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Leviathan Inc. and Corporate Environmental Engagement

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Abstract

In a special report in 2010, The Economist magazine called the resurging state-owned mega-enterprises worldwide, especially those from emerging economies, as "Leviathan Inc.", and warned about the danger of such state capitalism model. While traditionally state-owned firms are criticized for weaker governance and less efficiency, they are also believed to be better positioned for dealing with market failures and externalities. Our findings based on publicly-listed firms from 45 countries suggest that state-owned companies engage more in environmental issues, and such engagement does not come as a cost for shareholders. This effect is more pronounced among firms in manufacturing industries, in emerging market economies (Latin America and Asia-Pacific), and in countries with higher energy dependence and greater conflict with neighboring states. State-owned firms reacted more significantly to the Copenhagen Accord signed in December 2009 in upgrading their environmental performance. Interestingly, state-owned firms also engage more in social issues but they do not have better corporate governance performance.

Keywords: State ownership, environmental engagement, sustainability, ownership structure

JEL classification: G32, H11, H41, Q56

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1. Introduction

With the success of emerging market economies over the last two decades, the role of state capitalism has been brought back to center stage in the world economy. In China, companies in which the state is a majority shareholder account for over 60% of stock market capitalization. Other emerging market governments such as Brazil or Russia also hold majority or significant minority stakes in local companies. These holdings can be direct but also via public pension funds or sovereign wealth funds. This is in contrast with many Western economies where large scale privatizations in the 1980s and 1990s lead to the decline in the role of the state in business. In the post-privatization era of the early 21st century, some of the world's largest publicly-listed firms are state-owned enterprises (SOEs). In fact, Table 1 shows that 10 of the top 30 global companies as ranked by Forbes magazine in 2010 were SOEs.

The Economist (2010, 2014) called these resurging state-owned mega-enterprises worldwide, especially those from emerging economies, as "Leviathan Inc.", and warned about the danger of such state capitalism model, arguing that governments picking industrial winners nearly always failed.[1] There is a large literature on the economic inefficiency of state ownership, which is mostly built on the agency cost view (Megginson et al. (1994), Shleifer (1998), Dewenter and Malatesta (2001)). This view argues that SOE managers are chosen for political reasons, have low-powered incentives, and are poorly monitored by boards packed with politicians (La Porta and Lopez-de-Silanes (1999); Shleifer and Vishny (1998)). Political elites who control SOEs seek rents from the society at the costs of other stakeholders, which can reduce economic efficiency through corruption, poor resource allocation, reduced innovation and wealth creation.

Recent studies re-examining SOEs in emerging markets document the positive effects of this "new state capitalism" (Musacchio and Lazzarini (2014), Musacchio, Lazzarini, and Aguilera (2015)). State capital can help boost entrepreneurial activities by stimulating investments in projects that would otherwise remain unfunded due to their long-term nature (George and Prabhu (2000), Inoue, Lazzarini and Musacchio (2013)). The resurgence of SOEs can be particularly important in how emerging markets deal with market failures and externalities. The notion that SOEs are in a better position to address market failures is closely related to the public interest theory (Pigou (1938)), which suggests that the government aims to maximize the welfare of the society as the benevolent social planner can efficiently allocate resources and curb market failures and negative externalities.

One crucial dimension in which state ownership of businesses could be a way to pursue public interest is to address climate change. While developed nations have been the largest contributors to global warming, the growth rate in new emissions is concentrated in developing countries. In 2010, according to EU's EDGAR data, the countries emitting the most greenhouse gases were China (22%), the U.S. (13%), the EU-28 (10%), India (5%) and

[1] According to Merrian-Webster dictionary, "Leviathan" is something that is very large and powerful or a sea monster in scriptural accounts. Leviathan is generally used to refer to the political state and this comes from its use in Thomas Hobbes' 1651 book "Leviathan or The Matter, Forme and Power of a Common Wealth Ecclesiastical and Civil".

Brazil (5%).[2] In September 2016, Hangzhou G20 summit focused on "green finance" and the U.S. and China ratified the Paris climate change agreement. To curb such environmental externalities, the government can use its "visible hand" to direct green technology through imposing carbon taxes and providing research subsidies (Laffont and Tirole (1993), Acemoglu, Akcigit, Hanley, and Kerr (2016)). For example, in the U.S., green industrial policies include laws such as the Clean Air Act, tools like the federal tax credits and programs such as the state-level renewable portfolio standards. However, Rodrik (2014: 470) concludes that these policies are "…strong in theory, ambiguous in practice." Alternatively, the state can use an "invisible hand" (to borrow from Adam Smith), that is, to intervene via ownership in public corporations. Initiatives related to environmental protection usually require substantial investment and long-term resource commitment, which private firms often lack the incentive and capability to achieve. State-owned firms, in contrast, can coordinate resources through government procurement and state funds (such as oil or other natural resources funds and public pension funds) to support such green investment.

As companies in China and other emerging market countries transition from dirty to clean technology and reduce fossil fuel emissions to limit climate change, the role of state ownership can be important. Standard economic theories usually suggest that the private sector (the market) pursues profit maximization and efficiency, whereas the public sector (the state) corrects market failures such as negative externalities that corporations generate to the environment (Benabou and Tirole (2010)). In fact, companies in developed countries tend to exhibit more shareholder-friendly corporate governance and perform better in terms of shareholder value maximization (Aggarwal, Erel, Stulz, and Williamson (2009)). However, these companies do not internalize the environmental (and social) costs. For example, it might be shareholder-value increasing to outsource production to developing countries with looser environmental regulations. Even firms from emerging countries may not have the full incentives to pursue environmentally sustainable practices and instead maximize profits by using more polluting technologies. In this respect, emerging market SOEs may be the most prone to improve their environmental standards because of their state ownership status.

In this paper, we conduct an international study of the impact of state ownership on a firm's engagement in environmental, social and governance (ESG) issues. We compile a dataset of the level of state ownership and measures of ESG performance of publicly-listed firms in 45 countries over the period from 2004 to 2014. There is considerable cross-county variation in state ownership in our sample, with SOEs representing more than 60% of the market in China, close to 40% in Russia, about 20% in Brazil, 10% in France while being insignificant in the U.S. and other major developed economies. We focus primarily on how state ownership can address corporate

[2] Emission Database for Global Atmospheric Research (EDGAR) classifies CO2, CH4, N2O, F-gases as greenhouse gases (GHG). Under the United Nations Framework Convention for Climate Change (UNFCCC), countries submit their inventories of GHG. The emission time series 1990-2012 per region/country is available in http://edgar.jrc.ec.europa.eu/overview.php?v=GHGts1990-2012&sort=des9.. The country rankings based purely on CO2 emissions for 2014 are similar: China (31%) US (22%), EU-28 (14%), India (12%) and Russia (10%). This data is available at: http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts1990-2014&sort=des9.

environmental sustainability (the "E" in ESG) as it mostly represents the notions of addressing market failures and externalities generated via a firm's operation.[4] Nevertheless, we also touch on other sustainability issues such as corporate engagement in social issues (S) and corporate governance (G), and compare the state ownership effects on E and on the S & G dimensions to shed light on the relative strengths of state ownership in dealing with different types of sustainability issues.

Our findings are that SOEs engage more in environmental issues, especially in emission reduction and resource reduction. We do not find such a pattern for other types of block-owners from the non-public sector. We conclude that the effect is coming from the fact that the state is the controlling owner than just a mechanic effect of concentrated ownership. We document that the role of SOEs on environmental engagement is more pronounced among firms in energy-related and manufacturing industries, in emerging market economies (Latin America and Asia-Pacific), and in countries with lower energy independence and greater conflict with neighboring states. State-owned firms also reacted more significantly to the Copenhagen Accord signed in December 2009 in upgrading their environmental performance. These findings are consistent with the notion that state-owned firms are in a better position (compared to their private sector counterparts) to deal with environmental externalities.

Interestingly, we document that SOEs also engage more in social responsibility issues but we find that they do not have better corporate governance practices. We also show that SOE's engagement does not come as a cost for shareholder value in terms of Tobin's Q and long-term profitability. We conclude that SOE's environmental engagement does not come at a cost of sacrificing corporate governance and shareholder returns compared to their private counterparts.

Our paper contributes to the re-emerging literature on state-owned enterprises. The classical view of SOEs has typically been framed around the conflicting operational, financial, and social objectives faced by these companies (e.g., Megginson and Netter (2001)). However, the privatization waves in emerging markets in the last decades might have heralded the rise of a new breed of SOEs that have shed some of the shortcomings of their predecessors (Cuervo-Cazurra et al. (2014)). This echoes the findings in recent studies on how "Leviathans" can achieve good corporate governance practices and financial performance (e.g., Inoue, Lazzarini, and Musacchio (2013), Musacchio, Lazzarini, and Aguilera (2015)). Our contribution is to show that the state capitalism model can be effective in addressing market failures and environmental externalities.

Our paper also speaks to the growing finance literature on how ownership structure affects corporate environmental engagement. There have been fierce debates on the effects of ESG on shareholder value with some documenting a positive effect (Godfrey, Merrill, and Hansen (2009); Ferrell, Liang, and Renneboog (2016); Servaes and Tamayo (2013); Hong and Liskovich (2015)) while others finding a negative effect (Cheng, Hong, and Shue (2016); Masulis and Reza (2015)). In the U.S., large institutional investors have been shown to yield some power

[4] We use environmental engagement and sustainability interchangeably throughout the paper.

via shareholder proposals and voting (Del Guercio and Tran (2012)) and private engagements (Dimson, Karakas, and Li (2015)). Internationally, the research has focused on how shareholders affect mostly the "G" dimension (corporate governance). For example, foreign institutional investors also seem to impact positively corporate governance (Aggarwal, Erel, Ferreira, and Matos (2011)) and long-term investment (Bena, Ferreira, Matos, and Pires (2016)). In a recent working paper, Dyck, Lins, Roth, and Wagner (2016) examine how foreign institutional investors impact E&S. The authors find an effect only when institutional investors come from countries with high E&S social norms while, interestingly, U.S. institutions have no significant impact. Our contribution is to show that state ownership appears to be the most, and often the only, blockholder type that is positively correlated with E (and to some extent with S, but not with G). We also find that shareholder value is mostly immune from such engagement in non-shareholder issues by SOEs.

2. Sample and Summary Statistics

In this section we discuss our sample and summary statistics. We start by describing how we compile the data and correct errors in some widely-used databases for our key variables: state ownership and corporate environmental engagement. We then delineate our sample and control variables. Finally, we show the summary statistics for the sample.

2.1. Data and Variables

2.1.1. State Ownership

The primary data on state ownership is from Orbis, a Bureau van Dijk database. This data source provides the types of ultimate owners of publicly-listed companies from around the world.[5] An "ultimate owner" is identified by following the path of uninterrupted control rights throughout the ownership pyramid. A company is defined as state-owned if the ultimate owner is a public authority, a state, or a government entity and the percentage of voting rights exceeds 25% in every layer of the ownership pyramid. The main variable of interest in our study is ***State_own***, a dummy variable that equals one if the firm is state-owned, and zero otherwise.

The most commonly observed situation of a company being state-owned is when the government of the country in which the company is headquartered has direct ownership that exceeds 25%. The largest stakes are held by central or federal governments (e.g. the government of China, Brazil or France) and its related entities (e.g. the China State-Owned Assets Supervision & Administration Commission), as well as state-level governments (e.g. the states of Shanghai or Sao Paulo) or via development banks (e.g. BNDES in Brazil). However, the state can exert control over a company via alternative channels. First, some firms may be owned by a group of governments, such as the Scandinavian airline company SAS which is jointly owned by the Governments of Sweden, Norway, and Finland,

[5] The Orbis data sample does not include SOEs that are not publicly-listed so the presence of state-owned firms in the overall economy is likely to be underestimated in our study.

each of which owns less than 25% of the company's shares. Second, a company may be owned by a foreign government, instead of its local government, such as Indosat in Indonesia (originally controlled by the Government of Indonesia, and then by the Government of Singapore from 2003 to 2007, and then owned by the Government of Qatar afterwards).[6] These foreign-government controlling cases usually happen when a state-owned company or a sovereign wealth fund (e.g. GIC and Temasek for Singapore or the Qatar Investment Authority) acquires majority stakes on other companies overseas. Third, selling stakes to foreign state-owned firms does not necessarily imply majority-owned by a foreign state. For example, EDP Energias de Portugal, a company that was majority-owned by Parpublica (owned by the Government of Portugal), sold its shares in 2011 and since then China Three Gorges became the largest shareholder but holds less than 25%, so we consider EDP Energias de Portugal as state-owned before 2012, but no longer state-owned from 2012 onward. Fourth, some firms were initially not state-owned but later on were nationalized, a notable example of which is ABN AMRO that was nationalized in 2010 by the Dutch government (and the company was owned by RBS Holdings in 2008, which also later became state-owned after the U.K. government's bailout).

Despite Orbis taking into account many of the special cases of state ownership listed above, we manually checked the data for cases where state-owned status might be mismeasured. First, companies in some countries issue different classes of shares, such as preferred shares and ordinary shares as in Brazil, and our sample may only cover one class of these shares. For example, the Government of Brazil owns over 50% stakes of Petróleo Brasileiro (Petrobras) via holding of ordinary shares, but our database only includes the security code for its preferred shares, thus when merging with the Orbis data, Petrobras was classified as non-state-owned. Second, in some countries such as China, many publicly-listed companies are owned by a private parent company, which is further owned by the government. Orbis does not properly identify these private parent companies as state-owned. For example, Zijin Mining in China is majority-owned (>25%) by Minxi Xinghang State-Owned Assets Investment Co. Ltd., which is a private company controlled by the Chinese government. To correct for these mismeasurements of state ownership, we utilize three major databases for ownership information—Orbis, FactSet/Lionshares, and Datastream—to cross-check all companies in our sample. As long as a company is identified as state-owned based on our aforementioned criterion in any of the three databases, we consider the company as potentially state-owned. We then further checked the companies' annual reports and other public sources to gauge whether their ultimate owners are state entities.

Finally, we use an alternative measure of state ownership which is continuous and based on government-held free-float shares (***Government held shares***) which we obtain from Datastream. This variable measures the

[6] Other examples of foreign state ownership include Chartered Semiconductor Manufacturing (a Singaporean company currently controlled by GlobalFoundries which is owned by the Government of UAE), J Sainsbury (a U.K. company currently controlled by Qatar Holdings LLC), Tav Havalimanlari (a Turkish company currently controlled by Aéroports de Paris which is itself owned by the Government of France), Gallaher Group (a UK company currently controlled by Japan Tobacco which is owned by the Government of Japan), and ORANGE Polska (a Polish company owned by the Government of France through France Telecom (ORANGE)).

percentage of floating shares held directly by governments if the holding is higher than 5%. However, this variable only includes the ownership in the first layer and does not trace up to higher levels in the ownership pyramid and does not measure non-floating shares held by governments. Nevertheless, we obtain consistent results using this alternative measure of state ownership.

