Original Article

The influence of investor protection on the performance of financial analysts: Time series analyses in four different legal systems

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Christopher von Koch
earned a PhD at the University of Gothenburg, Sweden in 2005. Currently, he is an assistant professor at Linnaeus School of Business and Economics and a member of The Corporate Governance Research Group at Linnæus University. He has published in the areas of corporate governance with special emphasis on the gatekeepers, especially financial analysts, within the corporate governance system, how corporate governance mechanisms at firm level as well as country level interact, and what impact they have on the market and the company.

Ola Nilsson
is a PhD student at Linnaeus School of Business and Economics and a member of The Corporate Governance Research Group at Linnæus University. His research involves corporate governance with special emphasis on the gatekeepers within the corporate governance system, how corporate governance mechanisms at different levels interact, and what impact they have on the market and the company.

Sven-Olof Yrjö Collin
is a professor of Corporate Governance and Accounting at Linnæus University, Sweden. He has published in the areas of corporate governance, public management, accounting, gender, methodology and business ethics. His current research interests focus mainly on corporate governance of family firms, board compensation and auditing.

ABSTRACT **In the corporate governance landscape there are several different groups of so-called gatekeepers who act as intermediary between the company and investors. Financial analysts represent one of these groups that have been especially tied to the question of how corporate laws affect the overall efficiency of corporate governance. It has, for example, been proposed that their performance, that is, predicting earnings per share (EPS), is influenced by the strength of the legal system in terms of investor protection. In this study we analyze this relationship in four European countries using a newly developed index for investor protection. This allows us to conduct analysis both cross-sectionally and over time, which is an opportunity for a more refined analysis of the impact of strengthened investor protection than prior studies. Our main conclusion is that there is overall support for the proposition that there is a relation between financial analysts' performance and the strength of legal protection based on both analyses of changes over time and between countries. Their performance is better with a higher degree of investor protection. But we also claim that the analysts' role and investor protection can be seen as a substitution for each other when working as mechanisms in the corporate governance landscape, as there is a more extensive market for analysts when there is less investor protection. The results provide an in-depth analysis of the effect of strengthened legalization and also how different**

Correspondence: Christopher von Koch, School of Business and Economics, Linnæus University, Växjö, SE-351 95, Sweden.

corporate governance mechanisms can affect each other. This is especially of value for policy makers and academics interested in the impact and consequences of legal reforms.
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INTRODUCTION

This study is a development of prior research regarding financial analysts and the legal environment. It is related to the large body of literature initiated by La Porta *et al* (1998) discussing the investor protection thesis: that the function and structure of capital markets are related to investor protection regulation. It has been suggested that investor protection can be discerned through differentiation of countries based on their legal environment and origin. Researchers have recently become interested in analyzing how investor protection regulation is related to financial analysts' performance and/or the importance of the analyst's role. For example, some studies find that investor protection influences forecast quality (for example, Chang *et al*, 2000; Ashbaugh and Pincus, 2001; Hope, 2003a, b; Barniv *et al*, 2005; Barniv and Myring, 2006), and others have found that earnings forecasts have greater usefulness in countries with stronger investor protection (for example, DeFond *et al*, 2007).

Investor protection regulation is claimed to influence a variety of capital market factors, such as financial reporting, investment decisions, ownership concentration and firm valuation. To this list of factors influenced by investor protection regulation we add financial analysts because they can be regarded as sophisticated users of accounting information (Schipper, 1991; Revsine *et al*, 2004) and a means to reduce information asymmetry between the corporation and the investors (Krishnaswami and Subramaniam, 1999). Thus, it is reasonable to study their performance when analyzing factors connected to the efficiency of financial markets, especially when comparing market efficiency in different legal environments.

When it comes to studies focusing on the impact of investor protection, however, we find both a need and a possibility for improvement. One common denominator in most of these studies is the use of either the 'Legal Enforcement' or the antidirector rights (LLSV) index from La Porta *et al* (1998) as a proxy for the level of investor protection in a given country. In some instances this is also the basis for categorizing countries into strong investor protection countries or weak investor protection countries. Both indexes are based on cross-sectional data, which makes them relevant for classifying countries (see, for example, Alford *et al*, 1993; Ball *et al*, 2000; Hung, 2000; Ali *et al*, 2003; Leuz *et al*, 2003; Hail and Leuz, 2006; Sun, 2009). However, this also constitutes a deficiency in that these indexes do not take into consideration the fact that in most countries investor protection regulations change over time (see, for example, Martynova and Renneboog, 2011). The consequence of this is especially striking in studies using these indexes at the same time as they use forecast data over a period of time (see, for example, Chang *et al*, 2000; Barniv *et al*, 2005; Bhat *et al*, 2006). In other words, several studies do not take into account that changes in shareholder protection might have occurred during the period of time in which the observations of the country's forecast data were collected. So far, to our knowledge, the only study using time-series investor protection data to analyze the performance of analysts is von Koch *et al* (2013), which performs the analysis in a single country. By comparing four countries with different legal traditions, we are able to test the investor protection thesis more thoroughly. For example, we can thereby also assess the relevance of the underlying legal origin and whether this is perhaps an influential factor concerning the role analysts play in the corporate governance landscape.

This can also be compared with the impact of the actual regulation of investor protection.

In this study we investigate the relationship between investor protection and analysts' performance in four countries that we find representative of the four legal traditions described in La Porta *et al* (1998): Anglo-Saxon (United Kingdom), French (France), German (Germany) and Scandinavian (Sweden). We use a newly constructed shareholder protection index (SPI), which is more refined in several ways compared to indexes such as 'Legal Enforcement' and LLSV, as it is more detailed, allows higher variance in coding and has data over several years.

