“How does corporate governace pay off? Evidence from Korean stock listings”

AUTHORS	Paul Moon Sub Choi https://orcid.org/0000-0003-3338-4728 Joung Hwa Choi Mookyong Son

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Paul Moon Sub Choi (the Republic of Korea), Joung Hwa Choi (United States), Mookyong Son (United States)

How does corporate governace pay off? Evidence from Korean stock listings

Abstract

Corporate governance is an envelope for the mechanisms, processes and relations through which corporations are controlled and guided. Consequently, corporate governance affects operational performance and, in turn, stock returns, as Gompers et al. (2003) find. In this research, we use the Korea Corporate Governance Stock Price Index (KOGI) to test a possible linkage between corporate governance and shareholder wealth in Korea. Factor mimicking portfolios sorted per KOGI are constructed to estimate a corporate governance risk factor ("good minus bad"). By augmenting this new factor to the existing factor models (Fama and French, 1993; Carhart, 1997) to fit multiply imputed data, we find evidence that corporate governanceinfluences stock pricing in Korea.

JEL Classification: G11, G12, G34, C11.
Keywords: CG; risk factor; factor-mimicking portfolio; long-short portfolio; multiple imputation.

Introduction

Corporate governance (CG) encompasses the mechanisms, processes and relations through which corporations are controlled and guided. As a result, CG affects operationaland financial performances, including stock returns. And since shareholder rights vary across firms, there have been many studies about relationship between shareholder rights and corporate performance. Gompers et al. (2003) finda relationship between the shareholder rights and stock price performance by constructing a governance index ("G-Index")—which usesa set of 24 anti-takeover provisions (ATPs) appearing in corporate articles of listed companies in the U.S.—to inversely proxy for the degree of investor protection. shareholder rights. They document a significant abnormal return on an arbitrage portfolio of the lowest decile of the index (strongest shareholder rights) minus the highest decile of the index (weakest shareholder rights).

In extension, Masulis et al. (2007) report supporting evidence to the claim of Gompers et al. (2003) by showing that the announcement abnormal return of an acquisition is higher the better the firm governed (the lower the G-Index or the number of ATPs). In other words, investors evaluate acquisition decisions made by well-governed companies trustworthy. Chang et al. (2015) move the focus to theacquired companies in merger deals of U.S.-listed purchasers. Whether the target firm listed in or outside the U.S., its merger event-study return is higher the worse the U.S. acquirer is governed (again the lower the number of ATPs) due to a possible wealth transfer.

Based on these three key references (Gompers et al., 2003; Masulis et al., 2007; Chang et al., 2015), we expect an association between corporate governance and the stock returns of Korean listed companies. Also, the return on an arbitrage portfolio based on portfolios sorted per degree of corporate governance may explain the cross-section of returns of individual stocks. We find supporting evidence for both claims in this research by multiply imputing missing values (Dempster et al., 1977; van Dyk and Meng, 2001). The remainder of this paper is organized as follows. Section 1 discusses the theories in the literature and raises testable hypotheses. Section 2 describes the multiple imputation (MI) methodology, variables, data, and presents the empirical models. The main results are discussed in Section 3. We finally conclude in Final.

1. Theories and hypotheses

Based on our discussion, we empirically verify whether the findings pertaining to the U.S. markets are replicable in the Korean stock market. Previously, Choi and Choi (2015) and Lee et al. (2013) discuss the corporate governance of Korean listed companies. First of all, do well-governed Korean firms also show sound operational performance and, thus as a result, high stock returns? Our first testable hypothesis is raised as follows:

Hypothesis 1: The corporate governance of given firms and their stock returns are positively related. In other words, in the cross-section, stock return is higher the better the firm is governed or the better the invest rights and interests are protected.

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Paul Moon Sub Choi (first author), College of Business Administration, Ewha Womans University, Seoul 03760, Republic of Korea.
Joung Hwa Choi (corresponding author), Johnson Graduate School of Management, Cornell University, Ithaca, New York 14853, United States.
Mookyong Son, Department of Economics, Michigan State University, East Lansing, Michigan 48824, United States.

