Corporate Governance Indexes: The Confounding Effects of Using Different Measures

Genc Alimehmeti[1]
Department of Management, University of Tirana, Albania

Angelo Paletta
Department of Management, University of Bologna, Italy

Abstract

Prior empirical research has created and used many different governance indexes with mixed results. However, these different configurations might prove unlikely effects over firm valuation as they differ in configuration, scale and furthermore, in interpretation. To test the effectiveness of different governance indexes configurations, an OLS model and a panel data analysis is applied on a sample of 1.307 firms in the U.S. over three years. The results confirm statistical differences and significance of two different measures of external and internal governance in relation to firm value.

1. Introduction

In the last decade, corporate governance has recently received much attention due to recent governance failures over the world (Enron, Worldcom, Tycon, Parmalat, Cirio, etc.) On this wave of scandals, in order to restore stakeholders confidence, the U.S. reacted by enacting the Sarbanes-Oxley Act (SOX) in 2002 which has been defined as the most extensive governance regulation in the last 70 years (Romano, 2005). These rules include different provisions in order to align interests of investors with corporate insiders and to reduce the likelihood of insiders' misconduct or fraud. For example, SOX has introduced heavy penalties for the CEO and CFO requiring a personal statement on the effectiveness of the internal controls over financial reporting. Furthermore, it requires an increasing number of independent directors on corporate boards and an independence of the audit committee. The U.S. Senate approved these requirements, as it realized that one of the major factors that leaded the governance crisis was that the existing monitoring mechanisms in the U.S. firms were not sufficient to ensure good governance (Bastia & Paletta, 2008; Paletta, 2008).

These changes have driven the attention of scholars and data providers on governance issues, and specifically in evaluating the strength of governance as there is a "*widespread recognition, as well as growing empirical evidence, that corporate governance arrangements can substantially affect shareholders*" (Bebchuk, Cohen, & Ferrell, 2009, p. 1). But which of the many governance indexes created and used by scholars around the world, play a key role in the link between corporate governance and firm value? This is the question that this paper investigates. Even though it does not consider all the existing corporate indexes

---

configurations, it raises questions about the statistical cogency or misuse that they might have on different analysis.

In a landmark paper, Gompers, Ishii and Metrick (2003) study the effects of governance over firm performance using a proxy of 24 provisions from the Investor Responsibility Research Center (IRRC) database. They find that more shareholder power is related to a higher firm valuation measured by Tobin's Q (Gompers, Ishii, & Metrick, 2003). The same results were considered by Bebchuk et al. (2009) who reduce the 24 provisions to only six, by creating the entrenchment index which fully drives the valuation results of Gompers et al. (2003).

A critique raised to these indexes, is that they measure only external governance in spite of the fact that effective governance requires both internal and external measures (Brown & Caylor, 2006). On the other hand, several other scholars have created and used other governance indexes configurations (Ahmed, McAnally, Rasmussen, & Weaver, 2010; Klein, 2002; Chen, Kao, Tsao, & Wu, 2007). These indexes are constructed by mostly taking into account internal governance factors as the size of the board, the presence of independent members in the board and audit committee, their proportion in respect to the board / audit committee total number and furthermore, the use of a "big four" auditor, institutional ownership, etc.

This paper studies the confounding effects that different governance indexes configurations might have on firms' valuation. The basic assumption of this paper is that all these governance indicators strive to measure the same thing: the effectiveness of corporate governance. It seems though, that these different configurations might prove unlikely effects over firm valuation as they differ in configuration, scale and furthermore, in interpretation. The scope of this paper is to empirically test two different configurations of governance measures within the same model and same set of firms over three years, by applying an OLS regression and a panel data analysis with random fixed effects.

2. Background and prior research

Several empirical papers have strived to measure the effect of corporate governance on firm value (Brown & Caylor, 2006). Nevertheless, prior studies commonly examine the effect of corporate governance through certain characteristics of governance structure (Chen, Kao, Tsao, & Wu, 2007). For instance, Gompers, Ishii and Metrick (2003) create G-Index using the occurrence of 24 governance provisions as a proxy of the level of shareholder rights. They find that firms with stronger shareholder rights have higher firm value. Proceeding their work, Bebchuk, Cohen and Ferrell (2009) investigate the significance of the 24 provisions used for the G-Index, concluding that only six of these provisions drive the valuation results of G-Index, creating a new index (the entrenchment index). Both this paper use IRRC (RiskMetrics) data that collect anti-takeover measures, focusing on external governance factors (Shleifer & Vishny, 1986; Brown & Caylor, 2006; Cremers & Nair, 2005).

On the other hand, other studies have focused on internal governance, creating the basis for new configurations of governance indexes (Klein, 2002; Core, Holthausen, & Larcker, 1999; Xie, Davidson, & DaDalt, 2003; Ahmed, McAnally, Rasmussen, & Weaver, 2010). Even though these governance indexes are different from each other, they have a similar approach by largely assuming that strong monitoring is mainly related to board independence, audit independence, board size, external auditing quality, institutional ownership and other

factors (La Porta, Lopez-de-Silanes, & Shleifer, 1999; Chhaochharia & Grinstein, 2007; Jensen, 1993; Lipton & Lorsch, 1992; Yermack, 1996).