2.1.2. Corporate Environmental (and Social and Governance) Engagement

To evaluate corporate engagement in environmental issues (as well as in social and governance issues), we use data from Thomson Reuter's ASSET4 Environmental, Social, and Corporate Governance (ESG) database. The ASSET4 sample covers more than 4500 global publicly listed companies that are included in major equity indices.[7] The ASSET4 ratings consist of more than 750 ESG sub-dimensions (data points). Every data point goes through a multi-step verification process, including a series of data entry checks, automated quality rules and historical comparisons. These data points reflect more than 280 key performance indicators and are rated as both a normalized score (0 to 100) and the actual computed value. The equally-weighted average is then normalized by ASSET4 such that each firm is given a z-score relative to the performance of all firms in the same industry. All ratings are provided on a yearly basis. For all companies, at least 3 years of history is available, and most companies are covered from 2005 onward, and therefore the effective time-series of our sample firms are about ten years on average. Firms are rated based both on their ESG compliance (regulatory requirements) and on their ESG engagement (voluntary initiatives). Therefore, the ESG ratings reflect a comprehensive evaluation of how a firm engages in stakeholder issues and complies with regulations. We primarily focus on the "E" ratings.

One may raise the concern that the ASSET4 sample is biased toward certain countries such as the U.S., U.K., Japan and Germany. However, the sample is constructed by exclusively tracking major equity indices that cover the largest companies around the world, as those in other cross-country studies. A manual check of the data confirms that almost all major multinational corporations in Fortune 1000 are in our sample. Therefore, the results from our sample can be interpreted as environmental engagement for the world's largest companies regardless of their country or origin. This is consistent with larger firms having bigger societal and environmental impacts.

For our main analysis, we focus on a company's overall environmental performance score (***ENVSCORE***), as well as three sub-aggregate level score under the Environment Pillar of ASSET4: Product Innovation (ENPI), Resource Reduction (ENRR), and Emission Reduction (ENER). ***ENPI*** *(Product Innovation)* measures a company's management commitment and effectiveness towards supporting the research and development of eco-efficient products or services. It is compiled by checking for environmental benefits in the products or services of the reporting organization (for example, innovation of environmentally friendly products), and reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market

[7] These indices include the S&P 500, Russell 1000, NASDAQ 100, MSCI Europe, FTSE 250, ASX 300, STOXX 600, the MSCI World Index, the MSCI Emerging Market index, among other major equity indices.

opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability. ***ENRR*** *(Resource Reduction)* measures a company's management commitment and effectiveness towards achieving an efficient use of natural resources in the production process. It is compiled by monitoring the resources used by the reporting organization during the production of natural resources like water and energy, and reflects a company's capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management. ***ENER*** *(Emission Reduction)* measures a company's management commitment and effectiveness towards reducing environmental emission in the production and operational processes. It reflects a company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and SOx, etc.), waste, hazardous waste, water discharges, spills or its impacts on biodiversity and to partner with environmental organizations to reduce the environmental impact of the company in the local or broader community.

In supplementary tests, we also investigate companies' engagement in social issues and corporate governance issues by utilizing data on the non-environmental dimensions from ASSET4, such as the social pillar score and the corporate governance pillar score. The social pillar (***SOCSCORE***) measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value. It consists of the following dimensions: product responsibility, community, human rights, diversity and opportunity, employment quality, health and safety, and training and development. The corporate governance pillar (***CGVSCORE***) measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value. It consists of the following dimensions: board functions, board structure, compensation policy, vision and strategy, and shareholder rights.

2.1.3. Sample and Control Variables

To better understand the data, Table 1 shows that the top 10 state-owned enterprises feature prominently in the Forbes Global 2000 list of top companies as ranked by the Forbes magazine in 2010.[8] These include four SOEs from China, two from France and one each from Russia, Brazil, U.K. and Italy. This table suggests that SOEs play an important role in both developed and emerging economies as highlighted in The Economist (2010). While these SOEs score relatively well in terms of environmental performance (*ENVSCORE*, as well as its sub-scores) and the

[8] We choose 2010 to report these figures for data comparability with the figures quoted in The Economist (2010) we cite in the Introduction. The year 2010 is also in the middle of our sample period.

social performance (*SOCSCORE*), a large majority of SOEs seem poorly governed according to the corporate governance pillar score (*CGVSCORE*).

To conduct a large scale study, we assemble a panel data set consisting of 4,856 firms over 13 years (2002-2014). It includes firms headquartered in a total 45 countries in five geographic regions.[9] We examine the data availability across the years. In the interest of brevity, this analysis is described in the Internet Appendix. As shown in Table IA.1, we observe an increasing pattern in the number of firms with available *ENVSCORE* in the ASSET4 database. There are only 955 and 966 observations available in 2002 and 2003, respectively. The number surges to 1,819 observations in 2004 and steadily increases to more than 4,000 by 2014. We thus drop 2002 and 2003 from the main analysis to avoid our baseline results being biased by insufficient coverage. In unreported results, we obtain consistent results if we include 2002 and 2003 in the sample.

We control for common firm-level covariates included in most corporate finance research, such as total assets, leverage, market-to-book ratio and return on assets, with the data being obtained from Datastream and Compustat Global. Data definitions for the list of variables are provided in the Appendix. In addition, following Dyck, Lins, Roth, and Wagner (2016) which find that sustainability value can be driven by institutional investors (especially foreign ones), we control for a company's institutional ownership (including both domestic and foreign institutional holdings). Data on institutional ownership are collected from FACTSET/LionShares as those authors. Moreover, given the cross-country nature of our data, we control for country-level GDP per capita which are obtained from the World Bank. Finally, we control for country and year fixed effects. Given that we use a relatively short panel data set (and environmental investment is usually a long-term commitment), environmental scores are industry-benchmarked, and state ownership is quite stable over our sample period, we do not use industry × year fixed effects or country × year fixed effects in our baseline specifications due to multicollinearity concerns.

2.2. Summary Statistics

Figure 1 provides the average percentage of state-owned firms in our sample of publicly-listed companies in each country during the 2004-2014 sample period. There is considerable cross-county variation with SOEs representing more than 60% of the market in China, close to 40% in Russia, about 20% in Brazil, 10% in France and being insignificant in the U.S. Figure 2 shows the evolution of the proportion of state-owned firms (both equal-weighted and value-weighted) in five geographic regions over the sample period.[10] In both panels, there is an increase in SOEs from emerging economies such as Asia Pacific and Latin America. At the same time, there is a

[9] The regions consist of Africa & Middle East (Egypt, Israel, Morocco, Turkey, and South Africa), Asia Pacific (Australia, China, Hong Kong, India, Indonesia, Japan, Philippines, Malaysia, New Zealand, South Korea, Thailand, and Singapore), Europe (Austria, Belgium, Czech, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, and the U.K.), Latin America (Brazil, Chile, Colombia, Mexico, and Peru), and North America (Canada and the U.S.).

[10] We do not include the averages of Africa & Middle East and Latin America in 2004-2007 due to insufficient observations in these region-years.

decline of SOEs in Africa & Middle East in our sample. State ownership in Europe remains at relatively modest levels throughout the period and it is virtually absent in North America.

Figure 3 shows the evolution of the average environmental pillar score by presenting the time series of *ENVSCORE* in companies from the five geographic regions. We observe that North American firms are ranked the lowest in environmental pillar scores (*ENVSCORE*), although they improve. European firms are ranked the highest in terms of environmental scores. Some fluctuations are observed for firms in the other three regions, but they do not reveal a clear pattern. In Panel B we present value-weighted averages and find similar patterns for European and North American companies. Comparing Panels A and B suggests that larger corporations have higher levels of environmental engagement.

In Panel A of Table 2 we show the distribution of firm-year observations across countries for the sample in our regressions. Leading the list are firms from the U.S., Japan, U.K., Australia and Canada, all with over 1,000 observations. Our sample also has a reasonable coverage of firms from emerging economies such as the BRICS countries (Brazil, Russia, India, China and South Africa). Overall, we have a sample of 28,890 firm-year observations with data availability on all dependent and independent variables.

Column (2) shows that the average level of state ownership (*State_own*) of our sample is 6.6%. The country with the highest proportion of state-owned companies in our sample is China (65.1%), but the level is high also for other emerging countries (Colombia, Malaysia, Indonesia, Poland, Thailand, Russia and Czech Republic) and Singapore. The presence of the state in the corporate section is relatively low in more developed economies (Germany, U.K., Canada, Japan, U.S., etc.). Column (3) then shows the average of environmental pillar scores (*ENVSCORE*) in each country. The average environmental pillar score is 51.5, which is expected as all ESG scores are industry-adjusted for a middle point of 50. Firms from developed countries tend to score better than those from emerging countries (French firms are highest at 76.1 while Egyptian rank in the bottom with an average score of 19.6). Except for China (26.0), the average environmental pillar scores of the other four BRICS countries are around the standardized mean: Brazil (53.5), India (55.0), Russia (46.5), and South Africa (53.3). As the first probe into the relation between state ownership and environmental engagement, we conduct t-test for the equality of *ENVSCORE* between SOEs (i.e., firms with no less than 25% of control rights owned by the government) and non-SOEs. We present these results in the Internet Appendix to conserve space. As shown in Table IA.2, the average *ENVSCORE* for state-owned firms is 57.4 and for non-SOEs the score is 51.1 and this difference is statistically significant (p-value of 0.00). When we look into each individual country, we find that SOEs' environmental pillar score is higher than non-SOEs' in 31 out of 45 countries (the difference is statistically significant in 23 countries at the 10% level). These findings provide preliminary evidence on the link between state ownership and environmental engagement. We find similar country-level results for the sub-categories of emission reduction (*ENER*), environmental product innovation (*ENPI*), and environmental resource reduction category score (*ENRR*).

Columns (7) and (8) consider the other two ESG pillar scores: the social pillar scores (*SOCSCORE*) and corporate governance pillar scores (*CGVSCORE*). There are large cross-country variations in the average of social pillar scores with developed country firms scoring higher than those from emerging markets. In Table IA.2 of the Internet Appendix we test whether SOEs have higher *SOCSCORE* than non-SOEs and find that the difference is statistically significant in 24 countries (at the 10% significance level). Interestingly, we find the opposite correlation between state ownership and corporate governance: SOEs' average score is 41.7 and other firms' average score is 54.2 which is statistically different.

In Panel B of Table 2 we show the summary statistics across ten major industries. State ownership is high in Telecommunications (31.7%) and Utilities (25.6%) and low in Health Care (1.0%), Consumer Goods (1.9%) and Technology (2.1%). Comparing the environmental pillar scores, we find that SOEs have higher *ENVSCORE* in seven out of ten industries. It is noteworthy that the three industries in which non-SOEs' *ENVSCORE* are higher than SOEs' (Industrials, Consumer Goods, and Health Care) are industries with fairly low state ownership (5.3%, 1.9%, and 1.0%). In other words, in industries with stronger government presence, we find SOEs more active in environmental issues. Similarly, in industries with greater government presence, state-owned firms also have higher *SOCSCORE*, which echoes our finding in *ENVSCORE*. Finally, we find that SOEs are associated with lower corporate governance pillar scores (*CGVSCORE*) in all 10 industries. This finding is consistent with Panel A of Table 2, suggesting that on average state-owned firms are weaker in corporate governance.

Results on these univariate comparisons should be interpreted with caution because we haven't controlled for several firm-level factors. Panel A of Table 3 presents the summary statistics of the key variables in the multivariate regressions we implement later in our study. On average, about 6% of our sample firms are classified as state-owned. As expected, the sustainability scores (the *ENVSCORE* and its sub-scores, as well as *SOCSCORE* and *CGVSCORE*) have a mean of around 50 as they are normalized scores, but there exists variation across observations. Panel B of Table 3 reports the Pearson correlation coefficients among all variables used in regressions. We find that state ownership is positively and significantly correlated with all environmental engagement proxies. In addition, multicollinearity is unlikely to be a concern.

3. Empirical Results on State Ownership and Environmental Engagement

In this section, we test the relation between state ownership and corporate engagement in environmental issues. We present results from the baseline regression and explore several potential mechanisms that might account for the association between state ownership and environmental sustainability.

3.1. Baseline Regressions

Our baseline regression is specified as follows:

$$ENV_{i,t} = \alpha_0$$

$$+ \beta_1 State\_own_{i,t-1} + \beta_2 Inst\_own_{i,t-1} + \beta_3 Ln(Assets_{i,t-1}) + \beta_4 Leverage_{i,t-1} + \beta_5 MTB_{i,t-1} + \beta_6 ROA_{i,t-1}$$

$$+ \beta_7 Ln(GDP_{i,t}) + \Sigma \boldsymbol{\rho} * I(Country_j) + \sum \boldsymbol{\delta} * I(Year_t) + \varepsilon_{i,t}, \quad (1)$$

where $ENV_{i,t+1}$ denotes the environmental engagement proxies (*ENVSCORE*, *ENER*, *ENPI*, and *ENRR*) of firm *i* that is listed in country *j* in year *t*. The primary explanatory variable, $State\_own_{i,t-1}$, is an indicator variable that equals one if firm *i* is state-owned in year *t-1* and zero otherwise. Other control variables include the percentage of institutional ownership ($Inst\_own_{i,t-1}$), firm size (total assets in logarithm, $Ln(Assets_{i,t-1})$), leverage ($Leverage_{i,t-1}$), market-to-book ratio ($MTB_{i,t-1}$), return on assets ($ROA_{i,t-1}$), and GDP per capita in logarithm ($Ln(GDP_{i,t})$). All these control variables are winsorized at the 5th and 95th percentiles. We also control for country and year fixed effects by including $I(Country_j)$ and $I(Year_t)$ which are series of dummy variables denoting each country and each year. We do not include industry fixed effects because the dependent variables are already industry-benchmarked (industry adjusted). We estimate Equation (1) using ordinary least squares (OLS) regressions and all firm-year observations with non-missing values in all dependent and independent variables for the period 2004-2014.[11] Standard errors are clustered at the firm-level to correct for firm-specific autocorrelation in estimation errors.

Table 4 reports the estimation results for Equation (1). We first estimate the equation using only state ownership (*State_own*) as well as country and year fixed effects (Column (1)). We find that the point estimate of state ownership is 3.99 and is statistically significant at the 1% level. Given that the dependent variable is standardized on a scale of 0-100, this suggests that a firm being state-owned on average has an environmental score that is about 4% (or about 7.7% of sample mean and 12.5% of sample standard deviation) higher than non-state-owned firms. In Column (2), when we include all other control variables in the estimation, the economic magnitude of the state ownership effect is slightly reduced, but remains statistically significant at the 10% level.

We also break down the overall environmental score into its sub-dimensions and investigate which aspects drive the association between state ownership and environmental sustainability by replacing the dependent variable with *ENER* (in columns (3) and (4)), *ENPI* (columns (5) and (6)) and *ENRR* (columns (7) and (8)). Table 4 shows that the effects of the overall environmental score come from emission reduction and resource reduction, but not much from product innovation, as the coefficients on *State_own* in Columns (5) and (6) are not statistically significant (while still positive).

In terms of control variables, we find that environmental sustainability scores are higher in firms with greater institutional ownership, larger size, higher market-to-book ratio, and higher profitability. These results are

[11] The dependent variables are bounded between 0 and 100. In a robustness check, we used logarithmic value of environmental engagement proxies and obtain consistent results.

consistent with the findings in the extant literature of institutional investors promoting socially responsible corporate behavior (e.g., Dyck, Lins, Roth, and Wagner (2016)) and the "doing good by doing well" argument that more profitable companies care more about sustainability (e.g., Hong, Kubik, and Sheinkman (2012)).

Overall, the results in Table 4 support a positive relation between state ownership and environmental engagement, especially in emission reduction and resource reduction. The insignificant correlation between state ownership and environmental production innovation may be due to the fact that SOEs are not more innovative in creating new products and processes. State-owned firms may be taking more conservative approaches but not proactive ones in environmental engagement. It is also worth noting that a firm's state-control status is generally quite stable over time, especially during our sample period, as they are likely legacies of pre-privatization ownership structures. Therefore, our results are more in line with the notion that state ownership promotes more environmental engagement, rather than that governments as owners picking "green companies" to invest in.

