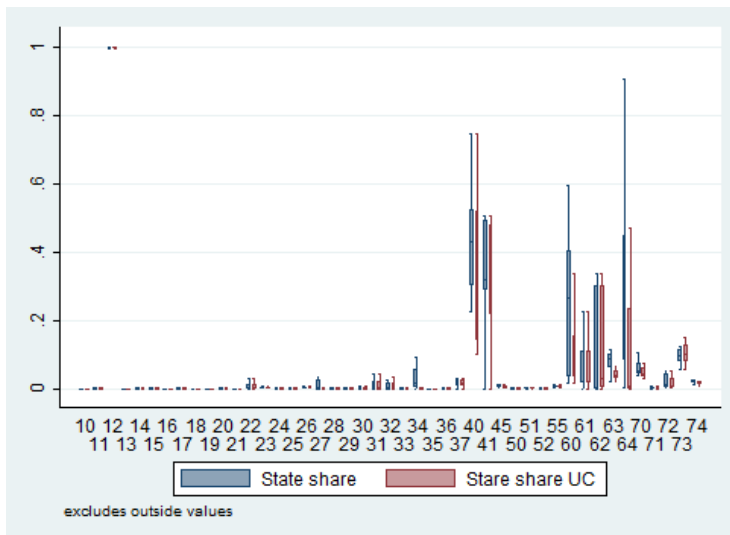
Figure 7a: State share across industries over legal origins (1)



(a) Socialist Legal Origin



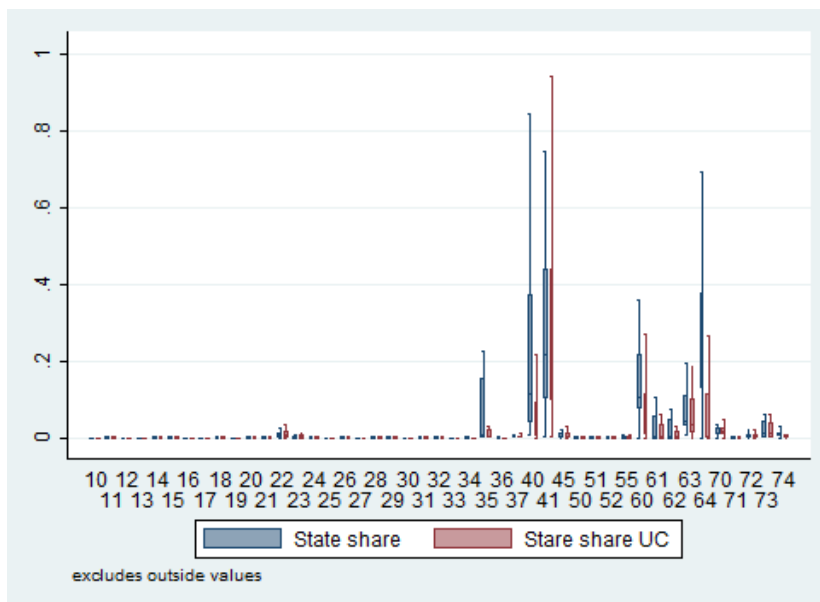
(b) Scandinavian Legal Origin



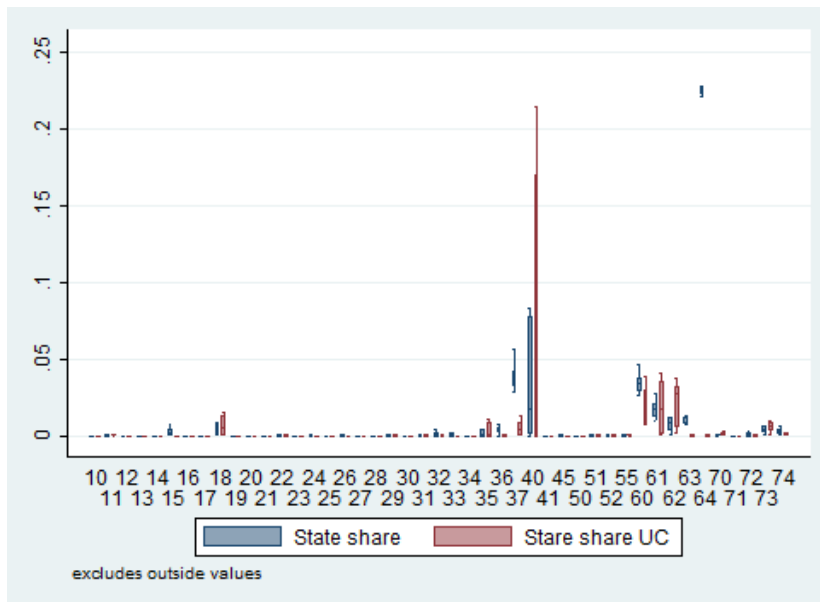
(c) German Legal Origin

Note: See the notes below the next figure.

