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Which Explains Stock Return Co-movement better, Corporate Governance or Corporate Transparency? Evidence from R^2

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1. Introduction

Corporate governance deals with the ways in which suppliers of financing to corporations assure themselves of getting a return on their investment. Suppliers of financing in each country need to understand and develop better corporate governance mechanisms so that they can secure their return and achieve economic efficiency. Understanding corporate governance not only enlightens the discussion of perhaps marginal improvements in rich economies, but can also stimulate major institutional changes in places where they need to be made (Shleifer – Vishny, 1997). Corporate governance is important for the above-mentioned reasons, even though some people argue that product market competition takes care of corporate governance in terms of economic efficiency (Alchian, 1950), (Stigler, 1958). Product market competition may reduce the returns on capital and hence cut the amount that managers can possibly expropriate, but it does not prevent managers from expropriating the competitive return after the capital is sunk. The two most common approaches to corporate governance rely on giving investors some power. The first approach is to give investors power through legal protection from expropriation by managers. Protection of minority rights and legal prohibitions against managerial self-dealing are examples of such mechanisms. The second major approach is ownership by large investors (concentrated ownership). Most corporate governance mechanisms used in the world – including large share holdings, relationship banking, and even takeovers – can be viewed as examples of large investors exercising their power (La Porta – Lopez – Shleifer – Vishny, 2002).[1] While large investors still rely on the legal system, they do not need as many rights as small investors do to protect their interests (Shleifer – Vishny, 1997). Previous literature shows that various measures of corporate governance are constructed in the international context. For example, La Porta et al. (1998) construct the anti-director rights index as the sum of the six rights

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[1] I will hereinafter refer to them as LLSV.

measuring how strongly the legal system favors minority shareholders against controlling shareholders in the corporate decision-making process with the index ranging from 0 to 6. A higher score on this index indicates greater respect for investor protection or better corporate governance. They also construct an accounting-standards index by examining or rating companies' 1990 annual reports on their inclusion or omission of 90 items, suggesting a minimum score of 0 and a maximum score of 90. These items fall into seven categories: general information, income statements, balance sheets, cash-flow statement, accounting standards, stock data, and special items. A high score of accounting standards suggests higher accounting-report quantity/quality or better corporate governance. LLSV (2002) construct cash-flow rights and control rights of controlling shareholders to see the effects of legal protection of minority shareholders and of cash-flow ownership by a controlling shareholder on the valuation of firms.

2. Literature Review

Bushman, Piotroski and Smith (2004) defined corporate transparency as the availability of firm-specific information to those outside publicly traded firms, and viewed as the joint output of multi-faceted systems whose components collectively produce, gather, validate and disseminate information to market participants. They factor analyze an extensive range of measures capturing countries' firm-specific information environments, isolating two factors interpreted as financial and governance transparency. Most of their transparency data is from International Accounting and Auditing Trends, Center for Financial Analysis and Research, Inc. (IAAT).

Extending the argument of Jin and Myers (2006), this paper shows the relationship among R-squared measure[2], corporate governance and corporate transparency. Jin and Myers (2006) argue that R^2 can be interpreted as the measure of corporate transparency because it represents how much market indices explain individual firm returns. So, some individual firm returns are explained more by the firm-specific information if R^2 is low and *vice versa*. Morck, Yeung and Yu (2000) show that R^2 is high in emerging markets which normally have low corporate transparency. Combining these two arguments, this paper argues that R^2 has a negative relationship to corporate transparency and it is affected more by corporate transparency variables than corporate governance variables. In other words, R^2 should be high when there is low corporate transparency, and it should be low when there is high corporate transparency. We will explain further why R^2 is affected more by corporate transparency variables than corporate governance variables.

Roll (1988) does a thorough study of R^2 and gives some implications for our study which guides this paper. Roll (1988) calculates R^2 for the returns of large stocks as explained by systematic economic influences, by the returns on other stocks in the same industry, and by public firm-specific news

[2] R-squared measure is obtained from market model regression which will be explained further in variable construction sections.