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Given our initial premise, if we construct portfolios of stocks sorted per corporate governance the difference of two extreme (best and worst governed) portfolios can be positive. These factor-mimicking portfolios can define a factor that may explain stock returns in the cross-section. This "good minus bad" (GMB) factor may consume the unexpected variation of stock returns rest of the explained territories of the size and valuation premia (Fama and French, 1993) and momentum premium (Carhart, 1997) factors. Accordingly, we postulate our second hypothesis as follows:

Hypothesis 2: The return of governance arbitrage (GMB factor) can explain stock returns in the cross-section.

2. Methodology, variables, data, and models

2.1. Multiple imputation. In collecting data, missing observations can lead to inefficient and/or imprecise inferences. In treating missing values, one can list-wise delete the whole rows or columns with perforated entries (list-wise deletion), risking that the remaining sample may not representative of the population. Alternatively, one can substitute each missing value with the average of other observations (mean substitution), possibly leading to a bias due to replacing all missing pieces with the same proxy. In this research, we adopt MI in order to address missing data by reflecting the population of inference that leads to unbiased estimators. Specifically, we employ MI based on data augmentation (DA; van Dyk and Meng, 2001).

DA refers to a procedure in which an tion Y_{obs} is augmented by an assumed value Y_{mis}. Accordingly, an intractable observed-data posterior ($P(\theta|Y_{obs})$) may evolve into a complete-data posterior ($P(\theta|Y_{obs}, Y_{mis})$), which is relatively tractile. The resulting iterative algorithm is as follows:

Draw ${Y_{mis}}^{t+1}$

$${Y_{mis}}^{t+1} \sim P(Y_{mis}|Y_{obs}, \theta^t), \quad (1)$$

Conditioning on ${Y_{mis}}^{t+1}$, draw θ^{t+1}

$$\theta^{t+1} \sim P\left(\theta \middle| Y_{obs}, {Y_{mis}}^{t+1}\right). \quad (2)$$

Repeating the algorithms (1) and (2) will yield stochastic quences $\left\{(\theta^t, {Y_{mis}}^t)\middle|t = 1,2,\ldots\right\}, \{(\theta^t)|t = 1,2,\ldots\}$, and $\left\{({Y_{mis}}^t)\middle|t = 1,2,\ldots\right\}$ with stationary distributions $P(\theta, Y_{mis}|Y_{obs})$, $P(\theta|Y_{obs})$, and $P(Y_{mis}|Y_{obs})$, respectively.

According to the expectation-maximization (EM) algorithm (Dempster et al., 1977), the E-step of the EM algorithm calculates the expected complete-data sufficient statistics, and the sequential M-step maximizes the complete-data likelihood. By comparison, in DA one first simulates a random draw of the complete-data sufficient statistics, andthen simulates a random draw from a complete-data posterior. In synthesis, we begin our MI by using the EM algorithm to fill out the gaps, then employ DA for the purpose of the unrestricted general location model (UGLM).

UGLM is a Markov chain Monte Carlo (MCMC) method for generating posterior draws of the parameters of UGLM, given a matrix of incomplete mixed data. At each step, missing data are randomly imputed under the current parameter, and a new parameter value is drawn from its posterior distribution given the existing data. After a suitable number of steps are taken, 1,000 times in this research, the resulting value of the parameter may be regarded as a random draw from its observed-data posterior distribution. With these new parameters, we impute the missing values. We repeat this procedure 100 times and create 100 sets of panel data. While imputing missing data, we calculate the maximum and minimum valuesfor each variable, and trim off those imputed values falling beyond the boundaries. The 100 sets of panel data are averaged for each entry to impute missing values (Tables 1 and 2 show that missing values are imputed.).