We find, in line with earlier research, that investor protection is correlated with the performance of analysts (c.f. Chang *et al*, 2000; Ashbaugh and Pincus, 2001; Hope, 2003a, b; Barniv *et al*, 2005; Barniv and Myring, 2006; DeFond *et al*, 2007; Sun, 2009; von Koch *et al*, 2013). We also find a substitution effect in all countries (Knyazeva, 2007; Sun, 2009): strengthened investor protection makes analysts' services less valuable to investors, thus leading to a reduction in the number of analysts. Our main conclusion is that changes in investor protection influence the performance of analysts irrespective of the country's legal origin. Thus, we accept the investor protection thesis, but reject the legal origin interpretation of regulation.

The remainder of this article is organized as follows. In the next section we present prior literature proposing how different institutional settings could be related to the role financial analysts play in the market and especially their performance. This section culminates in two hypotheses. The section after that includes a presentation of the chosen research design and the sample. In the subsequent section we present our empirical results, followed by our conclusions in the last section.

LITERATURE REVIEW

Prior literature shows evidence that the accuracy of analysts' earnings forecasts varies around the world and that such variation relates positively to disclosure practices and investor protection (for example, Basu *et al*, 1998; Ashbaugh and Pincus, 2001; Hope, 2003a, b). Bhat *et al* (2006) claim that as insiders are the major source of financial disclosure and the major driver of firm performance, information about governance structure (governance disclosure) is vital to analysts forming expectations regarding future firm performance (for example, Klein, 2002; Farber, 2005). This lends support to the argument that the contextual settings have an influence on analysts' performance. Greater forecast accuracy in strong investor protection countries may be related to the increased predictability of earnings because of more extensive use of accrual-basis accounting (matching principle) and/or reduced earnings management in these countries (Leuz *et al*, 2003; Sun, 2009). Strong investor protection could therefore be an important determinant of high-quality financial statements and greater financial transparency (La Porta *et al*, 1998, 2000, 2006; Ball *et al*, 2000; Leuz *et al*, 2003; Bushman *et al*, 2004; Nabar and Boonlert-U-Thai, 2007; Daske *et al*, 2008; Francis and Wang, 2008).

Greater forecast accuracy may also be the product of analysts having more incentives to forecast accurately. In strong investor protection countries, with well-developed capital markets, where earnings information is considered more value-relevant, investors may have higher demand for earnings information (for example, Barniv *et al*, 2005; DeFond *et al*, 2007). According to Bushman and Smith (2001), one reason for this higher demand is that the effectiveness of accounting information in limiting expropriation of minority investors is likely to be greater when investors have stronger protection. In other words, when investor protection is strong, accounting information can play a more prominent role in corporate governance, and investors rely to a greater extent on financial accounting information (for example, Hope *et al*, 2009). It is claimed that earnings forecasts have greater usefulness in countries with stronger investor protection (Chang *et al*, 2000; Ashbaugh and Pincus, 2001; Hope, 2003a, b; Barniv *et al*, 2005; Barniv and Myring, 2006; DeFond *et al*, 2007).

For example, Barniv *et al* (2005) found that analysts in common-law countries outperform their peers in civil-law countries; they therefore suggest that an association exists between legal and financial reporting environments and analysts' forecast behavior. Chang *et al*, (2000) found analysts' forecasts more accurate and forecast dispersion lower in common-law countries. Their argument is that common-law countries generally have more effective corporate governance mechanisms, including stronger shareholder protection. Bhat *et al* (2006) also discuss how greater compliance with rules and regulations should reduce analysts' uncertainty about financial reports and, in turn, make the task of forecasting earnings relatively easier.

All of the researchers cited here support their findings by referring to other research that shows reported earnings to be more useful to analysts in stronger rather than weaker investor protection countries (for example, Ball *et al*, 2000; Hung, 2000; Alford *et al*, 2003; Ali *et al*, 2003; Leuz *et al*, 2003; Hail and Leuz, 2006). To the extent that reported earnings are more useful in strong investor protection countries, investors demand earnings-related information, thereby giving analysts an incentive to provide superior earnings forecasts.

On the basis of prior research it seems that it is reasonable to assume that analysts' performance increases when investor protection is strengthened. At the same time, it is also reasonable to assume that there is a substitution effect between investor protection and financial analysts. With increased investor protection, the performance of the analysts increases, but at the same time, because of the increased quality of information, the demand of the financial analysts will be reduced. Thus, we hypothesize that:

Hypothesis 1: There is a positive relation between investor protection and financial analysts' performance.

Hypothesis 2: There is a negative relation between investor protection and the number of financial analysts.

RESEARCH DESIGN, SAMPLE AND VARIABLES

In this section, we first discuss our investor protection variable. We then describe our sample and variables and finally we present the regression models used for the analysis.

Investor protection

The investor regulation thesis started with the assumption that the governmental way of protecting the investor varied between different legal origins. The most influential study on this view is La Porta *et al* (1998), who defined four different legal origins based on the way corporate law was developed and designed. By using an index (LLSV) of investor protection they could classify countries and show the relation between the legal composition and variables connected to the financial market's efficiency.