But in order to have an effective assessment of corporate governance effectiveness these indexes must consider both internal and external mechanisms and their combined effects (Bebchuk, Cohen, & Ferrell, 2009). Cremers and Nair (2005) find that internal and external governance mechanisms are complements in being associated with long-term abnormal returns and even stronger in those with lower leverage. They report that G-Index results are stronger when is also considered the role of internal governance mechanism and in particular, the simultaneous consideration of takeover vulnerability and shareholder activism. They create an index which is based on two external measures: G-Index (Gompers, Ishii, & Metrick, 2003) and an alternative takeover protection index (ATI)[2]; and other two different proxies of internal governance: the percentage share ownership by institutional blockholders and the percentage of share ownership by public pension funds, which tend to be active shareholders. However, they do not examine which internal provision matters and if there are other provisions not considered which might affect firm value.

On this issue, Brown and Caylor (2006) identify five internal provisions which affect firm value by creating a new governance index (Gov-Score). Gov-Score is composed of seven governance measures[3], where the first two represent external governance and the other five represent internal governance. They argue that their Gov-Score is better linked with firm value than G-Index and furthermore, it is broader in scope. However, they use a different time period and methodology that can reason the strength of their results comparing to G-Index of Gompers et al. (2003) and the entrenchment index of Bebchuk, Cohen and Ferrell (2009).

The results of the above studies have been largely used in different empirical researches advancing the knowledge in the research stream that studies the relation between governance and firm performance. For instance, Dittmar and Mahrt-Smith (2007) use a dummy based on governance indexes of Gompers, Ishii and Metrick (2003), Bebchuk, Cohen and Ferrell (2009) and other two measures of large shareholder monitoring to measure the impact of governance on cash holdings. They find that good governance doubles cash value. Masulis, Wang and Xie (2007) investigate if governance affects profitability on firms' acquisitions. They use some of the antitakeover provisions used in G-Index as a measure of corporate governance, in order to test their hypothesis. They conclude that good governance impacts on management choices to make more value-enhancing investments and in particular acquisitions.

On the other side, other researchers do not consider the aforesaid for their governance measures, but create new indexes based mainly on their aims of research. For example, Iyengar and Zampelli (2009) try to investigate the relation between CEO duality (presence of CEO as chair of the board of directors) and firm performance (measured by Tobin's Q and ROA). They don't find any significant performance impact from CEO duality. As the authors say, these findings are "inconsistent with the theory that governance is endogenous with respect to performance." (Iyengar & Zampelli, 2009, p. 1111) They conclude that the

---

[2] Which focuses on only three key antitakeover provisions—the presence of staggered boards, of a preferred blank check ("poison pill"), and of restrictions on shareholder voting to call special meetings or act through written consent (Cremers and Nair 2005: 7)

[3] The measures are: *"(1) board members are elected annually; (2) company either has no poison pill or one approved by shareholders; (3) option re-pricing did not occur within the last three years; (4) average options granted in the past three years as a percentage of basic shares outstanding did not exceed 3%; (5) all directors attended at least 75% of board meetings or had a valid excuse for non-attendance; (6) board guidelines are in each proxy statement4; and (7) directors are subject to stock ownership guidelines"* (Brown & Caylor, 2006, p. 411)

selection between two governance structures is not strategically chosen to improve performance. Such conclusion is based on a model that does not take into account a measure which represents a proper configuration of governance. They consider CEO duality as representing the governance structure without taking into account other governance specific factors.

Other empirical papers have not used a single measure of corporate governance, but have investigated relation between individual factors of corporate governance and firm performance. Klein (2002) studies the relation of audit committee and board independence with earnings management of the firm. They find a negative relation between this governance characteristics and abnormal accruals, suggesting more independence for the board. Even Xie, Davidson and DaDalt (2003) follow the same approach in studying the role of the board of directors, the audit and executive committee in preventing earnings management, by applying an analysis on the single components of corporate governance. Again, Beiner, Drobetz, Schmid and Zimmermann (2004) focus on a single issue of corporate governance: the role of board size as an independent control mechanism on firm value. They do not use any corporate governance index to measure the quality of corporate governance, but model their analysis only with board characteristics and firm performance measures.

On the basis of this approach, some researchers have created their own corporate governance indexes. Beiner, Drobetz, Schmid and Zimmermann (2006) in an investigation over 275 Swiss firms in quoted at Swiss Exchange in 2002, create a governance index based on a questionnaire with five sections of categories of questions: (1) corporate governance commitment, (2) shareholders' rights, (3) transparency, (4) board of directors and executive management, and (5) auditing and reporting. Based on the responses from 1 (minimum) to 5 (maximum) they create a normalized index which scales from 0 to 100 (higher values indicate better governed firms). Furthermore, to broaden the scope of the governance index they add other four variables related to ownership structure, board characteristics, and leverage regressing Tobin's Q with a three-stage least squares model. Their results confirm a positive relation between governance and firm value.

