

Consequences of Data Errors for the Validity of the E-index as a Proxy for Corporate Governance*

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Abstract

The E-index is one of the most widely used proxy variables for corporate governance in empirical research. We show that ISS data contain a significant number of measurement errors and misreported values. We use alternative databases to manually check deviations across databases and to construct a corrected E-index. We then revisit analyses conducted in three well-known and widely-cited studies using the E-index and compare results from using either ISS or corrected data to construct the E-Index. The results show that data errors in ISS result in a substantially overestimated negative association between the E-index and firm value. Moreover, data errors in ISS lead to incorrect conclusions regarding the relationship between the E-index and different measures of operating performance and analysts' earnings forecasts. In summary, our results show that data quality is an important issue when measuring corporate governance.

JEL Classification: G32, G34, J33, M14

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1. Introduction

The “Entrenchment Index” (or E-index) introduced by Bebchuk, Cohen, and Ferrell (2009, BCF) is one of the most widely used proxy variables for corporate governance in empirical (corporate) finance research.¹ The E-index includes six individual governance provisions, generally related to companies’ anti-takeover protection, and assigns a score from zero to six based on the number of individual provisions a firm has in place. The provisions include staggered boards, limits to bylaw and charter amendments, supermajority requirements for mergers, golden parachutes, and poison pills. The E-index has established itself as a standard proxy for corporate governance and is used in many influential studies to analyze the effect of corporate governance on shareholder wealth, firm performance, and managerial actions, among other things. A total of 1,002 studies use the E-index², of which 60 articles are published in the top three finance journals (16 JF, 28 JFE, 16 RFS).

Since 2007, data underlying the six provisions of the E-index are collected and commercially sold by Institutional Shareholder Services Inc. (ISS). The ISS Governance database provides coded summaries on S&P 1500 firms’ antitakeover provisions collected from firms’ SEC filings. In this paper, we cross-check and, in case of deviations, manually correct ISS data using four alternative databases to construct a corrected E-index.³

The first finding of our paper is that ISS Governance data contain significant measurement errors and a large number of misreported values. We identify several larger-scale

¹ The E-index is a subset of the “Governance Index” (or G-index) by Gompers, Ishii, and Metrick (2003, GIM). In a seminal paper, GIM (2003) establish a link between the G-index and equity prices. Specifically, they show that stocks of firms with strong shareholder rights earn significantly higher returns than stocks of firms with low shareholder rights. To measure shareholder rights, GIM (2003) construct an index of 24 shareholder provisions that shield managers from the shareholders and the market for corporate control. BCF (2009) show that out of the 24 shareholder provisions included in the G-Index, only six provisions are relevant for explaining differences in firm valuations and stock price returns.

² A full list of the 1,002 studies that use the E-index is available at: <http://www.law.harvard.edu/faculty/bebchuk/studies.shtml>.

³ We compare ISS data on limits to bylaw and charter amendments, supermajority requirements for mergers, and poison pills to data from SharkRepellent. We compare data on staggered boards to data from the ISS Directors database, and data on golden parachutes to Compustat ExecuComp and the Refinitiv ESG database.

errors and inconsistencies in ISS that affect a large number of observations on a specific E-index attribute. For instance, ISS systematically misclassifies a 51% simple majority requirement for bylaw and charter amendments as a supermajority voting requirement. Similarly, ISS uses a different definition of golden parachutes for the years 2007 and 2008 than for 2009 onwards. In addition, ISS codes its staggered boards variable based on the date/year in which the board is fully (de-)staggered, instead of the year, in which the decision to (de-)stagger is approved by shareholders. Finally, for reasons unobservable to us, in 2007 and 2008, ISS overreports the existence of supermajority requirements for mergers by roughly 46%. Overall, we find that ISS data overestimate the existence of anti-takeover provisions. The average E-index of all S&P 1500 firms between 2007 and 2016 is 3.49 according to ISS. In our manually corrected data, we document an average E-index of 2.72 for the same sample, a reduction of about 22% versus the ISS sample mean, which account for about 72% of the standard deviation of the E-index constructed using ISS data. Moreover, we find that in 9,912 of 14,843 firm-year observations, or 67% of our sample, the corrected E-index deviates from ISS' E-index.

To study the consequences of data errors in ISS Governance data, we revisit key analyses of three well-known and widely-cited empirical studies using the E-index as a proxy for corporate governance: BCF (2009), Bebchuk, Cohen, and Wang (2013, BCW), and Giroud and Müller (2011, GM). The outcome variables analyzed in these studies include firm value as measured by Tobin's Q, abnormal stock returns, product market competition, analysts' earnings forecasts, operating performance, capital expenditures, labor productivity, and cost efficiency. We re-estimate each original regression set-up twice, once using the original E-index based on ISS data and once using our corrected index based on our manually adjusted data for the 2007-2016 sample period. Our analyses cover both, the E-index as a categorical variable and a

dummy variable that distinguishes firms with weak shareholder rights protections (“dictatorship firms”) from firms with strong shareholder rights protections (“democracy firms”).⁴

Based on these analyses, the second finding of our paper is that data issues in ISS data potentially affect the conclusions drawn in empirical studies. In particular, we show that using our corrected data instead of the data provided by ISS leads to significantly different conclusions with respect to a number of key analyses conducted by BCF (2009), BCW (2013), and GM (2011). First, the magnitude of the negative association between the E-index and firm value, as analyzed by BCF (2009), declines by roughly 50% when using corrected data to construct the E-index versus using ISS data. When we re-estimate firm value regression specifications of BCW (2013) and GM (2011), we find that data corrections result in a similar decline in the magnitude of the governance-value relationship. Second, revisiting BCW’s (2013) empirical analyses of different operating performance measures, namely the return on assets (ROA), sales growth, and net profit margin (NPM), we find data errors in ISS data to be even more consequential: Some results are significant when using ISS data, but turn insignificant when using corrected data. Other results turn significant when replacing ISS data by corrected data. Third, we revisit GM (2011), who differentiate between different levels of product market competition and show that corporate governance, as measured by the G-index or E-index, has a stronger effect on outcome variables in non-competitive industries. We document significant consequences from using corrected data to re-estimate GM’s (2011) regression specifications on analysts’ earnings forecasts and operating performance measures for the 2007-2016 sample period. Using the E-index based on ISS data, we find no difference between dictatorship firms (E-index of four, five, or six) and democracy firms (E-index of zero) in analysts’ forecast errors. Classifying dictatorship and democracy firms based on corrected

⁴ Note that our analyses do not attempt to establish a causal link between corporate governance and the respective outcome variables as the goal of our analysis is exclusively to show potential data issues and that they matter to the conclusions drawn from these tests. For discussions of causality issues, we refer the reader to the respective original research paper referenced in each section.

data, we document statistically significant evidence that analysts underestimate the magnitude of higher earnings of dictatorship firms. Besides, we find large differences in statistical significance and even the direction of the relationship between actual and forecasted earnings per share and the associated forecast error across different levels of product market competition when classifying dictatorship firms either according to corrected data or ISS data. Moreover, using ISS data to construct the E-index confirms GM's (2011) finding that poorly governed firms are associated with significantly lower ROA, NPM, and ROE. This finding disappears when corrected data is used to construct the E-index.

In our tests, we also identify analyses for which results remain unaffected by data errors in ISS. For instance, when analyzing capital expenditures, labor productivity, input costs, real wages, SG&A expenses, or R&D costs, as in GM (2011), we find qualitatively similar results when using ISS or corrected data. Similarly, when analyzing portfolio returns, we find the difference portfolio between democracy and dictatorship firms to show no significant abnormal returns in the 2007-2016 period, irrespective of whether we use BCF's (2009), BCW's (2013), or GM's (2011) regression specification. This finding is consistent with BCW (2013), who show that the negative relationship between the E-index and stock returns documented for the 1990s disappeared subsequently. They explain this with market participants observing and appreciating the differences between well and poorly governed firms so that firms' corporate governance is fully reflected in prices and does not result in significant long-term excess returns anymore.

In summary, our results show that conclusions drawn from empirical analysis using the E-index as measure of corporate governance critically hinge on the data quality of the underlying six provisions. Specifically, researchers need to be cautious when using ISS Governance data to construct the index: These data are subject to multiple data errors. In fact, only data on one of the six provisions in the index, the poison pill, show few errors. Hence, to ensure that valid

empirical conclusions are drawn from analyses including the E-index, we promote the use of a corrected version of the E-index.

Our study complements a paper by Larcker, Reiss, and Xiao (2015). They show that Investor Responsibility Research Center (IRRC)⁵ summaries on the E-index provisions from 1990 to 2006 also contain significant measurement errors, especially on golden parachutes and supermajority voting requirements. Using corrected information on antitakeover provisions over the period 1990-1999, they show that prior findings of significant annual excess returns for well-governed firms, do not hold and are likely a result of mismeasurement. We show that the data quality of the post-2007 ISS data, which supersedes IRRC data and provides annual updates on firms' corporate governance, is still subject to significant, albeit different, data errors that jeopardize empirical inference. In a contemporaneous paper, Frankenreiter, Hwang, Nili, and Talley (2021) manually collect data on the G-index provisions and further corporate governance variables for the years 1990 to 2019 and identify multiple data errors. Overall, they are able to manually compile original filing data on 42% of the observations in the original GIM (2003) dataset. Comparing their manually collected data to the G-index provisions as reported by IRRC, they find that 82.95% of the firms they analyze for the years 1990 to 2006 show some deviations across the two data sources. Using their G-index data to replicate results of GIM (2003), however, they find only negligible changes to GIM's original results.⁶ Our approach to correct governance data relies on a comparison of the original ISS data to four different databases and a manual correction of mismatches across databases which is presumably less prone to errors than an approach based exclusively on manual data collection. Moreover, we

⁵ Prior to 2007, data was collected and distributed by RiskMetrics, a subsidiary of IRRC. In 2005, ISS acquired IRRC and took over the data and its collection process. We refer to IRRC when we discuss pre-2007 data and to ISS when we refer to post-2007 data.

⁶ Using their "Cleaning Corporate Governance" database to construct the G-Index, Frankenreiter, Hwang, Nili, and Talley (2021) still find an abnormal return for a democracy-dictatorship long-short portfolio for the years 1990 to 1998 of 6.9% p.a. GIM (2003) report an abnormal return of 8.9% p.a. for the years 1990 to 1999. Importantly, the analysis in Frankenreiter, Hwang, Nili, and Talley (2021) is based on a sub-set of 42% of the firm-years used in GIM (2003). When using the full original GIM (2003) dataset and substituting the 42% of firm-years with their corrected values, Frankenreiter, Hwang, Nili, and Talley (2021) find an abnormal return of 7.3% p.a.

are able to compare, and if necessary correct, the full sample of ISS recommendations. Most important, we find that our corrections significantly change empirical results with respect to several firm outcomes, including firm value, operating performance, and analysts' earnings forecasts.

2. Data and data issues in ISS

2.1 ISS data

BCF's (2009) E-index includes six provisions that capture the extent to which a company and its managers are insulated from the market for corporate control. These provisions are staggered boards, limits to bylaw and charter amendments, supermajority requirements for mergers, golden parachutes, and poison pills.⁷ To construct the E-index, researchers generally rely on publicly available data on these provisions that are collected and commercially sold by ISS. Up to 2006, ISS (formerly RiskMetrics) relied on publicly available data on corporate governance standards provided by the Investor Responsibility Research Center (IRRC) on a bi- or tri-annual basis. IRRC provided summaries on firms' governance collected from 10-K, 10-Q, and other documents filed with the SEC that were subsequently coded to construct indices for empirical analyses. As explained above, Larcker, Reiss, and Xiao (2015) show that there are significant data errors in the IRRC data for the years 1990-2006.

In 2005, IRRC was acquired by ISS. IRRC data collection ended in 2006 and was resumed by ISS in 2007. While ISS continued to provide coded summaries on S&P 1500 firms' shareholder provisions collected from SEC filings, the acquisition resulted in significant changes to the procedures governing data collection. IRRC focused on changes in provisions, while ISS started with an initial review of the firms' bylaws and charter. Moreover, data reporting changed. For instance, the variable that indicates the existence of a supermajority

⁷ We refer the reader to BCF's (2009) section 1.2 and GIM's (2003) appendix 1 for a detailed description of the six E-index provisions and a discussion on the provisions' relation to corporate governance.

voting requirement for mergers has been coded as a binary yes/no variable by IRRC, but ISS data show the required shareholder support to approve a merger in percent.

Given the significant changes to the data collection and handling between the years 2006 and 2007, and given that Larcker, Reiss, and Xiao (2015) analyze pre-2007 data from RiskMetrics / ISS, our study focuses on ISS data that covers the period from 2007 to 2016.

2.2 Sample and data correction procedure

As a starting point for our analysis, we use the 14,843 firm-year observations on 2,126 firms covered by ISS in the years 2007-2016. To check the data quality of ISS and correct data errors where necessary, we analyze and cross-check each of the six provisions in the E-index separately. First, to check the staggered board indicator variable, we use ISS' own Director data. Specifically, we calculate for each firm-year's meeting date the mean and standard deviation of the time in years until re-election across all directors. From these data, we can derive whether a firm has a staggered board: Staggered boards are usually divided into three "classes" with one class standing for re-election each year. Hence, a firm has a staggered board in place if the average time until re-election is two years with a standard deviation of one year. A firm has no staggered board if the average time to re-election is one year with a standard deviation of zero. When a firm abolishes (adopts) a staggered board, mean and standard deviation of the time until re-election drop (increase). This allows us to classify each board as staggered or non-staggered in ISS' Director data as of a firm's meeting date. We classify the year in which the (de-)staggering was approved by shareholders as the year of a change in firms' staggered board status.⁸ Finally, we compare the resulting staggered board variable from the ISS Director database with information on staggered boards reported in the ISS Governance

⁸ We choose the time of the shareholders' approval, since the decision to (de-)stagger the board already sends a signal to the market. If staggered boards matter for company values, in an efficient market, the announcement of such a change in staggered board status should be incorporated in share prices immediately. Thus, to capture market reactions, we need to assign changes in staggered board status to the year in which the (de-)staggering decision was taken.

database and manually look up observations for which the two databases deviate in the respective SEC filings.