If state ownership represents the public interest in dealing with environmental externalities, the above effect should be more pronounced in industries that are more sensitive to environmental issues, such as energy-related ones. Therefore, in Panel A of Table 5 we interact state ownership with an indicator variable that equals one if the sample firm belongs to energy-related industries (Oil & Gas and Utilities) and zero otherwise. We focus on these industries as they are highly correlated with environment pollution for which green initiatives may improve environmental quality. As shown in Table 5, the coefficient estimates of the interaction term "State_own × Energy" are all statistically significant above the 5% level. These coefficients are greater than the estimates of *State_own* in Table 4, suggesting that the positive relation between state ownership and environmental engagement variables is particularly high among energy-related firms.

We also examine whether the role of state ownership is stronger in manufacturing industries which are likely to pollute more and generate environmental externalities from their operation. In Panel B of Table 5, we find that the significance of state ownership only comes from the Manufacturing subsample, especially when the dependent variables are *ENVSCORE*, *ENER*, and *ENRR*.[12] This again supports our conjecture that state ownership helps correct environmental externalities from firms' production when these are more severe. Interacting the *Manufacturing* dummy with the *State_own* dummy gives very similar results.

According to The Economist (2010, 2014) and Musacchio and Lazzarini (2014), the resurgence of Leviathan Inc is particular strong in emerging economies such as Brazil or China. These markets are more likely to suffer from the scarcity of long-term capital to fund promising projects such as environment-related expenditures, raising the necessity of government intervention in these projects. Therefore, we investigate the cross-region variation of the state-ownership effects. In Table 6, we report the results from estimating Equation (1) in each of five geographic

[12] Manufacturing industries include Oil & Gas, Utilities, Basic Materials, Consumer Goods, Industrials, and Technology. Non-manufacturing industries include Consumer Services, Financials, Health Care, and Telecommunications.

regions. For brevity, we only report the results based on *ENVSCORE*. We find that the state-ownership effects mainly exist in the subsamples of Asia Pacific and of Latin America. In contrast, the coefficient estimates of state ownership are negative (albeit insignificant) in Africa & Middle East and North America.

3.2. Alternative Measure of State Ownership and Other Types of Blockholders

To check the robustness of our baseline results, we replace the binary variable *State_own* (ultimate owner is the central government, a state or a public authority) with the continuous variable *Government_held* from Datastream which measures the percentage of free-float shares held by the government, if those holdings exceed 5%. In Table 7 we rerun the analyses with this alternative measure of state ownership. Our results still hold: firms with greater state holdings score higher in the environmental performance (*ENVSCORE*, *ENRR* and *ENER*), whereas the effects on environmental product innovation are still insignificant.

One concern is that the effects we document above are not unique to government ownership, but may just be related to the presence of any blockholding, rather than the government type of thse blockholdings. Controlling for institutional ownership in our previous regressions may partially capture one type of blockholder. To further address this concern, we use data from Datastream on the percentage of total shares by strategic blockholders. These include block holdings of 5% or more by foreign investors (*Foreign holdings*), by other (industrial) companies (*Cross holdings*), by pension funds (*Pension fund held*), by investment companies (*Investment co held*), by employees (*Employee held*), by other investors (*Other holdings*), and the total holdings by all the above blockholders (*Strategic holdings*). We also utilize data from Factset/Lionshares and construct the percentage of all outstanding shares (traded or non-traded) owned by domestic institutional investors (*Domestic inst. held*) and by foreign institutional investors (*Foreign inst. held*), as used by Aggarwal, Erel, Ferreira and Matos (2011) and Dyck, Lins, Roth, and Wagner (2016)). Table 8 presents the regression results with each one of these variables.[13] We find that almost all other types of blockholdings are either uncorrelated (foreign holdings, cross holdings, other holdings, and domestic institutional holdings) or negatively correlated (pension fund holdings, investment company holdings, employee holdings, and strategic holdings) with environmental engagement. The only exception is the positive loading on foreign institutional ownership, which is consistent with the findings in Dyck et al. (2016) that foreign institutional investors, especially those from developed countries, are concerned about environmental issues due to reputation or moral pressure from their investors. Nevertheless, we note that foreign institutional investors and governments are fairly independent investors with different objectives. It is less likely that our baseline results are driven by foreign institutional investors that attract government investment. A more convincing explanation for our finding is driven by the common interest of these two distinct types of investors: environmental issues. Overall, the findings

[13] Again, for brevity, we only present the results with ENVSCORE as the dependent variable in this table. In unreported results, using other sub-dimensional environmental scores as dependent variables yield similar results.

reported in Table 8 suggest that the influence of state ownership on environmental engagement is likely to be unique to government ownership and not driven by other types of block holdings.

3.3. Corporate Environmental Responses to the Passage of the 2009 Copenhagen Accord

The previous results show that there is a positive correlation between a firm's state ownership and its environmental performance, which is the *average effect*. Based on the demand-side arguments, one potential mechanism that explains why state-owned firms on average have higher levels of environmental performance may be that they are more responsive to societal demands for environmental engagement changes, which is the *marginal effect*. To test this effect, we resort to a shock to worldwide awareness of environmental sustainability and investigate whether state-controlled firms in our sample react differently. The exogenous shock that we focus on is the Climate Change Summit held in Copenhagen in 2009.[14] Arguably, the Copenhagen Conference raised awareness of the severity of climate change and other environmental problems, which shifted the demand for environmental engagement by corporations worldwide. We argue that the exogenous shock of the Copenhagen Summit moved firms out of equilibrium in a way that magnifies both the benefits and costs of state control.[15]

We conduct a differences-in-differences (DiD) analysis by identifying state-owned firms after the passage of Copenhagen Accord (December 2009) as the treatment and estimating the following regression:

$$ENV_{i,t} = \alpha_0 + \beta_0 State\_own_{i,t-1} * Post\ 2009_t$$

$$+ \beta_1 State\_own_{i,t-1} + \beta_2 Inst\_own_{i,t-1} + \beta_3 Ln(Assets_{i,t-1}) + \beta_4 Leverage_{i,t-1} + \beta_5 MTB_{i,t-1} + \beta_6 ROA_{i,t-1}$$

$$+ \beta_7 Ln(GDP_{i,t}) + \Sigma\, \boldsymbol{\rho} * I(Country_j) + \Sigma\, \boldsymbol{\delta} * I(Year_t) + \varepsilon_{i,t}, \quad (2)$$

where *Post 2009*$_t$ is an indicator variable that equals one if year *t* is from 2010 onward and zero otherwise (to capture the Copenhagen Agreement signed in December 2009). The interaction term is used to test if state-owned firms become more environmentally engaged after 2009 due to strengthened pressure from governments. We expect the coefficient estimate on the interaction term, β_0, to be significantly positive. To ensure that the estimation of Equation (2) is not affected by other economic factors, we restrict our sample period to a two-year window (2008-2011) or three-year window (2007-2012).

[14] The major milestone of the Summit was the passage of Copenhagen Accord, which is a document that delegated at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on December 18, 2009. The Accord was drafted by the U.S. and a coalition of the BASIC countries (China, India, South Africa, and Brazil), and was aimed to be the successor to the Kyoto Protocol, whose round ended in 2012. The Copenhagen Summit and the passage of the Copenhagen Accord were largely exogenous to the corporate environmental engagement in the recent decade, because the Accord was mainly aimed to serve as a continuation of the Kyoto Protocol that naturally expired, thus was not a direct response to corporate environmental performance.

[15] Some people have criticized that the Copenhagen Accord is a failure because it is not legally binding. However, we argue that this "non-legally-binding" feature is actually an advantage of our empirical setting, as it enables us to test on corporations' voluntary engagement (rather than compliance to regulations) in environmental issues.

We report the estimation results in Table 9, which shows significantly positive estimates on the interaction term *State_own* × *Post 2009*. For example, in Column (2) for *ENER* in 2008-2011, the coefficient estimate of the interaction term is 1.92 with statistical significance at the 5% level. This suggests that, after the passage of Copenhagen Accord, state-owned firms increased their efforts in emission reduction increases by about 2% more than non-state-owned firms. Overall, the results shown in Table 9 are suggestive that state-owned firms are more responsive to environmental shocks, and provide additional support for our main hypothesis for the following two reasons. First, if our baseline results are simply by chance, we should not expect to observe a stronger effect of state ownership after 2009. Second, if our baseline results are driven by other ownership types or by omitted variable bias, then such alternatives need to be stronger after 2009 to explain our results in Table 9. As a result, a more convincing interpretation for our findings is that environmental engagement is promoted by government ownership, and it is strengthened after 2009 due to the Copenhagen Accord pressure on all governments to act on climate change.

3.4. Potential Channels

In this section, we investigate a few potential channels which may account for the above effects of state ownership on environmental engagement. More specifically, we focus a country's energy dependence, its neighboring countries' conflicts, and the political orientation (left, center, right) of its ruling parties. These factors capture when the state plays a more important role and when environmental issues are stronger concerns.

First, if a country is highly energy dependent, the state may have stronger incentive to engage in activities and technologies that improve its energy efficiency, leading to better environmental performance. We test whether the state-ownership effect is stronger in countries with higher energy dependence by interacting the *State_own* dummy with a country-level energy dependence index. Data on country-level energy dependence are obtained from the International Index of Energy Security Risk by US Chamber of Commerce's Institute for 21st Century Energy (www.energyxxi.org). As shown in Column (1) of Table 10, the interaction term *State_own* × *Energy dependence* is positive and statistically significant, which indicates that a country's natural resources are a driver of the state's motivation for strong environmental engagement.

Second, if a country is in conflict with its neighboring countries, the government may have stronger incentives to improve the efficiency in energy use due to potential instability in energy supply. We test this by interacting the *State_own* dummy with a country-level neighboring country conflicts index. This is obtained from the Global Conflict Risk Index (GCRI) by European Commission's Joint Research Center. Column (2) of Table 10 shows that the interaction term *State_own* × *Neighboring countries conflict* is positive and statistically significant, which supports our hypothesis that a country's surrounding conflicts risk is a driver of the state ownership effect on environmental engagement.

Third, if a country's ruling party is more toward left-wing in its political orientation, its government may pursue a stronger role in controlling economic life (Mullainathan and Shleifer, 2005) and environmental issues. We test this by interacting the *State_own* dummy with a political leftness indicator for countries' ruling parties, with larger value indicating more toward left-wing. Data on ruling parties' political orientation are obtained from World Bank's Database of Political Institutions (DPI) and vary across countries and years. However, Column (3) of Table 10 shows that the coefficient of the interaction term *State_own* × *Political orientation* is statistically insignificant. Therefore, a government's political orientation is not likely the key driving force of the state-owned firms' engagement in environmental issues.

4. Other Dimensions: Shareholder Value, Social Responsibility and Corporate Governance

An important question is whether the state ownership effects we document above are unique to environmental sustainability, or state-owned firms in general are superior both in dealing with externalities and in generating higher financial returns. For example, some studies find that state-owned firms care more about social issues such as employment and community engagement (Liang and Renneboog, 2016), whereas Shleifer and Vishny (1998) argue that due to incentive problems, state-owned firms may engage in rent-seeking activities at the cost of society at large. Others find that state-owned firms usually have weaker corporate governance and consequently worse financial performance (e.g., Megginson, Nash, and van Randenborgh (1994); Megginson and Netter (2001); Dewenter and Malatesta (2001); Bortolotti and Faccio (2009)). In contrast, Musacchio, Lazzarini, and Aguilera (2015) argue that the new form of state ownership has mixed implications for governance and firm performance.

In Table 11 we investigate the shareholder value implications of such environmental engagement by state-owned firms. To do so, we first regress Tobin's Q (measured by *MTB*, the market-to-book ratio of assets) on the interaction between state ownership and the aforementioned environment engagement scores in Panel A. The control variables are similar as before, except that we do not include the market-to-book ratio on both sides of the equation. Several interesting observations can be made. First, the coefficients on *State_own* are statistically insignificant, consistent with the notion that SOEs do not have higher (or lower) shareholder value. Second, the four measures of environmental engagement are all positively and statistically correlated with Tobin's Q, consistent with the "doing well by doing good" hypothesis (e.g. Flammer (2015)) and the empirical evidence that corporate environmental engagement is related to better firm performance and higher value (e.g. Dowell, Hart, and Yeung (2000)). Third, and more importantly, none of the interactions between state ownership and environmental scores are statistically significant, suggesting that the environmental engagement done by state-owned firms are not associated with lower shareholder value.

In Panel B of Table 11, we report the results from regressing firms' forward five-year average ROA on the interaction between state ownership and the environment engagement scores. We again find insignificant

coefficients on *State_own*, consistent with the Tobin's Q results in Panel A and suggesting that state-owned firms do not underperform financially. On the other hand, three out of the four environmental engagement measures (*ENVSCORE*, *ENPI*, and *ENRR*) are positively and significantly associated with future ROA, suggesting that environmental engagement per se may enhance long-term profitability. Lastly, none of the interactions between state ownership and environmental scores are statistically significant, supporting the argument that state-owned firms' environmental engagement does not sacrifice future profitability. Overall, Table 11 highlights that the greater engagement in environmental issues of state-owned companies does not come at a cost at shareholders, but may have welfare implications for the society at large.

We then examine state ownership in the bigger picture of "ESG," namely how state-owned firms fare in terms of social issues and corporate governance. We address this question using the *social* and *corporate governance* pillar scores of ESG ratings from the ASSET4 database. In Table 12, we replace the dependent variable *ENVSCORE* with two aggregate scores measuring a company's overall commitment to social issues (*SOCSCORE*, which measures how firms care about customers, suppliers, employees, community, and human rights) and corporate governance quality (*CGVSCORE*, which concerns board functions and board structure, compensation policy for executives, integrated vision and strategy, and shareholder rights). Interestingly, we find that state-owned firms also engage more in social issues, as are evident by the coefficient on *State_own* in Column (1) (although only significant at the 10% level), but they do not have better corporate governance performance since the coefficient on *State_own* is insignificant in Column (2). These results further confirm that state-owned firms engage more in non-financial issues and dealing with externalities, but are no better (or worse) in corporate governance. This also echoes our results in Table 11 that SOEs do not have higher shareholder value, and is consistent with the large literature on the positive link between good corporate governance and higher shareholder returns (e.g., Gompers, Ishii, and Metricks (2003); Bebchuk, Cohen, and Ferrell (2009)). In our case, state-control does not render superior corporate governance thus greater returns to shareholders, but they contribute more to the welfare of society at large, without significantly sacrificing shareholder interests.

5. Conclusion

The proper role of the state in organizing economic life has been a long debated topic. A major trend characterizing the beginning of the 21st century is the resurgence of state-owned enterprises, especially in Asia and Latin America. This period is also characterized by an increasing attention paid to global warming and sustainability issues. Governments can address such market failures in various ways (Laffont and Tirole (1993)) including taxation/subsidies and regulations, but also directly being the provider of public goods to society via state-owned firms (Cuervo-Cazurra et al. (2014)). However, governments can be captured, may lack the technical capacity to run firms, and ultimately not be able to effectively manage SOEs. Therefore, whether governments can more effectively address externality issues via state ownership is an important, yet largely unanswered question.

