Research Article

Analyst Perceptions of Corporate Social Responsibility: A Replication and Extension of Ioannou and Serafeim (2015)

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We replicate and extend a highly influential study on corporate social responsibility (CSR): "The Impact of Corporate Social Responsibility on Investment Recommendations: Analysts' Perceptions and Shifting Institutional Logics." This 2015 publication reported evidence suggesting that analysts were initially skeptical of the value of CSR but became more positive over the ensuing decade – a finding that appeared to explain a connection between CSR and stock returns. Following best practices for replication, we first attempt to replicate the published finding using the original method. We then extend the analysis by using a more precise empirical specification and a longer panel of data. In contrast with the original publication, we find no evidence of a shift in analysts' attitudes toward CSR ratings over time. We conjecture that the original estimates may have been confounded by regression to the mean. Our paper provides revised information on CSR and demonstrates the importance of replication in social science.

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Many studies have contended that Corporate Social Responsibility (CSR) is connected to higher stock returns[1][2], but the explanation for such a connection remains unclear. If investors believe CSR signals higher or more reliable cash flows, stock prices should rise, bringing future returns back to risk-adjusted averages[3]. If investors prefer high CSR companies for their social mission, stock prices should likewise rise, making "virtue its own reward since investors get lower expected returns from the shares of virtuous firms"[4]. What, then, can explain a link between CSR and higher returns?

An influential publication by Ioannou and Serafeim[5] provides a possible explanation. It reports evidence suggesting analysts were biased against socially responsible firms and contends that this bias decreased

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over time. If analyst attitudes influenced or reflected general investor preferences, stock prices of CSR firms might have been suppressed initially and then recovered as unanticipated cash flows appeared, causing attitudes to change. The result would be an association between CSR and higher returns.

Ioannou and Serafeim[5] (hereafter I&S) has been highly influential. It is widely cited in academic research on corporate social responsibility (CSR) and financial markets, with over 1180 citations, according to Google Scholar, and it was used in testimony before the US Securities and Exchange Commission[6]. Yet, there are reasons to be cautious when applying its findings. It employs an unusual method requiring sequentially pooled samples, and its findings have not yet been replicated. As with any single study, I&S captures only a limited view of the underlying data-generating process, and further analysis is required to understand its dynamics better.

Replication studies are crucial in maintaining the reliability of influential academic research, particularly in fields where findings influence business decisions. If analysts make predictions based on flawed or incomplete findings, the decisions of investors and corporations are put at risk. If businesses use academic research in making strategic choices, published findings must be robust and repeatable.

In this study, we follow best practices for conducting a constructive replication[7][8]. We first attempt to replicate the original analysis as closely as possible: we analyze the same data, use the same statistical models, and recreate the main tables from the original paper. We then extend the original study to understand the dynamics between CSR performance and investment recommendations: we consider the potential for the original method to conflate regression to the mean with a meaningful change in analyst behavior, and consequently substitute a more appropriate statistical model. In total, we find no statistical evidence that analysts' behavior changed over time.

Introduction

Over the last decade, hundreds of new investment funds have promised to use CSR data in investment decisions. Trillions of dollars have been poured into these funds, pursuing higher returns and social impact[9]. Specialized rating agencies have emerged to measure corporate CSR efforts across environmental, social, and governance dimensions[10]. These CSR ratings have enabled standardized assessment of corporate sustainability performance across industries and geographies.

Many scholars have proposed that CSR is connected to superior performance, but the mechanism of action for this connection remains uncertain[11]. Higher stock returns imply the mispricing of future cash

flows, but the explanation for this mispricing remains elusive. Thus, I&S filled a critical gap in the empirical literature by hypothesizing and testing a possible mechanism for the proposed connection between CSR and financial performance.

I&S posits that stock analysts initially viewed CSR through an "agency cost lens" and thus assumed it would harm shareholder value. These shared perceptions caused undue skepticism about the prospects of high CSR firms and thereby suppressed stock prices. Over time, as analysts gained more experience, they reassessed their initial positions and began to perceive CSR in a more neutral light. As initial pessimism receded, recommendations and stock prices improved, causing higher returns for funds holding more high-CSR stocks.

Review of the Empirical Method used in Ioannou and Serafeim[5].

I&S's principal hypothesis is that "Over time, sell-side analysts' recommendations will be less pessimistic for firms with high CSR scores" (I&S, pg. 1059). To test this claim, it uses a sample of recommendations from stock analysts who evaluate individual firms, forecast key indicators (such as earnings per share), and make investment recommendations for a firm's stock, such as "buy," "hold," or "sell." Typically, an analyst evaluates multiple firms for multiple years, and since a firm's CSR ratings change over time, I&S's data provide a quasi-experimental treatment with which to evaluate the effect of CSR rating on each analyst's assessment, and the panel structure of these data allows comparison of these effects over time.

Although the focal actor in I&S's hypothesis is the analyst, I&S conducts its analyses and tests at a higher level of aggregation – the rated firm. This requires aggregating the recommendations of multiple analysts to form a mean rating for each. This mean rating is thus conditioned on the number and character of the analysts rating the organization.

I&S specifies its outcome variable as:

$$MRec_{it} = \frac{\sum_{\mathbf{a}}^{\mathbf{A_{it}}} Rec_{it}}{\mathbf{A_{it}}} \tag{1}$$

where each of A analysts makes a recommendation (Rec) for firm i in year t. The mean recommendation, $MRec_{it}$, is thus conditioned on which analysts operating that year evaluate firm i.

To evaluate the influence of CSR on recommendations, I&S specifies:

$$MRec_{it} = \beta_1 CSR_{it} + \omega \mathbf{x}_{it} + \varphi \mu_{it-1} + \delta \mathbf{z}_{it} + e_{it} \tag{2}$$

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where $\boldsymbol{x}_{it}$ is a vector of control variables, $\boldsymbol{\mu}_{it\text{-}1}$ is a vector of (lagged) control variables, and $\mathbf{z}$ is a "vector of fixed effects to capture constant effects of firm and year" (I&S, pg. 1061). Notable in equation 2 is the lack of any measure with which to evaluate the hypothesized temporal effect of CSR. Instead, I&S changes the sample. It estimates coefficients using successive samples: 1993-1996, 1993-1997, 1993-1998, and so on, until the final sample includes firms from 1993-2007. In an attempt to capture changing behavior, I&S conducts t-tests of β_1 for each sample frame.

$$\text{Testing: H: } \beta_1^{93-96} = 0, \text{ H: } \beta_1^{93-97} = 0, \ldots \text{H: } \beta_1^{93-07} = 0 \tag{3}$$

I&S reports negative and significant estimates of β_1 for the initial 1993-1996 sample, but the point estimate becomes more positive and loses significance for samples including years ending in 2002 and later (see I&S, Table 4, pg. 1066-1067). From this loss of significance, I&S infers: "Over time and leading to 2007, analysts issue increasingly less pessimistic and, eventually, optimistic recommendations for firms with higher CSR scores" (I&S, pg. 1054). It concludes that it finds evidence sufficient to support Hypothesis 1 by rejecting the null hypothesis of no difference.