Next, we use the SharkRepellent (formerly FactSet) database to check whether a company has a supermajority requirement for mergers in place at the end of our sample period, i.e., as of 2016. Next, we compare changes to supermajority requirements for mergers reported by ISS to changes reported by SharkRepellent. We assume data to be correct if information on supermajority requirements for mergers reported by SharkRepellent and ISS match.⁹ If there is a mismatch between the two databases, we screen the respective firm's amendments to the *Articles of Incorporation* as provided by SharkRepellent and, via EDGAR, screen the firm's SEC filing 8-K, item 5.03, and correct ISS data if necessary. We follow the same procedure to check and, if necessary, correct the two E-index provisions that pertain to limits to amend bylaws and limits to amend charters.

To assess the data quality of the golden parachutes variable in ISS, we compare ISS Governance data to data provided by Compustat ExecuComp and Refinitiv ESG (formerly Thomson Reuters). Similar to ISS, the Refinitiv ESG database reports a binary variable that indicates whether a golden parachute agreement is in place. Compustat ExecuComp reports estimated total payments made to an executive upon involuntary termination following a change of control. To be able to compare ExecuComp data to ISS data, we aggregate estimated executive payments reported in ExecuComp on the firm level and code a potential payment above zero as "one", indicating the existence of a golden parachute, and a potential payment of zero as "zero". If there is a mismatch across databases, or missing information in at least one

⁹ ISS reports a percentage number that indicates the required rate to approve a merger but does not translate this information into a binary variable. Thus, we first construct a binary variable that indicates the existence of a supermajority requirement for mergers according to ISS data. If ISS reports a voting requirement above 51%, we set the variable equal to one, else, if the percentage requirement is equal to or below 51%, the variable is zero.

database, we manually screen each firm’s proxy statement filed with the SEC to verify the existence of a golden parachute and correct ISS data if necessary.

To check the information on the poison pill provisions reported in ISS, we compare ISS data to SharkRepellent’s poison pill database. We manually review all mismatches across the two data providers by screening the respective 8-K filings for shareholder rights plan adoptions, amendments, and expirations.

A final data issue that pertains to ISS Governance data in general is that it is unclear how to correctly treat missing values. Table A1 in the appendix reports a summary of ISS’ reporting of variables that pertain to the construction of the E-index across the categories “missing”, “yes”, “no”, and “zero”. Notably, the (non-)reporting of missing data varies across provisions: Since ISS reports no incidents of “no” for staggered boards, golden parachutes, and poison pills, we assume missing data to indicate the non-existence of the respective provision. For limits to bylaw and charter amendments, we assume missing data to be truly missing. In most cases, the percentage variable reported by ISS is also missing and ISS reports a “no” for at least some firm-year observations.

2.3 Data issues in ISS

In this section, we describe data issues and errors in ISS Governance data for each of the six provisions in the E-index separately. To this end, we report differences between ISS data and data corrected using the procedures described in Section 2.2 in Table 1. The table reports descriptive statistics of the individual provisions (Panel A) and the annual fraction of firms that have each of the six E-index provisions in place (Panel B), using either ISS or corrected data.

For staggered boards, descriptive statistics in Panel A show that, overall, there is only little observable difference between ISS and our corrected data. Analyzing annual data in Panel B shows a more nuanced picture: Discrepancies in the staggered board variable between ISS

and corrected data first widen and then narrow at the end of the sample period: In 2007, ISS overreports the existence of a staggered board by approximately 5%. In 2010, the difference increases to nearly 8% but diminishes thereafter. In 2016, about 33% of firms have a staggered board in both the ISS database and the corrected dataset.

Table 1 shows that ISS reports 99% of firms to have limits to bylaw or charter amendments. In contrast, applying our correction procedure, we find that only 43% (or 55%) of firms have limits to amend bylaws (or the charter) in the corrected data (Panel A). Except for the year 2010, ISS reports all firms to have limits to bylaw and charter amendments throughout the entire period 2007-2016 (Panel B).¹⁰ The corrected data shows that, in fact, only about half of our sample firms have limits to amend bylaws or charters over this period. A closer analysis of the differences between ISS data and our corrected data on limits to amend bylaws and charters reveals that ISS consistently, but incorrectly, classifies a simple majority of 51% voting requirement as a supermajority requirement. A supermajority vote requires more than a simple majority of shareholders to vote in support of the amendment. A 51% voting requirement represents a simple majority, while most supermajority requirements range from a two-third to an 80% vote support. To illustrate this data issue, consider the following example of limits to amend bylaws at Apple, Inc. as reported by ISS: On its meeting date, on May 10, 2007, the ISS variable that indicates the existence of a limit to amend bylaws (“labylw”) reports a “YES” while the ISS variable that reports the percentage required to amend bylaws (“law_amend_vote_percent”) reports a 51% requirement.

For supermajority voting requirements for mergers, descriptive statistics in Table 1 show that, on average, there is only little difference between ISS and our corrected data (Panel A).

¹⁰ In addition to the binary variable measuring the existence of limits to amend bylaws and charters, ISS reports a percentage number that indicates the required approval rates to amend the charter or bylaws. Data on this latter percentage variable are not error-free but contain significantly less errors than the binary variable. However, ISS data on the percentage variable to amend bylaws (the charter) is missing for 17.5% (6.5%) of firm-year observations.

Sample means over the entire period 2007-2016 are similar (0.33 for ISS and 0.27 for corrected data). However, ISS data on supermajority voting requirements for mergers show substantial variation over time (Panel B): In 2007 and 2008, around 80% of firms are reported to have such a provision in place. In 2009, the number drops to 29.5%, and then increases to 55.4% in 2010. Subsequently, the percentage of firms with supermajority requirements for mergers gradually declines to 18.8% in 2016. The corrected data, in contrast, show a gradual decline in the percentage of firms with supermajority voting requirements, from 34.9% in 2007 to 20.0% in 2016. For reasons unobservable to us, ISS data on supermajority requirements for mergers contain a significant number of apparently random errors, in particular, in the years 2007 and 2008. We also find ISS data to contain significant data gaps. In 2007, 2008, and 2010, ISS provides no information on supermajority requirements for mergers for about 60% of firms covered by the database.¹¹

For the golden parachute variable, our corrections lead to a larger number of firms that have such a provision in place (93% instead of 75% as reported by ISS, see Panel A in Table 1). We find that ISS data significantly mismeasures the existence of golden parachutes in the years 2007-2008 (Panel B). In 2007 (2008) ISS reports that only 51.5% (33.4%) of firms have golden parachute agreements, whereas we find 89.4% (90.6%) of firms to have such agreements. Subsequently, the percentage of firms with golden parachutes jumps to 80.3% in 2009 and stays around that level until 2016 according to ISS data. In contrast, the corrected data shows an incidence of golden parachutes of about 90% throughout the entire sample period. Further research reveals that ISS is aware of this issue: In the data definitions, originally presented by RiskMetrics and updated by ISS in August 2010, ISS admits that "...this field [referring to golden parachutes] may be inconsistent for the 2006 through 2008 data years; in some cases "Yes" indicates that an NEO [named executive officer] at the company has such a

¹¹ Note that in our empirical tests of Section 3, we only include firm-years for which we have data entries provided by both ISS and an alternative source.

contract but in other cases "Yes" indicates that an NEO at the company has a contract that provides for a cash severance payment $> 3X$ salary + bonus." Since ISS reports higher incidences of golden parachutes from 2009 onwards, we assume that in 2007 and 2008 many golden parachute agreements with NEOs have not been captured by ISS since the threshold of three times salary plus bonus has not been exceeded.

Finally, there is only little difference between ISS and corrected data with respect to the poison pill provision. Both, ISS data and the corrected dataset show a steady decline in the percentage of firms with poison pill from around 40% in 2007 to about 5% in 2016 (Table 1, Panel B).

Across provisions, we find that the errors in ISS data are most prevalent in the variables that capture limits to amend bylaws and charters as well as golden parachutes. Moreover, according to ISS data, the fraction of firms with staggered boards, supermajority requirements for mergers, and poison pills decreases from 2007 to 2016 (Panel B in Table 1), but not the percentage of firms with the other three provisions in place. In contrast, in the corrected dataset, the annual frequencies of all provisions, except for golden parachutes, decrease from 2007 to 2016.

2.4 Consequences of data issues in ISS for the E-index

In this section, we analyze how these larger-scale data issues and errors of individual provisions affect E-index values. To this end, we report differences in the E-index that result from using either ISS Governance data or our corrected data to construct the index in Table 2. Panels A and B report descriptive statistics. Panel C reports the distribution of firms across E-index scores for each sample year. Panel A shows that the E-index based on our corrected data has a lower average value (2.72 versus 3.49), while the standard deviation increases from 1.07 to 1.49. Hence, the reduction in the corrected mean E-index of about 22% versus the ISS sample mean is substantial and represents about 72% of the standard deviation of the E-index

constructed using ISS data. In Panel B, we report the distribution of all E-index values, ranging from zero to six. In two-thirds of all firm-years, the E-index equals either three or four when using ISS data. In contrast, E-index values resulting from the use of corrected data are more evenly distributed, with about 42% of observations showing an E-index value of three or four. The difference in the distribution of the E-index between ISS and corrected data is largest for an index value of one: Based on ISS data, we find only 2% of observations in our sample to have an E-index of one, while 25% have an index value of one when using corrected data.

Panel C reports the distribution of firms across E-index scores for each sample year. The panel shows that the improved governance of the average firm in the corrected data is mostly due to a monotonic increase in the share of firms with low index values. The share of firms with an E-index of one increased from 17.61% in 2007 to 32.22% in 2016. Similarly, 55% of firms have an E-index score of three or below in 2007, increasing to 77% in 2016. In contrast, the weaker downward trend in ISS data is driven by a decline in firms with high index values of five, from 18.17% in 2007 to 5.40% in 2016, and a substantial increase in the percentage of firms with an index value of three, from 28.93% to 48.10%.

Figure 1 graphically illustrates the differences in annual mean E-index scores, constructed using either ISS or corrected data, over time. The figure shows a general downward trend for both indices, which is, however, more pronounced in the corrected data than in the original data. Index values are consistently higher when using ISS data and the gap between the two lines does not seem to converge over time.

Next, we analyze pairwise correlations between the six individual provisions across the ISS database and our corrected dataset. Results are reported in Table 3. Three variables are relatively highly correlated: The Pearson correlation between the poison pill variables in ISS and our corrected version is 0.98. The correlations of the staggered board variable and the variable indicating supermajority voting requirements for mergers are high as well: 0.90 and

0.84, respectively. The correlation between the original and corrected versions of the golden parachute variable is only 0.43. For the variables indicating a supermajority requirement to amend bylaws or the charter, correlations are even lower at 7% and 8%, respectively.

We find that our corrections result in changes to the original ISS E-index score in 9,912 of 14,843 firm-year observations, or 67% of the sample. Figure 2 plots the difference in the E-index score resulting from the correction of errors in the original ISS Governance data. The figure reveals that in more than 65% of all firm-year observations our corrections lead to a change in the E-index score. Most corrections cause a reduction in the E-index score. Close to 30% of firm-year observations experience a change of -1, and more than 25% a change of -2. In only 33% of firm-year observations, no changes in the E-index result from our corrections.

Next, we analyze whether deviations in E-index scores differ across firm characteristics. The incidence of data errors may be related to firm characteristics that have been shown to be associated with corporate governance variables in previous research.¹² To this end, we group firms into deciles according to firm size, firm age, firm value, operating performance, analysts' earnings forecast errors, labor productivity, input costs, capital expenditures, and product market competition. All these variables, except for competition, are industry-adjusted by subtracting the respective industry median based on Fama-French 48 industry classifications (Fama and French, 1997) from each firm's observation. Results are reported in Table 4 and show that differences between mean E-index scores are fairly constant across deciles for all firm characteristics considered. In summary, we do not find any evidence of data errors being concentrated in, or even confined to, certain firm characteristics.

Our corrected data lead to novel insights about the prevalence of anti-takeover protections at U.S. listed firms. First, our corrected data (but not ISS data) show that, between 2007 and

¹² For instance, data errors may happen more often – and be more likely to remain uncovered – at smaller companies that attract less interest by ISS' clients.

2016, the number of anti-takeover provisions in place has gone down monotonically, implying that governance of U.S. firms has gradually become more shareholder-friendly. Second, our data (but not ISS data) show that these improvements are driven by the abolition of five out of six (versus three out of six in ISS data) anti-takeover protections under consideration here. Taken together, our descriptive analysis shows that ISS data includes multiple data issues that affect individual provisions but also the aggregated E-index. Hence, conclusions and policy recommendations drawn from using ISS data may be affected by these data issues. We analyze how such data issues affect conclusions drawn from empirical research in the next section.

3. Revisiting key empirical results in corporate governance research

In this section, we test whether using corrected data to construct the E-index alters the results of empirical studies. Specifically, we revisit key analyses conducted in three well-known and widely-cited empirical studies using the E-index, or the G-index, as a proxy for corporate governance: BCF (2009), BCW (2013), and GM (2011). This allows us to illustrate the broader implications from using corrected data versus ISS' original data, rather than to just test whether one specific result hinges on the use of uncorrected ISS data to construct the E-index and thus presumably is driven by some systematic data errors. Besides, there exist, to the best of our knowledge, no general applications of the E-index that cover our full sample period of 2007-2016, let alone that are confined to this sample period.

To conduct the three sets of empirical tests, we augment firm-level governance data from ISS with data on company financials from Compustat, stock prices from the Center for Research in Security Prices (CRSP), insider ownership from ExecuComp, institutional ownership from Thomson Reuters, and analyst forecasts from I/B/E/S. Data on risk factors are obtained from

Kenneth French's data library.¹³ Data on the U.S. consumer price index stem from the U.S. Bureau of Labor Statistics.¹⁴

In each of our empirical tests, we first reproduce the original result as reported in the study. Second, we re-estimate the original regression model for the period 2007-2016 using the E-index constructed with ISS data. Third, we re-estimate the second specification using corrected data in the construction of the E-index. All three studies, BCF (2009), BCW (2013), and GM (2011), use sample periods that end before 2007. Hence, these studies do not use erroneous ISS but IRRC data to construct the E-index, and thus do not have any overlap with our sample. Hence, we do not necessarily expect our results to coincide with the results published in the original studies. The focus of our study is to analyze whether the correction of the E-index has a significant impact on the empirical results.

