Corporate Governance, Biases and Stock Returns

March 2010

Joseph GAWER, PhD

Université Paris Dauphine

NATIXIS Asset Management

PRI Academic Conference 2010
Mainstreaming responsible investment
5-7 May 2010, Copenhagen Business School
Copenhagen, Denmark

Corporate Governance, Biases and Stock Returns

Joseph GAWER[*]
Université Paris Dauphine
NATIXIS Asset Management

March 14, 2010

ABSTRACT

Is improved corporate governance better for shareholders? The current literature suggests that it is. But while a number of studies have found a contemporaneous correlation between firm performance and the quality of corporate governance (see Gompers, Ishii, and Metrick (2003), Bauer, Günster, and Otten (2004), Bebchuk, Cohen and Ferrell (2009)), we know of few empirical studies attempting to examine the effect of managerial actions on corporate governance on subsequent firm performance. This paper attempts to address this gap in the literature by directly examining the relationship between *revisions* in corporate governance's scores and *subsequent* equity returns.

I investigate this issue by tracing the market reaction to changes in Corporate Governance (CG) scores over the period 1999-2009 for the 600 companies included in the European index *Dow Jones Stoxx 600*. The data come from two purpose-built samples of equities of upward and downward revisions in CG scores. In order to take into account the presence of biases in stock markets including size, valuation or price momentum effects, I use specific reference portfolios in our event-study to determine the long-term performances.

This paper presents three main findings. (1) The absence of post-event long-term over-performance is robust for companies with upward revisions in CG scores. (2) The robustness of long-term underperformance is confirmed for the companies with downward revisions in CG scores. (3) The negative abnormal returns obtained over the 24 months following downward revisions are characterized by weak and stable tracking-error volatility during all the post-event period. Thus, the use of the market underreaction to downward revisions in corporate governance scores could be an effective investment strategy.

JEL classification: G14, G30
Keywords: Corporate governance, equity returns, long-term performance, event study

[*]Address correspondence to Joseph Gawer, Natixis Asset Management, 21, Quai d'Austerlitz, 75013 Paris, France. Phone: +331.78.40.86.29. Fax: +331.78.40.60.21. Email: joseph.gawer@am.natixis.com or gawerj@yahoo.fr

I. Introduction

In recent years, corporate governance has received increased attention because of high-profile scandals involving abuse of corporate power and, in some cases, alleged criminal activity by corporate officers. The stock market crisis of 2000-2003 was due in part to weak governance at Enron, Worldcom Parmalat amongst others.

Legislators and regulators tend to address this type of crisis by the introduction of reforms aimed at "restoring confidence" between stakeholders. In the absence of a better solution to protect the interests of shareholders, does the reinforcement of corporate governance influence the short run perception of investors before impacting on corporate equity returns?

Many studies have found a *contemporaneous* correlation between firm performance[1] and the quality of corporate governance (see Gompers, Ishii, and Metrick (2003), Brown and Caylor, (2008), Bebchuk, Cohen and Ferrell (2009)). The existing literature has found that *levels* in corporate governance's scores are contemporaneously correlated with firm performance. However, none of these studies focus on investors' potential reaction to *changes* in corporate governance scores. This paper attempts to address the gap in the literature by directly examining the relationship between *revisions* in corporate governance's scores and *subsequent* equity returns. We do so by investigating the corporate governance (henceforth CG) scores provided by Vigeo, a respected European corporate social responsibility ratings agency, whilst tracking the impact of a series of events – changes in scores – in the financial market.

We begin by splitting the sample of equities in two groups according to changes in their CG scores, between those who experienced *upward* vs. *downward* revisions in CG scores. All revised equities are associated with a stream of future returns. Employing an event study analysis during the period 1999-2009, we measure the financial investors' reaction and test the relationship between the revisions in CG scores and returns and risks of the revised stocks.

To calculate abnormal returns we determine a reference portfolio for every stock following the Fama French (1992) and Carhart (1997) factors models. This approach enables us to account for the presence of stock market biases like size, valuation or price momentum effects.

First, we proceed to examine the abnormal returns in each of the two sub-samples over a period of 24 months *after* the event-month and test whether the abnormal returns are statistically significant. Since commonly used methods to test for long-run abnormal returns yield misspecified test as documented by Kothari and Warner (1997), we also pay attention to statistical biases involved in the calculation of long-term performance. Our event study is built on an event-time approach and we use the specific statistical tests presented in Lyon, Barber and Tsai (1999) to account for the effect of the skew distribution usually observed in long-term abnormal returns.

[1] To discuss the question of the measurement of the firm performance and corporate governance see Charreaux and Desbrières (1998).

Second, we proceed to examine the abnormal returns for the upward and the downward revisions sub-samples over a period of 24 months *prior to* the event-month. We want to see whether there is a link between the abnormal returns prior to the revisions and the direction of the revisions.

We then examine the risks associated to the returns by focusing on the tracking error (the standard deviation of the abnormal returns) of the two sub-samples of revised CG scores companies. It helps us to measure how closely the samples follow the reference portfolios to which they are benchmarked.

To conclude, the evidence indicates significant negative abnormal returns for the downward revisions in CG scores sub-sample. We also find that following the event-month tracking errors increase for the upward revisions in CG scores and are stable for the downward revisions.

The remainder of this paper is organized as follows: The next section gives a brief overview of the financial literature on the relationship between corporate governance and firm performance. Section III describes our hypotheses. Section IV describes our sample, data sources and methodology. Section V presents the results of our empirical investigations on the relationship among corporate governance, stock returns and risks. The final section concludes with a summary and offers suggestions for future research.

II. Related Literature

In this brief survey of empirical research, we review the link between equity returns, firm performance and corporate governance. Those studies broadly distinguish three types of results concerning the sign of the relation (positive, negative or neutral).

The seminal paper of Gompers, Ishii and Metrick (2003) presents evidence of a positive relation between CG and investment performance by examining the relationship between corporate governance and long-term equity returns, firm value and accounting measures of performance. They use 24 measures of CG provided by Investor Responsibility Research Center (IRRC) on 1500 U.S. firms from 1990-1999 and analyse their financial impacts. They construct a “Governance Index” to proxy for the level of shareholders rights - a summary measure of corporate governance - based on the 24 measures of CG. They construct portfolios consisting of firms with numerous anti-takeover amendments ("Dictatorship Portfolio") and portfolios including firms with very few amendments ("Democracy Portfolio"). Subsequently, they examine the returns to holding a long position in the Democracy Portfolio and a short position in the Dictatorship Portfolio. This long-short strategy yields average returns of 8.5 percent per year. The authors determine that well-governed companies are also valued higher and their accounting statements show a better operating performance[2]. Their results clearly support the hypothesis that well-governed companies out-perform their poorly governed counterparts.

[2] The valuation is proxied by Tobin’s Q and their operational measures are net profit margin, return on equity and one-year sales growth.

Drobetz, Schillhofer and Zimmermann (2004) analyze the impact of corporate governance on stock returns over the period 1998-2002 in Germany. Due to the fact that their corporate governance data are limited to one observation, March 2002, they assume constant historical ratings. To construct their sample, the authors sent out questionnaires to 253 German firms in different market segments and received answers from about 36% of these firms. In line with Gompers, Ishii and Metrick (2003), Drobetz, Schillhofer, and Zimmermann (2004) also build factor portfolios consisting of well-governed versus poorly governed firms. After accounting for different factor exposures of the portfolios, their results show an annual excess return around 12 % to a corporate governance long-short strategy.

Klapper and Love (2004) analyze the relationship between corporate governance and firm performance in emerging markets. They use data on firm-level corporate governance rankings across 14 countries for only one year, 1999, on a sample of 335 firms. They find that companies with better governance and better disclosure standards exhibit higher Tobin's Qs[3].

Core, Guay and Rusticus (2005) examine the relationship between corporate governance investment performances. Like Gompers, Ishii and Metrick (2003), they use 24 measures of CG provided by Investor Responsibility Research Center (IRRC) on U.S. firms from 1990 to 1999 and analyse their financial impacts. They find evidence that weak shareholder rights are associated with lower operating performance proxied by Return on Asset.

Philippon (2006) provides empirical evidence that badly governed firms have lower profit margins and are more cyclical than well governed firms. He builds a model where managers are prone to over-invest and where shareholders are more likely to tolerate such behaviour when times are good. His analysis explains the average profit differences as well as the cyclical behaviour of sales, employment and investment for firms with different governance qualities. His results suggest that governance conflicts could explain up to a third of aggregate volatility.

Extending the study of Gompers, Ishii and Metrick (2003) to 2004, Bhagat and Bolton (2007) find that better governance is significantly positively correlated with better contemporaneous and subsequent operating performance

For the UK, Clacher, Doriye and Hillier (2008) study 63 firms of the FTSE 100 and the firms' characteristics are averages for each firm over the 2003 to 2005 time. They find that the well-governed companies are associated with increased firm value proxied by Tobin's Q and operating performance proxied by Return on Asset as well as lower levels of capital expenditure.

Aggarwal, Erel, Stulz and Williamson (2008) use data from RiskMetrics (formerly Institutional Shareholder Service (ISS)) and compare the governance of non-U.S. firms with a matched set of U.S. firms and find that the valuation of non-U.S. firms falls as their governance index value decreases as compared to the governance index of matching U.S. firms. Precisely, they find strong evidence that

[3] Tobin's-Q is defined as the market value of assets (calculated as book value of assets minus book value of equity plus market value of equity) over book value of assets.

non-U.S. firms invest less in internal governance mechanisms that increase the power of minority shareholders than comparable U.S. firms do.

Chhaochharia and Laeven (2009) evaluate the impact of firm-level corporate governance provisions on the valuation of 2300 firms on 23 developed countries for the period 2003 through 2005. They use data source for corporate governance characteristics from Institutional Shareholder Service (ISS). They find a positive association between corporate governance and firm valuation. Despite the cost associated with improving corporate governance a one standard deviation increase in the difference between the firm-level governance score and the minimally accepted country-level governance is associated with an 8 % increase in Tobin's Q.

Among the studies that find a negative relation between corporate governance and investment performance can be included that of Bauer, Günster, and Otten (2004). The authors use Deminor Corporate Governance Ratings for EMU and UK companies included in the FTSE Eurotop 300 index. Due to the fact that they have a limited history of corporate governance ratings available with only two years, 2000 and 2001, they assume constant historical ratings like Drobetz, Schillhofer and Zimmermann (2004). They find a significantly negative correlation between corporate governance and firm performance proxied by Net Profit Margin and also by Return on Equity.

Bebchuk, Cohen and Ferrell (2009) examine which provisions matter among the 24 provisions of IRRC in the relation between corporate governance and investment performance. They identify six entrenching provisions that are negatively correlated with firm performance proxied by Tobin's Q, as well as with stock returns over the period 1990-2003 in the US.

Finally, some studies offer mixed answers about the relation between corporate governance and investment performance. Brown and Caylor (2006) build a governance index (Gov-Score) as of February 2003, which includes in total 51 governance factors provided by the Institutional Shareholders Service (ISS). Linking this index with firm valuation as measured by Tobin's Q, they find a significantly positive relation. When they look for the factors driving the relation between firm valuation and Gov-Sore they find only a small subset of provisions that are related to firm valuation.

Brown and Caylor (2008) more or less replicate their study, but they concentrate on the correlation between governance and the firms' operating performance proxied by Return on Assets and Return on Equity. They show that corporations with low scores in their corporate governance index have significantly lower ROA and ROE. Among the 51 provisions, they identify only 10 factors which show significantly positive correlations with at least one of the two performance measures.

Bassen, Prigge and Zöllner (2008) examine the impact of corporate governance in Germany from the individual provisions of the German Corporate Governance Code (GCGC). They find that for a sample of 100 large listed German companies, the compliance with GCGC at large is significantly and negatively associated with Tobin's Q. Individual analysis of eleven GCGC recommendations

reveals that for three of them, there are not any correlations with performance measures. Four (four) components are significantly positively (negatively) associated with performance measures.

Johnson, Moorman and Sorescu (2009) re-examine the Gompers, Ishii and Metrick (2003) findings of long-term abnormal returns and find that firms in Democracy and Dictatorship portfolios are distributed differently across industries when compared to the general population of firms or to each other. They argue that the presence of industry clustering raises concerns about the robustness of the abnormal returns observed by Gompers, Ishii and Metrick (2003). Using well specified tests under this industry clustering – using a finer three-digit SIC industry return adjustment approach instead of the Fama and French (1997) 48 industry – they find statistically zero long-term abnormal returns for portfolios sorted on governance.

III. Development of hypotheses

This study investigates post-revisions in CG scores performance in Europe, using a sample comprised of scores provided by Vigeo covering the period 1999 to 2009. The scores are transformed in upward revisions and in downward revisions that could be hypothesised to influence post-revision returns.

To begin we investigate the two sub-samples of revisions for differences between the returns of the revised companies and the returns of the benchmark over the post-revision period, and test hypothesis 1a and hypothesis 1b.