events. Using daily and monthly U.S. stock return data, he shows that there is little relation between explanatory power and either a firm's size or its industry. Explanatory power by systematic economic factors is not very different across size or industries. By looking at the change in return distribution when public news events are excluded, he concludes that there exists private information or else unrelated to concrete information. Even though he does not use international return data, the same rule can be applied to international stock return behavior. According to his argument, systematic and firm-specific factors matter in R^2. If we assume the systematic factor as market indices in the market model regression, the paper is supportive of our interpreting the magnitude of R^2 as either higher or lower firm-specific information. Morck, Yeung and Yu (2000) show that stock prices move together more in poor economies than in rich economies. Using two stock-price synchronicity measures, the paper attempts to find the reason for this phenomenon. One measure is to calculate the fraction of stocks that move in the same direction in each country, and the other measure is to calculate the R^2s of regressions using the market-model-type regression equation. In this regression equation, they run the regression of individual firm stock returns of each country on the local market return of each country, US market return and the foreign-exchange rate. They consider stock co-movement variables, structural variables and institutional variables as explanatory variables. They find that market size does not explain this phenomenon and that higher fundamentals correlation in low-income economies partially explain this phenomenon. They also find that measures of property rights explain the phenomenon. The systematic component of returns variation is large in emerging markets, and appears unrelated to fundamentals co-movement, consistent with noise trader risk. Among developed-economy stock markets, higher firm-specific returns variation is associated with stronger public investor property rights. They propose that strong property rights promote informed arbitrage, which capitalizes detailed firm-specific information. Even though they find higher firm-specific returns variation, which can be interpreted as lower R^2, is associated with stronger public investor property rights, they cannot explain why this happens. This is because they cannot find the characteristic of R^2 itself. They simply define R^2 as the stock-price synchronicity or stock-return synchronicity. Jin and Myers (2006) extend Morck, Yeung and Yu's (2000) paper by making clear the characteristic of the R^2 measure. They argue that poor protection without opaqueness, which is the opposite of transparency, is not enough to explain high R^2. This is different from the view that opaqueness and imperfect protection of investors' property rights go together and probably are mutually reinforcing. Assuming the firm is not completely transparent, outside investors can observe all market-wide information, but only part of firm-specific information. Let's say poor protection of investors' property rights allows insiders to capture half of the firm's cash flows on average, but they capture more when the hidden firm-specific information is positive and less when it is negative. Opaqueness therefore requires insiders to absorb some firm-specific variance. The firm-specific variance absorbed by investors is correspondingly lower. Of course investors absorb all market risk (macroeconomic information is presumably common knowledge). Thus the ratio of market to total risk is increased by opaqueness.

Thus, higher R^2s are caused by opaqueness, not by poor investor protection. Furthermore, suppose that investors could enforce their property rights fully and without cost whenever they receive information about cash flows or firm value. They obtain every dollar of cash flow or value that is apparent to them. Nevertheless, if the firm is not completely transparent, insiders can still capture unexpected cash flows that are not perceived by investors. They will absorb some firm-specific risk. Again, the more opaque the firm, the higher its R-squared measure.[3] They test the hypothesis that lack of transparency shifts firm-specific risk to insiders and it reduces the amount of firm-specific risk absorbed by outsider investors. Using stock returns from 40 stock markets from 1990 to 2001, they find strong positive relations between R^2 and several measures of opaqueness. Even though they use good government index as the measure of the protection of property rights and five opaqueness measures, there are other measures of the protection of property rights such as anti-director rights (LLSV, 1998). Also, many corporate governance variables can be the indirect measure of the protection of property rights.

3. Hypothesis

Supporting the argument of Jin and Myers (2006), this paper tries to extend their argument to corporate governance versus corporate transparency. Using the corporate governance indices from LLSV (1998) and corporate transparency indices from Bushman, Piotroski and Smith (2004), the paper attempts to see whether R^2 has a negative relationship to corporate transparency variables and whether or not it is more affected by corporate transparency variables than corporate governance variables after controlling for macroeconomic variables. If Jin and Myers (2006) are correct and R^2 is affected by corporate transparency, then there should be a negative relationship between R^2 and corporate transparency variables. Also, R^2 is affected more by corporate transparency variables than corporate governance variables or the effect of corporate governance variables on R^2 will disappear after corporate transparency variables are included in the regression analysis. This will enhance the argument of Jin and Myers (2006) and help the better understanding of the characteristic of R^2 in the corporate governance context.

In summary, the paper tests the following hypothesis.

Hypothesis: R^2 has a negative relationship to corporate transparency variables and it is affected more by corporate transparency variables than corporate governance variables after controlling for macroeconomic variables.

The major contribution of this paper is that it introduces both corporate transparency and corporate governance variables to explain the relationship among R^2, corporate transparency and corporate governance. Jin and

[3] See Jin and Myers (2006) for detailed information about this argument and mathematical proofs.

Myers (2006) use some corporate opaqueness measures, but the measures they use are not much different from the corporate governance measures in LLSV (1998) or LLSV (2002). Also, LLSV (2002) focuses on the legal protection of minority shareholders, and does not consider corporate transparency itself, to explain the valuation of the firm. On the other hand, this paper introduces corporate transparency measures from Bushman, Piotroski and Smith (2004) and investigates the relationship among R^2, corporate governance and corporate transparency and their relative effect on R^2, which are not explored in either Jin and Myers (2006), LLSV (1998) or LLSV (2002).