3.1 Revisiting Bebchuk, Cohen, and Ferrel (2009)

BCF (2009) show that firms with a high E-index are associated with significantly lower firm values than firms with a low E-index. Their sample period covers the years 1992 to 2002. We first revisit BCF's (2009) analysis on the relationship between firm value and the E-index. To this end, we follow their regression set-up as closely as possible. In particular, we estimate pooled OLS regressions with robust White (1980) standard errors and the log of industry-adjusted Tobin's Q as dependent variable. We also follow BCF (2009) in defining Tobin's Q as the market value of assets divided by the book value of assets, with the market value of assets computed as the book value of assets plus the market value of common stock net of the sum of the book value of common stock and balance sheet deferred taxes. We adjust Tobin's Q by subtracting the median Q of the two-digit SIC industry. The independent variable of interest is either the E-index as categorical variable or dummy variables indicating different E-index

¹³ The data can be downloaded at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

¹⁴ The data can be downloaded at: <https://www.bls.gov/cpi/data.htm>

scores. As in BCF (2009), we control for firm size (defined as the log of total assets), firm age (defined as the log of the firm's age), incorporation in Delaware, insider ownership (defined as the fraction of shares held by executives and directors) and insider ownership squared, return on assets (net income divided by assets), capital expenditure (measured relative to assets), leverage (defined as the sum of long-term debt and debt due in one year divided by assets), and R&D (measured relative to sales). Following BCF (2009), all regressions include year dummies and a dummy for missing R&D data, but their coefficients are not reported in Tables 5 and 6. The only difference in terms of control variables is that we do not control for the O-index.¹⁵

Results are reported in Table 5. In Columns 1 and 2, we first reproduce the original results of BCF's (2009) Table 4 for the period 1992-2002. In Columns 3 and 4 as well as 5 and 6, we re-estimate the original BCF (2009) regression set-up for the years 2007-2016 using ISS Governance and our corrected data, respectively. BCF (2009) report a negative (-0.044) and statistically significant coefficient on the E-index (Column 1) and coefficient estimates on the individual E-index scores that are all negative, statistically significant, and monotonically decreasing with increases in the E-index (Column 2). In Column 3, we use ISS data from 2007 to 2016, and find a negative coefficient on the E-index that is also statistically significant at the 1% level. Hence, we can confirm the results of BCF (2009) reported in Column 1, although the economic magnitude of the coefficient estimate is smaller. In Column 4, the coefficient estimates for the individual E-index scores are all negative. Most coefficient estimates are statistically significant, and monotonically decreasing in magnitude with increasing levels of the E-index, confirming BCF's (2009) results as reported in Column 2. In Columns 5 and 6, we re-estimate the regressions reported in Columns 3 and 4 using our corrected E-index. A comparison of Columns 3 and 5 reveals that the coefficient on the E-index remains negative

¹⁵ BCF (2009) define the O-index (other provisions index) as the G-index minus the E-index. It consists of the 18 provisions in the G-index that are not included in the E-index. Data on all these 18 provisions is no longer available for the years after 2006.

and statistically significant, but the size of the coefficient drops from -0.014 to -0.008, i.e., by almost 50%, when using corrected data. Specifically, when using ISS data to construct the E-index, a one-point increase in the E-index is associated with a 1.4% decrease in firm value. Using corrected data, a one-point increase in the E-index is associated with a 0.8% decrease in firm value. In Column 6, we continue to find negative coefficient estimates on the individual E-index scores that are statistically significant and nearly monotonically decreasing with increases in index values. However, when comparing coefficient estimates in Column 6 to those in Column 4, we find the difference in firm value between well and poorly governed firms to be substantially smaller when using our corrected data ($0.030 = -0.035 - -0.065$) than when using ISS data ($0.069 = -0.099 - -0.030$).

Table 6 reports results from re-estimating Table 5 augmented with firm fixed effects. BCF (2009) show that even when accounting for time-invariant unobserved heterogeneity across firms, the coefficient estimates on the E-index and all dummy variables for different E-index levels remain negative and statistically significant (see Columns 1 and 2). When re-estimating these specifications for the period 2007-2016 using ISS data to construct the E-index, we find the coefficient on the E-index to turn insignificant (Column 3). Moreover, we find that while all dummy variables for different E-index scores are negative and significant they do not monotonically decrease anymore but tend to increase (Column 4). When re-estimating the regression specifications from Columns 3 and 4 using our corrected data, we find coefficients on the E-index and the individual E-index scores to all turn statistically insignificant (Columns 5 and 6). Hence, the significant coefficients on the E-index scores reported in Column 4 are the result of data errors in ISS. In summary, we find that a correction of ISS data significantly weakens the reported relationship between the E-index and firm value in OLS regressions. The data correction results in no such relation when using fixed effects regressions.

In another set of tests, BCF (2009) show that firms with low E-index scores significantly outperform firms with high E-index scores over the period 1990-2003. Specifically, they show that a strategy that goes long in an equal-weighted portfolio of firms with a zero E-index (“democracy” firms) and short in an equal-weighted portfolio of firms with an E-index of five or six (“dictatorship” firms) earns an abnormal return of approximately 7% p.a. To revisit this relation between the E-index and stock market performance, we follow BCF (2009) and use Carhart (1997) four-factor model regressions of monthly equal- and value-weighted democracy-dictatorship hedge portfolio returns. Specifically, we follow BCF (2009) and estimate the following regression:

$$Diff_t = \alpha + \beta_1 \times RMRF_t + \beta_2 \times SMB_t + \beta_3 \times HML_t + \beta_4 \times MOM_t + \varepsilon_t, \quad (1)$$

where $Diff_t$ is the return of the democracy portfolio in excess of the dictatorship portfolio in month t , $RMRF_t$ is the value-weighted return of all CRSP firms in excess of the risk-free rate, and SMB_t is the return of a zero-investment size portfolio. HML_t and MOM_t are the returns of a zero-investment book-to-market and momentum portfolio, respectively. ε_t is the error term. The abnormal monthly return is the regression constant α . Following BCF (2009), we use White (1980) robust standard errors.

Results are reported in Table 7. The first two columns reproduce the original results reported in Table 11 of BCF (2009) for the period 1990-2003. BCF (2009) document statistically significant, positive abnormal returns for several democracy-dictatorship hedge portfolios. In Columns 3 and 4 (5 and 6), we re-estimate BCF’s (2009) regressions using the original ISS-based (corrected) E-index to construct portfolios for the 2007-2016 sample period. The results in Columns 3 and 4 show that there is no evidence of an outperformance of well-governed versus poorly-governed firms in the 2007-2016 period. In fact, this finding is not surprising given the results in BCW (2013), which show that the outperformance of democracy firms documented for 1990-1999 does not prevail in the 2000-2008 period. Our results confirm

this absence of a significant relationship between the E-index and abnormal stock returns. Moreover, the results in Columns 5 and 6 show that this (non-)result is not driven by data errors in the ISS Governance database but prevails when using corrected data to construct the E-index.

3.2 Revisiting Bebchuk, Cohen, and Wang (2013)

BCW (2013) show that the correlation between corporate governance and abnormal stock returns disappeared post 1990-1999, while the negative relationship between the E-index and firm value or operating performance persists. BCW (2013) argue that this finding is consistent with market participants' learning to appreciate differences between well and poorly governed firms. We first revisit BCW's (2013) analysis of stock returns. Since BCW (2013) re-examine the original results of BCF (2009), our regression specification corresponds to the model shown in equation (1) above. The results are reported in Table A2 in the appendix. Columns 1 and 2 reproduce BCW's (2013) findings, as reported in their Table 4. BCW (2013) confirm BCF's (2009) result of statistically significant abnormal returns for equal- and value-weighted democracy-dictatorship hedge portfolios during the 1990-1999 period but find no significant outperformance during the later period 2000-2008. For the entire period 1990-2008, BCW (2013) also document positive and significant abnormal monthly returns, which, however, are weaker than those reported for the first sub-period and are entirely generated during the 1990s. Columns 3 to 6 report the performance of BCW's (2013) democracy-dictatorship hedge portfolio during the 2007-2016 period using original ISS (Columns 3 and 4) and corrected E-index data (Columns 5 and 6) to build portfolios. Note that Columns 3 to 6 in Table A2 reproduce the first row in Columns 3 to 6 in Table 7. Our (non-)results, discussed in Section 3.1, support the conjecture that BCW's (2013) learning hypothesis persists during the 2007-2016 period and that this is not due to mismeasurement resulting from errors in ISS Governance data. In fact, our corrected E-index data confirm that the correlation between corporate governance and abnormal stock returns has disappeared in the late 2000s.

In a separate analysis, BCW (2013) examine the relationship between the E-index and firm value as well as several operating performance measures for the 1990-2008 sample period. We revisit their analysis in Table 8. Following BCW (2013), we estimate pooled OLS regressions with either the log of Tobin's Q, return on assets (ROA, defined as net income before extraordinary items divided by assets), five-year, three-year, and one-year sales growth (defined as the percentage change in sales over the respective previous period in years), or net profit margin (NPM, defined as net income before extraordinary items divided by sales) as dependent variables. All dependent variables are adjusted by their Fama and French (1997) 48 industry median. Controls are as in BCW (2013): firm size (measured by the log of total assets), the log of firm's age, Delaware incorporation, insider ownership (defined as the fraction of shares held by executives and directors) and insider ownership squared, capital expenditure (measured relative to assets), R&D (measured relative to sales), and missing R&D or insider data. Firm value regressions with Tobin's Q as dependent variable additionally control for ROA and leverage (defined as the sum of long-term debt and debt due in one year divided by total assets). Operating performance regressions with ROA, sales growth, or NPM as dependent variable additionally control for the log of the book-to-market ratio from the previous year. To save space, Table 8 does not report the coefficients on control variables. Following BCW (2013), all regressions include year and industry fixed effects. Standard errors cluster at the firm- and year-level.

The first two Columns in Table 8 reproduce the original results of BCW (2013) for the periods 1990-2001 and 2002-2008, respectively, as reported in Panel A of their Table 8. In Columns 3 and 4, we re-estimate the original BCW (2013) set-up using ISS and corrected data, respectively, to construct the E-index for our sample period 2007-2016. Note that each coefficient estimate in Table 8 represents a separate regression analysis. Panel A reports regression estimates using the E-index as categorical variable. The results show that the E-index

is negatively associated with firm value, irrespective of the sample period under investigation or the data used to construct the index. However, using corrected versus ISS data reduces the negative coefficient on the E-index by almost 50%. This finding confirms previous results from revisiting BCF (2009) in Section 4.1.

BCW (2013) also document a relatively stable negative and statistically significant association between the E-index and several measures of operating performance during both the 1990-2001 and 2002-2008 period. When re-estimating BCW's (2013) operating performance regressions with 2007-2016 ISS Governance data, we find a negative and statistically significant coefficient estimate in ROA regressions only. Coefficient estimates on the E-index for all other operating performance measures are statistically insignificant. Using our corrected data, we also find a negative and statistically significant coefficient estimate for ROA, which is much smaller in absolute terms than when using original ISS data (-0.0015 versus -0.0027). In contrast, using corrected data to construct the E-index results in a negative and significant coefficient on the E-index on the five-year sales growth regression. Besides these two changes, we do not find errors in ISS data to impair their conclusions: The coefficient estimates on the E-index for three-year and one-year sales growth as well as for NPM are statistically indistinguishable from zero using either data to construct the E-index.

Panel B in Table 8 reports results from estimating pooled OLS regressions with a dummy variable for democracy firms instead of the E-index as main independent variable. To this end, we follow BCW (2013) and classify firms with an E-index of zero as democracy firm.¹⁶ The first two Columns reproduce original results of BCW (2013), reported in Panel B in their Table 8. Their results show a statistically significant and positive association between democracy firms and firm value and for all operating performance measures during the 2002-2008 period.

¹⁶ Based on this definition we classify 3.1% of firm-year observations as democracy firms when using corrected data and 0.2% when using ISS data.

The results for the 1990-2001 period only document statistically significant coefficient estimates on the democracy dummy for Tobin's Q, five-year sales growth, and three-year sales growth. The coefficient estimates in the remaining operating performance regressions are positive but statistically indistinguishable from zero during this earlier period. When re-estimating the regression specification for the 2007-2016 period, we confirm the positive association between democracy firms and Tobin's Q, irrespective of which E-index data we use to construct the democracy dummy. However, correcting the data weakens the relationship between the E-index and Tobin's Q. The coefficient declines from 0.27 (Column 3) to 0.21 (Column 4), or about 23%, with statistical significance also being reduced. Moreover, errors in ISS Governance data affect some of the conclusions drawn for the various measures of operating performance used by BCW (2013): First, errors in ISS data conceal a (weakly) statistically significant positive correlation between democracy firms and ROA. Second, errors in ISS data result in a spurious negative, statistically significant correlation between democracy firms and three-year and one-year sales growth. Third, using corrected data to construct the E-index, and, subsequently, the democracy dummy, produces a positive association with NPM which is statistically significant at the 5% level (Column 3). In contrast, when using ISS data, the respective coefficient estimate on the democracy dummy is insignificant (Column 4).

We also re-estimate all regression models in Table 8 with firm fixed effects. The results are reported in Table A3 in the appendix. All coefficient estimates on the E-index in Panel A turn statistically insignificant when accounting for time-invariant unobserved heterogeneity across firms, irrespective of which data we use to construct the index. This result may be due to limited within-firm variation in E-index data.¹⁷ In Panel B, the coefficient on the democracy dummy variable based on ISS data is positive and statistically significant at the 1% level in the Q-regression. When using our corrected data to construct the democracy dummy, the coefficient

¹⁷ There are 3,283 changes in the E-index based on ISS data and 1,651 changes in the E-index based on corrected data.

turns negative and statistically insignificant, suggesting that the positive and significant coefficient is caused by data errors in ISS. Moreover, we document statistically significant and negative correlations between within-firm switches to democracy firms and sales growth over the past three and five years when using corrected E-index data. Using ISS E-index data to construct the democracy dummy, we find the coefficient estimates to be statistically insignificant.

3.3 Revisiting Giroud and Müller (2011)

In this sub-section, we revisit empirical tests by GM (2011). GM (2011) show that corporate governance has a stronger effect on various outcome variables in non-competitive industries. They conclude that competition on firms' product markets can substitute for firm-level corporate governance. Note that GM (2011) use the G-index as main proxy for corporate governance. In unreported tests, they confirm that all results remain qualitatively unchanged when using the E-index as corporate governance measure. This justifies our inclusion of GM (2011)'s analyses in this sub-section to test for consequences of data errors in ISS.

We start by revisiting GM's (2011) analysis of analysts' earnings forecasts. Core, Guay, and Rusticus (2006) hypothesize that investors underestimate the extent to which operating performance between poorly and well governed firms differs, and, consequently, are negatively surprised by the earnings announcements of poorly governed firms. GM (2011) find that analysts are not surprised by lower earnings of poorly governed firms in general but that they significantly underestimate the magnitude of negative earnings in non-competitive industries.