However, the legal origin version of the investor protection thesis has recently been called into question, and it is claimed that prior categorization and tools for measuring investor protection are too general and partly a misleading concept of investor protection (Armour *et al*, 2009). The Corporate Governance Research Programme at the Centre for Business Research, University of Cambridge, UK (see Armour *et al*, 2009; Lele and Siems, 2007) therefore created a more refined tool for measuring investor protection, the *Shareholder Protection Indexes* (SPI). Compared to the LLSV index, SPI includes not only positive law, but also rules stemming from self-regulation, such as corporate governance and takeover codes, where they are binding for (listed) companies. It also differs from the LLSV in that it is not based on binary variables, but allows for intermediary scores between 0 and 1 where appropriate. Moreover, SPI, unlike the LLSV, is sensitive to 'default rules' in the sense of rules that apply in certain circumstances depending on the involved actors' choices. Such laws, although not strictly binding, are not necessarily coded 0. The index also explicitly acknowledges the importance of coding for functionally

equivalent instruments in different countries. Finally, SPI is constructed as a longitudinal measure for quantifying the legal SPI of a given country for each year from 1987 until 2005, that is, 19 years, compared to the LLSV, which is static when it comes to time (for details, see Armour *et al*, 2009 and Lele and Siems, 2007). The result of using this new index compared to LLSV is examined by Armour *et al* (2009). They find that SPI gives a new dimension to the discussion about high and low shareholder protection countries as the level of shareholder protection is dynamic and not fixed, that is, it is changing over time. The results also show that the assumed correlations between investor protection and market characteristics could be questioned, which makes it relevant to take the dynamic dimension into consideration in future studies (see also Lele and Siems, 2007).

This empirical development provides opportunities that we use in this study. What SPI offer us is an advanced empirical proxy of investor protection, thus making the evaluation of the investor protection thesis more rigorous than before. However, to make it possible to include an analysis of the legal origin thesis we also use the categorization by La Porta *et al* (1998) as a basis for choosing the countries. We have therefore selected one country from each legal origin, as defined by La Porta *et al* (1998). The United Kingdom represents the common-law context, Sweden represents Scandinavian civil law, Germany represents German civil law and France represents French civil law.

Figure 1 shows the development of investor protection, as measured by SPI, in the four countries during the 19-year study period.

As can be seen in Figure 1, investor protection strengthened considerably in all four countries during the study period, which can be compared to the static 'Legal Enforcement' index (La Porta *et al*, 1998). On the basis of that index, the United Kingdom has an investor protection index of 9.22, Germany 9.05, France 8.68 and Sweden the highest at 10.00 (see, for example, Sun, 2009). Accordingly, using a static index when examining 19 years of analysts' forecasts could be misleading, particularly if investor protection has changed considerably over that time, which indeed SPI indicates. Note that the time period includes a period in which there were strong international influences on corporate governance in many countries. For example, did the OECD's corporate governance guidelines and codes and principles of institutional investor bodies such as the International Corporate Governance Network have a strong impact on the development of shareholder protection all around the world (see Armour *et al,* 2009). This could, for example, explain the unequivocal changes in SPI in all countries at the beginning of 2000 and the tendency of a convergence between several countries (for a more extensive discussion about possible explanations behind the general development for the level of SPI as well as the development in the specific country see Armour *et al,* 2009, Lele and Siems, 2007 and Schnyder, 2008).

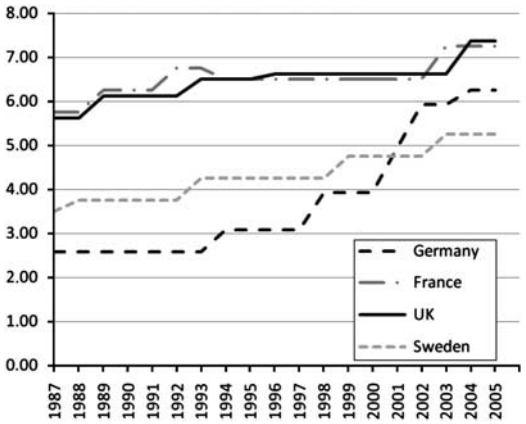

Figure 1: Investor protection development in four different legal environments.
Note: The development of investor protection (SPI) in Germany, France, the United Kingdom and Sweden during the period 1987–2005 obtained from Armour *et al* (2009) and Lele and Siems (2007). The dataset is also fully accessible at the project 'Law, Finance and Development' homepage, www.cbr.cam.ac.uk.

Sample and variables

Our sample consists of 33 378 observations of mean EPS forecasts. Table 1 shows the sample breakdown by year and country. It also shows the average number of forecasts per firm by country and over the sample period. As seen in the table, the United Kingdom has the highest absolute number of forecasts while Germany has the highest number of forecasts per firm. The first number could be explained simply by the size of the financial markets in each country where the United Kingdom is the financial centre in Europe. The second number could be explained by the usefulness of analysts in the market. Greater compliance with rules and regulations should reduce analysts' uncertainty about financial reports and, in turn, make the task of forecasting earnings relatively easier (Bhat *et al*, 2006) and thereby reduce the number of analysts following a firm.

Analysts' forecast data were obtained from the Institutional Brokers' Estimate System (I/B/E/S). The I/B/E/S has data for the four countries' firms dating from 1987. For this study, we compiled sample firm years from all firms listed on the I/B/E/S from 1987 to 2006, achieving a total sample of 16 592 forecasts of EPS in the United Kingdom, 2827 EPS forecasts in Sweden, 6620 EPS forecasts in Germany and 7347 EPS forecasts in France. Analysts usually forecast the EPS of a particular fiscal year several times before the actual figures are released. The frequency of the forecasts differs depending on the analyst. The I/B/E/S collects forecast data from individual analysts around the world once a month and uses those