Generally speaking, MI imputes missing data $m$times and then m different versions of the complete data are combined so that a single inferential statement can be obtained. When the observed posterior distribution $p_{obs}(\eta|y_{obs}, \delta)$ is available, the MI algorithm to impute the parameter (η) of a given missing value is implemented as follows:

1. Generate ${\eta^{*(1)}}_P, \cdots, {\eta^{*(m)}}_P$independently from $P_{obs}(\eta|y_{obs}, \delta)$

- Given the j-th parameter value ${\eta^{*(m)}}_{\mathbb{P}} = ({\theta^{*(m)}}_{\mathbb{P}}, {\phi^{*(m)}}_{\mathbb{P}})$ generated fromStep 1, generate an imputed missing value ${y^{*(j)}}_{mis}$ from the conditional distribution

$$h\left(y_{mis}\middle|y_{obs}, \delta; {\eta^{*(j)}}_p\right) = \frac{f(y; {\theta^{*(j)}}_p)\mathrm{P}(\delta|y; {\phi^{*(j)}}_p)}{\int f(y; {\theta^{*(j)}}_p)P(\delta|y; {\phi^{*(j)}}_p)dy_{mis}}. \quad (3)$$

Using the imputed values, ${y^{*(1)}}, \cdots, {y^{*(m)}}$, the MI estimator of η can be obtained as $\widehat{\eta_{MI}} = \frac{1}{m}\sum_{j=1}^{m}\widehat{\eta^{(j)}}$, where $\widehat{\eta^{(j)}}$ can be obtained by solving $S\left(\eta; {y^{*(j)}}\right) = 0$ for η. The variance can be estimated following Meng and Rubin (1991): $\widehat{V_{MI}}(\hat{\psi}_{MI}) = W_m + + \left(1 + \frac{1}{m}\right)B_m$, where ψ is another parameter of interest, $W_m = \frac{1}{m}\sum_{j=1}^{m}\hat{V}_I^{(j)}(\hat{\psi})$, $B_m = \frac{1}{m-1}\sum_{j=1}^{m}\left(\hat{\psi}_I^{(j)} - -\hat{\psi}_{MI}\right)^{\otimes 2}$, and $\hat{V}_I^{(j)}(\hat{\psi})$ is the imputed version of the complete-sample variance estimator of $\hat{\psi}$ based on the j-th imputed data.

2.2. Variables. As the only dependent variable, *Return*is the logarithm of companies' month-end prices. The independent variables of this study are as follows:

- *Corporate governance*. The Korea Corporate-Governance Svice (KCGS) has, since 2006, annually released the Korea Corporate Governance Stock Price Index (KOGI) scores of firms listed on the Korea Stock Exchange (KRX) and the Korea Securities Dealers Automated Quotations (KOSDAQ) exchange based on firm-level evaluation reports consisting of public announcements, regulatory filings, and KCGS-led survey results.
- *Risk-free rate.* The yield of 90-day certificates of deposits (CDs).
- *Market premium*. The return on KOSPI minus the risk-free rate.
- *Small-minus-big (SMB) factor*. The excess return between a portfolio of small firms and a portfolio of large firms (Fama and French, 1993).
- *High-minus-low (HML) factor*. The excess return between a portfolio of firms with high book-to-market (B/M) ratios (the inverse of price-to-book ratio) and a portfolio of firms with low B/M ratios (Fama and French, 1993).
- *GMB factor*. The excess return between a decile portfolio of firms with the highest (good) over lowest (bad) degrees of corporate governance.
- *Momentum.* Momentum in a stock is the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down. Momentum factor can be calculated as follows: Average return on the two highest prior return portfolios minus the average return on the two lowest prior return portfolios (Carhart, 1997).
- *KOSPI*. The log-return of the KOSPI.
- *Industry.* An indicator of sectors of listed companies.

2.3. Databases and panel data construction. The raw financial data to estimate theaforementioned variables is sourced from FnGuide.KCGS has annually released the KOGI scores of KRX- and KOSDAQ-listed firms,since 2006, based on firm-level evaluation reports consisting of public announcements, regulatory filings, and KCGS-led survey results. Specifically, these variables are collected and estimated on a firm-year basis: KOGI, dividend, sales growth, market capitalization, preferred share capital, total assets, total liabilities, Tobin's Q ratio, and liquidity ratio. These variables are calculated on a monthly basis: stock return synchronicity, stock return, risk-free rate, SMB, HML, UMD, and GMB factors, market return, market premium. Including a categorical variable for industry classification (*Industry*), we construct a raw panel dataset for 800 companies listed and traded from July 2005 until June 2015.

