How News Reports and ESG Publication Financially Affect Firms

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Abstract

ESG has become a growing and integral part of company activities. Not only is it something investors now take into consideration when choosing stocks, but the question of a firm's Environmental, Social and Governance awareness and actions has integrated itself into something as critical as some banks' decisions to provide loans to a firm. While ESG used to be just a "nice-to-have," there is no denying that it is now a must-have for any company that wants to be a global market leader. Many prior studies have focused on ESG ratings, the types of ESG information disclosed in annual reports and the effect of financial news on firms.

The aim of this research is to take a deeper look at the effect of ESG on firms and find out whether different news feed and news publications concerning a company's ESG activities and circumstances affect its value? Our research shows that there is a weakly significant effect of negative ESG-related news on firms in the window (–1, +1) and no significant reaction to positive news. This means that investors do not statistically significantly react to positive ESG news about firms. We examined 65 publicly traded companies from 7 different markets worldwide over the course of 13 years (from 2009 to 2021). We collected a total of 458 separate news articles from the S&P Global Market Intelligence platform –and classified them into positive and negative depending on the news. We ran OLS regressions of the data points together with financial control variables on a company's CAR in a 5-, 3- and 2-day interval to check for the effect. No significant effect was reported.

Keywords: ESG programme, effect of news reports and ESG publications, asset liquidity, demand on the market, loyalty of customers and suppliers

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Introduction

Over the past several years, a new trend has been arising amongst firms. Previously, a firm’s perceived value all came down to the ultimate fact of whether it could generate a profit or not. Over time, other factors emerged with the development of the business sphere as a whole: asset liquidity, demand on the market and expansion potential, customer and supplier loyalty, and many more.

One of the latest boxes every strategically concerned firm would want to check off nowadays is a highly extensive ESG programme. There are many firms that just “go with the flow”, implementing ESG strategies just because it’s mainstream or expected of them by stakeholders, i.e., consumers or the government. However, many overlook the fact that ESG is truly the future and should be incorporated in every firm. Not because of some moral obligation to give back to society and the future generations, but because ESG is a firm’s best bet at implementing the “going concern” principle, or simply put, sustainability. Most firms, especially if they are engaged in heavy manufacturing, exhaust their resources over time. Oil and gas companies are a good example. If no ESG strategy is implemented, fossil fuel resources will be depleted and without adequate compensation or support local communities will become unable to afford the goods and services of firms, and the constant rigorous work and stress could lead to health problems. So, even from a financial point of view, ESG is sort of an investment into a company’s future welfare.

ESG is now one of the deciding factors that firms consider in their actions. This has led to an interest from the media. Company-related news used to be strictly operational and financial, such as articles about M&As, the opening of a new factory or an affiliate, new product development, etc. There is no doubt that such news affects the companies’ financial components, in particular, stock prices. There is countless research studies backing up this conclusion, i.e., R. Engle and V. Ng (1991) [1]. Thus, we know for a fact that news concerning a company’s operations and financials, i.e., its very existence, affects a company, as expected. But do news concerning ESG activities or events linked to ESG have the same effect? We know of separate instances, i.e., the recent Boohoo slavery scandal proves it clearly. The British clothes company Boohoo was accused of using slave labour in some of its sweatshop factories. It was indeed a roller coaster ride for investors in 2020, as demonstrated in Figure 1. Stakeholders are concerned about the entire production and promotion chain of goods, and they will not stand socially immoral behavior. This scandal even caused the company to sever some of its ties with suppliers [2]. Now that ESG is an apparent part and parcel of the firm’s activities, we would like to clarify the extent of its impact. However, the above-mentioned Boohoo case may not be particularly representative. The reason behind it is because even though it is an ESG issue, it was, first of all, a very extreme case, which is why it blew up into a scandal, and second, it endangered the future of the firm as a whole, posing a threat to its existence. Therefore, one could argue that it is a serious operational matter in itself. Nornickel’s oil spill in 2020 was also accompanied by an approximately 10% drop in the share price in the next couple of days. Once again, these are separate events with catastrophic consequences, so it’s no surprise that such ESG events have an impact.

Figure 1. Boohoo Group PLC stock price in May 2020 – May 2021
Every company in the world is affected by ESG standards in one way or another. We have already observed that this new trend is slowly but steadily increasing its effect on firms. As shown in Figure 2, both the number of voluntary and mandatory instruments (these are different kinds of reports and statistics) is increasing over time.

**Figure 2.** The dynamics of voluntary and mandatory instruments of non-financial reports [3]

![Graph showing the dynamics of voluntary and mandatory instruments of non-financial reports](image)

The main challenge faced by all ESG-related activities is that of taxonomy, i.e. categorization or classification. This means there is no single standard for ESG metrics in companies around the world. This is more of an issue when dealing with non-financial reporting. Since there is no universal standard, the reporting varies vastly. Firms tend to stick to standards created by large funds and rating agencies like MSCI, Sustainalytics, etc.; however, they vary amongst themselves. The reports are not within the scope of our research, as such research has been conducted multiple times, in particular in the previously mentioned study by E. Fedorova, D. Afanasev, R. Nerseyan and S. Ledyaeva (2020) [3].

However, the issue of taxonomy is extrapolated to news articles as well. Since there are no universal standards, it's hard to react appropriately to certain news, such as the amount of emissions. Factors such as the firm's industry, asset size, geography and revenue have to be considered, and it is not something that can be done in a split second, like it can with financial indicators. We feel that this issue is worth highlighting as it is related to one of the limitations of this research.