In this paper, we pull together several data sources and conduct a thorough examination of the role of state ownership of publicly-listed companies around the world to answer the question above. We find that SOEs tend to have higher engagement in environmental issues over the last decade. We do not find such a pattern for other block-owners from the private sector. We document that the role of SOEs on environmental engagement is more pronounced in: 1) emerging economies (Latin America and Asia-Pacific); 2) manufacturing industries; 3) countries lacking energy resources; and 4) countries with conflict with neighboring countries. Further supporting our results on the effect of SOEs on environmental engagement is the finding that they reacted more than non-state-owned firms after the passage to the Copenhagen Accord in December 2009. Interestingly, state-owned firms also engage more in social issues, but they do not have better corporate governance performance.

We believe our findings have policy implications. As many economies worldwide embraced pro-market reforms in the last quarter of the 20th century (Yergin and Stanislaw (1998)), many prototypical SOEs were radically redesigned. The privatization processes of the late 20th century resulted in the transformation of many SOEs and a reduction in their numbers (Cuervo-Cazurra et al., 2014). However, privatization did not spell the end of state ownership of companies. Our findings show that today's SOEs seem to be more effective in dealing with market failures—especially in the domain of environmental externalities—without sacrificing shareholder returns, compared to their private counterparts.

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Appendix: List of Variables and Data Sources

Variable	Description
ENVSCORE	The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value. The environmental pillar is an equally weighted score of the following sub-dimensional scores: Emission Reduction, Product Innovation, and Resource Reduction. Source: Thomson Reuters ASSET4 database.
ENRR	Emission Reduction, which measures a company's management commitment and effectiveness towards reducing environmental emission in the production and operational processes. It reflects a company's capacity to reduce air emissions (greenhouse gases, F-gases, ozone-depleting substances, NOx and Sox, etc), waste, hazardous waste, water discharges, spills or its impacts on biodiversity and to partner with environmental organizations to reduce the environmental impact of the company in the local or broader community. Source: Thomson Reuters ASSET4 database.
ENPI	Product Innovation, which measures a company's management commitment and effectiveness towards supporting the research and development of eco-efficient products or services. It reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed, dematerialized products with extended durability. Source: Thomson Reuters ASSET4 database.
ENRR	Resource Reduction, which measures a company's management commitment and effectiveness towards achieving an efficient use of natural resources in the production process. It reflects a company's capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management. Source: Thomson Reuters ASSET4 database.
SOCSCORE	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value. The social pillar is an equally weighted score of the following sub-dimensional scores: Customer/ Product responsibility, Society/ Human rights, Workforce/ Diversity and opportunity, Workforce/ Employment quality, Workforce/ Health & safety, Workforce/ Training & development. Source: Thomson Reuters ASSET4 database.
CGVSCORE	The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value. The corporate governance pillar is an equally weighted score of the following sub-dimensional scores: Board of directors/ Board functions, Board of directors/ Board structure, Board of directors/ Compensation policy, Integration/ Vision and strategy, Shareholder/ Shareholder rights. Source: Thomson Reuters ASSET4 database.
State_own	A dummy variable that equals one if the ultimate owner is the state, the government or a public authority, and zero otherwise. Ultimate owner is defined as the shareholder for whom the percentage of direct voting rights owned by this shareholder who is identified by following the path of uninterrupted control rights (at 25%) throughout the ownership pyramid. Source: Datastream.
Inst_own	Holdings (end-of-year) by all institutions as a fraction of market capitalization. Source: FactSet/LionShares.
Market-to-book (MTB)	Calculated as the ratio of the market value of total assets to the replacement value of total assets of the company (the sum of book value of equity and book value of liabilities), winsorized at 5% level. Source: Datastream.
Return on assets (ROA)	Calculated as the ratio of net income to the book value of total assets of the company. Source: Datastream and Compustat.
Firm size	The logarithm of the company's total assets. Source: Datastream and Compustat.
Leverage	The ratio of total liabilities to total assets of the company, winsorized at 5% level. Source: Datastream and Compustat.
GDP per capita	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Source: World bank database.

Government held	The percentage of total shares in issue of holdings of 5% or more held by a government or government institution. Source: Datastream.
Foreign holdings	The percentage of total shares in issue of holdings of 5% or more held by an institution domiciled in a country other than that of the issuer. Note: Before March 1st 2005 this datatype was calculated as a separate strategic component. Since that date NOSHFR has represented the foreign held holdings of 5% or more included in the total strategic holdings datatype NOSHST. Source: Datastream.
Cross holdings	The percentage of total shares in issue of holdings of 5% or more held by one company in another. Source: Datastream.
Pension fund held	The percentage of total shares in issue of holdings of 5% or more held by pension funds or endowment funds. Source: Datastream.
Investment co held	The percentage of total shares in issue of holdings of 5% or more held as long term strategic holdings by investment banks or institutions seeking a long term return. **Note** that holdings by Hedge Funds are not included. Source: Datastream.
Employee held	The percentage of total shares in issue of 5% or more held by employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting, (typically family members). Source: Datastream.
Other holdings	The percentage of total shares in issue of 5% or more held strategically, and outside one of the above categories. Source: Datastream.
Strategic holdings	The percentage of total shares in issue of 5% or more held strategically and not available to ordinary investors. Note that holdings of 5% or more held by the Hedge Fund owner type or the Investment Advisor/Hedge Fund owner type are regarded as very active, and not counted as strategic Source: Datastream.
Domestic inst. held	Holdings (end-of-year) by institutions located in the same country where the stock is listed as a fraction of market capitalization. Source: FactSet/LionShares.
Foreign inst. held	Holdings (end-of-year) by institutions located in a different country from the country where the stock is listed as a fraction of market capitalization. Source: FactSet/LionShares.
Energy dependence	The scores for the country-level energy dependence are reported in relation to an average reference index measuring risks for the OECD member countries. The OECD average risk index is calibrated to a 1980 base year figure of 1,000. It includes the following categories: (1) Global fuels, which measures the reliability and diversity of global reserves and supplies of oil, natural gas, and coal. (2) Fuel import, which measure the exposure of the national economies to unreliable and concentrated supplies of oil and natural gas, and coal. (3) Energy expenditure, which measures the magnitude of energy costs to national economies and the exposure of consumers to price shocks. (4) Price & market volatility, which measures the susceptibility of national economies to large swings in energy prices. (5) Energy use intensity, which measures energy use in relation to population and economic output. (6) Energy power sector, which measures indirectly the reliability of electricity generating capacity. (7) Transportation sector, which measures efficiency of energy use in the transport sector per unit of GDP and population. (8) Environmental, which measures the exposure of national economies to national and international greenhouse gas emission reduction mandates. Lower emissions of carbon dioxide from energy mean a lower risk to energy security. Source: International Index of Energy Security Risk by US Chamber of Commerce's Institute for 21st Century Energy (www.energyxxi.org).
Neighboring country conflicts	The neighboring country conflicts index is an index of the statistical risk of violent conflict in the next 1-4 years and is exclusively based on quantitative indicators from open sources. With the assumption that structural conditions in a country are linked to the occurrence of violent conflict, the GCRI collects 25 variables in 5 dimensions (social, economic, security, political, geographical/environmental) and uses statistical regression models to calculate probability and intensity of violent conflict. Source: obtained from Global Conflict Risk Index (GCRI) by European Commission's Joint Research Center (http://conflictrisk.jrc.ec.europa.eu/)
Political orientation	Political Orientation of the Executive Party, which measures party orientation with respect to economic policy, coded based on the description of the party in the sources, 1=Right; 3=Left; 2=Center. Right: for parties that are defined as conservative, Christian democratic, or right-wing. Left: for parties that are defined as communist, socialist, social democratic, or left-wing. Center: for parties that are defined as centrist or when party position can best be described as centrist (e.g. party advocates strengthening private enterprise in a social-liberal context). *Not* described as centrist if competing factions "average out" to a centrist position (e.g. a party of "right-wing Muslims and Beijing-oriented Marxists"). 0: for all those cases which do not fit into the above-mentioned category (i.e. party's platform does not focus on economic issues, or there are competing wings), or no information. Source: Database of Political Institutions (DPI) from World Bank

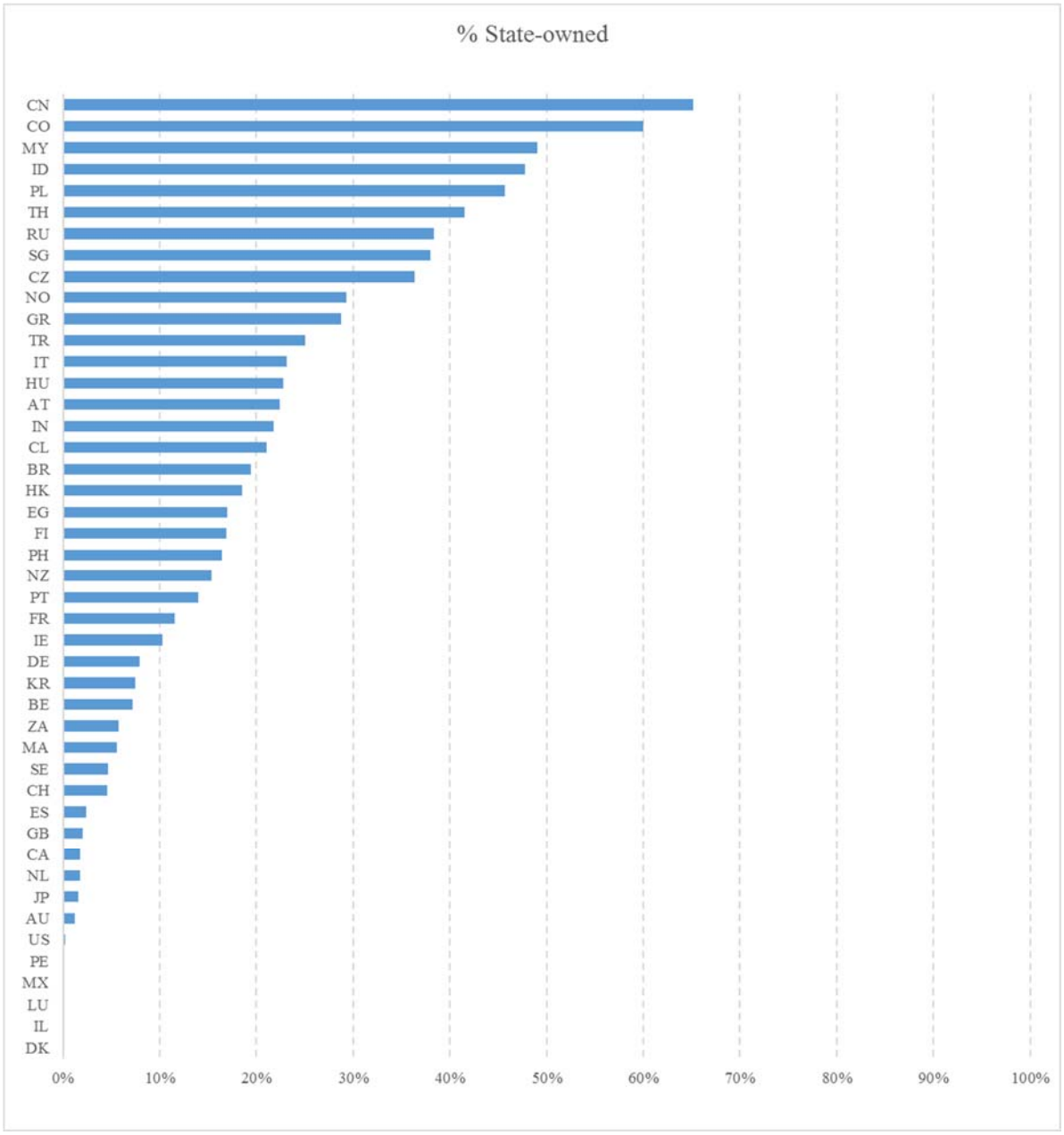

Figure 1. Average State-ownership of Publicly-Listed Firms, Per Country

This figure presents the rank of state-owned ratios of sample firms in each country. We require the firm-year to have non-missing values in the following variables (used in our regression analyses) to enter into our sample: ENVSCORE, State_own, institutional ownership, total assets, leverage, market-to-book ratio, ROA, and GDP per capita. The sample period is from 2004 to 2014.

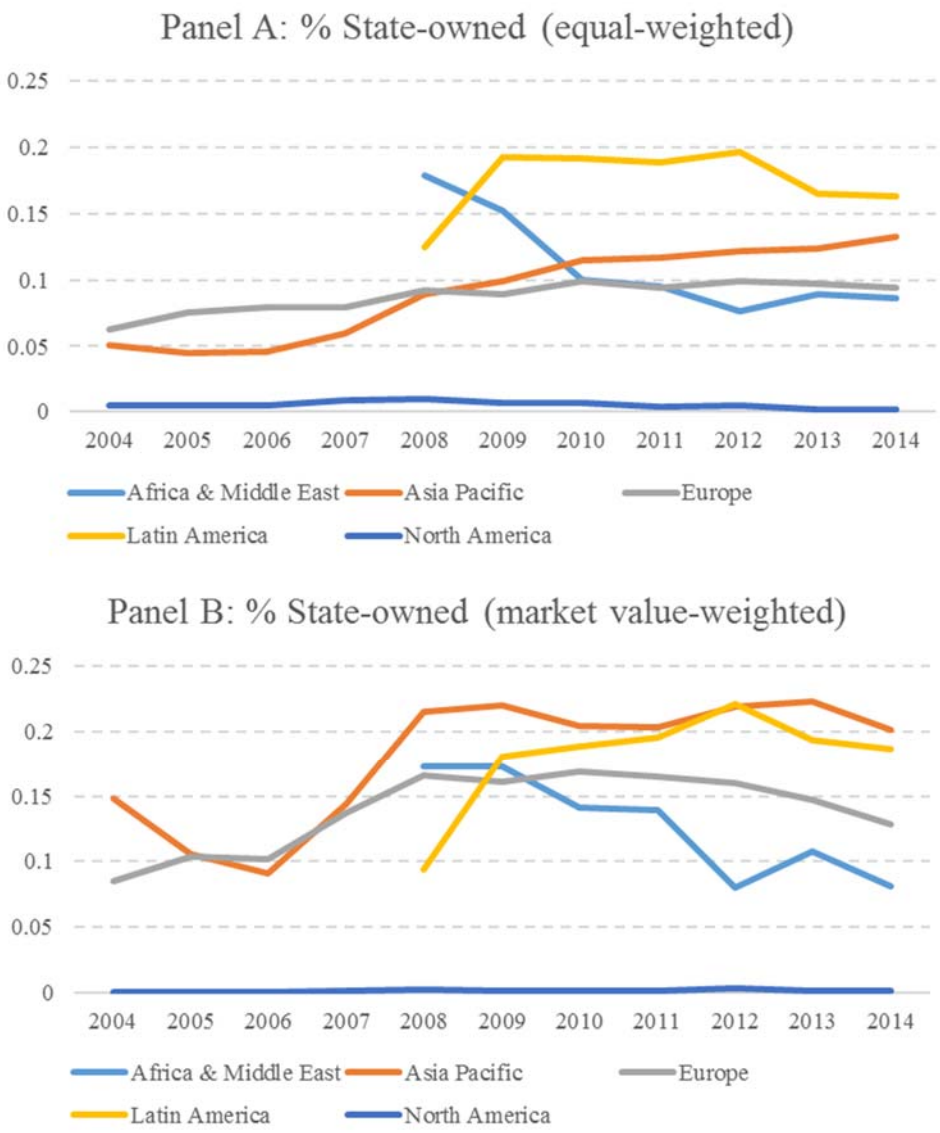

Figure 2. Average Proportion of State-owned Publicly-listed Firms, per Geographic Regions and Years

This figure presents the time series patterns of the ratios of state-owned public firms in the five different regions. The sample period is from 2004 to 2014. Panel A presents equal-weighted averages, in which we calculate the ratio of the number of state-owned firms among all public firms in a region in each year. Panel B shows value-weighted averages, in which we calculate the average ratios of state-owned firms among all public firms in a region in each year, weighted by the lagged market capitalization.