The rest of the paper consists of the following: First, data and variable construction is introduced in Section 2. Second, regression analysis is introduced in Section 3. The conclusion and further research are introduced in Section 4.

4. Data and the Construction of Variables

The main sources of data in this paper are Datastream, corporate governance variables from LLSV (1998) and corporate transparency variables from Bushman, Piotroski and Smith (2004). The R^2 variable is constructed from Datastream.

4.1 R^2

We first start with the list of 50 countries covered by Datastream International for which common stock-return data, local market-return data, US market-return data and the rate of change in the exchange rate per U.S. dollar are available. The sample period is from 1990 to 2004. We run the following regression which is the same as the regression equation in Morck, Yeung and Yu (2000) to get R^2:

$$r_{it} = \alpha_i + \beta_{1,i} r_{m,jt} + \beta_{2,i}[r_{US,t} + e_{jt}] + \varepsilon_{it} \quad (1)$$

where i is a firm index, j a country market index, t an annual time index, $r_{m,jt}$ a domestic market index, and $r_{US,t}$ the U.S. market return. The rate of change in the exchange rate per U.S. dollar is e_{jt}.

U.S. stock-market return is included because most economies are at least partially open to foreign capital. The expression $r_{US,t} + e_{jt}$ translates U.S. stock-market returns into local currency units. Non-overlapping, annually-compounded returns from daily total returns are used in this paper instead of bi-weekly returns in Morck, Yeung and Yu (2000) because all the independent and controlling variables to match the dependent variable are annual and thin-trading problems, which arise when securities are traded infrequently, can be resolved. For stock markets which are in different time zones, such as the South Korean versus the U.S., a one-day lag is given to U.S. market returns to resolve the time-difference problem. Also, when U.S. data are used in the equation (1), $\beta_{2,i}$ is set to zero.

The total cross section for the sample period contains 24,989 firms spanning 40 countries. Stocks traded on fewer than 200 trading days are omit-

ted and the R^2 out of 5 % of the critical value are dropped on the assumption that coding errors are overrepresented in extreme observations.[4] The regression statistic for equation (1), R^2_{ij}, measures the percent of the variation in the annual returns of stock *i* in country *j* explained by variations in country *j*'s market return and the U.S. market return. After trimming the data, the total cross section of the sample period contains 19,566 firms spanning 40 countries. Since the paper uses the same method of calculating R^2_{ij} as Morck, Yeung and Yu (2000), the same standard econometric remedy is used to cure the problem of R^2_{ij}[5] as dependent variables. Logistic transformations are applied to R^2_{ij} as the following equation.

$$L_{ij} = \log\left(\frac{R^2_{ij}}{1 - R^2_{ij}}\right) \tag{2}$$

In this way, L_{ij} maps R^2_{ij} from the unit interval to $\Re$ (the set of real numbers).

4.2 Corporate Governance and Corporate Transparency Variables

Corporate governance variables are obtained from LLSV (1998). They constructed different types of corporate governance variables from various sources and categorized them into different groups, such as legal rules, shareholder rights, creditor rights and legal enforcement. Among these variables which have the variation of the score for each country, three variables are selected which have the least correlation with the corporate transparency variables of Bushman, Piotroski and Smith (2004).[6] These are anti-director rights and accounting standards. LLSV (1998) categorize accounting standards as the legal enforcement group and anti-director rights as the shareholder rights group. Accounting standards comprise the index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. This index is from International Accounting and Auditing trends, Center for International Financial Analysis and Research. These items fall into 7 categories (general information, income statements, balance sheets, cash-flow statement, accounting standards, stock data, and special items). A minimum of three companies in each country were studied. The companies represent a cross section of various industry groups. Industrial companies represented 70 %, and financial companies represented the remaining 30 %. The anti-director rights comprise the index aggregating the shareholder rights LLSV (1998) labeled as "anti-director rights". This index is based on corporate law or the commercial code. The index is formed by adding 1 when (1) the company allows shareholders to mail their proxy vote to the firm; (2) shareholders are not re-

[4] Morck, Yeung and Yu (2000) define extreme values of return as greater than 0.25, but the paper uses 5 % of the critical value of R^2 because of the sample period difference.

[5] Morck, Yeung and Yu (2000) point out the problem of R^2_{ij} as a dependent variable in regressions, which is that they are bounded within the intervals [0,1].

[6] We selected the ones with less than 50 % of correlation with corporate transparency variables of Bushman, Piotroski and Smith (2004) because of the multicollinearity problem in the regression analysis.

quired to deposit their shares prior to the general shareholders' meeting; (3) cumulative voting or proportional representation of minorities in the board of directors is allowed; (4) an oppressed-minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to ten percent (the sample median); (6) shareholders have preemptive rights that can be waived only by a shareholder's vote. The index ranges from zero to six.