This research is relevant for several reasons. First, it is within the scope of the author's professional interest and is likely to be extremely useful in the future. ESG is a must-have for any respectable international company, and knowing the specific effects of different types of news publications and reports will allow to predict a company's future value and performance. Secondly, this research could provide practical insight to real investors and businessmen willing to acquire, invest and value a firm. With the help of this research and market best-practice insight, they would be able to tell what an appropriate news feed concerning a company's ESG should be. If news publications are completely different from these expectations, that would raise a huge red flag. And finally, the addition of sentiment and language specifics to the analysis would add to the already existing research. This is the case because, to the best of the author's knowledge, there is no existing research concerning the link between the effect of publication of comprehensive ESG factors and the financial performance and value of a firm.

Thus, the ultimate goal of this research is to answer the question of what kind of dependency there is between a firm's performance and value and news reports and publications on said company's ESG. To reach our goal, we need to attain the following objectives:

1) Familiarize ourselves with the theory and create an overview of existing research.
2) Create a pool of several existing firms from different markets.
3) Consider industry specifics and account for them as a separate variable.
4) Analyze the collected data to check for evident tendencies.
5) Search for hidden factors/tendencies with the help of models.

The object of this research are 65 publicly traded companies from the telecommunications, pharmaceutical, clothes/apparel, mining, retail, IT, oil/gas and many other industries operating in markets from around the world. The subject of this study is their Cumulative abnormal returns over 5-, 3- and 2-day periods, various news published about the companies, ROA, ROE, company size, profit margin and leverage. As we already mentioned, this topic is not a new one. However, the specifics of this research make its results a scientific novelty. First of all, to the best of our knowledge, all the existing research considers either only the publication of ESG reports, specific types of firms (small- and medium-sized) or a specific geographic region (North America / Europe, etc.). We will consider firms of all sizes in different industries, with different ESG programs and in all existing markets. Also, we have only seen research that does not incorporate dividends when measuring the return on stocks, while we include all dividends. All these factors will allow our results to be more universal and applicable to any firm in the world.

**Literature Review and Hypotheses**

**Evaluation**

Other authors have already made contributions to the topic of the general relationship between ESG and firm value. Even though no research completely satisfies our needs, there have been several articles published on topics close to or at least in the field of our research. There are 2 main points to our research – the ESG component and the effect on returns component. So we feel we have to look at the complete spectrum of ESG-related papers that have to do
with the financial aspect. As a result, the total amount of literature can be grouped into 4 categories:

1) Research on the companies’ motivation to report – what the incentives behind publishing ESG reports are.

2) How different types of reporting – integrated, i.e. ESG reports combined with annual reports, stand-alone, i.e. separate ESG reports or reports on CSR and a complete lack of ESG reports – affect firm performance or value.

3) Research as a social experiment, rather than based on empirical analysis, i.e. asking interviewees questions about their attitude towards ESG metrics when forming a portfolio, reviewing random companies, etc.

4) And lastly, the articles most relevant to this research that analyze the effect of external information about ESG activities and news of companies on firm value. They capture ideas like sentiment and some even come close to our research and use news publications on ESG.

Research on companies’ motivation to report – what the incentives behind publishing ESG reports are

The first article is written by De Silva Lokuwaduge, Chitra Sriyani and Heenetigala Kumudini (2017) [4], and examines the top 30 metal and mining companies in Australia. Their research uses Chi-squared testing to check their hypotheses, which stated that there is no significant difference between the mining companies’ ESG reporting practice and motivation to report, and that there is a significant difference between the mining companies’ ESG reporting practice and the underlying motivation of ESG reporting. They come to find that there are perceived pressures from stakeholders to report ESG information, and Australian mining companies are motivated to report this information in order to overcome the pressure they receive from their powerful stakeholders. This study further reveals that the reports that could create negative reactions from the stakeholders, such as industry disputes and grievances, were either not mentioned or least mentioned in the reports; as noted by the previous research of, the expectation may be to strategically create a positive attitude among stakeholders to manage (or manipulate) them in order to gain their approval or to divert their disapproval.

Another study was conducted by Zhou Shan (2016) [5], researching 75 Chinese companies on the Chinese Stock Exchange in 2005–2012. They used uni- and multivariate statistical analyses of ESG reporting and its relation to environmental and financial performance. In addition to descriptive statistics, t-tests and analyses of variance (ANOVA), they used linear panel regression to find out whether firms that publish environmental reports achieve higher financial returns. The authors discovered that ownership status and membership in certain stock exchanges influence the frequency of ESG disclosure. In turn, ESG reporting influences both environmental and financial performance. They conclude that the main driver of ESG disclosure is accountability, and that Chinese corporations are catching up to their western peers with respect to the frequency of ESG reporting as well as with respect to its quality. So, in short, a positive result of ESG disclosure was also found here.

One more study about the factors that influence ESG reporting was conducted by M. Arayssi, M. Jizi and H.H. Tabaja (2019) [6]. They studied 184 usable firm-year observations for 2008–2017 in Gulf countries to try to find out what the most influential ESG reporting factors were. In this research, examining publicly listed companies over a 10-year period shows that higher board independence and female board participation facilitate the transmission of a firm’s positive image by improving social responsibility. Independent boards of directors and women’s participation serve as catalysts to strike an effective balance between firms’ financial targets and social responsibilities. In contrast, boards chaired by chief executive officers are less supportive in executing a social agenda and, consequently, reporting their ESG activities. So we see that diversity in general, and board diversity in particular, positively affects ESG performance and disclosure and, in turn, firm performance.