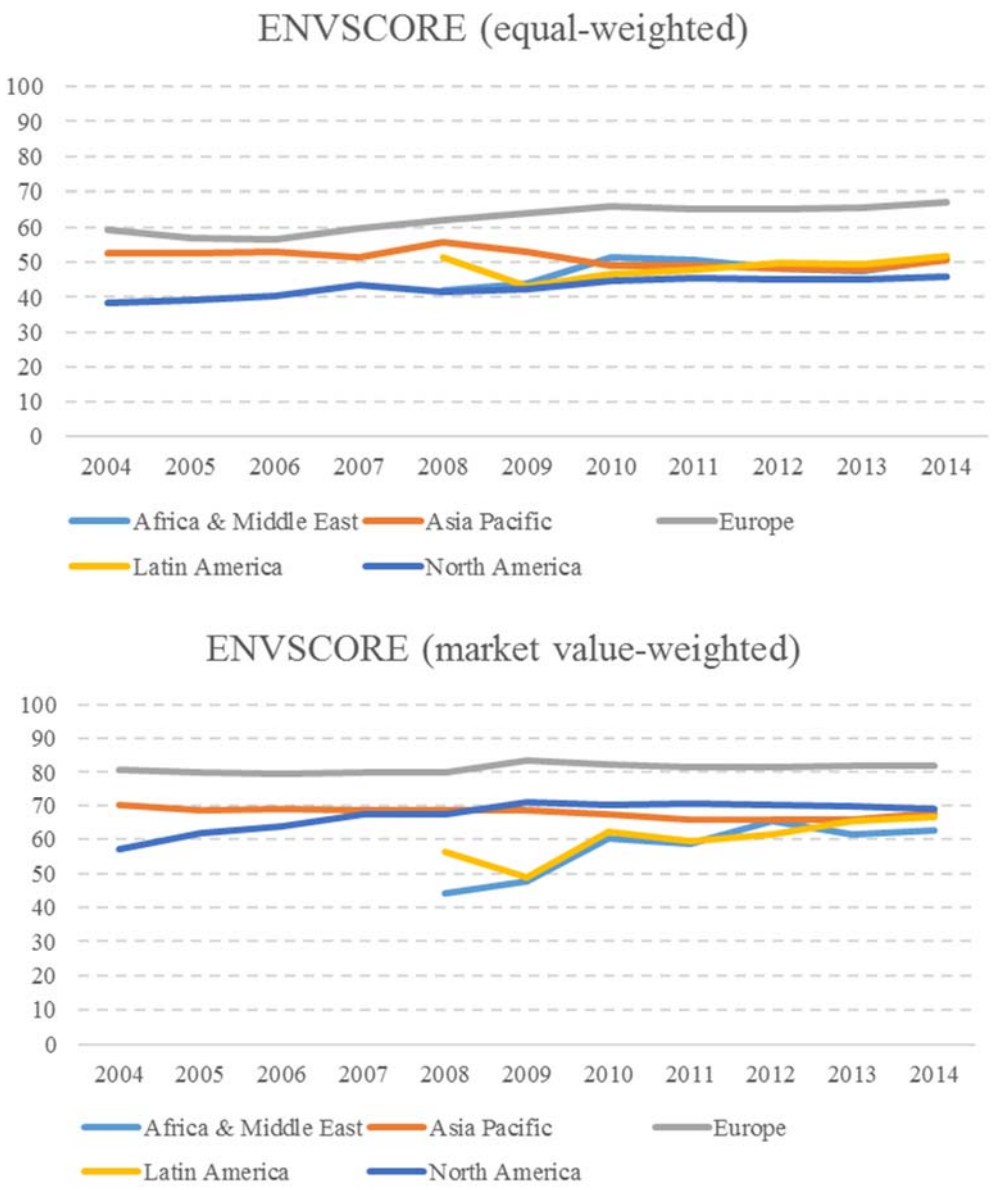

Figure 3. Average ENVSCORE of Publicly-listed Firms, per Geographic Regions and Years

This figure presents the time series patterns of the average of environmental pillar scores (*ENVSCORE*) of public firms in the five geographical regions. The sample period is from 2004 to 2014. Panel A presents equal-weighted averages, calculated with the simple average score of public firms in a region in each year. Panel B shows value-weighted scores, in which we calculate the average scores of public firms in a region in each year, weighted by the lagged market capitalization.

Table 1. Top-ranked Forbes Global Companies

In this table, we present the status of state ownership (*State_own*), the environmental pillar score (*ENVSCORE*, and the sub-categories: emission reduction *ENER*, product innovation *ENPI*, resource reduction *ENRR*), the social pillar score (*SOCSCORE*), and the corporate governance pillar score (*CGVSCORE*) of the top companies in the Forbes Global 2000 list for 2010. The top 10 SOEs are highlighted in bold.

Forbes Rank 2010	Country	*State_own*	*ENVSCORE*				*SOCSCORE*	*CGVSCORE*
				ENER	*ENPI*	*ENRR*		
1 JPMorgan Chase	US	No	92.50	76.57	97.25	87.06	66.48	72.70
2 General Electric	US	No	95.06	94.53	97.69	95.05	90.78	94.49
3 Bank of America	US	No	77.54	48.28	86.94	80.64	67.41	82.06
4 ExxonMobil	US	No	94.19	92.48	94.75	93.17	91.67	86.78
5 ICBC	**CN**	**Yes**	**87.86**	**72.09**	**95.19**	**85.65**	**78.27**	**78.98**
6 Banco Santander	ES	No	93.21	92.03	87.77	93.30	95.23	89.16
7 Wells Fargo	US	No	91.92	93.11	88.13	84.08	59.39	82.47
8 HSBC Holdings	GB	No	93.40	93.63	87.41	93.41	86.73	84.91
9 Royal Dutch Shell	GB	No	89.69	79.54	89.40	92.34	78.23	87.56
10 BP	GB	No	89.86	89.45	75.50	89.25	87.12	83.28
11 BNP Paribas	FR	No	93.04	87.99	97.34	90.84	94.07	90.89
12 PetroChina	**CN**	**Yes**	**57.50**	**64.25**	**15.44**	**75.30**	**81.13**	**19.74**
13 AT&T	US	No	92.71	93.39	88.22	88.37	79.26	91.63
14 Wal-Mart Stores	US	No	86.55	69.81	71.89	88.95	75.46	94.06
15 Berkshire Hathaway	US	No	9.36	9.39	14.92	8.92	3.75	63.05
16 Gazprom	**RU**	**Yes**	**81.95**	**91.28**	**53.11**	**79.10**	**76.46**	**6.99**
17 China Construction Bank	**CN**	**Yes**	**53.33**	**34.44**	**87.36**	**35.94**	**81.45**	**28.92**
18 Petrobras	**BR**	**Yes**	**91.67**	**90.93**	**84.42**	**88.34**	**93.80**	**34.01**
19 Total	FR	No	89.70	77.73	87.75	83.24	83.63	65.24
20 Chevron	US	No	90.42	86.96	87.89	82.06	63.51	77.78
21 Barclays	GB	No	94.11	90.95	94.89	92.44	93.23	86.60
22 Bank of China	**CN**	**Yes**	**79.61**	**37.93**	**95.50**	**88.15**	**82.44**	**49.77**
23 Allianz	DE	No	93.50	93.66	88.13	93.40	93.40	78.88
24 GDF Suez	**FR**	**Yes**	**90.06**	**92.34**	**88.28**	**78.89**	**95.71**	**76.96**
25 E ON	DE	No	91.60	94.91	85.84	84.94	96.59	29.78
26 Goldman Sachs	US	No	92.12	78.15	87.37	93.51	53.77	74.37
27 EDF Group	**FR**	**Yes**	**92.86**	**84.90**	**97.53**	**88.77**	**96.13**	**33.16**
28 AXA Group	FR	No	93.39	85.18	95.44	93.31	94.37	82.90
29 Lloyds	**GB**	**Yes**	**90.01**	**92.48**	**69.86**	**92.90**	**93.20**	**73.90**
30 Proctor & Gamble	US	No	94.69	92.76	97.41	93.50	92.54	81.51
31 ENI	**IT**	**Yes**	**89.02**	**83.41**	**81.75**	**84.79**	**96.11**	**59.61**
Average		0.32	85.56	79.50	82.92	83.86	81.33	69.10

Table 2. Univariate Comparisons by Countries and Industries

In this table, we present the averages of state ownership dummy (*State_own*), environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*), social pillar score (*SOCSCORE*), and corporate governance pillar score (*CGVSCORE*).

Panel A: By country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Obs.	State_own	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*	*SOCSCORE*	*CGVSCORE*
Total	28,890	0.066	51.51	51.45	49.16	51.72	52.07	53.36
AT	167	0.224	56.65	54.98	55.25	53.66	56.08	33.32
AU	1,855	0.012	36.91	40.15	34.69	39.16	39.30	63.42
BE	237	0.072	56.50	56.53	50.74	56.67	52.96	50.56
BR	401	0.194	53.51	52.50	46.89	56.34	64.11	27.24
CA	1,635	0.018	39.01	42.09	36.23	40.45	39.72	73.74
CH	485	0.046	58.41	57.15	54.97	58.25	56.61	47.10
CL	115	0.211	40.19	39.43	39.81	43.05	44.91	9.26
CN	218	0.651	26.01	24.39	38.47	23.13	25.40	24.59
CO	26	0.600	48.77	54.64	38.17	50.86	71.34	28.21
CZ	22	0.364	51.00	46.32	51.33	51.43	70.32	18.27
DE	734	0.079	67.38	64.75	65.09	66.30	68.48	34.59
DK	227	0.000	57.10	54.92	54.79	58.09	54.07	38.02
EG	55	0.170	19.55	21.37	25.05	20.67	27.24	8.64
ES	420	0.024	71.90	71.62	60.63	72.95	78.12	50.24
FI	244	0.169	76.11	69.22	78.39	71.03	70.35	60.87
FR	901	0.116	76.93	74.56	70.22	76.66	78.17	55.07
GB	2,893	0.020	60.14	62.80	48.16	62.88	63.31	73.89
GR	192	0.287	50.25	53.39	37.45	55.32	50.69	17.72
HK	920	0.185	34.69	33.12	36.85	37.07	35.98	36.48
HU	22	0.227	75.69	76.63	70.86	71.43	78.51	41.16
ID	139	0.477	46.41	51.94	37.26	48.70	62.82	26.03
IE	117	0.103	44.03	45.64	41.01	45.12	36.74	64.48
IL	82	0.000	42.73	37.24	40.99	49.35	45.73	37.17
IN	362	0.218	54.98	54.42	48.83	59.16	58.84	29.11
IT	426	0.231	55.00	53.93	52.84	56.28	64.23	43.97
JP	3,939	0.016	62.23	61.94	63.09	57.26	47.32	11.96
KR	564	0.075	61.73	61.18	63.98	56.14	57.05	13.79
LU	18	0.000	60.19	52.85	57.76	60.94	50.93	58.92
MA	19	0.056	27.30	25.57	27.54	33.38	54.64	5.45
MX	115	0.000	43.00	45.33	34.56	47.50	45.06	13.16
MY	207	0.490	40.12	44.71	37.32	40.53	49.12	46.94
NL	286	0.017	69.67	67.06	63.14	70.53	77.46	64.51
NO	174	0.293	66.21	63.98	64.62	61.74	69.81	63.62
NZ	65	0.154	44.31	43.31	45.98	41.67	41.47	62.47
PE	7	0.000	27.40	41.28	18.82	33.43	31.99	51.66
PH	63	0.164	44.86	42.42	43.30	48.75	45.31	28.78
PL	128	0.457	35.39	38.78	34.78	34.85	42.30	23.24
PT	103	0.140	67.44	69.26	56.18	67.15	76.88	56.78
RU	187	0.384	46.48	49.90	34.90	52.53	54.68	28.74
SE	454	0.047	67.71	64.58	66.35	64.50	64.94	54.29
SG	414	0.380	36.98	37.82	35.14	40.67	40.79	43.78
TH	136	0.415	49.30	48.04	47.37	50.58	59.71	45.53
TR	135	0.250	51.04	51.49	51.33	49.65	55.79	22.47
US	8,536	0.003	44.23	42.95	45.00	44.82	47.61	74.15
ZA	445	0.058	53.33	55.27	40.54	60.46	71.34	60.76

Table 2. (continued)

Panel B: By major industry

Industry	Obs.	*State_own*	*ENVSCORE*			p-value	*SOCSCORE*			p-value	*CGVSCORE*			p-value
			All	*State own*=1	*State own*=0	(1 - 0)	All	*State own*=1	*State own*=0	(1 - 0)	All	*State own*=1	*State own*=0	(1 - 0)
Basic Materials	3,015	0.056	55.58	59.84	55.40	0.07	53.39	63.75	52.79	0.00	54.89	53.80	55.03	0.62
Consumer Goods	3,370	0.019	61.55	47.15	61.90	0.00	57.76	44.97	58.06	0.00	46.95	38.20	47.21	0.02
Consumer Services	3,992	0.023	41.05	52.56	40.79	0.00	46.35	54.08	46.17	0.01	53.55	43.93	53.82	0.00
Financials	5,059	0.069	43.23	46.36	43.04	0.06	46.02	54.30	45.49	0.00	49.99	37.60	50.98	0.00
Health Care	1,633	0.010	43.79	20.76	44.06	0.00	50.63	26.25	50.91	0.00	55.82	29.47	56.15	0.00
Industrials	5,610	0.053	59.08	53.83	59.38	0.00	55.40	55.26	55.41	0.93	52.47	41.08	53.13	0.00
Oil & Gas	2,061	0.126	45.48	64.61	42.69	0.00	48.52	67.23	45.80	0.00	63.62	41.12	66.86	0.00
Technology	1,960	0.021	51.69	63.00	51.46	0.03	51.53	60.40	51.32	0.06	58.82	48.78	59.13	0.03
Telecommunications	771	0.317	55.43	63.37	51.95	0.00	62.53	69.97	59.15	0.00	52.13	48.34	54.09	0.01
Utilities	1405	0.256	63.53	64.80	63.32	0.36	62.40	71.35	59.56	0.00	55.66	36.14	62.43	0.00
Total	28,876	0.066	51.52	57.40	51.14	0.00	52.08	61.88	51.42	0.00	53.36	41.67	54.24	0.00

Table 3. Summary Statistics

Panel A presents the summary statistics of variables in the sample period 2004-2014. The main variables of interest include state ownership dummy (State_own), environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*) social pillar score (*SOCSCORE*) and corporate governance pillar score (*CGVSCORE*). The definitions of variables and data sources are provided in the Appendix. All control variables are winsorized at the 5th and 95th percentiles. Summary statistics in Panel A include mean, standard deviation (S.D.), minimum (Min), first quartile (0.25), median (Mdn), third percentile (0.75), and maximum (Max). Panel B presents the Pearson correlation coefficients among all variables. The sample period is 2004-2014.