Table 1: Sample description

	UK		*Sweden*		*Germany*		*France*	
Year	*Number of mean forecasts*	*Forecasts per firm*	*Number of mean forecasts*	*Forecasts per firm*	*Number of mean forecasts*	*Forecasts per firm*	*Number of mean forecasts*	*Forecasts per firm*
1987	636	5.50	70	1.93	149	5.75	297	3.28
1988	781	6.34	75	1.67	165	5.73	377	2.78
1989	879	6.43	78	1.90	176	7.22	416	3.94
1990	803	5.92	76	2.33	183	8.32	401	5.15
1991	743	5.75	76	3.53	199	8.73	360	5.59
1992	786	6.34	92	5.13	243	10.08	378	6.35
1993	813	6.77	128	4.16	410	7.71	348	8.39
1994	835	6.82	126	5.08	425	8.68	320	9.58
1995	868	6.66	156	5.74	391	10.83	362	8.56
1996	895	6.20	198	5.85	384	10.39	380	9.98
1997	1018	6.11	198	6.48	382	10.46	400	9.06
1998	1077	5.55	227	5.51	420	9.19	439	8.14
1999	1080	6.21	227	6.64	445	7.81	451	7.93
2000	1012	6.05	256	5.60	559	7.38	498	5.58
2001	935	2.72	230	5.22	540	6.24	460	5.29
2002	920	4.18	170	4.28	514	4.22	388	6.85
2003	822	4.59	162	4.00	430	4.94	372	7.73
2004	808	5.09	143	5.73	302	6.15	353	8.05
2005	881	5.80	139	5.35	303	7.12	347	7.99
87-05	*16 592*	*5.72*	*2827*	*5.01*	*6620*	*7.70*	*7347*	*6.83*

Note: The sample breakdown by year and country.
Source: Institutional Brokers' Estimate System (I/BES).

data to calculate statistics such as the mean, median and standard deviation. Only the final estimates of the analysts are included in the monthly calculation.

In this study, we use the final calculated mean of an analyst's forecasts of EPS before the first quarterly report is made for the year of the forecast. For example, the forecast statistics of a December fiscal year end firm were calculated based on observations collected from the days before the announcement of the first quarterly report of that fiscal year. Hence, we use the mean forecast calculated in March in year t as the forecast data for actual EPS for year t (in line with Lang and Lundholm (1996) among others). The mean forecast can therefore consist of a number of individual forecasts – indeed, some firms have around 50 analysts making predictions on their future EPS.

To measure analysts' performance in a broader sense than just accuracy, we use four dependent variables selected after a review of the literature: forecast accuracy, standard deviation of forecasts, number of analysts following a firm (Lang and Lundholm, 1996) and forecast bias (Francis and Philbricks, 1993). The data obtained from the I/B/E/S database are applied to these variables.

Our first dependent variable, forecast accuracy (AFA), is calculated as the negative of the absolute value of the actual earnings minus the analyst's earnings forecast, scaled by the stock price at the beginning of the year, and forecasted EPS_t is the mean analyst forecast of the EPS in period t. The negative value means that more accurate forecasts are represented by higher values, that is, a lower forecast error (see Lang and Lundholm, 1996).

$$Forecast\ Accuracy = \frac{-|Actual\ EPS_t - Forecast\ EPS_t|}{Beginning\ of\ the\ fiscal\ year\ stock\ price}$$

We expect a positive correlation between the level of shareholder protection and forecast accuracy.

The second dependent variable, standard deviation of forecasts (DISP), is the inter-analyst standard deviation of forecasts scaled by the stock price at the beginning of the year (see Lang and Lundholm, 1996). We expect a negative correlation between the index and forecast deviation, as this indicates greater precision in analysts' forecasts.

The third dependent variable is the number of analysts (ANALYST) who are following the company, and this number is determined by a simple count of those who are following the company and providing an EPS forecast (see Lang and Lundholm, 1996). As it has been suggested that analysts are intermediaries in the market, we expect a reduction in the number of analysts when shareholder protection increases, that is, a negative relationship.

We apply Francis and Philbrick's (1993) method to measure the fourth dependent variable, forecast bias (BIAS). We calculate this variable as the negative of the actual earnings minus the analyst's earnings forecast, scaled by stock price at the beginning of the year. Forecasted EPS_t is the mean analyst forecast of EPS in period t, and we scale the forecast measures with the stock price to permit cross-company comparisons. If the analyst has overestimated the company's EPS, the result is a positive value; if the EPS has been underestimated, the result is a negative value. On the basis of studies showing that forecast bias seems to have changed from optimistic to pessimistic with strengthened legislation in the United States (see Kothari, 2001; Kadan *et al*, 2009), we anticipate a negative relationship between shareholder protection and forecast bias.

$$Forecast\ Bias = \frac{-(Actual\ EPS_t - Forecasted\ EPS_t)}{Beginning\ of\ the\ fiscal\ year\ stock\ price}$$

In this study we use five control variables selected on the basis of prior research showing that particular factors influence the accuracy of analysts' forecasts (Lang and Lundholm, 1996). These variables are: market value (MV), trading volume (VOL), earnings surprise (SURPRISE), loss (LOSS) and standard deviation of return on equity (STD ROE).

We use market value and trading volume to control for firm size, which is treated in the literature as a proxy for several firm characteristics. Size should reflect information availability and therefore be positively related to forecast accuracy. Brennan and Hughes (1991) found empirical evidence of an association between firm size and the number of analysts following a firm, and Lang and Lundholm (1993) found that firm size and performance variability are likely correlated with disclosure policy. Market value is measured as the company's market value at the beginning of the fiscal year and is commonly used to control for size. However, we also add trading volume (VOL) as a control for size because it could be more relevant than market value to the number of analysts following a firm (analysts often get paid indirectly through the trading activity). Trading volume refers to the company's daily trading volume in the first month of the fiscal year. Earnings surprise (SURPRISE), which is the variation in a firm's results from one year to another, is calculated as the absolute value of the year's EPS, minus the previous year's EPS, scaled by the share price at the beginning of the fiscal year.

According to Lang and Lundholm (1996), earnings surprise controls for the fact that forecast characteristics are likely to be affected by major events such as a firm's introduction of a new product. In such circumstances realized earnings are most likely to deviate from expected earnings, and there are likely to be significant revisions in analysts' forecasts.