A more formal approach is taken by P. Sharma, P. Panday and R.C. Dangwal (2020) [7]. They study Indian companies listed at Bombay Stock Exchange in 2013–2016 and apply Ordinary Least Square (OLS) models to examine the relationship between the ESG disclosure index and the independent variables, namely the financial performance, market performance, FIIs’ (foreign institutional investors’) stake and leverage after statistically controlling the effects of a firm’s size and the industry type of the companies. Their results indicate that financial and market performance has a positive and significant association with the level of ESG disclosure, whereas FIIs’ stake and leverage have a negative and significant association with the level of ESG disclosure. There was nothing particularly unexpected here.

Sector-specific research was conducted by L. Conca, F. Manta, D. Morrone and P. Toma (2021) [8]. There were 57 European-listed companies (EU28) in the agri-food sector observed in 2010–2018 in this paper. The authors used several OLS regressions of ROA, Profit margin and Tobin’s Q on lnSIZE, LLEV, GROWTH, EBITDA, lnCASH, ESG_1, ENV_1, SOC_1, GOV_1 to check for the relationships among ESG practices and firm performance and value. They find out that ESG disclosure practices impact corporate profitability; specifically, evidence is provided for the existence of a positive relationship between profitability and disclosure practices of strictly environmental and social information and a negative effect between a company’s market value and disclosure practices relating to governance.

Y. Xiang and J.L. Birt (2020) [9] also had something to say about the factors that influence ESG internet disclosure. They looked at the Top 200 Australian firms by Market Capitalization from ASX 200 in 2018. This paper constructs a disclosure index featuring a wide range of both financial and non-financial disclosures, including social
media strategy. This study then investigates the firm characteristics associated with the level of internet disclosure. The authors find that a firm’s internet reporting is associated with firm size, financial performance and analysts’ coverage, but not associated with the percentage of independent board members. A firm’s social media strategy is associated with firm size and its environmental, social and corporate governance (ESG) ranking. However, this article was less insightful to us for the purpose of our research.

The last article from this group comes from the Indian authors S. Bhattacharya and D. Sharma (2019) [10]. This study considers a sample of 122 firms from the list of 500 companies listed on the Bombay Stock Exchange (BSE) 500. Ordered logistic regressions were used with credit ratings as predicted variables; ESG scores as predictor variables and market capitalization, net debt to equity, and total debt-to-asset as control variables. It was found that overall ESG performance and performance of individual components (environment, social and financial variables such as market capitalization, and debt to equity ratio) had significant positive indicators of creditworthiness as measured by the credit rating. The governance score had a positive and insignificant relationship with credit rating. Market capitalization was observed to have a significant direct relationship with credit worthiness. On the other hand, the number of independent directors in companies showed a significant inverse relationship with creditworthiness. ESG significantly impacted the credit rating in the desired direction only for small- and mid-level firms; for large firms which already had a higher credit rating, ESG showed no effect. It was also found that the credit rating itself significantly determined the extent of overall ESG reporting and disclosure of its components.

**How different types of reporting affect firm performance or value**

The second group deals with the different types of reporting and its influence on the firm. For example, in the research of L. Mervelskemper and D. Streit (2017) [11], the authors examined 217 publicly listed companies worldwide in 2010–2014. They ran OLS regressions to find out whether the type of ESG reporting influenced the companies; ESG performance or the investors’ attitude towards the firms. The results show that the degree to which a firm’s ESG performance is valued by investors does depend on its decision to report or not to report on ESG activities at all, irrespective of the specific report type chosen (stand-alone or integrated). More specifically, the issuance of any kind of ESG report is not only associated with a higher degree of value-relevance of ESG performance, but also seems to improve the investors’ ability to price ESG activities in the desired (positive) direction. Also, the research provides early empirical evidence that merely publishing an integrated report can even further enhance market valuation of a firm’s composite ESG and corporate governance performance to an economically and statistically significant extent at no additional cost, which is a new and critical finding.

Another article by J. Maniora (2017) [12] studies 200 to 300 companies from around the world over the 2002–2011 period. The authors run linear regression models to check whether ESG integrated reporting is beneficial to the firm and whether it brings a sense of Integrated Ethics into the company’s business model. The results suggest that IR is a superior mechanism only for the integration of ESG issues into the core business model, but only when comparing IR with the ESG reporting strategies of (a) no ESG reporting and (c) ESG reporting in annual reports. In comparison with (b), stand-alone ESG reporting, the results indicate that IR is negatively associated with the ESG integration level and with the economic and ESG performance. So this research displays mixed results depending on the situation.

A more market-valuation approach is proposed in the research of A. Landau, J. Rochell, C. Klein and B. Zwerger [13]. They examine 50 companies of the STOXX Europe 50 between 2010 and 2016 to see the impact of integrated reporting on the MV of the firms. It is worth noting that the Ohlson model is applied for market valuation and an OLS regression of MV was run on BV, NI, IR and type of ESG information disclosure. As a result of their research, they contribute to existing literature by finding that IR does play a role in the market valuation of a firm’s equity. In line with studies of the cost-concerned school, the findings show a negative influence on market valuation unless firms provide an IR with the assurance of a Big 4 audit firm and conduct their report according to the newest GRI guidelines. An assured IR that does not follow the newest GRI guidelines is also penalized by a lower market valuation but to a lower extent. This result is extremely surprising to us because it demonstrates a go-all-the-way approach, not saying that publishing a non-audited and non-GRI-standard report has no effect on MV, but rather that it will affect the company negatively. We would assume that these results would scare the firms that are not dedicated enough to publish audited reports to the latest GRI standard and would leave only the firms that are whole-hearted, so to say, and that have the experience and ability to satisfy the market’s ESG requirements.