Again, in a recent paper, Ahmed, McAnally, Rasmussen and Weaver (2010) use a combined governance index to study the effects of SOX on corporate profitability. To test whether governance influences firm profit after the new rules, they create a governance proxy for 2003 using board independence, board size, institutional ownership, and use of a Big-4 auditor. They score (0) or (1) indicating respectively low or strong monitoring for each of the above factors. For Big-4 they score (1) if firms use a Big-4 Auditor and (0) if otherwise. For the other variables, strong monitoring (scored 1) is suggested by above-mean results. By this mean, they create a governance index which scores from 0 to 4. Then again, they proxy this value with the above-mean rule by scoring (1) / (0) if above / below mean. This procedure gives them a governance proxy index which suggests strong / weak governance if (1) / (0). This governance index is used then to test their model, but they do not test its effectiveness as a proper governance indicator.

The existing literature suggests many different configurations of corporate indexes which lead to the same result: governance is positively related to firm value. While a stream of research strives to find the best comprehensive configuration of governance index by being based on governance provisions (Gompers, Ishii, & Metrick, 2003; Bebchuk, Cohen, & Ferrell, 2009) or internal governance factors (Brown & Caylor, 2006; Dittmar & Mahrt-Smith, 2007; Masulis, Wang, & Xie, 2007), other individual papers focus create and use governance indexes as control variables to complete their models (Ahmed, McAnally,

Rasmussen, & Weaver, 2010; Beiner S. , Drobetz, Schmid, & Zimmermann, 2006) without the objective to test its effectiveness as an extensive and comprehensive measure of the real governance structure.

Given this different approaches in creating and using different governance indexes, this paper aims to provide an empirical evidence of the various results the researchers might get while using these different alternative measures, by testing their significance and effectiveness on firm value. We test G-Index of Gompers et al. (2003) as representative of the first stream of research and a composite index (I-Index) created by following the approach of Ahmed, McAnally, Rasmussen and Weaver (2010) on three governance factors: board independence; audit committee independence and board size.

3. Research Design

The research question, sample selection criteria and the models used to test the relation between the two different corporate governance index configurations and firm value are elaborated in a detailed way on this section.

3.1 Methodological Approach

Results of empirical analysis are influenced by the selection and configuration of measures in statistical models. While the measures' selection depends on the model assumptions, the configurations of most firm indicators have a single way to be calculated (e.g. financial indexes as ROE, ROI, etc.) Nevertheless, in some cases, measures have not a generally accepted way of calculation. In particular, there are different configurations of corporate governance indicators in the existing literature that mainly differ from focusing on external or internal governance and yet they try to measure the same thing: the corporate governance quality. Logically, the use of different governance indexes in the same model unlikely is going to give same results. By this mean, the main objective of this paper is to address the following research question: Which governance measure is (if it is) significantly and strongly related to firm performance? By the basic assumption that corporate governance arrangements affect shareholders, it is expected that sound corporate governance is positively related to market valuation of firm value.

As firms are a set of tangible and intangible elements, linked by a relationship of mutual co-ordinated, unified and integrated relations (Paolone, 2007), their real value can't be measured by just financial measures revenues or profit and loss results, but by a comprehensive measure which represents their real value. A common indicator used in finance to measure corporate performance is Tobin's Q (Lewellen & Badrinath, 1997; Tobin, 1969). By this mean, Tobin's Q is regressed by using separately G-Index and I-Index as estimators, in order to confront the results and to check their validity as effective configurations of corporate governance.

3.2 Sample Selection

Firm financial, audit and governance data are collected respectively from Compustat and RiskMetrics databases. The study addresses the U.S. firms in the period from 2002 to 2006 because of the limited availability of data necessary to create the governance indexes. The upper limit is because of RiskMetrics provisions data for G-Index which are available until 2006. The lower limit of 2002 is imposed because SOX is enacted in 2002 and market became more responding to firms' governance quality (Ahmed, McAnally, Rasmussen, & Weaver, 2010). Years 2003 and 2005 are not included because RiskMetrics has only biennial data starting from 1996 as firms' governance do not show significant changes from year to year and a biannual period might capture the best governance changes.

Starting from raw data on firm characteristics attained from Compustat for 2002, 2004 and 2006, a first filter is applied to reduce firms without necessary financial data. The sample is so reduced from 15.003 firms with 33.710 years of observations, to 13.625 firms with 30.454 observations.

The second filter is applied to select only firms with required governance data for the construction of G-Index. The provision data are collected from RiskMetrics – Governance Legacy dataset. This filter reduces strongly the sample by getting it to a total of 2.263 firms with 5.348 years of observations. Successively, the sample is reduced to include only firms that have the required data to construct the second governance index (I-Index). The data on board independence, audit independence and board size utilized to create I-Index, are collected from RiskMetrics – Directors legacy dataset. The results from the sample selection process are clarified in Table 1 and 2.