Limitations of the I&S Empirical Method

The I&S method of evaluating sequentially pooled samples severely limits the inferences that can be made from the reported estimates. I&S also pools evaluations from many analysts to form firm ratings, making it challenging to differentiate changing analyst behavior from changes in the identity of analysts evaluating firms.

Limitations caused by pooling years

I&S hypothesizes that analysts become less pessimistic about the prospects of high CSR firms over time. Its hypothesis can be restated as:

$$\text{H1: } \beta_1^{1993} < \beta_1^{94} < \ \beta_1^{95} < \ldots \beta_1^{2007}, \text{where Y} = \beta_1 * CSR \tag{4}$$

This hypothesis can be tested using a variety of specifications: inspection of CSR interacted with a parameterized time variable, separate calculations of β_1 for each year, or other specifications that allow comparison of coefficient magnitudes over time.

I&S uses neither of these approaches and instead tests the null hypothesis that $\beta_1 = 0$ for all the pools in its sample (as in 3 above). It reports evidence sufficient to reject the null for coefficients estimated using samples of earlier years (e.g., 1993-1996) and a lack of such evidence for coefficients estimated using

samples of more years (e.g., 1993-2007). Based on this visual pattern of coefficient estimates, I&S infers that "as time goes by, analysts' reactions to CSR scores become increasingly less unfavorable, and eventually become favorable" (I&S, pg. 1065).

Unfortunately, I&S's visual test of coefficients is not dispositive. The pooled structure of I&S's analytical method makes an accurate test of their hypothesis (4) challenging and allows rival explanations for their estimates. For example, the pooled structure could enable "regression to the mean" to cause estimates that seem to imply a gradual change in analyst behavior when, in fact, the change was sudden. Figure 1 shows a simple demonstration of this process. Large grey dots show the true effect of CSR for each year. Note that we assume that the true effect of CSR was strongly negative from 1993 to 1996, and then constant thereafter. The bending line shows coefficients that would occur as this initially negative effect was diluted with the later data. The simulated effect is well within the confidence interval for I&S's measured effect, suggesting that regression to the mean provides a plausible rival explanation for I&S coefficient estimates.

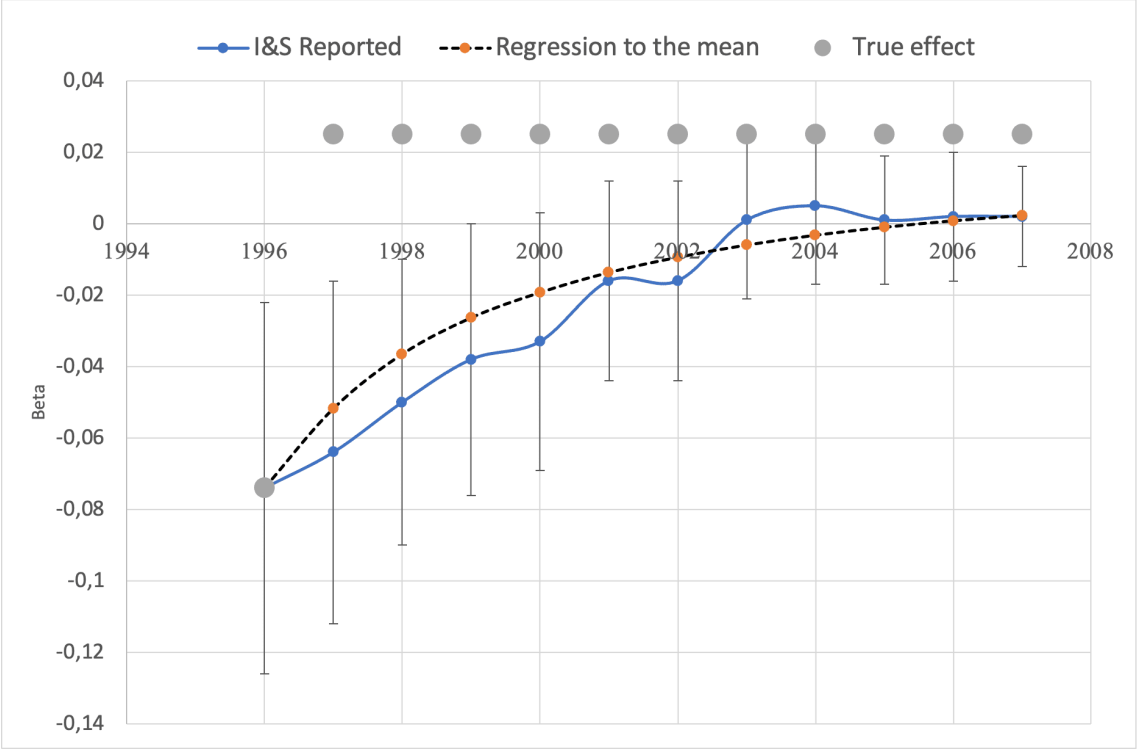

Figure 1. Demonstration of potential for regression to the mean.

This simulation assumes a simple regression with no covariance between factors.

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Limitations caused by pooling analysts

I&S hypothesizes that individual analysts alter their evaluations as they respond to changes in the world around them. The best way to evaluate this hypothesis is to evaluate recommendations from each analyst over time, but the I&S method prevents such analysis by pooling the ratings of all analysts covering a firm. Because the number and identity of these analysts can vary yearly, information on changes in each analyst's behavior is lost. Changes in the identity of analysts covering firms will influence firm-level pooled scores, obscuring how individual analysts modify their recommendations.

In summary, the I&S analysis limits what can be inferred from its estimates because its coefficient estimates are codetermined by changing samples and analysts.

Replication and Rectification

Given the outsized influence of I&S and the ambiguity of its reported estimates, it represents a good candidate for replication and rectification. Below, we follow current recommendations for conducting replications[7]. We first replicate the original sample and method to ensure we fully understand the original analysis. As questions emerged, we contacted the original authors for additional information (but received no response). After thoroughly replicating the original analysis, we rectify some of its limitations by conducting additional analysis at the analyst level. For robustness and to allow better comparison and more up-to-date estimates, we conduct our analysis for both the original 1993-2007 frame and an extended frame covering 1993-2016.

Data Sources

To replicate and extend the original study, we used data from the same sources used in the I&S research: Compustat, the Center for Research in Security Prices (CRSP), the Institutional Brokers' Estimate System (I/B/E/S), and Kinder, Lydenberg, and Domini (KLD). This enabled us to assess the accuracy and robustness of the original findings. We merged the data using Compustat CUSIP numbers.