Hypothesis 1a In the post-revision period, there are zero long-term abnormal returns for portfolios of upward revisions, that is there is no difference between the returns of the upward revised companies and the returns of the benchmark.

Hypothesis 1b In the post-revision period, there are zero long-term abnormal returns for portfolios of downward revisions, that is there is no difference between the returns of the downward revised companies and the returns of the benchmark.

If those hypotheses are rejected it suggests that investors take time to adjust to the information contained in upward and downward revisions. Alternatively, a finding of post-revisions underperformance could result from risk factors that are unknown to capital market researchers, but apparently known to practitioners.

An examination of the performance of the revised companies *prior to* the revision can act as a check on the robustness of the benchmark which is one reason for testing hypothesis 2a and 2b. The other reason is to test any evidence of similar abnormal returns between pre and post-revision periods. However, the confirmation of robust abnormal returns with similar magnitude prior to and after the revisions raises the question whether the revisions in CG scores contain specific information susceptible to modify the relative performance of equities.

Hypothesis 2a *In the pre-revision period, there are zero long-term abnormal returns for portfolios of upward revisions, that is there is no difference between the returns of the upward revised companies and the returns of the benchmark.*

Hypothesis 2b *In the pre-revision period, there are zero long-term abnormal returns for portfolios of downward revisions, that is there is no difference between the returns of the downward revised companies and the returns of the benchmark.*

Evidence of statistically significant abnormal returns between the upward and the downward revised companies could suggest an asymmetry in the behaviour of the investors towards the good or bad news conveyed by the information within the revisions.

Finally, an analysis of the tracking-errors volatility over the post-revision period could indicate whether the impact of revisions of CG scores on share price causes a deformation of the relative risk to the benchmark.

III. Data and the construction of Reference Portfolios

Firm-level data on returns and on corporate governance score

For our analysis we examine the 600 European firms represented in the European *Dow Jones Stoxx 600* index. This index includes large, mid and small capitalisation companies across 18 countries of the European region: are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. The sample consists of the 600 European firms included in the *Dow Jones Stoxx 600* index as of March 31, 2009.

The financial data we employ in our analysis are commonly used in academic research. The prices and the compounded total returns for the equities are obtained from different FactSet libraries.

Our source for corporate governance measures for firms is the Vigeo database. Vigeo is a major European supplier of extra-financial analysis. It assesses the degree to which companies take into account environmental, social, societal and corporate governance objectives.

Vigeo publishes for each company analysed a CG score that aggregates[4] the scores on 4 criteria of corporate governance: board of directors, audit & internal controls, shareholders and executive remuneration[5]. Generally the scores are revised during sector reviews that take place annually. However, Vigeo's analysts can change the score of a company at any time through alerts. In general, the frequency of Vigeo's scores updates is 12 to 18 months.

The CG score indicates the level of valuation of the *state* of Corporate Governance. This level is supposed to reflect the fact that the company adopts more

[4] The weighting of the criteria that make up the aggregate Vigeo CG score is proprietary information.
[5] see Appendix A for the Vigeo's definitions about the 4 criteria.

or less good Governance practices. It is precisely this level indicator which has so far been very often used by academics and practitioners to study the relationship between the Corporate Governance and stock returns.

Vigeo's historical database for European firms starts in 1999. Our sample of Vigeo's scores is a panel with data on over 600 firms for the period 1999 through 2009 with a total of 36,281 firm-month CG scores. We have 120 months of data on corporate governance scores for the examined period, so unlike many earlier studies we can create a panel dataset of firm-level CG scores that vary over time.

Table 1 presents summary statistics of CG scores. It reports the percentage of firms with corporate governance (CG) score provided by Vigeo among the 600 European firms included in the Dow Jones Stoxx 600 index as of March 31, 2009, between 12/31/1999 and 03/31/2009. As reported in this table, at the end of 2003, more than the half of the companies is scored on Corporate Governance by the extra-financial analysts of Vigeo. At the end of March 2009, 86 % of the 600 companies is scored: These 517 firms account for over 97 % of the total market capitalisation of the 600 companies as of March 31, 2009.

We use the FactSet historical databases to examine the financial data relative to the sample of the 600 European firms included in the *Dow Jones Stoxx 600* index as of March 31, 2009. Ultimately our sample of compounded monthly total returns data is a panel that includes data on over 600 firms for the period between 01/31/1997 to 11/30/2009 with a total of 81,700 firm-month observations. We have 155 months of financial data for the examined period, so unlike many earlier studies we can examine the impact of changes in CG scores over a long period incorporating bullish and bearish markets.

In contrast to other studies we do not study the *level* but the score's *revision* to examine the relationship between CG and stock returns. Among the existing literature some studies have shown that *levels* in CG scores are contemporaneously correlated with firm performance. However, none of these studies focuses on the investors' potential reaction in the capital market associated with the *changes* in the CG scores. In our study, we are apart of this approach and instead examine the impact of changing governance practices from our own indicator review. This indicator of *revision* measures the improvement or, conversely, the degradation of governance practices within the company.

The revision is calculated as the difference between two consecutive CG scores

$$\mathrm{Rev}_{i,t} = \mathrm{Score}_{i,t} - \mathrm{Score}_{i,t-1}$$

where $\mathrm{Score}_{i,t}$ is the level of the CG score, on security *i* in month *t* and the CG scores are between 0 and 100. When $\mathrm{Rev}_{i,t}$ is positive (negative), it is an upward (downward) revision.

The second step in our empirical analysis is as follows. This sample of equities is then split between those that have experienced *upward* vs. *downward* revisions in CG scores. For each sub-sample, namely the upward revision sample and the downward revision sample we determine the future returns and test if such returns are statistically significant.

What type of revision to choose to examine its market impact?

What minimum level of revision to hold to represent a substantial change in governance practices? It seems to us that to meet this objective, rather than to fix to the revisions an arbitrary threshold marking their substantiality, it is better to retain a minimum number of revisions oriented in the same direction. Repeated upward or downward revisions reflect the growing conviction of the extra-financial analyst with respect to improvement or deterioration of the governance practices of the company. The totals of revised equities, equities revised upward and equities revised downward are shown in Table 2.

It is clear that retaining a minimum of 3 revisions to reflect changing practices of governance seems a wise choice. Indeed, among the 600 European firms included in the Dow Jones Stoxx 600 index as of March 31, 2009, 252 firms have been revised at least three times in the same direction over the 10 years studied. In addition, Table 2 shows that more than one fifth of the 600 firms have been upward revised at least 3 times (132 companies) and almost the same percentage has been downward revised at least 3 times (120 companies). Consequently, when we select the third revision as the event to examine its impact on subsequent stock returns we get a sufficient number of observations to test rigorously the relationship between CG changes and stock returns.

[Insert Table 1]
[Insert Table 2]

III. Methodology

The literature about methodologies used to measure long-term abnormal returns has grown substantially in the past few years (see, Barber and Lyon (1997), Kotahri and Warner (1997), Lyon, Barber and Tsai (1999), Mitchell and Stafford (2000)). In the event studies the most used methods to detect long-term abnormal returns are the studies in *event time* and the studies in *calendar time*.

According to Barber and Lyon (1997), results through these methods are highly sensitive to the methods for calculating returns and to the methods for evaluating expected returns. The event time studies aim at measuring the impact of specific information on the share price around the date of event. Our event study is based on the *event time* approach. Our goal is to test the significance of the long-term abnormal returns yielded by revisions on CG scores.

There are basically two methods of calculating abnormal returns in the long-term: the accumulation of abnormal returns (CAR - Cumulative Abnormal Returns) and the abnormal returns based on a buy-and-hold strategy (BHAR – Buy-and-Hold Abnormal Returns). We present these two methods and the statistical difficulties they encounter.

The Cumulative Abnormal Return (CAR) method

The CAR method consists in adding monthly abnormal returns over a period of time after the event. Let $r_{i,t}$ as the month *t* return for security *i.* Let $E(r_{i,t})$ be the associated expected month *t* return for security *i.*

The Abnormal Return $AR_{i,t}$ is defined as the difference between the actual month *t* return for security *i* and its expected return.

$$AR_{i,t} = r_{i,t} - E(r_{i,t})$$

The Cumulative Abnormal Return, or $CAR_{i,k}$ is defined as the sum of abnormal returns for security *i* over a period of *k* month.

$$CAR_{i,k} = \sum_{t=1}^{k} AR_{i,t}$$

The CAR method involves the periodic rebalancing of portfolios that, as a practical investment strategy, would incur relatively high transactions costs that could significantly affect the returns available to investors. According to Barber and Lyon (1997) the Cumulative Abnormal Returns method is subject to three types of bias: the bias of measure (*measurement bias*), the bias of survivor (*survivor bias* or *new listing bias*) and bias of asymmetry (*skewness bias*).

The *measurement bias* arises because CARs are biased estimators of long-run abnormal returns. For example, calculate the abnormal return of a firm that provides returns of 30% for two consecutive months compared to a benchmark portfolio whose returns are 10% per month. According to the CAR method, we obtain a cumulative abnormal return of 30 % ((0.30 - 0.10) + (0.30 - 0.10)) while the BHAR is 48 % ((1.30 X 1 30) - (1.10 X 1.10)).

The *new listing* or *survivor bias* occurs when the expected return is calculated using a market index or a reference portfolio. Given that newly listed companies tend to generate lower returns than the market average for Ritter (991), the calculation of abnormal returns is positively skewed because the sample of firms contains no new firms after the event, hence the name of survivor bias, while the portfolio includes market continuously.

The *skewness bias* arises because the distribution of long-run abnormal stock returns is positively skewed. Barber and Lyon (1997) explain that it is usual to see an annual return exceeding 100 % for some specific companies while it is much less frequent to see such a return for a market portfolio. Since the abnormal returns are

the difference between the returns of a company and those of a market portfolio, the distribution of abnormal returns suffers from positive skewness. In statistical tests, the positive skewness usually generates a negative bias which is caused by the positive correlation between the mean and standard deviation of samples.

More specifically, an increase of the mean of a sample resulting from a distribution displaying a positive asymmetry is usually associated with an increase of the standard deviation, which decreases the possibility of obtaining a significant test.

The buy-and-hold abnormal return (BHAR) method

The buy-and-hold abnormal return (BHAR) is defined as the return on buy-and-hold investment in a firm less the return on a buy-and-hold investment in an asset/portfolio with an appropriate expected return. The Buy-and-Hold Abnormal Returns $BHAR_{i,k}$ are obtained by subtracting the expected compounded returns for security *i* from its actual compounded returns over a *k*-holding period of months following the event.

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1 + r_{i,t}\right) - \prod_{t=1}^{k}\left(1 + E\left[r_{i,t}\right]\right) \qquad (1)$$

This method allows checking whether the mean abnormal return after the event period is different from zero. “The advantage of this approach is that it yields an abnormal return measure that accurately represents investor experience” (Lyon, Barber and Tsai, (1999) p.198). On the other hand, this approach generates three types of bias: the *survivor bias*, the *skewness bias*, more acute than in the case of CAR returns because returns are rather compounded than added, and the *rebalancing bias*.

The *rebalancing bias* is due to the fact that when the market portfolio is equally-weighted, the weightings of share are implicitly changed periodically to reflect price fluctuations. To restore the equality of market values, we regularly sell equities that have outperformed the average of the portfolio and we buy those that have obtained lower returns. Due to the mean reverting process, we buy stocks that do well in the future and we sell stocks that will show poorer returns. It generates a relative increase of the long-term return of the *reference portfolio* with regard to the studied sample. Thereby it creates a negative bias in the calculation of the long-term abnormal returns.

The use of either of these methods of calculating performance is no unanimity in the scientific literature to date. Barber and Lyon (1997) and Lyon, Barber and Tsai (1999) found that CARs are biased estimators of long-run abnormal returns and favoured the use of BHARs in tests designed to detect long-run abnormal stock returns. Kothari and Warner (1997) also recommended BHARs as the cumulating procedures in CARs lead to systematically positively biased abnormal returns. Other studies have favoured the use of CARs over BHARs. Meanwhile Fama (1998) and

Mitchell and Stafford (2000) are advocating the CAR method in conjunction with the *calendar time* portfolio approach.

These arguments imply that the choice between the two methods is not straightforward. However, Gompers and Lerner (2003) advise that the choice between the two approaches should largely depend on the implicit trading strategy that is being assumed. Therefore, a BHAR approach is deemed appropriate to this study to avoid the problems associated with frequent transactions, and to facilitate a measure of differential returns on equivalent risk assets.

Evaluation of long-term abnormal returns

There are mainly two valuation methods for assessing the long term abnormal returns: the *reference portfolio* and the *control firm*. Generally, these methods use the size and the book-to-market ratio (book value/market value) to compare the studied companies to peer companies bearing similar risks. The use of these factors as firm risk measures result from the works of Fama and French (1992, 1993).

Reference portfolio

This method consists to compare the returns of two portfolios “p” and “rp”. In the portfolio “p” we group the equities associated to the event studied. In the portfolio “rp”, the reference portfolio, we group equities that are not influenced by the event and which are similar to those of portfolio “p” in terms of size and book-to-market ratio for example.