Hope (2003a) suggests that EPS is much harder to predict for firms with negative earnings. Therefore, we use the control variable 'LOSS', a dummy variable that takes the value 1 if the company reported a loss and 0 otherwise. King *et al* (1990) found that the number of analysts following a firm is likely to be positively correlated with return because it is easier to predict future earnings for firms that are performing well. Therefore, standard deviation of return on equity (STDROE) is the final control variable in our regressions, and it is measured as the company's return on equity over the previous 3 years.

Regression models

On the basis of our four performance variables we use four regression models. The first model tests whether a positive relationship exists between analysts' forecast accuracy and shareholder protection.

$$AFA_{it} = \alpha + \beta_1 SPI_t + \beta_2 MV_{it} + \beta_3 VOL_{it} + \beta_4 LOSS_{it} + \beta_5 SURPRISE_{it} + \beta_6 STDROE_{it} + \varepsilon_{it} \quad (1)$$

The second model tests for a negative relationship between forecast dispersion and shareholder protection.

$$DISP_{it} = \alpha + \beta_1 SPI_t + \beta_2 MV_{it} + \beta_3 VOL_{it} + \beta_4 LOSS_{it} + \beta_5 SURPRISE_{it} + \beta_6 STDROE_{it} + \varepsilon_{it} \quad (2)$$

The third model determines whether there is a negative relationship between the number of analysts following a firm and shareholder protection.

$$ANALYSTS_{it} = \alpha + \beta_1 SPI_t + \beta_2 MV_{it} + \beta_3 VOL_{it} + \beta_4 LOSS_{it} + \beta_5 SURPISE_{it} + \beta_6 STDROE_{it} + \varepsilon_{it} \quad (3)$$

The fourth and final model tests for a negative relationship between forecast bias and shareholder protection.

$$BIAS_{it} = \alpha + \beta_1 SPI_t + \beta_2 MV_{it} + \beta_3 VOL_{it} + \beta_4 LOSS_{it} + \beta_5 SURPRISE_{it} + \beta_6 STDROE_{it} + \varepsilon_{it} \quad (4)$$

EMPIRICAL RESULTS

Table 2 shows the correlations between all variables for the whole sample. The correlation coefficients are not high, indicating that multicollinearity does not present a statistical problem. An inspection of the VIF values for all independent variables in the regression analyses supports this impression.

Table 2: Correlation matrix – all countries

Variable	*Mean*	*Median*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1 AFA	−0.079	−0.019	0.46	1	—	—	—	—	—	—	—	—
2 DISP	0.05	0.01	1.57	−0.33***	—	—	—	—	—	—	—	—
3 ANALYST	6.35	3	7.01	0.05***	0	—	—	—	—	—	—	—
4 BIAS	−0.01	−0.001	0.53	0.19***	0.07***	−0.01	—	—	—	—	—	—
5 SPI	5.16	5.75	1.6	0.01	0	−0.07***	0.01**	—	—	—	—	—
6 MV	2047	149	10 813	0.02**	0	0.29***	0	0	—	—	—	—
7 VOL	9229	98	147 149	0.01	0	0.16***	0	0.04***	0.23***	—	—	—
8 LOSS	0.14	0	0.34	−0.19***	0.10***	−0.11***	−0.05***	−0.01	−0.04***	−0.03***	—	—
9 SURPRISE	0.085	0.02	2.09	−0.65***	0.76***	−0.05***	0.08*	0	−0.01	−0.01	0.06***	—
10 STDROE	2.26	0.08	14.82	−0.09***	0.05***	−0.05***	0.03***	−0.10***	0.01***	−0.01	0.11***	0.03***

***$P < 0.001$; **$P < 0.01$; *$P < 0.05$.

Forecast accuracy (AFA) is measured as the negative of the absolute value of the difference between the Institutional Brokers' Estimate System consensus forecast at the beginning of the fiscal year and the actual earnings per share for the year, scaled by the stock price. DISP is the interanalyst standard deviation of forecasts scaled by the stock price. ANALYST is the number of analysts. BIAS is the negative of the actual earnings minus the analyst's forecast scaled by the stock price. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007). MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years.

The results from our four models are presented in Tables 3–6. Table 3 shows that there is a significant relationship between SPI and AFA (*P*-value<0.001) if we look at the entire sample. For individual countries the results are mixed: significant positive relationships for the United Kingdom (*P*-value<0.05) and Sweden (*P*-value<0.1), but no significant relationship for Germany or France. We find similar results for the second performance variable, DISP (Table 4). A negative relationship exists between SPI and DISP (*P*-value<0.01) for the sample as a whole. For the individual countries, however, the only significant association is for Sweden (*P*-value<0.001), with the negative relationship indicating less dispersion and, hence, less disagreement among analysts in that country. In contrast to the first two variables, the third variable, ANALYST, is significantly and negatively correlated with SPI both for the sample as a whole and for all four individual countries (Table 5). The results for the last performance variable, BIAS (Table 6), indicate that SPI affects bias positively when the whole sample is taken into account (*P*-value<0.05). For the individual countries, the association is positive and significant for Germany (*P*-value<0.001) and negative and significant for the United Kingdom (*P*-value<0.01).

Table 3: Effect of investor protection (SPI) on analysts' accuracy (AFA)

	France *AFA*	*Germany* *AFA*	*UK* *AFA*	*Sweden* *AFA*	*All countries* *AFA*
MV	0.02	0.001	0.007	0.004	0.000
	0.000	0.000	0.000	0.000	0.000
VOL	−0.011	−0.004	−0.002	0.013	0.000
	0.000	0.000	0.000	0.000	0.000
LOSS	−0.187***	−0.001	−0.117***	−0.021	−0.124***
	0.004	0.019	0.010	0.019	0.002
SURPRISE	−0.554***	−0.911***	−0.548***	−0.313***	−0.083***
	0.012	0.013	0.007	0.032	0.002
STDROE	−0.037**	−0.006	−0.005	−0.275***	−0.001***
	0.001	0.016	0.003	0.000	0.000
SPI	−0.017	−0.006	0.022*	0.042†	0.006***
	0.004	0.007	0.007	0.015	0.001
Constant	0.026	0.032	−0.115*	−0.127	−0.060***
	0.024	0.038	0.047	0.069†	0.005
N	4350	1626	6999	1660	14 635
Adj R^2	0.412	0.832	0.340	0.199	0.319
F-stat	508.433***	1338.365***	603.039***	69.905***	1142.36***
Durbin-Watson	2.014	2.288	2.167	2.332	—

***$P<0.001$; **$P<0.01$; *$P<0.05$; †$P<0.1$.

Standardized beta is presented, except for the constant and the standard errors below it.