Table 1: Sample selection process

	Firms	Years*
Main Sample		
2002, 2004 and 2006 Compustat Observations on Firm Characteristics	15.003	33.710
Less		
Observations missing required Compustat data	(1.488)	(3.256)
Sample	**13.625**	**27.010**
Sub Sample with Corporate Governance data		
Base sample	13.625	30.454
Less		
Observations missing RiskMetrics governance data for G-Index	(11.362)	(25.106)
Observations missing RiskMetrics governance data for I-Index	(679)	(1.504)
Sub Sample	**1.584**	**3.844**

Notes: * Is the total of three years observations

Table 2: Number of selected firms for each year

Years	2002	2004	2006
Number of Firms	1.261	1.307	1.165

3.3 Model setup

The goal of this paper is to compare the effectiveness of different governance configurations. By this mean, two different measures of corporate governance are created from external and internal governance prospective. G-Index of Gompers, Ishii and Metrick (2003) is used as the first measure of corporate governance; and following the approach of Ahmed, McAnally, Rasmussen and Weaver (2010), the second index (I-Index) is constructed as a proxy of three characteristics of governance structure: board independence, audit independence and board size.

The benchmark is based on the following models, regressing Tobin's Q (firm value measure) used in corporate governance studies since Morck, Andrei and Robert (1988) and

furthermore, from Gompers, Ishii and Metrick (2003). We apply a two stage analysis for both models, to better test the responses. In the first stage is applied an OLS regression and furthermore, in the second stage is applied a panel data analysis with random and fixed effects for both models.

Model A: Tobin's Q = $\alpha A + \beta 1A \times$ G-Index + $\beta 2A \times$ Size + $\beta 3A \times$ Leverage + $\beta 4A \times$ ROA + $\beta 5A \times$ BTM

Model B: Tobin's Q = $\alpha B + \beta 1B \times$ I-Index + $\beta 2B \times$ Size + $\beta 3B \times$ Leverage + $\beta 4B \times$ ROA + $\beta 5B \times$ BTM

Where,

Dependent	
Tobin's Q	is the ratio of market value to the replacement cost of firm's assets (Tobin, 1969)

Independent	
Governance Index	
G-Index	is the sum of 24 provisions following the method of Gompers et al. (2003)
I-Index	1 indicates a strong monitoring; 0 otherwise. It's a proxy for board independence; audit independence and board size.
Firm Characteristics	
Size	is the natural log of fiscal year-end total assets
BTM	is the book to market ratio (fiscal-year end book value of equity to fiscal-year end market value of equity)
Leverage	is total debt divided by total assets
ROA	is the fiscal year-end earnings before interest and tax to total assets

3.3.1 Firm value

Tobin's Q compares firms' market value to the replacement cost of its assets (Tobin, 1969). It is a measure of firm valuation favored by scholars because it is risk adjusted, independent of industry, and provides a good indicator of shareholder value (Lewellen & Badrinath, 1997; Lev, 2001). Tobin's Q is calculated as [(Total assets) – (Common Shareholders' Equity) + (Common Shares Outstanding) * (Yearly Medium Price Close)] / [Total Assets] following the approximation method of Chung (1994).

3.3.2 Governance indexes

(1) Following the method of Gompers, Ishii and Metrick (2003), G-Index is calculated by summarizing 24 provisions, by adding one point for each provision4 that enhances managers' power. Firms with higher G-Index value are viewed as having weaker shareholders rights, since it is more costly to shareholders to remove managers from their position. Therefore, higher (lower) values of G-Index indicate lower (higher) shareholders rights and consequently, it is expected to be related negatively to firm valuation (Tobin's Q).

(2) The second governance indicator is created following the approach of Ahmed, McAnally, Rasmussen and Weaver (2010) as a proxy based on three variables: board independence, audit independence and board size. Several studies suggest that strong monitoring is positively related to a high level of board and audit independence, as independent outside directors protect shareholders interests (Klein, 2002; Core, Holthausen, & Larcker, 1999; Xie, Davidson, & DaDalt, 2003; Ahmed, McAnally, Rasmussen, & Weaver, 2010) and with a low number of board members (Beiner, Drobetz, Schmid, & Zimmermann, 2004; Jensen, 1993). A proxy is used for each measure by indicating a strong (weak) monitoring if the board and audit independence (calculated as number of independent members to total members) is above (below) the mean of the sample year, and the board number is below (above) the mean of the sample year. Following this procedure is obtained a variable scoring from 0 to 3, indicating stronger monitoring if 3. Then for each firm, the score is compared with the sample mean for each year. In cases above (below) the mean, firms are considered to have a strong (weak) governance and consequently I-Index is equaled to 1 (0). It is expected that firms with stronger governance are related positively to firm value, measured by Tobin's Q.

3.3.3 Firm characteristics

Four other variables are included in order to control for firm specific characteristics that affect firm value.

(1) Earlier studies have identified firm size as determinant of firm value (Hall & Weiss, 1967; Lang & Stulz, 1994). In order to control for scale effects, firm size is calculated as the natural logarithm of total assets. The literature suggests that higher q values for bigger firms because they have more chances, ceteris paribus, to collect opportunities rather than smaller firms (Moeller, Schlingemann, & Stulz, 2004).

