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An integrated corporate governance index for Spain: From construction to construct validity

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ABSTRACT

This study, based on agency theory, focuses on the measurement of corporate governance in the Spanish corporate sector. Its aim is to develop, evaluate and validate a specific corporate governance index that overcomes the limitations of previous research, which relies on aggregated and unvalidated measures.
The research questions are: How can corporate governance in Spain be adequately measured? And how well does the proposed index represent the relevant aspects of corporate governance? These questions lead to the sub-question of the validity of the sub-indices that make up the index in relation to specific aspects of corporate governance.
The study analyses a sample of 130 Spanish listed companies with 1,039 observations corresponding to the period from 2007 to 2018. An aggregate corporate governance index is constructed, composed of four sub-indices: compliance with good governance codes, ownership characteristics, board characteristics and transparency of accounting information.
The results show that both the overall index and the sub-indices are positively related to firm value. Methods such as Cronbach's alpha coefficient for internal consistency and Principal Component Analysis (PCA) for index structure are used to validate the index. In addition, panel data analysis using the GMM method is employed, incorporating a novel measure of firm value that takes into account the replacement cost of assets.
This study fills a gap in the literature by constructing and validating a specific index for Spain, while addressing econometric issues such as endogeneity and unobservable heterogeneity. In practical terms, the index can support the implementation of the United Nations 2030 Sustainable Development Agenda, which promotes the adoption of good governance codes.
Finally, it is suggested that future research should focus on creating and validating robust indices to assess the quality of corporate governance in other contexts, thereby promoting best practices globally.

Índice integrado de gobierno corporativo para el mercado español: desarrollo y validación

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RESUMEN

Este estudio, basado en la teoría de la agencia, se centra en la medición del gobierno corporativo en el sector corporativo español. Su objetivo es desarrollar, evaluar y validar un índice específico de gobierno corporativo que supere las limitaciones de investigaciones previas, las cuales se basan en medidas agregadas y no validadas.
Las preguntas de investigación son: ¿cómo medir adecuadamente el gobierno corporativo en España?, y ¿cuán bien representa el índice propuesto los aspectos relevantes del gobierno corporativo? De estas preguntas se deriva una sub-pregunta sobre la validez de los subíndices que componen el índice en relación con los aspectos específicos del gobierno corporativo.
El estudio analiza una muestra de 130 empresas españolas cotizadas con 1.039 observaciones correspondientes al período 2007-2018. Se construye un índice agregado de gobierno corporativo, compuesto por cuatro subíndices: cumplimiento con códigos de buen gobierno, características de la propiedad, características de los consejos directivos y transparencia de la información contable.
Los resultados muestran que tanto el índice general como los subíndices están positivamente relacionados con el valor de la empresa. Para validar el índice, se utilizan métodos como el coeficiente de Cronbach α para la consistencia interna y el análisis de componentes principales (PCA) para la estructura del índice. También se emplea el análisis de datos de panel GMM, incorporando una medida novedosa del valor de la empresa que considera el coste de reposición de los activos.
Este estudio llena un vacío en la literatura al crear y validar un índice específico para España, abordando además problemas econométricos como la endogeneidad y la heterogeneidad inobservable. A nivel práctico, el índice puede apoyar la implementación de la Agenda de Desarrollo Sostenible 2030 de las Naciones Unidas, que promueve la adopción de códigos de buen gobierno.
Finalmente, se sugiere que futuras investigaciones se enfoquen en la creación y validación de índices robustos para evaluar la calidad del gobierno corporativo en otros contextos, promoviendo así las mejores prácticas a nivel global.

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1. Introduction

It is now almost fifty years since the term corporate governance was first used. The growing interest in understanding how corporate governance works and how it is measured is reflected in the large number of studies published in recent decades (Chen et al., 2007; Nsour & Al-Rjoub, 2022). However, we still know little about corporate governance and even less about its relationship with other business areas such as gender diversity, corporate environmental impact, human rights and corporate social responsibility (Ahrens et al., 2011; Ouni et al., 2020; Zheng & Kouwenberg, 2019). And measures of corporate governance are not consistent across the world. Many academic works, such as Drobetz et al. (2004) and Black et al. (2006), have aimed to construct indices to measure corporate governance, but have not tested their validity. Nerantzidis (2016) sheds light on the need to construct an index that is valid and reliable. This need is also in line with the finding of Andreu-Pinillos et al. (2020), in the case of Spain, that not all items included in corporate governance and sustainability indices are homogeneous and interchangeable.

As noted, there are many shortcomings in the literature on the construction of a corporate governance index - including uncertainty about how to measure the construct of corporate governance, lack of comparability, lack of uniformity, lack of comprehensiveness and, most importantly, lack of construct validity - that cast doubt on the reliability of such indices and the findings derived from them (Bhagal et al., 2008). This lack of validity makes current indices highly imperfect instruments for deciding how to vote on corporate proxies and for assessing the relationship between such indices and company value. Therefore, any causal relationship between governance indices and firm value found in the literature may be highly biased because the proxy for the effectiveness of the governance system may not actually measure the underlying governance characteristics (Chen et al., 2007). Indeed, we argue that the literature has not properly assessed the relationship between governance and firm value because its construct of corporate governance lacks validity.

Hence, our main motivation is to rectify these weaknesses by using a proxy of corporate governance that measures the underlying concept of governance and not other corporate dynamics. Therefore, our aim is to construct a comprehensive index of corporate governance as a driver of firm value in the Spanish corporate sector and to test its validity. The main research questions are: How can we properly measure the construct of corporate governance for the Spanish corporate sector? How well does our suggested corporate governance index represent the reality of corporate governance in general? And how well do its subindices represent the specific aspects of governance? These last two questions are related to the construct-validity process.

Our study contributes to the literature in four ways. First, it offers a validated index of corporate governance for Spain. The literature uses proxies that do not necessarily measure attributes of corporate governance and their relation to firm value. For instance, Aggarwal et al. (2009) develop a firm-level corporate governance index that enables cross-country comparisons. However, since the authors remain silent regarding the validity of their index, it is hard to tell whether their metric of corporate governance actually measures firm-level corporate governance attributes, as pointed out by Bhagal et al. (2008).

Second, our study generates concerns about what existing measures of corporate governance really measure and how. For instance, Gompers et al. (2003) use twenty-four corporate governance provisions as proxies for the balance of power between shareholders and managers. The authors recognize that most of the provisions are proxies of corporate governance. However, they also argue that there are some ambiguous cases and suggest that there might be certain elements in their index that account for not governance but something else. Indeed, Bebchuk et al. (2008) assess the relative importance of Gompers et al. (2003)'s twenty-four provisions and find that eighteen of them are uncorrelated with firm valuation and abnormal returns. This suggests that Gompers et al. (2003) index is less a proxy of corporate governance than a proxy of other corporate aspects. Our study mitigates such flaws in the literature.

A third contribution is that our index, unlike classical corporate governance indices such as the G-index (Gompers et al., 2003), the E index (Bebchuk et al., 2008), and the O index (Straska & Waller, 2014), relies on an appropriate econometric approach to deal with endogeneity issues and heterogeneity problems that have not been properly treated in the empirical literature. Similarly, our study improves the existing estimations by using more suitable proxies of firm value that consider the replacement cost of assets vis-à-vis the traditional Tobin's Q, and it uses various metrics of the components of our suggested index's subindices. None of these studies properly address endogeneity issues caused by both the causality of the relationship and omitted variables, which might bias their findings (Karpoff et al., 2017), nor do they use the superior, replacement-cost-based proxy of firm value (Saona, 2014). Such problems might indicate that statistically significant relationships between their indices and firm value may be the result of correlation with an omitted variable that is the true predictor of firm value (Black et al., 2017).

Fourth, corporate governance has been on the political agenda of national and supranational institutions, such as the United Nations 2030 Agenda for Sustainable Development, which, among other things, establishes a framework for corporations seeking to implement good corporate governance practices, and our suggested index provides an appropriate measurement of the construct of governance. Consequently, this study helps the literature to advance this new agenda by legitimating future research on corporate governance using our validated Spanish corporate governance index.

Although there are multiple definitions of corporate governance (Claessens & Yurtoglu, 2013), all of them view it as the way in which suppliers of funds to corporations ensure they will get a return on their investment (Shleifer & Vishny, 1997). Corporate governance involves a set of conditions that support stakeholders' interests, preventing the agency problems arising from the separation of ownership and control. Hence, corporate governance is seen as the system by which companies are efficiently managed and controlled. As stated by Jensen (1993), corporate governance concerns four areas: capital markets, the legal-political-regulatory system, product and factor markets, and internal systems.

Along the same lines, Ocasio & Joseph (2005) describe the evolution of the concept of corporate governance from the '70s to the end of the twentieth century and explain how it has been associated with the preservation and promotion of shareholder value. They suggest that the term *corporate governance* has become popular in the corporate sector because of growing shareholder understanding of issues concerning institutional investors' roles in takeover defenses, board structure, and executive compensation. Moreover, corporate governance has come to be widely recognized in the corporate

conscience as the set of mechanisms designed to ensure that suppliers of financing receive a satisfactory risk-adjusted return on their investments as defined by Shleifer & Vishny (1997).

As observed above, corporate governance has gained momentum elsewhere in its association with different corporate dimensions, such as firm value and performance (Claessens & Yurtoglu, 2013; Denis & McConnell, 2003; Nasrallah & El Khoury, 2022; Shleifer & Vishny, 1997). But measures of corporate governance are still lacking. Stakeholders have started to demand governance ratings (Sherman, 2004) to avoid undesirable outcomes (Daines et al., 2010). This new trend has led to efforts at measuring governance quality (Aguilera Ruth & Desender Kurt, 2012), both by academics (Cheung et al., 2011; Cheung et al., 2007; La Porta et al., 1998; Tsipouri & Xanthakis, 2004) and by commercial agencies such as Governance Metrics International, Risk Metrics/Institutional Shareholder Service, Credit Lyonnais Securities, and Standard & Poor's.

Since corporate governance, being unobservable and abstract, cannot be precisely measured (Black et al., 2017), the empirical literature commonly relies on indices of firm-level proxy variables (Sami et al., 2011). However, as stated by Nerantzidis (2016), the indices are imperfect and sometimes do not measure what they are supposed to measure. The reasons for such imperfection include spurious correlations, incomplete knowledge about the governance phenomenon under study, the subjectivity of researchers' judgments as applied to the estimations, and the limitations of direct observation (Black et al., 2020).

The idea of measuring corporate governance quality through indices is relatively new, and several approaches have been developed thus far (Black et al., 2017; Daines et al., 2010; Kocmanová & Šimberová, 2014; Leech & Manjón, 2002; Renders et al., 2010). This study takes a comprehensive approach to it.

Using agency theory, our study follows the approach of Black et al. (2017) and applies a construct-validity process in the index construction. The data used for the construction of our index correspond to several years of microlevel data, which allows for the creation of panel structures. Hence, we use comparable constructs that proxy for similar underlying corporate governance attributes. We take a top-down approach in which we first identify several governance attributes, based mostly on (i) empirical evidence on the Spanish market and (ii) ad hoc variables suggested by corporate governance theories and our criteria (variables such as features of boards of directors, codes of good governance, financial transparency, and ownership structure). With these elements, we build proxies for general attributes of governance and then use them to create a governance index for Spanish capital markets, which we name the Spanish Corporate Governance Index (S-CGI).

We choose these ad hoc variables for the following reasons. First, codes of good governance are chosen because a company's governance needs to be aligned with the external regulatory framework (Aguilera & Cuervo-Cazurra, 2009). Second, boards of directors are an essential aspect of internal corporate governance since their fiduciary role is to protect shareholders' rights (Booth et al., 2002). Third, concerning ownership structure, we believe that one of the major governance characteristics of companies operating in civil-law countries, such as Spanish companies, is their concentrated and pyramidal ownership structure (de Miguel et al., 2004). This is a natural consequence of relatively weak external governance systems. Finally, we include financial transparency because the literature on Spanish firms has increasingly considered earnings management and the quality of the financial reporting in recent years (Prior et al., 2019). This growth is a symptom of concerns in academia regarding the need to consider financial transparency in corporate governance studies given the prevalence of corporate scandals and misreported financial information. Hence, we follow the recommendations of Black et al. (2020), who propose applying their approach to construct validity to country level governance indices, and we show that the Spanish corporate sector offers the characteristics needed to conduct the empirical analysis.

Following Black et al. (2017) road map for assessing validity, we apply Cronbach (1951) α, the most popular instrument for testing the reliability of measurement instruments (Ararat et al., 2017; Bozec & Bozec, 2012; Nerantzidis, 2016). If the elements used to construct a subindex collectively measure the same attribute of governance, then the elements will be positively correlated, yielding a relatively high Cronbach's α. However, if the various elements measure different attributes, the estimated Cronbach's α for the subindex will not be high (Chen et al., 2007; Hoekstra et al., 2019).

The second approach used to test construct validity is principal component analysis (PCA). Since we account for many variables that measure the same corporate governance attribute, we create clusters. The major benefits of this technique are that, first, the factors created are not correlated and, second, the factors incorporate a large amount of the variability of the individual variables used to estimate the factors (Kim & Mueller, 1978). The methodology also incorporates the validation process of the created corporate governance index in which it is later used to explain firm value. Our study goes one step beyond other publications by testing firm value with a suitable measure for validation. The superior, novel firm-value variable we use is derived from Tobin's Q but factored by the reposition cost of assets.

The study continues as follows. Section 2 reviews the literature on corporate governance indices. Section 3 describes our methodology. We validate our proposed corporate governance index in Section 4. Finally, we conclude in Section 5.