Forecast accuracy (AFA) is measured as the negative of the absolute value of the difference between the Institutional Brokers' Estimate System consensus forecast at the beginning of the fiscal year and the actual earnings per share for the year, scaled by the stock price. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007).

Table 4: Effect of investor protection (SPI) on analysts' forecast dispersion (DISP)

	France *DISP*	*Germany* *DISP*	*UK* *DISP*	*Sweden* *DISP*	*All countries* *DISP*
MV	−0.052**	−0.008	−0.004	−0.019	−0.006***
	0.000	0.000	0.000	0.000	0.000
VOL	0.035	0.010	0.003	0.006	0.000
	0.000	0.000	0.000	0.000	0.000
LOSS	0.183***	0.011	0.015	0.120***	0.029***
	0.002	0.007	0.004	0.007	0.000
SURPRISE	0.304***	0.833***	0.677***	0.240***	0.033***
	0.005	0.004	0.003	0.010	0.001
STROE	0.037*	0.039*	0.018†	0.134***	0.001***
	0.000	0.006	0.001	0.000	0.000
SPI	0.001	0.025	0.009	−0.111***	−0.002**
	0.001	0.002	0.002	0.005	0.000
Constant	0.006	−0.016	−0.012	0.103***	0.018***
	0.010	0.013	0.015	0.023	0.002
N	3789	1337	5997	1271	12 394
Adj R^2	0.168	0.704	0.465	0.131	0.222
F-stat	128.117***	531.044***	869.744***	32.917***	598.98***
Durbin-Watson	1.993	2.139	1.566	1.707	

***$P<0.001$; **$P<0.01$; *$P<0.05$.

Standardized beta is presented, except for the constant and the standard errors below it.

DISP is the interanalyst standard deviation of forecasts scaled by the stock price. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007).

Further test and results

So far a prevailing assumption has been that changes in investor protection have an immediate effect on a firm's behavior. However, it might be more realistic to assume that there is a lag time between the implementation of such changes and their actual impact. For this reason we decided to retest all four models using values of SPI lagged both by 1 year and 2 years (see Table 7). Owing to lack of space, the table does not include the results for individual countries. The results from the lagged models support our earlier findings. As shown in the table, the lagged values for SPI are strongly related to all four dependent variables (P-value<0.001); a minor exception is forecast bias, which is significant at P-value<0.01 when SPI is lagged by 1 year. These results confirm that strengthened shareholder protection increases analysts' forecast accuracy, decreases forecast dispersion, decreases the number of analysts following firms and increases forecast bias. Overall, our findings show that strengthened investor protection has a positive impact on the performance of analysts.

Note in the models above that analyst following is not used as an explanatory variable. In reality, the number of analysts following a firm is likely to vary with a number of

Table 5: Effect of investor protection (SPI) on number of analysts (ANALYST)

	France Analysts	*Germany Analysts*	*UK Analysts*	*Sweden Analysts*	*All countries Analysts*
MV	0.344***	0.404***	0.353***	0.254***	0.001***
	0.000	0.000	0.000	0.000	0.000
VOL	0.152***	0.182***	−0.003	0.323***	0.000***
	(0.000)	0.000	0.000	0.000	0.000
LOSS	−0.078***	−0.108***	−0.161***	−0.081***	−2.948***
	0.343	0.479	0.230	0.400	0.175
SURPRISE	−0.061***	−0.009	−0.036**	−0.055*	−0.717***
	0.978	0.325	0.155	0.660	0.154
STDROE	0.069***	−0.052*	−0.017	−0.077***	−0.075***
	0.072	0.393	0.079	0.007	0.007
SPI	−0.120***	−0.246***	−0.252***	−0.080***	−0.549***
	0.282	0.176	0.165	0.315	0.063
Constant	25.346***	19.512***	33.990***	11.522	11.980***
	1.923	0.950	2.193	1.441	0.406
N	4350	1626	6999	1670	14 635
Adj R^2	0.226	0.354	0.223	0.284	0.125
F-stat	212.31***	149.50***	3366.020***	110.617***	350.08***
Durbin-Watson	1.638	0.980	0.568	0.513	—

***$P < 0.001$; **$P < 0.01$; *$P < 0.05$.

Standardized beta is presented, except for the constant and the standard errors below it.