Bushman, Piotroski and Smith (2004) construct corporate transparency variables from various sources. They categorize corporate transparency variables into three groups. These are the corporate reporting environment, private information acquisition and dissemination of information. Two corporate transparency variables are selected which have low correlation with corporate governance variables and whose scores are varied. These are *measure* and *nanalyst*. *Measure* is from the corporate reporting environment group and *nanalyst* is from the private information acquisition group. *Measure* is a rough attempt to capture cross-country differences in the accounting principles used. Using the International Accounting and Auditing Trends, Center for Financial Analysis and Research, Inc. (IAAT) database, *measure* captures the extent to which 1. financial statements reflect subsidiaries on a consolidated basis, and 2. general reserves are used. Because consolidated financial statements generally are viewed as more informative, and the use of general reserves is viewed as a way to obscure a firm's periodic performance, they assign higher values of *measure* to firms that consolidate financial statements and do not use general reserves. They expect higher values of *measure* to be associated with more informative financial statements or higher transparency. *Measure* is the average percentile rank within the sample of countries across these two categories. *Nanalyst* is the number of analysts following the largest 30 companies in each country in 1996. It is based on Chang, Khanna and Palepu (2000). Relations between public information disclosure and the private information processing and gathering activities of investors have long been recognized as important determinants of information allocations in an economy (e.g., Verrecchia (1982)). This number of analysts is that of financial analysts who specialize in processing and interpreting financial information reported by firms, and in collecting additional information through discussion with firms' managers, suppliers, customers, etc. They expect higher values of *Nanalyst* to be associated with higher transparency. China and Poland are excluded because these countries do not have the above-mentioned data. After trimming the data, the total cross section of the sample period contains 19,107 firms spanning 38 countries.

4.3 Controlling Variables for Regression Analysis

In Morck, Yeung and Yu (2000) and Jin and Myers (2006), control variables are used for the regression analysis of R^2 on corporate governance and corporate transparency variables. These are the log of the number of stocks traded in each country and the year, the log of country size (geographical area in square kilometers), the variance of the growth rate of each coun-

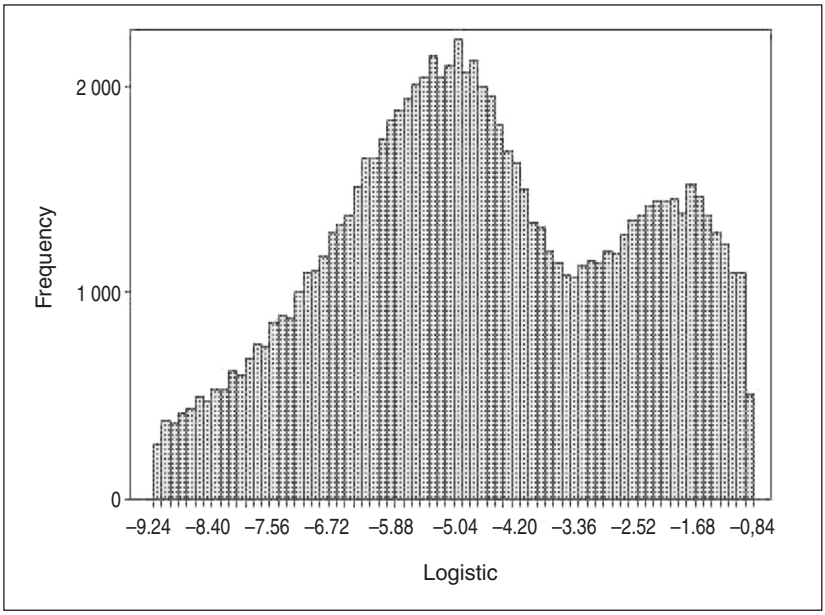
try's GDP measured in nominal U.S. dollars from 1990 to 2001, the log of per capita GDP and Herfindahl indices calculated from the distribution of sales of individual firms or industries within each country and year. From these controlling variables, this paper uses the log of country size (geographical area in square kilometers), the variance of the growth rate of each country's GDP in real U.S. dollars based on 1990 U.S. dollars from 1990 to 2004 and the log of real per capita GDP in real U.S. dollars based on 1990 U.S. dollars from 1990 to 2004. Morck, Yeung and Yu (2000) use the variance of per capita GDP growth for each country as the measure of macroeconomic instability. They also point out the importance of country size in two ways. First, economic activity in a small country could be geographically localized, so that nearby geopolitical instability or localized environmental catastrophes such as an earthquake or monsoons might have market-wide effects that would not be as evident in a larger country. Second, Bernstein and Weinstein (1998) observe the economic specialization predicted by standard international trade theory across geographical units of similar size, but not across countries. This finding is consistent with larger countries having factor endowments that exhibit less uniformity, and this relation in turn suggests that the stocks of firms in large countries might move more independently than those in small countries. Herfindahl indices and the number of stocks for each year and country are excluded because of the availability of firm-level accounting data and stock-market data for each country and year. Country size data is from the CIA World Factbook 2000. GDP data is from the international macroeconomic dataset of the Economic Research Service, United States Department of Agriculture. Another controlling variable is introduced in this paper. It is the skewness of individual stocks' R^2s. ***Figure 1*** shows the distribution of the individual stocks' logistic transformation of R^2 (logistic (R^2)). Y-axis is the number of observation for each value of logistic (R^2). X-axis is the value range of the individual stocks' logistic (R^2). The distribution is slightly right-skewed. Because of this characteristic of the distribution of R^2, skewness is calculated and included in the controlling variables of the regression. It is hard to decide whether the distribution has a fat tail, so kurtosis is not included in the controlling variables of the regression. Also, there is a strong positive correlation between skewness and kurtosis (above 90 %). The following formula is used to calculate skewness.

