

Is There a Convergence in Information Environment around the World?

1. Introduction

Coffee (1999) predicts convergence in corporate governance across the world towards the US structure. Coffee's convergence prediction appears to be supported by the globalization of securities markets and firms, in particular the increased number of foreign firms cross-listed in the US and the UK, and the efforts by the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) to make financial reporting standards more compatible and comparable across countries.¹ In this chapter, we analyze whether the last two decades have displayed a convergence in information environment, using common measures in the accounting and finance literature.

Several studies analyze the evolution through time of the quality of information environment and the usefulness of earnings announcements for US stock markets. For example, Landsman and Maydew (2002), and Francis, Schipper and Vincent (2002) report evidence of a significant increase in the information content of earnings announcements in US markets over the last few decades. Campbell, Lettau, Malkiel and Xu (2001) document a decrease in synchronous stock price movements in the US over

¹ However, Barth, Landsman and Lang (2008) report that only 327 firms across 22 countries adopted International Accounting Standards (IAS) from 1994 to 2003.

the period from 1962 to 1997, which they interpret as evidence of increasing stock price informativeness.

Cross-country studies, on the other hand, have focused on whether informativeness of earnings announcements and stock price synchronicity are different across countries, and have not analyzed the evolution of information environment through time. These studies typically find that earnings announcements are relatively more informative in countries with better accounting standards and stronger investor protection (DeFond, Hung and Trezevant (2006)). With regard to stock return synchronicity, Morck, Yeung and Yu (2000), and Jin and Myers (2006) find that R^2 is lower in countries with more developed capital markets and better corporate governance. In these studies, a lower market model R^2 is interpreted as evidence of a better information environment as it indicates the incorporation of more firm-specific information into stock prices.

We contribute to the literature by analyzing the development of earnings informativeness and the quality of information environment for a broad cross-section of countries for a 17-year period from 1990 through 2006.

Our sample includes data for 151,571 firm-years across 43 countries. We use abnormal return variance and abnormal volume in the days around earnings announcements as proxies for earnings informativeness, and R^2 from the market model as a proxy for the quality of information environment. We find that the improvement in the

quality of information environment in the last 17 years is a worldwide phenomenon. However, in contrast to the convergence hypothesis, we find that information environment has improved more slowly for emerging markets than for developed markets.

We also address a related question whether there has been increased convergence for firms cross-listed in the US, as Coffee (1999, 2002) suggests cross-listing is an effective mechanism towards convergence. Two recent studies in this area provide partial support for this hypothesis. Bailey, Karolyi and Salva (2006, hereafter BKS), and Fernandes and Ferreira (2008, hereafter FF) find a significant increase in information measures 5 years after the cross-listing. However, they also report that the improvement in information environment is larger for cross-listed firms from developed countries than for firms from emerging markets. These latter results are surprising and inconsistent with Coffee's convergence prediction. We replicate both studies, accounting for differences in the evolution of information environment in the local market - a factor not accounted for in BKS and FF. Our results show that once market-wide changes in information environment of the local markets are accounted for, there is no support for the bonding hypothesis in Coffee (2002): there is no evidence of a significant improvement in earnings informativeness and information environment after US cross-listing, and no difference between developed and emerging markets.

Baker, Nofsinger and Weaver (2002), and Lang, Lins and Miller (2003) also analyze the impact of US cross-listing on a firm's information environment. They show

that non-US firms cross-listed in the US experience increased analyst following, improved forecast accuracy, and more media coverage. However, as reported by Piotroski and Roulstone (2004), and Chan and Hameed (2006), an increase in the number of analysts that follow a firm does not necessarily have a positive impact on the production of firm-specific information. These papers show that greater analyst coverage is positively associated with market and industry information, and negatively associated with firm-specific stock return variation.

Our study is also related to Land and Lang (2002) who provide evidence on the convergence of financial information. Using earnings multiples for seven developed countries between 1987 and 1999, they find that the earnings multiples move towards the sample mean, an indication of convergence in earnings quality across their sample countries. In contrast, our results suggest that information environment in general, and earnings informativeness in particular, appears to improve more slowly for countries with weaker corporate governance and less developed markets.

The rest of the paper is structured as follows. In section 2, we discuss the research design. Section 3 describes sample selection and provides descriptive statistics. In section 4, we present the main empirical results and robustness tests. In section 5, we replicate BKS's and FF's main results with and without controlling for changes in the quality of information environment of the home country. Section 6 concludes.

2. Research Design

We measure the quality of information environment separately for the period around the annual earnings announcement date, and the remainder of the year. Following previous literature, we employ R^2 from the market model to proxy for stock price informativeness during the period from day $t-240$ through day $t-5$ before the earnings announcement date.² For each year from 1990 through to 2006, we estimate R^2 for all stocks using the following market model:

$$R_{c,i,t} = \alpha_{c,i} + \sum \beta_{c,i,t} R_{c,m,t} + \varepsilon_{c,i,t}, \quad (1)$$

where $R_{c,i,t}$ is the return of stock i in country c on day t . $R_{c,m,t}$ is the return of the local market index on day t .³ To reduce the effect of infrequent trading in less liquid markets, we include 3 lags and 3 leads of the local market return. We exclude firm-years that do not have at least 100 days of return data during the estimation period. We also exclude firm-years if more than 50% of the returns in the 235-day period are zero returns.

Following Morck, Yeung and Yu (2000), we measure a country's stock price synchronicity as an equally-weighted R^2 across all firms in that country for each year that the country appears in the sample. The trend in stock price synchronicity for different groups of countries is estimated with the following model:

² We also follow Morck, Yeung and Yu (2000), and Jin and Myers (2006) to re-estimate model (1) using weekly returns (Wednesday to Wednesday). The results (not reported) are qualitatively similar to the results reported in this paper.

³ The results reported in this chapter are based on arithmetic returns. When we use logarithmic returns, the results (not reported) are similar.

$$\begin{aligned}
SYNCH_{c,y} = & \alpha + \beta_1 IV_c + \beta_2 TREND_y + \beta_3 (IV * TREND)_{c,y} + \\
& \gamma_1 Ln(NSTKS)_{c,y} + \gamma_2 MVGDP_{c,y} + \gamma_3 VOLGDP_{c,y} + \varepsilon, \quad (2)
\end{aligned}$$

where $SYNCH_{c,y}$ is the logistic transformation of the average R^2 for country c in year y , $SYNCH = \log(R^2/(1-R^2))$.⁴ $IV_{c,y}$ represents different institutional and structural factors for country c in year y (see Table A1 in the Appendix for their descriptions and sources). These factors include several dummy variables to proxy for developed markets, good government, good accounting standards, and strong shareholder protection.⁵

Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. As in Morck, Yeung and Yu (2000), *government quality* is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. The dummy for *good government* is then defined as equal to 1 for a country that has an aggregate score above the median, and zero otherwise. *Accounting standards* measures the general quality of accounting information in a country. The dummy for *good accounting standards* is equal to 1 if a country's accounting standards index is above the median of all countries in the sample. *Shareholder protection* is the product of anti-director rights and rule of law indexes divided by ten. This index, used by Rossi and Volpin (2004), and Durnev and Kim (2005), captures both shareholders' de jure rights

⁴ We also use the SST-weighted R^2 , where SST is a stock's sum of squared total variation. The results for model (2) using the SST-weighted R^2 are reported in Table A2 in the Appendix.

⁵ We also estimate models (2), (5) and (6) using continuous institutional variables. The results are reported in Tables A3, A4 and A5 in the Appendix. Note that we use the logarithm of GDP per capita as a proxy for the development of a country's financial market as in Morck, Yeung and Yu (2000).

and the enforceability of these rights. The dummy for *strong shareholder protection* is then defined as equal to 1 if a country's shareholder protection index is above the median of all sample countries. All corporate governance indexes are from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

$TREND_y$ is a time variable; its value ranges from 0 (year 1990) to 17 (year 2006). We include a number of control variables that have been used in other studies in this area: the logarithm of number of stocks, $Ln(NSTKS)$, the total capitalization of a country's stock market as a percentage of its total GDP, $MVGDP$, and the total value of stock trading as a percentage of GDP, $VOLGDP$. Since these variables represent the development of stock markets, they are likely to have an impact on the quality of information environment, and, therefore, need to be controlled for (Morck, Yeung and Yu (2000), and DeFond, Hung and Trezevant (2006)).

To estimate the information content of earnings announcements, we use abnormal return variance and abnormal volume around the earnings announcement date (Beaver (1968), and Landsman and Maydew (2002)).

Abnormal return variance is defined as:

$$ARVAR_i = \sum u_{i,t}^2 / \sigma_i^2, \quad (3)$$

where u_{it} is the market model adjusted abnormal return for firm i on day t relative to the earnings announcement day (day 0). σ_i^2 is the variance of the return residuals from the market model (1) for stock i . $ARVAR_i$ is the simple sum of the squared abnormal returns over the 3-day announcement window $(-1,+1)$, scaled by the variance of the market model residuals.

Abnormal volume is defined as:

$$AVOL_i = \sum(VOL_{it} - MVOL_i) / \sigma_i, \quad (4)$$

where VOL_{it} is trading volume, measured as the number of shares traded divided by the total number of shares outstanding, of firm i on day t . $MVOL_i$ and σ_i are the mean and standard deviation of the daily trading volume during the estimation period of 235 days ending on day $t-5$ relative to earnings announcement i . $ARVOL_i$ is abnormal volume during the 3-day announcement period $(-1,+1)$, scaled by the standard deviation of daily volume.

We exclude observations if there is missing daily volume or return data during the announcement period, i.e. day $t-1$ through day $t+1$.

We examine the usefulness of earnings announcements for different groups of countries during the sample period, using the following models:

$$\begin{aligned}
AARVAR_{c,y} = & \alpha + \beta_1 IV_c + \beta_2 TREND_y + \beta_3 (IV * TREND)_{c,y} + \\
& \gamma_1 Ln(NSTKS)_{c,y} + \gamma_2 MVGDP_{c,y} + \gamma_3 VOLGDP_{c,y} + \varepsilon \quad (5)
\end{aligned}$$

$$\begin{aligned}
AAVOL_{c,y} = & \alpha + \beta_1 IV_c + \beta_2 TREND_y + \beta_3 (IV * TREND)_{c,y} + \\
& \gamma_1 Ln(NSTKS)_{c,y} + \gamma_2 MVGDP_{c,y} + \gamma_3 VOLGDP_{c,y} + \varepsilon, \quad (6)
\end{aligned}$$

where $AARVAR_{c,y}$ and $AAVOL_{c,y}$ are abnormal return variance and abnormal volume averaged across all earnings announcements for country c in year y . All other variables have been defined before.