**Social experiments aimed changing the attitude towards ESG**

The third group is a cluster of studies that relies on social experiment methods like questionnaires and case study situations. This is less relevant for us, so we will not cover as many articles here, and just use one example from the research study by L. Espahbodi, R. Espahbodi, N. Juma and A. Westbrook [14]. They conducted interviews and an experiment – a between-subject 2 × 2 sequential experiment using graduate students in a Master’s of Accountancy program as participants. Participants were provided with the industry, company and selected financial data manipulated to show improving or declining sales and earnings for a medical device company (disguised) and were asked to assess the stock price in the short and long run and to decide what portion of their additional funds to invest in the company. Participants were then provided with ESG
information, manipulated for the ESG priorities to be either included or not included in the company's strategy, and asked to repeat their previous stock price assessments and investment allocation. They found that integration of material ESG priorities into corporate strategy has no significant effect on investors' price assessments and investment allocation, and that financial performance does not strengthen that relationship. Further analysis reveals that perceived relevance and reliability of ESG disclosures have a mediating effect on long-term stock price assessment and investment allocation, and that financial performance has a stronger effect on investors' long-term price assessment and investment allocation when ESG priorities are integrated into corporate strategy. It means that investors, at least represented by this sample group, do not incorporate ESG factors into their main decision to invest in a firm or to price it. This result is critical for us, as we will be looking at the effect of ESG news publications on a firm's MV and performance. When comparing 2 firms, we don't exclude the possibility that ESG could be a deciding factor. That means that if 2 firms demonstrate equal or very similar performance, value, competitive advantage, etc., essentially, they are the same, from a financial perspective. Let's presume that one firm actively performs ESG activities and publishes reports, while the other doesn't – in that case we believe the investor would pick the former. However, sacrificing financial performance for social responsibility doesn't seem like a rational investment strategy in today's day and age. We will look deeper into this idea in our research.

The effect of external ESG information on firm value

And finally, the fourth group, which utilizes methods most similar to ours and studies analogous topics. In reality, there are different types of literature in this group. Some of the studies have to do with the effect of extreme events on the firm value. For example, the effect of severe events like product recalls, airline crashes, product tampering, corporate fraud, "unethical behavior", social movements and protests or massive layoffs. The methodology used in these studies is impeccable, and they show that firms are penalized by society beyond the direct cost of these adverse events. The problem with these cases, however, is that they analyze the effects of only these extreme cases, such as plane crashes, massive layoffs or complete biological disaster. This is a serious limitation since they don't happen that often and represent only a negligibly small part of ESG-related events. Thus, making conclusions about the effect of general ESG behavior and its coverage in the media on firms would result in sample biases. This is the critique of G. Capelle-Blancard and A. Petit (2019) [15], which we will now cover in more detail. We will not examine any other literature that deal with the somewhat extreme cases for reasons mentioned earlier. We will focus more on general research on the topic.

G. Capelle-Blancard and A. Petit use event studies to examine the effects of ESG-related news, classified as positive or negative, on the abnormal returns of companies. They analyze news of 100 firms from the Dow Jones Sector Titans indexes between January 2002 and December 2010. The authors collect ESG publications from the Covalence EthicalQuote database and use control variables like lexical news context, firm size by asset value and firm reputation, calculated by the portion of positive ESG news in the total news pool. They find that investors react to ESG news, but mainly, although not exclusively, to negative ones. While the change in a firm's market value within a 3-day window around the publication of negative ESG news is about 0.1% on average, the impact of positive ESG news is barely significant. So we see minimal reaction of investors to ESG-related news.

Similar research was conducted in Japan by Miho Murashima (2016) [16]. It was a short-term event study and OLS regression on the 6295 news events from 879 Japanese companies in 2001–2016. The authors collected news from a Japanese database called Nikkei Telecom based on around 50 keywords in positive and negative categories. They find that, first, that there are different reactions to CSR-related news announcements depending on the type of shareholders. Second, only individual investors react to positive news, while individual, institutional and foreign investors all react to negative news. This is one of the reasons for mixed results in the CSR and financial performance linkage studies. Once again, we see research with some reaction to negative ESG news and barely any reaction at all from positive news in external sources.

Another study was conducted by Junhee Seok, Youseok Lee and Byung-Do Kim (2019) [17]. This research was designed slightly different, however, since the authors incorporated advertisement expenses into the equation. They covered 77 Korean firms over the period of 2012–2015. They used a three-step regression analysis and the Sobel test, this study reveals the roles of word-of-mouth (WOM) and advertising expenditures in the relationship between CSR news reports and firm value. They found thatCSR news reports positively affect firm value, and this relationship is mediated by WOM and moderated by advertising expenditures. Notably, the positive effect of WOM on firm value is stronger for companies that spend less on advertising. This study, however, takes a different route and does not focus on the effect of positive and negative news, but, rather, analyzes the impact of publicizing news about CSR activities in the media on firm value, where they find their significance.