$$skewness_j = \frac{\sum_{t=1}^{N} (R_{ij}^2 - \bar{R}^2)^3}{(N-1) * S^3} \tag{3}$$

$skewness_j$ is the skewness of the individual stocks' R^2 for country j. R_{ij}^2 is the R^2 of the stock i for each year for country j. $\bar{R}^2$ is the mean of the individual stocks' R^2 for country j. N is the number of observation of R^2 for country j. S is the standard deviation of the individual stocks' R^2 for country j.

As shown in Kraus and Litzenberger (1976), the skewness in the stock--return distribution is a risk factor in the asset-pricing model if the stock return distribution does not follow normal distribution. Bae, Lim and Wei

FIGURE 1 The Distribution of Cross-Country Logistic (R^2)



Notes: This is the distribution of cross-country logistic transformation of R^2, which is the dependent variable of the regression analysis. The sample period is from 1990 to 2004. There are 38 countries in the sample. X-axis is the logistic (R^2) value ranging from around –9.18 to around –0.66 value. Y-axis is the frequency of the R^2 value ranging from around 300 to around 2,200. The distribution is slightly skewed to the right and shows the form of bimodal distribution.

(2005) show the relationship between the corporate governance and the skewness characteristic of stock return. They find that stock returns in economies characterized by poor corporate governance are likely to be more positively skewed. Furthermore, stock returns of firms with poor governance within a country are also likely to be more positively skewed. Since R^2 is calculated based on the market model regression, its distribution also shows the characteristic of stock-return distribution. Furthermore, its distribution may have the relationship with corporate governance based on the results of Bae, Lim and Wei (2005). Since we use the country-level corporate governance, corporate transparency and controlling variables, we calculate the country-level skewness of R^2 to see its effect on individual firms' R^2 so that we can have consistent country-level effects of independent variables on the individual firms' R^2.

In *Figure 1*, it can be also argued that logistic (R^2) follows bi-modal distribution. We calculate summary statistics by dividing the sample into two sub-samples based on the changing point of logistic (R^2) value, which is –3.18, in *Figure 1*. The summary statistics shows that there is no significant difference between two sub-samples in terms of corporate governance, corporate transparency and controlling variables, except for the *measure* variable. The mean value of *measure* of the sub-sample with logistic (R^2) less than –3.18 is 65.64, while that of the sub-sample with logistic (R^2)

greater than –3.18 is 57.47. It is consistent with Jin and Myers (2006) that firms with high corporate transparency countries have low R^2. However, the result is not enough to show the distinct relationship among R^2, corporate governance and corporate transparency.

The total firm-year observation in the regression analysis of *Table 3* and *Table 4* is reduced to 91,332. This is because some countries do not have the complete set of corporate governance and corporate transparency variables even though they have the complete set of controlling variables. In other words, some countries have corporate governance variables while they do not have one of the corporate transparency variables. Furthermore, the per capita GDP data is not available for some countries and specific years, especially for the year 2004. Since the regression analysis is based on the complete set of corporate governance, corporate transparency and controlling variables, it only has 91,332 firm year observations in the regression. So, the number of countries covered in the regression is not exactly 38, but we use the same number of countries to be consistent with the number in the summary statistics.