2. Literature review

Agency theory is the fundamental basis for many academic studies of corporate governance (Bathala et al., 1994; Berger & Bonaccorsi di Patti, 2006; Block, 2012; Cuevas-Rodríguez et al., 2012; Eisenhardt, 1989; Garbade & Silber, 1982; Jensen, 1994; Jiraporn et al., 2008). It concerns the conflicts of interest in companies due to disparities in parties' incentives (Berle & Means, 1932; Jensen & Meckling, 1976; Vitolla et al., 2020). These conflicts of interest call for mechanisms to protect shareholders against managers, and these mechanisms give rise to corporate governance (Aguilera Ruth & Desender Kurt, 2012; Ararat et al., 2020; Filatotchev et al., 2013; Mayer, 1998).

As noted, there are multiple definitions of corporate governance, but in the classical definition (Brown et al., 2011; Kumari & Pattanayak, 2014; Mayer, 1998; Williamson, 1988) it is the set of systems that ensure companies are managed in the interest of all stakeholders.

Multiple approaches and measures have been used to construct governance indices. For instance, Gompers et al. (2003) develop a broad index (G-index) based on twenty-four variables tracked by the Investor Responsibility Research Center for approximately 1,500 US firms with equal weighting. The index is negatively correlated with firm value (meas-

ured using Tobin's Q). Bebchuk & Cohen (2005) construct an entrenchment index based on six factors selected from twenty-three governance factors developed by the research center. Brown & Caylor (2009), using a broader index based on the governance provisions mandated by the three major US stock exchanges, find that corporate governance is positively correlated with operating performance, market valuation, and dividend payout for a large sample of US firms.

Black et al. (2006) construct a corporate governance index for 515 Korean companies using a survey conducted by the Korea Stock Exchange. They find a positive correlation between corporate governance practices and market valuation as measured by Tobin's Q and market-to-book ratio. Similar results have been documented by Beiner et al. (2006) in Europe, Ahmadjian (2012) in Japan, and Klapper & Love (2004) in twenty-five emerging markets. Following Aman & Nguyen (2008), Brown & Caylor (2009) construct a governance index based on several attributes associated with good corporate governance such as board composition, ownership structure, and disclosure policy. Though all these works build corporate governance indices, none develop the construct-validity process, which is essential to ensure that the indices actually measure governance attributes and no other features correlated with governance.

Unlike Gompers et al. (2003) index, which measures firms' resistance to external-control mechanisms (such as takeovers), our index emphasizes the quality of firms' internal controls. In that sense, our index is closer to that of Aman & Nguyen (2008), Brown & Caylor (2009), Black et al. (2010), and Black et al. (2017). We consider a few internal, firm-level aspects of governance that have not been studied before. In the following sections, we review each variable and justify their inclusion in our index.

Despite a general consensus on the importance of corporate governance, the findings of the vast majority of existing governance studies are mixed, raising major concerns as to whether the governance constructs that are often employed are valid proxies for the complex and unobservable concept of governance that they intend to measure (Black et al., 2017). Indeed, Larcker et al., (2007, p. 964) argue that the measurement error that may be introduced from using a single governance mechanism (for example, board size) as a proxy "will almost certainly cause the regression coefficients to be inconsistent." They suggest that using multiple indicators can avoid that measurement error.

Other researchers seek to address the measurement-error issue by constructing governance indices that contain multiple measures. According to Elmagrhi et al. (2020), there are three major problems with such indices. First, as there is no theoretical basis for selecting governance provisions, such indices are often naively constructed (Brown & Caylor, 2009), thereby resulting in similar measurement errors (Black et al., 2017; Larcker et al., 2007).

Second, it is not only practically impossible to include all relevant governance provisions but likely that not all included provisions will be relevant; therefore, measurement problems such as omitted-variable bias are likely to persist in such governance indices (Black et al., 2017; Denes et al., 2017; Larcker et al., 2007) [1]. Consequently, a small but growing number of researchers have recently employed statistical approaches in developing more reliable governance indices, such as Black et al. (2017), Karpoff et al. (2017), and Larcker et al. (2007). Larcker et al. (2007), for example, employ PCA to develop an alternative disclosure index containing fourteen key components out of thirty-nine governance provisions for US firms, and they demonstrate that it is more reliable and better specified compared with previous ones, such as the G-disclosure index (Gompers et al., 2003). We also employ the PCA to develop an alternative corporate governance disclosure index for Spanish firms.

Third, despite increasing anecdotal evidence suggesting that corporate executives below the CEO level, such as CFOs, receive pay packages as large as those of CEOs, existing studies have mainly investigated the determinants of CEO pay (for example, Core et al. (1999); Dong & Ozkan (2008); Adams & Ferreira (2009); Fahlenbrach (2009); Guest (2009); Brick et al. (2006)); so, relatively little is known about the impact of firm-level corporate governance on the pay packages of other executives. All these studies show that the construction of corporate governance indices is still being debated (see, for instance, Benvenuto et al. (2021), Mishra et al. (2021), López-Quesada et al. (2018), Nerantzidis (2016), Kocmanová & Šimberová (2014), Kaufmann et al. (2011), and Chen et al. (2007), among others).

Empirically, Benvenuto et al. (2021) investigate the impact of a corporate governance index on financial performance—more specifically, return on assets, general liquidity, capital adequacy, and size of company in the banking sector. Similarly, Mishra et al. (2021) study the empirical relationship between corporate governance, on one side, and market-based performance measures of firms (such as Tobin's Q) and accounting-based performance measures (such as return on assets), on the other. López-Quesada et al. (2018), using a corporate governance index, find that good corporate governance increases a measure of firms' financial performance—namely, comprehensive income. Table 1 summarizes the most important studies focused on corporate governance indices.

This study intends to overcome the major limitations of index construction highlighted above and conducts a subsequent test of validity by incorporating multidimensional internal characteristics of corporate governance in a single institutional context. Hence, the governance index developed in subsequent sections includes four dimensions corresponding to the degree to which a corporation complies with codes of good governance, features of boards of directors, ownership-structure features, and transparency in financial reporting. After constructing the corporate governance index, we validate the construct by applying multiple suitable measures of firm value.

[1] For example, Gompers et al. (2003) influential governance-disclosure index (G-index), which equally weights twenty-four US shareholder-rights provisions, shows that firms with poor governance have lower operating profits, market valuation, and stock returns compared with their better-governed counterparts. However, subsequent researchers, such as Cremers & Nair (2005), Bebchuk & Hamdani (2009), and Karpoff et al. (2017), have demonstrated that only six (in the entrenchment index, or E-index), eighteen (in the other index, or O-index), and twelve (in the deterrent index, or D-index) of the twenty-four governance items, respectively, are relevant. Their findings not only contradict the findings of Gompers et al. (2003) but are mutually contradictory. In addition, these indices generally cover US firms and feature no alternative indices for other countries. A few commercial agencies, such as Governance Metric International, Institute of Shareholder Service, Credit Lyonnais Securities, and Standard & Poor's, construct commercial indices for sale, but the indices are often copyrighted and rarely freely available. Nevertheless, as stated by Bozec & Bozec (2012, p. 85), "These ratings are often too subjective and, therefore, might lead to an incorrect assessment of a firm's governance quality."

Table 1. Summary of literature on corporate governance indices

This table provides a summary description of the most remarkable studies on corporate governance indices.

Author	Title	Country Data/Scope	Summary
Gompers et al. (2003)	Corporate Governance and Equity Prices	US firms	Develops a broad index of governance rules tracked by the Investor Responsibility Research Center (IRRC). Most of the governance features tracked by the IRRC are defensive tactics. The features consist of twenty-two provisions in firms corporate documents and six types of state takeover statutes, resulting in a total of twenty-four distinct items included in the construction of the index. The index is negatively correlated with firm value, measured by Tobins Q. An investment strategy that bought firms in the lowest decile of the index (strongest rights) and sold firms in the highest decile of the index (weakest rights) would have earned abnormal returns of 8.5% per year during the sample period. Firms with stronger shareholder rights had higher firm value, profits, and sales growth but lower capital expenditures, and they made fewer corporate acquisitions.
Klapper & Love (2004)	Corporate Governance, Investor Protection, and Performance in Emerging Markets	Firms from twenty-five emerging markets	The empirical tests show that better corporate governance is highly correlated with better operating performance and market valuation. Although the study does not deal specifically with the design of a corporate governance index, it uses a ranking of corporate governance. This ranking, compiled by Credit Lyonnais Securities Asia, is a composite of fifty-seven qualitative, binary (yes/no) questions. The paper shows that firm-level governance and performance (market valuation measured by return on assets and Tobins Q) are lower in countries with weak legal environments, suggesting that improving the legal system should remain a priority for policy makers.
Bebchuk & Cohen (2005)	The Costs of Entrenched Boards	US firms	The study designs an index based on six factors selected from twenty-four governance factors developed by Gompers et al. (2003), whose index is built upon the information provided by the IRRC. Bebchuk & Cohen (2005) index is accepted as the best explanation of Gompers et al. (2003) result that corporate governance is positively associated with firms performance. Among the major findings, the authors highlight that the correlation with reduced firm value (measured by Tobins Q) is stronger for staggered boards that are established in the corporate charter (which shareholders cannot amend) than for staggered boards established in the companys bylaws (which shareholders can amend). The authors conclude that their index outperforms that of Gompers et al. (2003), as it is more parsimonious and better motivated.
Black et al. (2006)	Predicting Firms Corporate Governance Choices: Evidence from Korea	Korean firms	The authors construct a corporate governance index for companies listed on the Korean Stock Exchange, composed of thirty-nine governance elements, divided into five equally weighted subindices that characterize shareholder rights, board structure, board procedures, disclosure, and ownership parity. The most important finding is that regulatory factors are highly important as determinants of firms corporate governance practices. Regarding the firm-level variables, the findings indicate that larger firms are better governed than smaller firms and that riskier companies are also better governed than conservative firms. Additionally, long-term averages of profitability and equity-finance need are significant drivers of governance, while short-term averages are not. This is consistent with sticky governance, in which firms alter their governance slowly in response to economic factors.
Beiner et al. (2006)	An Integrated Framework of Corporate Governance and Firm Valuation	Swiss firms	The study is focused on the relationship between the quality of firm-specific corporate governance and firm valuation. The most important variables included in the index are ownership structure, board characteristics, and leverage. The results support the widespread hypothesis of a positive relationship between corporate governance and firm valuation.
Brown & Caylor (2006)	Corporate Governance and Firm Valuation	US firms	The authors create a more comprehensive corporate governance index than Gompers et al. (2003) and Bebchuk & Cohen (2005) based on firm-level information obtained from Institutional Shareholder Services. The authors index is based on the sum of fifty-one factors. They highlight that their index has the potential advantage of providing a superior measure of a firms governance quality because (i) it incorporates a set of components of governance defense not considered in previous studies, (ii) it is broader in scope of governance, (iii) it covers more firms, and (iv) it is more dynamic than previous governance indices. The results show that only a small subset of provisions marketed by corporate governance data providers are related to firm valuation and that both internal and external governance are linked to firm value.
Chen et al. (2007)	Building a Corporate Governance Index from the Perspectives of Ownership and Leadership for Firms in Taiwan	Taiwanese firms	The paper tests the relationship between ownership/leadership structures and stock returns for listed firms. A governance index is built based upon CEO duality, size of the board of directors, managements holdings, and block shareholders holdings. The major findings imply that well-governed firms should outperform those with poor governance and that the index successfully evaluates the effectiveness of the governance mechanism of firms in Taiwan.
Cheung et al. (2007)	Do Investors Really Value Corporate Governance? Evidence from the Hong Kong Market	Hong Kong firms	The created corporate governance index reflects the presence of good corporate governance practices and variation in the quality of those practices. The studys empirical evidence shows that a companys market valuation is positively related to its overall corporate governance index score, a composite measure of a firms corporate governance practices. The authors also find that the transparency component of the index score drives the relation with market valuation.
Larcker et al. (2007)	Corporate Governance, Accounting Outcomes, and Organizational Performance	US firms	The study is based on thirty-nine structural measures of corporate governance (for example, board characteristics, stock ownership, institutional ownership, activist stock ownership, existence of debtholders, mix of executive compensation, and antitakeover variables). The study finds that its diverse corporate governance indices have a mixed association with abnormal accruals, little relation to accounting restatements, but some ability to explain future operating performance and future excess stock returns.
Aman & Nguyen (2008)	Do Stock Prices Reflect the Corporate Governance Quality of Japanese Firms?	Japanese firms	The authors use new corporate governance information from Nikkei CGES to identify fifteen attributes that impact agency problems and thus are associated with governance features. These attributes include board composition, ownership structure, and investor rights. The main finding is that after adjusting for firm size and book-to-market ratio, poorly governed firms significantly outperform better-governed firms. The authors show that neither the sample period nor the behavior of specific industries is responsible for this outcome. Consistent with market efficiency, stock prices appear to reflect the higher (lower) risk associated with poor (good) corporate governance.