After we construct a panel dataset with the above mentioned, estimated and procured variables, in order to minimize inefficiency due to information loss we multiply impute missing values (Dempster et al., 1977; van Dyk and Meng, 2001) to arrive at another panel dataset free of unobserved entries. While restricting the imputed values to fall within the minimum and maximum of respective variable observations, we save the results from 100 repetitions of the EM algorithm after discarding the first 1,000 iterations. The averages of 100 imputed values replace the existing missing entries in the raw panel.

2.4. Empirical models. In addition to Fama and French's (1993) three-factor and Cahart's (1997) four-factor models, we introduce a governance (GMB)-augmented factor model as follows:

$$R_{i,t} = \alpha_i + \beta_1 MP_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_{i,t},$$

$$R_{i,t} = \alpha_i + \beta_1 MP_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_{i,t},$$

$$R_{i,t} = \alpha_i + \beta_1 MP_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \beta_5 GMB_t + \varepsilon_{i,t},$$

where $R_{i,t}$ is the excess return of listed firm $i$over the risk-free ratein month t, MP_t is the market excess return, and SMB_t, HML_t,UMD_t and $GMB_t$are the excess returns of zero-investment factor-mimicking portfolios designed to capture the size premium, value premium, momentumeffect and governance effect, respectively.

3. Empirical results

3.1. Summary statistics. In Table 1, Panel A shows the summary statisticsofvariables collected and estimated through the sample period from July 2005 until June 2015. In comparison, Panel B assimilates Table 1 with a multiply imputed panel. In case one might be wary of possible biases due to MI, for Governance (KOGI), the differences in mean, median and standard deviation are 0.6, 0 and 0, even though the number of observations has significantly increased from 5,509 (original, Panel A) to 8,000 (imputed, Panel B). Since the distribution of Govenance is largely unaffected, we judge MI was reasonably implemented.[2]

[2] The resulting distribution of the GMB factor after MI might have varied to some extent might be due to a possible irregular distribution of the GMB factor and that sizable 3,400 out of 8,000 firm-year observations have been imputed for.

Table 1. Representative statistics

Panel A. Original panel						
Variable	Mean	Median	St. Dev.	Min	Max	No. of Obs.
Return	0.227	0.062	0.866	-0.938	37.667	6 483
Governance	111.900	106.000	28.506	0.000	260.000	5 509
RiskFree	0.001	0.001	0.000	0.000	0.001	8 000
MarketReturn	0.119	0.071	0.276	-0.407	0.560	8 000
MarketPrem	0.118	0.071	0.276	-0.408	0,559	8 000
SMB	0.401	0.210	0.748	-0.449	2.472	8 000
HML	0.333	0.179	0.518	-0.405	1.647	8 000
UMD	0.344	0.228	0.537	-0.426	1.719	8 000
GMB	-0.001	-0.001	0.001	-0.002	0.001	5 600
Panel B. Multiply imputed panel						
Variable	Mean	Median	St. Dev.	Min	Max	No. of Obs.
Return	0.243	0.104	0.804	-0.938	37.667	8 000
Governance	111.590	106.000	26.267	0.000	260.000	8 000
RiskFree	0.001	0.001	0.000	0.000	0.001	8 000
MarketReturn	0.119	0.071	0.276	-0.407	0.560	8 000
MarketPrem	0.118	0.071	0.276	-0.408	0.559	8 000
SMB	0.401	0.210	0.748	-0.449	2.472	8 000
HML	0.333	0.179	0.518	-0.405	1.647	8 000
UMD	0.344	0.228	0.537	-0.426	1.719	8 000
GMB	0.012	0.013	0.045	-0.127	0.134	8 000