The last article we will cover is that of P. Krüger (2015) [18]. The author used information from a closed database KLD (which is now part of MSCI). This resource seeks to classify publicly available ESG information into 6 clusters and label them positive or negative. The sample comprises 2116 events related to 745 different firms between 2001 and 2007. He finds that investors react to negative news about CSR in a strongly negative manner. The reaction is particularly pronounced for information regarding communities and the environment. He also finds that there is a mix of significant negative effects for some windows of CAR and non-significant results. This again reinforces the idea that
investors react to negative news about ESG events, but do not react or react negatively to some of these news.

Based on real-world experience, trends in certain industries and the revised literature, the following hypotheses were put forward:

1) There is a strong significant relationship between negative ESG-related news and CAR in all windows.

2) There is no positive significant relationship between positive ESG-related news and positive returns.

3) There is no relationship between the publishing of ESG-related news and stock returns in emerging markets.

4) The stated hypotheses are valid in all windows of observation in the short-term.

5) A company's industry has no effect on the relationship between ESG news publishing and stock return.

As we have shown, there are some articles on the subject, even extremely specific ones in specific countries like Japan and South Korea. They are all correct in their own right. However, none of them entirely fit our goal, which is to analyze the global market, with all of its peculiarities and attitudes towards ESG and in different sectors. Thus, the main novelty of this research is that:

1) It considers a truly international sample, as will be demonstrated in the data description. It means that the results will be applicable worldwide.

2) It considers all dividends in the calculation of return. To the best of our knowledge, dividends were excluded from previous research. We understand that this effect is not life-changing, but its inclusion does make the method more refined.

Data Collection and Methodology

Data collection, description and classification. Firm choice and ESG publication specifics

The specifics of our research require it to be an event study, so we followed the general principles throughout our work. The first question that requires an answer in this research was the pool of companies. As we already mentioned, previous research focused on only one market or one country. We want to conduct truly universal research, so for that purpose we need to include companies from around the globe. We understand that companies cannot be selected at random from each market, and one of our ideas was to select the top companies by market capitalization from every major stock exchange. However, there’s also the question of which specific stock exchanges to select, and given the volatility of the market, this list of top companies is constantly changing. Thus, the best and most consistent method is to select a global index and select companies from that index. There are 8 generally accepted global indices:

1) MSCI ACWI Index.
2) MSCI World.
3) S&P Global 100.
4) S&P Global 1200.
5) The Global Dow – Global version of the Dow Jones Industrial Average.
6) Dow Jones Global Titans 50.
7) FTSE All-World index series.
8) OTCM QX ADR 30 Index.

Out of all these 8 indices there is only one index that allows us to both have a large enough list of companies to choose from and provides the most diversity between emerging and developed markets – that is the S&P Global 1200. This index is comprised of more than 1200 companies, covers 31 countries and accounts for 70% of the global stock market capitalization [19]. But most importantly, it covers 7 diverse regional indices (Table 1).

Even though this is the most diverse index, as we can see from the table, we have a total of only 90 companies from emerging markets and over 1000 companies from developed markets. Just due to the sheer number of firms from developed countries, they always outweigh the number of firms from emerging markets. If we were to take the companies as is, our research would be subject to selection bias, since the ratio of firms from emerging and developed markets would equal approximately 1 : 11. The bias is obviously in favour of the developed markets, and we would not be able to claim that our research is universal. So the only way to overcome this bias is to balance the number of firms. We have a total of 90 firms from 2 emerging market indices. Thus, we have to gather firms from the remaining 5 developed market indices to match those 90 firms. We decided to select the top 20 firms from each of the 5 indices to approximately match the total number of firms, resulting in a total of 190 firms. A list of these firms is provided in Appendix 1.

Table 1. S&P Global 1200 constituents

| Index                  | Region       | Country     |
|------------------------|--------------|-------------|
| S&P 500                | North America| USA         |
| S&P/TSX 60             | North America| Canada      |
| S&P Europe 350         | Europe       | European countries |
| S&P/TOPIX 150          | Asia/Pacific | Japan       |
| S&P/ASX All Australian 50 | Asia/Pacific | Australia   |
| S&P Asia 50            | Asia/Pacific | Asian countries |
| S&P Latin America 40   | Latin America| Latin American countries |
However, two more adjustments still need to be made: 
- We have to exclude financial firms and banks due to the specifics of their operations and balance sheet. We shall be adding financial control variables, so firms from these sectors would alter the true result. 
- To avoid sample bias, we excluded firms that had more that 60 news articles. Some firms (like Apple and Facebook, for example) had more than 200 news articles each. Including such cases would skew the results in the direction of those firms.

After all the adjustments, we arrived at a total of 65 firms from 7 regional indices from 21 different countries (9 emerging and 12 developed) (Appendix 2) and 25 industries (grouped into 11 categories depending on the similarity for the purpose of relevant regression analysis – Appendix 3). This amounts to a total of 458 news articles.

The second question we had to face was gathering the needed ESG information. We couldn’t gather the information from any open resource for 3 reasons – we needed the information to be reliable, timely and related to the topic of ESG. Luckily, we were able to gain access to the S&P Global Market Intelligence Platform. This is a sub-division of S&P that gathers news, financials and other key information concerning companies around the world. The articles available can be sorted by geography, industry, company and most importantly, topic. We selected the only 3 topics that are linked to ESG – ESG, Environment and Renewables. From the 65 selected firms we were able to extract 458 separate news articles with timestamps. We then went over the articles to define the sentiment as positive or negative. There turned out to be more positive news than negative. We had 115 negative news and 343 positive ones. That concludes the collection of the news articles.