Author	Title	Country Data/Scope	Summary
Bhagal et al. (2008)	The Promise and Peril of Corporate Governance Indices	Critical discussion of previous literature on corporate governance indices	The study analyzes the effectiveness of corporate governance indices in predicting corporate performance and assesses the implications for policy makers. The most prominent contribution of this work is its identification of major methodological shortcomings of the studies that claim to have identified a causal relationship between governance measures and corporate performance. Indeed, the study concludes that there is no consistent relationship between governance and performance and that there is no single best measure of corporate governance. The authors claim that the most effective governance system depends on context and on firms specific circumstances. Their criticism of corporate governance indices concerns factors such as boards of directors, shareholder franchise and block ownership, and executive compensation.
Brown & Caylor (2009)	Corporate Governance and Firm Operating Performance	US firms	Based on the authors preliminary work (L. D. Brown & Caylor, 2006) but using a broader index based on the fifty-one governance provisions mandated by the three major US stock exchanges, the study confirms that corporate governance is positively correlated with operating performance, market valuation, and dividend pay-out ratio for a large sample of US firms. Six corporate governance provisions are significantly and positively linked to return on assets, return on equity, or both. The results reveal that the governance provisions mandated in 2002 by the stock exchanges are less closely linked to firm operating performance than are those not mandated.
Black et al. (2010)	Corporate Governance in Brazil	Brazilian firms	The studys governance metric is based on an extensive survey distributed to all firms listed on BOVESPA, Brazils principal stock exchange. The survey includes information on board composition, board procedures, oversight of financial reporting, shareholder meetings and shareholder rights, related-party transactions and executive compensation, disclosure, and control and shareholder agreements. Such detailed information allows the authors to identify areas in which Brazilian corporate governance is relatively strong or weak and areas in which regulation might usefully be weakened or strengthened. For instance, the authors highlight that board independence and financial disclosure are areas of notable weakness in corporate governance in Brazil.
Cheung et al. (2011)	Does Corporate Governance Predict Future Performance?	Hong Kong firms	The authors metric of governance is based on a scorecard built upon the five principles of corporate governance developed by the OECD. The scorecard items are modified to accommodate the codes of best practice applicable in Hong Kong. The criteria for the index are grouped in five sections replicating the OECD principles. The empirical results show that firms that exhibit improvements in the quality of corporate governance see a subsequent increase in market valuation as measured by Tobins Q and market-to-book value. The authors state that firms whose quality of corporate governance practices deteriorates in one period tend to see a decline in market valuation in the next. The impact is stronger for firms that are included in the middle- and small-cap index and firms that are related to China.
Ammann et al. (2011)	Corporate Governance and Firm Value: International Evidence	Publicly listed firms from twenty-two developed countries	The authors are pioneers in using a large data set from Governance Metrics International to build two additive corporate governance indices with equal weights based upon sixty-four firm-level governance attributes. They also create one index derived using principal component analysis. For all three indices the authors find a strong and direct relation between firm-level corporate governance and firm valuation, as observed in previous empirical studies. In addition, the authors study the value relevance of governance attributes that characterize companies social behavior (identified with corporate social responsibility). The study also expands the panel used in international studies. The findings indicate a positive and significant effect on firm value, even after controlling for individual and aggregated governance attributes.
Balasubramanian et al. (2010)	The Relation between Firm-Level Corporate Governance and Market Value: A Case Study of India	Indian firms	The study constructs a broad Indian Corporate Governance Index based on an extensive survey of publicly listed companies. The authors find a positive and statistically significant association between their suggested index and firms market value. The association is more significant for more profitable firms and firms with greater growth opportunities. A subindex for shareholder rights is statistically significant, but subindices for board structure, disclosure, board procedure, and related-party transactions are not. Contrary to some other works, the study does not find statistically significant results for board-structure features, suggesting that Indias legal requirements are sufficiently strict. This finding indicates that overcompliance with the legal framework does not imply higher firm valuation.
Kaufmann et al. (2011)	The Worldwide Governance Indicators: Methodology and Analytical Issues	Over two hundred countries	This paper summarizes the methodology of the Worldwide Governance Indicators project and related analytical issues undertaken by the World Bank, organizing the index in six aggregate governance indicators: (i) voice and accountability, (ii) political stability, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption. Multiple underlying variables from many data sources are used to build these indicators, allowing for meaningful cross-country and over-time comparisons.
Black et al. (2012)	What Matters and for Which Firms for Corporate Governance in Emerging Markets?	Brazilian firms	The study provides strong evidence that corporate governance quality depends on country- and firm-specific features in line with Bhagal et al. (2008). The authors construct an index of governance for the Brazilian corporate sector. The metric is based on subindices for ownership structure, board structure, and minority shareholder rights. The authors extend prior studies conducted in emerging markets to compare those studies results with those for Brazil. The index and its subindices predict higher lagged values for Tobins Q as a measure of firms value. Unlike other studies, however, this one finds that greater board independence predicts lower Tobins Q. Firm characteristics also matter; for instance, governance predicts market value for nonmanufacturing (but not manufacturing) firms, small (but not large) firms, and high-growth (but not low-growth) firms. Regarding policy implications, the findings of the study are not consistent with some mandatory minimum rules on adding corporate value.
Ammann et al. (2013)	Product Market Competition, Corporate Governance, and Firm Value: Evidence from the EU Area	Companies from fourteen EU countries	The authors examine whether the valuation effect of corporate governance depends on the degree of competition in companies product market. They claim that previous studies are plagued with measurement problems regarding both corporate governance and market competition. The authors corporate governance index is based on sixty-four governance attributes obtained from Governance Metrics International, similarly to their own previous study (Ammann et al., 2011). As a robustness test of their findings, the authors use an alternative version of this index that excludes attributes in place at more than ninety or less than 10% of the sample firms. The degree of market competition is measured with a Herfindahl-Hirschman index. The major findings of the study indicate that the corporate governance is positively associated with firm value in noncompetitive markets only, which is consistent with the hypothesis that product-market competition acts as a substitute for governance.

Author	Title	Country Data/Scope	Summary
Kocmanová & Šimberová (2014)	Determination of Environmental, Social and Corporate Governance Indicators	Czech firms	The article contributes to the effort to measure corporate sustainability and proposes a conceptual framework of ESG performance indicators for the Sustainability Reporting of Czech companies operating in the processing industry. The results of factor analysis indicate that the factors fall into three measurement categories: environmental, social, and corporate governance.
Nerantzidis (2016)	A Multi-methodology on Building a Corporate Governance Index from the Perspectives of Academics and Practitioners for Firms in Greece	Greek firms	The goal of the study is to shed light on how to construct an efficient, reliable, and valid index of corporate governance. The value of the study lies in an improved understanding of the methodological issues in constructing corporate governance indices. The authors discuss how to measure corporate governance, the main criteria used in index construction, and the previous literature on corporate governance indices. The study expands our theoretical understanding of corporate governance index development by using the Delphi method, classical test theory, and analytic hierarchy process.
Ararat et al. (2017)	The Effect of Corporate Governance on Firm Value and Profitability: Time-Series Evidence from Turkey	Turkish firms	A Turkey Corporate Governance Index (TCGI) is developed that is composed of subindices for board structure, board procedure, disclosure, ownership, and shareholder rights. The TCGI predicts higher market value with firm fixed effects and higher firm-level profitability with firm random effects. The principal subindex that predicts higher market value and profitability and drives the results for the TCGI as a whole is the disclosure subindex.
Black et al. (2017)	Corporate Governance Indices and Construct Validity	Firms from emerging markets (Brazil, India, Korea, and Turkey)	The authors exhaustively analyze how to test the validity of a firm-level corporate governance index. They argue that uncertain construct validity of most corporate governance indices suggests caution in relying on research using these indices as a basis for firm-level governance changes or country-level legal reforms. Hence, they build country-specific indices based on country-specific governance elements that reflect local norms, institutions, and data availability, and they show that these indices predict firm market value in each country after conducting the construct-validity process.
Karpoff et al. (2017)	Do Takeover Defense Indices Measure Takeover Deterrence?	US firms	The authors go beyond Gompers et al. (2003) and Bebchuk & Cohen (2005) indices of governance by supplying an instrument version of these indices that is significantly and inversely related to firms takeover likelihood. The authors highlight the flaws of previously constructed corporate governance indices in measuring a firms takeover defense and in handling the potential endogeneity problems in constructing the index. Using simple tests that account for endogeneity, the authors do not find significant evidence that previous corporate governance indices are able to measure takeover likelihood. However, once endogeneity is considered, the authors find that previous popular indices are negatively associated with takeover likelihood. Concerns about the endogeneity issues in previous indices calls for the use of coverage antitakeover laws to control for the lack of causality in the construction of governance indices.
López-Quesada et al. (2018)	Corporate Governance Practices and Comprehensive Income	US firms	This paper analyzes the effect of corporate governance practices on firms financial performance. High levels of corporate governance culture, measured with an index composed of inputs such as board size, outside directors, board duality, board meetings, and CEO compensation, has a positive impact on firms financial performance measures such as return on assets, return on equity, and return on investment and on an innovative measure named Comprehensive Income. The results indicate a positive correlation between the percentage of outside directors and financial performance and a negative one between the number of board meetings and financial performance. The main contribution is to show that good corporate governance strategies deliver superior financial performance for businesses in terms of Comprehensive Income.
Black et al. (2020)	Which Aspects of Corporate Governance Do and Do Not Matter in Emerging Markets	Firms from merging markets (Brazil, India, Korea, and Turkey)	This study builds country-specific governance indices comprising indices for disclosure, board structure, ownership structure, shareholder rights, board procedure, and control of related-party transactions. Disclosure (especially financial disclosure) predicts higher market value across all four studied countries. Board structure (principally board independence) has a positive coefficient in all countries and is significant in two countries. The other indices do not predict firm value. These results suggest that regulators and investors, in assessing governance, and firm managers, in responding to investor pressure for better governance, would do well to focus on disclosure and board structure.
Elmagrhi et al. (2020)	Corporate Governance Disclosure Index-Executive Pay Nexus: The Moderating Effect of Governance Mechanisms	UK firms	The study uses the PCA technique to construct an alternative UK corporate governance index that comprises 31 out of 120 comprehensive governance provisions included in the UK Combined Code. In this sense, this index differs substantially from US-centered ones. Unlike indexes in previous empirical studies, this index allows researchers to capture the qualitative differences in governance structures across firms. The study assesses whether governance systems moderate payment of those in senior positions of UK firms. The most important findings suggest that better-governed firms tend to pay their executives less compared with their poorly governed counterparts. Pay-for-performance sensitivity is generally positive but improves in firms that exhibit high internal corporate governance quality.
Mishra et al. (2021)	Does Corporate Governance Characteristics Influence Firm Performance in India?	Indian firms	The study examines the empirical relationship between a suggested corporate governance index (for example, characteristics of board structure, ownership structure, director participation and busyness, market for external control, and product-market competition) and firms financial performance. The authors use internal and external corporate governance data to construct their index. They use the generalized method of moments to overcome the endogeneity and simultaneity biases observed in the construction of other corporate governance indices. The result shows a significant positive impact of the suggested index on firms return on assets and return on net wealth, but such relations are negative with Tobins Q.
Benvenuto et al. (2021)	Assessing the Impact of Corporate Governance Index on Financial Performance in the Romanian and Italian Banking Systems	Romanian banks	The research question is how a modification in corporate governance legislation influences two different banking systems. Corporate governance has a significant, positive, and long-lasting effect on profitability and capital adequacy in both Romania and Italy. Taking the size of companies into consideration, the impact of the Index of Corporate Governance on a homogenous banking system is positive, while the impact on a heterogeneous banking system is negative. The corporate governance principles applied do not encourage the growth of large banks in heterogeneous banking sectors.

Author	Title	Country Data/Scope	Summary
Nsour & Al-Rjoub (2022)	Building a Corporate Governance Index (JCGI) for an Emerging Market: Case of Jordan	Jordanian firms	The study develops the first Jordan Corporate Governance Index, comprising five subindices: board structure, board procedure, disclosure, ownership structure, and minority-shareholder rights. The results show that Jordanian companies did not progress in corporate governance during the study period.
Nasrallah & El Khoury (2022)	Is Corporate Governance a Good Predictor of SMEs Financial Performance? Evidence from Developing Countries (the Case of Lebanon)	Small and medium Lebanese enterprises	Using a questionnaire to collect data on corporate governance and applying the bundles approach, the authors construct a corporate governance score based on (i) the characteristics of an efficient management board, (ii) the credibility and accounting of internal control and external audit, and (iii) the features of sound operational practices. Unlike previous studies, the study applies two-stage least-squares regression estimates to deal with endogeneity concerns. The paper studies the impact of the suggested corporate governance score and each of its components on financial performance measured by return on assets and return on investment. The study finds a positive interdependency between the governance index and different metrics of financial performance.

The hypotheses we test are as follows:

H1: The components of the subindices of corporate governance considered in this study capture internal coherence as metric of corporate governance.

H2: The components of the comprehensive index of corporate governance considered in this study capture internal coherence as metrics of corporate governance.

H3: In the construction-validity process, the subindices of corporate governance explain firm value.

H4: In the construction-validity process, the comprehensive Spanish corporate governance index explains firm value.

3. Methodology

3.1. Comprehensive corporate governance index and its construct validity

3.1.1. Cronbach's α

The subindices of our corporate governance index for Spanish firms (S-CGI) are degree of compliance with Spanish codes of good governance ($IndexCGG$), the features of boards of directors ($IndexBOARD$), ownership-structure features ($IndexOWN$), and transparency of financial reporting ($IndexEQ$)[2]. Every subindex is divided into several subcomponents. Since it is not easy to determine which components are relevant for each subindex, we use Cronbach (1951) α to measure the scaled inter-subindex correlation—in other words, the internal consistency of the scale. The major advantages of α are that it represents the average of all possible split halves for a set of items and that it can be used for dummies and, as in this study, for continuous scored variables[3,4]. The coefficient runs from 0 to 1—from no consistency in the measurement to perfect internal consistency. According to Black et al. (2017), if the components of every element of an index contribute to a measure of the same general aspect of governance, then α is expected to be reasonably high, meaning that the components are highly correlated. Conversely, if the components capture distinct elements of corporate governance, α should be moderate or low.

The rule of thumb in psychology is that a coefficient value above 0.7 is strong. A value above 0.6 is usually considered acceptable, and values below that threshold indicate relatively poor reliability in the measurement[5]. The coefficient is estimated as

$$\alpha = \frac{k\bar{r}}{(1+(k-1)\bar{r})} \quad (1)$$

where k represents the number of components in each subindex of S-CGI and $\bar{r}$ is the mean intercomponent correlation. The coefficient α is highly sensitive to the number of components included in the corporate governance subindex, and there is a positive, nonlinear relationship between the number of components and the reliability. The important assumptions in calculating α are, first, that it features intrinsic unidimensionality, meaning that the components of the subindices are single dimensions of corporate governance, and second, that the error terms of the components are uncorrelated.