Figure 7b: State share across industries over legal origins (2)



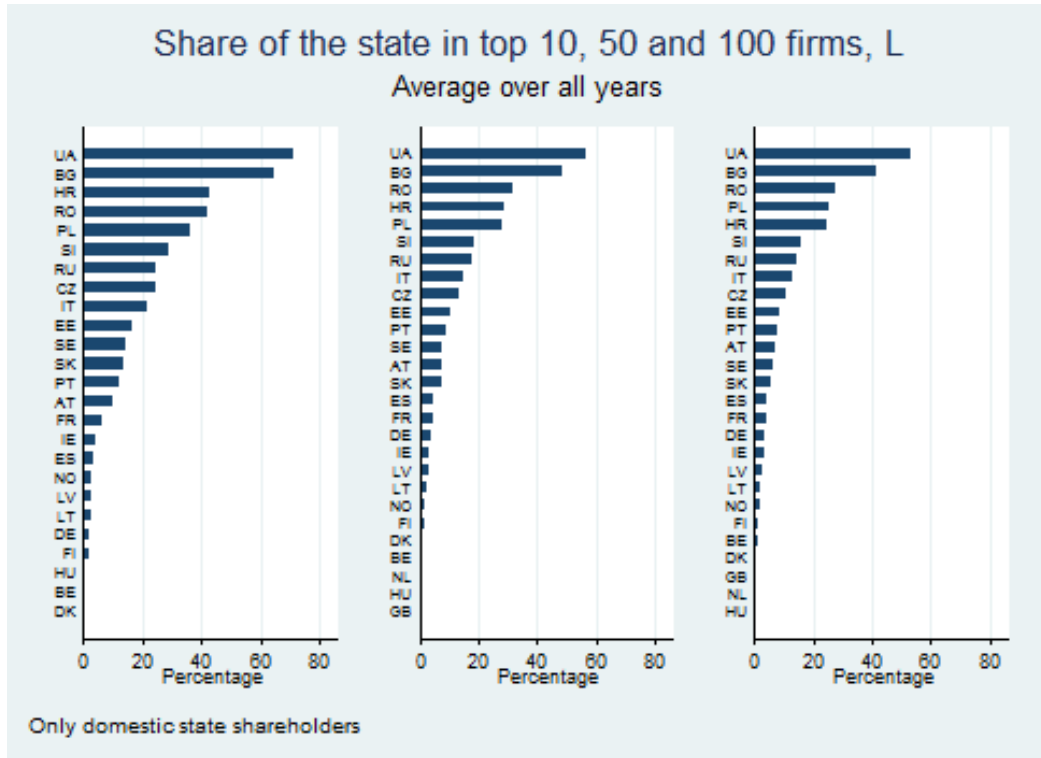
(a) French Legal Origin



(b) English Legal Origin

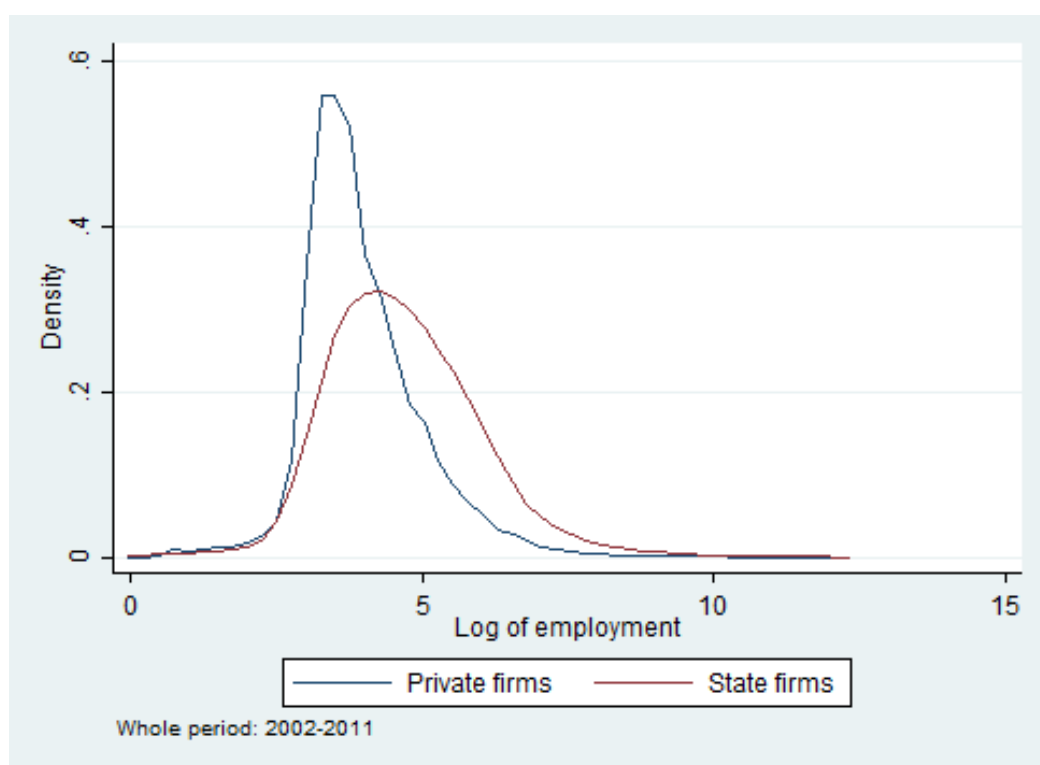
Note: Classification based on La Porta et al. (2002). Figures computed for the years 2002-2011. Sectoral classification based on 2-digit Nace revision 1.1.