(2) Book to Market ratio (BTM) calculated as the ratio of book equity to market equity, is included as a growth indicator. Low (high) values of the ratio signal strong (low) earnings and growth opportunities (Fama & French, 1995; Bernard, 1994). Therefore, it is expected a negative relation with Tobin's Q.

(3) Following the model of Gompers, Ishii and Metrick (2003) and Bebchuk, Cohen and Ferrell (2009) leverage ratio is included to control for risk. It is calculated as the ratio of long-term debt to total assets and it is expected to have a negative relation with Tobin's Q, as higher leverage is associated with higher risk of losses (Penman, 2007).

(4) Return on assets (ROA) calculated as ratio of EBIT to Assets, is included as a measure of profitability relative to the capital employed by the firm, expecting a positive relation with Tobin's Q.

---

4 For a list of the provisions see Gompers, Ishii and Metrick (2003)

3.4 Multivariate analysis

As noted before, the estimation of the model's structural parameters will proceed in two stages. In the first stage Model A and Model B are estimated in a linear regression with standard errors robust to heteroskedasticity and autocorrelation. Table 3 contains descriptive statistics and Table 4 contains the correlation matrix for Model A and B. The regression results for each year and model are reported in Table 5.

Table 3: Cross sectional analysis – Descriptive statistics for model A and B

		MODEL A				MODEL B			
		Mean	*Std. Dev.*	*Min*	*Max*	*Mean*	*Std. Dev.*	*Min*	*Max*
2002	Tobin	1.66	1.00	0.40	11.26	1.65	1.05	.40	11.26
	G/I-Index	9.41	2.59	2	17	0.66	0.47	0	1
	Size	7.61	1.68	3.04	13.54	7.60	1.68	3.04	13.54
	BTM	0.62	0.54	-3.48	5.17	0.62	0.54	-3.48	5.17
	Leverage	.23	0.18	0	1.74	0.23	0.18	0	1.74
	ROA	0.07	0.12	-1.53	0.86	0.07	0.12	-1.53	.86
2004	Tobin	1.94	1.12	.79	10.17	1.94	1.12	.79	10.17
	GINDEX	9.41	2.50	2	17	0.27	0.44	0	1
	Size	7.81	1.65	3.96	14.21	7.80	1.65	3.95	14.21
	BTM	0.43	0.42	-10.22	2.17	0.43	0.42	-10.22	2.17
	Leverage	0.21	0.17	0	1.52	0.21	0.17	0	1.52
	ROA	0.09	0.08	-0.77	0.57	0.09	0.08	-.77	.57
2006	Tobin	1.95	1.05	0.84	13.73	1.95	1.05	.84	13.73
	GINDEX	9.35	2.49	2	18	0.34	0.47	0	1
	Size	7.94	1.59	3.88	14.19	7.94	1.59	3.88	14.19
	BTM	0.43	0.23	-0.81	1.57	0.43	0.23	-.81	1.57
	Leverage	0.21	0.16	0	1.03	0.21	0.16	0	1.03
	ROA	0.10	0.08	-0.50	0.73	0.10	0.08	-.50	.73

Table 4: Correlation matrix for model A and B for each year

		MODEL A					MODEL B				
		1	*2*	*3*	*4*	*5*	*1*	*2*	*3*	*4*	*5*
2002	Tobin (1)	-					-				
	G/I-Index (2)	-0.10	-				0.00	-			
	Size (3)	-0.13	0.19	-			-0.13	-0.09	-		
	BTM (4)	-0.48	-0.08	-0.05	-		-0.48	0.02	-0.05	-	
	Leverage (5)	-0.14	0.16	0.27	-0.09	-	-0.14	-0.00	0.27	-0.09	-
	ROA (6)	0.43	0.06	0.06	-0.26	-0.06	0.43	-0.07	0.06	-0.26	-0.06
2004	Tobin (1)	-					-				
	G/I-Index (2)	-0.10	-				0.05	-			
	Size (3)	-0.23	0.15	-			-0.23	-0.20	-		
	BTM (4)	-0.39	0.01	0.01	-		-0.39	-0.07	0.01	-	
	Leverage (5)	-0.26	0.11	0.30	-0.17	-	-0.26	-0.01	0.30	-0.17	-
	ROA (6)	0.62	-0.01	-0.10	-0.25	-0.17	0.62	0.01	-0.10	-0.25	-0.17
2006	Tobin (1)	-					-				
	G/I-Index (2)	-0.10	-				0.01	-			
	Size (3)	-0.21	0.12	-			-0.21	-0.17	-		
	BTM (4)	-0.65	0.02	0.01	-		-0.65	0.03	0.01	-	
	Leverage (5)	-0.25	0.09	0.27	0.01	-	-0.25	-0.03	0.27	0.01	-
	ROA (6)	0.61	-0.03	-0.03	-0.45	-0.13	0.61	0.02	-0.03	-0.45	-0.13

In the second stage, data are analyzed longitudinally by creating a data panel with the available years (1 year gap). One of the fundamental assumptions in a classical regression method is the independence between observations. However, when faced with data that consist of repeated measures correlated within a subject, such as in the case of panel-data with repeated observations of the same subjects' measures over time, the analysis must account for the correlation within subject in order to have a correct estimation of the regression coefficients (Wooldridge, 2001).