Panel A:

	Obs	Mean	S.D.	Min	0.25	Mdn	0.75	Max
State_own	28,890	0.06	0.25	0.00	0.00	0.00	0.00	1.00
ENVSCORE	28,890	51.51	31.96	8.48	18.00	51.19	85.17	97.50
ENER	28,890	51.45	32.00	7.29	18.46	50.34	85.45	98.04
ENPI	28,890	49.16	31.21	8.35	19.30	35.78	82.49	99.68
ENRR	28,890	51.72	31.99	6.31	18.20	54.58	84.48	97.69
SOCSCORE	28,890	52.07	30.59	3.43	22.43	52.81	82.37	98.88
CGVSCORE	28,881	53.36	30.06	1.09	24.21	61.29	79.71	97.55
Inst_own	28,890	0.39	0.31	0.02	0.14	0.28	0.68	0.96
Ln(Assets)	28,890	15.57	1.53	11.81	14.54	15.49	16.63	18.31
Leverage	28,890	23.46	16.83	0.00	9.34	22.21	34.88	59.54
MTB	28,890	2.48	1.83	0.54	1.19	1.89	3.11	7.60
ROA	28,890	6.13	6.27	-7.55	2.05	5.39	9.55	20.39
Ln(GDP)	28,890	10.51	0.59	8.05	10.50	10.70	10.82	10.96

Panel B:

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	State_own	1												
(2)	ENVSCORE	0.049	1											
(3)	ENER	0.062	0.925	1										
(4)	ENPI	0.016	0.825	0.638	1									
(5)	ENRR	0.048	0.922	0.838	0.626	1								
(6)	SOCSCORE	0.085	0.781	0.756	0.568	0.772	1							
(7)	CGVSCORE	-0.103	0.170	0.177	0.068	0.204	0.295	1						
(8)	Inst_own	-0.198	-0.094	-0.116	-0.062	-0.077	-0.025	0.560	1					
(9)	Ln(Assets)	0.125	0.399	0.381	0.326	0.374	0.398	0.031	0.030	1				
(10)	Leverage	0.039	0.102	0.112	0.065	0.088	0.074	0.007	-0.030	0.190	1			
(11)	MTB	-0.054	-0.080	-0.090	-0.079	-0.046	0.002	0.136	0.177	-0.260	-0.047	1		
(12)	ROA	0.002	-0.030	-0.031	-0.051	-0.002	0.040	0.078	0.104	-0.225	-0.150	0.457	1	
(13)	Ln(GDP)	-0.277	0.013	0.004	0.042	-0.005	-0.051	0.331	0.353	-0.045	-0.026	-0.009	-0.091	1

Table 4. Baseline Regressions

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*) on state ownership dummy (*State_own*), other control variables, country fixed effects, and year fixed effects. Control variables include the ratio of institutional ownership (*Inst_own*), total assets in logarithm (*Ln(Assets)*), *Leverage*, market-to-book ratio (*MTB*), return on assets (*ROA*), and GDP per capita in logarithm (*Ln(GDP)*). All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables:	*ENVSCORE*	*ENVSCORE*	*ENER*	*ENER*	*ENPI*	*ENPI*	*ENRR*	*ENRR*
State_own	3.991***	2.507*	4.385***	2.857**	2.606	1.306	4.703***	2.702*
	(1.524)	(1.410)	(1.472)	(1.384)	(1.670)	(1.603)	(1.511)	(1.397)
Inst_own		3.323*		2.906		3.665*		3.808*
		(1.896)		(1.953)		(2.052)		(2.007)
Ln(Assets)		6.334***		6.608***		4.074***		6.916***
		(0.310)		(0.291)		(0.305)		(0.328)
Leverage		0.0230		0.0298*		-0.00714		0.0288
		(0.0175)		(0.0180)		(0.0186)		(0.0181)
MTB		0.248**		0.276**		0.127		0.342***
		(0.113)		(0.112)		(0.127)		(0.123)
ROA		0.0915***		0.0975***		0.0560*		0.139***
		(0.0268)		(0.0277)		(0.0307)		(0.0298)
Ln(GDP)		2.536		1.191		0.0704		4.322**
		(1.735)		(1.804)		(2.034)		(1.987)
Observations	28,890	28,890	28,890	28,890	28,890	28,890	28,890	28,890
Number of firm_id	4,009	4,009	4,009	4,009	4,009	4,009	4,009	4,009
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5. Effects by Industry

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*) on state ownership dummy (State_own). Control variables are defined in the Appendix. All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. We interact *State_own* with an indicator variable *Energy* that equals to one if the firm is the energy industries including Oil & Gas and Utilities and zero otherwise. Manufacturing industries include Oil & Gas, Utilities, Basic Materials, Consumer Goods, Industrials, and Technology. Non-manufacturing industries include Consumer Services, Financials, Health Care, and Telecommunications. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Conditional effect in energy industries

Dependent variables:	(1) *ENVSCORE*	(2) *ENER*	(3) *ENPI*	(4) *ENRR*
State_own * Energy	6.747**	5.659**	7.965***	6.027**
	(2.931)	(2.846)	(3.003)	(2.903)
State_own	0.659	0.574	-0.499	1.427
	(1.673)	(1.614)	(1.965)	(1.661)
Energy	0.738	7.377***	-3.018***	-3.021**
	(1.186)	(1.182)	(1.146)	(1.193)
Inst_own	3.417*	3.310*	3.596*	3.726*
	(1.900)	(1.955)	(2.056)	(2.010)
Ln(Assets)	6.336***	6.585***	4.098***	6.938***
	(0.310)	(0.290)	(0.305)	(0.328)
Leverage	0.0227	0.0264	-0.00550	0.0304*
	(0.0176)	(0.0180)	(0.0186)	(0.0181)
MTB	0.251**	0.296***	0.121	0.336***
	(0.113)	(0.112)	(0.127)	(0.123)
ROA	0.0913***	0.0959***	0.0566*	0.139***
	(0.0268)	(0.0277)	(0.0307)	(0.0298)
Ln(GDP)	2.528	1.200	0.0485	4.301**
	(1.735)	(1.803)	(2.034)	(1.988)
Observations	28,890	28,890	28,890	28,890
Number of firms	4,009	4,009	4,009	4,009
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 5. (Continued)

Panel B: Results by type of industry

	Manufacturing				Non-manufacturing			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables:	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*
State_own	2.998*	3.114*	0.0989	3.445*	-0.479	-0.723	1.378	-0.127
	(1.815)	(1.615)	(2.117)	(1.771)	(1.953)	(2.064)	(2.306)	(2.114)
Inst_own	0.0185	-0.693	0.163	1.851	8.028***	7.650**	8.672***	6.335*
	(2.348)	(2.440)	(2.621)	(2.501)	(3.028)	(3.040)	(3.065)	(3.242)
Ln(Assets)	8.284***	9.569***	4.288***	9.031***	6.341***	6.018***	5.363***	6.434***
	(0.392)	(0.398)	(0.455)	(0.400)	(0.443)	(0.376)	(0.372)	(0.501)
Leverage	-0.00450	-0.00410	-0.00591	-0.0167	0.0316	0.0324	-0.00809	0.0535*
	(0.0222)	(0.0233)	(0.0256)	(0.0228)	(0.0265)	(0.0266)	(0.0242)	(0.0281)
MTB	0.144	0.269*	-0.00797	0.216	0.551***	0.554***	0.319*	0.677***
	(0.149)	(0.152)	(0.169)	(0.160)	(0.172)	(0.167)	(0.182)	(0.196)
ROA	0.0518	0.0386	0.0605	0.0708**	0.130***	0.144***	0.0616	0.203***
	(0.0317)	(0.0332)	(0.0380)	(0.0340)	(0.0501)	(0.0497)	(0.0514)	(0.0584)
Ln(GDP)	-2.582	-1.870	-4.206	-1.965	7.821***	3.011	5.736*	11.06***
	(2.154)	(2.287)	(2.679)	(2.399)	(2.839)	(2.910)	(3.052)	(3.356)
Observations	17,421	17,421	17,421	17,421	11,469	11,469	11,469	11,469
Number of firms	2,419	2,419	2,419	2,419	1,590	1,590	1,590	1,590
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6. Regressions by Regions

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*) on state ownership dummy (*State_own*), other control variables, country fixed effects, and year fixed effects in each of the following five regions: Africa & Middle East, Asia Pacific, Europe, Latin America, and North America. Control variables are defined in the Appendix. All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)
Region	Africa & Middle East	Asia Pacific	Europe	Latin America	North America
Dependent variable:	*ENVSCORE*	*ENVSCORE*	*ENVSCORE*	*ENVSCORE*	*ENVSCORE*
State_own	-0.984	5.238**	0.283	6.851*	-3.900
	(5.236)	(2.383)	(2.152)	(3.805)	(3.719)
Inst_own	-8.729	10.48*	5.518	0.140	1.671
	(11.02)	(5.489)	(3.393)	(10.35)	(2.626)
Ln(Assets)	7.326***	6.576***	6.375***	6.203***	6.461***
	(1.009)	(0.527)	(0.619)	(1.716)	(0.510)
Leverage	0.0193	0.0198	-0.0223	0.0106	0.0437
	(0.0769)	(0.0290)	(0.0337)	(0.0690)	(0.0299)
MTB	1.703***	0.555**	0.106	-0.170	0.239
	(0.512)	(0.229)	(0.184)	(0.688)	(0.190)
ROA	0.229	0.0502	0.0302	0.0489	0.158***
	(0.141)	(0.0486)	(0.0462)	(0.143)	(0.0461)
Ln(GDP)	17.23	10.65***	4.670	-1.039	-13.40
	(11.77)	(2.733)	(4.212)	(11.41)	(8.646)
Observations	736	8,882	8,437	664	10,171
Number of firms	173	1,313	1,037	135	1,351
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Table 7. Alternative Measure of State Ownership

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*) on an alternative continuous measure of state ownership (*Government_held*) capturing the percentage of free-float shares held by the government if they are above 5% threshold, other control variables, country fixed effects, and year fixed effects. Control variables are defined in the Appendix. All control variables are winsorized at the 5th and 95th percentiles. *Government_held* and other control variables (except *Ln(GDP)*) are lagged by one year. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables:	*ENVSCORE*	*ENVSCORE*	*ENER*	*ENER*	*ENPI*	*ENPI*	*ENRR*	*ENRR*
Government_held	0.0455*	0.063**	0.059**	0.077***	0.029	0.035	0.053**	0.064**
	(0.0239)	(0.027)	(0.024)	(0.025)	(0.025)	(0.030)	(0.0257)	(0.027)
Inst_own		2.214		1.613		3.612*		2.605
		(1.816)		(1.869)		(2.007)		(1.915)
Ln(Assets)		6.245***		6.505***		4.078***		6.768***
		(0.304)		(0.284)		(0.299)		(0.320)
Leverage		0.023		0.032*		-0.011		0.031*
		(0.017)		(0.018)		(0.018)		(0.018)
MTB		0.286**		0.302***		0.153		0.378***
		(0.112)		(0.110)		(0.126)		(0.121)
ROA		0.088***		0.091***		0.0560*		0.134***
		(0.026)		(0.027)		(0.030)		(0.029)
Ln(GDP)		2.647		0.960		0.098		4.493**
		(1.710)		(1.777)		(2.013)		(1.955)
Observations	33,983	29,721	34,090	29,721	34,090	29,721	34,090	29,721
Number of firm_id	4,746	4,174	4,766	4,174	4,766	4,174	4,766	4,174
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8. Other Block-owners

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*) on the variables for other ownership types, other control variables, country fixed effects, and year fixed effects. Proxies for other ownership types include the ratios of floating shares owned by foreign investors (*Foreign holdings*), by other corporates (*Cross holdings*), by pension funds (*Pension fund held*), by investment companies (*Investment co held*), by employees (*Employee held*), by other investors (*Other holdings*), by strategic investors (*Strategic holdings*), and the ratios of shares owned by domestic institutional investors (*Domestic inst. held*) and by foreign institutional investors (*Foreign inst. held*). Control variables are included in the regressions but estimated coefficients are not shown. Control variables include the ratio of institutional ownership (*Inst_own*), total assets in logarithm (*Ln(Assets)*), *Leverage*, market-to-book ratio (*MTB*), return on assets (*ROA*), and GDP per capita in logarithm (*Ln(GDP)*). All control variables are winsorized at the 5th and 95th percentiles. The variables for other ownership types and control variables (except *Ln(GDP)*) are lagged by one year. When we use domestic and foreign institutional investors as explanatory variables, we do not include *Inst_own* as a control variable in regressions. We omit the coefficients of the control variables for brevity. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign holdings	0.0017								
	(1.488)								
Cross holdings		-0.007							
		(0.014)							
Pension fund held			-0.314***						
			(0.076)						
Investment co held				-0.038**					
				(0.016)					
Employee held					-0.097***				
					(0.018)				
Other holdings						0.002			
						(0.031)			
Strategic holdings							-0.0424***		
							(0.010)		
Domestic inst. held								-1.537	
								(2.310)	
Foreign inst. held									7.585***
									(2.419)
Observations	28,659	28,724	28,724	28,724	28,724	28,724	28,724	28,890	28,890
Number of firms	4,004	4,006	4,006	4,006	4,006	4,006	4,006	4,009	4,009
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 9. Tests Based on the 2009 Copenhagen Accord

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*, and sub-scores: emission reduction *ENER*, product innovation *ENPI* and resource reduction *ENRR*) in year t, interacted with an indicator variable Post 2009 that equals one if year t-1 is larger than or equal to 2010 and zero otherwise (to capture the event of Copenhagen Agreement signed in December, 2009), on state ownership dummy (*State_own*) in year t-1, control variables, country fixed effects, and year fixed effects. Control variables are included in the regressions but estimated coefficients are not shown. Control variables include the ratio of institutional ownership (*Inst_own*), total assets in logarithm (*Ln(Assets)*), *Leverage*, market-to-book ratio (*MTB*), return on assets (*ROA*), and GDP per capita in logarithm (*Ln(GDP)*). All control variables are winsorized at the 5th and 95th percentiles. All control variables are in year t-1 (except *Ln(GDP)* that is in year t). The sample period is 2008-2011 in Panel A (the pre-event period is 2008-2009 and the post-event period is 2010-2011) and 2007-2012 in Panel B (the pre-event period is 2007-2009 and the post-event period is 2010-2012). Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	Panel A: 2-year window (2008-2011)				Panel B: 3-year window (2007-2012)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variables:	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*
State_own × Post 2009	2.081**	1.917**	1.540	1.886**	2.136**	1.923*	1.416	1.942*
	(0.859)	(0.945)	(1.162)	(0.956)	(0.954)	(1.012)	(1.218)	(1.047)
State_own	2.073	3.016**	1.135	1.595	1.798	2.993**	1.106	1.387
	(1.375)	(1.502)	(1.470)	(1.400)	(1.309)	(1.488)	(1.548)	(1.335)
Inst_own	3.964*	4.469**	4.376**	7.435***	2.342	4.048**	3.358	2.592
	(2.076)	(2.254)	(2.190)	(2.177)	(1.815)	(1.891)	(2.078)	(1.999)
Ln(Assets)	7.332***	7.490***	5.239***	7.713***	6.468***	6.571***	4.645***	7.153***
	(0.282)	(0.287)	(0.293)	(0.289)	(0.289)	(0.291)	(0.291)	(0.295)
Leverage	-0.0163	-0.000490	-0.0269	-0.0106	-0.00263	0.00881	-0.0157	-0.00359
	(0.0182)	(0.0189)	(0.0196)	(0.0197)	(0.0164)	(0.0174)	(0.0174)	(0.0181)
MTB	0.267**	0.375***	0.0547	0.413***	0.166	0.163	-0.00932	0.366***
	(0.135)	(0.136)	(0.157)	(0.145)	(0.120)	(0.120)	(0.137)	(0.131)
ROA	0.0398	0.0444	0.0301	0.0834**	0.0242	0.0424*	0.00610	0.0545**
	(0.0279)	(0.0302)	(0.0319)	(0.0324)	(0.0235)	(0.0252)	(0.0273)	(0.0273)
Ln(GDP)	2.946	4.722*	-1.137	4.266	3.231*	2.515	0.480	5.015**
	(2.457)	(2.656)	(3.132)	(2.815)	(1.678)	(1.852)	(2.156)	(2.010)
Observations	12,612	12,612	12,612	12,612	18,480	18,480	18,480	18,480
Number of firms	3,648	3,648	3,648	3,648	3,833	3,833	3,833	3,833
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 10. Channel Specifications