3.1.2. Principal component analysis

In addition to Cronbach (1951) α, we also adopt PCA to validate the construct of the corporate governance index. PCA is a statistical technique aiming to create a condensed number of index variables from a larger set of measured variables (Aydin et al., 2019), which in our case are the components of the subindices in S-CGI. It does this using a weighted-average linear combination of the set of input variables. The created index variables are referred to as factors. The point of PCA is to determine the optimal number of components, the optimal choice of measured variables for each component, and the optimal weights of the measures (Khongmalai et al., 2010).

One of the major advantages of this technique is that the information in each data set corresponds to the data set's total variation (Dray, 2008). The goal of PCA is to identify directions (or principal factors) in which the variation in the data is maximal (Florackis & Palotás, 2010). In other words, PCA reduces the dimensionality of a multivariate data set to two or three uncorrelated principal factors that can be identified with minimal loss of information.

3.1.3. Additive indices

We use additive indices to sum the normalized subindices. The general guidelines provided by Mazziotta & Pareto

[2] Mazziotta & Pareto (2013) provide a thorough description of methods for constructing composite indices. They focus on finding the most suitable method depending on the indicators' substitutability or nonsubstitutability, whether the aggregation is simple or complex, whether the comparisons are relative or absolute, and whether the weights of indicators are subjective or objective.

[3] An alternative approach would be to use Kuder & Richardson (1937) reliability coefficient, but this is exclusively used for items that score dichotomously, which is not necessarily the case here.

[4] Note that α is not a measure of homogeneity or unidimensionality.

[5] See Lance et al. (2006) on commonly cited guidelines for the cutoff of the coefficient.

(2013) for constructing composite indices suggest using an additive index if the components of a composite index are substitutable—that is, if a deficit in one component may be compensated by a surplus in another. For instance, low gender diversity on a board of directors might be offset with a high proportion of independent, external board members, and vice versa. In such situations, a compensatory approach can be found that involves the use of additive methods, such as the arithmetic mean, as in this study, Ammann et al. (2011), and Ammann et al. (2013). This technique is common (see, for instance, Gompers et al. (2003), Bebchuk & Cohen (2005), Brown & Caylor (2006), and more recently Ararat et al. (2017) and Black et al. (2017)).

3.1.4. Panel-data approach for regression analysis

The last step in the construct-validation process is to assess the power of S-CGI as an input variable to explain firm value as an output variable. To do so, we use panel-data regression analysis. Given that the Spanish companies we study are observed during several years, we can form panel microstructures, or combinations of cross-sectional information (on individual firms) with time-series information. Panel-data analysis allows us to tackle the individual-heterogeneity issues typically observed in the corporate governance literature (Gormley & Matsa, 2014). Indeed, Gormley & Matsa (2014) state that controlling for unobserved heterogeneity is fundamental in empirical finance research because asset prices and most corporate policies depend on factors that are unobservable to the econometrician but must be considered in the analysis. Constant and unobservable heterogeneity refers to factors that are invariant over time (differences in firms' economic environments, internal long-term corporate strategies, managerial styles, attitudes toward risk, and internal policies, to name a few). If these factors are correlated with the variables of interest, and if the individual and unobservable effect is not properly treated, the results can lead to biased estimations of parameters (Gormley & Matsa, 2014).

In addition to the unobservable-heterogeneity problem, there is the endogeneity (or simultaneity) problem, which is quite common in corporate governance, finance, and accounting studies (Gippel et al., 2015; Roberts & Whited, 2013; Wintoki et al., 2012). This problem occurs when the direction of causality is unclear between internal corporate governance systems and proxies for firm value (Wintoki et al., 2012). In other words, simultaneity bias occurs when the dependent variable and one or more of the independent variables are determined in equilibrium so that it can plausibly be argued either that the independent variables cause the dependent one or that the dependent variable causes the independent variables. Consequently, when the endogeneity issue is ignored, the results are at the very least incomplete.

We follow Saona et al. (2020) in applying the two-stage generalized-method-of-moments system estimator (GMM-SE), which overcomes both the unobservable-heterogeneity and endogeneity problems by using as instruments lagged right-hand-side variables (Alonso-Borrego & Arellano, 1999). We also employ the unobservable fixed-effects (FE) method as a robustness check of the major findings.

3.2. Construction of variables

We use firm value as the dependent variable for checking construct validity. In most of the empirical literature, Tobin's Q is used as a proxy for firm value, which is a common outcome variable in governance studies (Chung & Pruitt, 1994; Lindenberg & Ross, 1981; Lozano et al., 2016; Setia-Atmaja, 2009; Smirlock et al., 1984). Tobin's Q can be used to measure the value added to a firm by corporate governance because investors ascribe higher value to assets as corporate governance practices improve (Black et al., 2017).

The theoretical definition of Tobin's Q is the ratio of the market value of a firm to the replacement cost of its assets. Although often criticized, its simplified version—the ratio of the market value to the book value of total assets—is widely accepted in the literature (Adam & Goyal, 2008; Smirlock et al., 1984) [6]. One of the firm-value literature's major flaws regarding validity is that measuring firm value with Tobin's Q produces inaccuracy, bias, and variability. Thus, although the measure boasts simplicity of computation, it has major disadvantages. As recently suggested by Barlett & Partnoy (2020), Tobin's Q has been one of the most important concepts for examining how various regulatory and corporate governance provisions affect firm value and therefore economic welfare. As originally conceived, Tobin's Q, named for the economist James Tobin, was an important variable in macroeconomic theory; it was defined as the market value of a firm's assets divided by their replacement value. Within macroeconomics, it was originally viewed as a means to understand corporate investment policy. To mitigate the risk of misspecification of such a critical variable in the model specification of the construct-validity process, we follow an approach based on Perfect & Wiles (1994), Pindado et al., (2010), and Saona (2014) in which the Tobin's Q proxy is computed based on the reposition cost of total assets in addition to the popular market-to-book-based ratios.

Hence, our first measure of firm value ($Q1$) is defined as $Q1 = (MkCptz_{it} + TD_{it})/K_{it}$, where $MkCptz_{it}$ is a firm's market capitalization (computed as the product of the year-end closing price per share and the number of shares outstanding for firm i). TD_{it} is total liabilities in year t. K_{it} is the replacement value of the firm's assets, which is estimated in Perfect & Wiles (1994) as $K_{it} = RNP_{it} + RINV_{it} + (TA_{it} - BNP_{it} - BINV_{it})$, where RNP_{it} is the replacement cost of net property, plant, and equipment (net fixed assets); $RINV_{it}$ is the replacement value of inventory; TA_{it} is total assets; BNP_{it} is the book value of net property, plant, and equipment; and $BINV_{it}$ is the book value of inventory.

$RNP_{it} = RNP_{it-1}\left[\frac{1+\phi_t}{1+\delta_{it}}\right] + I_{it}$ for $t > t_0$, where t_0 is the first year of observations for a given company in this study, while $RNP_{it_0} = BNP_{it_0}$. Meanwhile, ϕ_t is the growth of capital-goods prices in year t as defined by the gross domestic product (GDP) deflator. In other words, $\phi_t = \frac{NomGDP_t}{RealGDP_t}100$, where $NomGDP_t$ is nominal GDP and $RealGDP_t$ is real GDP, both reported by the National Institute of Statistics of Spain. δ_{it} is the real depreciation rate, defined as $\delta_{it} = \frac{Dep_{it}}{BNP_{it}}$, where Dep_{it} is annual book depreciation.

I_{it} is new investment in property, plant, and equipment and is defined as $I_{it} = BNP_{it} - BNP_{it-1} + Dep_{it}$.

$RINV_{it} = BINV_{it}\left[\frac{2WPI_t}{WPI_t + WPI_{t-1}}\right]$, where WPI_t is the wholesale price index reported by the National Institute of Statistics of Spain. This estimation for the replacement value of inventory assumes that the inventory-accounting method is average cost. In this method, the value of inventory reported at time t is approximately equal to the average of the prices at $t-1$ and t.

The second measure of firm value ($Q2$) is based on enterprise value (EV_{it}) according to Łudzińska (2017), which

[6] Further discussion of the construction of Tobin's Q can be found in Perfect & Wiles (1994), Chung & Pruitt (1994), and Lindenberg & Ross (1981).

is the sum of market capitalization ($MkCptz_{it}$), total debt (TD_{it}), preferred stock ($PrefStock_{it}$), and minority interest ($MinInt_{it}$) minus cash and short-term investments ($CashEquiv_{it}$). Enterprise value is scaled by the replacement value of the firm's assets (K_{it}), following Perfect & Wiles (1994). Therefore, $Q2 = EV_{it}/K_{it}$. The third measure of firm value ($Q3$) is market capitalization ($MkCptz_{it}$) plus total debt (TD_{it}), all over the book value of total assets, based upon Goyal et al. (2002), Maury & Pajuste (2005), and Saona & San Martín (2018): $Q3 = (MkCptz_{it} + TD_{it})/TA_{it}$. The fourth measure of firm value ($Q4$) is the quotient between enterprise value and book value of total assets (Łudzińska, 2017): $Q4 = EV_{it}/TA_{it}$.

Hence, the econometric model takes the following form:

$$Q_{it} = \beta_0 + \beta_1 SCGI_{it-1} + \beta_2 X'_{it} + \mu_i + \epsilon_t + \varepsilon_{it} \qquad (2)$$

The output variable Q_{it} is any of the alternative measures of firm value defined above. In constructing the dependent variable, market capitalization is in the nominator, which might lead to large variation of the variable. Hence, to minimize the impact of outliers and to normalize the distribution of the covariates, we also use as a dependent variable in model (2) the natural logarithmic transformation of the various metrics of firm value defined above. Consequently, in these cases, β_1 and β_2 must be interpreted as partial elasticities: the percentage change in firm value caused by a unit change in any of the right-hand-side variables included in equation (2). Additionally, $SCGI_{it}$ corresponds to either S-CGI or any of its subindices (namely, features of the board of directors, ownership-structure features, degree of compliance with codes of good governance, and transparency in financial reporting).

Additionally, to prevent misspecification problems, we enter in the model the vector X'_{it}, which incorporates exogenous firm-level control covariates typically used in the literature (Kocmanová & Šimberová, 2014). This vector includes ROA_{it}, a measure of profitability computed as net income over total assets (Singh & Gaur, 2009); leverage (Lev_{it}), defined as total debt as a share of total assets (Harris & Raviv, 1990; Saona & Vallelado, 2012); and the firm's capital expenditure ($CAPEX_{it}$), which represents the sum of purchases of fixed assets, acquisitions of intangible assets, and software-development costs (Rosenblatt & Jucker, 1979) [7]. Firm size ($Size_{it}$) is also used as a control variable and is defined as the logarithmic transformation of the firm's total assets (Beck et al., 2008; Dennis & Sharpe, 2005). Additionally, dummy variables that identify the industry sector are introduced in the analysis. Finally, μ_i, ϵ_t, and ε_{it} represent the individual fixed effect, the time-series fixed effect, and the stochastic error, respectively.

To mitigate potential biases resulting from outliers, variables are winsorized at the 1% level in the lower and upper tails when appropriate as in previous studies (Jara et al., 2019; Mellado & Saona, 2020).

The subindices of S-CGI are defined based on the following covariates.

Degree of compliance with codes of good governance (*IndexCGG*): As we explained earlier, codes of good governance play an essential role in aligning a company's governance with the external regulatory framework (Aguilera & Cuervo-Cazurra, 2009). Following the main arguments of Aguilera & Cuervo-Cazurra (2004), the degree of compliance with these codes is measured by answers to thirty-one questions regarding Spanish firms' compliance with codes of good governance. The answers are provided in four points on a Likert scale. The questions are listed in the Appendix. We use PCA and the additive-indices technique as alternative approaches to create a subindex from these thirty-one components. Afterward, the subindex is normalized to have a mean of 0 and a standard deviation equal to 1.

Assidi (2020), Renders & Gaeremynck (2012), and Outa & Waweru (2016), among other authors, have found a positive relationship between corporate governance compliance and firm value in institutional contexts such as France, Indonesia, and Kenya. Consequently, we expect that Spanish companies with high compliance with the Spanish $SCGI_{it}$ will experience greater firm value.

Features of board of directors (*IndexBOARD*): We consider it fundamental to include board-of-directors characteristics because of their importance in control and supervision (Saona et al., 2020). These characteristics play a key role in reducing agency costs and in improving the effectiveness of corporate governance (Frias-Aceituno et al., 2013). According to the empirical literature—see, for instance, Baysinger & Butler (1985), Forbes & Milliken (1999), Klein (2002), de Cabo et al., (2012), Kumar & Zattoni (2014), Fernández-Gago et al., (2016), Birindelli et al., (2018), Arzubiaga et al., (2018), and Lidia & Patricia (2018)—the most influential board variables are percentage of the firm's capital represented by directors' stock options, percentage of directors on the boards of other companies, percentage of independent directors on the audit committee, percentage of independent directors on the executive committee, percentage of independent directors on the nomination committee, whether the board secretary monitors the good-governance recommendations, whether an executive committee exists, whether directors receive external advice, percentage of the firm's owners (weighted by capital) attending the firm's general meetings, percentage of independent directors, percentage of total directors on the audit committee, percentage of total directors on the executive committee, percentage of total directors on the nomination committee, restrictions on the exercise of voting rights, whether the secretary is a board member, whether there is separation of powers between the board chair and the chief executive, whether there are specific requirements for being board chair, whether there is a supermajority voting rule, whether there is a policy of tenure for independent directors, whether there is a policy regarding time to prepare a board meeting, and number of female board members.