In this stage, data are investigated longitudinally because panel data has various advantages over cross sectional analysis: panel data control for individual heterogeneity, give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency (Hsiao, 2003; Baltagi, 2005).

The panel analysis can be done by applying either random or fixed effects models. Fixed effects regression is used to control for omitted variables that differ between cases but are constant over time for the same unit. When omitted variables may be constant over time but vary between cases, and others may be fixed between cases but vary over time, than both cases can be included by applying random effects. The choice between these two models has generated a hot debate in statistics and econometrics literature (Balestra & Nerlove, 1966; Mundlak, 1961; Baltagi, 2005). The specification test proposed by Hausman (1978) is the most accepted procedure to select one or another in cases when the researcher is not sure about the test to use (Baltagi, 2005; Li & Stengos, 1992). The null hypothesis tested by Hausman test is that coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If there is no correlation (null hypothesis not rejected) then random effects would be more powerful and parsimonious.

If there is correlation (null hypothesis rejected) the fixed effects model would be the model of choice as the random effects model would be inconsistently estimated.

Table 5: OLS regression for model A and B

Tobin's Q	Predictions	Model A (β_A)						Model B (β_B)					
		2002		2004		2006		2002		2004		2006	
		Coef.	St. Coef.	Coef.	St. Coef.	Coef.	St. Coef.	Coef.	St. Coef.	Coef.	St. Coef.	Coef.	St. Coef.
Firms Number		1.261		1.307		1.165		1.261		1.307		1.165	
Adj. R²			0.3771		0.5019		0.6057		0.3717		0.4987		0.6031
CG_Index	(-)	-0.03*	-0.08	-0.02*	-0.050	-0.02*	-0.05						
I-Index	(+)							+0.05	+0.02	+0.01	+0.01	+0.02	+0.01
Size	(+)	-0.07*	-0.12	-0.08*	-0.116	-0.10*	-0.15	-0.08*	-0.13	-0.08*	-0.12	-0.10*	-0.16
BTM	(-)	-0.78*	-0.42	-0.80*	-0.299	-2.18*	-0.48	-0.78*	-0.42	-0.81*	-0.30	-2.18*	-0.48
Leverage	(-)	-0.59*	-0.11	-1.18*	-0.181	-0.97*	-0.15	-0.64*	-0.12	-1.21*	-0.19	-0.99*	-0.16
ROA	(+)	+2.27*	+0.33	+6.89*	+0.499	+4.64*	-0.37	+2.74*	+0.33	+6.87*	+0.50	+4.66*	-0.37
_cons		+2.91*		+2.74*		+3.62*		+2.66*		+2.54*		+3.46*	

Notes: * and ** indicate significance at 0.05 and 0.01 levels. Coefficients not in bold are statistically insignificant. Standardized Coefficients have the same significance as regression ones. Standard errors are robust to heteroskedasticity and autocorrelation.

3.5 Results

3.5.1 Stage I

The negative and significant coefficients of G-Index in Model A for each year are consistent with the first hypothesis that higher values of G-Index are negatively related to Tobin's Q. Indeed, higher values of G-Index indicate lower shareholder power influencing negatively the market valuation. Each one-point increase in G-Index is associated with a decrease in Tobin's Q of 3% in 2002; 2.5% in 2004 and 2.2% in 2006. In fact, these results contrast the trend reported by Gompers, Ishii and Metrick (2003), who declare a 2.2% negative relation from the beginning of the last decade growing to 11.2% at the end of the same decade. Even though, standardized coefficients show higher values during the three years (7.8%, 5% and 5.2% respectively for 2002, 2004 and 2006).

On the other hand, I-Index in model B is insignificantly and weakly related with Tobin's Q. The coefficients, even though statistically insignificant, indicate that the market assesses firms with good governance (I-Index score 1) +4.5%, +0.5% and +2.1% more valuable than firms with bad governance (I-Index score 0). I-Index indicates a low difference between two governance situations and is unlikely to be considered into the model.

Almost all firm characteristics' coefficients meet the predictions and show similar weights for both models. Size does not meet the initial prediction of a positive relation with q values. In fact, while the literature suggests that bigger firms have more opportunities to make profit (Moeller, Schlingemann, & Stulz, 2004), it has not always found an empirical relation between size and q value (Hall & Weiss, 1967). The negative relation can be explained if market value is not more than / or proportionally related to total assets value. In this case, increases in size (natural log. of total assets) would result in lower q values.

Q value is more influenced by BTM, Leverage and ROA for both models. The coefficients have significant and similar values meeting the initial predictions. In general, the coefficients have higher values in 2004 then 2002 and 2004, due to differences in sample size.