This table reports the regression results from regressing environmental pillar score (*ENVSCORE*) on lagged state ownership dummy (*State_own*), condition variables, interaction term of *State_own* and conditional variables, other control variables, country fixed effects, and year fixed effects. Conditional variables include *Energy dependence* as the international energy security risk index from the U.S. Chamber of Commerce, *Neighboring countries conflict* is the variable nb_is in Global Conflict Risk Index (GCRI), and political orientation as the variable EXECRLC in the Database of Political Institutions. Political orientation takes a value of 1, 2, and 3 if the government is right, central, and left. Control variables are included in the regressions but estimated coefficients are not shown. All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. We omit the coefficients of the control variables for brevity. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)
State_own	1.438	3.524**	3.175**
	(1.828)	(1.681)	(1.544)
Energy dependence	-0.0149***		
	(0.00382)		
State_own × Energy dependence	0.0118***		
	(0.00422)		
Neighboring countries conflict		-8.042***	
		(2.400)	
State_own × Neighboring countries conflict		13.72***	
		(3.580)	
Political orientation			1.236***
			(0.239)
State_own × Political orientation			-0.0111
			(0.0126)
Observations	24,819	21,493	27,970
Number of firms	3,826	3,688	3,867
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 11. Shareholder Value

This table reports the regression results from regressing current Tobin's Q (or Market-to-Book ratio of assets, *MTB*) (Panel A) or future five-year average ROA (Panel B), winsorized at the 5th and 95th percentiles, on state ownership dummy (*State_own*), environmental pillar score (*ENVSCORE*), the interaction effect, other control variables, country fixed effects, and year fixed effects. Control variables are defined in the Appendix. All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. The sample period is 2004-2014. Robust standard errors are clustered at the firm-level and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A. Dependent variable is Tobin's Q (Market-to-Book Ratio of Assets)				
	(1)	(2)	(3)	(4)
State_own	0.041	0.049	0.042	-0.009
	(0.092)	(0.087)	(0.092)	(0.091)
ENVSCORE	0.003***			
	(0.0006)			
State_own × ENVSCORE	-0.002			
	(0.0013)			
ENER		0.0025***		
		(0.0006)		
State_own × ENER		-0.002		
		(0.0013)		
ENPI			0.0027***	
			(0.000524)	
State_own × ENPI			-0.002	
			(0.0013)	
ENRR				0.002***
				(0.0005)
State_own × ENRR				-0.0007
				(0.0014)
Inst_own	0.484***	0.487***	0.489***	0.488***
	(0.144)	(0.144)	(0.144)	(0.144)
Ln(Assets)	-0.341***	-0.337***	-0.329***	-0.331***
	(0.0246)	(0.0244)	(0.0237)	(0.0244)
Leverage	0.00411***	0.00410***	0.00417***	0.00408***
	(0.00150)	(0.00150)	(0.00150)	(0.00150)
ROA	0.0474***	0.0474***	0.0476***	0.0475***
	(0.00283)	(0.00283)	(0.00283)	(0.00283)
Ln(GDP)	0.00361	0.00689	0.00416	-0.00237
	(0.122)	(0.122)	(0.122)	(0.123)
Observations	26,826	26,826	26,826	26,826
Number of firm_id	4,014	4,014	4,014	4,014
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 11 (Continued). Shareholder Value

Panel B. Dependent Variable is 5-Year Average Return on Assets (ROA)				
	(1)	(2)	(3)	(4)
State_own	0.310	0.244	0.371	0.385
	(0.499)	(0.464)	(0.408)	(0.503)
ENVSCORE	0.00458***			
	(0.00157)			
State_own × ENVSCORE	-0.00432			
	(0.00533)			
ENER		0.00256		
		(0.00157)		
State_own × ENER		-0.00313		
		(0.00455)		
ENPI			0.00227*	
			(0.00126)	
State_own × ENPI			-0.00619	
			(0.00479)	
ENRR				0.00504***
				(0.00131)
State_own × ENRR				-0.00560
				(0.00552)
Inst_own	-0.0293	-0.0228	-0.0232	-0.0272
	(0.431)	(0.432)	(0.432)	(0.431)
Ln(Assets)	-1.029***	-1.013***	-1.002***	-1.032***
	(0.0781)	(0.0778)	(0.0775)	(0.0780)
Leverage	0.0161***	0.0161***	0.0161***	0.0160***
	(0.00423)	(0.00423)	(0.00422)	(0.00423)
ROA	0.0414***	0.0413***	0.0417***	0.0413***
	(0.00780)	(0.00781)	(0.00780)	(0.00781)
Ln(GDP)	-1.370***	-1.387***	-1.398***	-1.360***
	(0.408)	(0.408)	(0.407)	(0.408)
Observations	11,969	11,969	11,969	11,969
Number of firm_id	2,696	2,696	2,696	2,696
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 12. Social and Corporate Governance Performance

This table reports the regression results from regressing social pillar score (*SOCSCORE*) and corporate governance pillar score (*CGVSCORE*) on state ownership dummy (*State_own*), other control variables, country fixed effects, and year fixed effects. Control variables include total assets in logarithm (*Ln(Assets)*), *Leverage*, market-to-book ratio (*MTB*), return on assets (*ROA*), and GDP per capita in logarithm (*Ln(GDP)*). All control variables are winsorized at the 5th and 95th percentiles. *State_own* and other control variables (except *Ln(GDP)*) are lagged by one year. The sample period is 2004-2014.

	(1)	(2)
Dependent variables:	*SOCSCORE*	*CGVSCORE*
State_own	2.233*	0.917
	(1.284)	(1.099)
Inst_own	4.856***	11.59***
	(1.753)	(1.434)
Ln(assets)	6.690***	3.330***
	(0.303)	(0.191)
Leverage	-0.0176	0.0116
	(0.0164)	(0.0120)
MTB	0.364***	0.108
	(0.103)	(0.0872)
ROA	0.117***	0.0129
	(0.0252)	(0.0213)
Ln(GDP)	5.139***	5.827***
	(1.691)	(1.440)
Observations	28,890	28,881
Number of firms	4,009	4,009
Country FE	Yes	Yes
Year FE	Yes	Yes

Internet Appendix for

Leviathan Inc. and Corporate Environmental Engagement

Po-Hsuan Hsu, University of Hong Kong

Hao Liang, Singapore Management University

Pedro Matos, University of Virginia – Darden School of Business

Table IA.1. Data Distribution Across Years

This table presents the number of firm-year observations with available data on state ownership dummy (*State_own*), environmental pillar score (*ENVSCORE* and sub-scores: emission reduction *ENER*, product innovation *ENPI*, resource reduction *ENRR*) across the sample years (2002-2014).

Year	State_own	*ENVSCORE*	*ENER*	*ENPI*	*ENRR*
2002	4,589	955	961	961	961
2003	4,590	966	972	972	972
2004	4,592	1,819	1,827	1,827	1,827
2005	4,592	2,235	2,244	2,244	2,244
2006	4,567	2,248	2,257	2,257	2,257
2007	4,557	2,425	2,436	2,436	2,436
2008	4,546	2,918	2,929	2,929	2,929
2009	4,536	3,347	3,360	3,360	3,360
2010	4,523	3,958	3,978	3,978	3,978
2011	4,496	4,048	4,070	4,070	4,070
2012	4,472	4,128	4,150	4,150	4,150
2013	4,410	4,225	4,246	4,246	4,246
2014	4,278	4,130	4,131	4,131	4,131
Total	58,748	37,402	37,561	37,561	37,561

Table IA.2. Comparisons by Countries

In this table, we present the averages of state ownership dummy (*State_own*), environmental pillar score (*ENVSCORE* and sub-scores: emission reduction *ENER*, product innovation *ENPI*, resource reduction *ENRR*), social pillar score (*SOCSCORE*), and corporate governance pillar score (*CGVSCORE*). We also conduct t-tests for the difference in averages across state-owned and non-state-owned firms and report the p-value based on unequal variance. In Morocco (MA), we only have one observation in State_won =1 and the p-value cannot be calculated.

Country	Obs	*State_own*	*ENVSCORE* All	*ENVSCORE* *State_own*=1	*ENVSCORE* *State_own*=0	p-value (1 - 0)	*ENER* All	*ENER* *State_own*=1	*ENER* *State_own*=0	p-value (1 - 0)
Total	28,890	0.066	51.51	57.40	51.13	0.00	51.45	58.81	50.96	0.00
AT	167	0.224	56.65	78.42	49.88	0.00	54.98	80.90	47.12	0.00
AU	1,855	0.012	36.91	47.95	36.80	0.07	40.15	51.70	40.01	0.04
BE	237	0.072	56.50	64.10	56.13	0.34	56.53	61.02	56.39	0.61
BR	401	0.194	53.51	68.79	49.78	0.00	52.50	65.42	49.26	0.00
CA	1,635	0.018	39.01	33.81	38.98	0.27	42.09	44.06	41.93	0.68
CH	485	0.046	58.41	67.57	57.95	0.15	57.15	69.85	56.54	0.02
CL	115	0.211	40.19	39.81	40.54	0.91	39.43	42.18	38.93	0.61
CN	218	0.651	26.01	28.92	20.58	0.00	24.39	28.61	16.49	0.00
CO	26	0.600	48.77	59.70	33.50	0.02	54.64	64.40	43.08	0.08
CZ	22	0.364	51.00	61.92	44.76	0.00	46.32	86.10	23.59	0.00
DE	734	0.079	67.38	69.65	67.11	0.45	64.75	68.73	64.40	0.25
DK	227	0.000	57.10		56.94		54.92		54.76	
EG	55	0.170	19.55	10.55	21.15	0.00	21.37	11.33	23.11	0.00
ES	420	0.024	71.90	87.47	71.75	0.00	71.62	86.56	71.44	0.01
FI	244	0.169	76.11	88.02	73.94	0.00	69.22	88.12	65.66	0.00
FR	901	0.116	76.93	79.53	76.67	0.24	74.56	79.25	73.99	0.03
GB	2,893	0.020	60.14	63.34	60.10	0.39	62.80	69.50	62.67	0.08
GR	192	0.287	50.25	69.69	42.92	0.00	53.39	74.83	45.21	0.00
HK	920	0.185	34.69	40.49	33.78	0.00	33.12	37.89	32.49	0.02
HU	22	0.227	75.69	35.23	87.58	0.00	76.63	51.58	84.00	0.00
ID	139	0.477	46.41	46.58	46.82	0.96	51.94	53.08	51.80	0.79
IE	117	0.103	44.03	72.69	40.76	0.00	45.64	71.13	42.73	0.00
IL	82	0.000	42.73		42.34		37.24		36.66	
IN	362	0.218	54.98	52.61	55.62	0.44	54.42	55.70	54.15	0.71
IT	426	0.231	55.00	81.41	46.84	0.00	53.93	81.50	45.42	0.00
JP	3,939	0.016	62.23	70.17	62.12	0.03	61.94	72.24	61.80	0.00
KR	564	0.075	61.73	65.77	61.34	0.31	61.18	69.18	60.43	0.06
LU	18	0.000	60.19		60.19		52.85		52.85	
MA	19	0.056	27.30	54.56	23.33	-	25.57	61.80	23.06	-
MX	115	0.000	43.00		42.73		45.33		44.92	
MY	207	0.490	40.12	51.97	29.13	0.00	44.71	54.10	35.94	0.00
NL	286	0.017	69.67	85.72	69.38	0.00	67.06	68.86	67.02	0.86
NO	174	0.293	66.21	85.57	58.19	0.00	63.98	82.11	56.47	0.00
NZ	65	0.154	44.31	76.07	38.54	0.00	43.31	71.02	38.27	0.00
PE	7	0.000	27.40		27.40		41.28		41.28	
PH	63	0.164	44.86	42.04	46.01	0.68	42.42	48.10	41.42	0.57
PL	128	0.457	35.39	44.60	27.94	0.00	38.78	50.98	28.92	0.00
PT	103	0.140	67.44	78.67	65.14	0.04	69.26	84.03	66.12	0.02
RU	187	0.384	46.48	56.83	40.14	0.00	49.90	57.82	45.11	0.00
SE	454	0.047	67.71	82.53	66.92	0.00	64.58	83.88	63.57	0.00
SG	414	0.380	36.98	45.66	32.19	0.00	37.82	46.77	32.87	0.00
TH	136	0.415	49.30	68.88	35.19	0.00	48.04	73.11	30.53	0.00
TR	135	0.250	51.04	34.88	55.89	0.00	51.49	37.08	55.55	0.00
US	8,536	0.003	44.23	19.42	44.31	0.00	42.95	24.79	43.00	0.00
ZA	445	0.058	53.33	59.25	52.54	0.14	55.27	56.69	54.86	0.74

Table IA.2. (continued)