Researchers have found various relationships between these features and firm value. For instance, Pucheta-Martínez et al., (2018) report that female institutional directors increase firm value, with an inverse-U-shaped relationship at the threshold of 11.72% of female members in the board of Spanish companies. Vitolla et al. (2020) find a positive relationship between the size, independence, diversity, and activity of a board with integrated reporting quality. Fernández-Gago et al. (2016) find positive relationships between, on the one side, small boards, boards with many women, and boards with more independent members and, on the other side, firm value. Kao et al., (2019) show an increase in the value of Taiwanese firms with a high proportion of independent directors, a smaller board size, a two-tier board system, and no CEO duality. Fich & Shivdasani (2005) find a positive relationship between stock-option plans and firm value.

From our analysis we can see that the characteristics of the board play a fundamental role as a corporate governance mechanism; consequently, improvements in them will in-

[7] By construction, in the REFINITIV EIKON Thomson Reuters data set, negative values of CAPEX represent additions of capital, while positive values represent decreases in physical and intangible capital.

crease the value of firms.

Ownership-structure features (*IndexOWN*): Spain belongs to the group of civil-law countries which are characterized by concentrated ownership structures in its companies. Different ownership-structure attributes provide different incentives to control a firm's management (Ang et al., 2000; Jensen & Meckling, 1976; Morck et al., 1988; Shleifer & Vishny, 1986), and consequently affect the corporate governance of the firm. Firms' ownership structure, viewed as a governance device, is also measured by several variables. We measure the institutional nature of the majority shareholder with a dummy variable (Azofra et al., 2003). Additionally, following the existing literature (Bozec & Bozec, 2007; Lefort & Urzúa, 2008; Saona & San Martín, 2016; Saona et al., 2018; Setia-Atmaja, 2009), we use ownership concentration, measured alternatively as the percentage of capital held by the majority shareholder, the ownership held by the ten largest shareholders, the ownership held in accordance with Article 4 of the Spanish Securities Market Law, and the percentage of capital owned by other significant shareholders[8]. All these variables are normalized to have a mean of 0 and a standard deviation of 1.

Ruiz-Mallorquí & Santana-Martín (2011) find that when the dominant institutional investor is a banking institution, this increases the value of unlisted Spanish firms. Comparable findings are reached by de Miguel et al. (2004). Saona et al., (2019) find that more concentrated ownership structures, as found in Spain, and the presence of institutional investors act as corporate governance drivers that prevent earnings mismanagement.

Transparency in financial reporting (*IndexEQ*): We include the quality of financial information in our corporate governance index because, first, corporate governance and readability reports are highly correlated as recently reported by Melon-Izco et al. (2021) and Arcas-Pellicer et al. (2022) for Spanish companies and government agencies and, second, earnings management is a critical issue for Spanish firms (Saona et al., 2020). This metric is an already-defined, scaled variable that tracks earnings quality as developed by StarMine. This metric is comparable to those described in previous empirical studies such as Obeng et al. (2020), Beyer et al. (2019), and Gaio & Raposo (2011). Earnings quality is based on a percentile ranking from 0 to 100 of stocks based on sustainability of earnings, with 100 representing the most sustainable. StarMine defines earnings quality as the degree to which past earnings are reliable and likely to persist. High-quality earnings accurately reflect a company's current and past operating performance, indicate future operating performance, and reliably measure company value, regardless of the level of earnings. Meanwhile, according to StarMine, companies with poor earnings quality are not necessarily engaging in earnings manipulation; in most cases, low earnings quality reflects a likelihood of deteriorating fundamentals and reflects low reporting transparency because of weak internal-governance tools. Furthermore, earnings quality can be measurably high. This is the case for companies that have very persistent earnings and strengthening fundamentals and are likely to outperform their benchmarks in the future, assuming earnings faithfully represent the effect of good corporate governance on the firm's economic performance. This also is the case for companies whose earnings have high informational content or high transparency.

Gaio & Raposo (2011) find a positive and significant relationship between earnings quality and firm value across firms in thirty-eight countries. This relationship is stronger in countries with big investment opportunities and low investor protection. More recently, Pavlopoulos et al. (2019) and Obeng et al. (2020) confirm the relationship.

The earnings-quality algorithm developed by StarMine is broken down into accruals, cash flow, and operating efficiency. Accordingly, earnings can be broken down into accruals and cash flow. Accruals are measured as changes in operating assets and liabilities from four quarters ago to the most recent quarter. The measure includes changes in both current and noncurrent operating assets and liabilities. Finally, accruals are scaled by average assets. The operating-cash-flow component of earnings is defined as the sum of net cash flow from operations and cash flow from investment. Cash flow is relatively free of estimation error and therefore is more reliable than accruals. It is measured as annualized free cash flow scaled by average assets. StarMine computes free cash flow as the cash generated (used) by operations after subtracting capital expenditures, which are investments made in the business to support operations. Finally, the operating-efficiency measure of earnings quality is based on return on assets. Return on assets is decomposed into a profit-margin subcomponent and an asset-turnover subcomponent, similarly to a DuPont analysis. StarMine evaluates asset turnover and profit margin against sector benchmarks because of the structurally different ways in which companies in various industries produce similar levels of return on assets. Profit margin is measured using the annualized operating profit margin as a percentage of annualized sales while total-asset-turnover ratio is calculated as annualized sales over average net operating assets. Change in asset turnover measures the annualized asset turnover for the most recent quarter minus the annualized asset turnover from four quarters ago. Based on these three measures, StarMine creates a ranking of all stocks in the country. This ranking, an overall measure of earnings quality, corresponds to our first metric of earnings quality (*EQ*1). Our alternative metrics of earnings quality correspond to accruals (*EQ*2), cash flow (*EQ*3), and operating efficiency (*EQ*4) as defined above. This composite index is normalized to have a mean of 0 and a standard deviation of 1.

Finally, these four subindices are equally weighted to generate S-CGI.[9] Subsequently, S-CGI is normalized to have a mean of 0 and standard deviation of 1.

3.3. Source of information

Our study is conducted with information on a sample of 130 listed Spanish companies with a total of 1,039 firm-year observations. This gives us an average of almost 8 continuous observations per company in our micropanel data. According to Baltagi (2013), a minimum of 4 continuous observations per individual (for example, a company) is a sine qua non condition to run an efficient panel-data estimation, even if it is unbalanced as in this study. The financial information, the information concerning the ownership-structure features, and the data regarding the quality of financial reporting were obtained from Thomson Reuters REFINITIV EIKON from 2007 to 2018. Given their regulated status and different financial reporting system, financial institutions were ex-

[8] Notice that board members' ownership of the capital of the company is included not in this subindex but in the board index as the percentage of the firm's capital held as directors' stock options.

[9] Black et al. (2017) and Chhaochharia & Laeven (2009) emphasize that weighting the elements equally is common in building an index. Doing so reduces subjectivity arising from assigning varying weights to the components.

Table 2. Variables' construction

This table provides information about the construction of the variables used in this study. The dependent variable is firm value. The independent variables are *SCGI*, which is the corporate governance index for Spanish firms, and *SCGI_N*, the indexs normalized value. *IndexCGG* represents the subindex of *SCGI* concerning the degree of compliance with codes of good governance, *IndexBOARD* represents the subindex of features of boards of directors, *IndexOWN* is the subindex component that represents firms ownership-structure features, and *IndexEQ* represents the subindex that measures transparency in financial reporting. Beneath these variables, their normalized versions are reported. Control variables include *Size*, *ROA*, *Lev*, and *CAPEX*.

Variable	Acronym	Definition	Source of Information
Firm Value	Q1	(Market capitalization + total debt) / replacement value of firms assets	Thomson Reuters REFINITIV EIKON
	Q2	Enterprise value / replacement value of firms assets	Thomson Reuters REFINITIV EIKON
	Q3	(Market capitalization + total debt) / total assets	Thomson Reuters REFINITIV EIKON
	Q4	Enterprise value / total assets	Thomson Reuters REFINITIV EIKON
Spanish Corporate Governance Index	SCGI	Spanish Corporate Governance Index	Thomson Reuters REFINITIV EIKON
	SCGI_N	Normalized Spanish Corporate Governance Index with mean of 0 and standard deviation of 1	Thomson Reuters REFINITIV EIKON and Annual Report on Corporate Governance, Spanish Stock Exchange
Degree of Compliance with Codes of Good Governance	IndexCGG	Index measured with answers to thirty-one questions regarding Spanish firms compliance with codes of good governance included in the Table 6, Panel B and the Appendix	Annual Report on Corporate Governance, Spanish Stock Exchange
	IndexCGG_N	Normalized Index of Compliance with Codes of Good Governance with mean of 0 and standard deviation of 1	Annual Report on Corporate Governance, Spanish Stock Exchange
Features of Board of Directors	IndexBOARD	Index measured with twenty-one board characteristics listed in Table 6, Panel B	Thomson Reuters REFINITIV EIKON
	IndexBOARD_N	Normalized Index of Features of Board of Directors with mean of 0 and standard deviation of 1	Thomson Reuters REFINITIV EIKON
Ownership-Structure Features	IndexOWN	Index measured with four characteristics of the firms ownership structure listed in Table 6, Panel C	Thomson Reuters REFINITIV EIKON
	IndexOWN_N	Normalized Index of Ownership-structure Features with mean of 0 and standard deviation of 1	Thomson Reuters REFINITIV EIKON
Transparency in Financial Reporting	IndexEQ	Index measured with earnings-quality algorithm metric reported by StarMine, representing the degree to which past earnings are reliable and likely to persist. This index is measured with four components listed in Table 6, Panel D	Thomson Reuters REFINITIV EIKON
	IndexEQ_N	Normalized Index of Transparency in Financial Reporting with mean of 0 and standard deviation of 1	Thomson Reuters REFINITIV EIKON
Profitability	ROA	Net income / total assets	Thomson Reuters REFINITIV EIKON
Leverage	Lev	Total debt / total assets	Thomson Reuters REFINITIV EIKON
Capital Expenditure	CAPEX	(Acquisition of fixed assets, intangible assets, and software-development costs) / total assets	Thomson Reuters REFINITIV EIKON
Firm Size	Size	Logarithmic transformation of total assets	Thomson Reuters REFINITIV EIKON

cluded from the sample. The advantage of Thomson Reuters REFINITIV EIKON is that it contains homogenized data and enables comparison and analysis of data on companies in different industrial sectors. Board-feature variables and the degree of compliance with codes of good governance were obtained from the Annual Report on Corporate Governance published by the Spanish Stock Exchange Commission (Comisión Nacional del Mercado de Valores). Table 2 describes how the variables were constructed.

4. Results and discussion

4.1. Univariate analysis

4.1.1. Descriptive statistics

We proceed to explain the general characteristics of the variables we used to build our index. Table 3 shows the four alternative measures of firm value, the subindices of S-CGI, and the control variables. Three of our four measures of firm value exhibit mean values slightly greater than one, indicating favorable market sentiment regarding firms' performance. This is confirmed by a *t* test. For the first three measures, the null hypothesis was rejected, suggesting that the average firm value is greater than one. Recall that the first two measures (*Q1* and *Q2*) are based on the replacement cost of total assets, *Q3* is a function of the ratio of market value to book value of total assets, and *Q4* compares enterprise value with the book value of total assets. Their distributions, however, are far from normal, as observed in their skewness and kurtosis, which are zero and three, respectively, for a normally distributed variable. This is not surprising, because market capitalization, which tends to be skewed toward the lower tail, is incorporated in the firm-value metrics. Hence, to mitigate the risk of biased results, we also eventually use the logarithmic transformations of all four proxies for firm value in the regression estimates.

Regarding the degree of compliance with codes of good governance, the coefficient of *IndexCGG* indicates that its average is 0.844, suggesting relatively high compliance among Spanish firms. Kubíček et al. (2016) analyze the degree to which the national governance codes of the twenty-seven European countries conform to European Union requirements; they find universal compliance, with Spain incorporating the most EU recommendations (seventeen out of eighteen) in its corporate governance code. The normalized transformation of this subindex—with mean equal to 0 and standard deviation equal to 1—is also reported in the table (*IndexCGG_N*). Indeed, if we look at the distribution of *IndexCGG*, we observe that in the first percentile depicted in the table (p5), the mean for the variable is 0.688, where its range goes from 0 to 1.

The mean values of the board-features subindex (*IndexBOARD*) and ownership-structure index (*IndexOWN*) are 0.340 and 0.356, respectively. The financial-reporting subindex (*IndexEQ*) shows a mean

Table 3. Descriptive statistics

This table details the descriptive statistics of the variables used in the empirical analysis. It shows the variables mean values; standard deviations; minimum and maximum values; p5, p25, p50, p75, and p95 values; and skewness and kurtosis. Firm value is measured according to models 1, 2, 3, and 4 as described in Section 3b. *SCGI* is the corporate governance index for Spanish firms, and *SCGI_N* is its normalized value. *IndexCGG* represents the subindex of *SCGI* concerning the degree of compliance with codes of good governance, *IndexBOARD* represents the subindex of features of boards of directors, *IndexOWN* is the subindex component that represents firms ownership-structure features, and *IndexEQ* represents the subindex that measures transparency in financial reporting. Beneath these variables, their normalized versions are reported, with their corresponding mean values of zero and standard deviations of one. Control variables include *Size* (the logarithmic transformation of total assets), *ROA* (net income over total assets), *Lev* (total debt as a share of total assets), and *CAPEX* (the sum of purchases of fixed assets, acquisitions of intangible assets, and software-development costs).