Notes: As the dependent variable, Return is the logarithm of companies' month-end prices. The independent variables of this study are as follows: Corporate governance is the Korea Corporate Governance Stock Price Index (KOGI) scores of firms listed on the Korea Stock Exchange (KRX) and the Korea Securities Dealers Automated Quotations (KOSDAQ) exchange based on firm-level evaluation reports consisting of public announcements, regulatory filings, and KCGS-led survey results. RiskFree is the yield of 90-day certificates of deposits (CDs). MarketReturn is the log-return of the KOSPI. Industry is an indicator of sectors of listed companies. MarketPrem is the return on KOSPI minus the risk-free rate. The small-minus-big (SMB) factor is the excess return between a portfolio of small firms and a portfolio of large firms (Fama and French, 1993). The high-minus-low (HML) factor. The excess return between a portfolio of firms with high book-to-market (B/M) ratios (the inverse of price-to-book ratio) and a portfolio of firms with low B/M ratios (Fama and French, 1993). The good-minus-bad (GMB) factor is the excess return between a decile portfolio of firms with the highest (good) over lowest (bad) degrees of corporate governance. Momentum is the average return on the two highest prior return portfolios minus the average return on the two lowest prior return portfolios (Carhart, 1997). Panel B is based on a multipy imputed (Dempster et al., 1977; van Dyck and Meng, 2001) panel.

4.2. Main results. The results of regression using the factor models are also in two-fold: original and multiply imputed data.We identify models with and without firm-fixed effects. Also, we control for robust clustering (Petersen, 2009) to account for control heteroscedasticity and autoregression.

Table 2. Regression results (original panel)

Panel A. Replication of Gompers et al. (2003): GMB = alpha + MP + SMB + HML + UMD + error.											
Variable	Intercept		MarketPrem		SMB		HML		UMD		
Estimate	-0.114196	***	-0.603365	***	-0.510647	***	1.346524	***	-0.453494	***	
t-value	-100.32		-62.27		-66.21		96.92		-73.63		
Adjusted R^2	0.8883										
Panel B. Model: Return - RiskFree = alpha + MP + SMB + HML + UMD + GMB + error											
Variable	Intercept		MarketPrem		SMB		HML		UMD		GMB
Estimate	-0.0916	**	-0.29549	*	-0.72414	***	1.5974	***	0.22605		-0.36044
t-value	-2.539		-1.303		-3.882		3.721		1.427		-1.327
Adjusted R^2	0.3089										

Notes: Panel A replicates the model of Gompers et al. (2003). whose dependent variable is good-minus-bad (GMB) factor defined as a return of the portfolio that buys top 10% of the Governance Index (KOGI) and sells lowest 10% of the Governance Index (KOGI). GMB is reabalanced every year. The independent variables are as follows. Return is the logarithm of companies' month-end prices. Corporate governance is the Korea Corporate Governance Stock Price Index (KOGI) scores of firms listed on the Korea Stock Exchange (KRX) and the Korea Securities Dealers Automated Quotations (KOSDAQ) exchange based on firm-level evaluation reports consisting of public announcements, regulatory filings, and KCGS-led survey results. RiskFree is the yield of 90-day certificates of deposits (CDs). The market return is the log-return of the KOSPI. Industry is an indicator of sectors of listed companies. MarketPrem is the return on KOSPI minus the risk-free rate. The small-minus-big (SMB) factor is the excess return between a portfolio of small firms and a portfolio of large firms (Fama

and French, 1993). The high-minus-low (HML) factor. The excess return between a portfolio of firms with high book-to-market (B/M) ratios (the inverse of price-to-book ratio) and a portfolio of firms with low B/M ratios (Fama and French, 1993). The good-minus-bad (GMB) factor is the excess return between a decile portfolio of firms with the highest (good) over lowest (bad) degrees of corporate governance. Momentum (UMD) is the average return on the two highest prior return portfolios minus the average return on the two lowest prior return portfolios (Carhart, 1997). Panel B is based on a model that augments the GMB factor to Carhart's (1997) 4 factor model. * significant at 10%; ** significant at 5%; *** siginificant at 1%.

In Table 2, we can note that only the intercept term, market premium and valuation premium (HML)factors are significant under a 5% significance level in all models we specified. Although the size premium factor (SMB) is numerically and economically meaningful in Models 5 and 6, the momentum (UMD) and governance (GMB) factors get less than strong support from data.Considering the firm-fixed effect does not affect much to the overall inference since most of the coefficients estimates and t-values are only slightly different. The R-square increases from 0.166 to 0.190 as additional factors are included in the model. The number of observations varies from 59,230 up to 84,329 due to differing missing values in the data fitted byrespective models.