Country	*ENPI* All	*ENPI* *State_own*=1	*ENPI* *State_own*=0	p-value (1 - 0)	*ENRR* All	*ENRR* *State_own*=1	*ENRR* *State_own*=0	p-value (1 - 0)
Total	49.16	51.16	49.07	0.00	51.72	57.41	51.34	0.00
AT	55.25	67.03	51.33	0.00	53.66	74.65	47.16	0.00
AU	34.69	33.59	34.74	0.85	39.16	60.32	38.92	0.00
BE	50.74	61.85	50.04	0.09	56.67	64.84	56.25	0.32
BR	46.89	56.61	44.57	0.00	56.34	71.56	52.67	0.00
CA	36.23	27.63	36.35	0.02	40.45	34.56	40.39	0.24
CH	54.97	65.89	54.39	0.08	58.25	62.62	58.05	0.54
CL	39.81	42.56	39.30	0.61	43.05	37.62	44.63	0.27
CN	38.47	37.28	40.69	0.37	23.13	27.40	15.14	0.00
CO	38.17	46.24	28.07	0.05	50.86	60.28	34.02	0.02
CZ	51.33	33.56	61.49	0.00	51.43	53.90	50.02	0.54
DE	65.09	57.89	65.69	0.04	66.30	71.60	65.71	0.10
DK	54.79		54.62		58.09		57.94	
EG	25.05	18.63	26.66	0.00	20.67	10.07	22.22	0.00
ES	60.63	85.49	60.20	0.00	72.95	78.94	73.07	0.09
FI	78.39	84.05	77.30	0.05	71.03	77.77	69.92	0.02
FR	70.22	71.47	70.19	0.68	76.66	77.95	76.52	0.55
GB	48.16	45.96	48.26	0.57	62.88	67.62	62.78	0.20
GR	37.45	45.89	34.21	0.01	55.32	76.57	47.39	0.00
HK	36.85	42.61	35.57	0.00	37.07	42.58	36.35	0.01
HU	70.86	28.00	83.46	0.00	71.43	34.58	82.27	0.00
ID	37.26	37.58	36.66	0.84	48.70	46.25	51.62	0.26
IE	41.01	70.06	37.69	0.00	45.12	63.80	42.99	0.00
IL	40.99		40.92		49.35		48.95	
IN	48.83	42.24	50.62	0.02	59.16	55.29	60.21	0.20
IT	52.84	73.52	46.38	0.00	56.28	77.78	49.66	0.00
JP	63.09	66.64	63.04	0.32	57.26	65.52	57.14	0.05
KR	63.98	61.64	64.20	0.56	56.14	58.05	55.90	0.62
LU	57.76		57.76		60.94		60.94	
MA	27.54	19.15	24.40	-	33.38	75.92	29.03	-
MX	34.56		34.69		47.50		47.13	
MY	37.32	48.88	26.60	0.00	40.53	50.09	31.63	0.00
NL	63.14	85.12	62.75	0.00	70.53	85.43	70.27	0.01
NO	64.62	82.94	57.03	0.00	61.74	78.55	54.78	0.00
NZ	45.98	84.61	38.96	0.00	41.67	60.42	38.26	0.00
PE	18.82		18.82		33.43		33.43	
PH	43.30	30.37	46.54	0.03	48.75	46.97	49.78	0.68
PL	34.78	34.52	34.90	0.91	34.85	46.91	25.09	0.00
PT	56.18	59.68	56.06	0.57	67.15	79.06	64.54	0.02
RU	34.90	42.22	30.37	0.00	52.53	63.43	45.83	0.00
SE	66.35	68.01	66.15	0.74	64.50	79.00	63.73	0.00
SG	35.14	37.99	33.60	0.11	40.67	51.22	34.88	0.00
TH	47.37	61.70	36.62	0.00	50.58	61.63	42.60	0.00
TR	51.33	41.18	54.22	0.03	49.65	29.56	56.31	0.00
US	45.00	21.92	45.09	0.00	44.82	21.37	44.88	0.00
ZA	40.54	41.20	40.04	0.81	60.46	72.73	59.42	0.00

Table IA.2. (continued)

Country	*SOCSCORE* All	*SOCSCORE* *State_own*=1	SOCSCORE *State_own*=0	p-value (1 - 0)	*CGVSCORE* All	*CGVSCORE* *State_own*=1	*CGVSCORE* *State_own*=0	p-value (1 - 0)
Total	52.07	61.88	51.41	0.00	53.36	41.67	54.24	0.00
AT	56.08	87.38	46.75	0.00	33.32	48.26	28.71	0.00
AU	39.30	52.69	39.24	0.04	63.42	71.81	63.44	0.10
BE	52.96	67.52	52.04	0.09	50.56	52.84	50.49	0.59
BR	64.11	86.21	58.72	0.00	27.24	28.04	27.11	0.67
CA	39.72	26.66	39.90	0.00	73.74	73.80	73.75	0.99
CH	56.61	56.39	56.61	0.97	47.10	39.11	47.62	0.11
CL	44.91	44.76	45.29	0.95	9.26	9.33	9.31	0.99
CN	25.40	30.71	15.48	0.00	24.59	26.33	21.33	0.05
CO	71.34	77.48	62.04	0.24	28.21	32.82	22.20	0.23
CZ	70.32	75.72	67.23	0.02	18.27	24.79	14.55	0.00
DE	68.48	67.05	68.53	0.67	34.59	30.44	34.97	0.07
DK	54.07		53.88		38.02		37.85	
EG	27.24	12.45	29.99	0.00	8.64	2.30	9.77	0.00
ES	78.12	94.15	77.98	0.00	50.24	55.75	50.15	0.24
FI	70.35	85.47	67.44	0.00	60.87	63.32	60.51	0.32
FR	78.17	81.77	77.74	0.06	55.07	51.64	55.55	0.12
GB	63.31	67.70	63.25	0.22	73.89	65.51	74.08	0.00
GR	50.69	67.35	44.55	0.00	17.72	23.84	15.49	0.00
HK	35.98	38.76	35.82	0.23	36.48	41.96	35.11	0.00
HU	78.51	34.34	91.50	0.00	41.16	34.47	43.12	0.11
ID	62.82	71.48	56.43	0.00	26.03	35.39	18.78	0.00
IE	36.74	50.74	35.14	0.01	64.48	65.43	64.37	0.83
IL	45.73		45.08		37.17		36.88	
IN	58.84	61.23	58.25	0.38	29.11	14.91	32.89	0.00
IT	64.23	86.13	57.51	0.00	43.97	53.81	41.01	0.00
JP	47.32	57.70	47.16	0.02	11.96	13.77	11.94	0.30
KR	57.05	72.12	55.70	0.00	13.79	10.21	14.09	0.00
LU	50.93		50.93		58.92		58.92	
MA	54.64	87.75	50.62	-	5.45	14.80	4.82	-
MX	45.06		44.64		13.16		13.16	
MY	49.12	64.32	34.62	0.00	46.94	58.28	35.29	0.00
NL	77.46	90.48	77.23	0.00	64.51	74.15	64.34	0.00
NO	69.81	89.97	61.45	0.00	63.62	71.78	60.24	0.00
NZ	41.47	46.59	40.54	0.54	62.47	66.47	61.74	0.31
PE	31.99		31.99		51.66		51.66	
PH	45.31	57.02	43.73	0.15	28.78	27.42	29.15	0.76
PL	42.30	55.41	31.83	0.00	23.24	27.09	20.18	0.02
PT	76.88	88.50	74.62	0.00	56.78	46.00	58.71	0.13
RU	54.68	62.50	49.59	0.00	28.74	28.03	29.40	0.64
SE	64.94	85.60	63.74	0.00	54.29	64.16	53.80	0.01
SG	40.79	52.71	34.38	0.00	43.78	53.16	38.97	0.00
TH	59.71	73.89	49.45	0.00	45.53	48.97	42.73	0.11
TR	55.79	38.17	61.65	0.00	22.47	19.94	23.09	0.29
US	47.61	23.52	47.68	0.00	74.15	71.84	74.17	0.30
ZA	71.34	72.29	71.15	0.83	60.76	63.94	60.15	0.31

Table IA.3. Comparisons by Industries

This table presents the averages of state ownership dummy (State_own), environmental pillar score (*ENVSCORE* and sub-scores: emission reduction *ENER*, product innovation *ENPI*, resource reduction *ENRR*), social pillar score (*SOCSCORE*), and corporate governance pillar score (*CGVSCORE*) in ten different industries: Basic Materials, Consumer Goods, Consumer Services, Financials, Health Care, Industrials, Oil & Gas, Technology, Telecommunications, and Utilities. We also conduct t-tests for the difference in averages across state-owned and non-state-owned firms and report the p-value based on unequal variance.

Industry	Obs	*State_own*	*ENVSCORE*	*ENVSCORE* *State_own*	*ENVSCORE* *State_own*	p-value	*ENER*	*ENER* *State_own*	*ENER* *State_own*	p-value
			All	=1	=0	(1 - 0)	All	=1	=0	(1 - 0)
Basic Materials	3015	0.056	55.58	59.84	55.40	0.07	58.38	62.94	58.16	0.05
Consumer Goods	3,370	0.019	61.55	47.15	61.90	0.00	59.96	48.85	60.26	0.00
Consumer Services	3,992	0.023	41.05	52.56	40.79	0.00	41.00	58.37	40.59	0.00
Financials	5,059	0.069	43.23	46.36	43.04	0.06	41.47	40.42	41.60	0.50
Health Care	1,633	0.010	43.79	20.76	44.06	0.00	44.24	27.83	44.43	0.04
Industrials	5,610	0.053	59.08	53.83	59.38	0.00	57.31	56.64	57.35	0.70
Oil & Gas	2,061	0.126	45.48	64.61	42.69	0.00	51.42	68.79	48.86	0.00
Technology	1,960	0.021	51.69	63.00	51.46	0.03	48.05	61.04	47.79	0.01
Telecommunications	771	0.317	55.43	63.37	51.95	0.00	54.71	62.69	51.13	0.00
Utilities	1405	0.256	63.53	64.80	63.32	0.36	69.93	69.70	70.23	0.73
Total	28,876	0.066	51.52	57.40	51.14	0.00	51.46	58.81	50.97	0.00

Industry	*ENPI*	*ENPI* *State_own*	*ENPI* *State_own*	p-value	*ENRR*	*ENRR* *State_own*	*ENRR* *State_own*	p-value
	All	=1	=0	(1 - 0)	All	=1	=0	(1 - 0)
Basic Materials	49.57	51.01	49.59	0.58	55.14	59.51	54.92	0.06
Consumer Goods	59.38	41.96	59.78	0.00	60.85	48.94	61.14	0.00
Consumer Services	36.90	36.17	36.96	0.77	46.01	57.66	45.74	0.00
Financials	42.89	50.33	42.37	0.00	45.26	47.01	45.16	0.32
Health Care	39.91	23.61	40.13	0.02	47.33	21.12	47.59	0.00
Industrials	59.43	47.52	60.11	0.00	56.19	54.50	56.29	0.33
Oil & Gas	40.69	53.47	38.81	0.00	44.08	63.28	41.27	0.00
Technology	55.58	63.88	55.42	0.10	50.57	64.41	50.28	0.01
Telecommunications	51.54	56.74	49.26	0.00	56.74	64.96	53.09	0.00
Utilities	53.16	54.94	52.68	0.19	59.50	61.85	58.91	0.07
Total	49.16	51.16	49.07	0.01	51.73	57.41	51.36	0.00

Industry	*SOCSCORE*	*SOCSCORE* *State_own*	*SOCSCORE* *State_own*	p-value	*CGVSCORE*	*CGVSCORE* *State_own*	*CGVSCORE* *State_own*	p-value
	All	=1	=0	(1 - 0)	All	=1	=0	(1 - 0)
Basic Materials	53.39	63.75	52.79	0.00	54.89	53.80	55.03	0.62
Consumer Goods	57.76	44.97	58.06	0.00	46.95	38.20	47.21	0.02
Consumer Services	46.35	54.08	46.17	0.01	53.55	43.93	53.82	0.00
Financials	46.02	54.30	45.49	0.00	49.99	37.60	50.98	0.00
Health Care	50.63	26.25	50.91	0.00	55.82	29.47	56.15	0.00
Industrials	55.40	55.26	55.41	0.93	52.47	41.08	53.13	0.00
Oil & Gas	48.52	67.23	45.80	0.00	63.62	41.12	66.86	0.00
Technology	51.53	60.40	51.32	0.06	58.82	48.78	59.13	0.03
Telecommunications	62.53	69.97	59.15	0.00	52.13	48.34	54.09	0.01
Utilities	62.40	71.35	59.56	0.00	55.66	36.14	62.43	0.00
Total	52.08	61.88	51.42	0.00	53.36	41.67	54.24	0.00

Table IA.4. Comparisons by Sample Years

This table presents the averages of state ownership dummy (*State_own*), environmental pillar score (*ENVSCORE* and sub-scores: emission reduction *ENER*, product innovation *ENPI*, resource reduction *ENRR*), social pillar score (*SOCSCORE*), and corporate governance pillar score (*CGVSCORE*) in each year from 2004 to 2014. We also conduct t-tests for the difference in averages across state-owned and non-state-owned firms and report the p-value based on unequal variance.

Year	Obs	*State_own*	*ENVSCORE* All	*ENVSCORE* *State_own*=1	*ENVSCORE* *State_own*=0	p-value (1 - 0)	*ENER* All	*ENER* *State_own*=1	*ENER* *State_own*=0	p-value (1 - 0)
2004	1,463	0.037	49.26	59.41	48.87	0.02	48.87	58.13	48.52	0.03
2005	1,829	0.042	49.38	59.31	48.95	0.00	49.10	59.43	48.65	0.00
2006	1,858	0.043	49.71	56.96	49.43	0.04	49.43	56.24	49.19	0.05
2007	2,005	0.048	51.46	59.37	51.06	0.01	51.25	60.31	50.77	0.00
2008	2,395	0.060	52.05	58.77	51.64	0.01	51.75	60.93	51.18	0.00
2009	2,764	0.063	51.77	55.25	51.54	0.14	51.68	57.92	51.28	0.01
2010	3,174	0.075	51.96	55.91	51.59	0.05	51.88	57.45	51.39	0.01
2011	3,270	0.075	51.99	56.54	51.65	0.02	52.00	58.32	51.52	0.00
2012	3,404	0.078	51.60	56.69	51.12	0.01	51.70	58.43	51.08	0.00
2013	3,473	0.077	51.54	58.34	51.14	0.00	51.76	59.60	51.25	0.00
2014	3,255	0.079	53.10	58.51	52.85	0.01	53.19	59.76	52.81	0.00
Total	28,890	0.066	51.51	57.40	51.13	0.00	51.45	58.81	50.96	0.00
Year			*ENPI* All	*ENPI* *State_own*=1	*ENPI* *State_own*=0	p-value (1 - 0)	*ENRR* All	*ENRR* *State_own*=1	*ENRR* *State_own*=0	p-value (1 - 0)
2004			46.66	53.60	46.39	0.06	48.72	59.32	48.31	0.01
2005			46.73	45.97	46.77	0.81	48.93	63.15	48.31	0.00
2006			47.22	45.61	47.36	0.60	49.57	60.40	49.07	0.00
2007			49.35	53.46	49.15	0.19	51.50	58.81	51.13	0.02
2008			50.23	54.04	50.02	0.15	52.24	57.03	51.94	0.07
2009			49.84	49.66	49.85	0.94	51.81	55.12	51.60	0.16
2010			49.56	50.92	49.41	0.47	52.22	54.86	51.96	0.18
2011			49.55	50.71	49.47	0.56	52.41	56.62	52.09	0.03
2012			49.26	50.55	49.14	0.49	52.26	57.08	51.80	0.01
2013			49.17	52.63	49.05	0.08	52.04	58.16	51.67	0.00
2014			50.40	52.18	50.46	0.41	53.48	58.31	53.22	0.01
Total			49.16	51.16	49.07	0.01	51.72	57.41	51.34	0.00
Year			*SOCSCORE* All	*SOCSCORE* *State_own*=1	*SOCSCORE* *State_own*=0	p-value (1 - 0)	*CGVSCORE* All	*CGVSCORE* *State_own*=1	*CGVSCORE* *State_own*=0	p-value (1 - 0)
2004			50.50	60.96	50.10	0.01	52.64	41.29	53.08	0.01
2005			50.32	62.22	49.80	0.00	51.86	44.41	52.19	0.03
2006			50.67	62.17	50.13	0.00	51.95	42.40	52.43	0.00
2007			51.74	60.83	51.26	0.00	52.21	44.70	52.60	0.01
2008			52.36	61.31	51.79	0.00	52.78	38.62	53.70	0.00
2009			51.83	60.41	51.27	0.00	52.88	36.72	54.01	0.00
2010			52.25	60.69	51.54	0.00	53.93	38.51	55.13	0.00
2011			52.45	62.17	51.70	0.00	53.80	40.37	54.95	0.00
2012			51.95	61.55	51.10	0.00	53.78	44.93	54.61	0.00
2013			52.12	62.88	51.37	0.00	53.86	42.35	55.04	0.00
2014			54.27	63.75	53.66	0.00	54.91	44.85	55.94	0.00
Total			52.07	61.88	51.41	0.00	53.36	41.67	54.24	0.00