ANALYST is the number of analysts. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007).

factors. Consistent with this assumption, significant variation in analyst following has been found in both within- (for example, Lang and Lundholm, 1996) and across-country studies (for example, Basu *et al*, 1998) causing endogenous problems. This is especially important when analyst following is used as a conditioning variable to test whether the role of legal origin varies with the information environment. In addition, there could be an endogenous relationship between several performance variables and analyst coverage. This endogenous relationship may exist because analysts are more likely to select companies with high earnings quality than companies with low earnings quality. By not using analyst following in the same model as the performance variable (market value, trading volume, earnings surprise, loss and standard deviation of return on equity), we might mitigate this endogeneity problem. However, while prior evidence shows that both analyst following and the properties of the analysts' forecast are affected by shareholder protection, the results should be interpreted with caution as most research in this area has not taken into account the potentially endogenous nature of a firm's shareholder protection and analyst following. However, we acknowledge that the number of analysts might have a direct impact on performance. For example, Lys and Soo (1995) argue that the number of analysts is a proxy for the intensity of competition in the

Table 6: Effect of investor protection (SPI) on analysts' forecast bias (BIAS)

	France *BIAS*	*Germany* *BIAS*	*UK* *BIAS*	*Sweden* *BIAS*	*All countries* *BIAS*
MV	−0.014	−0.019	0.011	−0.004	−0.009
	0.000	0.000	0.000	0.000	0.000
VOL	−0.018	0.011	−0.004	−0.005	−0.002
	0.000	0.000	0.000	0.000	0.000
LOSS	−0.302***	0.025*	0.123***	−0.278***	−0.015†
	0.006	0.022	0.011	0.021	0.009
SURPRISE	−0.187***	−0.891***	0.400***	0.087***	−0.149***
	0.016	0.015	0.008	0.035	0.008
STDROE	−0.012	0.028*	−0.013	0.218***	0.002***
	0.001	0.018	0.004	0.000	0.000
SPI	0.007	0.044***	−0.037**	0.005	0.007*
	0.005	0.008	0.008	0.017	0.003
Constant	0.006	−0.082†	0.166**	−0.016	−0.032
	0.031	0.044	0.052	0.076	0.020
N	4350	1626	6999	1660	14 635
Adj R^2	0.160	0.781	0.196	0.096	0.028
F-stat	138.789***	969.221***	284.754***	30.242***	71.94***
Durbin-Watson	1.981	2.049	1.781	2.195	—

***$P<0.001$; **$P<0.01$; *$P<0.05$; †$P<0.1$.

Standardized beta is presented, except for the constant and the standard errors below it.

BIAS is the negative of the actual earnings minus the analyst's forecast scaled by the stock price. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007).

market. Several studies therefore use the number of analysts as a control variable for analyst performance as analysts have the incitement to perform better in a more competitive market (see, for example, Hope, 2003a). Therefore, we now concentrate on models 1 (forecast accuracy) and 2 (forecast dispersion) and add the number of analysts in these regression models as a new control variable. The results from these regressions are shown in the first six columns of Table 8 (the first three columns concern forecast accuracy while the next three concern dispersion). We also test for SPI lagged 1 year as well as 2 years (columns 2, 3, 5 and 6). We find consistent results from these six regressions; SPI is highly significant ($P>0.001$), with the expected sign confirming earlier regressions that strengthen investor protection improves accuracy and decrease dispersion. In addition, ANALYST is highly significant ($P>0.001$) with the expected sign. An increase in analyst coverage therefore improves accuracy and decreases forecast dispersion. These combined with earlier results therefore indicate that SPI improves analyst performance while at the same time reducing the number of analysts, which in turn will lead to worse performance.

Note that the adjusted R^2 in general are higher when including ANALYST in these

Table 7: Effect of lagged investor protection (SPI) on analysts' performance

	All countries				*All countries*			
	AFA	*DISP*	*ANALYST*	*BIAS*	*AFA*	*DISP*	*ANALYST*	*BIAS*
	SPI lagged 1 year				*SPI lagged 2 years*			
MV	0.000***	−0.000***	0.000***	0	0.000***	−0.000***	0.000***	0
	0	0	0	0	0	0	0	0
VOL	0	0	0.000***	0	0	0	0.000***	0
	0	0	0	0	0	0	0	0
LOSS	−0.126***	0.030***	−2.958***	−0.009	−0.126***	0.030***	−2.953***	−0.009
	0.002	0.001	0.181	0.009	0.002	0.001	0.182	0.009
SURPRISE	−0.081***	0.327***	−0.698***	−0.149***	−0.080***	0.327***	−0.699***	−0.149***
	0.002	0.001	0.155	0.008	0.002	0.001	0.155	0.008
STDROE	−0.001***	0.000***	−0.070***	0.002***	−0.001***	0.000***	−0.068***	0.003***
	0	0	0.007	0	0	0	0.007	0
SPI-lagged	0.006***	−0.002***	−0.380***	0.009**	0.007***	−0.002***	−0.311***	0.011***
	0.001	0	0.063	0.003	0.001	0	0.061	0.003
Constant	−0.063***	0.019***	10.924***	−0.046*	−0.066***	0.021***	10.456***	−0.058*
	0.005	0.002	0.398	0.02	0.005	0.002	0.376	0.019
N	14 635	12 394	14 635	14 635	14 635	12 394	14 635	14 635
Adj R^2	0.322	0.223	0.115	0.096	0.323	0.234	0.114	0.028
F-stat	1086.42***	555.83***	289.49***	30.242***	1091.42***	559.87***	296.60***	67.65***

***$P < 0.001$; **$P < 0.01$; *$P < 0.05$.

Standardized beta is presented, except for the constant and the standard errors below it.

Forecast accuracy (AFA) is measured as the negative of the absolute value of the difference between the Institutional Brokers' Estimate System consensus forecast at the beginning of the fiscal year and the actual earnings per share for the year, scaled by the stock price. DISP is the interanalyst standard deviation of forecasts scaled by the stock price. ANALYST is the number of analysts. BIAS is the negative of the actual earnings minus the analyst's forecast scaled by the stock price. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous three years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007), here lagged 1 and 2 years.