3. Data and Descriptive Statistics

We draw my sample firms from the I/B/E/S database from 1990 to 2006. Earnings announcement dates are also from I/B/E/S. Similar to Bailey, Karolyi and Salva (2006), and DeFond, Hung and Trezevant (2006), we only use annual earnings announcements for my analysis because the frequency of earnings information reports varies across firms and countries. Stock returns are from Datastream. Local market indexes are obtained from Globalfinancialdata.com. We obtain the total capitalization of stock markets as a percentage of GDP, and the total value of stock trading as a percentage of GDP from the World Development Indicators published by the World Bank. We limit our sample to countries for which data on corporate governance are available from La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

Table 1 shows the distribution of our sample firms by country and year. The last row of Table 1 shows the total number of observations per year while the last column presents the total number of firm-year observations per sample country. Our sample includes a total of 151,571 firm-years from 43 countries, of which 23,976 observations are from emerging markets, and 127,595 observations are from developed countries. For both groups of countries, there are more observations in more recent years than in earlier years. The United States contribute more than one third of the total number of observations. Japan also has relatively many firm-year observations (15% of the total sample). Venezuela is the sample country with the fewest number of firm-years (a total of 54). It is also one of the countries that do not have observations in all sample years.

Table 1: Distribution of firm-year observations by country and year

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
<u>Emerging countries</u>																		
Argentina				11	28	30	33	33	28	31	20	16	17	27	29	12	14	329
Brazil				3	41	47	47	56	55	81	95	89	79	86	82	84	89	934
Chile				43	49	62	55	46	33	41	37	38	36	33	33	30	29	565
Colombia					5	4	3	8	6	7	2	4	5	5	2	2		53
Egypt										1	11	15	11	15	3	12	20	88
India						156	156	198	144	139	182	180	140	159	178	191	256	2079
Indonesia		23	15	23	37	45	55	74	50	46	74	58	46	45	55	58	63	767
Israel							9	15	24	37	37	25	28	26	23	32	29	285
Malaysia	87	105	138	164	165	198	149	270	222	217	241	200	192	202	248	249	277	3324
Mexico				31	36	43	44	60	62	50	47	41	31	47	40	42	42	616
Pakistan				23	16	36	29	41	29	24	33	13	8	21	28	20	11	332
Peru						24	22	13	15	11	9	4	2	4	5	4	5	118
Philippines	6	11	13	18	31	52	59	76	70	60	41	29	33	27	32	31	36	625
South Africa	19	25	42	24	26	43	109	161	159	168	153	150	115	134	109	122	106	1665
South Korea	51	47	62	216	305	323	254	379	297	281	286	325	481	498	348	109	203	4465
Sri Lanka				32	38	18	10	18	20	18	6		2	6	7	1	1	177
Taiwan		70	140	204	237	267	155	223	344	487	491	428	318	329	319	282	261	4555
Thailand	33	68	103	127	155	165	168	141	78	76	75	95	106	152	189	217	220	2168
Turkey								3	82	98	89	99	96	93	75	66	76	777
Venezuela						8	6	10	7	5	6	3	2	3	2	1	1	54
<u>Developed countries</u>																		
Australia	84	96	126	129	141	201	226	239	278	291	322	353	353	371	352	405	407	4374
Austria	23	53	49	56	50	62	44	58	41	39	35	35	36	26	33	30	32	702
Belgium	22	31	27	26	30	44	44	57	63	65	79	86	70	79	77	88	83	971
Canada	97	209	234	275	285	329	406	501	548	583	528	461	420	460	530	646	672	7184
Denmark	9	11	41	56	52	60	59	61	48	94	70	76	62	66	68	79	72	984
Finland	3	6	7	12	16	22	28	31	30	44	75	88	89	96	88	93	98	826
France	9	64	200	190	189	246	248	352	379	408	401	406	387	376	324	358	334	4871
Germany	11	15	16	20	16	21	11	13	13	267	361	448	442	394	360	326	318	3052
Greece				59	86	108	120	118	138	140	112	148	132	115	101	104	106	1587
Hong Kong	108	107	126	150	148	163	178	196	193	196	213	191	200	223	261	285	260	3198
Ireland											12	34	30	29	30	32	28	195
Italy	14	16	17	23	93	107	103	115	131	139	149	166	165	177	166	174	182	1937
Japan	3	413	407	411	421	924	1058	1557	1525	1728	1887	2030	1424	1495	1483	1521	1455	19742
Netherlands	108	97	94	98	95	100	116	128	134	128	143	133	110	117	109	101	96	1907
New Zealand	8	6	32	38	38	42	39	44	49	51	48	41	47	60	61	55	34	693
Norway	15	19	21	26	29	39	63	64	71	72	79	80	81	79	87	106	118	1049
Portugal			1	3	17	25	29	35	41	37	32	29	28	24	26	25	28	380
Singapore	80	88	102	123	130	143	123	166	157	173	141	151	151	141	167	183	167	2386
Spain	54	73	70	75	70	82	78	86	95	100	106	107	95	97	95	97	96	1476
Sweden	26	26	32	62	79	99	114	133	146	181	194	186	185	168	151	150	150	2082
Switzerland	46	59	46	66	62	62	81	101	106	106	113	127	115	119	117	124	127	1577
United Kingdom	123	294	296	342	327	294	348	432	491	543	540	557	489	485	498	622	611	7292
United States	2093	2221	2394	2689	3070	3552	3856	4305	4473	4467	4228	3928	3683	3574	3452	3676	3469	59130
Emerging total	196	349	513	919	1169	1521	1363	1825	1725	1878	1935	1812	1748	1912	1807	1565	1739	23976
Developed total	2936	3904	4338	4929	5444	6725	7372	8792	9150	9852	9868	9861	8794	8771	8636	9280	8943	127595
Sample total	3132	4253	4851	5848	6613	8246	8735	10617	10875	11730	11803	11673	10542	10683	10443	10845	10682	151571

Table 2 presents the value of institutional factors and corporate governance measures used in this study. The last three rows show the average across emerging markets, developed markets and total sample, respectively. Developed markets, on average, have higher-quality governments, better accounting standards, and stronger shareholder protection. The average of the government quality index is 9.1 for developed countries and 6.2 for emerging countries. The average score for accounting standards is more than 11 points higher for developed economies than for emerging economies (66.9 vs. 55.1). The shareholder protection index is twice as high for developed countries as for emerging countries (2.9 vs. 1.4).

Stock markets, on average, are much bigger and more liquid for developed countries than for emerging economies. The average of the total market capitalization is 93.5% of GDP for developed markets compared to 53.7% of GDP for emerging countries. The average of the total trading value is 64.3% and 27.1% of GDP for developed countries and emerging economies, respectively. For Hong Kong, Switzerland, the United States and Finland, the total market capitalization and total annual trading volume exceed the value of annual GDP. Venezuela, Sri Lanka and Colombia have the smallest and least liquid stock markets, with the total market capitalization at less than 20 percent of GDP, and the total trading volume at less than 5 percent of GDP.

Table 2: Country-level insitutional variables

Developed is equal 1 if a country is classified as a developed country, and zero otherwise. Government quality is defined as the mean of three indexes from La Porta et al. (1998) measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards is an index measuring the quality of the disclosure of accounting information. Shareholder protection is defined as the product of anti-director rights and rule of law from La Porta et al. (1998) divided by ten. Total market capitalization is the averaged market capitalization as a percentage of GDP. Total trading value is the averaged market trading volume as a percentage of GDP.

Country	Developed	Government quality	Accounting standards	Shareholder protection	Total market cap. (%GDP)	Total trading value (%GDP)
<u>Emerging countries</u>						
Argentina	0	5.6	45.0	2.1	31.1	4.7
Brazil	0	6.7	54.0	1.9	40.5	15.4
Chile	0	6.5	52.0	3.5	101.6	9.8
Colombia	0	6.3	50.0	0.6	17.0	1.2
Egypt	0	5.4	24.0	0.8	51.0	5.4
India	0	6.1	57.0	2.1	44.9	42.7
Indonesia	0	5.1		0.8	25.4	25.3
Israel	0	8.0	64.0	1.4	60.5	26.0
Malaysia	0	7.6	76.0	2.7	170.5	82.2
Mexico	0	6.2	60.0	0.5	29.3	9.6
Pakistan	0	4.5		1.5	18.5	28.2
Peru	0	5.0	38.0	0.8	25.8	5.4
Philippines	0	4.3	65.0	0.8	57.1	16.7
South Africa	0	7.7	70.0	2.2	169.1	47.8
South Korea	0	7.4	62.0	1.1	46.9	96.5
Sri Lanka	0	5.4		0.6	17.5	3.1
Taiwan	0	8.4	65.0	2.6	62.3	
Thailand	0	6.1	64.0	1.3	61.2	43.0
Turkey	0	6.0	51.0	1.0	34.3	50.0
Venezuela	0	6.0	40.0	0.6	8.8	1.5
<u>Developed countries</u>						
Australia	1	8.8	75.0	4.0	90.9	51.1
Austria	1	9.3	54.0	2.0	15.9	6.2
Belgium	1	9.3	61.0	0.0	76.0	14.0
Canada	1	9.5	74.0	5.0	94.4	50.6
Denmark	1	9.7	62.0	2.0	51.4	30.6
Finland	1	9.6	77.0	3.0	125.2	102.9
France	1	9.3	69.0	2.7	69.6	48.1
Germany	1	9.5	62.0	0.9	49.4	55.3
Greece	1	7.0	55.0	1.2	61.3	38.3
Hong Kong	1	8.5	69.0	4.1	330.3	154.0
Italy	1	8.2	62.0	0.8	41.7	37.4
Japan	1	9.3	65.0	3.6	71.4	40.7
Netherlands	1	9.8	64.0	2.0	104.5	94.5
New Zealand	1	9.7	70.0	4.0	44.1	15.2
Norway	1	9.9	74.0	4.0	40.9	29.1
Portugal	1	8.3	36.0	2.6	40.1	24.0
Ireland	1	9.1		3.1	61.7	24.5
Singapore	1	8.8	78.0	3.4	156.7	79.6
Spain	1	8.4	64.0	3.1	59.6	84.2
Sweden	1	9.7	83.0	3.0	101.4	90.0
Switzerland	1	10.0	68.0	2.0	202.0	165.0
United Kingdom	1	9.5	78.0	4.3	141.4	94.6
United States	1	9.2	71.0	5.0	121.2	148.4
Emerging average	-	6.2	55.1	1.4	53.7	27.1
Developed average	-	9.1	66.9	2.9	93.5	64.3
Total average	-	7.8	61.7	2.2	75.0	47.5

4. Main Results

4.1 Univariate Analysis

For each year in our sample, Figures 1, 2 and 3 show the market model R^2 , abnormal return variance, and abnormal volume for the 3-day period around the earnings announcement date averaged across developed and emerging countries, respectively. A trend line is also included for each group of countries.