Variable	Mean	Std. Dev.	Min.	Max.	p5	p25	p50	p75	p95	Skewness	Kurtosis
Q1	1.212	1.105	0.043	7.972	0.334	0.617	0.879	1.315	3.293	3.018	14.204
Q2	1.131	1.089	-0.415	7.774	0.228	0.562	0.811	1.249	3.201	2.975	13.933
Q3	1.051	0.867	0.041	7.514	0.386	0.627	0.822	1.135	2.468	3.870	22.610
Q4	0.982	0.864	-0.393	7.389	0.272	0.562	0.767	1.093	2.454	3.722	21.603
SCGI	0.509	0.069	0.302	0.705	0.402	0.463	0.505	0.555	0.629	0.046	2.893
SCGI_N	0.000	1.000	-3.003	2.833	-1.546	-0.666	-0.065	0.654	1.728	0.046	2.893
IndexCGG	0.844	0.083	0.473	1.000	0.688	0.806	0.860	0.903	0.946	-1.134	4.785
IndexBOARD	0.340	0.077	0.121	0.570	0.211	0.285	0.340	0.392	0.466	0.041	2.778
IndexEQ	0.511	0.196	0.030	0.950	0.208	0.370	0.498	0.658	0.845	0.116	2.353
IndexOWN	0.356	0.154	0.009	0.742	0.113	0.239	0.359	0.466	0.610	0.049	2.498
IndexCGG_N	0.000	1.000	-9.234	1.724	-1.693	-0.397	0.192	0.664	1.135	-2.375	17.675
IndexBOARD_N	0.000	1.000	-2.816	2.974	-1.659	-0.710	0.007	0.673	1.637	0.041	2.778
IndexEQ_N	0.000	1.000	-2.460	2.245	-1.552	-0.721	-0.069	0.749	1.708	0.116	2.353
IndexOWN_N	0.000	1.000	-2.246	2.504	-1.570	-0.756	0.019	0.712	1.651	0.049	2.498
Size	20.734	2.035	15.955	25.589	17.692	19.193	20.652	22.008	24.428	0.261	2.458
ROA	0.014	0.097	-0.430	0.357	-0.151	-0.008	0.023	0.056	0.119	-0.965	8.758
Lev	0.328	0.201	0.000	0.998	0.018	0.180	0.319	0.452	0.686	0.510	3.125
CAPEX	-0.040	0.037	-0.278	0.008	-0.116	-0.054	-0.030	-0.013	-0.001	-1.766	7.674

value of 0.511. Comparing the mean values, we can state that compliance with codes of good governance makes the greatest contribution to firm value, followed by transparency of financial reporting. We normalized each of the subindex variables with mean equal to zero and standard deviation equal to one. For identification purposes, we designated these variables with _N as the suffix (*IndexCGG_N*, *IndexBoard_N*, *IndexOWN_N*, and *IndexEQ_N*).

We observe that the average Spanish corporation exhibits a return on assets (*ROA*) of about 1.40% and a debt ratio (*Lev*) of 32.8%. The *ROA* variable is used as a measure of profitability and indicates that 1.40% of total annual sales become after-tax income. This finding is comparable to Saona et al. (2020). Regarding the debt-ratio variable (*Lev*), the findings indicate that about one-third of the company's total assets are financed with debt. Note, however, that a few observations correspond to all-equity firms, as might be expected given the general trend toward zero-debt capital structure reported by Saona et al., (2020). The firms in the sample exhibit an average capital investment (*CAPEX*) of about 4.0% of total assets, indicating an increase in the amount of the average firm's physical and intangible assets during the period of analysis.

To gain a sense of the evolution of each variable throughout the analyzed period, we constructed Table 4 and Figure 1. Although the four proxies for firm value were composed based on comparable elements, their values differ across time. One clear pattern emerges in 2008, 2011, and 2018: the four metrics exhibit low values relative to the other years. The aftermath of the worldwide financial recession (2008-14), as reflected in 2008 and 2011, explains the values in those years; and by 2018 Spain had reached precrisis economic performance, but the upward trend would not endure.

Figure 1. Evolution of Spanish corporate governance index and its subindices

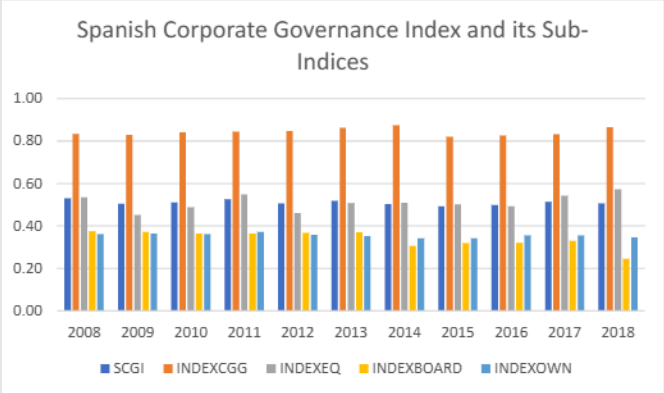


Table 4. Evolution of variables over time

This table provides information about the evolution of our four measures of firm value, our subindices, and our control variables.

Years	Q1	Q2	Q3	Q4	SCGI	IndexCGG	IndexBOARD	IndexOWN	IndexEQ	Size	ROA	Lev	CAPEX
2008	0.967	0.892	1.006	0.926	0.529	0.834	0.374	0.362	0.534	20.707	0.014	0.348	-0.057
2009	1.502	1.425	1.075	1.012	0.505	0.829	0.372	0.363	0.452	20.591	-0.001	0.365	-0.046
2010	1.653	1.515	0.958	0.874	0.511	0.841	0.364	0.361	0.488	20.722	0.020	0.325	-0.041
2011	0.801	0.725	0.869	0.797	0.526	0.844	0.363	0.372	0.548	20.730	0.008	0.344	-0.036
2012	0.931	0.864	0.890	0.828	0.505	0.848	0.368	0.358	0.461	20.668	-0.006	0.336	-0.037
2013	1.442	1.349	0.919	0.858	0.518	0.863	0.370	0.352	0.508	20.820	-0.013	0.330	-0.032
2014	1.155	1.094	1.051	0.996	0.504	0.875	0.305	0.342	0.510	20.852	0.029	0.311	-0.032
2015	1.278	1.221	1.189	1.139	0.492	0.821	0.319	0.342	0.501	20.602	0.020	0.323	-0.036
2016	1.524	1.421	1.176	1.094	0.498	0.826	0.320	0.356	0.492	20.754	0.022	0.325	-0.035
2017	1.264	1.182	1.299	1.227	0.514	0.832	0.329	0.354	0.541	20.831	0.031	0.312	-0.040
2018	0.805	0.742	1.118	1.041	0.506	0.865	0.246	0.346	0.572	20.836	0.028	0.283	-0.043
Mean	1.212	1.131	1.051	0.982	0.509	0.844	0.340	0.356	0.511	20.734	0.014	0.328	-0.040

Table 5. Correlation matrix

This table exhibits the pairwise Pearson correlation matrix.

	Q1	Q2	Q3	Q4	SCGI	IndexCGG	IndexBOARD	IndexOWN	IndexEQ	Size	ROA	Lev
Q1	1.000											
Q2	0.983***	1.000										
Q3	0.858***	0.854***	1.000									
Q4	0.835***	0.864***	0.980***	1.000								
SCGI	0.192***	0.193***	0.242***	0.232***	1.000							
IndexCGG	-0.0765*	-0.0587	-0.0273	-0.0287	0.319***	1.000						
IndexBOARD	0.0666	0.0636	-0.00434	-0.00641	0.356***	0.248***	1.000					
IndexOWN	0.0829*	0.0878*	0.114**	0.120***	0.507***	-0.140***	-0.0787*	1.000				
IndexEQ	0.216***	0.207***	0.269***	0.252***	0.746***	0.0212	0.0599	0.0365	1.000			
Size	-0.160***	-0.158***	-0.150***	-0.152***	0.222***	0.367***	0.317***	-0.0501	0.0662	1.000		
ROA	0.377***	0.352***	0.440***	0.398***	0.246***	-0.0266	-0.0215	0.0895*	0.301***	0.0686	1.000	
Lev	-0.0814*	-0.0821*	-0.155***	-0.157***	-0.140***	0.0992**	-0.00788	-0.0226	-0.223***	0.204***	-0.354***	1.000
CAPEX	-0.208***	-0.181***	-0.169***	-0.148***	-0.0239	-0.0305	-0.0364	-0.0255	0.0138	-0.0996**	-0.178***	0.0229

The comparatively low values of our proxies for firm value in 2011 and 2018 are a result of normal economic cycles, as also observed in other European economies. Figure 1 displays the evolution of $SCGI$ and its four subindices.

Table 5 exhibits the pairwise Pearson correlation matrix. Observe that there are no high correlations among the independent variables except for the proxies that measure firm value, as expected. The correlation between $SCGI$ and its subindices ($IndexCGG$, $IndexBOARD$, $IndexOWN$, and $IndexEQ$) is positive and statistically significant (p-value $<$ 0.001) in all cases, as expected.

4.1.2. Cronbach's α

Our indices of corporate governance measure an underlying attribute that is unobservable and cannot be defined with precision. Hence, in this section we consider the validity of our alternative indices of corporate governance. Following the literature, for this purpose we use Cronbach's α, which measures the correlation among the components of an index and the degree to which they measure the same underlying construct, whatever that construct may be (Cronbach, 1951).

Table 6 discloses Cronbach's-α values and their corresponding average interitem correlations. This indicator measures to what extent the individual elements of a multielement construct go in the same direction (Ararat et al., 2017). Cronbach's α is borrowed from the psychological literature, in which different elements of a multielement construct are chosen to capture different aspects of the underlying object (Black et al., 2017; Khongmalai et al., 2010). As noted above, α values higher than 0.7 indicate closely related concepts measuring essentially the same construct, while values around 0.6 are said to be acceptable. Table 6 shows each subindex and its elements, for which the mean, minimum, and maximum values are reported. The covariates for the code-compliance subindex ($IndexCGG$) and financial-reporting subindex ($IndexEQ$) show, respectively, values of 0.844 and 0.735 for Cronbach's α, indicating a strong internal consistency of the elements that constitute these two subindices. $IndexCGG$ comprises thirty-one covariates, while $IndexEQ$ consists of four. The Cronbach's α for the board-features subindex ($IndexBOARD$) and ownership-structure subindex ($IndexOWN$) reach 0.662 and 0.561, respectively. Even though the scores are not as strong as with the other two covariates, they are acceptable and show greater consistency than previous studies. For instance, in assessing the effect of corporate governance systems on firm value for a sample of Turkish firms, Ararat et al. (2017) generate an index of ownership structure comprising six covariates and arrive at a

Table 6. Cronbach's-α values

This table presents Cronbachs-α mean values and the minimum and maximum for all variables. The information is divided into panels. Panels A, B, C, and D disclose all the variables that explain each of the components of $SCGI$namely, $IndexCGG$, $IndexBOARD$, $IndexOWN$, and $IndexEQ$. Each panel also discloses the Cronbachs-α values for each index component and its normalized values. The average interitem correlation is also presented.

Panel A			
Compliance with Codes of Good Governance	**Mean**	**Min.**	**Max.**
Bylaw restrictions	2.836	0.000	3.000
Listed companies from the same group	0.242	0.000	3.000
Corporate interest	2.992	0.000	3.000
Committee size	2.763	0.000	3.000
Ratio of proprietary to independent directors	2.586	0.000	3.000
Functions of chair	2.938	0.000	3.000
Regular evaluation	2.714	0.000	3.000
Director information	2.392	0.000	3.000
Audit-committee skills and experience	2.951	0.000	3.000
Audit-committee oversight of internal-audit function	2.715	0.000	3.000
Head of internal-audit reporting to audit committee	2.659	0.000	3.000
Audit-committee functions	2.764	0.000	3.000
Any employee or manager able to call audit-committee meeting	2.954	0.000	3.000
Members of the appointment and compensation committee	1.475	0.000	3.000
Nomination-committee functions	2.797	0.000	3.000
Remuneration-committee functions	2.848	0.000	3.000
Remuneration committee consulted on matters concerning executive directors and senior officers	2.849	0.000	3.000
Annual accounts presented without qualifications	2.981	0.000	3.000
Opposition to proposals contrary to the corporate interest	2.305	0.000	3.000
Explanation for director removals before end of mandate	1.903	0.000	3.000
Directors nonattendance	2.888	0.000	3.000
Public information on directors	2.689	0.000	3.000
Control policy and risk management	2.911	0.000	3.000
Orientation program of new directors	2.810	0.000	3.000
Selection, appointment, and reelection of directors	2.729	0.000	3.000
Remuneration linked to earnings	1.811	0.000	3.000
Technical caution in variable remuneration	2.278	0.000	3.000
Monitoring of compliance with corporate governance rules, internal codes of conduct, and corporate-social-responsibility policy	2.759	0.000	3.000
Composition of supervisory and control committees	2.194	0.000	3.000
Previous information on proposals from the general meetings	2.771	0.000	3.000
No proposal to remove independent directors before expiry of their tenure	2.843	0.000	3.000
IndexCGG	0.844	0.473	1.000
IndexCGG_N	0.000	-9.234	1.724
Average interitem correlation	0.149		
Number of items in the scale	31		
Scale-reliability coefficient: Cronbachs	0.844		