Figure 8: Share state shareholdings in top 10, 50 and 100 firms



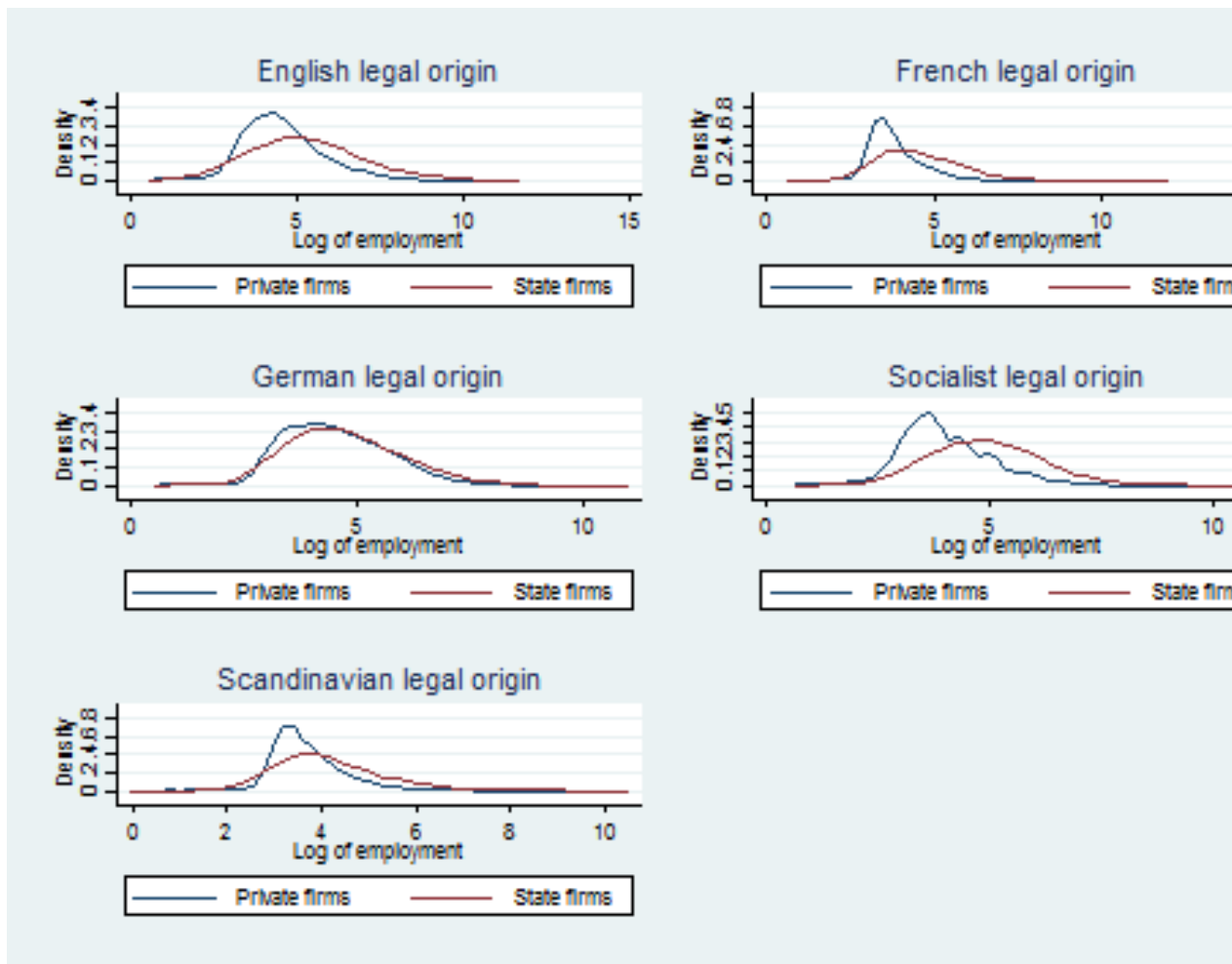
This figure presents the average shareholdings in the countries' largest 10, 50 and 100 firms. We have classified the firms each year based on their recorded number of employees. The government shareholdings within these largest employers were then averaged over the whole period 2002-2011.