Figure 1 shows that there is a decline in stock price synchronicity for both groups of countries.⁶ However, the decline is stronger for developed markets than for emerging countries. The coefficient for the trend is -0.002 (t -statistic = -2.29) for emerging markets and -0.005 (t -statistic = -10.08) for developed countries.

Both Figures 2 and 3 suggest an increase in the information content of earnings announcements. Also, the increase is larger for countries with developed markets. The trend coefficient for abnormal return variance is 0.07 (t -statistic = 2.59) for emerging markets and 0.30 (t -statistic = 9.88) for developed countries. The trend coefficient for abnormal volume is 0.03 (t -statistic = 1.72) for emerging markets and 0.13 (t -statistic = 12.07) for developed countries.

⁶ Figure 1 in Jin and Myers (2006) also shows a decreasing trend of the equally-weighted R^2 for 30 countries in their sample for the period of 1990-2002. However, they stop short of comparing R^2 across countries. Moreover, convergence in information environment is not the focus of their paper.

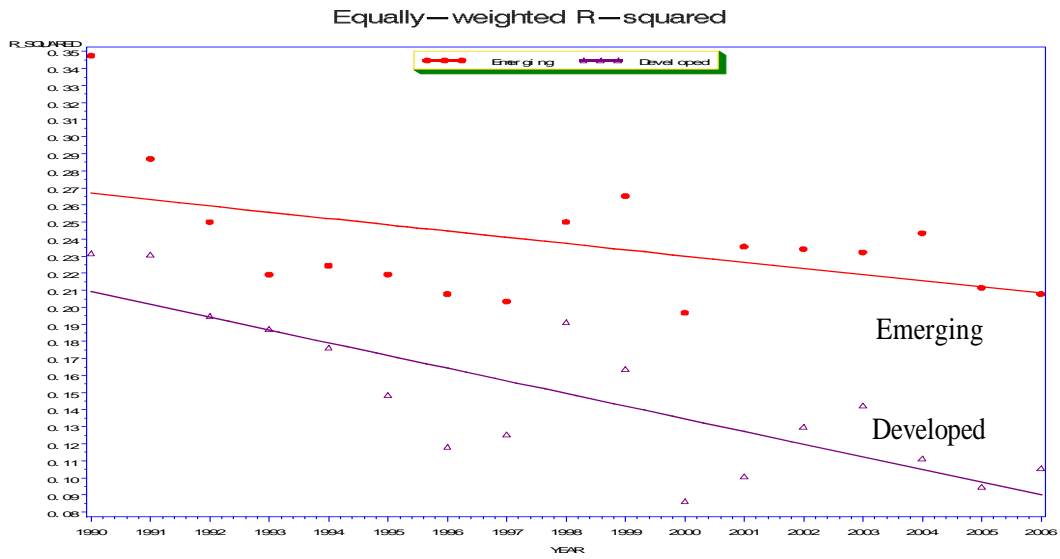


Figure 1: The triangle and round solid points represent the equally weighted R^2 's for developed and emerging countries, respectively. A trend line for the mean R^2 is also included for each group of countries.

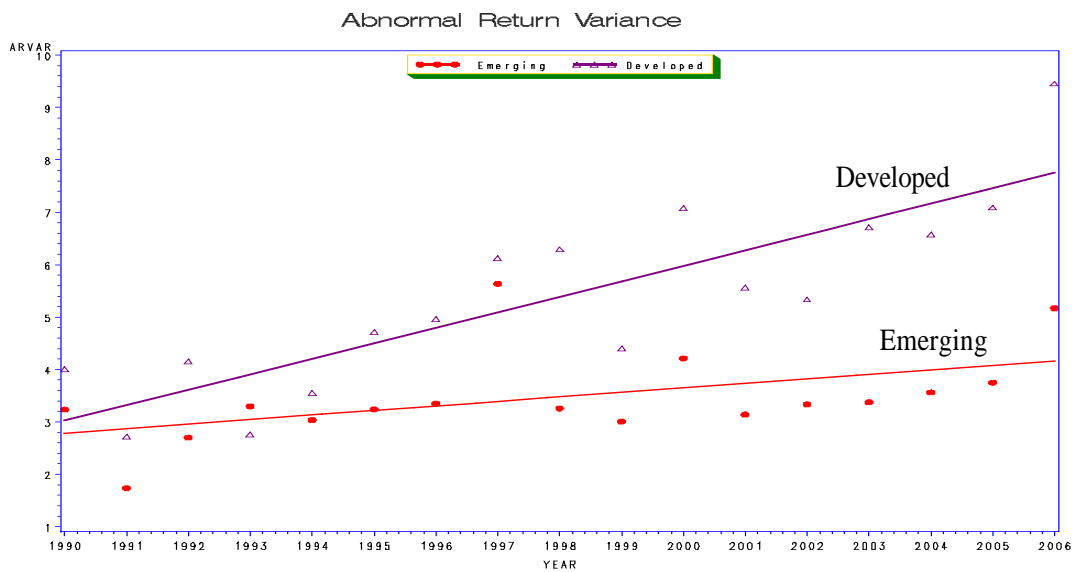


Figure 2: The triangle and round solid points represent the mean abnormal return variance for developed and emerging countries, respectively. A trend line for the mean variance is also included for each group of countries.

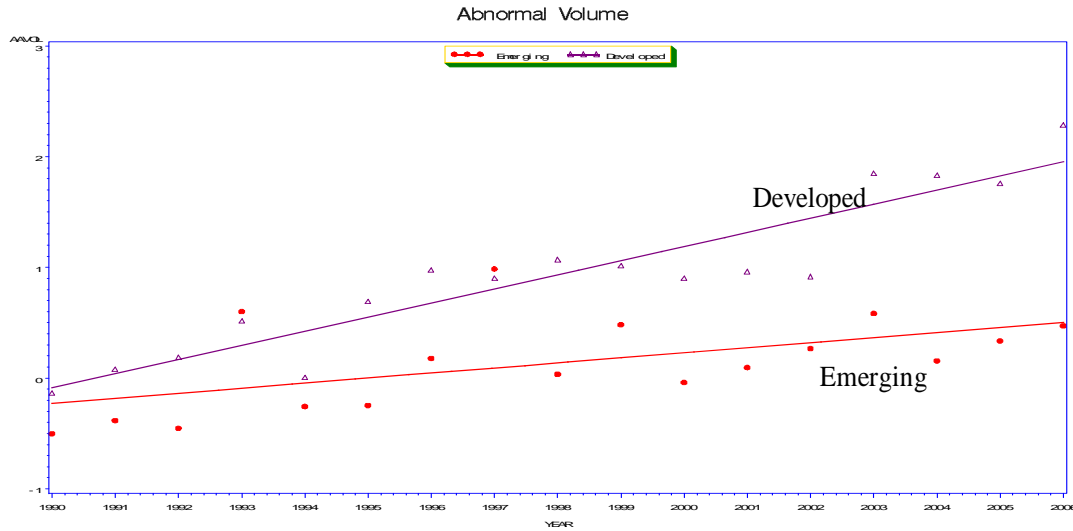


Figure 3: The triangle and round solid points represent the mean abnormal volume for developed and emerging countries, respectively. A trend line for the mean volume is also included for each group of countries.

The trends shown in all three figures are inconsistent with the prediction of informational convergence across countries over time. The figures also suggest that information environment both before and around annual earnings announcements has improved over the past 17 years, and that the improvement, on average, is larger for developed markets than for emerging markets.

The average trend for each of the three measures of the quality of information environment for each country in our sample is shown in Figures 4, 5 and 6. The trend coefficient is obtained by running a simple regression of the annual average of the proxies for the quality of information environment on the trend variable.

Figure 4 shows that 32 out of 43 sample countries experienced a decrease in stock price synchronicity over the past 17 years. South Africa, Ireland, Argentina, Taiwan, and

Norway are countries with the greatest reductions. Among countries that exhibit an increase in the information content of stock markets, Pakistan has the largest annual increase. Interestingly, the US is the only developed market that shows a significant increase (trend coefficient = 0.07, t -statistic = 2.74) in stock price synchronicity.⁷

Figures 5 and 6 show earnings announcements have become more informative to investors over the years. The trend coefficient for abnormal return variance and abnormal volume is positive for more than two-thirds of the sample countries. The countries with negative trends all are from the emerging market group, except the trend of abnormal return variance for Italy.

⁷ Campbell, Lettau, Malkiel and Xu (2001) show an increase in idiosyncratic volatility for all US stocks from 1962 to 1997, which suggests an increase in the information content of US stock markets. However, Brandt, Brav, Graham and Kumar (2008) find that idiosyncratic volatility drops significantly during more recent years, especially after the year 2000.