Following this method, the Abnormal Return $AR_{i,t}$ is defined as the difference between the actual month *t* return $r_{i,t}$ for security *i* and its month *t* reference portfolio return $r_{rpi,t}$.

$$AR_{i,t} = r_{i,t} - r_{rpi,t} \qquad (2)$$

The studies of Barber and Lyon (1997) and Lyon, Barber and Tsai (1999) show that a careful construction of a reference portfolio can eliminate a lot of the *survivor bias* and the *rebalancing bias*.

The *survivor bias* is eliminated because the companies that are included in reference portfolios must have data of size and of book-to-market ratio prior to the event date. Furthermore, using the buy-and-hold method for the calculation of the returns of the sample and of the reference portfolio avoids the *rebalancing bias* because the equities are held for the purchase until the end of the period.

The buy-and-hold returns for a revised CG score company *i* ($BHR_{i,k}$) are obtained by compounding its monthly returns over the *k*-month period following the month of the revision. This measure replicates an investment strategy that consists of buying and holding shares for a period of time. The same logic applies to the reference portfolio “*rp*” associated with the revised firm *i*. The difference between the

BHR of the revised firm *i* and the BHR of its reference portfolio *rpi* corresponds to the buy-and-hold returns $BHAR_{i,k}$ for the firm *i* over the *k*-month period.

$$BHR_{i,k} = \prod_{t=1}^{k}\left[\left(1 + r_{i,t}\right)\right] \qquad (3)$$

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1 + r_{i,t}\right) - \prod_{t=1}^{k}\left(1 + r_{rpi,t}\right) \qquad (4)$$

Consequently, the average buy-and-hold abnormal returns (ABHAR) for N securities and for the *k*-months period following the event is the equal-weighted average of the BHARs of the individual stocks and they are estimated as:

$$ABHAR_{N,k} = \frac{1}{N}\sum_{i=1}^{N} BHAR_{i,k} \qquad (5)$$

Construction of Reference Portfolios

Barber and Lyon (1997) and Kothari and Warner (1997) advocate the use of a single-control firm as a benchmark because reference portfolios introduce new-listing, rebalancing and skewness biases in the calculation of BHARs. However, Lyon, Barber and Tsai (1999) point out that carefully constructed reference portfolios, as in this study, overcome these sources of bias and smooth out the measurement noise related to the use of a single-control firm.

Hence, we use the idea of a reference portfolio as a proxy for the expected holding period return in Equation (1). We construct two families of reference portfolios: size/book-to-market portfolios and size/momentum return portfolios. Following the works of Fama and French (1993) and Carhart (1997), our reference portfolios are formed on the basis of firm size, book-to-market ratios in July of each year, from 1997 through 2009. In addition, for the second family, the reference portfolios are formed on the basis of firm size, momentum return each month from 01/31/1997 to 11/30/2009.

Specifically, for each event firm (i.e., a revised company in CG score), we compute its size and book-to-market ratio. We construct a reference or benchmark using a number of non-event (i.e., non-revised) firms chosen such that they are as close as possible to each event firm in terms of size and book-to-market ratio.

Identically, for each event firm (i.e., a revised company in CG score), we compute its size and momentum return. We construct a reference or benchmark using a number of non-event (i.e., non-revised) firms chosen such that they are as close as possible to each event firm in terms of size and momentum return.

The sample consists of the 600 European firms listed on the *Dow Jones Stoxx 600* index as of March 31, 2009. Each month over the period 01/31/1997 to 11/30/2009 we sort these 600 firms according to their size, book-to-market ratio and momentum return.

We construct 2 size reference portfolios as follows:

1. We take the free float Market Capitalization calculated by Dow Jones in June of each year for all firms. The free float market capitalization is the portion of a stock's total market capitalization that is available for trading.
2. We sort stocks into two size groups. Small stocks with June market capitalization below the median and Big stocks with market cap above the median.

We construct 3 book-to-market ratio reference portfolios as follows:

1. We take the ratio Price to Book calculated by WorldScope for all firms. The Price to Book ratio is the price in December of year *t*-1 divided by the Book Value Per Share in year *t*-1.
2. In December of year t-1, we sort stocks into three book-to-market ratio (B/M) groups. Growth stocks in the (bottom 30% of B/M), Neutral (middle 40% of B/M), and Value (top 30% of B/M).

We construct 3 momentum return reference portfolios as follows:

The 3 momentum return reference portfolios are defined like the 3 book-to-market ratio reference portfolios except that we sort on prior return rather than B/M and the momentum sort is refreshed monthly rather than annually.

1. We take the Momentum return (PR1Yr) for all firms. At the end of each month *t*-1 we sort stocks on the eleven months of returns to the end of month *t*-2. (Dropping the return for month t-1 is common in the momentum literature.)
2. Each month, we sort stocks into Momentum return (PR1Yr) groups. Low momentum stocks in the (bottom 30% of PR1Yr), Neutral (middle 40% of PR1Yr), and High momentum (top 30% of PR1Yr).

The intersection of the (independent) Size and B/M sorts produces six equally-weighted portfolios, refreshed at the end of June each year. In parallel, the intersection of the (independent) Size and Momentum return sorts produces six equally-weighted portfolios, refreshed monthly.

Finally, we have constructed two families of six reference portfolios: 6 size/book-to-market buy-and hold portfolios and 6 size/momentum return buy-and hold portfolios. We use separately these 2 families to compare the studied companies to their peer companies bearing similar risks.

Tests of Significance

To address the problem of positive skewness bias associated with the use of the BHAR methodology highlighted in earlier literature (Barber and Lyon (1997);

Kothari and Warner (1997)), Lyon, Barber and Tsai (1999) advocate a statistical method that allows to take into account the *skewness bias* which is not eliminated by the approach of the reference portfolio. They have presented the skewness adjusted *t-statistic* to test the null hypothesis of abnormal return. In detail, the t_{sa}-values for all $ABHAR_{N,k}$, are estimated as:

$$t_{sa} = \sqrt{n}\left(S + \frac{1}{3}\hat{\gamma} S^2 + \frac{1}{6n}\hat{\gamma} \right) \qquad (6)$$

where $S = \frac{\overline{ABHAR}}{\sigma(ABHAR)}$ and $\hat{\gamma} = \frac{\sum_{i=1}^{n}\left(ABHAR_{N,k} - \overline{ABHAR}\right)^3}{n\,\sigma(ABHAR)^3}$

Risk Examination

After having measured the performance of the revised CG score companies sub-samples, we examine the risks associated to the returns by focusing on the tracking-error volatility (TEV). Even if our Buy-and-Hold strategy is a passive strategy it seems interesting to test if it induces a significant risk taking. For Grinold and Kahn (1989), “passive managers want minimum tracking error, Page65”.

This measure of risk explains how closely the samples follow the reference portfolios to which they are benchmarked. Roll (1992) suggests that the level may be an important criterion to assess a portfolio performance and Pope and Yadav (1994) also agree that the tracking errors are crucial in structuring and managing a portfolio.

As defined in Chincarini and Daehwan (2006), the tracking-error volatility is calculated as the standard deviation of the difference in returns between the portfolio and the benchmark. Analytically, the tracking-error volatility for portfolio *pt* is estimated as:

$$TEV = \sigma\left(R_{p,t} - R_{b,t}\right) = \sqrt{\frac{\sum_{t=1}^{n}\left(R_{p,t} - R_{b,t}\right)^2}{n}} \qquad (7)$$

where *TEV* is the tracking-error volatility calculated from the monthly returns of the sub-sample *p,t* at month *t* and from the monthly returns of the benchmark *b,t* at month *t* and *n* the number of months retained in the calculation of the standard deviation.

IV. Empirical results

At first we examine the presence of country bias. We test the presence of abnormal returns on the post-event period then on the pre-event period. An examination of the TEV offers an additional analysis of investors' behaviour towards the revisions on CG scores. Finally, a proposal to use these revisions as part of an investment strategy closes this section.

Are there Country-bias in the samples?

Prior studies suggest that corporate governance is strongly determined by country-specific factors. Bauer, Günster and Otten (2003) find large and statistically significant differences across countries with regard to the average firm-level corporate governance rating. Also Klapper and Love (2004) show that companies' corporate governance practices are related with country-level characteristics. For Doidge, Karolyi and Stulz (2007), the country characteristics explain much more of the variance in governance ratings than observable firms' characteristics.

If the weight of the countries most represented in the two sub-samples of revised CG score companies is different of the weight of the countries most represented in the benchmark then the abnormal returns of the sub-samples could be explained by the presence of country bias. To control for this type of sample selection bias, we have measured the percentage of equities by countries.

The number of listed firms per country and the weights of each country in the Dow Jones Stoxx 600 index and in the two sub-samples of revised in CG scores companies are shown in Table 3. This table presents in its second column the weight of each country in our equally-weighted benchmark of 600 companies included in the European Dow Jones Stoxx 600 index as of March 31, 2009. The third column lists the weight of each country among the upward revised companies and the fourth column the weight of each country among the downward revised companies.

Table 3 shows that among the 18 countries included in the index as of March 31, 2009, the largest number of listed firms are United Kingdom (165), France (83), Germany (59), and Switzerland (48) while Greece (11), Portugal (11) and Ireland (8) have the smallest number.

The percentage of equities of the six countries most represented in the sub-sample of the downward revised companies comes from United Kingdom, France, Germany, Switzerland, Spain and Sweden and represents 80 % of this sub-sample. Furthermore we note that the number of equities of these same six countries covers 71% of the companies listed in our equally-weighted benchmark of 600 companies. A similar result can be maintained when comparing the weight of these six countries in the sub-sample of the upward revised (82 %) and in the DJ Stoxx 600 (71 %). Ultimately, the weights of the most represented counties in the DJ Stoxx 600 index and in the 2 sub-samples of revised companies are comparable. Therefore, we may not support the hypothesis of the presence of a significant country bias to explain the evidence of abnormal returns in the sub-sample of downward revised companies.

[Insert Table 3]

In the next sections we present successively the results for the two families of reference portfolios: size/book-to-market portfolios and size/momentum return portfolios.

Abnormal returns in the Post-Event Period

Table 4 reports the post-event long-term market performance for the upward revised companies (Panel A) and for the downward revised companies (Panel B) for period $k=1,2,\ldots,24$ months. Benchmark-excess returns with size/book-to-market reference portfolios are estimated as the difference of BHR for the CG scores revised companies compared to the performance of the size/book-to-market reference portfolios.

[Insert Table 4]

According to Table 4 panel A, during the two years following the event - the third revision - the market performance of the upward revised companies are around zero compared to the benchmark. In terms of statistical significances, the skewness adjusted t-statistics exhibit any significant figures during the 24 months period.

As illustrated in Figure 1a the ABHARs are close to zero up around 24 months after the event. These results confirm the absence of long-term over or underperformance for the upward revised companies in CG scores in the post-event period. Therefore, with the size/book-to-market reference portfolio, *Hypothesis 1a* of zero long-term abnormal returns for portfolios of upward revisions is rejected over the post-revision period.

According to Table 4 panel B, five months after the third revision, the stock market performance of the downward revised companies deteriorates significantly. Compared to the size/book-to-market reference portfolio, the returns of the downward revised companies ranges from a level of -4.7 % reported for an investment holding period of twelve months and down to -7.0 % and -8.9 % reported at sixteen and twenty-three months following the third revision event. In terms of statistical significances, the skewness adjusted t-statistics for those two last abnormal returns (t_{sa}-values of -2.865 and -2.820 respectively) are both significant at one-percent level.

As illustrated in Figure 1b the ABHARs show a declining trend on the 24 months after the event. These results confirm the robustness of the downward revised companies' long-term underperformance in post-event period. Therefore, with the size/book-to-market reference portfolio, *Hypothesis 1b* of zero long-term abnormal returns for portfolios of downward revisions is rejected over the post-revision period.

At this stage of the study we may imagine that the event - the third downward revision in CG scores - is likely to contain information negatively impacting the stock returns over the next twenty-four months.

[Insert Figure 1a & Figure 1b]

Table 5 reports the post-event long-term market performance for the upward revised companies (Panel A) and for the downward revised companies (Panel B) for period *k=1,2,…,24* months. Benchmark-excess returns with size/momentum return reference portfolios are estimated as the difference of BHR for the CG scores revised companies compared to the performance of the size/momentum return reference portfolios.

[Insert Table 5]

According to Table 5 panel A, during the two years following the event - the third revision - the market performance of the upward revised companies are around zero compared to the benchmark. In terms of statistical significances, the skewness adjusted t-statistics exhibit almost none significant figures during the 24 months period.

As illustrated in Figure 2a the ABHARs are close to zero up around 24 months after the event. These results confirm the absence of long-term over or underperformance for the upward revised companies in CG scores in the post-event period. Therefore, with the size/momentum reference portfolio, *Hypothesis 1a* of zero long-term abnormal returns for portfolios of upward revisions is rejected over the post-revision period.