To measure earnings forecasts, we follow GM (2011). We only include firms that are followed by a minimum of five analysts to ensure that the consensus forecast reliably proxies for market expectations (e.g., Mikhail, Walther, and Willis, 1999; Loh and Mian, 2006) and exclude forecast errors that are larger than 10% of the stock price (e.g., Easterwood and Nutt, 1999; Lim, 2001; Teoh and Wong, 2002). To ensure that analysts are informed about earnings

in the previous year, we measure forecast errors eight months prior to the fiscal year's end (Core, Guay, and Rusticus, 2006; GM, 2011). Following GM (2011), we classify firms with an E-index of four, five, or six as dictatorship firms and firms with an E-index of zero as democracy firms and restrict the sample to dictatorship and democracy firms.¹⁸ We follow GM (2011) by estimating whether the relation between analysts' forecast errors and the democracy dummy depends on the level of product market competition, using their regression specification:

$$y_{it} = \alpha_j + \alpha_t + (D_{it-1} \times I_{it-1})\beta' + X_{it-1}\gamma' + \varepsilon_{it} , \quad (2)$$

where y_{it} is either actual annual earnings per share (EPS), the mean I/B/E/S consensus forecast of annual EPS, or the forecast error (difference between actual and forecasted EPS), all scaled by total assets for firm i in year $t-1$. α_j and α_t are industry and year fixed effects, D_{it-1} is a dummy variable that indicates whether a firm is classified as dictatorship firm in year $t-1$. I_{it-1} is a (3 x 1) vector of Herfindahl-Hirschman Index (HHI) dummies that indicate whether firm i in year $t-1$ belongs to the lowest, medium, or highest HHI tercile. The HHI is defined as the sum of squared market shares based on the sales of each firm in a specific Fama-French 48 industry per year, with a high HHI indicating low competition. X_{it-1} is a vector of control variables and includes firm size, the log of the book-to-market ratio, and HHI dummies to account for any direct effect of competition. ε_{it} is the error term. Following GM (2011), we cluster standard errors on the industry level based on Fama and French (1997) 48 industry classifications. The original GM (2011) sample period is from 1991-1999, our sample period is from 2007 to 2016.

The results are reported in Table 9. In Columns 1 to 3, we reproduce the original results of GM (2011) that use the G-index to identify dictatorship and democracy firms during the period 1991-1999, as reported in their Table 6.¹⁹ Control variables are not reported for space

¹⁸ Based on this definition we classify 34% (3.1%) of firm-year observations as dictatorship (democracy) firm when using corrected data and 48% (0.2%) when using ISS data.

¹⁹ GM (2011) classify firms with a G-index of 5 or less as democracy firms and firms with a G-index of 14 or more as dictatorship firms.

reasons. Panel A reports results from regression models that do not include interaction terms between the dictatorship dummy and the HHI tercile dummies. GM (2011) find that dictatorship firms on average have lower EPS than democracy firms (Column 1). This is correctly predicted by analysts (Column 2). The forecast error in Column 3 is statistically insignificant, implying that investors, on average, are not surprised by the lower EPS of dictatorship firms. When re-estimating the regression specification using 2007-2016 ISS data to classify dictatorship and democracy firms, we document similar patterns: The forecast error in Column 6 is indistinguishable from zero, suggesting that investors, on average, are not surprised. Using corrected 2007-2016 E-index data to identify dictatorship firms reveals a different picture: The forecast error in Column 9 is positive and statistically significant at the 5% level. This implies that dictatorship firms tend to have larger EPS than democracy firms. Analysts correctly predict this difference but underestimate the magnitude of the effect.

Panel B reports coefficients on the interactions between the dictatorship dummy and HHI tercile dummies. GM (2011) find that only dictatorship firms in the highest HHI tercile, representing non-competitive industries, have lower EPS (Column 1), lower forecasts (Column 2), and lower forecast errors (Column 3) (Table 6 in GM (2011)). GM (2011)'s interpretation is that analysts correctly predict that governance only matters in non-competitive industries but underestimate the magnitude of the effect. We revisit their analysis using 2007-2016 ISS data on the E-index to classify dictatorship firms in Columns 4 to 6. We find significantly higher EPS of dictatorship firms in competitive industries. Analysts' forecasted EPS are even higher, resulting in a negative and statistically significant forecast error in the lowest HHI tercile. This suggests that analysts overestimate the magnitude of the positive effect, or underestimate the negative effect, of entrenchment provisions on EPS in competitive industries. In the medium HHI tercile, ISS Governance data indicates significantly lower forecasted EPS for dictatorship firms. The magnitude of this negative effect is overestimated by analysts: The forecast error is

positive and statistically significant. In non-competitive industries (high HHI) there is no statistically significant difference between dictatorship and democracy firms. We re-estimate this analysis using our corrected 2007-2016 E-index data in Columns 7 to 9. This analysis reveals a different picture: The coefficient estimates on the dictatorship dummy for actual and forecasted EPS are insignificant, irrespective of the level of product market competition. In contrast to using ISS data, we find a positive and statistically significant forecast error in non-competitive industries. Analysts significantly underestimate the magnitude of higher EPS of dictatorship firms in the highest HHI tercile. These conflicting conclusions drawn from ISS versus corrected E-index data illustrate the consequences of data errors and thus highlight the importance of using correct data.

In a next step, we revisit GM's (2011) analysis of the relationship between corporate governance and operating performance. To this end, GM (2011) estimate the following regression specification:

$$y_{it} = \alpha_j + \alpha_t + (E_{it-1} \times I_{it-1})\beta' + X_{it-1}\gamma' + \varepsilon_{it} \quad (3)$$

where y_{it} is either ROA, NPM, sales growth, or ROE for firm i in year t , and E_{it} is the E-index. α_j , α_t , I_{it} , X_{it} , and ε_{it} are defined as in equation (2). All variable definitions correspond to definitions used by GM (2011). ROA is measured as net income divided by the book value of total assets. NPM is the ratio of net income to sales, sales growth is the percentage change in sales over the previous five years, and ROE is defined as net income divided by the book value of common stock. Control variables in vector X_{it} are firm size, defined as the log of firm's assets, the log of firm age, a dummy for firms incorporated in Delaware, a dummy for S&P 500 index constituents, the log of the book-to-market ratio, and, in regressions that include interaction terms between the E-index and HHI tercile dummies, additionally HHI dummies. We follow GM (2011) and lag all independent variables by one year to address endogeneity concerns,

adjust all dependent variables by their industry median, cluster standard errors on the industry level based on Fama French 48 industries, and trim all dependent variables at their 5th and 95th percentiles. The original GM (2011) sample period is from 1990-2006, our sample period is from 2007-2016. Control variables in vector X_{it} are not reported for space reasons.

Table 10 reports results from estimating equation (3) with industry-adjusted ROA as dependent variable y_{it} . Columns 1 and 2 reproduce GM's (2011) original results, reported in their Table 8, that use the G-index to measure corporate governance between 1990 and 2006. The negative and statistically significant non-interacted G-index coefficient in Column 1 indicates that poorly governed firms have lower ROA on average. In Column 2, the coefficient on the G-index is negative, small, and insignificant in competitive industries, more negative and significant at the 5% level in the medium HHI tercile, and largest in absolute terms (i.e., most negative) and significant at the 1% level in non-competitive industries. Using ISS Governance data and the E-index to measure corporate governance during the adjacent 2007-2016 period mirrors GM's (2011) original result: The coefficient on the non-interacted G-index in Column 3 is negative and statistically significant. The pattern across HHI terciles is also similar to the original results: The coefficient estimate on the E-index is small and insignificant in the lowest HHI tercile but becomes negative and turns statistically significant in the medium and highest HHI terciles. When using corrected 2007-2016 E-index data in Columns 5 and 6, we find different results: Compared to Column 3, the coefficient estimate on the E-index in Column 5 is much smaller, reduced by more than half, and statistically insignificant. Moreover, coefficients on the E-index are also insignificant across all three HHI terciles when using corrected data, while negative and significant in the medium and highest HHI tercile when using ISS data. Consequently, using original ISS data to construct the E-index, would lead researchers to confirm previous results of GM (2011): Weakly governed firms are associated with significantly lower ROA in medium and non-competitive industries. In contrast, using corrected

E-index data does not lead to this conclusion: There is no significant association between the E-index and ROA, irrespective of the level of product market competition.

We also document significant deviations when using corrected versus ISS data and the three other operating performance measures used in GM (2011). Table 11 reports results from regressions with NPM as dependent variable. Using ISS data to construct the E-index confirms GM's (2011) conjecture that weakly governed firms on average have lower NPMs, as the coefficient estimates on the non-interacted G-index in Column 1 (GM (2011)) and the E-index in Column 3 (ISS data) are negative and statistically significant at the 1% and 5% level, respectively. In contrast, after correcting errors in ISS Governance data, we no longer document a negative association between the E-index and NPMs. Unlike in the analyses of ROA, there are no differences when using ISS or our corrected data for the construction of interaction terms between the E-index and HHI dummies: Comparing the results in Columns 4 and 6 reveals that coefficient estimates on the interacted E-index are statistically insignificant, irrespective of the level of product market competition, using either data to construct the E-index.

Table 12 reports results from regressions with sales growth as dependent variable. As before, the mismeasurement resulting from errors in ISS Governance data leads to fundamentally different conclusions. While the coefficient on the non-interacted E-index is negative and significant at the 5% level in GM's (2011) analysis (Column 1), constructing the E-index using ISS data in our sample period produces a coefficient estimate that is negative but statistically indistinguishable from zero (Column 3). In contrast, the coefficient estimate is negative and statistically significant at the 5% level when using corrected E-index data, confirming the results of GM (2011). Moreover, we document differences between ISS and corrected data in the pattern across HHI terciles. Using ISS data to construct the E-index results in a significant negative E-index coefficient in the highest HHI tercile only (Column 4). Using corrected data, the coefficient estimate on the interacted E-index is negative and significant in

the medium HHI tercile only (Column 6). GM (2011) document a significantly negative relation between sales growth and the G-index in all but the low HHI tercile.

Table 13 reports results from estimating regressions with ROE as dependent variable. The first two columns reproduce original results of GM (2011) for the 1990-2006 sample period, as reported in their Table 8. They find a small and statistically insignificant coefficient on the non-interacted G-index and interacted coefficients that monotonically decrease (i.e., become more negative) in the HHI terciles and turn statistically significant in the highest HHI tercile. The results reported in Columns 3 and 4 and 5 and 6 use the same regression specification on the E-index, which is constructed using either ISS or corrected data during the adjacent 2007-2016 period. Again, we document significant differences when using ISS versus our corrected data to construct the E-index: The coefficient estimate on the non-interacted E-index is negative and significant at the 10% level when using ISS data (Column 3). In contrast, this coefficient becomes smaller and turns insignificant when using corrected data (Column 4). Differences persist across HHI terciles: Results based on ISS data to construct the E-index show a negative and statistically significant coefficient on the E-index in non-competitive industries only, confirming GM (2011)'s results. In contrast, results that use corrected data to construct the E-index show no significant association between the E-index and ROE, irrespective of the level of product market competition.

We also revisit GM's (2011) analyses on corporate governance and stock returns, firm value, capital expenditures, labor productivity, and cost efficiency. The results are reported in Tables A4 to A11 in the appendix. Overall, we find no large differences between using ISS Governance data or corrected data to construct the E-index in these analyses. GM (2011), in their Table 2, document positive abnormal returns for value- and equally weighted democracy ($E\text{-index} = 0$) – dictatorship ($E\text{-index} \geq 4$) hedge portfolios using a Carhart (1997) four-factor model during the period 1990-1999. Besides, they show that the alpha is monotonically

increasing across HHI terciles: It is small and insignificant in the smallest HHI tercile and large and significant in the highest tercile using either equally or value-weighted portfolios. In Table A4 in the appendix, we reproduce these original results of GM (2011) in Row 1 and contrast abnormal returns from similar democracy-dictatorship hedge portfolio regressions based on either ISS Governance data or corrected data on the E-index for the later 2007-2016 period in Rows 2 and 3. The results confirm our previous findings from revisiting portfolio return analyses by BCF (2009) and BCW (2013) in sections 4.1 and 4.2: The correlation between corporate governance and abnormal stock returns has disappeared post 1999 and neither shows using ISS nor corrected data.

Table A5 reports results from estimating equation (3) with industry-adjusted Tobin's Q as dependent variable. GM (2011) document a negative relationship between the G-index and firm value, which is especially large and significant in non-competitive industries. We reproduce these original results in Columns 1 and 2. Our results, using GM's (2011) original regression set-up with the E-index for the later 2007-2016 period, confirm the negative association between the E-index and firm value, using either ISS or corrected E-index data. The coefficient estimates on the non-interacted E-index and across all HHI dummy interactions are negative and significant using either data. Consequently, conclusions drawn from GM's (2011) firm value regressions translate into later time periods and are not impaired by errors in ISS Governance data.

GM (2011) also show that weakly governed firms in non-competitive industries are associated with higher capital expenditures (capex) between 1990 and 2006. However, when estimating equation (3) with capex as dependent variable in Table A6, we find no differences in capex of poorly versus well governed firms using either ISS Governance or corrected data for the later 2007-2016 period. Coefficient estimates on the E-index and all interactions with HHI dummies are insignificant across all specifications.

Bertrand and Mullainathan (2003) argue that highly entrenched managers tend to enjoy the quiet life, leading to lower productivity and cost efficiency. Consistently, GM (2011) show that weakly governed firms have lower labor productivity and cost efficiency, especially in non-competitive industries. To revisit GM's (2011) analyses on the relationship between corporate governance and labor productivity and cost efficiency, we estimate equation (3) using either labor productivity, input costs, real wages, sales, general, and administrative expenses (SG&A), or research & development (R&D) costs as dependent variables. For all variables, we use the same definitions as GM (2011). Variable definitions can be found in the captions of Tables A6 to A10 in the appendix. The results, reported in Tables A7-A11, show GM's (2011) results mostly translate into the subsequent time periods, independent of whether ISS or corrected data is used to compute the E-index. Hence, data errors in ISS Governance data do not impair conclusions for any of these analyses.