Trend of Stock Price Synchronicity (SYNCH) by Country

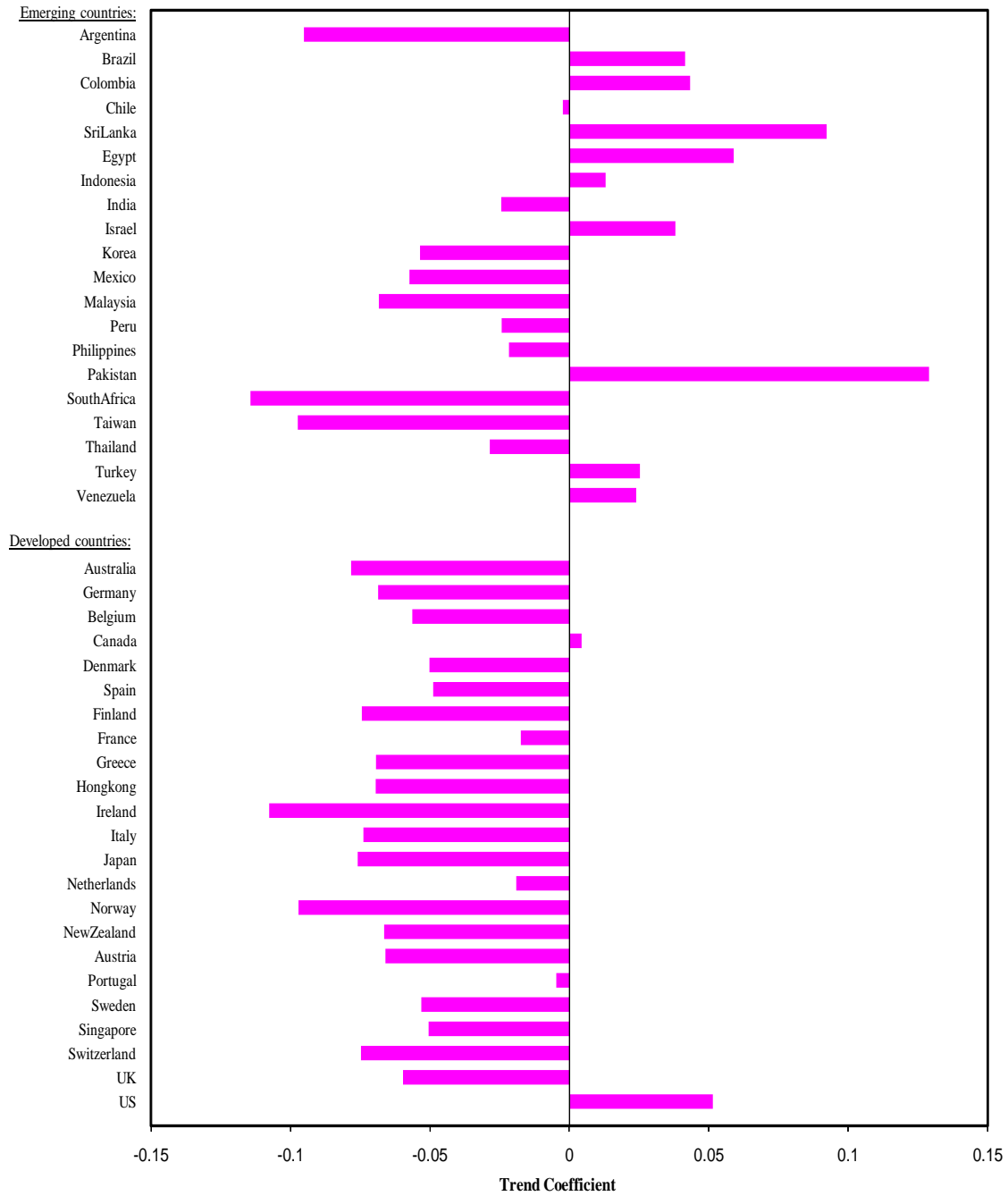


Figure 4: The trend coefficient for each country is obtained from the following model: $SYNCH_t = a + b \cdot TREND_t + u$, where SYNCH is the yearly average of stock price synchronicity.

Trend of Abnormal Return Variance (AAVAR) by Country



Figure 5: The trend coefficient for each country is obtained from the following model: $AARVAR_t = a + b \cdot TREND_t + u$, where AARVAR is the yearly average of cumulative abnormal return variance 3 days around the earnings announcement date.

Trend of Abnormal Volume (AAVOL) by Country

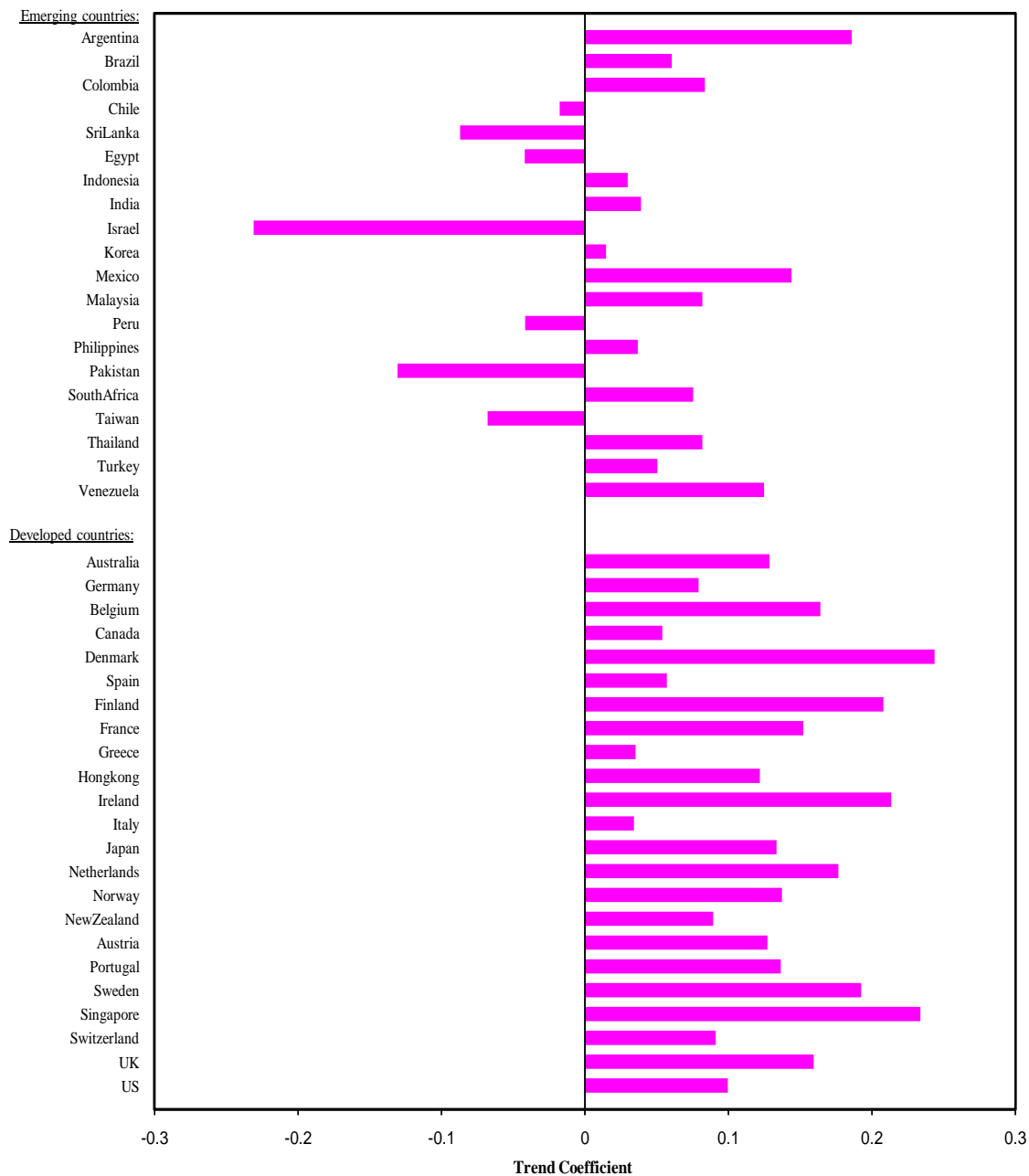


Figure 6: The trend coefficient for each country is obtained from the following model: $AAVOL_t = a + b \cdot TREND_t + u$, where AAVOL is the yearly average of cumulative abnormal volume 3 days around the earnings announcement date.

4.2 *Multivariate Analysis*

4.2.1 *Stock Price Synchronicity*

To examine the trend of stock price synchronicity across countries over the past 17 years, we estimate model (2). Table 3 reports the results for model (2) with the dependent variable being the annual country-average stock price synchronicity, $SYNCH_{c,y}$. IV represents four different institutional variables for each of the specifications in Table 3. Our main focus is on the coefficients for $TREND$, and its interaction with the institutional variables ($IV*TREND$).

The results for the trend coefficient indicate a decrease over the last 17 years in the average stock price synchronicity for emerging markets and countries with weak corporate governance. With the exception of emerging markets, the trend coefficient across all specifications is negative and statistically significant. Bad government countries, for instance, experience an annual decrease of 1.7% (t -statistic = -2.38) in stock price synchronicity. The same result is found for countries with loose accounting standards and poor shareholder protection.

Table 3: Stock return synchronicity for the 235-day pre-announcement period

This table presents the OLS regression results for model (2). The dependent variable is the logistic transformation of the country-average R^2 . IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.494 (-4.85) ***	-0.519 (-5.15) ***	-0.490 (-4.49) ***	-0.510 (-5.27) ***
IV	-0.252 (-2.75) ***	-0.278 (-3.22) ***	-0.148 (-1.60)	-0.014 (-0.16)
TREND	-0.012 (-1.63)	-0.017 (-2.38) **	-0.023 (-3.30) ***	-0.014 (-1.98) **
IV*TREND	-0.032 (-3.51) ***	-0.030 (-3.38) ***	-0.018 (-1.84) *	-0.025 (-2.71) ***
Ln(NSTKS)	-0.123 (-6.70) ***	-0.124 (-6.79) ***	-0.148 (-7.36) ***	-0.161 (-8.69) ***
MVGDP	-0.032 (-0.79)	0.022 (0.55)	0.082 (2.06) **	0.024 (0.58)
VOLGDP	0.041 (0.70)	-0.002 (-0.04)	-0.110 (-1.81) *	-0.070 (-1.11)
ADJRSQ	0.39	0.39	0.29	0.28
N_obs	641	641	591	641

The results for $IV*TREND$ show that the information environment of stock markets has improved more for developed markets and countries with higher-quality government, better accounting standards, and stronger shareholder protection compared to countries with lower ratings on these institutional factors. The interaction coefficient for all variables is relatively similar at around 3% and statistically significant at

conventional levels. The results in Table 3 not only confirm the results reported by Morck, Yeung and Yu (2000), and Jin and Myers (2006) that, on average, there is a gap in synchronous stock price movement between poor and rich countries, but also show that the gap has increased over time.