Compustat is a comprehensive database of financial, statistical, and market information on global companies, provided by S&P Global Market Intelligence. It contains standardized financial statement data for publicly traded companies, including balance sheets, income statements, cash flow statements, and various financial ratios. The database is available through subscription via the Wharton Research Data Services (WRDS) platform.

I/B/E/S, now owned by Refinitiv, is a database that provides global analyst forecasts and recommendations data. It contains detailed analyst estimates, forecasts, and recommendations for public companies worldwide. The database is accessible through subscription services like WRDS or Refinitiv Eikon.

CRSP is a comprehensive database maintained by the University of Chicago's Booth School of Business that provides historical stock market data, including security prices, returns, and trading volumes for NYSE, AMEX, and NASDAQ stocks. It is considered the primary source for research-quality US stock market data and is available through subscription via WRDS. Academic researchers and financial professionals primarily use these databases.

KLD provides environmental, social, and governance (ESG) ratings and research for global companies. The database evaluates companies across various ESG dimensions, including community relations, diversity, employee relations, environment, product quality/safety, and corporate governance. Access is available through a subscription to MSCI ESG Research services. We extended the dataset through 2016 to provide more recent estimates. The endpoint was chosen to align with data availability.

Measures

The primary outcome variable in I&S is MRec_{it} (see Eq. 2). It represents the mean investment recommendation for all analysts covering firm i in year t. Analysts' recommendations are typically scored on a 5-point scale, where 1 represents a strong buy and 5 represents a strong sell recommendation. Following I&S, we invert the scores for more straightforward interpretation, so higher values indicate more favorable recommendations.

Our primary independent variable of interest is the Total CSR Strengths score, which we constructed using data from Kinder, Lydenberg, and Domini (KLD). This composite score is calculated as follows. We begin with KLD's ratings across various CSR dimensions, including community relations, diversity, employee relations, environment, and product quality/safety. KLD provides a set of binary strength indicators for each dimension, where 1 signifies the presence of a particular strength, and 0 signifies its absence. Total CSR Strengths is then computed as the equally weighted sum of these specific strength scores. We use the same process to create a Total CSR Concerns score.

Following I&S, we include several control variables such as the number of analysts following the firm, mean house size, long-term forecast error, market value, market-adjusted returns, intangibles, return on

assets, earnings-to-price ratio, book-to-market ratio, and capital expenditure. We explore differential impacts across analyst experience quartiles and brokerage house sizes in additional analyses.

Results

Descriptive Statistics

As shown in Table 1, the descriptive statistics for our sample conform to those reported in the original paper by Ioannou and Serafeim[5]. The differences in the calculated means are significant, but Cohen's D for the differences is less than 0.2 for all variables except for our measure of the number of analysts. We find more analysts covering each company. One possible explanation is that IBES improved or changed its coverage over time.

Another important difference in the descriptive statistics concerns the standard deviation of the "Long Term Forecast Error." This is probably due to differences in the construction of this variable. I&S does not provide a specific formula for its construction. Our calculation is:

$$ForecastError_{it} = \sum_{a=1}^{A} \frac{\sum_{j=1}^{J} \left[\frac{2*(\gamma_{aijt} - \delta_{ijt})}{(\gamma_{aijt} + \delta_{ijt})} \right] \theta_{aijt}}{\sum_{j=1}^{J} [\theta_{aijt}]} \forall \; a \; covering \; i \; in \; year \; t \tag{5}$$

where there are 1 to A analysts covering each firm i and they each issue 1 to j forecasts, γ_{aijt} is the long-term forecast issued by the analyst, δ_{ijt} is the realized (actual) value corresponding to that forecast, and θ_{aijt} is the weight assigned to each forecast instance.

Our calculation follows accepted standards, but descriptive statistics suggest it may not match with I&S. We note, for example, that the I&S measure seems to be bounded by the range [-0.5, 0.5], but our measure is not so bounded.

Despite such differences, the overall similarity in descriptive statistics between our sample and the original study suggests that our dataset is comparable, providing a solid foundation for our replication and extension efforts.

	Ioannou & Serafeim (2015)				Replication				Cohen's D
Variable	*Mean*	*Std. dev.*	*Min*	*Max*	*Mean*	*Std. Dev.*	*Min*	*Max*	
Mean analyst recommendation	3.652	0.520	1.00	5.00	3.598	0.535	1.00	5.00	0.07
Total CSR strengths	1.055	1.481	0.00	15.71	1.144	1.517	0.00	15.96	0.04
Total CSR concerns	1.014	1.079	0.00	12.41	1.118	1.129	0.00	11.35	0.07
Number of analysts	10.707	7.067	1.00	47.00	14.032	9.387	1.00	61.00	0.28
Mean house size	64.047	36.638	1.00	353.00	65.195	29.443	1.00	350.00	0.02
Long-term forecast error	0.005	0.033	-0.45	0.50	0.009	0.515	-2.69	2.41	0.01
Market value (size)	14.476	1.467	11.30	19.33	14.644	1.462	9.09	20.21	0.08
Market-adjusted return	0.037	0.402	-0.86	3.21	0.083	0.414	-0.78	1.86	0.08
Intangibles	0.139	0.175	0.00	0.77	0.128	0.165	0.00	0.75	0.05
Return on assets	0.082	0.111	-0.57	0.42	0.055	0.090	-0.57	0.25	0.19
Earnings-to-price ratio	0.029	0.093	-1.54	0.20	0.026	0.117	-1.50	0.23	0.02
Book-to-market ratio	0.438	0.281	-0.25	3.20	0.432	0.278	-0.45	2.32	0.02
Capital expenditure	0.049	0.054	0.00	0.36	0.051	0.050	0.00	0.30	0.02
	N= 16064				N= 16088				

Table 1. Descriptive Statistics for Replication Sample

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	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Mean analyst	1.00												
2	Total CSR strengths	-0.03	1.00											
3	Total CSR concerns	-0.03	0.36	1.00										
4	Number of analysts	0.05	0.29	0.28	1.00									
5	Mean house size	-0.10	0.12	0.19	0.10	1.00								
6	Long-term forecast error	-0.02	-0.01	-0.01	0.00	0.00	1.00							
7	Market value (size)	0.06	0.44	0.46	0.68	0.35	0.01	1.00						
8	Market-adjusted return	0.15	-0.04	-0.02	-0.05	-0.04	-0.02	0.01	1.00					
9	Intangibles	0.02	-0.04	0.02	-0.05	0.13	-0.01	0.02	-0.04	1.00				
10	Return on assets	0.06	0.05	-0.02	0.08	0.03	0.06	0.20	0.06	0.01	1.00			
11	Earnings-to-price ratio	0.04	0.01	-0.05	0.01	0.00	0.08	0.13	0.08	-0.06	0.60	1.00		
12	Book-to-market ratio	-0.15	-0.05	0.03	-0.16	0.03	-0.01	-0.22	-0.25	-0.05	-0.14	-0.01	1.00	
13	Capital expenditure	0.08	-0.02	0.03	0.21	0.00	0.01	0.05	-0.04	-0.19	0.12	0.02	-0.09	1.00
	(obs=16,088)													

Table 2. Correlation Statistics for Replication Sample

Analysis

Tables 3 and 4 show coefficient estimates from our replication. Following I&S, we initially limit the analysis to those firms that were in the panel for at least 8 of the 14 years. We then extend the sample to include all firms. Finally, we split the sample based on analyst experience and evaluate separately those firms with experienced vs inexperienced analysts.