Financial information was collected from Bloomberg. To calculate the stock returns, we downloaded information about stock prices and dividends. We take dividends into account as that is a vital part of the stock value. We collected information concerning the 7 indices and 65 companies. Stock return was calculated by the standard return formula:

\[
r_{i,t} = \frac{P_t - P_{t-1} + Div_{t}}{P_{t-1}}.
\]

The return for the indices were calculated the same way, but without dividends since they do not yield dividends. Since we have the information about stock returns and the timestamps of every event, we are able to collect the observed returns within a time window.

An event study begins by identifying the period (event window) involved in the event. Several papers address the issue of the appropriate window length that should be used to measure the price reaction correctly. S.C. Hillmer and P.L. Yu (1979) [20] find that the event window should end within hours of the initial announcement. S.G. Chang and Son-Van Chen (1989) [21] find that event windows should last a number of days as the market keeps responding to news. D. Krivin et al. (2003) [22] point out that event window length may be related to the period of observation. We took the estimation window and analyzed the statistical properties of the 5-day [–2, +2], 3-day [–1, +1] and 2-day [0, 1] Cumulative Abnormal Returns around the event date. We kept the windows small because, as A. McWilliams et al. (1999) [23] mentioned, expansion of the event windows resulted in raising the amount of information-related noise, or in other words, increasing confounding concurrent events reduces the power of the test statistic. Also, these are the most commonly used windows in the research we covered. To mitigate the information leakage problem or to identify relevant prior events and control for their effects, however, we include time returns from days in the past, as we mentioned, –2 and –1 days.

We previously stated that we analyzed abnormal returns. They were calculated based on the observed returns, which was achieved by extracting information from Bloomberg. According to S. Brown and J.B. Warner (1985) [24], there are 3 ways to calculate an abnormal stock return: The mean adjusted return:

\[
AR_{i,t} = R_{i,t} - \bar{R}_t ,
\]

where the Abnormal return (AR) is the difference between the observed return and the mean return of the estimation period (usually 250 days);

The market adjusted return –

\[
AR_{i,t} = R_{i,t} - R_{m,t} ,
\]

where the AR is the difference between the observed return of the stock and the observed return of the market on the same day;

The OLS market model –

\[
AR_{i,t} = R_{i,t} - \hat{\alpha} - \hat{\beta} \cdot R_{m,t} ,
\]

S. Brown and J.B. Warner go on to conclude that “With daily data, these two methodologies [Market adjusted returns and OLS market model] have similar power, and, as expected, the power of each is much greater with daily than with monthly data. Market Adjusted Returns and the OLS market model also outperform a simpler Mean Adjusted Returns procedure, which has low power in cases involving event-date clustering” [24]. Since we have daily data, the two best models are the OLS market model and the Market adjusted model. We started by using the OLS market model, but soon encountered the fact that some of the regressions were non-significant, so it would not be applicable for all 458 cases. In addition, the Market Adjusted model is conceptually closer to us. Looking at this from an investor’s point of view, we find comparing the stock to the market would be more appropriate than comparing a stock to its previous returns. Taking all of this into consideration, we selected the Market Adjusted model and used it to calculate CAR. We selected the corresponding S&P Index (from the given 7) for every stock as a proxy for the market. By subtracting the market return from the observed return, we obtain the abnormal return for a day, and then sum up the returns for several days in the three windows we have...
previously mentioned. A description and test for significance of the CARs are provided in the next chapter.

We also collected the information about the companies’ ROA, ROE, Revenue, Total Assets, Profit margin and financial leverage. We used the natural logarithm of Revenue over Total assets as a proxy for the size of the firm as is done in similar research study by E. Fyodorova, R. Sayakhov, I. Demin, D. Afanasyev (2019) [25]. We set these indicators as control variables in our regressions.

**Model-based analysis with key factor significance**

Before we start with the statistical checks, a brief report of the summary statistics and correlation of variables is provided in Figures 3 and 4.

**Figure 3.** Summary statistics of variables

| Variable  | Obs | Mean  | Std. Dev. | Min  | Max  |
|-----------|-----|-------|-----------|------|------|
| car22     | 458 | 0.006861 | .0376465 | -.153775 | .2099734 |
| car11     | 458 | -0.009622 | .0279271 | -.1409184 | .1215356 |
| car01     | 458 | -0.0004621 | .0227503 | -.1064207 | .1009659 |
| roatl     | 458 | 6.966878 | 6.180668 | -5.06 | 30.15 |
| roetl     | 458 | 19.70306 | 30.75732 | -15.38 | 298.25 |

| Variable  | Obs | Mean  | Std. Dev. | Min | Max  |
|-----------|-----|-------|-----------|-----|------|
| sizenl    | 458 | -0.5732736 | .5689946 | -3.117398 | .9824046 |
| profitmarg-1 | 458 | 13.91393 | 27.58448 | -13.05 | 476.51 |
| leverage1 | 458 | 2.676591 | 1.507119 | 1.21 | 15.12 |
| sentiment | 458 | 1.251092 | .4341153 | 1 | 2 |
| marketype | 458 | 1.427948 | .4953223 | 1 | 2 |
| industry  | 458 | 5.18059 | 2.258572 | 1 | 11 |