3.5.1 Stage II

Model A is regressed by a random effects model since fixed effects do not have significant results for G-Index. Model B has significant values for both random and fixed effects analysis, so Hausman test is applied to specify the model to use (Table 6). As H0 is not rejected, the test suggests that fixed effects model is preferred to random effects.

Table 6: Hausman test for model B

	Coefficients			
	(b) fixed	(B) random	(b – B) Difference	sqrt(diag(V_b-V_B)) S.E.
I-INDEX	- 0.053	- 0.04	- 0.01	0.01
Size	- 0.12	- 0.11	- 0.01	0.03
BTM	- 0.50	- 0.61	0.11	0.01
Leverage	- 0.68	- 0.80	0.11	0.07
ROA	3.67	3.82	- 0.15	0.10

Notes: b = consistent under Ho and Ha; B = inconsistent under Ha, efficient under Ho.
Test: Ho: difference in coefficients not systematic – Fixed effects are selected as Ho is rejected at p < 0.01

The results for both models are listed in Table 7. Most of the coefficients for both models (except I-Index) are significant and the relations have the same signs as in the results of OLS in Stage I, so the same considerations can be made.

Table 7: Panel data analysis results for model A and B

	Coefficients	
	Model A (random effects)	Model B (fixed effects)
G / I-INDEX	- 0.02	- 0.05
Size	- 0.10	- 0.12
BTM	- 0.62	- 0.50
Leverage	- 0.80	- 0.68
ROA	3.84	3.66
_cons	2.98	2.88

Notes: All coefficients are significant at $p < 0.1$ values. Model A coefficients are obtained from GLS random effects; Model B coefficients are obtained from a fixed effects model as per Hausman test.

It can be observed that in Model B, I-Index has a negative sign and very low coefficient. It means that firms with good governance have a less q value of 5% than firms with bad governance. Of course this result does not meet the initial expectation, which is the basic assumption of this paper, that good governance influences positively firm value. This governance index not only has a very low coefficient which indicates that governance has quite no effects over firm value, but it has a negative meaning that good corporate governance is a penalty from a market prospective.

On the other hand, G-Index in Model A shows a negative relation of 2% with q value. The negative relation means that for lower values of G-Index, q value increases. This result meets the initial prediction as shareholders have more power in firms with lower levels of G-Index. The value of the results suggests that for each less one-point provision, q value increases of 2%. This relation is a bit lower than OLS previous results which range from 3-2.2%.

The other control variables show the same results in significance as in the OLS analysis, without important changes for both models.

4. Conclusions

The existing literature suggests many different configurations of corporate indexes which lead to the same result: governance is positively related to firm value. It seems though, that these different configurations might prove unlikely effects over firm valuation as they differ in configuration, scale and furthermore, in interpretation as they consider only internal, external or both mechanisms of governance. Starting from the basic assumption that corporate governance is positively related to firm value, we empirically test two different configurations of governance measures within the same model and same set of quoted U.S. firms over three years, by applying an OLS regression and a panel data analysis with random and fixed effects.

The two indexes used in this analysis show differences in (1) configuration as the first (G-Index) takes in consideration governance provisions and the second one (I-Index) is based on board independence, audit independence and board size; (2) in scale, as the first one scores from 0 to 24 and the second one scores only 0 and 1; and (3) in interpretation, as G-Index considers external governance factors and I-Index only internal governance factors.

The results of the above analysis have the same limits that other researchers have in their models: (1) they depend on period framing and time gap, and (2) on sample selection.

The results of the OLS model show a strong relation of G-Index with firm value, while I-Index proves a weak and insignificant relation. In the panel data analysis G-Index shows the same results in significance, while I-Index gains significance but its coefficient suggests a very weak and furthermore, negative relation with firm value. These results suggest that indexes configured as I-Index, might not represent a proper configuration of corporate governance, even though they might give significant results in other models; while G-Index proves itself again a strong.

References

Ahmed AS, McAnally ML, Rasmussen S, Weaver CD. 2010. How costly is the Sarbanes Oxley Act? Evidence on the effects of the Act on corporate profitability. *Journal of Corporate Finance* 16:3, 352-369.

Balestra P, Nerlove M. 1966. Pooling cross-section and time-series data in the estimation of a dynamic model: The demand for natural gas. *Econometrica* 34, 585–612.

Baltagi BH. 2005. *Econometric Analysis of Panel Data, John Wiley & Sons Ltd*, West Sussex.

Bastia P., Paletta A. 2008. *Regole, trasparenza e imprenditorialità*, *Isedi*, Milano.

Bebchuk L, Cohen A, Ferrell A. 2009. What Matters in Corporate Governance? *The Review of Financial Studies* 22:2, 783-827.

Beiner S, Drobetz W, Schmid F, Zimmermann H. 2004. Is Board Size an Independent Corporate Governance Mechanism? *Kyklos* 57:3, 327-356.

Beiner S, Drobetz W, Schmid MM, Zimmermann, H. 2006. An Integrated Framework of Corporate Governance and Firm Valuation. *European Financial Management* 12:2, 249–283.

Bernard VL. 1994. Accounting-based valuation methods, determinants of market-to-book ratios, and implications for financial statement analysis. *Working paper University of Michigan. Business School. Faculty Research*.