4. Conclusion

The E-index, introduced by Bebchuk, Cohen, and Ferrell (2009), is one of the most widely used proxy variables for corporate governance in empirical (corporate) finance research. Since 2007, data underlying the six provisions in the E-index is provided by Institutional Shareholder Services Inc. (ISS). In this paper, we cross-check and, if necessary, correct ISS data to construct a corrected E-index. We then show that ISS Governance data contain a significant number of measurement errors and misreported values. Most important, we find that in 9,912 of 14,843 firm-year observations in our sample, or 67% of the sample, the corrected E-index deviates from the index derived from ISS data.

We conduct a series of empirical tests to analyze and illustrate the importance of using corrected data to construct the E-index. Specifically, we revisit key analyses conducted in three well-known and widely-cited studies that use the E-index as a proxy for corporate governance: BCF (2009), BCW (2013), and GM (2011). Outcome variables analyzed in these studies include

firm value, operating performance, abnormal stock returns, analyst earnings forecasts, labor productivity, cost efficiency, capital expenditures, and product market competition. In these tests, we first reproduce the original results published in these studies. We then re-estimate the original regression set-up for the time period 2007-2016 using either ISS Governance data or our corrected data to construct the E-index. Our empirical tests show that using ISS data leads to incorrect conclusions with respect to different measures of operating performance, specifically, the return on assets, net profit margin, sales growth, and the return on equity, as well as with respect to analysts' earnings forecasts. Moreover, we show that errors in ISS Governance data have a significant impact on the magnitude of the reported negative association between firm value and the E-index, which is substantially inflated when using ISS data. In summary, researchers should be cautious when using ISS governance data to construct the E-index. Our evidence suggests that some, but not all, conclusions drawn from empirical analysis using ISS data to construct the E-index may be tainted by data errors.

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Table 1: Individual E-index provisions: ISS versus corrected data

This table reports descriptive statistics and the dispersion of E-index provisions across sample years using either ISS or corrected data. Panel A reports mean, median, standard deviation, and 25th and 75th percentiles of the individual E-index provisions based on either ISS data (odd-numbered columns) or corrected data (even-numbered columns). Panel B presents annual relative frequencies of the individual E-index provisions using either ISS data or corrected data. The sample comprises an unbalanced panel of 2,126 firms between 2007 and 2016.

Panel A: Descriptive Statistics of E-index provisions

	Mean		Median		Standard deviation		25th percentile		75th percentile	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Staggered board	0.46	0.41	0	0	0.50	0.49	0	0	0	0
Limits to amend bylaws	0.99	0.43	1	0	0.10	0.49	1	0	1	0
Limits to amend charters	0.99	0.55	1	1	0.09	0.50	1	0	1	1
Supermajority	0.33	0.27	0	0	0.47	0.44	0	0	0	0
Golden parachute	0.75	0.93	1	1	0.43	0.26	0	1	1	1
Poison pill	0.19	0.19	0	0	0.39	0.39	0	0	0	0

Panel B: Dispersion of E-index provisions across sample years

	2007		2008		2009		2010		2011	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
Staggered board	55.3%	50.5%	53.8%	46.9%	51.8%	44.7%	50.2%	42.5%	45.2%	40.5%
Limits to amend bylaws	100%	43.2%	100%	42.9%	100%	41.9%	88.8%	41.8%	100%	40.6%
Limits to amend charters	100%	56.8%	100%	56.5%	100%	56.0%	91.5%	54.7%	100%	53.8%
Supermajority	81.1%	34.9%	79.2%	33.1%	29.5%	32.1%	55.4%	32.4%	38.7%	29.2%
Golden parachute	51.5%	89.4%	33.4%	90.6%	80.3%	91.8%	81.8%	91.4%	82.4%	91.8%
Poison pill	37.5%	39.4%	33.6%	33.7%	26.6%	26.4%	20.9%	20.8%	16.7%	16.9%

Table 1 continued

Panel B: Dispersion of E-index provisions across sample years

	2012		2013		2014		2015		2016	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
Staggered board	42.8%	37.2%	39.7%	33.9%	36.4%	32.4%	34.0%	32.1%	32.6%	32.7%
Limits to amend bylaws	100%	40.3%	100%	39.8%	100%	40.6%	100%	39.5%	100%	38.8%
Limits to amend charters	100%	53.2%	100%	52.8%	100%	52.8%	100%	52.1%	100%	52.4%
Supermajority	34.2%	22.8%	22.8%	21.5%	20.1%	20.9%	19.5%	20.4%	18.8%	20.0%
Golden parachute	81.8%	92.2%	82.3%	92.9%	82.6%	93.3%	77.5%	92.9%	82.7%	93.5%
Poison pill	13.7%	13.6%	10.7%	10.7%	9.8%	9.9%	7.7%	7.5%	4.9%	5.6%

Table 2: E-index scores: ISS versus corrected data

This table reports descriptive statistics and the dispersion of E-index scores across sample years using either ISS or corrected data. Panel A and B report mean, median, standard deviation, and 25th and 75th percentiles of the E-index which is constructed using either ISS data (odd-numbered columns) or corrected data (even-numbered columns). Panel A shows descriptive statistics for the categorical E-index variable. Panel B shows descriptive statistics across the dispersion of E-index scores. Panel C presents annual relative frequencies of different E-index scores contrasting the annual percentage of firms with E-index scores of zero to six for corrected data to percentages reported by ISS. The sample comprises an unbalanced panel of 2,126 firms between 2007 and 2016.

Panel A and B: Descriptive Statistics of E-index scores

	Mean		Median		Standard deviation		25th percentile		75th percentile	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: E-index										
E-Index	3.49	2.72	3	3	1.07	1.49	3	1	3	3
Panel B: E-index distribution										
E-index = 0	0.00	0.03	0	0	0.04	0.17	0	0	0	0
E-index = 1	0.02	0.25	0	0	0.15	0.43	0	0	0	0
E-index = 2	0.14	0.17	0	0	0.35	0.38	0	0	0	0
E-index = 3	0.35	0.21	0	0	0.48	0.41	0	0	0	0
E-index = 4	0.31	0.21	0	0	0.46	0.41	0	0	0	0
E-index = 5	0.14	0.10	0	0	0.35	0.30	0	0	0	0
E-index = 6	0.03	0.02	0	0	0.16	0.15	0	0	0	0

Table 2 continued

Panel C: Dispersion of E-index scores across sample years

E-index score	2007		2008		2009		2010		2011	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
E-index = 0	0.77%	3.7%	0.48%	3.50%	0.14%	2.99%	0.00%	3.44%	0.00%	3.27%
E-index = 1	4.75%	17.61%	5.89%	19.40%	2.51%	22.12%	2.50%	23.77%	2.18%	26.39%
E-index = 2	17.19%	17.82%	22.69%	18.44%	13.23%	18.25%	13.64%	17.83%	11.29%	17.07%
E-index = 3	28.93%	19.36%	30.57%	18.51%	29.24%	18.52%	30.38%	18.77%	33.06%	19.80%
E-index = 4	24.81%	18.59%	21.25%	20.01%	30.05%	20.76%	29.98%	21.34%	32.59%	21.77%
E-index = 5	18.17%	16.49%	15.76%	15.70%	20.15%	13.91%	19.78%	12.22%	17.69%	9.73%
E-index = 6	5.38%	6.43%	3.36%	4.46%	4.68%	3.46%	3.71%	2.63%	3.20%	1.97%
E-index score	2012		2013		2014		2015		2016	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
E-index = 0	0.00%	3.55%	0.13%	3.18%	0.07%	3.15%	0.07%	3.27%	0.07%	3.14%
E-index = 1	1.81%	28.20%	1.59%	29.67%	1.21%	30.14%	1.53%	31.29%	1.13%	32.22%
E-index = 2	12.46%	17.15%	14.04%	17.35%	14.53%	18.22%	16.28%	19.15%	14.14%	18.81%
E-index = 3	35.30%	21.97%	39.47%	23.38%	42.60%	23.11%	45.03%	21.68%	48.10%	22.35%
E-index = 4	33.22%	20.90%	34.24%	20.07%	33.02%	19.36%	30.02%	19.28%	30.95%	18.75%
E-index = 5	15.07%	7.37%	9.87%	5.63%	8.17%	5.22%	6.80%	4.87%	5.40%	4.34%
E-index = 6	2.14%	0.87%	0.66%	0.73%	0.40%	0.80%	0.27%	0.47%	0.20%	0.40%

Table 3: Correlation of single E-index provisions

This table reports pairwise correlations between the ISS database and our corrected dataset of the six individual provisions. The sample comprises an unbalanced panel of 2,126 firms between 2007 and 2016.

Pairwise Correlation ISS - Corrected	Staggered board	Limits to amend bylaws	Limits to amend charters	Supermajority requirement for mergers	Golden parachute	Poison pill
Staggered board	0.90					
Limits to amend bylaws		0.07				
Limits to amend charters			0.08			
Supermajority				0.84		
Golden parachute					0.43	
Poison pill						0.98

Table 4: E-index scores across firm characteristics

This table presents the mean (and median for product market competition) E-index score within firm deciles for ISS and corrected data according to firm size, firm age, firm value, operating performance, forecast error, labor productivity, input costs, capex, and product market competition. Firm size is defined as the stock price per share times shares outstanding, firm age is the natural logarithm of the time in years since the first observation is reported in CRSP, and firm value is measured by Tobin's Q defined as the market value of assets divided by the book value of assets. Operating performance is net income divided by the book value of total assets, forecast error is measured as the difference between actual and forecasted earnings per share both scaled by assets per share, and labor productivity is the logarithm of sales divided by the number of employees and adjusted for the U.S. Bureau of Labor Statistics' consumer price index. Input costs are costs of goods sold divided by sales and capex is the ratio of capital expenditures to assets. Product market competition is measured by the Herfindahl-Hirschman index which is the sum of squared market shares based on the sales of each firm in a specific industry (FF48) per year. The sample comprises an unbalanced panel of 2,126 firms between 2007 and 2016.

Decile	Firm Size		Firm Age		Firm Value		Operating Performance		Forecasting Error	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
1	3.5	2.8	3.3	2.9	3.7	2.8	3.6	2.8	3.5	2.8
2	3.6	2.9	3.3	3.1	3.6	2.8	3.6	2.9	3.5	2.8
3	3.6	2.9	3.3	3.0	3.5	2.7	3.6	2.8	3.5	2.7
4	3.6	2.9	3.5	3.0	3.5	2.8	3.6	2.9	3.4	2.6
5	3.6	2.9	3.5	3.0	3.6	2.9	3.5	2.8	3.5	2.7
6	3.6	2.9	3.6	3.0	3.4	2.7	3.5	2.7	3.6	2.8
7	3.6	2.9	3.5	2.8	3.5	2.8	3.5	2.8	3.5	2.7
8	3.5	2.7	3.5	2.6	3.4	2.7	3.4	2.7	3.5	2.6
9	3.4	2.5	3.4	2.4	3.4	2.5	3.4	2.5	3.5	2.8
10	3.0	1.8	3.5	2.7	3.2	2.4	3.3	2.4	3.5	2.7
Total	3.49	2.71	3.49	2.71	3.49	2.72	3.49	2.72	3.49	2.71

Decile	Labor Productivity		COGS		Capex		Competition - Mean		Competition - Median	
	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected	ISS	Corrected
1	3.5	2.8	3.4	2.5	3.5	2.8	3.5	2.7	3	3
2	3.6	2.7	3.4	2.6	3.5	2.7	3.4	2.7	3	3
3	3.4	2.5	3.4	2.5	3.5	2.7	3.5	2.7	4	3
4	3.5	2.7	3.4	2.7	3.5	2.7	3.4	2.7	3	3
5	3.5	2.7	3.5	2.8	3.6	2.9	3.5	2.8	3	3
6	3.5	2.7	3.6	2.9	3.5	2.7	3.5	2.7	3	3
7	3.4	2.6	3.6	2.8	3.5	2.6	3.5	2.6	4	3
8	3.5	2.8	3.6	2.9	3.4	2.5	3.5	2.6	3	3
9	3.5	2.9	3.5	2.8	3.5	2.8	3.6	2.8	4	3
10	3.5	2.8	3.5	2.7	3.5	2.7	3.5	2.7	3	3
Total	3.49	2.71	3.49	2.72	3.49	2.72	3.49	2.72	3	3

Table 5: The E-index and firm value – BCF (2009)

This table reports coefficient estimates and standard errors (in parentheses) from pooled OLS regressions of the log of industry-adjusted Tobin's Q on several control variables and two specifications of the E-index. Tobin's Q is defined as the market value of assets divided by the book value of assets. The market value of assets is defined as the sum of the book value of assets and the market value of common stock minus the book value of common stock and deferred taxed. To adjust for industry, we subtract the median Tobin's Q of a firm's two-digit SIC Code. We include the E-index as a categorical variable and as a set of dummy variables that equal one if a firm has an E-index of 1, 2, 3, 4, or 5 and 6 and equal zero if not. Additional control variables are firm size, defined as the log of firm assets, the log of firm age according to the first observation reported in CRSP, a Delaware dummy, insider ownership, defined as the percentage of total shares owned by executives and directors, the square of insider ownership, return on assets which is net income divided by the book value of assets, capital expenditures divided by assets, leverage, defined as the sum of long-term debt and debt due in one year divided by total assets, R&D expenditures divided by sales, and a dummy for missing R&D data (which is not reported). Columns 1 and 2 reproduce original results of BCF (2009) for the 1992-2002 sample period, which additionally control for the O-index defined as the G-index minus the E-index. Columns 3 and 4 report coefficient estimates and standard errors using ISS Governance data to construct the E-index. Columns 5 and 6 use corrected E-index data. The sample in model 2 and 3 comprises an unbalanced panel of 1,807 firms during the period 2007-2016. All regressions include year fixed effects. We use White (1980) robust standard errors. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	BCF (2009)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
E-index	-0.044 *** (0.004)		-0.014 *** (0.001)		-0.008 *** (0.001)	
E-index 1		-0.092 *** (0.023)		-0.030 (0.029)		-0.035 *** (0.010)
E-index 2		-0.146 *** (0.022)		-0.060 ** (0.027)		-0.051 *** (0.010)
E-index 3		-0.155 *** (0.022)		-0.082 *** (0.027)		-0.059 *** (0.010)
E-index 4		-0.206 ** (0.023)		-0.097 *** (0.027)		-0.057 *** (0.010)
E-index 5-6		-0.282 *** (0.027)		-0.099 *** (0.027)		-0.065 *** (0.011)
O-index	0.010 *** (0.003)	0.010 *** (0.003)				
Log (Assets)	0.015 *** (0.004)	0.015 *** (0.004)	-0.014 *** (0.001)	-0.014 *** (0.001)	-0.014 *** (0.001)	-0.015 *** (0.001)
Log (Company Age)	-0.048 *** (0.008)	-0.047 *** (0.008)	-0.012 *** (0.002)	-0.012 *** (0.002)	-0.014 *** (0.002)	-0.014 *** (0.002)
Delaware Incorp.	-0.03 *** (0.01)	-0.028 *** (0.01)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Insider Ownership	0.001 (0.001)	0.001 (0.001)	0.048 ** (0.019)	0.053 *** (0.019)	0.049 *** (0.019)	0.054 *** (0.019)
Insider Ownership ²	-0.000 (0)	-0.000 (0)	-0.058 ** (0.023)	-0.063 *** (0.023)	-0.060 *** (0.023)	-0.065 *** (0.023)
ROA	0.008 (0.009)	0.008 (0.009)	0.525 *** (0.051)	0.524 *** (0.051)	0.530 *** (0.513)	0.528 *** (0.051)
CAPEX/Assets	0.994 *** (0.089)	1.00 *** (0.09)	0.123 *** (0.028)	0.117 *** (0.028)	0.122 *** (0.028)	0.122 *** (0.028)
Leverage	-0.544 *** (0.046)	-0.553 *** (0.046)	-0.033 * (0.018)	-0.034 * (0.018)	-0.361 ** (0.018)	-0.034 * (0.018)
R&D per Sales	0.002 ** (0.001)	0.001 * (0.001)	0.082 *** (0.010)	0.083 *** (0.010)	0.082 *** (0.010)	0.082 *** (0.010)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# observations	8,015	8,015	12,398	12,398	12,398	12,398
R ²	0.096	0.098	0.174	0.175	0.172	0.173
Time Period	1992-2002	1992-2002	2007-2016	2007-2016	2007-2016	2007-2016