For Tables 3 A & B, the dependent variable is the mean recommendation of the analysts for bundles of years that include observations for the period 1993–1996, and additional years are added in each subsequent column. The main independent variable is *Total CSR Strengths*.

With respect to the control variables used in the model, our coefficient estimates differ most substantially from the I&S report for the coefficient for Market Value. I&S estimates a positive coefficient, whereas we usually estimate a negative one. We conjecture that the difference may be caused by variations between the lag structure of the model used in I&S and our replication. If we do not lag market value one year, we also estimate a positive coefficient. I&S seems to indicate that they lagged market value one year, but it is possible we have not interpreted the report as intended. Fortunately, changes to the lag structure for market value do not change the sign and significance of our main coefficient of interest (*Total CSR Strengths*). Our coefficient estimates also differ from those in I&S for Long-term Forecast Error. This is not surprising given the uncertainties in the construction of this variable.

Table 3 shows the coefficient estimates obtained from the sample limited only to those firms that appeared in the sample for at least 8 years. Unlike I&S, we do not detect evidence of a substantive or significant change in the influence of CSR strengths over time. In Table 4, we repeat the analysis without requiring an 8-year panel length. Relaxing this criterion means that the sample expands. Nonetheless, a similar pattern emerges: most coefficient estimates for the effect of CSR are positive, and all confidence intervals include zero.

In total, the estimates presented in Tables 3 and 4 provide no support for I&S's principal hypothesis: "Over time, sell-side analysts' recommendations will be less pessimistic for firms with high CSR scores."

Period	*1993-1996*	*1993-1997*	*1993-1998*	*1993-1999*	*1993-2000*	*1993-2001*	*1993-2002*	*1993-2003*	*1993-2004*	*1993-2005*	*1993-2006*	*1993-2007*
Total CSR Strengths	0.030	0.036	0.008	0.022	0.018	0.021	0.020	0.015	0.007	0.005	0.006	0.003
	(0.037)	(0.030)	(0.026)	(0.024)	(0.021)	(0.018)	(0.016)	(0.010)	(0.009)	(0.007)	(0.007)	(0.006)
Total CSR concerns	-0.027	-0.016	-0.017	-0.019	-0.016	-0.005	-0.009	-0.013	-0.012	-0.018	-0.017	-0.018
	(0.036)	(0.030)	(0.025)	(0.022)	(0.020)	(0.017)	(0.015)	(0.012)	(0.011)	(0.011)	(0.010)	(0.010)
Number of analysts	-0.001	0.000	-0.001	-0.000	-0.000	-0.002	-0.005*	-0.005**	-0.006**	-0.006**	-0.006**	-0.005**
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Mean house size	-0.001	0.000	-0.001	-0.001	-0.001	-0.001	-0.001*	-0.002***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Long term-forecast error	-0.044	-0.082*	-0.063*	-0.065**	-0.081***	-0.064***	-0.066***	-0.053***	-0.060***	-0.064***	-0.062***	-0.054***
	(0.038)	(0.032)	(0.028)	(0.025)	(0.021)	(0.018)	(0.016)	(0.015)	(0.015)	(0.014)	(0.014)	(0.013)
Market value (size)	0.023	-0.040	-0.075	-0.117**	-0.103**	-0.062*	-0.024	-0.019	-0.014	-0.014	-0.005	-0.003
	(0.091)	(0.067)	(0.053)	(0.042)	(0.034)	(0.029)	(0.025)	(0.023)	(0.021)	(0.020)	(0.019)	(0.018)
Market adjusted return	0.076	0.104*	0.095*	0.123***	0.126***	0.142***	0.131***	0.145***	0.135***	0.146***	0.154***	0.160***
	(0.063)	(0.051)	(0.043)	(0.037)	(0.031)	(0.027)	(0.024)	(0.023)	(0.022)	(0.022)	(0.021)	(0.021)
Intangibles	0.342	0.215	0.106	0.065	0.003	-0.038	0.038	0.086	0.093	0.086	0.143	0.176
	(0.441)	(0.319)	(0.249)	(0.207)	(0.181)	(0.159)	(0.138)	(0.122)	(0.113)	(0.106)	(0.100)	(0.093)
Return on assets	0.459	0.063	0.139	0.245	-0.033	0.151	0.365	0.249	0.294	0.347	0.354*	0.378*
	(0.615)	(0.499)	(0.393)	(0.332)	(0.295)	(0.255)	(0.220)	(0.196)	(0.190)	(0.186)	(0.179)	(0.174)
Earnings-to-price ratio	-0.108	0.104	0.031	-0.022	0.093	-0.045	-0.082	-0.030	-0.015	-0.013	-0.024	-0.022
	(0.256)	(0.231)	(0.206)	(0.195)	(0.183)	(0.143)	(0.121)	(0.102)	(0.101)	(0.100)	(0.097)	(0.096)
Book-to-market ratio	-0.587**	-0.564***	-0.547***	-0.505***	-0.491***	-0.279***	-0.219***	-0.201***	-0.190***	-0.179***	-0.157***	-0.158***
	(0.205)	(0.160)	(0.135)	(0.109)	(0.087)	(0.066)	(0.061)	(0.053)	(0.050)	(0.048)	(0.046)	(0.044)
Capital expenditure	-0.624	-0.527	-0.615	-0.260	-0.064	0.260	0.140	0.035	-0.054	-0.001	0.069	0.176
	(0.682)	(0.552)	(0.463)	(0.412)	(0.371)	(0.346)	(0.319)	(0.300)	(0.293)	(0.288)	(0.281)	(0.273)
F	3.026	4.348	4.592	11.011	13.216	12.872	20.798	30.050	35.100	36.686	39.416	39.766
r2	0.053	0.059	0.052	0.101	0.107	0.096	0.137	0.177	0.192	0.191	0.197	0.194
N	1133.000	1445.000	1783.000	2119.000	2448.000	2776.000	3105.000	3436.000	3768.000	4086.000	4382.000	4659.000
N_g	308.000	322.000	342.000	342.000	342.000	342.000	342.000	342.000	342.000	342.000	342.000	342.000