Brown LD, Caylor ML. 2006. Corporate governance and firm valuation. *Journal of Accounting and Public Policy* 25, 409–434.

Chen A, Kao L, Tsao M, Wu C. 2007. Building A Corporate Governance Index from the Perspectives of Ownership and Leadership. *Corporate Governance: An International Review* 2:3, 251-261.

Chhaochharia V, Grinstein Y. 2007. Corporate Governance and Firm Value: The Impact of the 2002 Governance Rules. *The Journal of Finance* 62:4, 1789–1825.

Chung KH, Pruitt SW. 1994. A simple approximation of Tobin's q. *Financial Management* 23:3, 70-74.

Core JE, Holthausen RW, Larcker DF. 1999. Corporate governance, chief executive oficer compensation, and firm performance. *Journal of Financial Economics* 51:3, 371-406.

Cremers KJM, Nair VB. 2005. Governance Mechanisms and Equity Prices. *The Journal of Finance* 60:6, 2859–2894.

Dittmar A, Mahrt-Smith J. 2007. Corporate governance and the value of cash holdings. *Journal of Financial Economics* 83:3, 599–634.

Fama E, French K. 1995. Size and book-to-market factors in earnings and returns. *Journal of Finance* 50:1, 131-155.

Gompers PA, Ishii JL, Metrick A. 2003. Corporate Governance and Equity Prices. *The Quarterly Journal of Economics* 118:1, 107-156.

Hall M, Weiss L. 1967. Firm Size and Profitability. *The Review of Economics and Statistics* 49:3, 319-331.

Hausman JA. 1978. Specification tests in econometrics. *Econometrica* 46:6, 1251–1271.

Hsiao C. 2003. *Analysis of Panel Data*, *Cambridge University Press*, Cambridge.

Iyengar RJ, Zampelli EM. 2009. Self-Selection, Endogeneity, and the Relationship between CEO Duality and Firm Performance. *Strategic Management Journal* 30:10, 1092-1112.

Jensen MC. 1993. Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems, *Journal of Finance*. 22:1, 831-880.

Klein A. 2002. Audit committee, board of director characteristics, and earnings management. *Journal of Accounting and Economics* 33:3, 375-400.

La Porta R, Lopez-de-Silanes F, Shleifer A. 1999. Corporate Ownership Around the World. *Journal of Finance* 54:2, 471-517.

Lang LHP, Stulz RM. 1994. Tobin's q, Corporate Diversification, and Firm Performance. *The Journal of Political Economy* 102:6, 1248-1280.

Lev B. 2001. *Intangibles: Management, Measurement, and Reporting, Brookings Institution Press*, Washington.

Lewellen WG, Badrinath SG. 1997. On the measurement of Tobin's q. *Journal of Financial Economics* 44:1, 77-122.

Lipton M, Lorsch JW. 1992. A Modest Proposal for Improved Corporate Governance. *Business Lawyer* 48:1, 59–77.

Li Q, Stengos T. 1992. A Hausman specification test based on root N consistent semiparametric estimators. *Economics Letters* 40:2, 141–146.

Masulis RW, Wang C, Xie F. 2007. Corporate Governance and Acquirer Returns, *The Journal of Finance* 62:4, 1851-1889.

Moeller SB, Schlingemann FP, Stulz RM. 2004. Firm size and the gains from acquisitions, *Journal of Financial Economics* 73:2, 201-228.

Morck R, Andrei S, Robert V. 1988. Management Ownership and Market Valuation: An Empirical Analysis. *Journal of Financial Economics* 20, 293-315.

Mundlak Y. 1961. Empirical production function free of management bias. *Journal of Farm Economics* 43:1, 44–56.

Paletta A. 2008. *Il sistema di controllo interno nella corporate governance*, *Il Mulino*, Bologna.

Paolone G. 2007. *L' economia aziendale e la ragioneria nella teoria e nelle specializzazioni, Franco Angeli*, Milano.

Penman S. 2007. *Financial Statement Analysis and Security Valuation, McGraw-Hill Irwin*, New York.

Romano R. 2005. The Sarbanes-Oxley Act and the making of quack corporate governance. Sarbanes-Oxley Act. 2002. Pub. L. 107–204, Enacted July 30, 2002. *The Yale Law Journal* 114, 1521–1611.

Shleifer A, Vishny R. 1986. Large shareholders and corporate control. *Journal of Political Economy* 94:3, 461-488.

Tobin J. 1969. A general equilibrium approach to monetary theory, *Journal of Money Credit and Banking* 1:1, 15-29.

Wooldridge JM. (2001) *Econometric Analysis of Cross Section and Panel Data*, The MIT Press, Cambridge.

Xie B, Davidson WN, DaDalt PJ. 2003. Earnings management and corporate governance the role of the board and the audit committee. *Journal of Corporate Finance* 9:3, 295– 316.

Yermack D. 1996. Higher Market Valuation for Firms with a Small Board of Directors. *Journal of Financial Economics* 40:2, 185–211.