According to Table 5 panel B, five months after the third revision, the stock market performance of the downward revised companies deteriorates. Compared to the size/momentum return reference portfolio, the returns of the downward revised companies ranges from a level of -5.9 % reported for an investment holding period of twelve months and down to -9.5 % and -10.9 % reported at sixteen and twenty-three months following the third revision event. In terms of statistical significances, the skewness adjusted t-statistics for those two last abnormal returns (t_{sa}-values of -4.200 and -3.550 respectively) are both significant at one-percent level.

As illustrated in Figure 2b the ABHARs show a declining trend on the 24 months after the event. These results confirm the robustness of the downward revised companies' long-term underperformance in post-event period. Therefore, with the size/momentum reference portfolio, *Hypothesis 1b* of zero long-term abnormal returns for portfolios of downward revisions is rejected over the post-revision period.

[Insert Figure 2a & Figure 2b]

After controlling abnormal returns for both size and book-to market and both size and momentum return, we support the hypothesis of a market underreaction to downward revisions in CG scores. It seems that the accumulation of bad news on Corporate Governance is likely to contain information negatively impacting the long-term relative performance following downward revisions in CG scores.

Abnormal returns in the Pre-Event Period

To measure the abnormal returns in the pre-event period, we imagine that we buy the shares 23 months before they will be finally revised in CG scores.

Table 6 reports the pre-event long-term market performance for the upward revised companies (Panel A) and for the downward revised companies (Panel B) for period *k=-23,-22…,0* months. Benchmark-excess returns with size/book-to-market reference portfolios are estimated as the difference of BHR for the CG scores revised companies compared to the performance of the size/book-to-market reference portfolios.

[Insert Table 6]

According to Table 6 panel A, during the two years preceding the third revision, the stock market performance of the upward revised companies over-performs. Relative to the size/book-to-market reference portfolios, the abnormal returns of the upward revised companies yield 11.4 % for an investment holding period of twelve months between the 23rd month and the 12th month before the event-month. The abnormal returns reach 13.5 % over all the pre-event period of 24 months. In terms of statistical significances, the skewness adjusted *t-statistics* for those two abnormal returns (t_{sa}-values of 2.762 and 2.104) are both significant respectively at one-percent level and five-percent level.

As illustrated in Figure 3a the ABHARs show an upward trend over the 24 months prior the event. These results confirm the robustness of the upward revised companies' long-term over-performance in the pre-event period. Therefore, with the size/book-to-market reference portfolio, *Hypothesis 2a* of zero long-term abnormal returns for portfolios of upward revisions is rejected during the pre-revision period.

According to Table 6 panel B, during the two years preceding the third revision, the stock market performance of the downward revised companies deteriorates. Relative to the size/book-to-market reference portfolios, the abnormal returns of the downward revised companies yield -4.9 % for an investment holding period of twelve months between the 23rd month and the 12th month before the event-month. The abnormal returns reach -12.8 % over all the pre-event period of 24 months. In terms of statistical significances, the skewness adjusted *t-statistics* for those two abnormal returns (t_{sa}-values of -2.265 and -3.490) are both significant respectively at five-percent level and one-percent level.

As illustrated in Figure 3b the ABHARs show a declining trend over the 24 months prior to the event. These results confirm the robustness of the downward revised companies' long-term underperformance in the pre-event period. Therefore, with the size/book-to-market reference portfolio, *Hypothesis 2b* of zero long-term abnormal returns for portfolios of downward revisions is rejected during the pre-revision period.

At this stage of the study we notice that the event - the third revision in CG scores - is preceded by a relative performance in which the trend is similar to that of the revision.

[Insert Figure 3a & Figure 3b]

Table 7 reports the pre-event long-term market performance for the upward revised companies (Panel A) and for the downward revised companies (Panel B) for period *k=-23,-22…,0* months. Benchmark-excess returns with size/momentum return reference portfolios are estimated as the difference of BHR for the CG scores revised companies compared to the performance of the size/momentum return reference portfolios.

[Insert Table 7]

According to Table 7 panel A, during the two years preceding the third revision, the stock market performance of the upward revised companies over-performs. Relative to the size/momentum return reference portfolios, the abnormal returns of the upward revised companies yield 11.7 % for an investment holding period of twelve months between the 23rd month and the 12th month before the event-month. The abnormal returns reach 13.2 % over all the pre-event period of 24 months. In terms of statistical significances, the skewness adjusted *t-statistics* for those two abnormal returns (t_{sa}-values of 2.722 and 2.010) are both significant respectively at one-percent level and five-percent level.

As illustrated in Figure 4a the ABHARs show an upward trend over the 24 months prior to the event. These results confirm the robustness of the upward revised companies' long-term over-performance in the pre-event period. Therefore, with the size/momentum return, *Hypothesis 2a* of zero long-term abnormal returns for portfolios of upward revisions is rejected during the pre-revision period.

According to Table 7 panel B, during the two years preceding the third revision, the stock market performance of the downward revised companies deteriorates. Relative to the size/momentum return reference portfolios, the abnormal returns of the downward revised companies yield -4.9 % for an investment holding period of twelve months between the 23rd month and the 12th month before the event-month. The abnormal returns reach -12.8 % over all the pre-event period of 24 months. In terms of statistical significances, the skewness adjusted *t-statistics* for those two abnormal returns (t_{sa}-values of -2.265 and -3.490) are both significant respectively at five-percent level and one-percent level.

As illustrated in Figure 4b the ABHARs show a declining trend over the 24 months prior the event. These results confirm the robustness of the downward revised companies' long-term underperformance in the pre-event period. Therefore, with the size/momentum return reference portfolio, *Hypothesis 2b* of zero long-term abnormal returns for portfolios of downward revisions is rejected during the pre-revision period.

After controlling abnormal returns for both size and book-to-market and both size and momentum return, we support the hypothesis of a replication in the trend of the revisions of the trend of the former relative performances. It seems that 24 months of accumulation of good (bad) news on Corporate Governance are reflected in the upward (downward) trend of the revision in CG scores.

[Insert Figure 4a & Figure 4b]

Revisions and market underreaction

When the CG scores of companies are three times revised positively, it emerges that on average their relative performances over 24 months which precede the third revisions are also positive. A cynical analysis would say that the direction of the revisions made by the extra-financial analysts depends only on the trend of the past relative performances. Beyond the question of the causality which we do not investigate in this study, the quasi-absence of post-revision abnormal returns seems to indicate that investors do not offer additional premiums to shares whose CG scores have been upward revised.

A similar observation can be established between the negative revisions and the sign of the relative performances over the period which precedes them. When the CG scores of companies are three times revised negatively, it seems that on average their relative performances over 24 months which precede the third revisions are also negative. Still cynically we could say that the direction of the revisions of the extra-financial analysts is only reflecting the trend of the past relative performances.

Nevertheless, the evidence of robust negative abnormal returns suggests that the market does not integrate immediately the information contained in these negative revisions.

After controlling abnormal returns for both size and book-to-market and both size and momentum return, we support the hypothesis of an underreaction of the market towards the negative revisions in the CG scores.

To illustrate our idea, we take the following example. Let us suppose - to caricature - that all the downward revised companies really group only looser stocks a.k.a. the stocks which the most decreased last 24 months. In other words, a "momentum return" bias characterizes them. Besides, if we reject the concept of mean reversion we could then suppose that the share prices of these looser stocks continue to lower even over the post-revision period. Now we have to test whether the downward revisions do not contribute anything to this decline.

The use of the reference portfolio Size/Momentum return allows to detect the possible presence of a "looser" bias within sub-sample of downward revised companies. Indeed, the calculation of the abnormal return is obtained by subtracting the non-revised looser stocks return of the revised looser stocks return.

The significant negative abnormal returns of the downward revised companies confirm finally that on average, the revised looser stocks underperform the non-revised looser stocks. From then on we can assume that specific information related to downward revisions are not immediately incorporated into share prices. Therefore, we support the hypothesis of a market underreaction to downward revisions in CG scores.

Finally, evidence of zero abnormal returns for the upward revised companies and robust abnormal returns for the downward revised companies suggest an

asymmetry in the behaviour of the investors as the information conveyed by the revisions are positive or negative.

We find evidence that the absence of post-event long-term over-performance is only robust for the upward revised companies in CG scores. Moreover, we find evidence of significant negative abnormal returns for the downward revised companies in CG scores. Therefore, it is necessary to analyse the risk of the two sub-samples of revised companies relative to the benchmark. More precisely it seems interesting to measure the tracking-error volatility over the post-event period.

Tracking-error volatility

We finish our study by examining the active risk associated to the returns by focusing on the tracking-error volatility. Even if our Buy-and-Hold strategies by investing in upward (downward) revised companies are passive strategies it seems interesting to test if they induce a significant risk taking.

The tracking-error volatility measures how closely a portfolio of revised companies follows the reference portfolio to which it is benchmarked. The tracking-error volatility is calculated as the standard deviation of the difference in returns between the portfolio and the benchmark. In our study, every month, we calculate the standard deviation on the last 24 monthly returns.

Table 8 reports the tracking-errors volatility (TEV) relative to the two families of reference portfolios for revised in CG scores companies over the post-event period. In Panel A, the benchmark used to calculate the TEV is the Size and Book-to-market reference portfolio and in Panel B, the benchmark used to calculate the TEV is the Size and Momentum return reference portfolio. For these two panels, the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice at the event-month among 600 firms included in the Dow Jones Stoxx 600 index as of March 31, 2009.

[Insert Table 8]

According to the second line of Table 8 panel A, during the two years following the third revision, the tracking-errors of the upward revised companies evolve in a range between 1.7 to 3.4 % with an upward trend. With the Size and Book-to-market reference portfolio, we notice an increase in tracking-errors over the post-event period; however the levels of the tracking-errors of this investment strategy still remain moderate.

As illustrated in Figure 5a the rolling tracking-errors evolve in a rather small interval after the post-upward revision period of 24 months. These results underline a slight increase of risk-taking during this period. However, this increase of tracking-errors is not rewarded by positive abnormal returns (see Table 4 panel A and Figure 1a). Therefore, investing in upward revised companies does not seem an effective strategy.

According to the third line of Table 8 panel A, during the two years following the third revision, the tracking-errors of the downward revised companies evolve in a range between 3 to 1.9 % with a slight downward trend. Overall, the levels of the tracking-errors of this investment strategy still remain moderate.

As illustrated in Figure 5b the rolling tracking-errors evolve in a rather small interval after the post-downward revision period of 24 months. These results confirm the stability of the relative volatility to the benchmark underlining a relatively low risk-taking. Moreover, this slight decrease of tracking-errors is rewarded by negative abnormal returns. Therefore, investing in downward revised companies by short selling their stocks seems effective.

[Insert Figure 5a & Figure 5b]

Similar results in terms of terms of tracking-errors are obtained in using the second benchmark: Size and Momentum return reference portfolio

According to the second line of Table 8 panel B, during the two years following the third revision, the tracking-errors of the upward revised companies evolve in a range between 1.6 to 2.9 % with an upward trend. With the Size and Momentum return reference portfolio, we notice an increase in tracking-errors over the post-event period; however the levels of the tracking-errors of this investment strategy still remain moderate.

As illustrated in Figure 6a the rolling tracking-errors evolve in a small interval after the post-upward revision period of 24 months. These results underline a slight increase of risk-taking during this period. However, this increase of tracking-errors is not rewarded by positive abnormal returns.

According to the third line of Table 8 panel B, during the two years following the third revision, the tracking-errors of the downward revised companies evolve in a range between 2.6 to 1.8 % with a slight downward trend. Overall, the levels of the tracking-errors of this investment strategy still remain moderate.

As illustrated in Figure 6b the rolling tracking-errors evolve in a small interval after the post-downward revision period of 24 months. These results confirm the stability of the relative volatility to the benchmark underlining a relatively low risk-taking. Moreover, this slight decrease of tracking-errors is rewarded by negative abnormal.

[Insert Figure 6a & Figure 6b]

Ultimately, an analysis of the tracking-errors volatility over the post-revision period could indicate that the impact of revisions of CG scores on share price causes a weak deformation of the relative risk to the benchmark for the downward revisions and no deformation for the upward revisions.

Revisions on Corporate Governance Scores and Investment Strategy

When they are collectively considered our findings suggest that repeated revisions contain information and investor behaviour toward them seems to depend on their direction be they upward or downward. Understanding and anticipating the behaviour of investors can design investment strategies that could be profitable.

In this section we wonder about the interest in terms of risk/reward to build an investment strategy based solely on the use of the revisions on the scores of CG.

The impact of the upward revisions on the equities appears not to be followed by sustainable significant positive abnormal returns (see Table 4 panel A and Table 5 panel A). Furthermore, the absence of abnormal returns is not accompanied by a reduction of tracking-errors volatility but instead a slight increase of the TEV (see the second lines of Table 8 panel A and Table 8 panel B). Therefore, to design equity portfolio on upward revised companies on CG scores is unlikely to be a profitable investment strategy.