As for control variables, Table 3 shows that the relation between the number of stocks and stock price synchronicity is negative and significant at the 1% level across all specifications, consistent with Morck, Yeung and Yu (2000). The impact of market size and market liquidity on the synchronous movement of stock prices, however, is unclear.

4.2.2 Information Content of Earnings Announcements

In this section, we report the regression results for models (5) and (6) to examine the trend of the information content of annual earnings announcements. Table 4 reports the results for abnormal return variance around the 3-day earnings announcement period. The results for the trend coefficient and its interaction with institutional variables indicate that earnings announcements have generally become more useful to investors, and that the increase in the usefulness of earnings announcements is greater for countries with developed economies, good government, good accounting standards, and strong shareholder protection.

Table 4: Cumulative abnormal return variance for the (-1,+1) event window

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	1.834 (4.93) ***	1.952 (5.25) ***	1.495 (4.08) ***	1.752 (4.81) ***
IV	0.064 (0.18)	-0.150 (-0.43)	0.078 (0.21)	-0.414 (-1.15)
TREND	0.073 (2.38) **	0.061 (2.10) **	0.101 (3.13) ***	0.089 (2.83) ***
IV*TREND	0.167 (4.02) ***	0.211 (5.12) ***	0.080 (1.83) *	0.124 (2.89) ***
Ln(NSTKS)	0.198 (2.29) **	0.213 (2.49) **	0.328 (3.92) ***	0.292 (3.37) ***
MVGDP	0.457 (2.88) ***	0.410 (2.62) ***	0.235 (1.22)	0.305 (1.60)
VOLGDP	0.352 (1.25)	0.239 (0.85)	0.650 (2.07) **	0.758 (2.54) **
ADJRSQ	0.29	0.31	0.25	0.24
N_obs	641	641	591	641

The trend coefficient and the interaction are statistically significant across all 4 specifications. Specification 1, for instance, shows that the 3-day abnormal return variance, on average, increased by 7.3% (t -statistic = 2.38) per year for emerging markets. The combined coefficients of *TREND* and *IV*TREND* indicate that the average

increase in abnormal return variance has been 24% per year for developed markets, a significant 16.7% (t -statistics = 4.02) larger than for emerging markets. Although the *TREND* coefficient is relatively similar for all institutional variables, the coefficient of *IV*TREND* is substantially larger for developed markets and countries with good government compared to countries with good accounting standards and strong shareholder protection.

Table 4 shows that the number of stocks is positively correlated with the country-average stock return volatility around the annual earnings announcement. The coefficient for $\ln(NSTKS)$ is statistically significant at conventional levels for all four specifications. Table 4 also presents weak evidence that stock returns are more volatile for countries with larger capital markets relative to their GDP. The *MVGDP* coefficient is positive and significant for 2 out of 4 specifications.⁸ Evidence of a relation between stock return volatility and the total value of stock trading as a percentage of GDP is also weak. The *VOLGDP* coefficient is positive and significant at the 10% level for good accounting standards and strong shareholder protection.

The results for abnormal trading volume are presented in Table 5. The *TREND* coefficient and its interaction with other institutional factors both show a statistically significant increase in trading volume around the 3-day announcement period for the countries in our sample. Only the interaction between *TREND* and good accounting standards is not significant.

⁸ DeFond, Hung and Trezevant (2006) also control for the total market capitalization as a percentage of the 1994 GDP in their analysis. They do not find a significant correlation between this variable and abnormal return variance around the earnings announcement date.

Table 5: Cumulative abnormal volume for the (-1,+1) event window

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal trading volume for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.464 (-2.51) **	-0.418 (-2.36) **	-0.661 (-3.76) ***	-0.533 (-3.13) ***
IV	0.015 (0.09)	-0.109 (-0.73)	0.150 (0.90)	-0.200 (-1.35)
TREND	0.037 (2.49) **	0.033 (2.36) **	0.066 (3.92) ***	0.047 (3.34) ***
IV*TREND	0.075 (4.07) ***	0.091 (5.11) ***	0.030 (1.50)	0.050 (2.75) ***
Ln(NSTKS)	0.067 (1.99) **	0.080 (2.36) **	0.097 (2.53) **	0.116 (3.29) ***
MVGDP	0.183 (2.37) **	0.164 (2.14) **	0.057 (0.61)	0.131 (1.41)
VOLGDP	0.008 (0.08)	-0.030 (-0.30)	0.175 (1.56)	0.179 (1.62)
ADJRSQ	0.27	0.28	0.23	0.21
N_obs	641	641	591	641

The results show that emerging countries exhibit an average annual increase of 3.7% (t -statistic = 2.49) in abnormal trading volume around the earnings announcement date. Compared to emerging countries, the abnormal volume increase for developed countries is a significant 7.5% (t -statistic = 4.07) per annum larger. Similarly, the

magnitude of the annual increase in abnormal trading volume is approximately 9.1% (t -statistic = 5.11) higher for countries with good government relative to countries with bad government; and the magnitude of the annual increase in abnormal trading volume is approximately 5% (t -statistic = 2.75) higher for countries with strong investor protection than for countries with weak investor protection.

As in Table 4, Table 5 also shows a significantly positive correlation between the number of stocks and abnormal trading volume. The *MVGDP* coefficient is positive and significant at the 5% level for developed markets and good government. The *VOLGDP* coefficient is not significant for any of the four specifications.

To summarize, the multivariate analysis confirms the results in Figures 1 – 3, that stock price informativeness and earnings informativeness have improved over the last two decades, and that this improvement is significantly larger for countries with better scores on institutional measures.

4.3 Robustness Tests

DeFond, Hung and Trezevant (2006) find that I/B/E/S earnings announcement dates for some countries are measured with substantial noise. Using a random sample of five company-year earnings announcement dates from 26 countries, they find that only 44% of I/B/E/S earnings dates are within 1 day of Lexis/Nexis announcement dates. In this section, we present two sets of tests that are designed to deal with the problem of

inaccurate earnings announcement dates. The first test is to exclude incorrect earnings dates, and the second test is to widen the event window.

4.3.1 Excluding Incorrect Earnings Announcement Dates

DeFond, Hung and Trezevant (2006) find that the proportion of I/B/E/S earnings announcement dates falling within 1 day of Lexis/Nexis announcement dates is positively correlated with the difference between the earnings announcement date and the fiscal year-end date. If they restrict their sample to observations with a reporting lag of less than 99 (62) days, this proportion increases to 57% (73%).

Based on the findings reported in DeFond, Hung and Trezevant (2006), we perform two robustness tests in this section. We exclude observations for which the reporting lag is larger than 99 and 62 calendar days, respectively. The 99-day exclusion results in a 14% reduction of the total number of observations in our sample.⁹ The reduction is 29% for emerging countries and 11% for developed markets.¹⁰ The 62-day exclusion results in a 32% reduction in sample size. The reduction is 51% for emerging countries and 28% for developed markets. We re-examine models (2), (5) and (6) in section 2 and report the results in Tables 6, 7 and 8 for the 99-day exclusion and in Tables 9, 10 and 11 for the 62-day exclusion.

⁹ A similar exclusion results in an 18% reduction of the total number of observations in DeFond, Hung, and Trezevant (2006)'s sample.

¹⁰ DeFond, Hung, and Trezevant (2006) do not find a significant correlation between the likely incorrectness of I/B/E/S earnings announcement dates (as compared to Lexis/Nexis earnings announcement dates) and investor protection.

The results for *TREND* and *IV*TREND* in Tables 6, 7 and 8, and Tables 9, 10 and 11 are generally consistent with those reported in Tables 3, 4 and 5, respectively. The results, albeit less significant, again indicate that information environment before and around earnings announcements has improved over the past 17 years across countries, and that the improvement is greater for countries with better institutional factors.

Table 6: Stock return synchronicity for the 235-day pre-announcement period, excluding observations with a reporting lag of more than 99 calendar days

This table presents the OLS regression results for model (2). The dependent variable is the logistic transformation of the country-average R^2 . IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.648 (-6.54) ***	-0.715 (-7.64) ***	-0.728 (-7.14) ***	-0.772 (-8.44) ***
IV	-0.316 (-3.29) ***	-0.319 (-3.54) ***	-0.146 (-1.50)	-0.010 (-0.11)
TREND	-0.011 (-1.40)	-0.014 (-1.89) *	-0.016 (-2.20) **	-0.007 (-1.01)
IV*TREND	-0.026 (-2.68) ***	-0.026 (-2.85) ***	-0.021 (-2.09) **	-0.024 (-2.49) **
Ln(NSTKS)	-0.098 (-5.72) ***	-0.092 (-5.30) ***	-0.117 (-6.25) ***	-0.125 (-7.00) ***
MVGDP	-0.022 (-0.53)	0.032 (0.80)	0.095 (2.40) **	0.031 (0.71)
VOLGDP	0.041 (0.71)	-0.010 (-0.18)	-0.104 (-1.80) *	-0.082 (-1.33)
ADJRSQ	0.34	0.33	0.25	0.22
N_obs	632	632	582	632

Table 7: Cumulative abnormal return variance for the (-1,+1) event window, excluding observations with a reporting lag of more than 99 calendar days

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	1.864 (4.88) ***	2.027 (5.66) ***	1.976 (5.37) ***	2.154 (5.90) ***
IV	0.567 (1.32)	0.404 (0.94)	0.410 (0.84)	-0.122 (-0.24)
TREND	0.079 (2.30) **	0.071 (2.18) **	0.099 (2.73) ***	0.085 (2.27) **
IV*TREND	0.146 (3.09) ***	0.184 (3.92) ***	0.062 (1.22)	0.101 (1.99) **
Ln(NSTKS)	0.187 (2.14) **	0.187 (2.11) **	0.260 (2.68) ***	0.244 (2.48) **
MVGDP	0.438 (2.39) **	0.385 (2.11) **	0.168 (0.76)	0.261 (1.14)
VOLGDP	0.471 (1.47)	0.385 (1.21)	0.886 (2.49) **	1.020 (2.93) ***
ADJRSQ	0.26	0.27	0.21	0.20
N_obs	632	632	582	632

Table 8: Cumulative abnormal volume for the (-1,+1) event window, excluding observations with a reporting lag of more than 99 calendar days