Table 6: The E-index and firm value – BCF (2009) with firm fixed effects

This table reports coefficient estimates and standard errors (in parentheses) from fixed-effect regressions of the log of industry-adjusted Tobin's Q on several control variables and two specifications of the E-index. Tobin's Q is defined as the market value of assets divided by the book value of assets. The market value of assets is defined as the sum of the book value of assets and the market value of common stock minus the book value of common stock and deferred taxed. To adjust for industry, we subtract the median Tobin's Q of a firm's two-digit SIC Code. We include the E-index as a categorical variable and as a set of dummy variables that equal one if a firm has an E-index of 1, 2, 3, 4, or 5 and 6 and equal zero if not. Additional control variables are firm size, defined as the log of firm assets, the log of firm age according to the first observation reported in CRSP, a Delaware dummy, insider ownership, defined as the percentage of total shares owned by executives and directors, the square of insider ownership, return on assets which is net income divided by the book value of assets, capital expenditures divided by assets, leverage, defined as the sum of long-term debt and debt due in one year divided by total assets, R&D expenditures divided by sales, and a dummy for missing R&D data (which is not reported). Columns 1 and 2 reproduce original results of BCF (2009) for the 1992-2002 sample period. Columns 3 and 4 report coefficient estimates and standard errors using ISS Governance data to construct the E-index. Columns 5 and 6 use corrected E-index data. The sample in model 2 and 3 comprises an unbalanced panel of 1,807 firms during the period 2007-2016. All regressions include year and firm fixed effects. We use White (1980) robust standard errors. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	BCF (2009)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
E-index	-0.020 *** (0.007)		0.002 (0.002)		0.001 (0.002)	
E-index 1		-0.056 ** (0.022)		-0.071 *** (0.023)		0.030 (0.028)
E-index 2		-0.065 *** (0.025)		-0.069 *** (0.024)		0.036 (0.030)
E-index 3		-0.077 *** (0.029)		-0.064 *** (0.024)		0.038 (0.030)
E-index 4		-0.104 *** (0.031)		-0.063 *** (0.024)		0.043 (0.030)
E-index 5-6		-0.107 *** (0.040)		-0.058 ** (0.025)		0.030 (0.031)
Log (Assets)	-0.119 *** (0.014)	-0.118 *** (0.014)	-0.073 *** (0.006)	-0.073 *** (0.006)	-0.072 *** (0.006)	-0.072 *** (0.006)
Log (Company Age)	-0.026 (0.031)	-0.026 (0.031)	-0.059 *** (0.014)	-0.059 *** (0.014)	-0.058 *** (0.014)	-0.057 *** (0.014)
Delaware Incorp.	0.004 (0.04)	0.008 (0.04)				
Insider Ownership	0.005 *** (0.002)	0.005 *** (0.002)	0.003 (0.019)	0.003 (0.019)	0.002 (0.019)	0.002 (0.019)
InsiderOwnership ²	-0.000 * (0)	-0.000 * (0)	-0.002 (0.021)	-0.002 (0.021)	-0.002 (0.021)	-0.002 (0.021)
ROA	0.019 (0.015)	0.019 (0.015)	0.090 *** (0.022)	0.090 *** (0.022)	0.090 *** (0.022)	0.090 *** (0.022)
CAPEX/Assets	0.868 *** (0.120)	0.869 *** (0.120)	-0.023 (0.046)	-0.026 (0.045)	-0.024 (0.046)	-0.026 (0.046)
Leverage	-0.426 *** (0.047)	-0.427 *** (0.047)	0.002 (0.021)	0.001 (0.021)	0.002 (0.021)	0.004 (0.020)
R&D per Sales	-0.001 ** (0.001)	-0.001 ** (0.001)	0.020 (0.012)	0.020 (0.012)	0.020 (0.012)	0.020 (0.012)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# observations	8,015	8,015	12,398	12,398	12,398	12,398
R ²	0.704	0.804	0.764	0.772	0.762	0.781
Time Period	1992-2002	1992-2002	2007-2016	2007-2016	2007-2016	2007-2016

Table 7: The E-index and stock returns – BCF (2009)

This table presents monthly alphas and robust standard errors (in parentheses) from time-series Carhart (1997) four-factor model regressions of different trading strategies that go long in firms with low E-index scores and short in firms with high E-index scores. Low E-index scores range from zero to two and high E-index scores range from three to six. The dependent variable, y_{it} , is the respective monthly long-short hedge portfolio excess return in %. The following risk factors are included but not displayed: *RMRF* is the monthly value-weighted return of all CRSP firms in excess of the risk-free rate and *SMB* is the return of a zero-investment size portfolio. *HML* and *MOM* are the returns of a zero-investment book-to-market and momentum portfolio, respectively. Columns 1 and 2 reproduce original results of BCF (2009) for the period 1990-2003. Columns 3 and 4 report alphas and associated standard errors when using ISS Governance data to construct the E-index, Columns 5 and 6 use corrected E-index data. The sample period in Columns 3 to 6 is from 2007 to 2016. The table reports results from equal- and value-weighted long-short portfolios. Value-weighted long – short portfolios are constructed using the previous month's stock market capitalization. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	Baseline Model					
	BCF (2009)		ISS		Corrected	
	Equal-weight	Value-weight	Equal-weight	Value-weight	Equal-weight	Value-weight
Long-short portfolios	(1)	(2)	(3)	(4)	(5)	(6)
Index 0 - Index 5-6	0.60 *** (0.185)	0.84 *** (0.224)	0.05 (0.892)	0.16 (0.986)	0.16 (0.183)	0.20 (0.255)
Index 0 - Index 4-5-6	0.39 *** (0.145)	0.57 *** (0.186)	0.04 (0.883)	0.08 (0.962)	0.14 (0.151)	0.21 (0.229)
Index 0-1 - Index 4-5-6	0.42 *** (0.133)	0.52 *** (0.157)	-0.05 (0.087)	0.10 (0.207)	0.00 (0.073)	0.12 (0.136)
Index 0-1 - Index 3-4-5-6	0.37 *** (0.107)	0.41 *** (0.132)	-0.07 (0.075)	0.08 (0.199)	-0.02 (0.064)	0.10 (0.114)
Index 0-1-2 - Index 3-4-5-6	0.27 *** (0.085)	0.37 *** (0.117)	-0.07 (0.075)	0.01 (0.130)	0.02 (0.062)	0.08 (0.105)
Time Period	1990-2003	1990-2003	2007-2016	2007-2016	2007-2016	2007-2016

Table 8: The E-index, firm value, and operating performance – BCW (2013)

This table reports coefficient estimates and standard errors (in parentheses) from pooled OLS regressions of the log of industry-adjusted Tobin's Q and several industry-adjusted operating performance measures on control variables and two governance measures based on the E-index. Each cell in the table represents the coefficient on the respective governance variable using the respective dependent variable on the left. Tobin's Q is defined as the market value of assets divided by the book value of assets. The market value of assets is defined as the sum of the book value of assets and the market value of common stock minus the book value of common stock and deferred taxed. Operating performance measures include ROA, defined as net income before extraordinary items divided by assets, 5-Yr, 3-Yr, and 1-Yr sales growth (the percentage change in sales over the respective previous period in years), and NPM which is net income before extraordinary items divided by sales. All dependent variables are industry-median-adjusted based on a Fama-French (1997) 48 industry classification. The following controls are used in all regressions: log of total assets, the log of the firm's age, a dummy for firms incorporated in Delaware, insider ownership (fraction of shares held by executives and directors) and the square of insider ownership, capex relative to assets, R&D per sales, and a dummy for missing R&D or insider data. Q regressions additionally control for ROA, as defined above, and leverage, defined as the sum of long-term debt and debt due in one year divided by total assets. ROA, sales growth, and NPM regressions additionally control for the log of the book-to-market ratio from the previous year. Panel A reports regression estimates on the E-index as categorical variable and Panel B reports estimates on a democracy dummy that is equal to one if a firm's E-index is zero. The first two columns reproduce original results of BCW (2013) for the 1990-2001 and 2002-2008 sample period. Column 3 reports coefficient estimates and standard errors using ISS Governance data to construct the E-index. Column 4 uses corrected E-index data. The sample period in Columns 3 and 4 is from 2007 to 2016. All regressions control for year and industry fixed effects. We use two-way cluster robust standard errors, clustering by firm and year, that appear below the coefficient estimate. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	BCW (2011)		ISS		Corrected
	(1)	(2)	(3)		(4)
Panel A: E-index					
Q	-0.0255 *** (0.007)	-0.0247 *** (0.006)	-0.0610 *** (0.016)		-0.0368 *** (0.011)
ROA	-0.0026 * (0.001)	-0.0036 *** (0.001)	-0.0027 ** (0.001)		-0.0015 * (0.001)
5-Yr sales growth	-0.1164 *** (0.028)	-0.0866 ** (0.034)	-0.0157 (0.015)		-0.0190 * (0.010)
3-Yr sales growth	-0.0302 *** (0.010)	-0.0219 ** (0.010)	-0.0042 (0.005)		-0.0060 (0.004)
1-Yr sales growth	-0.0047 * (0.002)	-0.0030 (0.002)	-0.0011 (0.002)		-0.0012 (0.001)
NPM	-0.0011 (0.001)	-0.0031 ** (0.001)	-0.0022 (0.002)		-0.0014 (0.002)
Panel B: Democracy					
Q	0.1003 *** (0.036)	0.1341 *** (0.044)	0.2696 *** (0.074)		0.2079 * (0.107)
ROA	0.0090 (0.009)	0.0386 *** (0.014)	0.0103 (0.006)		0.0122 * (0.007)
5-Yr sales growth	0.6159 ** (0.248)	0.9458 *** (0.263)	-0.1629 (0.206)		0.0242 (0.093)
3-Yr sales growth	0.1723 ** (0.082)	0.2496 *** (0.061)	-0.2104 *** (0.049)		-0.0115 (0.042)
1-Yr sales growth	0.0190 (0.020)	0.0286 *** (0.007)	-0.0547 ** (0.024)		-0.0030 (0.010)
NPM	0.0050 (0.008)	0.0355 *** (0.012)	0.0262 (0.015)		0.0294 ** (0.012)
Controls	Yes	Yes	Yes		Yes
Year fixed effects	Yes	Yes	Yes		Yes
Industry fixed effects	Yes	Yes	Yes		Yes
Time Period	1990- 2001	2002- 2008	2007- 2016		2007- 2016

Table 9: The E-index and analysts' forecast errors – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of either actual annual earnings per share (EPS), the mean I/B/E/S consensus forecast of annual EPS, or the forecast error (difference between actual and forecasted EPS), all scaled by lagged total assets for firm *i* in year *t*, on a set of control variables and a dictatorship dummy. Columns 1 to 3 reproduce original results of GM (2011) that use the G-index to classify dictatorship firms (G-index of 14 or higher) and democracy firms (G-index of 5 or lower) for the sample period 1991-1999. Columns 4 to 6 use ISS Governance data and Columns 7-8 corrected data on the E-index to classify dictatorship firms (E-index of 4 or higher) and democracy firms (E-index of 0) for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm assets, and the natural logarithm of the previous year's book-to-market ratio defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Panel A reports coefficient estimates on the non-interacted dictatorship dummy. In Panel B the dictatorship dummy is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. All regressions include year and industry fixed effects. Coefficient estimates are multiplied by 100. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. The sample only includes dictatorship and democracy firms. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	GM (2011)			ISS			Corrected		
	Actual	Forecast	Error	Actual	Forecast	Error	Actual	Forecast	Error
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Non-interacted regressions									
Dictatorship	-0.57 *	-0.48	-0.09	-0.47	-0.56	0.09	1.90	1.67	0.23 **
	(1.66)	(1.25)	(0.69)	(-0.23)	(-0.25)	(0.29)	(1.05)	(0.92)	(2.05)
Panel B: Interaction with HHI dummies									
Dictatorship x HHI	0.23	0.13	0.10	3.60 *	4.58 *	-0.99 **	0.28	0.15	0.13
(low)	(0.31)	(0.19)	(0.72)	(1.81)	(1.92)	(-2.25)	(0.23)	(-0.12)	(1.06)
Dictatorship x HHI	0.11	0.04	0.07	-2.50	-3.15 *	0.65 ***	2.52	2.51	0.01
(medium)	(0.21)	(0.08)	(0.31)	(-1.50)	(-1.94)	(4.38)	(1.23)	(-1.22)	(0.04)
Dictatorship x HHI	-2.02 ***	-1.59 **	-0.43 *	-0.09	0.10	-0.19	3.39	2.76	0.63 **
(high)	(2.71)	(2.16)	(1.81)	(0.06)	(0.08)	(-0.44)	(0.91)	(-0.77)	(2.34)
HHI medium	0.79	0.57	0.22	-1.07	-0.95	-0.12	-3.35	-3.16	-0.19
	(1.14)	(1.12)	(0.59)	(-1.11)	(-0.98)	(-0.89)	(-1.24)	(-1.16)	(-1.26)
HHI high	2.30 ***	0.99 *	1.31 **	-1.11	-1.27	0.16	-0.13	-0.29	0.15
	(2.71)	(1.70)	(2.15)	(-0.86)	(-1.00)	(0.35)	(-0.04)	(-0.09)	(0.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,071	1,071	1,071	5,478	5,478	5,478	4,090	4,090	4,090
Adj. R ²	0.40	0.43	0.11	0.03	0.03	0.04	0.03	0.03	0.02
Index	G-index	G-index	G-index	E-index	E-index	E-index	E-index	E-index	E-index
Time Period	1991-1999	1991-1999	1991-1999	2007-2016	2007-2016	2007-2016	2007-2016	2007-2016	2007-2016