***p<0.01, **p<0.05, *p<0.10, std error in parenthesis

Table 3. Replication of I&S Analysis for Restricted Sample

Period	*1993-1996*	*1993-1997*	*1993-1998*	*1993-1999*	*1993-2000*	*1993-2001*	*1993-2002*	*1993-2003*	*1993-2004*	*1993-2005*	*1993-2006*	*1993-2007*
Total CSR Strengths	0.016	0.018	-0.006	-0.001	-0.002	0.008	0.009	0.015	0.005	0.006	0.010	0.008
	(0.025)	(0.022)	(0.019)	(0.017)	(0.016)	(0.014)	(0.013)	(0.008)	(0.007)	(0.006)	(0.006)	(0.005)
Total CSR concerns	-0.036	-0.026	-0.022	-0.023	-0.019	-0.011	-0.011	-0.012	-0.020*	-0.022**	-0.023**	-0.025***
	(0.024)	(0.020)	(0.018)	(0.016)	(0.015)	(0.013)	(0.012)	(0.010)	(0.009)	(0.008)	(0.008)	(0.007)
Number of analysts	-0.002	0.000	-0.001	-0.001	-0.001*	-0.001	-0.001**	-0.002***	-0.002***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mean house size	-0.003	0.001	0.001	0.001	0.001	-0.001	-0.003	-0.003*	-0.004**	-0.004*	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Long term-forecast error	-0.015	-0.030	-0.031*	-0.035*	-0.042***	-0.047***	-0.047***	-0.038***	-0.040***	-0.049***	-0.044***	-0.032***
	(0.019)	(0.017)	(0.015)	(0.014)	(0.013)	(0.012)	(0.011)	(0.010)	(0.009)	(0.008)	(0.007)	(0.007)
Market value (size)	-0.012	-0.080	-0.101**	-0.115***	-0.104***	-0.084***	-0.051*	-0.042*	-0.032	-0.046**	-0.054***	-0.052***
	(0.060)	(0.046)	(0.037)	(0.031)	(0.026)	(0.023)	(0.021)	(0.018)	(0.017)	(0.016)	(0.015)	(0.014)
Market adjusted return	0.087*	0.125***	0.139***	0.156***	0.143***	0.146***	0.129***	0.134***	0.116***	0.097***	0.112***	0.121***
	(0.042)	(0.036)	(0.031)	(0.028)	(0.024)	(0.021)	(0.018)	(0.017)	(0.015)	(0.013)	(0.012)	(0.012)
Intangibles	0.412	0.314	0.145	0.125	0.002	-0.056	0.007	0.057	0.070	0.062	0.087	0.092
	(0.319)	(0.234)	(0.183)	(0.158)	(0.141)	(0.127)	(0.112)	(0.096)	(0.087)	(0.080)	(0.072)	(0.065)
Return on assets	-0.577	-0.584	-0.375	-0.296	-0.354	-0.149	0.129	0.166	0.181	0.283**	0.230*	0.205*
	(0.349)	(0.303)	(0.233)	(0.210)	(0.195)	(0.179)	(0.154)	(0.129)	(0.118)	(0.105)	(0.096)	(0.088)
Earnings-to-price ratio	0.263	0.366**	0.342**	0.298*	0.307**	0.171	0.089	0.030	0.002	-0.001	-0.007	-0.012
	(0.155)	(0.140)	(0.122)	(0.116)	(0.111)	(0.097)	(0.086)	(0.066)	(0.059)	(0.057)	(0.054)	(0.052)
Book-to-market ratio	-0.421***	-0.454***	-0.429***	-0.420***	-0.413***	-0.292***	-0.254***	-0.202***	-0.193***	-0.227***	-0.245***	-0.242***
	(0.110)	(0.092)	(0.080)	(0.069)	(0.059)	(0.048)	(0.045)	(0.037)	(0.034)	(0.032)	(0.031)	(0.029)
Capital expenditure	-0.410	-0.612	-0.698*	-0.479	-0.399	-0.112	-0.127	-0.146	-0.159	-0.231	-0.277	-0.077
	(0.488)	(0.408)	(0.344)	(0.314)	(0.287)	(0.272)	(0.248)	(0.226)	(0.215)	(0.203)	(0.190)	(0.174)
F	5.300	8.455	10.304	17.819	19.552	19.216	32.563	46.526	53.141	51.220	56.184	56.204
r2	0.048	0.061	0.064	0.095	0.096	0.088	0.132	0.161	0.163	0.129	0.119	0.106
N	2279.000	2820.000	3369.000	3895.000	4418.000	4956.000	5848.000	6842.000	9159.000	11504	13845	16088
N_g	686.000	727.000	782.000	830.000	893.000	963.000	1347.000	1497.000	2848.000	3194.000	3461.000	3680.000

***p<0.01, **p<0.05, *p<0.10, std error in parenthesis

Table 4. Replication of I&S Analysis for Unrestricted Sample

Following best replication practices, we also replicated the auxiliary and robustness analyses reported in I&S. The results of these tests match those shown in Tables 3 & 4. I&S reports that both groups became more favorably disposed to firms with high *Total CSR Strengths*, and for analysts with more experience, the effect became positive in the larger samples. We find that neither group changed significantly, and if anything, those analysts with less experience became more favorable to CSR strengths over time. These results are available from the authors.

Extension

We turn now to an extension of the original I&S analysis. Though seminal in its exploration of analyst recommendations, its use of sequentially expanding samples makes it hard to distinguish the cause of coefficient changes. Do they capture changing behavior among analysts or other changes in the sample configuration? It is also difficult to interrogate the individual year coefficients because their changes capture both information from the new data and the dilution of the effect of the old. This problem could allow "regression to the mean" to cause estimates that analysts are changing their behavior when, in fact, an initial strong effect is being diluted by the growth of the panel over time (see Figure 1).

In our first extension, we eliminate the expanding sample. We keep the same base period as I&S, 1993-1996, but we allow each subsequent year to have a different coefficient. To test the hypothesis of a reduction of influence for high CSR, we also estimate a linear form of this changing effect. We specify:

$$\text{MRec}_{it} = \beta_1 CSR_{it} + \beta_2 CSR_{it} * time + \omega \mathbf{x}_{it} + \varphi \mu_{it-1} + \delta \mathbf{z}_{it} + e_{it} \quad (6)$$

OR

$$\text{MRec}_{it} = \beta_1 CSR_{it} + \theta CSR_{it} * \mathbf{T}_t + \omega \mathbf{x}_{it} + \varphi \mu_{it-1} + \delta \mathbf{z}_{it} + e_{it} \quad (7)$$

where the mean forecast from analysts (MRec_{it}) is calculated for each firm *i* in year *t*. We follow I&S in specifying a vector of control variables ($\mathbf{x}_{it}$), a vector of (lagged) control variables ($\mathbf{u}_{it-1}$), and a vector of firm- and year-fixed effects ($\mathbf{z}$). We capture changes in the influence of CSR over time by interacting CSR with linear time (*time*) or by interacting CSR with a vector of time dummies T_t capturing each year after 1993.