Table 1 provides the summary statistics of R^2, corporate governance, corporate transparency and controlling variables for the total sample. Mean R^2 is 0.0495. This mean is quite different from the mean R^2 of Morck, Yeung and Yu (2000) or Jin and Myers (2006) because the paper uses a longer sample period, annual compounding returns and a different way of removing extreme values. However, the longer sample period should not have a major effect on different mean R^2 in comparison with that of Jin and Myers (2006) or Morck, Yeung and Yu (2000), especially Jin and Myers (2006), because Jin and Myers (2006) also use a long sample period from 1990 to 2001. We attribute the main reason of the difference to the way of calculating compounded returns and removing extreme values. Both Morck, Yeung and Yu (2000) and Jin and Myers (2006) use either weekly or biweekly compounded returns instead of annually compounded returns. Morck, Yeung and Yu (2000) remove R^2s greater than 0.25 instead of removing R^2s beyond five percent critical values of the distribution of R^2. Since Morck, Yeung and Yu (2000) only use the year 1995, they set the extreme values of R^2 according to their sample. However, we think the method of removing extreme values in this paper is a more general way.

The summary statistics of logistic transformation of R^2 are also introduced and it is used as the dependent variable in the regression. Variables are scale-adjusted before performing the regression analysis. Univariate analyses are performed and not reported for the difference among the corporate governance and corporate transparency variables that are selected. All the differences among these variables are statistically significant within the one-percent significance level.

In the regression analysis of *Table 3* and *Table 4*, we adjusted the scale of some variables based on the method used in Jin and Myers (2006). Jin and Myers (2006) adjusted the scale of corporate governance variables, log (per capita GDP) and log (country size) by dividing them by either 1,000 or 10,000 instead of dividing them by standard deviation. In *Table 3* and *Table 4*, ($x10^{-3}$) and ($x10^{-4}$) means divide the variable by 1,000 and 10,000, respectively.

TABLE 1 Summary Statistics

Variables	MIN	MAX	MEAN	STD
Dependent Variable (Individual Stocks' Average R^2)				
R^2	0.0001	0.3340	0.0495	0.0787
logistic transformation of R^2	–9.2099	–0.6633	–4.5093	2.1045
Corporate Governance Variables				
accounting standard	36.0000	83.0000	68.5093	6.8842
antidirector	0.0000	5.0000	3.8123	1.1467
Corporate Transparency Variables				
measure	22.8300	100.0000	63.2025	27.0483
nanalyst	3.1900	32.4000	17.5277	6.4031
Controlling Variables				
log(country size)	6.4731	16.1157	12.8557	2.2008
log(per capita GDP)	10.6325	15.9533	13.5403	1.3127
variance(growth rate of per capita GDP)	0.0001	0.0032	0.0006	0.0007
skewness	0.8772	9.2011	2.5403	1.8195

Notes: R^2s for individual stocks are averaged for each year. The sample period is from 1990 to 2004, spanning 38 countries. Summary statistics are calculated from the cross-sectional distribution of these individual stocks' averages. Corporate governance variables are obtained from LLSV (1998) and IMD. Anti-director rights and accounting standards are from LLSV (1998). Accounting standards comprise the index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. This index is from International Accounting and Auditing Trends, Center for International Financial Analysis and Research. Anti-director rights comprise the index aggregating the shareholder rights LLSV (1998) labeled as "anti-director rights". Higher accounting standards and stronger anti-director rights mean better corporate governance. *Measure* and *nanalyst* are from Bushman, Piotroski and Smith (2004). *Measure* is a rough attempt to capture cross-country differences in the accounting principles used. It is from the International Accounting and Auditing Trends, Center for Financial Analysis and Research, Inc. (IAAT) database. *Nanalyst* is the number of analysts following the largest 30 companies in each country in 1996. It is from Chang, Khanna and Palepu (2000). Higher values of *nanalyst* are associated with higher transparency. Higher values of *measure* are associated with higher transparency. Country size data is from the CIA World Factbook 2000. GDP data is from the international macroeconomic dataset of the Economic Research Service, United States Department of Agriculture. Skewness is the third moment of the individual stocks' R^2s.

Table 2 provides the Pearson correlation matrix and is shown below. Definitions of all the variables below are the same as those in *Table 1*. Most of the corporate governance and corporate transparency variables have less than fifty-percent positive correlation and are statistically significant within the one-percent significance level. The correlation between the anti-director and accounting standards is slightly above fifty percent and positive. Most of the controlling variables have less than fifty-percent correlation. Half of them have negative correlation with other variables while others have positive correlation. The correlation between log of per capita GDP and *measure*, between log of per capita GDP and log of country size and between variance of per capita GDP growth rate and log of per capita GDP is –0.5286, 0.5356 and –0.5053, respectively.

5. Regression Analysis

Table 3 provides the cross-sectional regression of individual stocks' annual average R^2s across countries. The regression equation is as follows.