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal trading volume for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.438 (-2.48) **	-0.323 (-1.80) *	-0.554 (-2.84) ***	-0.384 (-2.24) **
IV	0.142 (0.77)	-0.045 (-0.24)	0.204 (0.93)	-0.126 (-0.65)
TREND	0.034 (2.13) **	0.027 (1.72) *	0.064 (3.14) ***	0.043 (2.61) ***
IV*TREND	0.075 (3.77) ***	0.094 (4.71) ***	0.020 (0.86)	0.043 (2.08) **
Ln(NSTKS)	0.074 (2.27) **	0.080 (2.46) **	0.102 (3.00) ***	0.110 (3.13) ***
MVGDP	0.147 (1.88) *	0.128 (1.63)	0.018 (0.18)	0.093 (0.97)
VOLGDP	0.051 (0.50)	0.030 (0.28)	0.273 (2.29) **	0.280 (2.35) **
ADJRSQ	0.26	0.27	0.20	0.19
N_obs	632	632	582	632

Table 9: Stock return synchronicity for the 235-day pre-announcement period, excluding observations with a reporting lag of more than 62 calendar days

This table presents the OLS regression results for model (2). The dependent variable is the logistic transformation of the country-average R^2 . IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.795 (-8.02) ***	-0.896 (-9.34) ***	-1.000 (-9.02) ***	-0.967 (-9.63) ***
IV	-0.463 (-4.40) ***	-0.423 (-4.15) ***	-0.146 (-1.30)	-0.059 (-0.55)
TREND	-0.013 (-1.61)	-0.014 (-1.79) *	-0.012 (-1.43)	-0.007 (-0.85)
IV*TREND	-0.017 (-1.69) *	-0.019 (-1.90) *	-0.016 (-1.44)	-0.013 (-1.27)
Ln(NSTKS)	-0.067 (-3.93) ***	-0.064 (-3.62) ***	-0.086 (-4.55) ***	-0.105 (-5.83) ***
MVGDP	-0.083 (-1.94) *	-0.025 (-0.61)	0.015 (0.37)	-0.048 (-1.07)
VOLGDP	0.095 (1.47)	0.036 (0.60)	-0.056 (-0.90)	-0.030 (-0.46)
ADJRSQ	0.29	0.27	0.15	0.14
N_obs	619	619	570	619

Table 10: Cumulative abnormal return variance for the (-1,+1) event window, excluding observations with a reporting lag of more than 62 calendar days

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	2.368 (4.42) ***	2.464 (5.02) ***	2.335 (4.96) ***	2.462 (5.46) ***
IV	0.182 (0.30)	0.119 (0.20)	0.430 (0.63)	0.059 (0.09)
TREND	0.057 (1.30)	0.053 (1.33)	0.093 (2.11) **	0.086 (2.12) **
IV*TREND	0.191 (3.11) ***	0.225 (3.74) ***	0.081 (1.30)	0.121 (1.96) *
Ln(NSTKS)	0.126 (1.25)	0.124 (1.23)	0.179 (1.56)	0.140 (1.27)
MVGDP	0.511 (2.16) **	0.455 (1.93) *	0.186 (0.62)	0.248 (0.85)
VOLGDP	0.630 (1.43)	0.526 (1.20)	1.105 (2.27) **	1.274 (2.73) ***
ADJRSQ	0.20	0.22	0.17	0.17
N_obs	619	619	570	619

Table 11: Cumulative abnormal volume for the (-1,+1) event window, excluding observations with a reporting lag of more than 62 calendar days

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal trading volume for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.368 (-1.86) *	-0.269 (-1.39)	-0.542 (-2.56) **	-0.358 (-1.96) **
IV	0.175 (0.79)	0.031 (0.14)	0.342 (1.35)	0.066 (0.29)
TREND	0.038 (2.05) **	0.033 (1.84) *	0.074 (3.17) ***	0.055 (3.01) ***
IV*TREND	0.076 (3.28) ***	0.092 (4.05) ***	0.012 (0.44)	0.027 (1.16)
Ln(NSTKS)	0.067 (1.82) *	0.072 (1.96) **	0.094 (2.44) **	0.097 (2.39) **
MVGDP	0.175 (2.05) **	0.154 (1.79) *	0.041 (0.40)	0.108 (1.04)
VOLGDP	0.010 (0.08)	-0.016 (-0.13)	0.236 (1.66) *	0.264 (1.88) *
ADJRSQ	0.21	0.22	0.17	0.15
N_obs	619	619	570	619

4.3.2 *Expanding the Event Window*

As in DeFond, Hung and Trezevant (2006), an alternative way to deal with possibly incorrect earnings announcement dates is to expand the event window from a 3-day window $(-1, +1)$ to a 5-day window $(-2, +2)$ or an 11-day window $(-5, +5)$. The results for the $(-2, +2)$ event window are reported in Table 12 for abnormal return variance, and Table 13 for abnormal volume. Tables 14 and 15 report the results for the $(-5, +5)$ event window. Although widening the event window reduces the power of the tests because of the increased number of non-announcement days, there is still evidence of a divergent trend in the information content of earnings announcements between countries with weak and strong institutional quality over the sample period.

Table 12: Cumulative abnormal return variance for the (-2,+2) event window

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 5 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	4.413 (7.22) ***	4.434 (7.58) ***	3.230 (6.35) ***	3.896 (7.17) ***
IV	-0.552 (-1.03)	-0.677 (-1.34)	0.109 (0.23)	-0.520 (-1.05)
TREND	0.034 (0.75)	0.031 (0.74)	0.116 (2.91) ***	0.091 (2.15) **
IV*TREND	0.244 (4.29) ***	0.279 (5.09) ***	0.072 (1.34)	0.133 (2.43) **
Ln(NSTKS)	0.226 (2.00) **	0.245 (2.18) **	0.425 (4.10) ***	0.338 (2.98) ***
MVGDP	0.509 (2.58) ***	0.463 (2.37) **	0.319 (1.37)	0.370 (1.60)
VOLGDP	0.397 (1.12)	0.278 (0.78)	0.751 (1.93) *	0.851 (2.29) **
ADJRSQ	0.23	0.24	0.21	0.18
N_obs	641	641	591	641

Table 13: Cumulative abnormal volume for the (-2,+2) event window

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal trading volume for 5 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.687 (-2.47) **	-0.620 (-2.29) **	-0.972 (-3.67) ***	-0.771 (-2.99) ***
IV	0.018 (0.08)	-0.161 (-0.73)	0.242 (0.98)	-0.265 (-1.23)
TREND	0.054 (2.44) **	0.047 (2.28) **	0.096 (3.87) ***	0.066 (3.26) ***
IV*TREND	0.104 (3.89) ***	0.126 (4.87) ***	0.038 (1.32)	0.072 (2.78) ***
Ln(NSTKS)	0.113 (1.98) **	0.130 (2.30) **	0.152 (2.38) **	0.176 (2.98) ***
MVGDP	0.261 (2.44) **	0.235 (2.21) **	0.084 (0.65)	0.181 (1.43)
VOLGDP	-0.124 (-0.86)	-0.174 (-1.20)	0.098 (0.61)	0.118 (0.77)
ADJRSQ	0.23	0.24	0.20	0.18
N_obs	641	641	591	641

Table 14: Cumulative abnormal return variance for the (-5,+5) event window

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 11 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	12.767 (10.73) ***	12.960 (11.34) ***	11.244 (9.55) ***	11.986 (11.55) ***
IV	-0.967 (-0.89)	-1.508 (-1.45)	-0.284 (-0.26)	-0.370 (-0.36)
TREND	-0.035 (-0.38)	-0.055 (-0.64)	0.080 (0.87)	0.053 (0.68)
IV*TREND	0.333 (3.11) ***	0.402 (3.90) ***	0.078 (0.74)	0.177 (1.80) *
Ln(NSTKS)	0.033 (0.15)	0.072 (0.33)	0.308 (1.39)	0.130 (0.58)
MVGDP	0.490 (1.46)	0.440 (1.31)	0.313 (0.85)	0.214 (0.56)
VOLGDP	0.660 (1.08)	0.519 (0.84)	1.222 (1.91) *	1.311 (2.10) **
ADJRSQ	0.09	0.09	0.06	0.06
N_obs	641	641	591	641

Table 15: Cumulative abnormal volume for the (-5,+5) event window

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal trading volume for 11 days around the earnings announcement date. IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.752 (-1.49)	-0.622 (-1.25)	-1.327 (-2.80) ***	-0.889 (-1.91) *
IV	-0.021 (-0.05)	-0.407 (-0.96)	0.425 (0.94)	-0.424 (-1.05)
TREND	0.064 (1.65) *	0.052 (1.38)	0.139 (3.32) ***	0.084 (2.37) **
IV*TREND	0.157 (3.40) ***	0.191 (4.21) ***	0.045 (0.93)	0.109 (2.50) **
Ln(NSTKS)	0.130 (1.33)	0.166 (1.71) *	0.197 (1.96) *	0.223 (2.21) **
MVGDP	0.436 (2.20) **	0.403 (2.04) **	0.163 (0.75)	0.320 (1.47)
VOLGDP	-0.215 (-0.82)	-0.271 (-1.01)	0.139 (0.49)	0.139 (0.52)
ADJRSQ	0.17	0.18	0.15	0.13
N_obs	641	641	591	641

5. Information Environment for Cross-listed Firms

The empirical analysis so far shows a consistent and surprising divergence in the quality of information environment between countries with high scores on institutional quality and countries with low scores on institutional quality. Using similar measures as in this paper, Bailey, Karolyi and Salva (2006), BKS, find that non-US stocks from developed countries experience a significant increase in return volatility and trading volume after cross-listing in the US, whereas no such increase is found for cross-listed stocks from emerging economies. Fernandes and Ferreira (2008), FF, report that stock price synchronicity increases significantly for cross-listed firms from developed countries and decreases significantly for firms from emerging markets after US cross-listing. BKS and FF do not adjust their measures of the quality of information environment for the change in the quality of information environment in the home country. Therefore, given the result in the previous section that firm-specific information during the year and around earnings announcements generally has become more useful over time, especially for developed countries, the results in BKS and FF could be a reflection of general trends in the domestic countries rather than the result of cross-listing.

In this section, we use a sample of cross-listed stocks to analyze the change in information environment after US cross-listing. We compare the results with and without adjusting for changes in the quality of information environment averaged across all firms in the domestic market (excluding cross-listed stocks). In addition to comparing the results between developed and emerging markets as in BKS and FF, we also compare the

results between countries with strong investor protection and countries with poor investor protection.