For downward revisions on CG sores their impact on the equities appears to be followed by sustainable significant negative abnormal returns. Table 4 panel B reports that -with the size/book-to-market benchmark- 12 months after the third downward revision abnormal returns are -4.7 % and that 24 months after the same event they are -8.9 %; those two abnormal returns are respectively significant at five and one-percent level. Similarly, the same magnitudes of abnormal returns are obtained when the size/momentum returns is the benchmark. Table 5 panel B reports that 12 months after the third downward revision abnormal returns are -5.9 % and that 24 months after the same event they are -10.9 %; those two abnormal returns are both significant at one-percent level.

In addition, the presence of those robust abnormal returns is accompanied by a weak and almost unchanged level of tracking-errors volatility over the post-event period (see the third lines of Table 8 panel A and Table 8 panel B). Therefore, to design an equity portfolio on downward revised companies on CG scores by short selling their stocks could be a profitable investment strategy.

VI. Conclusion

In recent years, Corporate Governance has received increased attention because of scandals and their disastrous consequences for corporate and their stakeholders. However, with a few notable exceptions discussed above, the finance literature lacks empirical research on long-term performance studies focused on the relationship between *changes* in Corporate Governance scores and stock returns.

This paper highlights three main findings.

(1) The absence of post-event long-term abnormal returns is robust for the upward revised companies in CG scores. This absence seems to indicate that investors do not offer additional premiums to shares whose CG scores have been

upward revised. In addition, the impact of the upward revisions causes a slight increase of tracking-errors volatility. Therefore, building a portfolio on upward revised stocks is unlikely to be an effective investment strategy.

(2) The robustness of long-term negative abnormal returns is confirmed for the downward revised companies in CG scores. The presence of this underperformance seems to indicate that the information conveyed by these revisions is not immediately integrated in the share price. This market underreaction manifests itself through information that spreads slowly over the 24 months following the downward revision release.

(3) The negative buy-and-hold abnormal returns obtained on the 24 months following downward revisions are characterized by weak and slightly declining tracking-error volatility during the post-event period. The use of the investors underreaction to downward revisions in corporate governance's scores could be exploited financially. Thereby, designing an equity portfolio on downward revised companies on CG scores by short selling their stocks could be a profitable investment strategy.

Finally, evidence of zero abnormal returns for the upward revised companies and robust abnormal returns for the downward revised companies suggest an asymmetry in the behaviour of the investors as the information conveyed by the revisions are positive or negative.

These results contribute to our understanding of the relationship between governance changes and stock returns, and provide a basis for future work in several ways. The CG data that we have used for our study is a CG score that aggregates the scores on four criteria of corporate governance: board of directors, audit and internal controls, shareholders and executive remuneration. Each of those four criteria aggregates also scores on governance provisions[6]. It might be interesting to examine what factors affect the European stock market in terms of risk and returns. These results may lead to the construction of a new indicator, which aggregates factors that matter most to shareholders.

[6] See Appendix A

References

Ammann, M., Oesch D., and M.M. Schmid (2009), "Corporate Governance and Firm Value: International Evidence", Working Paper, Swiss Institute of Banking and Finance, University of St. Gallen.

Aggarwal, R., Erel, E., Stulz, R., and R. Williamson (2008), "Differences in Governance Practices between U.S. and Foreign Firms: Measurement, Causes, and Consequences", *Review of Financial Studies*, February, Vol. 22, No. 8, Pages 3131-3169.

Barber, B. M., and J. D. Lyon, (1997), "Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics", *Journal of Financial Economics*, Vol. 43, No. 3, Pages 341-372.

Bassen, A., Prigge, S., and C. Zöllner, (2008), "Behind Broad Corporate Governance Aggregates: A First Look at Single Provisions of the German Corporate Governance Code." (April) SSRN: http://ssrn.com/abstract=965355.

Bauer, R., Günster, N., and R. Otten, (2004), "Empirical Evidence on Corporate Governance in Europe: The Effect on Stock Returns, Firm Value and Performance." *Journal of Asset Management*, Vol. 5, No. 2, Pages 91-104.

Bebchuk, L.A., Cohen, A., and A. Ferrell, (2009), "What matters in Corporate Governance?", *Review of Financial Studies*, February, Vol. 22, No. 2, Pages 783-827.

Bhagat, S., and B. J. Bolton, (2008), "Corporate Governance and Firm Performance." *Journal of Corporate Finance*, Vol. 14, No. 3, Pages 257-273.

Brown, L. D., and M.L. Caylor, (2006), "Corporate Governance and Firm Valuation." *Journal of Accounting and Public Policy*, Vol. 25, No 4, Pages 409-434.

Brown, L. D., and M.L. Caylor, (2009), "Corporate Governance and Firm Operating Performance." *Review of Quantitative Finance and Accounting*, Vol. 32, No 2, Pages 129-144.

Carhart, M.M., (1997), "On Persistence in Mutual Fund Performance." *Journal of Finance*, Vol. 52, Issue 1, Pages 57-82.

Charreaux, G., and P. Desbrières, (1998), "Gouvernance des entreprises : valeur partenariale contre valeur actionnariale." *Finance Contrôle Stratégie*, juin, Vol. 1, No. 2, Pages 57-88.

Chhaochharia, V., and L. A. Laeven, (2009), "Corporate Governance, Norms and Practices." *Journal of Financial Intermediation*, Vol. 18, No3, Pages 405-431.

Chincarini, L. B., and K. Daehwan (2006), "Quantitative equity portfolio management: an active approach to portfolio construction and management." McGraw-Hill.

Clacher, I., Doriye, E., and D. Hillier, (2008), “Does Corporate Governance Matter? New Evidence from the United Kingdom”, (November), SSRN, http://ssrn.com/abstract=1293188.

Core, J., Guay, W., and T. Rusticus, (2006), “Does Weak Governance Cause Weak Stock Returns? An Examination of Firm Operating Performance and Investors’ Expectations.” *Journal of Finance*, Vol. 61, Issue 2, Pages 655-687.

Doidge C., Karolyi G. A., and R.M. Stulz, (2007), “Why do countries matter so much for corporate governance?” *Journal of Financial Economics*, Vol. 86, Issue 1, Pages 1-39.

Drobetz, W., Schillhofer, A., and H. Zimmermann, (2004), “Corporate Governance and Expected Stock Returns: Evidence from Germany.” *European Financial Management*, Vol. 10, Pages 267-293.

Fama, E.F., and K. R. French, (1992), “The Cross-Section of Expected Stock Returns.” *Journal of Finance*, Vol. 47, Issue 2, Pages 427-465.

Fama, E.F., and K. R. French, (1993), “Common Risk Factors in the Returns on Bonds and Stocks.” *Journal of Financial Economics*, Vol. 33, Pages 3-56.

Fama, E.F., (1998), “Market Efficiency, Long-Term Returns, and Behavioral Finance.” *Journal of Financial Economics*, Vol. 49, No. 1, Pages 283-306.

Gompers, P.A., Ishii, J., and A. Metrick, (2003), “Corporate Governance and Equity Prices.” *Quarterly Journal of Economics*, Vol. 118, No 1, Pages 107-155.

Gompers, P.A., and J. Lerner, (2003), “The Really Long-Run Performance of Initial Public Offerings: the Pre-Nasdaq Evidence.” *Journal of Finance*, Vol. 58, Issue 4, Pages 1355-1392.

Grinold, R.C., and R.N. Kahn, (1989), “Active portfolio management: a quantitative approach for providing returns and controlling risk”, 2nd ed., McGraw-Hill.

Johnson, S.A., Moorman, T., and S. Sorescu, (2009), “A Re-examination of Corporate Governance and Equity Prices”, *Review of Financial Studies*, Vol. 22, Pages 4753-4786.

Klapper, L.F., and I. Love, (2004), “Corporate Governance, Investor Protection, and Performance in Emerging Markets.” *Journal of Corporate Finance*, Vol. 10, Pages 203-28.

Kothari, S.P., and J. B. Warner, (1997), “Measuring Long-Horizon Security Price Performance.” *Journal of Financial Economics*, Vol. 43, No. 3, Pages 301-39.

Lyon, J.D., Barber B. M., and C-L Tsai, (1999), “Improved Methods for Tests of Long-Run Abnormal Stock Returns.” *Journal of Finance*, Vol. 54, Issue 1, Pages 165-201.

Mitchell, M.L., and E. Stafford, (2000), “Managerial Decisions and Long-Term Stock Price Performance.” *Journal of Business*, Vol. 73, No. 3, Pages 287-320.

Philippon, T., (2006), “Corporate Governance over the Business Cycle.” *Journal of Economic Dynamics and Control*, Vol. 30, Issue 11, Pages 2117-2141.

Pope, P., and P. Yadav, (1994), “Discovering Errors in Tracking Error.” *Journal of Portfolio Management*, Vol. 20, Issue 2, Pages 27-32.

Ritter, J.R., (1991), “The Long-Run Performance of Initial Public Offerings: the Pre-Nasdaq Evidence.” *Journal of Finance*, Vol. 46, Issue 1, Pages 3-27.

Roll, R., (1992), “A Mean/Variance Analysis of Tracking Error.” *Journal of Portfolio Management*, Vol. 18, Issue 4, Pages 13-22.

Appendix A – Vigeo reference model and definitions of Corporate Governance Criteria

CG1.1 Board of directors
Definition
Enterprise commitment to set up a board of directors with capability to control upon and advise executives and to be held accountable to shareholders
Principle for action
A. Ensure that the board is able to exercise appropriate control over top management
B. Ensure that the board is held accountable to company shareholders

CG2.1 Audit and internal controls
Definition
Assesses the enterprise commitment to establish efficient systems for risk tracking and risk assessment and to ensure internal information of executives; assesses the extent to which this commitment is reflected in financial information provided to the public. The board of directors is responsible for objectivity and relevance of the system.
Principles for action
A. Ensure that financial information provided to the public is accurate and that company risks are appropriately managed
B. Ensure that an audit committee/function is in place to manage the issues above

CG3.1 Shareholders' rights
Definition
Assesses the enterprise commitment to ensure fair treatment of shareholders who should be able to actively exercise appropriate control over strategic decision making. Rights pertaining to shareholding and shareholders rights to participate in general meetings are of fundamental importance.
Principles for action
A. Ensure the fair and equal treatment of all shareholders and respect the principle of one share- one vote
B. Guarantee the right of shareholders to participate in the Annual General Meeting and to adopt resolutions
C. Promote and facilitate the exercise of voting rights

CG 4.1 Executive remuneration
Definition
Assesses enterprise commitment to use executives' remuneration as a tool to improve congruence between executives and shareholders interests.
Principles for action
Ensure that executive remuneration is used as a tool to align the interests of executives with those of company shareholders

Table 1

Corporate governance scores statistics

This table reports for each year from 1999 to 2009 the percentage of firms with Corporate Governance (CG) score provided by Vigeo among the 600 European firms included in the Dow Jones Stoxx 600 index as of March 31, 2009.

Date	Percentage of firms with CG scores
12/31/1999	20%
12/31/2000	27%
12/31/2001	33%
12/31/2002	38%
12/31/2003	56%
12/31/2004	60%
12/31/2005	64%
12/31/2006	67%
12/31/2007	74%
12/31/2008	82%
03/31/2009	86%

Table 2

Corporate governance revisions statistics

This table reports statistics on the number of upward and downward revisions in CG scores by equity from 1999 to 2009 among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. The figure at the intersection of the fourth row and second column shows that 252 equities have been revised at least three times. The figure at the intersection of the fourth row and the fourth column shows that 132 equities have been revised upwards at least three times. The figure at the intersection of the fourth row and sixth column shows that 120 equities have been revised downwards at least three times.

Number of Revisions (X)	Total of equities revised at least X times	Total of equities revised upward only X times	Total of equities revised upward at least X times	Total of equities revised downward only X times	Total of equities revised downward at least X times
1	723	126	378	135	345
2	462	120	252	90	210
3	**252**	80	**132**	73	**120**
4	99	41	52	33	47
5	25	11	11	13	14
6	1	0	0	1	1

Table 3

Overview of countries included in the samples

This table reports the weights of each country in the Dow Jones Stoxx 600 index as of March 31, 2009 and in the two sub-samples of companies revised at least three times in CG scores among the 600 European firms included in the Dow Jones Stoxx 600 index as of March 31, 2009. The figure at the intersection of the second row and second column shows that 165 UK firms were listed in the Jones Stoxx 600 index as of March 31, 2009. The figure at the intersection of the fourth row and third column shows that 10 % of the equities of the equally-weighted benchmark of 600 companies are listed in Germany. The figure at the intersection of the third row and the fourth column shows that 33 % of the equities that have been revised upwards at least three times are listed in France. The figure at the intersection of the sixth row and the fifth column shows that 12 % of the equities that have been revised downwards at least three times are listed in Italy.