TABLE 2 Correlation

	Accounting standard	Antidirector	Measure	nanalyst	log (country size)	log (per capita GDP)	Variance (GDP growth rate)	Skewness
Accounting standard	1							
Antidirector	**0.5126**	1						
	(<.0001)							
Measure	0.4675	0.3075	1					
	(<.0001)	(<.0001)						
nanalyst	0.4635	0.3531	0.1618	1				
	(<.0001)	(<.0001)	(<.0001)					
log	0.1019	0.3035	-0.1638	0.1164	1			
(country size)	(<.0001)	(<.0001)	(<.0001)	(<.0001)				
log	-0.0968	0.3483	**-0.5286**	0.2968	**0.5356**	1		
(per capita GDP)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)			
Variance	-0.0385	-0.2989	0.1105	-0.2330	-0.2907	**-0.5053**	1	
(GDP growth rate)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)		
Skewness	-0.0580	0.0164	0.0445	-0.1119	0.1321	-0.1809	0.1900	1
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	

Notes: The Pearson correlation matrix is shown below. Definitions of all the variables below are the same as those in *Table 1*. Most of the corporate governance and corporate transparency variables have less than fifty-percent positive correlation and are statistically significant within the one-percent significance level. The correlation between anti-director and accounting standard is slightly above fifty percent and positive. Most of the controlling variables have less than fifty-percent correlation. Half of them have negative correlation with other variables while others have positive correlation. The correlation between log of per capita GDP and *measure,* between log of per capita GDP and log of country size and between variance of per capita GDP growth rate and log of per capita GDP is –0.5286, 0.5356 and –0.5053, respectively.

$$logistic(R^2)_{i,j,t} = \alpha + \beta_1 measure_{j,t} + \beta_2 nanalyst_{j,t} + \beta_3 antidirector_{j,t} + \\ + \beta_4 accountingstandard_{j,t} + \beta_5 \log(countrysize)_{j,t} + \beta_6 \log(percapitaGDP)_{j,t} + \\ + \beta_7 Variance(GDPgrowthrate)_{j,t} + \beta_8 skewness_{j,t} \quad (4)$$

i, j and t represents stock ID, country ID and year ID, respectively. α is the intercept of the regression. $logistic(R^2)$ is the logistic transformation of individual stocks' annual average across each country. *measure* is the *measure* variable. *nanalyst* is the *nanalyst* variable. *accountingstandard* is the accounting standard variable. *antidirector* is the anti-director variable. log(*countrysize*) is the log of country size variable. log(*percapitaGDP*) is the log of real per capita GDP variable. *Variance*(*GDPgrowthrate*) is the variance of real per capita GDP growth rate. *skewness* is the skewness of the individual stocks' R^2s for each country. The regression is adjusted for heteroskedasticity. The feasible Generalized Least Squares method is used to adjust for heteroskedasticity, following Park (1966). A feasible GLS procedure to correct for heteroskedasticity is performed as follows: First, run the OLS regression using the above regression equation and save the residuals. Second, create a new residual variable by first squaring the OLS residuals and then taking the natural log. Third, run the regression of this new variable on the same set of regressors and save the fitted values. Fourth, take exponential for the fitted values. Finally, estimate the original equa-

TABLE 3 Regression Analysis

Dependent Variable: logistic (R–squared)	**R^2(1)**	**R^2(2)**	**R^2(3)**	**R^2(4)**	**R^2(5)**	**R^2(6)**	**R^2(7)**	**R^2(8)**
Independent Variables								
measure(x10^{-4})	–50.75***		–1.43			–9.72**	–11.11***	–11.77***
	(–17.24)		(–0.45)			(–2.52)	(–3.40)	(–3.05)
nanalyst(x10^{-4})		–478.59***	–477.40***			–488.48***	–533.12***	–536.53***
		(–46.04)	(–42.06)			(–42.60)	(–41.71)	(–41.84)
Antidirector(x10^{-3})				–58.17***		31.23***		4.01
				(–9.40)		(3.91)		(0.45)
Accounting standard(x10^{-4})					–154.82***		107.52***	104.73***
					(–16.09)		(9.09)	(8.05)
log(country size) (x10^{-3})	–89.65***	–108.60***	–107.81***	–100.04***	–90.38***	–108.63***	–112.69***	–112.34***
	(–25.73)	(–31.95)	(–30.92)	(–28.98)	(–25.81)	(–31.24)	(–31.76)	(–31.79)
log(per capita GDP) (x10^{-4})	1020.80***	2426.33***	2420.20***	1827.95***	1432.58***	2276.69***	2529.74***	2516.79***
	(12.91)	(35.81)	(27.69)	(28.15)	(21.11)	(23.73)	(28.53)	(24.32)
Variance(GDP growth rate)	–212.02***	–214.99***	–212.20***	–220.75***	–198.56***	–209.21***	–209.82***	–209.02***
	(–22.51)	(–23.20)	(–22.32)	(–24.81)	(–21.39)	(–21.80)	(–21.83)	(–21.65)
Skewness	–0.27***	–0.29***	–0.29***	–0.25***	–0.27***	–0.29***	–0.28***	–0.29***
	(–84.18)	(–93.53)	(–92.55)	(–81.59)	(–83.39)	(–91.45)	(–91.12)	(–87.22)
Adjusted R^2	0.11	0.13	0.13	0.13	0.11	0.13	0.13	0.13
Sample Size	91332	91332	91332	92054	91158	91332	91158	91158