	(1)	(2)	(3)	(4)	(5)	(6)
Tot CSR Strengths	0.003	0.008	0.02	-0.004	-0.003	-0.009
	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)
Tot CSR Concerns	-0.017	-0.024***	-0.022	-0.033*	-0.026	-0.044*
	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)
StrengthsX LinearTime			-0.001	0.001		
			(0.00)	(0.00)		
ConcernsX LinearTime			0.00	0.001		
			(0.00)	(0.00)		
F	39.884	56.144	37.065	52.173	19.577	27.355
R2	0.194	0.105	0.195	0.105	0.198	0.107
N	4666	16095	4666	16095	4666	16095
Ng	343	3683	343	3683	343	3683

Table 5. Extension of I&S Analysis at Firm Level

Table 4 Models 1, 3, and 5 report coefficients for the sample restricted to firms with at least 8 observations in the panel. Models 2, 4, and 6 report estimates from the unrestricted sample. Models 1 and 2 estimate just the base effect of CSR, Models 3 and 4 include a linear interaction with time, and Models 5 and 6 include interactions with the time dummies. The coefficients for these interactions are not shown but are graphed in Figure 2.

As shown, across all the models, we do not estimate a statistically significant effect of CSR strengths on analysts' recommendations. We estimate a negative coefficient for CSR concerns, which could be deemed statistically significant for estimates using the unrestricted sample. We find no evidence of a linear time effect on analysts' reactions to either strengths or concerns.

Figure 2 provides a graphical depiction of the annual effects estimated in Models 4&5. As shown, all but one of the annual effects is non-significant. Only for strengths in 1996 does the 95% confidence interval exclude zero. Furthermore, consistent with the estimates from Tables 3 and 4, we perceive no strong trend in the response of analysts to CSR strength scores.

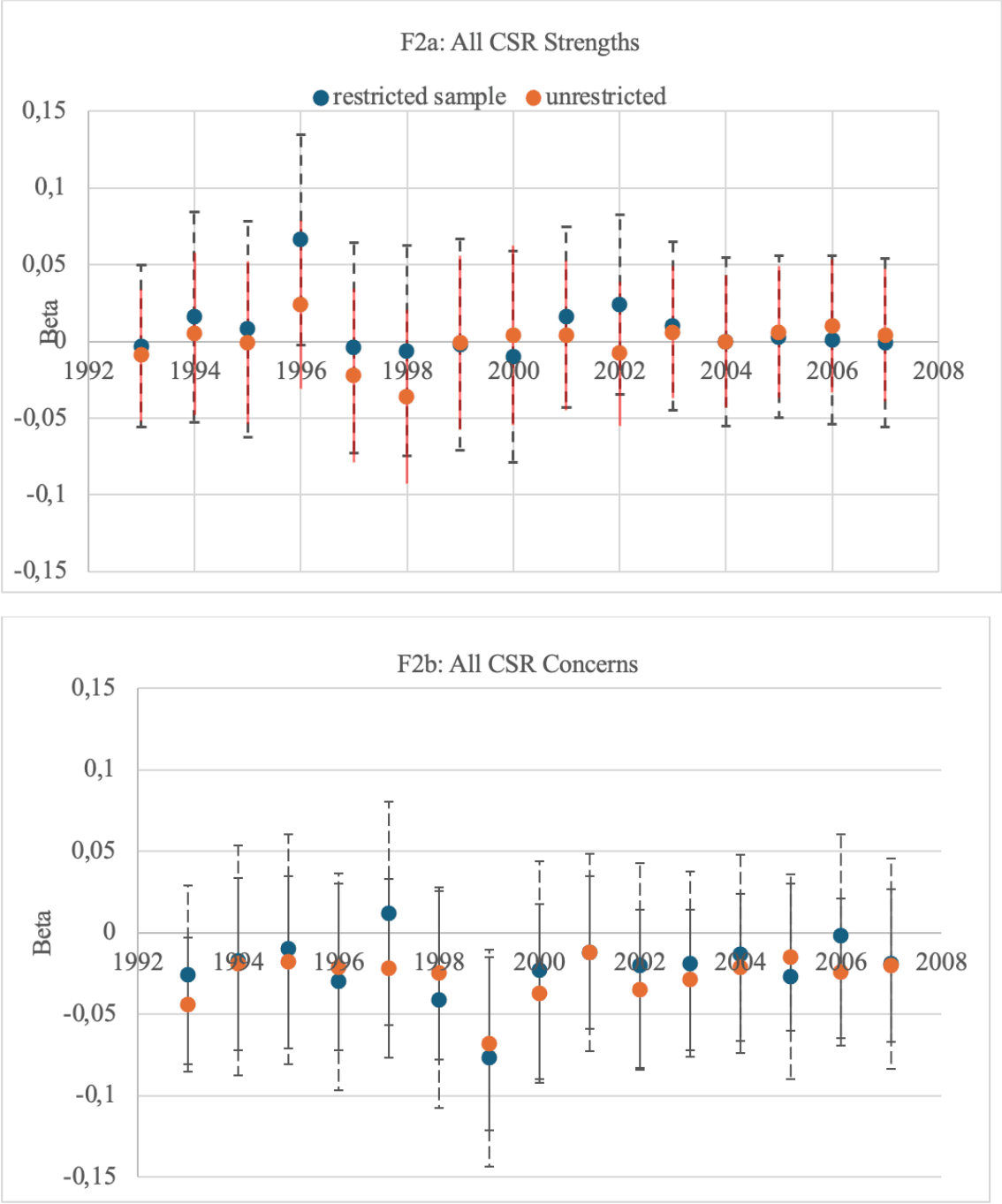

Figure 2. Annual Estimates of the Effect of CSR on Analyst Recommendations

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In a final extension, we move the unit of analysis to the individual agent. This allows us to separate changes in analyst behavior from changes in the analysts covering firms. We specify:

$$\text{Rec}_{ait} = \beta_1 CSR_{it} + \beta_2 CSR_{it} * time + \omega \mathbf{x}_{it} + \varphi \mu_{it-1} + \delta \mathbf{z}_{it} + \alpha + e_{it} \quad (8)$$

OR

$$\text{Rec}_{ait} = \beta_1 CSR_{it} + \theta CSR_{it} * \mathbf{T}_t + \omega \mathbf{x}_{it} + \varphi \mu_{it-1} + \delta \mathbf{z}_{it} + \alpha + e_{it} \quad (9)$$

where an analyst evaluates firm i in each year t, and forecasts Rec_{ait}. We capture changes in the influence of CSR over time by interacting CSR with linear time (*time*) or by interacting CSR with a time dummy capturing each year after 1993. To account for unobservable fixed differences in analysts, we add a fixed effect for each analyst (α). The control variables are the same as in I&S.