Country	**Listed firms in DJ Stoxx 600 (Number)**	**Listed firms in DJ Stoxx 600 (%)**	**Equities revised Upwards (%)**	**Equities revised Downwards (%)**
United Kingdom	165	28%	18%	0%
France	83	14%	33%	43%
Germany	59	10%	18%	17%
Switzerland	48	8%	1%	3%
Italy	36	6%	6%	12%
Spain	36	6%	6%	6%
Sweden	35	6%	0%	0%
Netherlands	27	5%	11%	8%
Finland	19	3%	2%	3%
Belgium	18	3%	2%	4%
Denmark	18	3%	0%	0%
Norway	14	2%	2%	0%
Austria	12	2%	0%	0%
Greece	11	2%	0%	0%
Portugal	11	2%	2%	2%
Ireland	8	1%	2%	4%
Total	600	100%	100%	100%

Table 4

Average Buy-and-Hold Abnormal Returns for European Firms following the event-month on Corporate Governance scores

This table presents the difference in returns for revised in CG scores companies against the benchmark – **Size and Book-to-market reference portfolio** – in the post-event period. In Panel A (Panel B), the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. Buy-and-Hold Abnormal Returns are calculated on the period 1997-2009 and are defined as the difference in the change in wealth for investors that hold shares in a revised CG score company compared to the benchmark for an investment holding period of k=1,2,…,24 months following the event. To solve the problem of positive skewness present in the buy-and-hold methodology and associated with the comparison of individual securities' returns to those of broad benchmarks we adopt *t-statistic* calculated using the skewness-adjusted methodology introduced by Lyon, Barber and Tsai (1999). Significant levels are indicated by *, **, *** for 10 %, 5 % and 1 % respectively.

Panel A : Post Upward Revision ABHAR & Size/BtM reference portfolios

Month	μ	σ	t_{sa}	n
1	0.3%	0.080	0.438	132
2	0.4%	0.111	0.396	132
3	-0.2%	0.126	-0.191	132
4	0.9%	0.136	0.759	132
5	1.7%	0.161	1.251	132
6	2.7%	0.242	1.575	132
7	1.8%	0.187	1.131	132
8	2.3%	0.193	1.441	132
9	2.3%	0.207	1.320	132
10	2.9%	0.224	1.504	132
11	3.1%	0.228	1.573	127
12	2.7%	0.227	1.370	127
13	1.7%	0.245	0.776	126
14	1.7%	0.263	0.751	123
15	1.3%	0.275	0.520	123
16	0.4%	0.289	0.143	120
17	0.4%	0.310	0.160	117
18	1.4%	0.334	0.479	117
19	0.5%	0.340	0.183	117
20	-0.4%	0.356	-0.112	115
21	-0.6%	0.375	-0.151	103
22	-0.0%	0.433	0.028	99
23	-0.5%	0.511	-0.036	99
24	-1.2%	0.563	-0.134	96

Panel B : Post Downward Revision ABHAR & Size/BtM reference portfolios

Month	μ	σ	t_{sa}	n
1	0.5%	0.062	0.961	120
2	0.0%	0.097	0.065	120
3	-0.7%	0.103	-0.691	120
4	-1.8%	0.110	-1.811*	120
5	-2.9%	0.125	-2.576***	120
6	-3.2%	0.140	-2.451**	120
7	-3.7%	0.156	-2.454**	120
8	-4.1%	0.159	-2.810***	120
9	-4.8%	0.175	-2.967***	120
10	-4.7%	0.194	-2.650***	120
11	-4.2%	0.210	-2.091**	118
12	-4.7%	0.218	-2.252**	118
13	-5.5%	0.233	-2.376**	118
14	-6.3%	0.221	-2.888***	117
15	-6.7%	0.228	-2.970***	116
16	-8.2%	0.231	-3.657***	115
17	-8.2%	0.231	-3.747***	112
18	-7.0%	0.260	-2.865***	112
19	-6.0%	0.284	-2.263**	112
20	-8.1%	0.284	-3.060***	111
21	-7.5%	0.287	-2.789***	106
22	-8.9%	0.303	-3.102***	104
23	-8.8%	0.317	-2.926***	104
24	-8.9%	0.333	-2.820***	103

Figure 1a & Figure 1b

Average Buy-and-Hold Abnormal Returns for European Firms during the period of 24 months following the event-month on Corporate Governance scores

In Figure 1a, the sample comprises 132 equities which have been upward revised at least thrice in CG score and in Figure 1b, the sample comprises 120 equities which have been downward revised at least thrice in CG score, among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. ABHAR is the Average Buy-and-Hold Abnormal Returns of revised CG scores companies after the event-month. The Buy-and-Hold Abnormal Returns (BHAR) for security *i* over the holding period *k* are mathematically defined as

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1+r_{i,t}\right) - \prod_{t=1}^{k}\left(1+r_{rpi,t}\right)$$

Where $r_{i,t}$ is the total return in security *i* at month *t* and $r_{pi,t}$ the return of the **Size and Book-to-market reference portfolio**.

Figure 1a

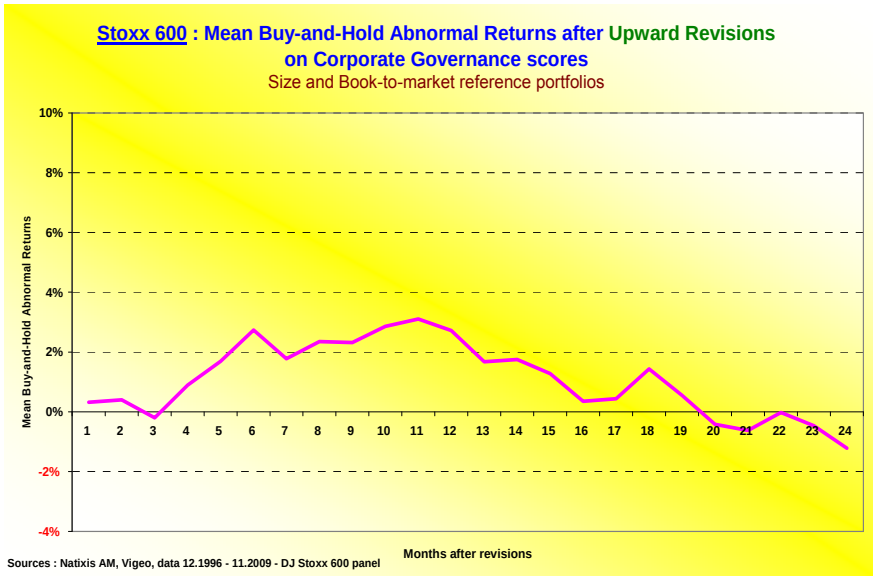

Figure 1b

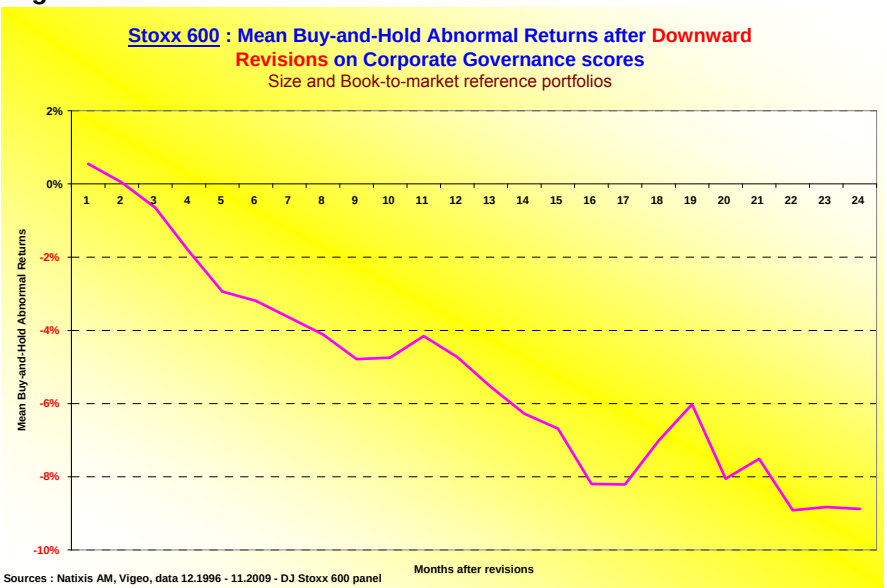

Table 5

Average Buy-and-Hold Abnormal Returns for European Firms following the event-month on Corporate Governance scores

This table presents the difference in returns for revised in CG scores companies against the benchmark – **Size and Momentum return reference portfolio** – in the post-event period. In Panel A (Panel B), the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. Buy-and-Hold Abnormal Returns are calculated on the period 1997-2009 and are defined as the difference in the change in wealth for investors that hold shares in a revised CG score company compared to the benchmark for an investment holding period of k=1,2,…,24 months following the event. To solve the problem of positive skewness present in the buy-and-hold methodology and associated with the comparison of individual securities' returns to those of broad benchmarks we adopt *t-statistic* calculated using the skewness-adjusted methodology introduced by Lyon, Barber and Tsai (1999). Significant levels are indicated by *, **, *** for 10 %, 5 % and 1 % respectively.

Panel A : Post Upward Revision ABHAR & Size/Mom reference portfolios

Month	μ	σ	t_{sa}	n
1	0.3%	0.078	0.361	132
2	0.5%	0.104	0.558	132
3	0.3%	0.114	0.262	132
4	1.2%	0.122	1.137	132
5	2.1%	0.149	1.655*	132
6	3.3%	0.231	2.069**	132
7	2.7%	0.182	1.780*	132
8	3.1%	0.190	1.963**	132
9	2.9%	0.198	1.760*	132
10	3.3%	0.208	1.896*	132
11	2.7%	0.227	1.390	127
12	2.3%	0.238	1.099	127
13	1.3%	0.259	0.560	126
14	1.7%	0.274	0.715	123
15	1.3%	0.286	0.492	123
16	-0.2%	0.299	-0.049	120
17	-0.2%	0.324	-0.073	117
18	0.4%	0.346	0.133	117
19	-1.0%	0.353	-0.290	117
20	-2.1%	0.367	-0.597	115
21	-1.3%	0.378	-0.335	103
22	-0.8%	0.437	-0.150	99
23	-1.5%	0.514	-0.217	99
24	-2.6%	0.566	-0.344	96

Panel B : Post Downward Revision ABHAR & Size/Mom reference portfolios

Month	μ	σ	t_{sa}	n
1	0.5%	0.062	0.895	120
2	0.1%	0.098	0.110	120
3	-0.9%	0.105	-0.888	120
4	-2.0%	0.117	-1.857*	120
5	-3.0%	0.133	-2.527**	120
6	-3.0%	0.148	-2.213**	120
7	-3.6%	0.165	-2.337**	120
8	-4.3%	0.166	-2.905***	120
9	-5.0%	0.178	-3.087***	120
10	-5.2%	0.201	-2.853***	118
11	-5.1%	0.219	-2.572**	118
12	-5.9%	0.225	-2.814***	118
13	-6.5%	0.238	-2.814***	117
14	-6.7%	0.217	-3.109***	116
15	-7.7%	0.229	-3.440***	115
16	-9.5%	0.231	-4.200***	112
17	-9.5%	0.232	-4.328***	112
18	-8.7%	0.259	-3.563***	112
19	-8.0%	0.284	-3.018***	111
20	-9.2%	0.279	-3.448***	106
21	-10.1%	0.286	-3.754***	104
22	-11.0%	0.297	-3.893***	104
23	-10.9%	0.316	-3.550***	103
24	-10.7%	0.328	-3.402***	103

Figure 2a & Figure 2b

Average Buy-and-Hold Abnormal Returns for European Firms during the period of 24 months following the event-month on Corporate Governance scores

In Figure 1a, the sample comprises 132 equities which have been upward revised at least thrice in CG score and in Figure 1b, the sample comprises 120 equities which have been downward revised at least thrice in CG score, among the 600 firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. ABHAR is the Average Buy-and-Hold Abnormal Returns of revised CG scores companies after the event-month. The Buy-and-Hold Abnormal Returns (BHAR) for security *i* over the holding period *k* are mathematically defined as

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1+r_{i,t}\right) - \prod_{t=1}^{k}\left(1+r_{rpi,t}\right)$$

Where $r_{i,t}$ is the total return in security *i* at month *t* and $r_{pi,t}$ the return of the **Size and Momentum return reference portfolio**.