Panel B			
Features of Boards of Directors	**Mean**	**Min.**	**Max.**
Percentage of the firms capital represented by directors stock options	0.001	0.000	0.105
Percentage of directors in the board of other companies	0.222	0.000	0.778
Percentage of independent directors on the audit committee	0.611	0.000	1.000
Percentage of independent directors on the executive committee	0.110	0.000	1.000
Percentage of independent directors on the nomination committee	0.577	0.000	1.000
Whether the board secretary monitors the good governance recommendations	0.489	0.000	1.000
Existence of executive committee	0.417	0.000	1.000
Existence of external advice for directors	0.856	0.000	1.000
Percentage of the capital attending the companys general meetings	0.701	0.000	1.000
Percentage of independent directors	0.382	0.000	1.000
Percentage of the total directors on the audit committee	0.371	0.000	0.800
Percentage of the total directors on the executive committee	0.196	0.000	0.909
Percentage of the total directors on the nomination committee	0.365	0.000	0.750
Restrictions on the exercise of voting rights	0.012	0.000	1.000
Whether secretary is a board member	0.217	0.000	1.000
Whether there is separation of power between the board chair and the chief executive	0.205	0.000	1.000
Existence of specific requirements for board chairmanship	0.079	0.000	1.000
Existence of supermajorities	0.204	0.000	1.000
Existence of policy of tenure for independent directors	0.132	0.000	1.000
Existence of policy regarding time to prepare a board meeting	0.902	0.000	1.000
Number of female board members	0.133	0.000	0.571
IndexBOARD	0.340	0.121	0.570
IndexBOARD_N	0.000	-2.816	2.974
Average interitem correlation	0.085		
Number of items in the scale	21		
Scale-reliability coefficient: Cronbachs	0.662		
Panel C			
Ownership Structure	**Mean**	**Min.**	**Max.**
Ownership held by majority shareholder	0.280	0.001	0.943
Ownership held by ten largest shareholders	0.539	0.001	1.081
Ownership held by controlling shareholder according to Art. 4 of the Spanish Securities Markets Law	0.227	0.000	0.917
Percentage of the capital owned by other significant shareholders	0.311	0.000	0.961
IndexOWN	0.356	0.009	0.742
IndexOWN_N	0.000	-2.246	2.504
Average interitem correlation	0.242		
Number of items in the scale	4		
Scale-reliability coefficient: Cronbach's	0.561		
Panel D			
Transparency of Financial Reporting	**Mean**	**Min.**	**Max.**
EQ1	43.467	1.000	100.000
EQ2	50.930	1.000	100.000
EQ3	54.734	4.000	100.000
EQ4	52.571	1.000	100.000
IndexEQ	0.511	0.030	0.950
IndexEQ_N	0.000	-2.460	2.245
Average interitem correlation	0.409		
Number of items in the scale	4		
Scale-reliability coefficient: Cronbach's	0.735		
Panel E			
Spanish Corporate Governance Index	**Mean**	**Min.**	**Max.**
SCGI	0.509	0.302	0.705
SCGI_N	0.000	-3.003	2.833
Average interitem correlation	0.351		
Number of items in the scale	4		
Scale-reliability coefficient: Cronbach's	0.745		

Cronbach's α of only 0.40, with an interelement correlation of just 0.10. Some have argued that ownership metrics are a flawed proxy for corporate governance because of the conflict between two hypotheses: alignment of interest, and potential wealth expropriation by entrenched majority shareholders. The conflict may drive a nonlinear relationship between firm value and proxies for governance systems based on ownership concentration (Claessens et al., 2002; de Miguel et al., 2005; Saona et al., 2020). Therefore, although Cronbach's α is relatively low for $IndexOWN$ compared with that for the other subindices, the α and the average interitem correlation are much higher than those found in previous empirical studies (Ararat et al., 2017), a fact that does not invalidate our findings.

Indeed, when we look at average interitem correlation in Table 6 for the different subindices, the highest scores are reached for earnings quality ($IndexEQ$) at 0.4091 and ownership structure ($IndexOWN$) at 0.2424. The lowest are observed for code compliance ($IndexCGG$), at 0.149, and board features ($IndexBOARD$), at 0.0817. The first two have the most items in the scale, and as the number of elements that form the construct increases, α increases. Black et al. (2017) highlight the importance of having intermediate average interitem correlations—as with our constructs—as high values indicate the lack of a relationship among the elements within the construct and low values mean no coherence among them. In summary, these estimates show internal coherence in the elements that form the four different constructs, and consequently, they can be used as independent covariates in our estimation models of firm value. Hence, these findings support our first two research hypotheses, suggesting that the subindices are reasonable constructs of corporate governance.

4.1.3. Principal component analysis

PCA helps us develop S-CGI, as it allows us to reduce the number of variables in every subindex to reach the optimal number of variables. The eigenvectors created based on the correlation matrix between the variables that form each subindex are chosen when their eigenvalues are higher than one. The major advantage of this technique is that the factors are not correlated and they capture a large portion of the variability of the corresponding components (Saona & Muro, 2018).

Table 7 displays the number of factors generated for the variables in our four subindices[10]. In Panel A, we see that seven factors' eigen values exceed one, set as the standard discrimination value as indicated in (Kim & Mueller, 1978; Nerantzidis, 2016). These seven factors record about 56.80% of the variability of the thirty-one alternative variables used to measure the degree of compliance with codes of good governance ($IndexCGG$). Similarly, Table 7, Panel B indicates that eight factors are selected, as they account for 66.20% of the variability of the twenty-one covariates used to measure $IndexBOARD$. Panel C discloses the two factors selected to account for about 88.00% of the variability of the five variables used to measure $IndexOWN$. Finally, the last panel discloses the quality of financial reporting, and two factors account for 86.60% of the variability of the four covariates used to measure $IndexEQ$.

In all panels of Table 7, we estimate a likelihood-ratio test of independence against the saturated model for each estimation method. Because we are factor-analyzing a correlation

[10]To save space, we only report the factors with eigenvalues greater than one.

Table 7. Principal component analysis

This table displays the number of factors generated for the variables used to measure our four subindices.

Panel A: Factors for				
Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor1	7.676	5.061	0.248	0.248
Factor2	2.615	0.565	0.084	0.332
Factor3	2.050	0.239	0.066	0.398
Factor4	1.811	0.539	0.058	0.457
Factor5	1.272	0.171	0.041	0.498
Factor6	1.102	0.034	0.036	0.533
Factor7	1.068	0.079	0.034	0.568
Plus other factors with eigenvalue<1	...	...	...	...
LR test: independent vs. saturated: chi2(465) = 2.0e+04 Prob>chi2 = 0.0000				
Panel B: Factors for				
Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor1	3.288	0.493	0.157	0.157
Factor2	2.794	0.921	0.133	0.290
Factor3	1.873	0.479	0.089	0.379
Factor4	1.395	0.088	0.066	0.445
Factor5	1.307	0.153	0.062	0.508
Factor6	1.154	0.081	0.055	0.562
Factor7	1.073	0.052	0.051	0.614
Factor8	1.021	0.101	0.049	0.662
Plus other factors with eigenvalue<1	...	...	...	...
LR test: independent vs. saturated: chi2(210) = 1.1e+04 Prob>chi2 = 0.0000				
Panel C: Factors for				
Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor1	1.939	0.363	0.485	0.485
Factor2	1.576	1.281	0.394	0.879
Plus other factors with eigenvalue<1	...	...	...	...
LR test: independent vs. saturated: chi2(6) = 2744.03 Prob>chi2 = 0.0000				
Panel D: Factors for				
Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor1	2.375	1.286	0.594	0.594
Factor2	1.088	0.581	0.272	0.866
Plus other factors with eigenvalue<1	...	...	...	...
LR test: independent vs. saturated: chi2(3) = 328.83 Prob>chi2 = 0.0000				

matrix, independence implies sphericity. Passing this test is a desirable condition for factor analysis to be meaningful. This means that the likelihood-ratio test for differences between the estimated and actual covariance matrixes is expected to be insignificant. Nevertheless, this almost never happens in large samples, as in our case, in which we have more than one thousand observations.

Subsequently, in addition to using the subindices, all these factors are used in estimating the different regression outputs and in their robustness checks.

4.2. Multivariate analysis

To validate S-CGI we use micropanel-data regression analysis, which allows us to tackle individual-heterogeneity issues and potential simultaneity (endogeneity) problems. Specifically, we use the two-stage GMM-SE to run equation (3). The efficiency of this method depends on the assumptions that the independent variables are valid instruments and that the error term does not show serial correlation (Saona et al., 2019). We use the Fisher-type test (F test) to confirm that the independent variables are jointly significant. We also use second-order-correlation tests—AR(2)—normally distributed under the null hypothesis that there is no serial correlation of the stochastic error. The GMM estimators are consistent because although the AR(1) reveals first-order autocorrelation, the AR(2) test rules out second-order autocorrelation. The Sargan contrast is developed to test the overidentifying restrictions and consequently to prove that the instruments are valid. This test is distributed as a chi-squared under the null hypothesis that the instruments are valid.

The output variables considered in Table 8 are all our various measures of firm value and their corresponding log transformations. We do this to mitigate biased-estimation problems resulting from erroneous measures. We observe a positive and statistically significant effect of the four subindices on the different measures of firm value. For instance, an increase of one standard deviation in $IndexCGG\_N$ increases $Q1$ by about 0.111 (p-value = 0.011) as shown in model 1. This implies that compliance with codes of good governance is positively associated with firm value. Our results are in line with the findings of Utrero-González & Callado-Muñoz (2016), who test whether Spanish markets react positively to news about compliance with codes of governance. Similar findings are observed in seven of the eight models listed in Table 8.

Regarding the board-features subindex ($IndexBOARD\_N$), we also observe in five models reported in Table 8 a positive and statistically significant relationship with the various proxies for firm value. However, caution is warranted since in model 3 the relationship is negative and significant. Nevertheless, the economic impact of the subindex is lower than that in model 1, with a coefficient equal to 0.205 (p-value = 0.016). Model 1 in Table 8 indicates, for instance, that an increase of one standard deviation in $IndexBOARD\_N$ is associated with an increment of 0.205 in $Q1$. Alternatively, such an increase in $IndexBOARD\_N$ is associated with a 15.6% (p-value = 0.009) increase in the $Q1$ (measured with its log transformation) as tabulated in model 5. Models 2, 6, 7, and 8 can be considered as providing additional support for this finding.

Additionally, ownership-structure features ($IndexOWN\_N$) have a positive and statistically significant impact on firm-value measures, ceteris paribus, as shown by models 3 through 8. Indeed, a one-standard deviation increase in the ownership-concentration subindex triggers an increase in $Q3$ of 0.035 (as shown in model 3 with p-value = 0.008), which corresponds to an increase of 4.20% in the firm-value variable's log transformation (as exhibited in model 7). Models 3 to 8 also exhibit a positive and statistically significant impact of changes in $IndexOWN\_N$ on the dependent variables. These findings are valuable, as not many studies have used our reposition-cost-based measure of firm value ($LnQ1$) as a proxy[11]. Table 8 also reports as dependent variables the logarithmic transformations of our four metrics of firm value ($LnQ1$, $LnQ2$, $LnQ3$, and $LnQ4$) to mitigate the problems arising because they are not normally distributed (Demsetz & Villalonga, 2001) [12]. These findings are supported by previous empirical studies, particularly in emerging economies, where governance tools are mostly endogenous to the corporations whose ownership-structure features play a

[11] We also calculated $Q2$, $Q3$, and $Q4$ in the regressions, but to save space we do not include them here. They are available to the reader upon request.

[12] We can see in the descriptive statistics (see Table 3) that the four measures of firm value have skewness and kurtosis different from zero and three, respectively, indicating the existence of heavy tails.

critical role in monitoring managerial behavior (Chu et al., 2015; Lassoued et al., 2017).

Furthermore, we find some evidence that transparency of financial reporting exerts a positive impact on firm valuation. Indeed, model 8 of Table 8 shows that a one-standard deviation increase in the financial-transparency subindex ($Index\ EQ\_N$) is associated with a 1.4% (p-value = 0.004) increase in $Q4$ (using $LnQ4$ as the dependent variable). This finding is in line with Gaio & Raposo (2011), who, adopting an international perspective, find that firms with higher earnings quality are valued higher in stock markets, this relationship being stronger for firms with greater investment opportunities and more external financial needs. Models 2, 3, and 4 also support the positive relationship between the financial-transparency subindex and firm value. The other models do not return statistically significant coefficients. Therefore, we observe consistent evidence that supports our third research hypothesis that the subindices of corporate governance explain firm value in the Spanish corporate sector.

Regarding the control variables, firm size ($Size$) exhibits a negative and statistically significant impact on firm value, suggesting that bigger companies are creating less value than small ones. The life cycle of firms is associated with changes in corporate governance quality (Filatotchev et al., 2006). According to this theory, we should expect mature and big firms to have better corporate governance systems and create more value, but it seems that young and small Spanish corporations are the ones creating value. Nevertheless, and as supported by the literature, firm profitability (ROA), capital expenditure ($CAPEX$), and financial leverage (Lev) exhibit a positive impact on the different measures of firm value.

The last task of our empirical analysis is to assess the validity of S-CGI as a determinant of firm value. This task is accomplished in Table 9. As observed, the eight models exhibit a positive and statistically significant impact of S-CGI on all our metrics of firm value. This implies that improvements in corporate governance are indeed positively associated with firm value as stated in our fourth research hypothesis. Our results are consistent when using the normalized transformation of $SCGI$, although, to save space, we do not report the latter results. According to Jensen (1986, 1993) free-cash-flow hypothesis, corporate governance mechanisms are employed to reduce agency conflicts between shareholders and managers. Additionally, signaling theory states that investors rely on the information provided by a company, which plays a fundamental role in reducing information asymmetry and agency conflicts (Harun et al., 2020). Consequently, improvements in firm disclosure and better governance systems increase firm value. These results are in line with the corporate governance literature. For instance, for a sample of firms in sixteen European countries, Lozano et al. (2016) find a strong and positive relation between firm-level corporate governance and firm valuation by using alternative corporate governance indices. Similarly, Chhaochharia & Laeven (2009), using a sample that includes a large cross section of countries, find that markets reward companies that are prepared to adopt corporate governance practices beyond those required by their own countries' regulations.