Table 10: The E-index and operating performance: return on assets – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted return on assets (ROA), defined as a firm's net income divided by its total assets less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. ROA is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	ROA					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.066 *** (2.88)		-0.268 ** (-2.42)		-0.130 (-1.61)	
G-index/E-index x HHI (low)		-0.001 (0.02)		0.033 (-0.20)		-0.051 (-0.56)
G-index/E-index x HHI (medium)		-0.076 ** (2.02)		-0.377 ** (-2.14)		-0.222 (-1.42)
G-index/E-index x HHI (high)		-0.137 *** (4.34)		-0.391 ** (-2.20)		-0.117 (-1.01)
HHI medium		0.877 (1.48)		0.896 (1.07)		0.207 (0.45)
HHI high		1.051 * (1.75)		0.470 (0.46)		-0.563 (-0.92)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,699	17,699	12,394	12,394	12,394	12,394
Adj. R ²	0.32	0.32	0.49	0.49	0.49	0.49
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table 11: The E-index and operating performance: net profit margin – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted net profit margin (NPM), defined as a firm's ratio of net income to sales less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. NPM is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	NPM					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.108 *** (3.47)		-0.264 ** (-1.99)		-0.132 (-1.32)	
G-index/E-index x HHI (low)		-0.011 (0.21)		0.029 (-0.11)		-0.156 (-1.15)
G-index/E-index x HHI (medium)		-0.139 ** (2.14)		-0.629 (-1.55)		-0.272 (-0.88)
G-index/E-index x HHI (high)		-0.192 *** (2.87)		-0.085 (-0.29)		0.053 (0.25)
HHI medium		1.518 (1.21)		1.442 (0.70)		-0.249 (-0.20)
HHI high		1.633 * (1.87)		-0.849 (-0.65)		-1.529 * (-1.83)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,699	17,699	12,394	12,394	12,394	12,394
Adj. R ²	0.23	0.23	0.50	0.50	0.50	0.50
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table 12: The E-index and operating performance: sales growth – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted sales growth, defined as a firm's percentage change in sales over the previous five years less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. Sales growth is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 10. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Sales Growth					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.064 ** (2.35)		-0.213 (-1.39)		-0.226 ** (-2.07)	
G-index/E-index x HHI (low)		-0.004 (0.07)		-0.026 (-0.12)		-0.023 (-0.16)
G-index/E-index x HHI (medium)		-0.096 *** (2.65)		-0.126 (-0.42)		-0.346 ** (-2.31)
G-index/E-index x HHI (high)		-0.109 *** (3.06)		-0.517 ** (-2.47)		-0.322 (-1.64)
HHI medium		1.414 ** (2.05)		0.519 (0.43)		0.999 (1.57)
HHI high		1.975 *** (2.72)		2.194 ** (2.00)		1.237 (1.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,699	17,699	11,725	11,725	11,725	11,725
Adj. R ²	0.24	0.24	0.14	0.14	0.14	0.14
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table 13: The E-index and operating performance: return on equity – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted return on equity (ROE), defined as a firm's net income divided by its book value of common stock less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. ROE is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	ROE					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.010 (0.30)		-0.429 * (-1.66)		-0.285 (-1.40)	
G-index/E-index x HHI (low)		0.054 (0.87)		-0.338 (-0.74)		-0.191 (-0.72)
G-index/E-index x HHI (medium)		-0.004 (0.05)		0.007 (-0.02)		-0.132 (-0.33)
G-index/E-index x HHI (high)		-0.099 * (1.93)		-1.023 * (-1.87)		-0.564 (-1.55)
HHI medium		0.771 (0.65)		-1.456 (-0.65)		-0.516 (-0.35)
HHI high		1.926 * (1.74)		0.968 (0.34)		-0.430 (-0.20)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,699	17,699	12,394	12,394	12,394	12,394
Adj. R ²	0.24	0.24	0.21	0.21	0.21	0.21
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Figure 1: Average E-index over time

This figure plots the time series of mean E-index scores for the years 2007 to 2016. The blue line shows mean E-index scores when using ISS data to construct the E-index. The red line depicts mean E-index scores when using corrected data to construct the E-index.

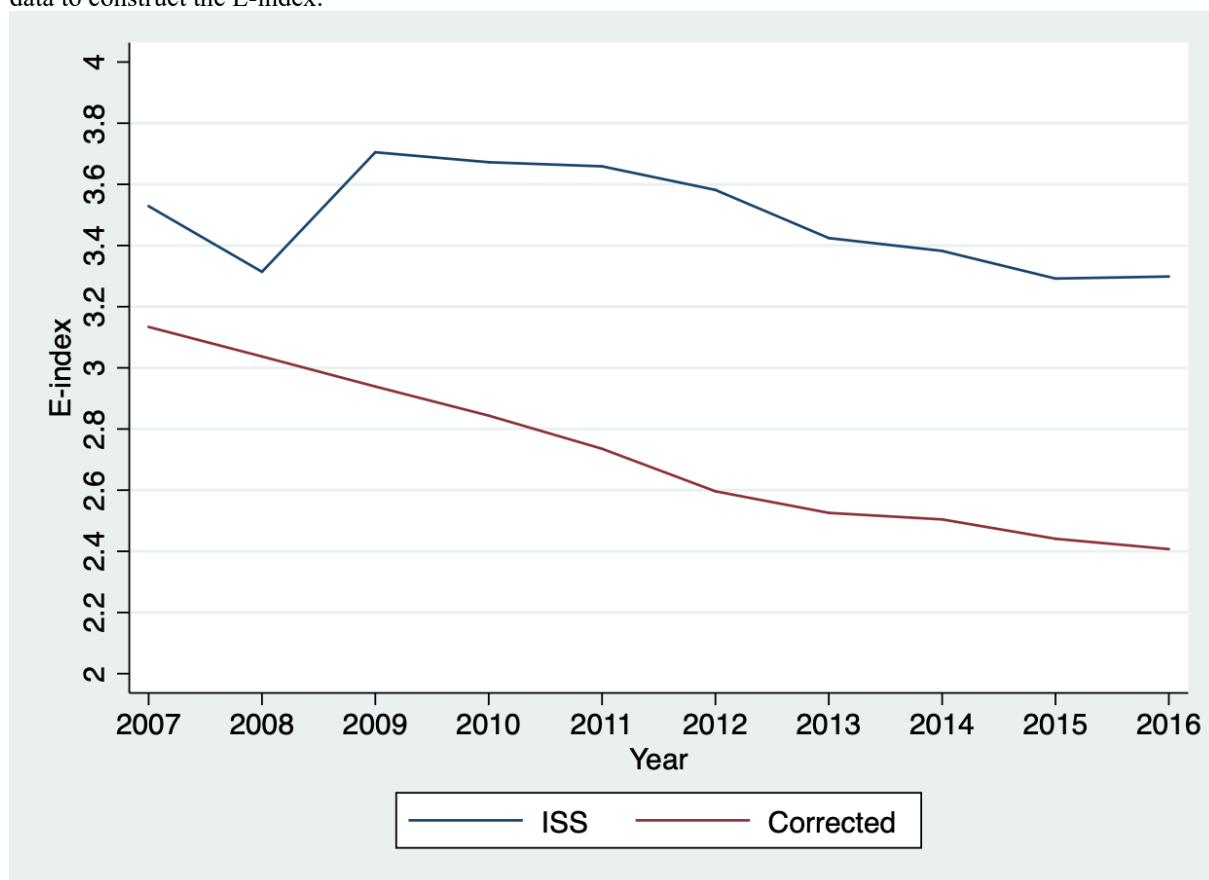


Figure 2: Distribution of E-index changes after correcting errors in ISS Governance data

This figure plots the fraction of firm-year observations according to the magnitude of the change in the E-index score after correcting errors in ISS Governance data. A value of 0 indicates no change in a firm's E-index score after correcting ISS data. The sample comprises an unbalanced panel of 2,126 firms between 2007 and 2016.

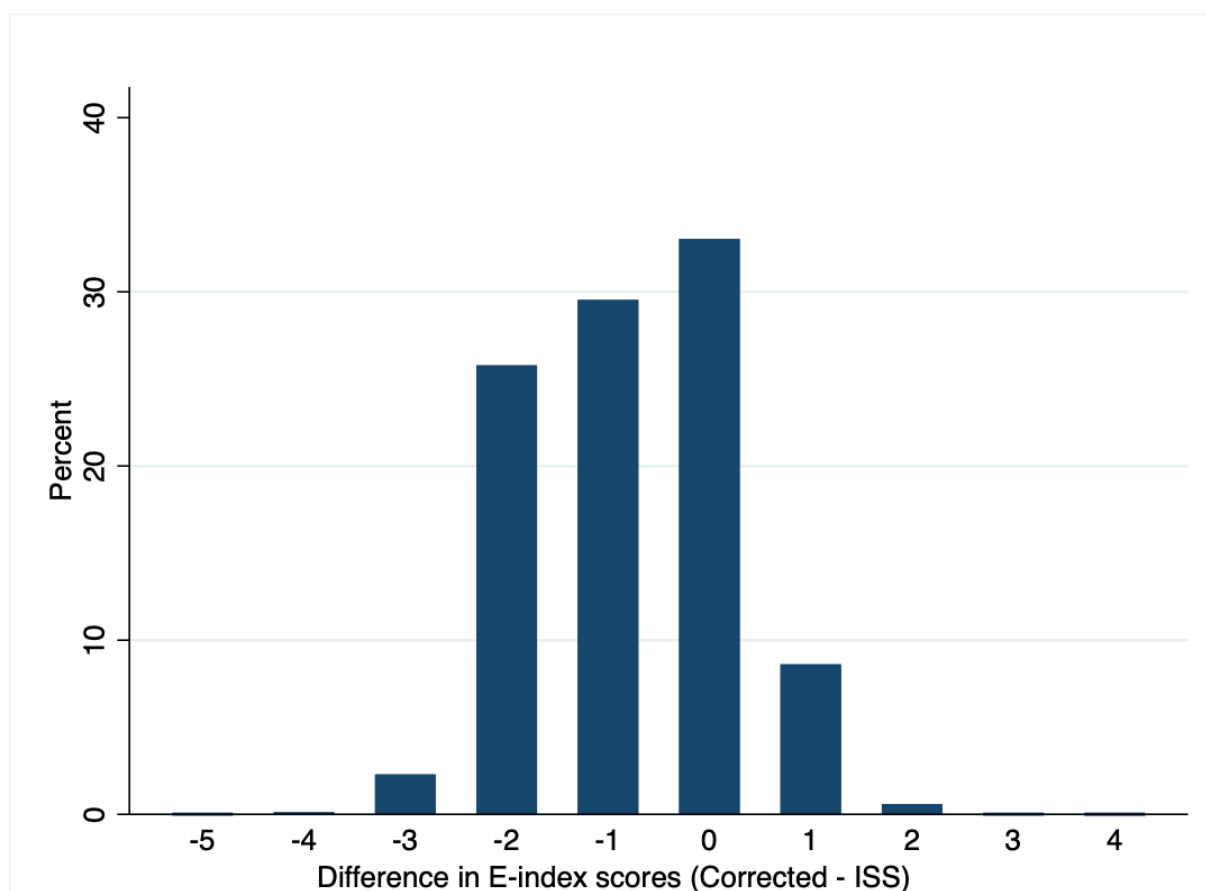


Table A1: Overview of ISS classifications

This table shows how ISS classifies data on the six shareholder provisions that constitute the E-index into missing, “yes”, “no”, and zero over the period from 2007 to 2016. For each provision, the column *Missing* tabulates the number of firm-year observations that are missing in ISS data. The column *Yes* indicates the number of firm-year observations for which ISS reports the existence of the respective provisions and the column *No* indicates the number of firm-year observations for which ISS reports that the respective provision does not exist. For percentage variables we translated the reported percentage into a *Yes* if it is above 51%, and into a *No* if it is equal to or below 51%. ISS additionally reports a value of zero for percentage variables. The number of these firm-year observations is reported in the column *Zero*.