Figure 2a

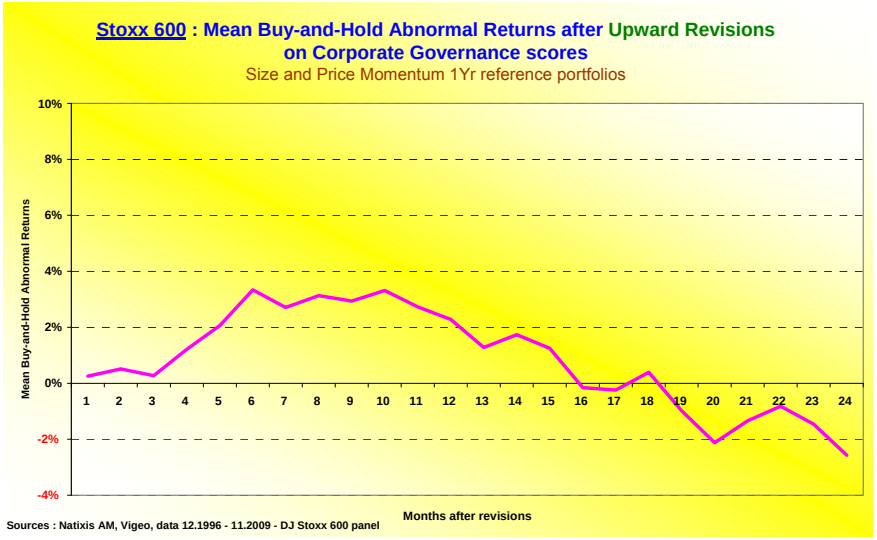

Figure 2b

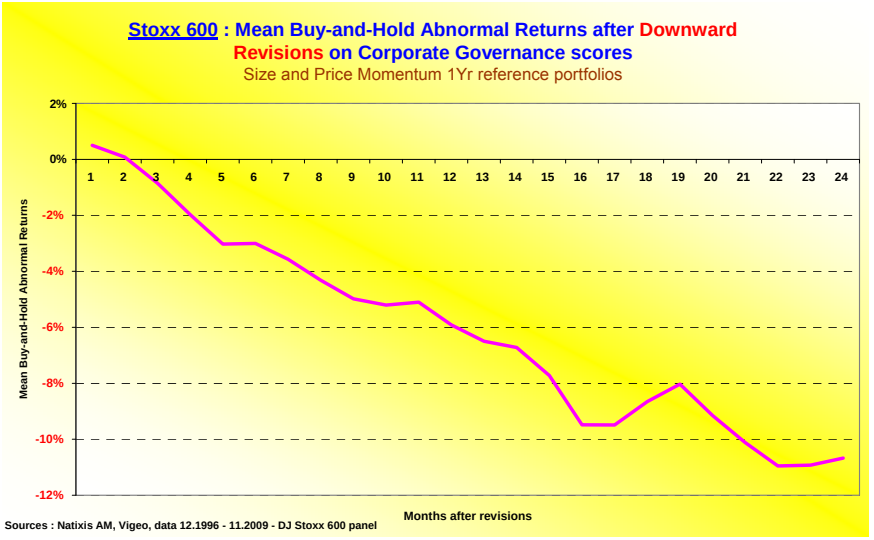

Table 6
Average Buy-and-Hold Abnormal Returns for European Firms preceding the event-month on Corporate Governance scores

This table presents the difference in returns for revised in CG scores companies against the benchmark – **Size and Book-to-market reference portfolio** – in the pre-event period. In Panel A (Panel B), the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. Buy-and-Hold Abnormal Returns are calculated on the period 1997-2009 and are defined as the difference in the change in wealth for investors that hold shares in a revised CG score company compared to the benchmark for an investment holding period of k=-23,-22…,0 months prior to the event. Statistical inferences are calculated using the skewness adjusted *t-statistic* methodology introduced by Lyon, Barber and Tsai (1999). Significant levels are indicated by *, ** , *** for 10 %, 5 % and 1 % respectively.

Panel A : Pre Upward Revision ABHAR & Size/BtM reference portfolios

Month	μ	σ	t_{sa}	n
-23	-0.2%	0.107	-0.216	132
-22	1.0%	0.157	0.753	132
-21	2.7%	0.182	1.714*	132
-20	2.1%	0.208	1.180	132
-19	3.7%	0.267	1.600	132
-18	6.0%	0.320	2.141**	132
-17	7.2%	0.334	2.400**	132
-16	8.0%	0.354	2.573**	132
-15	10.0%	0.402	2.804***	132
-14	9.8%	0.423	2.631***	132
-13	11.3%	0.460	2.773***	132
-12	11.4%	0.466	2.762***	132
-11	11.1%	0.490	2.570**	132
-10	11.5%	0.515	2.537**	132
-9	10.9%	0.522	2.396**	132
-8	9.8%	0.551	2.052**	132
-7	11.3%	0.566	2.295**	132
-6	11.9%	0.602	2.343**	132
-5	11.4%	0.615	2.146**	132
-4	12.8%	0.642	2.305**	132
-3	11.3%	0.654	1.985**	132
-2	11.9%	0.673	2.030**	132
-1	12.7%	0.708	2.069**	132
0	13.5%	0.739	2.104**	132

Panel B : Pre Downward Revision ABHAR & Size/BtM reference portfolios

Month	μ	σ	t_{sa}	n
-23	-0.5%	0.090	-0.557	120
-22	-0.2%	0.104	-0.152	120
-21	0.6%	0.126	0.544	120
-20	0.0%	0.133	0.059	120
-19	-0.2%	0.133	-0.141	120
-18	-2.0%	0.154	-1.394	120
-17	-2.3%	0.173	-1.367	120
-16	-3.0%	0.190	-1.661*	120
-15	-4.3%	0.190	-2.405**	120
-14	-4.8%	0.217	-2.416**	120
-13	-4.2%	0.244	-1.850*	120
-12	-4.9%	0.236	-2.265**	120
-11	-5.0%	0.263	-2.103**	120
-10	-5.4%	0.281	-2.064**	120
-9	-5.3%	0.281	-2.052**	120
-8	-5.4%	0.285	-2.082**	120
-7	-6.4%	0.305	-2.219**	120
-6	-7.4%	0.325	-2.426**	120
-5	-8.5%	0.326	-2.800***	120
-4	-10.0%	0.336	-3.182***	120
-3	-10.2%	0.345	-3.139***	120
-2	-10.8%	0.342	-3.335***	120
-1	-10.7%	0.381	-2.762***	120
0	-12.8%	0.383	-3.490***	120

Figure 3a & Figure 3b

Average Buy-and-Hold Abnormal Returns for European Firms over the period of 24 months *prior to* the event-month on Corporate Governance scores over periods of 24 months

In Figure 3a, the sample comprises 132 equities which have been upward revised at least thrice in CG score prior to and after the event-month and in Figure 3b, the sample comprises 120 equities which have been downward revised at least thrice in CG score prior to and after the event-month, among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. ABHAR is the Average Buy-and-Hold Abnormal Returns of revised CG scores companies prior to and after the event-month. The Buy-and-Hold Abnormal Returns (BHAR) for security *i* over the holding period *k* are mathematically defined as

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1+r_{i,t}\right) - \prod_{t=1}^{k}\left(1+r_{rpi,t}\right)$$

Where $r_{i,t}$ is the total return in security *i* at month *t* and $r_{pi,t}$ the return of the **Size and Book-to-market reference portfolio**.

Figure 3a

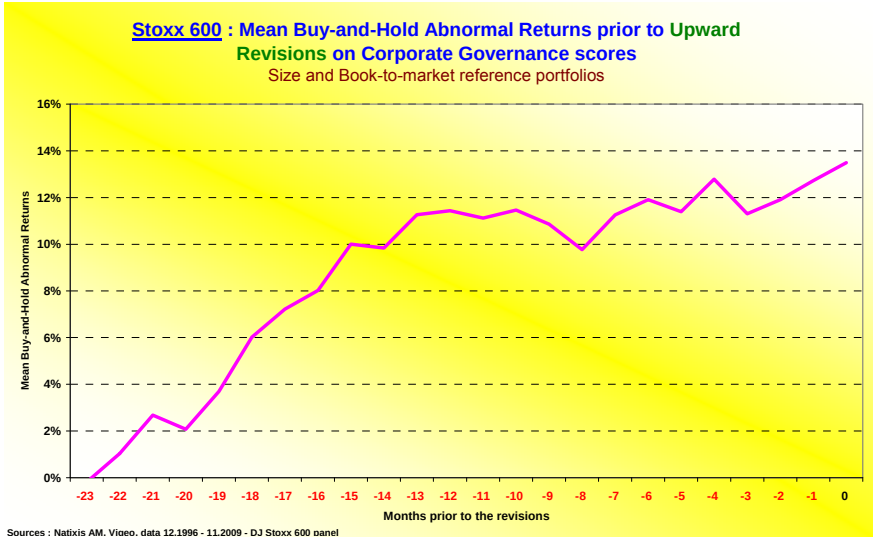

Figure 3b

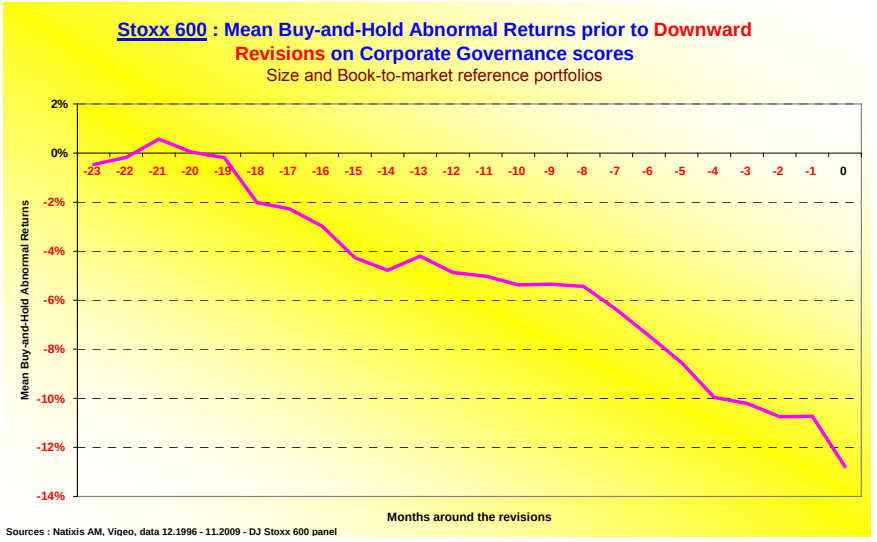

Table 7
Average Buy-and-Hold Abnormal Returns for European Firms preceding the event-month on Corporate Governance scores

This table presents the difference in returns for revised in CG scores companies against the benchmark – **Size and Momentum return reference portfolio** – in the pre-event period. In Panel A (Panel B), the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. Buy-and-Hold Abnormal Returns are calculated on the period 1997-2009 and are defined as the difference in the change in wealth for investors that hold shares in a revised CG score company compared to the benchmark for an investment holding period of k=-23,-22…,0 months prior to the event. Statistical inferences are calculated using the skewness adjusted *t-statistic* methodology introduced by Lyon, Barber and Tsai (1999). Significant levels are indicated by *, **, *** for 10 %, 5 % and 1 % respectively.

Panel A : Pre Upward Revision ABHAR & Size/Mom reference portfolios

Month	μ	σ	t_{sa}	n
-23	-0.3%	0.107	-0.285	132
-22	1.1%	0.156	0.834	132
-21	3.2%	0.181	2.017**	132
-20	2.4%	0.208	1.357	132
-19	4.1%	0.269	1.726*	132
-18	6.6%	0.321	2.315**	132
-17	8.2%	0.336	2.636***	132
-16	8.8%	0.359	2.717***	132
-15	10.6%	0.410	2.868***	132
-14	10.3%	0.432	2.639***	132
-13	11.6%	0.463	2.774***	132
-12	11.7%	0.472	2.722***	132
-11	11.5%	0.498	2.565**	132
-10	12.0%	0.523	2.556**	132
-9	11.4%	0.531	2.413**	132
-8	10.1%	0.557	2.053**	132
-7	11.6%	0.570	2.316**	132
-6	12.0%	0.600	2.326**	132
-5	11.0%	0.614	2.049**	132
-4	12.4%	0.642	2.203**	132
-3	11.1%	0.658	1.909*	132
-2	11.9%	0.680	1.973**	132
-1	12.6%	0.718	1.986**	132
0	13.2%	0.746	2.010**	132

Panel B : Pre Downward Revision ABHAR & Size/Mom reference portfolios

Month	μ	σ	t_{sa}	n
-23	0.1%	0.092	0.165	120
-22	0.6%	0.108	0.662	120
-21	0.8%	0.128	0.726	120
-20	-0.0%	0.134	0.013	120
-19	-0.3%	0.135	-0.201	120
-18	-1.7%	0.159	-1.128	120
-17	-2.3%	0.177	-1.360	120
-16	-3.1%	0.196	-1.732*	120
-15	-4.5%	0.193	-2.583***	120
-14	-5.1%	0.218	-2.644***	120
-13	-4.5%	0.239	-2.071**	120
-12	-5.5%	0.238	-2.592***	120
-11	-5.8%	0.267	-2.435**	120
-10	-5.9%	0.283	-2.333**	120
-9	-6.0%	0.290	-2.330**	120
-8	-6.2%	0.296	-2.364**	120
-7	-7.3%	0.315	-2.559**	120
-6	-8.3%	0.332	-2.781***	120
-5	-9.6%	0.333	-3.256***	120
-4	-10.8%	0.340	-3.643***	120
-3	-10.6%	0.347	-3.442***	120
-2	-11.0%	0.343	-3.594***	120
-1	-11.1%	0.378	-3.030***	120
0	-12.8%	0.380	-3.719***	120

Figure 4a & Figure 4b

Average Buy-and-Hold Abnormal Returns for European Firms over the period of 24 months *prior to* the event-month on Corporate Governance scores over periods of 24 months

In Figure 4a, the sample comprises 132 equities which have been upward revised at least thrice in CG score prior to and after the event-month and in Figure 4b, the sample comprises 120 equities which have been downward revised at least thrice in CG score prior to and after the event-month, among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. ABHAR is the Average Buy-and-Hold Abnormal Returns of revised CG scores companies prior to and after the event-month. The Buy-and-Hold Abnormal Returns (BHAR) for security *i* over the holding period *k* are mathematically defined as

$$BHAR_{i,k} = \prod_{t=1}^{k}\left(1+r_{i,t}\right) - \prod_{t=1}^{k}\left(1+r_{rpi,t}\right)$$

Where $r_{i,t}$ is the total return in security *i* at month *t* and $r_{pi,t}$ the return of the **Size and Momentum return reference portfolio**.