Table 8. Normalized subindices: regressions and control variables

This table shows the regression estimates that explain firm value according to the different models used. We use as independent variables the normalized subindices ($IndexCGG\_N$, $IndexBOARD\_N$, $IndexOWN\_N$, and $IndexEQ\_N$) and all the control variables described in Section 3b. We use the Fisher-type test (F) to confirm that the independent variables are jointly significant. We also use AR(1) and AR(2) for first- and second-order correlation tests, which are normally distributed under the null hypothesis that there is no serial correlation of the stochastic error. The Hansen-Sargan contrast is developed to test the overidentifying restriction that the instruments are valid. This test is distributed as a chi-squared under the null hypothesis that the instruments are valid. Standard errors are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Q1	Q2	Q3	Q4	LnQ1	LnQ2	LnQ3	LnQ4
IndexCGG_N	0.111***	0.127***	0.057***	0.083***	-0.010	0.100***	0.030***	0.109***
	(0.011)	(0.009)	(0.003)	(0.002)	(0.006)	(0.009)	(0.004)	(0.008)
IndexBOARD_N	0.205***	0.190***	-0.018***	-0.016	0.156***	0.146***	-0.004	0.030***
	(0.016)	(0.008)	(0.004)	(0.053)	(0.009)	(0.007)	(0.006)	(0.006)
IndexOWN_N	0.040	-0.111	0.035***	0.053***	0.117***	0.077***	0.042***	0.136***
	(0.030)	(0.001)	(0.008)	(0.018)	(0.023)	(0.017)	(0.008)	(0.023)
IndexEQ_N	-0.002	0.051***	0.003*	0.021***	0.001	0.010	-0.003	0.014***
	(0.010)	(0.008)	(0.002)	(0.002)	(0.006)	(0.006)	(0.003)	(0.004)
Size	-0.349***	-0.423***	-0.113***	-0.139***	-0.130***	-0.027***	-0.134***	-0.247***
	(0.021)	(0.016)	(0.011)	(0.013)	(0.011)	(0.005)	(0.009)	(0.018)
ROA	1.995***	3.250***	1.346***	0.792***	0.324**	-0.225*	1.420***	0.928***
	(0.177)	(0.236)	(0.066)	(0.092)	(0.133)	(0.116)	(0.113)	(0.146)
Lev	0.580***	0.718***	0.104***	-0.208***	0.642***	0.194*	0.718***	0.625***
	(0.148)	(0.099)	(0.031)	(0.040)	(0.069)	(0.106)	(0.053)	(0.060)
CAPEX	-2.588***	-1.592***	-1.177***	-1.423***	-0.396	0.141	-1.420***	-0.915***
	(0.428)	(0.511)	(0.176)	(0.188)	(0.431)	(0.344)	(0.177)	(0.279)
Constant	7.472***	-0.423***	3.184***	-0.139***	2.178***	0.000	2.158***	4.434***
	(0.385)	(0.016)	(0.195)	(0.013)	(0.251)	(0.000)	(0.172)	(0.341)
Observations	823	797	1,039	1,017	823	797	1,039	1,017
Number of iden	111	108	130	127	111	108	130	127
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
F	767,000	746,600	92,593	8,823	94,404	542,800	3,788	11,898
p-value	0.003	0.025	0.080	0.022	0.000	0.000	0.004	0.000
Avg obs group	7.414	7.380	7.992	8.008	7.414	7.380	7.992	8.008
AR1	-2.974	-3.223	-2.223	-2.284	-2.809	-2.939	-4.059	-3.858
p-value	0.000	0.009	0.000	0.000	0.005	0.000	0.000	0.000
AR2	-2.176	-2.245	1.081	0.721	-4.493	-4.590	-0.261	-1.456
p-value	0.960	0.564	0.308	0.471	0.704	0.107	0.339	0.145
Sargan	113.9	121.8	469.3	292.2	290.7	323.7	529	554.2
p-value	0.905	0.127	0.992	0.992	0.604	0.881	0.966	0.501

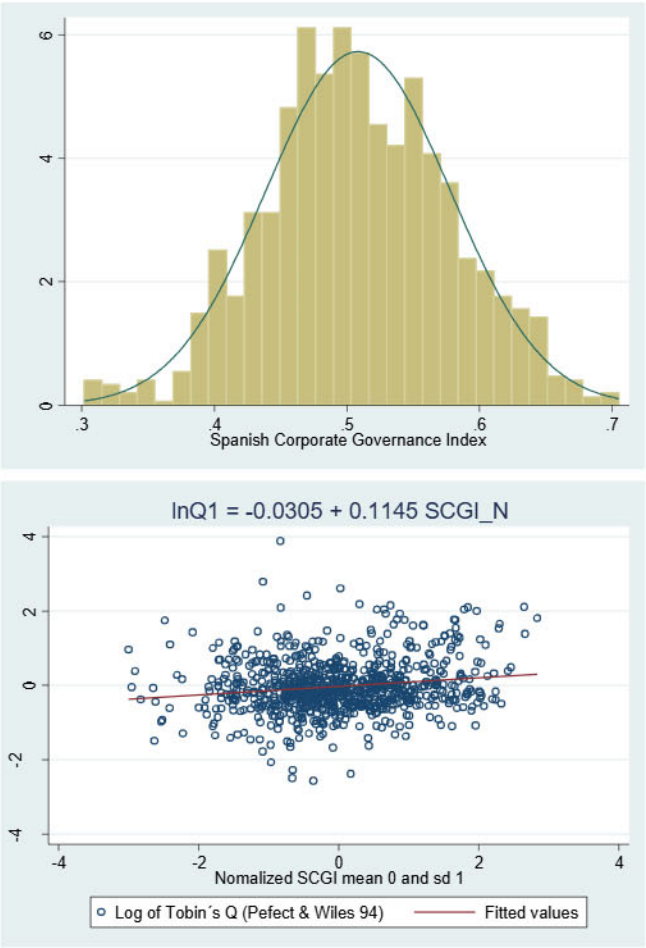
Table 9. Corporate governance index regression

This table shows the regression estimates for S-CGI's effect on the four firm-value measures and their logarithmic transformations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Q1	Q2	Q3	Q4	lnQ1	lnQ2	lnQ3	lnQ4
SCGI	2.161***	1.351***	0.241***	0.760***	0.772***	1.051***	0.178***	1.196***
	(0.084)	(0.083)	(0.040)	(0.047)	(0.074)	(0.062)	(0.053)	(0.113)
Size	-0.224***	-0.325***	-0.085***	-0.102***	-0.087***	-0.154***	-0.143***	-0.190***
	(0.017)	(0.019)	(0.006)	(0.008)	(0.015)	(0.007)	(0.010)	(0.014)
ROA	2.703***	2.454***	2.453***	1.847***	1.211***	0.403***	2.096***	1.513***
	(0.167)	(0.204)	(0.069)	(0.059)	(0.179)	(0.064)	(0.081)	(0.103)
Lev	0.582***	0.432***	0.008	-0.145***	0.531***	0.511***	0.626***	0.770***
	(0.110)	(0.103)	(0.056)	(0.045)	(0.077)	(0.037)	(0.063)	(0.048)
CAPEX	-6.580***	-4.608***	-2.673***	-2.926***	-0.288	0.180	-2.284***	-2.890***
	(0.417)	(0.341)	(0.117)	(0.194)	(0.326)	(0.237)	(0.162)	(0.341)
Constant	3.937***	6.293***	2.653***	2.541***	0.887***	2.061***	2.329***	2.604***
	(0.320)	(0.370)	(0.157)	(0.165)	(0.280)	(0.140)	(0.202)	(0.226)
Observations	823	797	1,039	1,017	823	797	1,039	1,017
Number of iden	111	108	130	127	111	108	130	127
Industry and year FE	YES	YES	YES	YES	YES	YES	YES	YES
F	54,379	45,549	6,754	829.6	597,705	394,945	9,254	245.3
p-value	0.000	0.022	0.000	0.004	0.000	0.000	0.000	0.001
Avg obs group	7.414	7.380	7.992	8.008	7.414	7.380	7.992	8.008
AR1	-3.216	-3.163	-2.851	-2.847	-2.894	-3.111	-4.188	-4.383
p-value	0.001	0.000	0.982	0.989	0.000	0.002	0.000	0.994
AR2	-2.227	-2.286	0.886	0.510	-4.586	-4.634	-0.619	-1.582
p-value	0.259	0.156	0.375	0.255	0.210	0.999	0.244	0.117
Sargan	126.7	138.9	407.7	429.9	419.7	432.9	632.4	618.8
p-value	0.861	0.906	0.308	0.610	0.381	0.747	0.536	0.201

Figure 2. Histogram of S-CGI and scatterplot of firm value and S-CGI

This figure shows the histogram of S-CGI, which ranges from zero to one and has a normal distribution. Additionally, it provides a scatterplot of $LnQ1$ and our normalized S-CGI ($SCGI\_N$) and the corresponding regression line.



Following Ararat et al. (2017), Figure 2 shows a histogram of $SCGI$, which ranges from zero to one and exhibits a normal distribution. Figure 2 also shows a scatterplot of $LnQ1$ as well as $SCGI\_N$ and the corresponding regression line. The slope of the coefficient is a positive and significant 0.1145.

5. Conclusions

Corporate governance is at the top of the agenda for corporations worldwide. Its association with corporate dimensions such as firm value and performance has been proven. However, the question of how to measure corporate governance has not been answered in a standardized way across countries. Therefore, the goal of this paper has been to build a robust and aggregated corporate governance index for the Spanish corporate sector and subsequently test its validity as a predictor of firm value.

We assessed the validity of an aggregate corporate governance index ($SCGI$) and its subindices, which measure several governance attributes of the Spanish market. These subindices cover compliance with codes of good governance ($IndexCGG$), features of boards of directors ($IndexBOARD$), ownership-structure features ($IndexOWN$), and transparency of financial reporting ($IndexEQ$). We then used Cronbach's α to test the reliability of our measurement instruments. PCA helped us develop our additive index and allowed us to reduce the number of covariates in every subindex to reach the optimal number of variables.

One of the firm-value literature's major flaws regarding validity is its use of the general measure of firm value based on Tobin's Q, which, although simple to compute, produces inaccuracy, bias, and variability. Our study is the first to attempt to mitigate estimation biases caused by imprecise definition of the output variable. In particular, we use a superior metric of Tobin's Q in which it is computed as the value of a firm's assets divided by a proxy for their replacement value.

Our study contributes to the extensive literature on corporate governance and suggests other possible, more precise approaches to measuring a firm's value based on the reposition costs of total assets. When the ratio of market value to book value is used as a proxy for Tobin's Q, aggregated book values omit important assets, such as a sizable percentage of intangible assets, leading to biases in the estimation of firm value. This study is the first that attempts to eliminate this classical measurement error.

We found that the four corporate governance subindices are positively associated with the various measures of firm value. The proposed aggregate corporate governance index also exhibits a positive association with firm value. Thus, corporate value and governance cannot be dissociated. Higher societal welfare can be achieved through sound governance mechanisms. And even more important, our aggregated index of corporate governance can be used to mitigate biases in the relationship between governance and firm value as a consequence of including in the corporate governance proxy elements that are different from governance.

We encourage regulators and policy makers to design legal structures with corresponding enforcement mechanisms that help protect the interests of shareholders and promote more transparent disclosure of financial reports. Financial markets evaluate very positively companies' compliance with good governance codes as well as transparency in financial reporting. Although Spanish firms have a relatively high level of compliance with the codes, there is room for improvement. Moreover, transparency in financial reporting is far from sustainable values (1.00), with an average of 0.511 for the sample during the period of analysis. Therefore, we suggest that policy makers complement internal corporate policies with regulations that help reconcile the interests of board members and shareholders. Similarly, researchers have discovered that the fiduciary role of boards of directors promotes firm value. National and supranational organizations should develop and promote regulations associated with the governance and management of companies. Moreover, improving transparency in companies' financial reporting is key not only for having a healthy financial system but also as a firm-value-creation mechanism that can contribute to national wealth generation. These improvements in corporate governance call for a multi-stakeholder approach, in which all participants engage in best practices in their respective fields.

This study has some limitations, which may correspond to avenues for future research. Direct observation is limited, for one thing, and knowledge about governance is incomplete because our judgments applied in the estimations are subjective. Corporate governance systems are not perfect, and more research is necessary to reduce agency conflicts. For instance, Garcia-Sanchez et al. (2021) find CEO power critical as a corporate governance determinant that limits the propensity of companies to adopt information transparency. Our index could be further developed with new determinants such as CEO power.

Although our index is current, a vivid political and social debate regarding corporate social responsibility and sustainability is ongoing. An even more comprehensive corporate governance index might include such components as integrated reporting, which represents the cutting edge of today's corporate reporting systems (Vitolla et al., 2020). Future research should use our robust and validated index to measure corporate governance and spur the development of good governance practices in other countries. Our index could be ported to different institutional contexts to shed light on cross-country divergences and similarities and to derive more effective corporate governance practices.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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APPENDIX

This appendix shows the questions regarding the level of compliance with codes of good governance by Spanish firms.

Bylaw restrictions
Listed companies from the same group
Corporate interest
Committee size
Ratio of proprietary to independent directors
Functions of chair
Regular evaluation
Director information
Audit-committee skills and experience
Audit-committee oversight of internal-audit function
Head of internal-audit reporting to audit committee
Audit-committee functions
Any employee or manager able to call audit-committee meeting
Members of the appointment and retribution committee
Nomination-committee functions
Remuneration-committee functions
Remuneration committee consulted on matters concerning executive directors and senior officers
Annual accounts presented without qualifications
Opposition to proposals contrary to the corporate interest
Explanation for director removals before end of mandate
Directors unattendance
Public information on directors
Control policy and risk management
Orientation program of new directors
Selection, appointment, and reelection of directors
Remuneration linked to earnings
Technical caution in variable remuneration
Monitoring of compliance with corporate governance rules, internal codes of conduct, and corporate-social-responsibility policy
Composition of supervisory and control committees
Previous information on proposals from the general meetings
No proposal to remove independent directors before expiry of their tenure