**Figure 4.** Correlation of variables

(observ=458)

|       | car22 | car11 | car01 | roatl | roetl | sizenl | profitmarg-1 | leverage1 | sentiment | marketype | industry |
|-------|-------|-------|-------|-------|-------|--------|--------------|-----------|-----------|-----------|----------|
| car22 | 1.0000 |     |       |       |       |        |              |           |           |           |          |
| car11 | .7804 | 1.0000 |       |       |       |        |              |           |           |           |          |
| car01 | .6103 | .7414 | 1.0000 |       |       |        |              |           |           |           |          |
| roatl | -0.0416 | 0.0408 | 0.0555 | 1.0000 |       |        |              |           |           |           |          |
| roetl | 0.0018 | 0.0516 | 0.0400 | 0.6989 | 1.0000 |        |              |           |           |           |          |
| sizenl | -0.0087 | -0.0168 | -0.0244 | 0.1779 | 0.2814 | 1.0000 |              |           |           |           |          |
| profitmarg-1 | -0.0478 | 0.0167 | 0.0276 | 0.4167 | 0.1602 | -0.4273 | 1.0000 |           |           |           |          |
| leverage1 | 0.0289 | 0.0302 | 0.0250 | 0.1650 | 0.7272 | 0.1951 | -0.0895 | 1.0000 |           |           |          |
| sentiment | 0.0174 | -0.0605 | -0.0275 | -0.1361 | -0.1397 | -0.1193 | -0.0599 | -0.1402 | 1.0000 |           |          |
| marketype | 0.0385 | -0.0276 | 0.0074 | -0.2709 | -0.2923 | -0.1551 | -0.0061 | -0.2688 | 0.2828 | 1.0000 |          |
| industry | -0.0602 | 0.0309 | 0.0050 | 0.4467 | 0.2365 | -0.1714 | 0.4006 | 0.0383 | -0.2552 | -0.3039 | 1.0000 |

The results of the event study are provided in Table 2. We start by checking the significance of the mean CARs in the case of positive and negative news. We use a z-test instead of a t-test, since the sample size is more than 30 in each case, even though we do not know the population’s standard deviation – we assume that the sample variance equals the population variance. Since we would like to check for statistically significant positive CARs in the case of positive news and statistically significant negative CARs in the case of negative news, we use a one-tail distribution and compare at 1%, 5% and 10% confidence intervals, which correspond to critical z-values (+–)1.28, (+–)1.64 and (+–)2.33. We test the null hypothesis, which states that for the positive (negative) events the mean is equal to 0. The alternative hypothesis is that it is greater (less) than 0.
### Table 2. Results of the event study

| Market type | Window   | Positive news | Negative news |
|-------------|----------|---------------|---------------|
|             | Mean     | z-statistic   | Obs.          | Mean     | z-statistic | Obs. |
| Overall     | (–2, +2) | 0.00031       | 0.163         | 343      | 0.0018      | 0.43 | 115 |
|             | (–1, +1) | 0.000016      | 0.010         | 343      | –0.0039*    | –1.33 | 115 |
|             | (0, +1)  | –0.0001       | –0.086        | 343      | –0.0015     | –0.62 | 115 |
| Developed   | (–2, +2) | –0.00017      | –0.082        | 224      | –0.0029     | –0.888 | 38 |
|             | (–1, +1) | –0.00009      | –0.058        | 224      | –0.0015     | –0.566 | 38 |
|             | (0, +1)  | –0.0008       | –0.675        | 224      | 0.00054     | 0.261 | 38 |
| Emerging    | (–2, +2) | 0.0012        | 0.315         | 119      | 0.004       | 0.683 | 77 |
|             | (–1, +1) | 0.0002        | 0.067         | 119      | –0.005      | –1.216 | 77 |
|             | (0, +1)  | 0.00122       | 0.494         | 119      | –0.0026     | –0.720 | 77 |

As we can see from the table, only one window of CARs, that is (–1, +1) is significant at 10% for the negative events. Some of the others come close to being significant, but they are not. Looking at the significance of the data in this table, we can say that there is no correlation between positive news and positive CARs and there is little correlation with negative news and a negative CAR, which is in line and confirms the research of previous authors mentioned in the literature review. The message is clear – investors react to negative information (in our research – only in certain windows), but show no reaction to positive information. Based on the results, we can say that two of our hypotheses (H2 and H3) have been proven and two others (H1 and H4) have been disproven.

To measure the extent of investors’ reaction and the influence of other factors, we ran a number of regressions. In the case of event studies with several non-sequential events with time gaps, OLS is an appropriate model. As seen in previous research covered in the review, OLS regression is what is used as the golden standard. Also proven to be representative in itself, S. Brown and J.B. Warner (1985) writes: “Procedures other than OLS for estimating the market model in the presence of non-synchronous trading convey no clear-cut benefit in detecting abnormal performance” [24]. We use the following model for our OLS regression:

\[
CAR(-n,n)_{i,t} = \alpha + \beta_1 \cdot ROA_{t-1,i} + \beta_2 \cdot ROE_{t-1,i} + \beta_3 \cdot Asset_{size,t-1,i} + \beta_4 \cdot Profit \margin_{t-1,i} + \beta_5 \cdot Leverage_{t-1,i} + \beta_6 \cdot dummy_{dev, emerg} + \beta_7 \cdot dummy_{industry} + \epsilon
\]

For our control variables, we selected those that are most commonly used in research literature and can have an effect on CARs in order to address probable heterogeneity. All of them are lagged by one year to avoid potential endogeneity problems due to simultaneity, also consistent with previous research.

### Results of the Regression and Analysis

Running 3 robust regressions for different windows, we achieved the following result:

For CAR(–2, +2) see Figure 5.
We obtained a non-significant model with very little predictive power. None of the variables are significant in a 5-day window.