Figure 4a

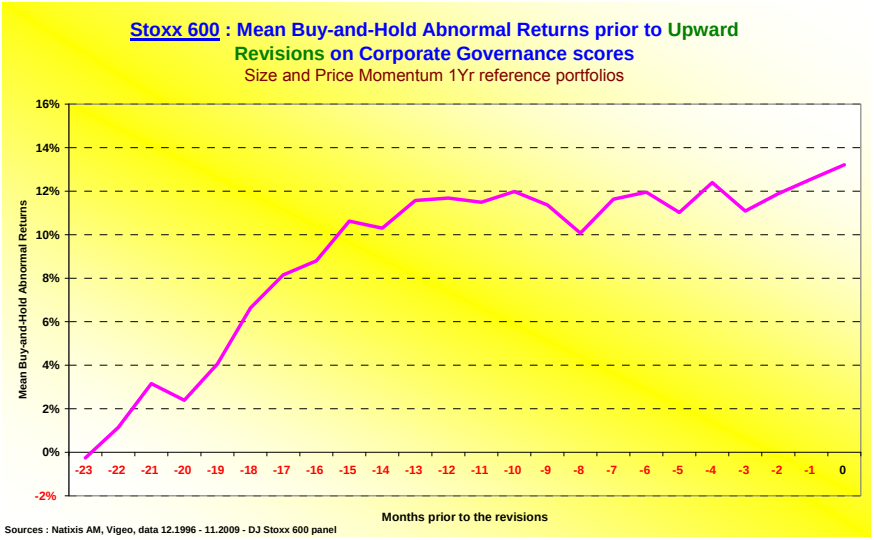

Figure 4b

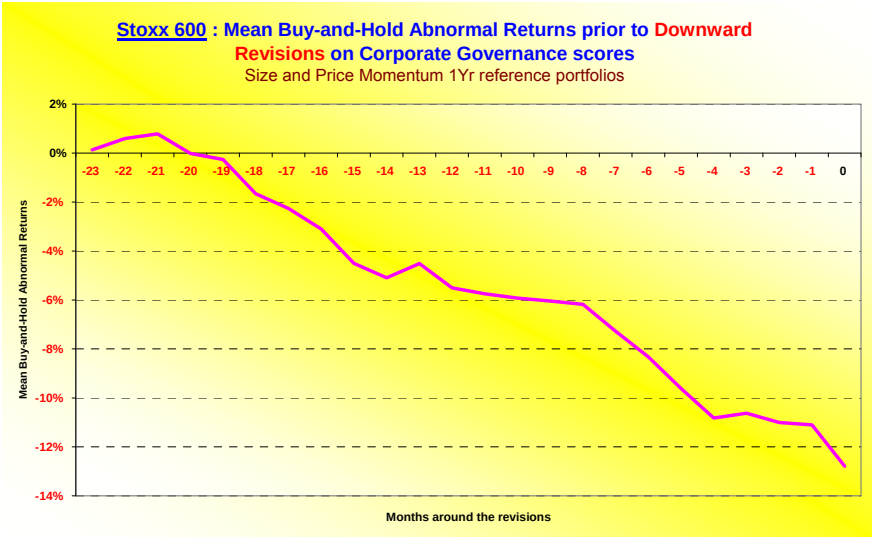

Table 8
Tracking-error volatility with specific reference portfolios for European Firms following the event-month on Corporate Governance scores

This table presents the tracking-errors volatility (TEV) relative to reference portfolios for revised in CG scores companies over the post-event period. The tracking-error volatility measures how closely a portfolio of revised companies follows the reference portfolio to which it is benchmarked. The tracking-error volatility is calculated as the standard deviation of the difference in returns between the portfolio and the benchmark. In Panel A, the benchmark used to calculate the tracking errors is the **Size and Book-to-market reference portfolio** and in Panel B, the benchmark used to calculate the tracking errors is the **Size and Momentum return reference portfolio**. For these two panels, the sample under examination comprises 132 (120) equities which have been upward (downward) revised at least thrice among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009.

Panel A

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Upward Revision TEV & Size/BtM reference portfolios	1.7%	1.7%	1.8%	2.0%	2.1%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.5%	2.5%	2.6%	2.6%	2.5%	3.1%	3.1%	3.1%	3.4%	3.3%	3.3%	3.3%
Downward Revision TEV & Size/BtM reference portfolios	3.0%	3.0%	2.9%	2.9%	3.0%	2.8%	2.8%	2.7%	2.6%	2.6%	2.6%	2.3%	2.3%	2.3%	2.0%	1.9%	2.0%	2.1%	2.6%	2.5%	2.5%	2.6%	2.6%	2.5%

Panel B

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Upward Revision TEV & Size/Mom reference portfolios	1.6%	1.6%	1.7%	1.8%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.3%	2.3%	2.3%	2.4%	2.3%	2.7%	2.7%	2.7%	2.9%	2.9%	2.9%	2.9%
Downward Revision TEV & Size/Mom reference portfolios	2.6%	2.5%	2.5%	2.6%	2.6%	2.5%	2.6%	2.5%	2.4%	2.3%	2.4%	2.2%	2.2%	2.2%	1.9%	1.8%	1.8%	1.9%	2.3%	2.4%	2.4%	2.4%	2.5%	2.5%

Figure 5a & Figure 5b

Tracking-error volatility with size and book-to-market reference portfolios for European Firms following the event-month on Corporate Governance scores

In Figure 5a, the sample comprises 132 equities which have been upward revised at least thrice in CG score after the event-month and in Figure 5b, the sample comprises 120 equities which have been downward revised at least thrice in CG score after the event-month, among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. The tracking-error volatility is calculated as the standard deviation of the difference in returns between the portfolio and the benchmark. In our study, every month of the post-event period, we calculate the standard deviation on the last 24 monthly returns. The Tracking-error volatility (TEV) is mathematically defined as

$$TEV = \sigma\left(R_{p,t} - R_{b,t}\right) = \sqrt{\frac{\sum_{t=1}^{n}\left(R_{p,t} - R_{b,t}\right)^2}{n}}$$

Where $r_{p,t}$ is the monthly return of the revised in CG scores portfolio at month t and $r_{b,t}$ the monthly return of the **Size and Book-to-market reference portfolio** and n the number of months retained in the calculation of the standard deviation.

Figure 5a

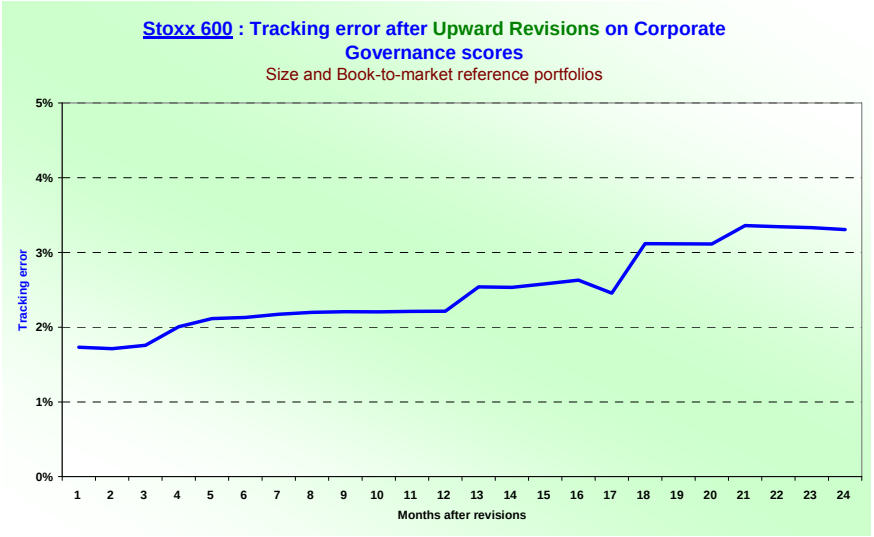

Figure 5b

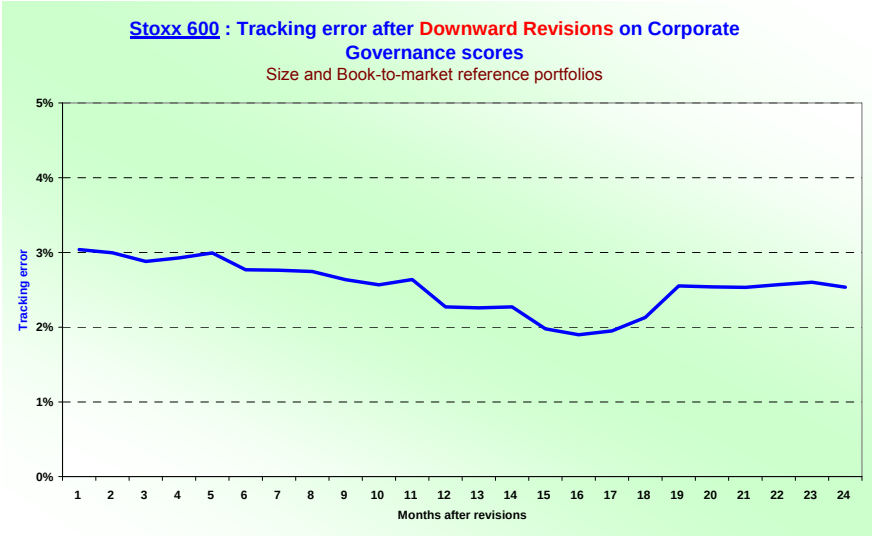

Figure 6a & Figure 6b

Tracking-error volatility with size and book-to-market reference portfolios for European Firms following the event-month on Corporate Governance scores

In Figure 6a, the sample comprises 132 equities which have been upward revised at least thrice in CG score after the event-month and in Figure 6b, the sample comprises 120 equities which have been downward revised at least thrice in CG score after the event-month, among the 600 European firms included in the European Dow Jones Stoxx 600 index as of March 31, 2009. The tracking-error volatility is calculated as the standard deviation of the difference in returns between the portfolio and the benchmark. In our study, every month of the post-event period, we calculate the standard deviation on the last 24 monthly returns. The Tracking-error volatility (TEV) is mathematically defined as

$$TEV = \sigma\left(R_{p,t} - R_{b,t}\right) = \sqrt{\frac{\sum_{t=1}^{n}\left(R_{p,t} - R_{b,t}\right)^2}{n}}$$

Where $r_{p,t}$ is the monthly return of the revised in CG scores portfolio at month *t* and $r_{b,t}$ the monthly return of the **Size and Momentum return reference portfolio** and n the number of months retained in the calculation of the standard deviation.

Figure 6a

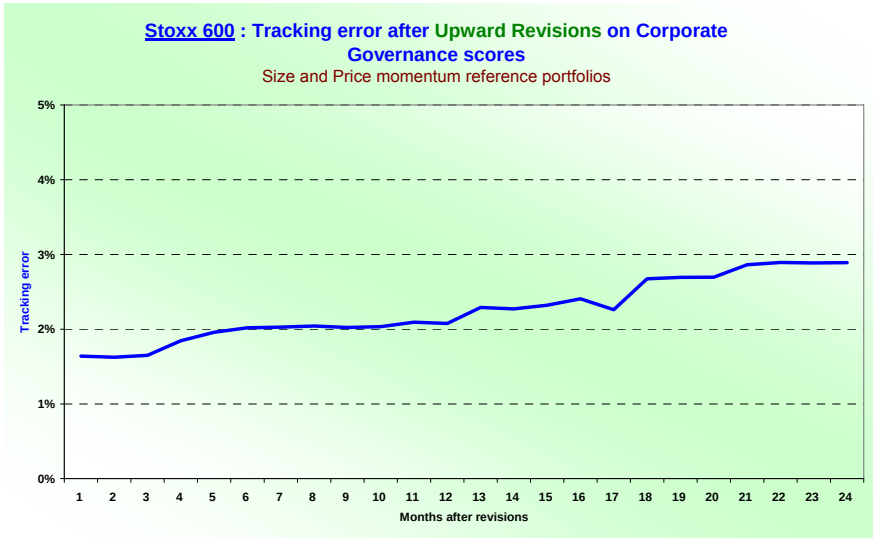

Figure 6b