	Missing	Yes	No	Zero
Staggered board	8,302	6,541	0	-
Limits to amend bylaws	1,609	13,070	164	-
Percentage to amend bylaws	2,594	5,781	4,120	2,348
Limits to amend charters	863	13,854	126	-
Percentage to amend charters	958	7,929	5,701	255
Supermajority (percentage)	2,228	6,910	3,962	1,743
Golden parachute	3,885	10,958	0	-
Poison pill	12,165	2,678	0	-

Table A2: The E-index and stock returns – BCW (2013)

This table presents monthly alphas and robust standard errors (in parentheses) from time-series Carhart (1997) four-factor model regressions of hedge portfolios that go long in democracy firms and short in dictatorship firms. The dependent variable, y_{it} , is the monthly democracy-dictatorship hedge portfolio excess return in %. Democracy firms are firms with an E-index of zero, dictatorship firms are firms with an E-index of five or six. The following risk factors are included but not displayed: *RMRF* is the monthly value-weighted return of all CRSP firms in excess of the risk-free rate and *SMB* is the return of a zero-investment size portfolio. *HML* and *MOM* are the returns of a zero-investment book-to-market and momentum portfolio, respectively. Columns 1 and 2 reproduce original results of BCW (2013) for the periods 1990-1999, 2000-2008, and 1990-2008. Columns 3 and 4 report alphas and associated standard errors when using ISS Governance data to construct the E-index, Columns 5 and 6 use corrected E-index data. The sample period in Columns 3 to 6 is from 2007 to 2016. The table reports results from equal-weighted (EW) and value-weighted (VW) democracy-dictatorship hedge portfolios. Value-weighted portfolios are constructed using the previous month's stock market capitalization. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Periods	Democracy (E) - Dictatorship (E)					
	BCW (2013)		ISS		Corrected	
	VW	EW	VW	EW	VW	EW
	(1)	(2)	(3)	(4)	(5)	(6)
1990-1999	0.0123 *** (0.003)	0.0060 *** (0.002)				
2000-2008	0.0026 (0.002)	0.0035 (0.002)				
1990-2008	0.0069 *** (0.002)	0.0041 ** (0.002)				
2007-2016			0.0016 (0.986)	0.0005 (0.892)	0.0020 (0.255)	0.0016 (0.183)

Table A3: BCW (2013): The E-index, firm value, and operating performance –firm fixed effects

This table reports coefficient estimates from pooled OLS regressions of the log of industry-adjusted Tobin's Q and several industry-adjusted operating performance measures on control variables and two governance measures based on the E-index. Each cell in the table represents the coefficient on the respective governance variable using the respective dependent variable on the left. Tobin's Q is defined as the market value of assets divided by the book value of assets. The market value of assets is defined as the sum of the book value of assets and the market value of common stock minus the book value of common stock and deferred taxed. Operating performance measures include ROA, defined as net income before extraordinary items divided by assets, 5-Yr, 3-Yr, and 1-Yr sales growth (the percentage change in sales over the respective previous period in years), and NPM which is net income before extraordinary items divided by sales. All dependent variables are industry-median-adjusted based on a Fama-French 48 industry classification. The following controls are used in all regressions: log of total assets, the log of the firm's age, a dummy for firms incorporated in Delaware, insider ownership (fraction of shares held by executives and directors) and the square of insider ownership, capex relative to assets, R&D per sales, and a dummy for missing R&D or insider data. Q regressions additionally control for ROA, as defined above, and leverage, defined as the sum of long-term debt and debt due in one year divided by total assets. ROA, sales growth, and NPM regressions additionally control for the log of the book-to-market ratio from the previous year. Panel A reports regression estimates on the E-index as categorical variable and Panel B reports estimates on a democracy dummy that is equal to one if a firm's E-index is zero. Column 1 reports coefficient estimates and standard errors using ISS Governance data to construct the E-index. Column 2 uses corrected E-index data. The sample period is from 2007 to 2016. All regressions control for year, industry, and firm fixed effects. We use two-way cluster robust standard errors, clustering by firm and year, that appear below the coefficient estimate. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	ISS (1)	Corrected (2)
Panel A: E-index		
Q	0.0131 (0.012)	0.0052 (0.012)
ROA	0.0003 (0.001)	-0.0009 (0.002)
5-Yr sales growth	-0.0076 (0.015)	0.0058 (0.020)
3-Yr sales growth	-0.0080 (0.010)	-0.0037 (0.009)
1-Yr sales growth	-0.0027 (0.003)	-0.0021 (0.003)
NPM	0.0003 (0.003)	0.0013 (0.003)
Panel B: Democracy		
Q	0.4470 *** (0.132)	-0.0440 (0.103)
ROA	0.0041 (0.007)	-0.0004 (0.006)
5-Yr sales growth	-0.0423 (0.182)	-0.1435 * (0.083)
3-Yr sales growth	-0.1543 (0.100)	-0.1028 ** (0.048)
1-Yr sales growth	0.0246 (0.018)	-0.0075 (0.010)
NPM	0.0215 (0.035)	-0.0016 (0.013)
Controls	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Time Period	2007-2016	2007-2016

Table A4: The E-index and stock returns – GM (2011)

This table presents monthly alphas and t-statistics (in parentheses) from time-series Carhart (1997) four-factor model regressions of hedge portfolios that go long in democracy firms and short in dictatorship firms. The dependent variable, y_{it} , is the monthly democracy-dictatorship hedge portfolio excess return in %. Democracy firms are firms with an E-index of zero, dictatorship firms are firms with an E-index of five or six. The following risk factors are included but not displayed: *RMRF* is the monthly value-weighted return of all CRSP firms in excess of the risk-free rate and *SMB* is the return of a zero-investment size portfolio. *HML* and *MOM* are the returns of a zero-investment book-to-market and momentum portfolio, respectively. Row [1] reproduces original results of GM (2011) for the period 1990-1999. Rows [2] and [3] report alphas and associated t-statistics when using ISS Governance or corrected data, respectively, to construct the E-index. The sample period in rows [2] and [3] is from 2007 to 2016. Columns 1 and 5 are based on the entire sample of democracy and dictatorship firms. Columns 2 and 6 only include firms in the lowest HHI tercile. Columns 3 and 7 (4 and 8) only include firms in the medium (highest) HHI tercile. A detailed description of the procedure can be found in GM (2011, pp. 570-571). HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given FF-48 industry. The table reports results from equal-weighted (EW) and value-weighted (VW) democracy-dictatorship hedge portfolios. Value-weighted portfolios are constructed using the previous month's stock market capitalization. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

	Value-Weighted Democracy-Dictatorship Hedge Portfolios				Equally Weighted Democracy-Dictatorship Hedge Portfolios			
	All Firms	Lowest HHI Tercile	Medium HHI Tercile	Highest HHI Tercile	All Firms	Lowest HHI Tercile	Medium HHI Tercile	Highest HHI Tercile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
[1] GM (2011) 1990 - 1999	0.74 *** (4.09)	0.02 (0.09)	0.84 *** (2.92)	1.53 *** (3.42)	0.47 *** (3.01)	0.21 (0.89)	0.53 ** (2.10)	0.68 *** (3.10)
[2] ISS 2007-2016	0.057 (0.06)	0.371 (0.27)	-0.910 (-0.68)	-0.560 (-0.47)	0.186 (0.22)	0.269 (0.24)	-1.789 (-1.53)	1.091 (1.01)
[3] Corrected 2007-2016	0.239 (1.13)	0.357 (1.19)	0.468 * (1.74)	-0.196 (-0.66)	0.135 (1.00)	0.211 (1.09)	0.079 (0.28)	0.146 (0.71)

Table A5: The E-index and firm value – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted Tobin's Q, defined as a firm's market value of assets divided by its book value of assets less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. The market value of assets is defined as the sum of the book value of assets and the market value of common stock minus the book value of common stock and deferred taxes. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, and a dummy for S&P 500 firms. Control variables are not reported for space reasons. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Tobin's Q					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.036 *** (3.46)		-0.076 *** (-4.10)		-0.044 *** (-3.00)	
G-index/E-index x HHI (low)		-0.005 (0.33)		-0.058 ** (-2.26)		-0.036 ** (-2.30)
G-index/E-index x HHI (medium)		-0.043 * (1.77)		-0.076 ** (-1.99)		-0.053 * (-1.76)
G-index/E-index x HHI (high)		-0.065 *** (3.17)		-0.094 *** (-4.04)		-0.043 *** (-2.58)
HHI medium		0.463 (1.42)		0.031 (0.21)		0.017 (0.19)
HHI high		0.671 ** (2.40)		0.058 (0.43)		-0.048 (-0.63)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	20,051	20,051	12,536	12,536	12,536	12,536
Adj. R ²	0.08	0.08	0.15	0.15	0.15	0.15
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A6: The E-index and investments: capital expenditures – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted capital expenditures (Capex), defined as a firm's capex divided by total assets less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. Capex is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Capital Expenditures					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	0.032 ** (2.35)		0.009 (-0.44)		-0.018 (-0.30)	
G-index/E-index x HHI (low)		0.019 (0.96)		0.015 (0.12)		-0.038 (-0.34)
G-index/E-index x HHI (medium)		0.025 (0.97)		0.025 (0.21)		0.022 (0.30)
G-index/E-index x HHI (high)		0.053 ** (2.08)		-0.018 (-0.24)		-0.042 (-0.55)
HHI medium		0.083 (0.19)		0.025 (0.04)		-0.092 (-0.25)
HHI high		-0.171 (0.44)		-0.206 (-0.44)		-0.299 (-0.88)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,355	17,355	11,897	11,897	12,369	12,369
Adj. R ²	0.08	0.08	0.07	0.07	0.09	0.09
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A7: The E-index and labor productivity – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted labor productivity, defined as the log of a firm's sales divided by the number of employees and adjusted for the U.S. Bureau of Labor Statistics' consumer price index less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. Labor productivity is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Labor Productivity					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.012 *** (3.66)		-0.024 ** (-2.36)		-0.023 *** (-2.93)	
G-index/E-index x HHI (low)		-0.008 (1.35)		-0.017 (-1.37)		-0.015 * (-1.73)
G-index/E-index x HHI (medium)		-0.014 ** (2.51)		-0.039 ** (-2.01)		-0.037 *** (-3.28)
G-index/E-index x HHI (high)		-0.015 *** (2.91)		-0.015 (-1.45)		-0.017 * (-1.99)
HHI medium		0.044 (0.53)		0.111 (1.60)		0.090 ** (2.51)
HHI high		0.064 (0.91)		0.006 (0.10)		0.016 (0.41)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,387	17,387	12,189	12,189	12,189	12,189
Adj. R ²	0.16	0.16	0.44	0.44	0.44	0.44
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A8: The E-index and cost efficiency: input costs – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted input costs, defined as a firm's costs of goods sold scaled by sales less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. Input costs are trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Input Costs					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	0.236 ** (2.47)		0.602 ** (2.53)		0.383 * (1.95)	
G-index/E-index x HHI (low)		0.140 (1.14)		0.522 * (1.79)		0.272 (1.35)
G-index/E-index x HHI (medium)		0.228 (1.28)		0.877 ** (2.00)		0.624 (1.41)
G-index/E-index x HHI (high)		0.361 ** (2.49)		0.361 (0.75)		0.236 (0.87)
HHI medium		-0.824 (0.40)		1.020 (0.56)		1.300 (1.04)
HHI high		-2.160 (1.27)		3.020 (1.58)		2.600 *** (2.80)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,699	17,699	12,189	12,189	12,189	12,189
Adj. R ²	0.11	0.11	0.18	0.18	0.18	0.18
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A9: The E-index and cost efficiency: real wages – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of industry-median-adjusted real wages, defined as the log of a firm's labor and related expenses divided by the number of employees and adjusted for the U.S. Bureau of Labor Statistics' consumer price index less the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. Real wages are trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	Real Wages					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	0.066 (1.61)		0.009 (0.81)		-0.001 (-0.12)	
G-index/E-index x HHI (low)		0.051 (0.84)		0.006 (0.44)		-0.005 (-0.58)
G-index/E-index x HHI (medium)		0.059 (1.27)		0.017 * (1.85)		0.006 (0.48)
G-index/E-index x HHI (high)		0.090 (1.42)		0.012 (0.67)		0.013 * (1.81)
HHI medium		-0.126 (0.23)		-0.044 (-0.97)		-0.034 (-1.07)
HHI high		-0.397 (0.46)		-0.021 (-0.49)		-0.045 (-1.52)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,249	2,249	1,995	1,995	1,995	1,995
Adj. R ²	0.79	0.79	0.75	0.75	0.75	0.75
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A10: The E-index and cost efficiency: sales, general, and administrative costs – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of sales, general, and administrative expenses (SG&A) scaled by total assets and adjusted by the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. SG&A is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	SG&A					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	0.095 (1.61)		-0.028 (-0.10)		-0.085 (-0.36)	
G-index/E-index x HHI (low)		0.045 (0.35)		-0.117 (-0.31)		-0.180 (-0.80)
G-index/E-index x HHI (medium)		0.117 (0.68)		0.116 (0.30)		0.261 (0.85)
G-index/E-index x HHI (high)		0.101 (0.70)		-0.115 (-0.27)		-0.357 (-0.97)
HHI medium		-0.576 (0.29)		-0.144 (-0.08)		-0.468 (-0.44)
HHI high		-0.611 (0.33)		1.130 (0.52)		1.680 (1.17)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	13,672	13,672	10,682	10,682	10,682	10,682
Adj. R ²	0.15	0.15	0.28	0.28	0.28	0.28
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016

Table A11: The E-index and cost efficiency: research and development costs – GM (2011)

This table presents coefficient estimates and t-statistics (in parentheses) from pooled OLS regressions of research and development costs (R&D) scaled by total assets and adjusted by the respective industry median in a given FF-48 industry and year, on a set of control variables, and a governance index. R&D is trimmed at the 5th and 95th percentiles. Columns 1 and 2 reproduce original results of GM (2011) with the G-index as governance index for the sample period 1990-2006. Columns 3 and 4 use ISS Governance data and Columns 5 and 6 corrected data on the E-index as governance index for the sample period 2007-2016. Control variables included in all regressions are firm size, defined as the log of firm's assets, the log of firm age based on the firm's first observation in CRSP, a dummy for firms incorporated in Delaware, a dummy for S&P 500 firms, the log of the book-to-market ratio, defined as the sum of total common equity and deferred taxes divided by the product of stock price times shares outstanding. Control variables are not reported for space reasons. All independent variables are lagged by one year. Odd-numbered columns report coefficient estimates on the non-interacted index. In even-numbered columns the respective governance index is interacted with HHI dummies that indicate whether a firm belongs to the lowest, medium, or highest HHI tercile and HHI dummies are included as additional control variables. HHI is the Herfindahl-Hirschman Index that measures competition as the sum of squared market shares within a given industry. Coefficient estimates are multiplied by 100. All regressions include year and industry fixed effects. Standard errors are clustered at the industry level. Industries are classified using Fama-French 48 industry classifications. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Dependent variable:	R&D					
	GM (2011)		ISS		Corrected	
	(1)	(2)	(3)	(4)	(5)	(6)
G-index/E-index	-0.052 *		0.015		-0.081	
	(1.75)		(0.09)		(-0.66)	
G-index/E-index x HHI (low)		-0.059		-0.091		-0.119
		(1.19)		(-0.52)		(-1.34)
G-index/E-index x HHI (medium)		-0.037		-0.024		-0.143
		(1.15)		(-0.07)		(-0.58)
G-index/E-index x HHI (high)		-0.064		0.093		-0.011
		(1.13)		(0.77)		(-0.09)
HHI medium		0.028		-0.743		-0.474
		(0.09)		(-0.57)		(-0.86)
HHI high		0.619		-1.200		-0.863 ***
		(0.86)		(-1.64)		(-2.75)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	9,340	9,340	6,600	6,600	6,600	6,600
Adj. R ²	0.17	0.17	0.44	0.44	0.44	0.44
Index	G-index	G-index	E-index	E-index	E-index	E-index
Time Period	1990-2006	1990-2006	2007-2016	2007-2016	2007-2016	2007-2016