	mean	sd												
1 Analyst Rating	3.61	0.89	1.00											
2 Total CSR strengths	1.42	1.77	-0.02	1.00										
3 Total CSR concerns	1.31	1.26	-0.02	0.40	1.00			N = 12338						
4 Number of analysts	1.76	0.87	-0.05	0.20	0.20	1.00								
5 Mean house size	19.83	10.64	0.05	0.29	0.21	0.03	1.00							
6 Long-term forecast error	68.32	25.51	-0.04	0.08	0.15	0.22	-0.07	1.00						
7 Market value (size)	15.26	1.50	0.06	0.49	0.45	0.25	0.64	0.25	1.00					
8 Market-adjusted return	0.09	0.42	0.08	-0.05	-0.04	-0.15	-0.05	-0.03	0.01	1.00				
9 Intangibles	0.12	0.16	0.00	-0.04	0.01	0.02	-0.08	0.14	-0.01	-0.03	1.00			
10 Return on assets	0.04	0.10	0.06	0.05	-0.03	0.11	0.08	-0.01	0.20	0.08	-0.03	1.00		
11 Earnings-to-price ratio	0.02	0.12	0.05	0.00	-0.05	0.08	-0.01	-0.03	0.12	0.09	-0.09	0.62	1.00	
12 Book-to-market ratio	0.40	0.27	-0.09	-0.05	0.06	0.05	-0.16	0.04	-0.22	-0.25	-0.02	-0.18	-0.02	1.00
13 Capital expenditure	0.06	0.05	0.04	-0.04	0.01	0.01	0.23	-0.05	0.03	-0.05	-0.22	0.12	0.02	-0.09
1 Analyst Rating	3.58	0.88	1.00											
2 Total CSR strengths	1.50	1.99	-0.02	1.00										
3 Total CSR concerns	1.29	1.46	-0.01	0.37	1.00									
4 Number of analysts	2.01	1.03	-0.07	0.20	0.17	1.00		N = 248917						
5 Mean house size	19.27	10.80	0.02	0.35	0.22	0.05	1.00							
6 Long-term forecast error	65.30	22.99	-0.05	0.10	0.14	0.17	-0.01	1.00						
7 Market value (size)	15.15	1.56	0.03	0.55	0.43	0.23	0.64	0.31	1.00					
8 Market-adjusted return	0.07	0.42	0.10	-0.04	-0.04	-0.13	-0.02	-0.04	0.04	1.00				
9 Intangibles	0.15	0.18	0.01	0.02	0.01	0.06	-0.03	0.09	0.06	-0.02	1.00			
10 Return on assets	0.04	0.11	0.02	0.09	0.03	0.11	0.12	0.04	0.26	0.09	0.03	1.00		
11 Earnings-to-price ratio	0.02	0.16	0.03	0.04	0.00	0.06	0.03	0.03	0.19	0.13	-0.01	0.61	1.00	
12 Book-to-market ratio	0.46	0.35	-0.07	-0.03	0.02	0.08	-0.13	-0.04	-0.22	-0.28	-0.06	-0.15	-0.12	1.00
13 Capital expenditure	0.05	0.06	0.03	-0.05	0.05	-0.05	0.23	-0.08	0.00	-0.05	-0.24	0.05	-0.03	-0.05

Table 6. Descriptive Stats for Analysis at Analyst Level

Table 6 provides our estimated coefficients of interest. Models 1-3 use the data from I&S's original time frame (1993-2007). Models 4-6 extend the data to 2016. Models 1 and 4 include only main effects for CSR, Models 2 and 5 allow a time trend, and Models 3 and 6 use year dummies to allow a non-parametric

trend. In general, we estimate negative coefficients for both CSR strengths and weaknesses. When a linear trend or year dummies are interacted with, the main effect is not significant for CSR Strengths. With a linear trend, we estimate a negative coefficient for concerns and a positive trend that is even significant for the longer sample.

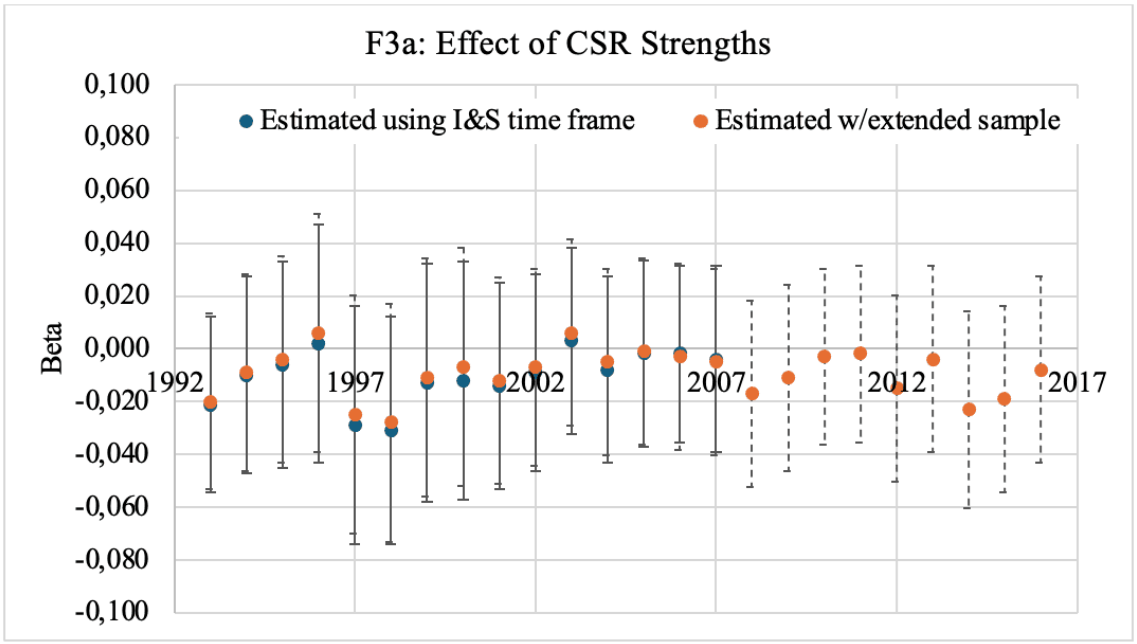
Figure 3 graphs the coefficient estimates for each year from models 3 & 6. Consistent with models 2 and 5, there is no evidence of a linear trend for CSR coefficients with year, but there is a hint of a rising favorable response to CSR concerns, particularly in the extended sample.