Table 8: Further robustness test

	All countries				*All countries*			
	AFA	*AFA/SPI lagged 1 year*	*AFA/SPI lagged 2 years*	*DISP*	*DISP/SPI lagged 1 year*	*DISP/SPI lagged 2 years*	*AFA>2000*	*AFA<2000*
MV	0.000*	0.000*	0.000*	−0.000**	−0.000**	−0.000***	0.000***	0.000***
	0	0	0	0	0	0	0	0
VOL	0	0	−0.000***	0	0	0	0	0
	0	0	0	0	0	0	0	0
LOSS	−0.123***	−0.126***	−0.122***	0.029***	0.029***	0.029***	−0.123***	−0.125***
	0.002	0.002	0.002	0.001	0.001	0.001	0.003	0.009
SURPRISE	−0.080***	−0.080***	−0.080***	0.033***	0.033***	0.032***	−0.059***	−0.120***
	0.002	0.002	0.002	0.001	0.001	0.001	0.003	0.008
STDROE	−0.001***	−0.001***	−0.001***	0.000***	0.000***	0.000***	−0.001***	−0.001***
	0	0	0	0	0	0	0	0
SPI	0.006***	0.006***	0.007***	−0.001***	−0.002***	−0.002***	0.006***	0.007***
	0.001	0.001	0.001	0	0	0	0.001	0.001
ANALYST	0.001***	0.001***	0.001***	−0.000***	−0.002***	−0.000***	—	—
	0.001	0	0	0	0	0	—	—
Constant	−0.073***	−0.075***	−0.078***	0.021***	0.021***	0.024***	−0.071***	−0.064***
	0.005	0.005	0.004	0.002	0.002	0.002	0.012	0.006
N	14 635	14 635	14 635	12 394	12 394	12 394	7535	6122
Adj R^2	0.327	0.328	0.328	0.223	0.224	0.226	0.289	0.4
F-stat	952.86***	955.71***	960.02***	481.00***	482.55***	486.24***	392.91***	771.94***

***$P<0.001$; **$P<0.01$; *$P<0.05$.

Standardized beta is presented, except for the constant and the standard errors below it.

Forecast accuracy (AFA) is measured as the negative of the absolute value of the difference between the Institutional Brokers' Estimate System consensus forecast at the beginning of the fiscal year and the actual earnings per share for the year, scaled by the stock price. DISP is the interanalyst standard deviation of forecasts scaled by the stock price. ANALYST is the number of analysts. BIAS is the negative of the actual earnings minus the analyst's forecast scaled by the stock price. MV is the market value. VOL is the trading volume. LOSS is a dummy variable that takes a value of 1 if the firm reported a loss and 0 otherwise. SURPRISE is the absolute value of the year's earnings per share, minus the previous year's earnings per share, scaled by the share price. STDROE is the standard deviation of the firm's return on equity over the previous 3 years. SPI is the investor protection index obtained from Armour *et al* (2009) and Lele and Siems (2007), here lagged 1 and 2 years.

two models. We also ran these regressions without SPI and found a decrease in adjusted R^2, and therefore including both variables increases the exploratory power of the regressions. Furthermore, as the time period of our analysis involves a large number of years, our dependent variables may vary over time (but not necessarily cross-sectionally) because of events such as market shocks, and regulatory and accounting standard changes. These changes affect the dependent variables but in the same way for all firms (or analysts). When we perform the Hausman test it strongly supports the fixed-effects model. So far our models fail to take into account these effects and therefore we include time-fixed effects. This means that we have made a re-run of our original models with a dummy variable for each year. This was made both with and without the SPI variable and the results (not shown in Table 8 owing to lack of space) confirm our earlier results. Finally, as a robustness check, there could also be a problem with the sample period chosen; for example, during the period there has been a sharp decline in analyst following as an effect of the dot-com bubble. To mitigate for our sample period possibly being exceptional we split our sample into two periods. As shown in the last two columns of Table 8, we test model 1 for both 1987–1999 and 2001–2005, leaving the year 2000 out of the sample. The results from these regressions confirm our earlier results and show that investor protection is highly significant ($P<0.001$) for both periods and positively related to forecast accuracy.

CONCLUSIONS

By using a newly constructed index to measure shareholder protection, we were able to analyze the relationship between investor protection and financial analysts' performance in a more sophisticated way than found in previous studies. In line with earlier research, we find general support for the notion that investor protection is correlated with the performance of analysts (c.f. Chang *et al*, 2000; Ashbaugh and Pincus, 2001; Hope, 2003a, b; Barniv *et al*, 2005; Barniv and Myring, 2006; DeFond *et al*, 2007; Sun, 2009). However, the results are mixed when we analyze them more specifically. The accuracy of the forecasts increases with a strengthened legal environment but the relation is more obvious in Sweden and the United Kingdom than in Germany and France. It may be the case that improved forecast accuracy is harder to achieve in a legal environment undergoing a rapid strengthening of investor protection, as happened in Germany in 2000–2003. Analysts' difficulty in adapting to such dramatic changes might be caused by strong professional routines or weak competition for their services, either of which could make them slower to adjust to a new reality.

When it came to forecast dispersion we found a weak support for the expectation that forecast dispersion would decrease with improved investor protection. The effect of SPI on forecast dispersion may depend on whether analysts use more public or private information (Heflin *et al*, 2003; Irani and Karamanou, 2003). If public information is the primary source, there should be less dispersion because of the better quality of such information that is available to all analysts. However, if analysts seek to gain advantage by gathering private information in response to better-quality public information, the effect would then be increased dispersion.

Our strongest results pertain to the relationship between the number of analysts following firms and investor protection. We find that the number of analysts declines with increased investor protection. This suggests that analysts are intermediaries in capital markets, in greater demand and therefore more prevalent, when market information systems are not performing well. If the role as an intermediary is seen to improve the functioning of the market by reducing information asymmetry, we can say that analysts are probably efficient intermediaries in this market, as they appear to be in greater demand when the market information system performs less well. This is also in line

with Knyazeva (2007) and Sun's (2009) argument about a substitution effect, that is, that the governance role played by analysts is magnified where investor protection is weak. Indeed, for all four countries we examined, the demand for analysts' services declined when investor protection strengthened.

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