Figure 9: Private firms' and state firms' employment distribution



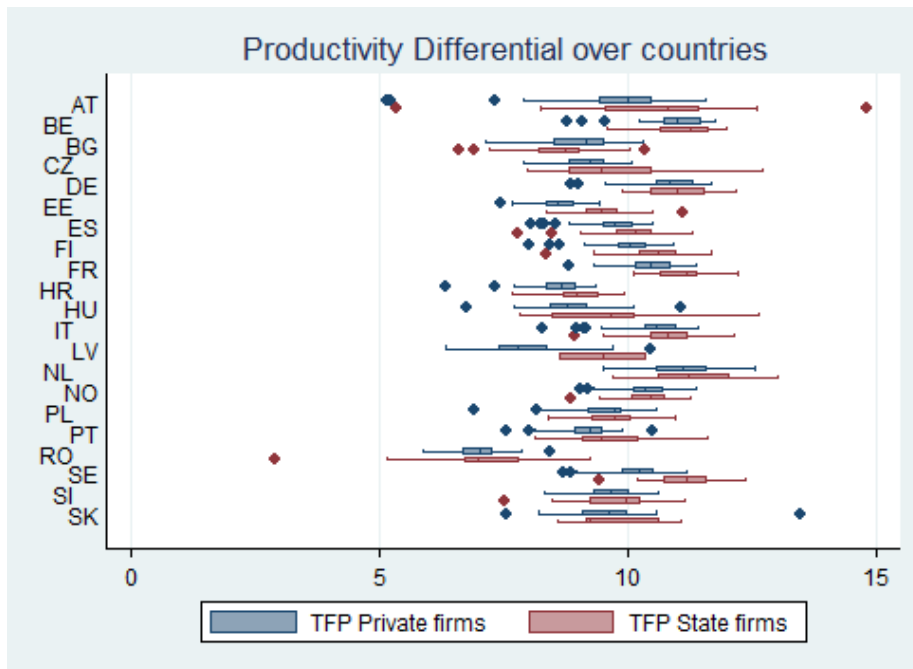
Note: The type of Kernel used is a standard Epanechnikov kernel. The bandwidths used are of the Silverman rule-of-thumb, as described in (Henderson and Parmeter, 2015, p. 32-33). Firms with on average less than 20 employees were removed from the dataset.