We obtain an ADR list from the Bank of New York website as at 09 December, 2005. Since the list of ADRs is frequently updated, our sample differs from the sample in BKS. We select stocks that cross-list in the US sometime between 1 January 1989 to 31 December 2001 as in BKS. We then match our sample to the I/B/E/S database to obtain local earnings announcement dates. Similar to BKS, we require my sample of ADRs to have at least one earnings announcement before and one earnings announcement after the cross-listing date. Moreover, the maximum number of earnings announcements required for each ADR is 5 announcements before and 5 announcements after US cross-listing. Abnormal return variance, abnormal volume, and stock price synchronicity are estimated using the same method as discussed in section 2. Following BKS, we also require that cross-listed stocks have at least 3 analyst earnings forecasts per announcement.¹¹ Compared to 387 stocks across 42 countries in BKS, our final cross-listed sample includes 257 stocks across 36 countries. Of these 257 stocks, 71 are NYSE-listed, 12 are NASDAQ-listed, 131 are OTC-listed, and 43 are Rule 144a stocks.

The country distribution of my cross-listing sample is presented in Table 16. As in BKS, only a few ADR firms have full data for the 10-year window surrounding the cross-listing date. The number of pre-listing and post-listing events is not always equal either. The spearman correlation between the number of ADR firms across countries in BKS's sample and our sample is 82%. Similar correlations are also found between BKS's

¹¹ When we drop this requirement in the sample selection, the results (not reported) are similar.

sample and our sample when we compare the number of observations in each country before, and the number of observations in each country after the cross-listing date. The correlation between the number of non-ADR firms across countries in BKS's sample and our sample is 92%.

The last two rows in Table 16 show that the number of cross-listed firms from developed countries is twice the number of cross-listed firms from emerging markets (171 versus 86). The second column shows the average number of non-cross-listed firms in the home country that are used to estimate the general information environment of the domestic market in a year.

Table 16: Distribution of ADRs and their earnings events across countries

This table presents the number of US-cross-listed firms ordered by the home country. Non-ADR firms are the average number of non-cross-listed firms in the home market that are used to compute the market-wide information environment in a year. Pre- (post-) listing events are the number of earnings announcement events available for the ADR firms before and after the cross-listing.

Country	ADR firms	Non-ADR firms	Pre-listing events	Post-listing events
Argentina	1	20	1	5
Australia	10	204	23	50
Austria	7	38	25	35
Belgium	2	57	9	10
Brazil	8	56	17	38
Canada	4	434	20	20
Chile	5	42	11	25
Denmark	1	53	2	5
Egypt	1	12	2	5
Finland	3	46	9	15
France	17	299	69	84
Germany	6	312	14	30
Greece	3	117	13	15
Hongkong	38	130	135	188
India	8	159	25	40
Indonesia	1	56	1	3
Israel	2	21	4	10
Italy	6	123	21	30
Japan	24	1300	83	117
Malaysia	2	178	10	6
Mexico	12	33	26	51
Netherlands	4	108	16	20
Norway	3	53	8	15
Peru	1	12	2	3
Philippines	4	44	9	20
Portugal	1	30	5	5
Singapore	7	141	20	35
SouthAfrica	15	110	55	71
Spain	6	84	25	30
SriLanka	1	18	1	5
Sweden	2	160	3	8
Taiwan	19	303	67	94
Thailand	1	110	4	5
Turkey	2	90	3	10
UK	27	407	113	131
Venezuela	3	2	9	10
Emerging markets	86	1266	247	401
Developed markets	171	4094	613	843

Table 17 reports univariate results for unadjusted and adjusted abnormal return variance and abnormal volume cumulated over a window of three days (-1 through +1) around the earnings announcement date. The adjusted abnormal return variance for cross-listed firm i in year t is calculated by subtracting the median abnormal return variance for all non-cross-listed firms in the home market in that year from the unadjusted abnormal return variance for that firm in that year. The adjusted abnormal volume is similarly calculated. As in BKS, all significance levels are based on Wilcoxon non-parametric tests.

The results for unadjusted measures in Panel A show that stocks from developed markets experience significant increases in both abnormal return variance and abnormal volume after US cross-listing, whereas there are no significant changes for cross-listed stocks from emerging markets. The mean of abnormal return variance for 3 days around the earnings announcement date increases from 4.86 before cross-listing to 5.56 after cross-listing for developed countries.¹² The increase of 0.7 is statistically significant at the 5% level. The increase of 23% in abnormal volume post-listing is also significant at the 5% level for countries with developed markets. The results are consistent with BKS.¹³

¹² Note that BKS use absolute abnormal returns rather than abnormal return variance (scaled by the variance of the market model residuals) around earnings announcement dates as in this study. The 21.8% increase (2.66% pre-listing to 3.24% post-listing) in absolute abnormal returns in BKS is similar to the 14.4% increase (4.86 pre-listing to 5.56 post-listing) in abnormal return variance in our study for cross-listed firms from developed countries.

¹³ Fernandes and Ferreira (2007) also reports similar results as BKS.

Table 17: Abnormal return variance and abnormal volume with and without adjusting for the market-wide effect

The market-wide effect is defined as the median of abnormal return variance and abnormal volume for all non-cross-listed stocks in the home market in a year. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. All tests are Wilcoxon nonparametric tests. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

Panel A: Unadjusted abnormal return variance and abnormal volume

	Obs		Unadjusted abnormal return variance			Unadjusted abnormal volume		
	Before	After	Before	After	After - Before	Before	After	After - Before
Emerging markets	247	403	3.20	3.58	0.38	0.04	-0.05	-0.10
Developed markets	613	843	4.86	5.56	0.70 **	0.90	1.14	0.23 **
Bad government	214	352	3.43	3.80	0.37	0.17	0.13	-0.05
Good government	646	892	4.74	5.38	0.64 **	0.84	1.01	0.18 *
Bad accounting standards	185	317	4.09	4.37	0.27	0.24	0.34	0.11 *
Good accounting standards	673	919	4.56	5.19	0.63 **	0.82	0.95	0.13 *
Weak shareholder protection	178	305	4.12	4.88	0.76 **	0.54	0.46	-0.08
Strong shareholder protection	682	939	4.56	4.99	0.43	0.74	0.90	0.16 **

Panel B: Market-adjusted abnormal return variance and abnormal volume

	Obs		Adjusted abnormal return variance			Adjusted abnormal volume		
	Before	After	Before	After	After - Before	Before	After	After - Before
Emerging markets	247	403	1.49 ***	1.70 ***	0.21	0.55	0.45	-0.10
Developed markets	613	843	2.71 ***	3.06 ***	0.35	1.08 ***	1.10 ***	0.03
Bad government	214	352	1.73 ***	1.97 ***	0.23	0.65	0.52 *	-0.13
Good government	646	892	2.60 ***	2.90 ***	0.29	1.03 ***	1.05 ***	0.02
Bad accounting standards	185	317	2.36 ***	2.43 ***	0.07	0.71	0.69 ***	-0.02
Good accounting standards	673	919	2.43 ***	2.74 ***	0.31	1.01 ***	1.00 ***	-0.01
Weak shareholder protection	178	305	2.30 ***	2.92 ***	0.62 *	0.93 ***	0.72 ***	-0.21
Strong shareholder protection	682	939	2.45 ***	2.55 ***	0.10	0.95 ***	0.98 ***	0.03

Panel A of Table 17 also shows significant increases in both measures of earnings informativeness after US cross-listing for the group of stocks from countries with good government. In addition, the difference in unadjusted abnormal return variance between pre- and post-listing is only statistically significant for firms from countries with good accounting standards. However, unadjusted abnormal volume exhibits significant increases for cross-listed stocks from both good and bad accounting standards countries. Using shareholder protection as the classification variable, I find a significant increase in abnormal volatility for cross-listed stocks from weak shareholder protection countries. However, the increase in abnormal volume is only significant for cross-listed stocks from strong investor protection countries.

Panel B of Table 17 reports the results for abnormal return variance and abnormal volume after adjusting for the median abnormal return variance and median abnormal volume for all non-cross-listed firms from the same country in the same year. The results generally show that the information content of earnings announcements for cross-listed stocks is higher than the median earnings informativeness of the market both before and after US cross-listing. The results are statistically significant at the 1% level for adjusted return variance regardless of what institutional factor we use. For adjusted abnormal volume, the results are highly significant for cross-listed stocks from countries with better institutional quality, whereas they are only significant in half of the tests for cross-listed stocks from countries with lower institutional quality. The results are consistent with BKS in that, on average, information environment is better for cross-listed firms than for non-cross-listed firms, especially for firms from developed countries.

As for the difference in market-adjusted information environment between pre- and post-listing, the results in Panel B of Table 17 show no significant differences between the pre- and post-period, except for the adjusted abnormal return variance for weak shareholder protection stocks. Therefore, these results suggest that the divergence in the information content of earnings announcements for cross-listed stocks is driven by the market-wide changes described in the previous section. In relation to BKS, the results in Panel B of Table 17 suggest that the puzzling increase in information environment for cross-listed firms from developed markets following US listing is just a reflection of a similar increase in the quality of information environment of the domestic market.

Table 18 presents the results for unadjusted and market-adjusted stock price synchronicity 5 years before and 5 years after the US cross-listing year.¹⁴ The unadjusted results show that stock price synchronicity decreases significantly after US listing for countries with developed financial markets, good government, high-quality accounting standards, and strong protection of shareholder rights.¹⁵ There is also a decrease in stock price synchronicity for countries with lower ratings of institutional measures. However, this decrease is not statistically significant for any of the classification variables.

¹⁴ Note that our sample of 83 stocks cross-listed on NYSE and NASDAQ is much smaller than the 879 exchange-listed stocks in FF. The analysis in Table 18 uses all cross-listed stocks regardless of their listing venues, and caution is therefore warranted when comparing the results with FF.

¹⁵ The change in stock price synchronicity is, however, not significant for both unadjusted and adjusted measures if we use 1-year, 2-year, and 3-year event windows as in FF (not reported). We also restrict my sample to exchange-listed ADRs, the results (not reported) do not indicate any significant change in the co-movement of stock prices for both adjusted and unadjusted measures.