Table 3. Regression results (multiply imputed panel)

Panel A. Replication of Gompers et al. (2003): GMB = alpha + MP + SMB + HML + UMD + error.											
Variable	Intercept		MarketPrem		SMB		HML		UMD		
Estimate	-0.044766	***	0.163616	***	-0.563683	***	0.827542	***	-0.339451	***	
t-value	-34.19		14.44		-62.02		49.95		-47.49		
Adjusted R^2	0.9008										
Panel B. Model: Return - RiskFree = alpha + MP + SMB + HML + UMD + GMB + error											
Variable	Intercept		MarketPrem		SMB		HML		UMD		GMB
Estimate	-0.02799	*	0.22737	*	-0.31694	**	0.87168	***	0.16616	*	-0.25445
t-value	-1.699		1.686		-2.438		3.908		1.747		-1.936
Adjusted R^2	0.2441										

Notes: this table presents regression results based on a multiply imputed panel (Dempster et al., 1997; van Dyk and Meng, 20001). Panel A replicates the model of Gompers et al. (2003). whose dependent variable is good-minus-bad (GMB) factor defined as a return of the portfolio that buys top 10% of the Governance Index (KOGI) and sells lowest 10% of the Governance Index (KOGI). GMB is reabalanced every year. The independent variables are as follows. Return is the logarithm of companies' month-end prices. Corporate governance is the Korea Corporate Governance Stock Price Index (KOGI) scores of firms listed on the Korea Stock Exchange (KRX) and the Korea Securities Dealers Automated Quotations (KOSDAQ) exchange based on firm-level evaluation reports consisting of public announcements, regulatory filings, and KCGS-led survey results. RiskFree is the yield of 90-day certificates of deposits (CDs). The market return is the log-return of the KOSPI. Industry is an indicator of sectors of listed companies. MarketPrem is the return on KOSPI minus the risk-free rate. The small-minus-big (SMB) factor is the excess return between a portfolio of small firms and a portfolio of large firms (Fama and French, 1993). The high-minus-low (HML) factor. The excess return between a portfolio of firms with high book-to-market (B/M) ratios (the inverse of price-to-book ratio) and a portfolio of firms with low B/M ratios (Fama and French, 1993). The good-minus-bad (GMB) factor is the excess return between a decile portfolio of firms with the highest (good) over lowest (bad) degrees of corporate governance. Momentum (UMD) is the average return on the two highest prior return portfolios minus the average return on the two lowest prior return portfolios (Carhart, 1997). Panel B is based on a model that augments the GMB factor to Carhart's (1997) 4 factor model. * significant at 10%; ** significant at 5%; *** siginificant at 1%.

In contrast to Table 2, Table 3 is based on the complete, multiply imputed dataset. Most pronounced, all coefficient estimates are statistically significant at a 5% significance level.As Models 5 and 6 show, the governance (GMB) factor appears to be a determinant of stock returns in the cross-section of Korean listed companies. The explanatory power (R-square) improves from 0.114 to 0.153as the number of factors gains.Now that all missing values have been imputed the number of observations is 96,000 for all identified models. The unexpected, negative sign for the governance factor (GMB) moots a further investigation: While Gompers et al. (2003) created the G-Index using 24 distinct ATPs for a sample of about U.S-listed 1,500 firms per year during 1990s, CGS devised KOGI based on 9 distinct corporate governance provisions of Korean listed companies.Also,it is deemed sound corporate governance can accommodate sustainingthe cashflows of "mature" firms in the U.S. If so, those "growing"corporations in Korea can be adversely impacted by stringent implementation of corporate governance and this may additionally explain the described negative association.

Conclusion

Corporate governance is an envelope for the mechanisms, processes and relations through which corporations are controlled and guided. Consequently, corporate governance affects operational performance and, in turn, stock returns, as Gompers et al. (2003) find. In this research, we used the KOGI to test a possible linkage between corporate governance and shareholder wealth in Korea. Factor mimicking portfolios sorted per KOGI are constructed to estimate a corporate governance risk factor (GMB). By augmenting this new factor to the existing factor models

(Fama and French, 1993; Carhart, 1997) to fit multiply imputed data, we found evidence that corporate governance influences stock pricing in Korea. However, the unintuitive sign for the governance factor (GMB) is left for future research by our readers.

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