Figure 10: Employment distribution across legal origins

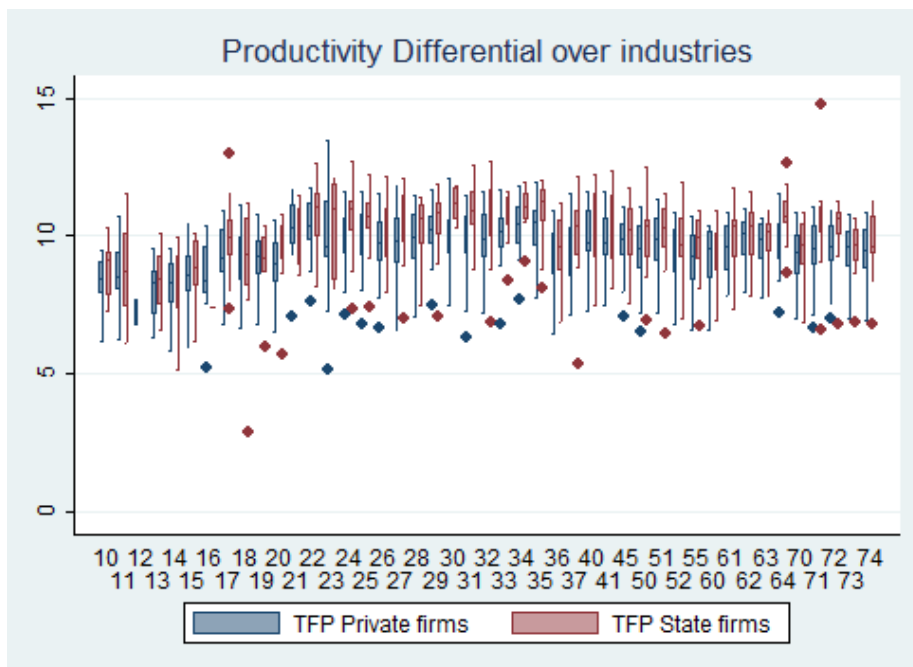


Note: A standard Epanechnikov kernel is used for each figure. The Silverman rule-of-thumb bandwidths are used, as described in (Henderson and Parmeter, 2015, p. 32-33). Firms with on average less than 20 employees were removed from the dataset.

Figure 11: Total Factory Productivity differential between private and state firms



(a) Country differential



(b) Industry differential

Note: These figures present the distribution of TFP across state firms and private firms.

Appendix

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

Variable	Description	Source
ATM	Automated teller machines (ATMs) (per 100,000 adults)	Worldbank
Contract Enforce (days)	Time required to enforce a contract (days)	Worldbank
Cost of Business	Cost of business start-up procedures (% of GNI per capita)	Worldbank
Export of ICT	ICT goods exports (% of total goods exports)	Worldbank
GDP_L	GDP per capita (constant 2010 US\$)	Worldbank
GDP per capita (PPP)	GDP per capita, PPP (constant 2011 international \$)	Worldbank
Government Consumption	General government final consumption expenditure (% of GDP)	Worldbank
Industry VA	Industry, value added (% of GDP)	Worldbank
Manufacturing VA	Manufacturing, value added (% of GDP)	Worldbank
Military Expenditure	Military expenditure (% of central government expenditure)	Worldbank
Patent Population	Patent Applications over Population	Worldbank
R&D Technicians	Technicians in R&D (per million people)	Worldbank
R&D Expenditure	Research and development expenditure (% of GDP)	Worldbank
R&D Researchers	Researchers in R&D (per million people)	Worldbank
Rural Population	Rural population (% of total population)	Worldbank
S&P Global	S&P Global Equity Indices (annual % change)	Worldbank
Stocks Traded	Stocks traded, total value (% of GDP)	Worldbank
Agriculture VA	Agriculture, value added (% of GDP)	Worldbank
Army	Armed forces personnel (% of total labor force)	Worldbank
Corruption	CPIA transparency, accountability, and corruption in the public sector rating (1=low to 6=high)	Transparency International
Manufacturing VA	Manufacturing, value added (constant 2010 US\$)	Worldbank
Subsidies	Subsidies and other transfers (% of expense)	Worldbank
Tax Revenue	Tax revenue (% of GDP)	Worldbank
PMR	Index of Product Market Regulation in the economy, scale 0 to 6, with 6 most regulation	OECD
Civil Liberties	Index of civil Liberties. Index takes on values from 1 to 7, with 1 most Free.	Freedom House
Political Rights	Index of Political Rights. Values 1 to 7. 1 is the most Free.	Freedom House

Table A.2a: 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 continued on the next page

Table A.2b: 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

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