Table 18: Stock return synchronicity with and without adjusting for the market-wide effect

The market-wide effect is defined as the median of stock return synchronicity for all non-cross-listed stocks in the home market in a year. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. All tests are Wilcoxon nonparametric tests. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Unadjusted return synchronicity			Market-adjusted return synchronicity		
	Before	After	After - Before	Before	After	After - Before
Emerging markets	-0.75	-0.80	-0.05	0.24 ***	0.35 ***	0.12
Developed markets	-0.98	-1.10	-0.12 **	0.56 ***	0.62 ***	0.06
Bad government	-0.87	-0.92	-0.06	0.26 ***	0.33 ***	0.07
Good government	-0.94	-1.04	-0.10 *	0.54 ***	0.62 ***	0.07
Bad accounting standards	-0.75	-0.77	-0.03	0.63 ***	0.61 ***	-0.02
Good accounting standards	-0.97	-1.10	-0.12 **	0.45 ***	0.52 ***	0.07
Weak shareholder protection	-0.79	-0.81	-0.02	0.61 ***	0.55 ***	-0.07
Strong shareholder protection	-0.97	-1.09	-0.12 *	0.45 ***	0.50 ***	0.05

The market-adjusted results show that stock price synchronicity is significantly higher for cross-listed stocks regardless of where they come from than for the median non-cross-listed firm in the home country both before and after US listing. There is no evidence that firm-specific information for cross-listed stocks increases post-listing. The differences in the market-adjusted stock return synchronicity for all classification variables are small and not statistically significant.

6. Conclusion

In this paper, we investigate changes through time in the quality of information environment for a large sample of stocks from different countries. We also re-examine the main evidence reported in Bailey, Karolyi and Salva (2006), and Fernandes and

Ferreira (2008), which suggests that cross-listed stocks experience an improvement in information environment.

We find that for most countries stock price synchronicity has decreased over the 17-year sample period. However, the decrease is significantly larger for stocks from countries with developed markets, good government, good accounting standards, and strong shareholder protection. Our results also show a significant improvement in the informativeness of earnings announcements. Again, we find that this improvement is larger for stocks from countries with better institutional factors.

Our results are inconsistent with the convergence in information environment predicted by Coffee (1999), and provide no support for the bonding hypothesis, which predicts that stocks will experience an improvement in information environment after cross-listing in the US.

4.7 Appendix

Table A1: Descriptions and sources of institutional and investor protection variables

Variable	Description	Source
Accounting standards	Index measuring the quality of the disclosure of accounting information in each target country. The index value is obtained by rating its companies' 1990 annual reports on their inclusion or omission of 90 items.	LLSV
Anti-director rights	Index of six anti-director rights: right to vote by mail, right not to deposit shares with the company or a financial intermediary several days before a shareholder meeting, right to voting cumulatively for directors, right to litigate against oppression by directors, pre-emptive right to buy new issues of stock, and minimum percentage of share capital needed to call an extraordinary shareholders' meeting.	LLSV
Corruption	ICR's assessment of the corruption in government. Lower scores indicate that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans." Average of the months of April and October of the monthly index between 1982 and 1995. Scale from zero to 10, with lower scores for higher levels of corruption.	LLSV
Developed countries	A country is classified as a developed or emerging market by Standard & Poor's.	Datastream
Government quality	Mean of corruption, risk of expropriation, and risk of repudiation	LLSV
Repudiation of contracts by government	ICR's assessment of the "risk of a modification in a contract taking the form of a repudiation, postponement, or scaling down" due to "budget cutbacks, indigenization pressure, a change in government, or a change in government economic and social priorities." Average of the months of April and October of the monthly index between 1982 and 1995. Scale from zero to 10, with lower scores for higher risks.	LLSV
Risk of expropriation	ICR's assessment of the risk of "outright confiscation" or "forced nationalization". Average of the months of April and October of the monthly index between 1982 and 1995. Scale from zero to 10, with lower scores for higher risks.	LLSV
Rule of law	Assessment of law and order tradition in the country provided by the country risk rating agency International Country Risk. Average of the months of April and October of the monthly index between 1982 and 1995. Scale from zero to 10, with lower scores for less tradition for law and order.	LLSV
Shareholder protection	Product of rule of law and anti-director rights divided by ten.	LLSV

Table A2: Stock return synchronicity for the 235-day pre-announcement period using SST-weighted R²

This table presents the OLS regression results for model (2). The dependent variable is the logistic transformation of the country-average R². IV represents independent variables in columns 1-4. Developed markets is equal 1 if a country is classified as a developed economy, and zero otherwise. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Good government, good accounting standards, and strong shareholder protection in this table are dummy variables with the value of 1 if a country's score for an index is above the median score for all sample countries, and zero otherwise. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Developed markets (1)	Good government (2)	Good accounting standards (3)	Strong shareholder protection (4)
INTERCEPT	-0.656 (-4.60) ***	-0.687 (-5.15) ***	-0.532 (-3.99) ***	-0.631 (-4.98) ***
IV	-0.134 (-1.00)	-0.159 (-1.32)	-0.077 (-0.66)	0.046 (0.39)
TREND	0.001 (0.09)	-0.003 (-0.32)	-0.017 (-1.87) *	-0.005 (-0.51)
IV*TREND	-0.044 (-3.44) ***	-0.045 (-3.84) ***	-0.025 (-2.06) **	-0.031 (-2.62) ***
Ln(NSTKS)	-0.174 (-7.94) ***	-0.171 (-7.82) ***	-0.206 (-8.73) ***	-0.210 (-9.51) ***
MVGDP	-0.023 (-0.50)	0.033 (0.74)	0.079 (1.65) *	0.030 (0.61)
VOLGDP	0.103 (1.51)	0.064 (1.03)	-0.036 (-0.53)	-0.010 (-0.14)
ADJRSQ	0.30	0.31	0.26	0.23
N_obs	641	641	591	641

Table A3: Stock return synchronicity for the 235-day pre-announcement period for continuous institutional variables

This table presents the OLS regression results for model (2). The dependent variable is the logistic transformation of the country-average R2. IV represents independent variables in columns 1-4. Market development is the logarithm of GDP per capita. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Market development (1)	Government quality (2)	Accounting standards (3)	Shareholder protection (4)
INTERCEPT	-0.494 (-4.85) ***	-0.519 (-5.15) ***	-0.490 (-4.49) ***	-0.510 (-5.27) ***
IV	-0.252 (-2.75) ***	-0.278 (-3.22) ***	-0.148 (-1.60)	-0.014 (-0.16)
TREND	-0.012 (-1.63)	-0.017 (-2.38) **	-0.023 (-3.30) ***	-0.014 (-1.98) **
IV*TREND	-0.032 (-3.51) ***	-0.030 (-3.38) ***	-0.018 (-1.84) *	-0.025 (-2.71) ***
Ln(NSTKS)	-0.123 (-6.70) ***	-0.124 (-6.79) ***	-0.148 (-7.36) ***	-0.161 (-8.69) ***
MVGDP	-0.032 (-0.79)	0.022 (0.55)	0.082 (2.06) **	0.024 (0.58)
VOLGDP	0.041 (0.70)	-0.002 (-0.04)	-0.110 (-1.81) *	-0.070 (-1.11)
ADJRSQ	0.39	0.39	0.29	0.28
N_obs	641	641	591	641

Table A4: Cumulative abnormal return variance for the (-1,+1) event window for continuous institutional variables

This table presents the OLS regression results for model (5). The dependent variable is the country-average of abnormal return variance for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Market development is the logarithm of GDP per capita. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Market development (1)	Government quality (2)	Accounting standards (3)	Shareholder protection (4)
INTERCEPT	1.845 (4.32) ***	1.805 (3.74) ***	2.052 (4.30) ***	1.887 (4.32) ***
IV	0.756 (0.93)	0.050 (0.08)	-0.189 (-0.25)	0.024 (0.04)
TREND	0.031 (0.71)	0.021 (0.47)	0.024 (0.50)	0.049 (1.00)
IV*TREND	0.202 (2.46) **	0.282 (3.61) ***	0.275 (3.11) ***	0.217 (2.74) ***
Ln(NSTKS)	0.174 (1.94) *	0.213 (2.44) **	0.228 (2.69) ***	0.210 (2.31) **
MVGDP	0.410 (2.50) **	0.417 (2.49) **	0.190 (1.00)	0.243 (1.31)
VOLGDP	0.392 (1.36)	0.341 (1.20)	0.602 (1.95) *	0.637 (2.13) **
ADJRSQ	0.28	0.28	0.27	0.25
N_obs	641	641	591	641

Table A5: Cumulative abnormal volume for the (-1,+1) event window for continuous institutional variables

This table presents the OLS regression results for model (6). The dependent variable is the country-average of abnormal volume for 3 days around the earnings announcement date. IV represents independent variables in columns 1-4. Market development is the logarithm of GDP per capita. Government quality is calculated as the mean of three indexes measuring government corruption, the risk of expropriation of private property by the government, and the risk of government repudiating contracts. Accounting standards measures the general quality of accounting information in a country. Shareholder protection is the product of anti-director rights and rule of law divided by ten. Trend is a time variable ranging from 0 (year 1990) to 17 (year 2006).

Control variables include the logarithm of number of stocks, Ln(NSTKS), the total capitalization of a country's stock market as a percentage of its total GDP, MVGDP, and the total value of stock trading as a percentage of GDP, VOLGDP. Heteroscedasticity-corrected t-statistics are in parentheses. ***, **, and * represent significant at the 1%, 5%, and 10% levels, respectively.

	Market development (1)	Government quality (2)	Accounting standards (3)	Shareholder protection (4)
INTERCEPT	-0.334 (-1.69) *	-0.391 (-1.75) *	-0.542 (-2.44) **	-0.496 (-2.40) **
IV	0.069 (0.22)	-0.076 (-0.30)	0.358 (1.03)	-0.090 (-0.34)
TREND	0.005 (0.28)	0.003 (0.14)	0.042 (1.77) *	0.034 (1.61)
IV*TREND	0.119 (3.77) ***	0.149 (4.64) ***	0.097 (2.47) **	0.078 (2.38) **
Ln(NSTKS)	0.055 (1.58)	0.065 (1.90) *	0.044 (1.13)	0.095 (2.55) **
MVGDP	0.160 (2.04) **	0.163 (2.08) **	0.023 (0.25)	0.120 (1.31)
VOLGDP	0.017 (0.17)	-0.017 (-0.17)	0.163 (1.49)	0.136 (1.24)
ADJRSQ	0.27	0.28	0.26	0.21
N_obs	641	641	591	641