Notes: Explaining differences in individual stock's annual average R^2 across countries. The sample period is from 1990 to 2004, spanning 38 countries. The dependent variable is logistic transformation of R^2. The explanatory variables are the *measure* from the International Accounting and Auditing Trends, Center for Financial Analysis and Research, Inc. (IAAT) database, the *nanalyst* from Chang, Khanna and Palepu (2000), *accounting standard* and *anti–director* from LLSV (1998). The controlling variables are the *country size* from the CIA World Factbook 2000, the *GDP* data from the international macroeconomic dataset of the Economic Research Service, United States Department of Agriculture and the *skewness* of the individual stock's R^2s for each country. The regression is adjusted for heteroskedasticity. The regression adjusted for serial correlation using maximum likelihood estimation is also performed and the result is not statistically different from the original, and thus not reported. White and Newey–West robust standard errors are also used for robustness check and the result is not statistically different from the original. The *t*-statistics are reported in the parentheses under each coefficient. ** and *** means 5% and 1% significance levels, respectively.

TABLE 4 Standardized Coefficient Estimates of the Regressions in *Table 3*

Dependent Variable: logistic (R-squared)	**R^2(1)**	**R^2(2)**	**R^2(3)**	**R^2(4)**	**R^2(5)**	**R^2(6)**	**R^2(7)**	**R^2(8)**
Independent variables								
Measure($x10^{-4}$)	–0.06611		–0.00184			–0.01257	–0.01436	–0.01523
nanalyst($x10^{-4}$)		–0.15933	–0.15850			–0.16173	–0.17554	–0.17659
Antidirector($x10^{-3}$)				–0.03296		0.01738		0.00223
Accounting standard ($x10^{-4}$)					–0.05387		0.03697	0.03604
log(country size) ($x10^{-3}$)	–0.09865	–0.12157	–0.12096	–0.10929	–0.09908	–0.12230	–0.12645	–0.12675
log(per capita GDP) ($x10^{-4}$)	0.06486	0.15664	0.15603	0.11565	0.09110	0.14698	0.16256	0.16212
Variance (GDP growth rate)	–0.08429	–0.08448	–0.08326	–0.09193	–0.07923	–0.08159	–0.08151	–0.08095
Skewness	–0.27693	–0.30572	–0.30562	–0.26094	–0.27749	–0.30947	–0.30411	–0.30507

Notes: The sample period is from 1990 to 2004, spanning 38 countries. The variable description is the same as that of *Table 3*. The regression is adjusted for heteroskedasticity. The regression adjusted for serial correlation is also performed but not reported. The maximum likelihood estimation method is used for serial correlation adjustment, and the result is not statistically different from the original regression. The standardized coefficients are the estimates that would be obtained if all the variables in the model were standardized to zero mean and unit variance prior to performing the regression computations. Each coefficient indicates the number of standard deviation changes in the dependent variable associated with the standard deviation change in the independent variable, holding constant all other variables. In other words, the magnitudes of the standardized coefficients are not affected by the scales of measurement of the various model variables and thus may be useful in ascertaining the relative importance of the effects of the independent variables. By using the standardized coefficient estimates, we can clearly see whether or not transparency variables have more effect on R^2 than governance variables. The Wald test is performed for the robustness check and the result is not statistically different from the standardized coefficient estimates, and are thus not reported.

tion by weighted least squares using weights of one over exponential of fitted values. The regression adjusted for serial correlation is also performed but not reported. Maximum likelihood estimation method is used for serial correlation adjustment, and the result is not statistically different from the original regression.

All the corporate governance and transparency variables have a negative relationship to R^2 when you see regressions (1), (2), (3), (4) and (5). In regression (3), the effect of the *measure* variable on R^2 becomes negative but statistically insignificant. Bushman, Piotroski and Smith (2004) categorize *nanalyst* as the private information acquisition group and *measure* as the corporate reporting environment group. According to the result of regression (3), the private information acquisition characteristic of corporate transparency affects R^2 more than the corporate reporting environment characteristic of corporate transparency. In regression (6), the effect of the anti-director variable on R^2 becomes positive while that of each corporate transparency variable is still negative. In regression (7), the effect of the accounting standard variable on R^2 becomes positive. This is not consistent with the result of Morck, Yeung and Yu (2000) that good corporate