In total, we again find no evidence that CSR analysts improve their response to CSR over time.

	(1)	(2)	(3)	(4)	(5)	(6)
All Strengths	-0.004	-0.017	-0.021	-0.006**	0.000	-0.020
	(0.003)	(0.009)	(0.017)	(0.002)	(0.007)	(0.017)
All Concerns	-0.012*	-0.026*	-0.024	-0.001	-0.021**	-0.027
	(0.005)	(0.010)	(0.017)	(0.003)	(0.008)	(0.017)
StrengthsX LinearTime		0.001			-0.000	
		(0.001)			(0.000)	
ConcernsX LinearTime		0.001			0.001**	
		(0.001)			(0.000)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE X Concerns			Yes			Yes
Year FE X Strengths			Yes			Yes
F	70.597	66.111	36.038	86.089	81.981	41.763
R2	0.240	0.241	0.241	0.217	0.217	0.217
N	123328	123328	123328	248917	248917	248917

Table 7. Extension of I&S Analysis at Analysts Level

doi.org/10.32388/E37RHF



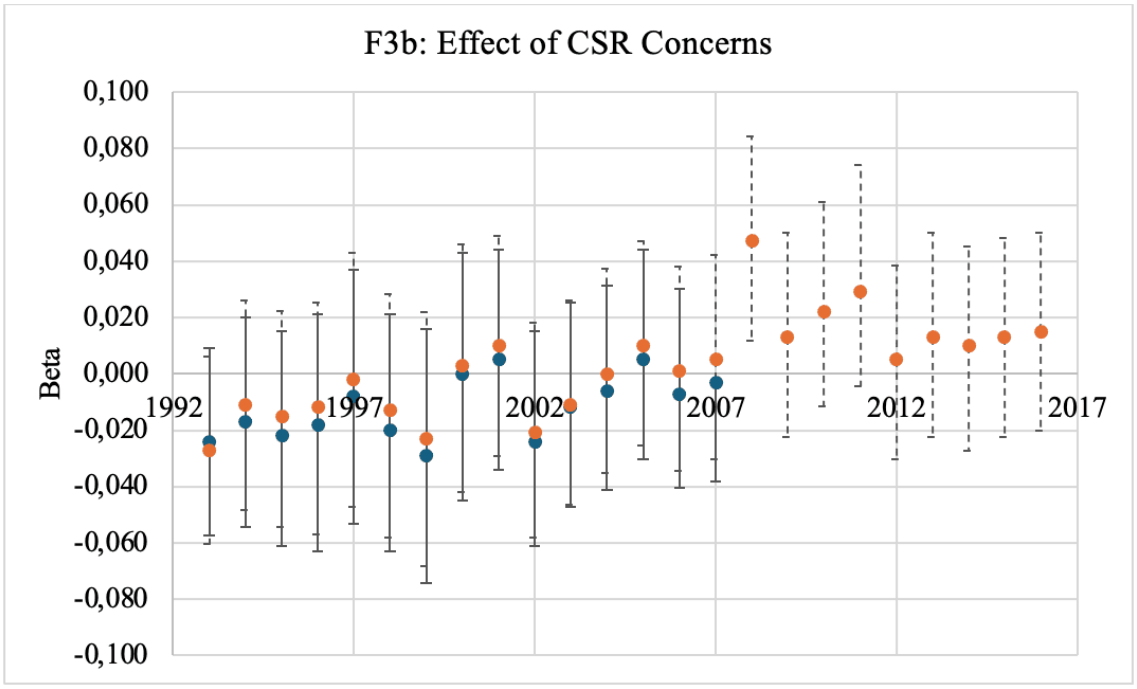


Figure 3. Analyst Level Estimates of Effect of Strengths and Concerns on Analyst Recommendations

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Limitations

Our study relies on historical data sources like Compustat, CRSP, and I/B/E/S. While these datasets are well-established, their relevance may have diminished over time, and analyst practices evolved after 2016. We used KLD CSR strengths and concerns as predictors of analyst recommendations, but some CSR variables or industry-specific factors considered by the analysts may not have been captured in the dataset, i.e., analysts might have considered CSR factors other than the ones considered by KLD. Moreover, the narrow operationalization of CSR using the KLD database could miss nuanced aspects of CSR performance or emerging sustainability criteria.

The fixed effects we used in the study primarily account for financial variables, such as market value, returns, and financial ratios. While these are crucial, they may overlook significant operational factors influencing analyst recommendations. For instance, operational changes like shifts in management strategy, production innovation, or supply chain sustainability practices may also contribute to analysts' perceptions of CSR. The absence of such non-financial and operational controls could lead to an incomplete picture of the dynamics between CSR performance and investment recommendations, potentially biasing the conclusions drawn.

While our study uses year-fixed effects to adjust for economic cycles, it does not deeply explore how macroeconomic shocks, regulatory changes, or societal shifts may have interacted with CSR perceptions during the study period. These limitations provide opportunities for future research to refine methodological approaches, extend the temporal and geographic scope, and incorporate emerging trends in CSR evaluation.

Conclusion

This study examines the previously reported relationship between corporate social responsibility (CSR) and analyst investment recommendations. By replicating and extending the I&S research, we find that the presumed positive association between CSR and analyst favorability is not as robust as previously suggested.

Contrary to the original paper's assertions, we find no evidence that analysts exhibit a consistent positive shift toward firms with high CSR ratings across different years or sample extensions. Our extension research, designed to address potential confounding factors such as regression to the mean, again fails to reveal evidence that analysts' perceptions of CSR changed over time.

This study's contribution is twofold: it challenges the robustness of widely influential findings on CSR and analyst recommendations, and it exemplifies how replication and methodological rigor can refine our understanding of complex relationships in financial and social sciences. By focusing on accounting for analyst-specific behaviors, we contribute a nuanced perspective that calls for a cautious interpretation of CSR's role in shaping investment recommendations. These insights emphasize the importance of reliability in academic research, reinforcing the critical need for replication and methodological scrutiny in studies that influence significant economic and policy decisions. Our analysis highlights the necessity for replication in social science, especially for widely cited studies impacting both academic discourse and investment practices.

Our work emphasizes that without a solid empirical foundation, integrating CSR into corporate strategies could lead to misguided investment decisions, potentially jeopardizing both investor interests and corporate sustainability initiatives. In summary, while the initial findings by Ioannou and Serafeim suggested a positive trajectory in analysts' perceptions of CSR, our replication study calls for a reevaluation of these claims. The ongoing discourse surrounding CSR and its impact on investment recommendations highlights the critical need for continuous empirical validation in this field.

Statements and Declarations

Author Contributions

Andrew King and Ankit Saraf contributed equally to this work. Both authors were involved in the study's conception, data analysis, and manuscript preparation.

Competing Interests

The authors declare no competing interests.

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Declarations

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