For CAR(−1,+1) see Figure 6.

Figure 6. OLS CAR(−1,+1) regression

|   | Robust Coef. | Std. Err. | t   | P>|t| | [95% Conf. Interval] |
|---|--------------|-----------|-----|-----|---------------------|
| rottl | 0.000589 | 0.000538 | 0.30 | 0.766 | -0.000886 | 0.001206 |
| rottl | 0.000876 | 0.001229 | 0.38 | 0.708 | -0.000243 | 0.001904 |
| sizetl | -0.003427 | 0.002911 | -1.19 | 0.237 | -0.009108 | 0.002252 |
| profit2 | -0.000632 | 0.000467 | -1.78 | 0.075 | -0.00175 | 0.57e-06 |
| leveragetl | -0.000504 | 0.002713 | -0.11 | 0.911 | -0.009563 | 0.000521 |
| 2.sentiment | -0.003717 | 0.002818 | -1.06 | 0.291 | -0.008672 | 0.001236 |
| 2.markettype | 0.000362 | 0.005329 | 0.07 | 0.947 | -0.010117 | 0.010294 |
| industry | 2 | -0.024126 | 0.029324 | -0.85 | 0.395 | -0.079929 | 0.031608 |
| 3 | -0.007177 | 0.012290 | -0.50 | 0.600 | -0.021347 | 0.001592 |
| 4 | -0.004702 | 0.031766 | -0.36 | 0.721 | -0.030576 | 0.021935 |
| 5 | -0.006523 | 0.013766 | -0.48 | 0.631 | -0.033667 | 0.020443 |
| 6 | -0.016279 | 0.013635 | -1.24 | 0.217 | -0.042165 | 0.013654 |
| 7 | -0.009589 | 0.014215 | -0.70 | 0.486 | -0.027967 | 0.008794 |
| 8 | -0.002229 | 0.013923 | -0.16 | 0.873 | -0.029541 | 0.025143 |
| 9 | -0.007548 | 0.013488 | -0.56 | 0.574 | -0.034108 | 0.019515 |
| 11 | 0.008209 | 0.016811 | 0.49 | 0.622 | -0.024184 | 0.040605 |
| _cons | 0.049341 | 0.014640 | 0.34 | 0.736 | -0.023039 | 0.037079 |
A similar result, but the sentiment parameter is much more significant in this case, although it still does not reach a tangible mark. However, we do get a significant profit margin variable.

For CAR(0, +1) see Figure 7.

**Figure 7. OLS CAR(0, +1) regression**

| Linear regression | Robust                          | [95% Conf. Interval] |
|-------------------|---------------------------------|----------------------|
|                   | Coef.  | Std. Err. | t    | P>|t| |                     |
| car01             | .0007427 | .0004516 | 1.64 | 0.101 | -0.0001449 | .0006304 |
| roatl             | -0.000831 | .0001328 | -0.63 | 0.532 | -0.0034242 | .000178 |
| roat2             | -0.0036795 | .0021574 | -1.71 | 0.089 | -0.0079195 | .0005606 |
| size1             | -0.000886 | .0000361 | -2.45 | 0.015 | -0.001896 | -.0000176 |
| profitmargintl    | .0014128 | .0022898 | 0.62 | 0.538 | -0.0030975 | .005913 |
| 2.sentiment       | .0024427 | .0027261 | -0.90 | 0.371 | -0.0078006 | .002915 |
| 2.markettype      | .0016875 | .0040467 | 0.42 | 0.677 | -0.0062657 | .0096408 |

The result for (0, +1) window is slightly different – the model itself and the variable “size” become significant at 10%, but the sentiment is still non-significant. Unfortunately, due to the insignificance of the OLS models and sentiment variables, we are unable to tell what the specific effect of the good or bad news is. This is somewhat inconsistent with previous research since we did observe some significant variables in some of the research we covered, whilst seeing insignificant in others.

One of our ideas was to remove the industry variable, since it has 11 states and could potentially be ruining the regression. Nevertheless, that assumption proved to be wrong, as can be seen in Figure 8. Removing it only makes it less significant and reduces predictive power. However, this does not completely prove or disprove our 5th hypothesis (H5). We hypothesized that the industry would be irrelevant to the CARs, but we do see that for industry 6, which is energy and oil, the variable is positive and close to being significant at 5%. It is an interesting result – this means companies that notoriously have a historically sizeable influence on ESG react more than others, and react positively. This is logical and a novelty to existing literature. Other combined effects were applied to make the model more refined and significant, but they did not reach a tangible result worth including in this research.
Figure 8. OLS CAR(0, +1) regression without the industry variable

|            | Coef.     | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|------------|-----------|-----------|-------|-------|----------------------|
| car01      | .0004163  | .0004273  | 0.97  | 0.330 | -.0004235 : 0.0012562|
| roetl      | -.0000443 | .000128   | -0.33 | 0.729 | -.0002959 : 0.0002073|
| sizetl     | -.0019613 | .0018754  | -1.05 | 0.296 | -.0056469 : 0.0017243|
| profitmargintl | -.000022  | .000211   | -1.04 | 0.297 | -.0000635 : 0.000194 |
| leveragetl | .0009345  | .0022198  | 0.43  | 0.667 | -.003408 : 0.005317  |
| 2.sentiment| -.0015665 | .0027343  | -0.57 | 0.567 | -.00694 : 0.003071  |
| 2.markettype | .0017541  | .0024787  | 0.71  | 0.480 | -.003171 : 0.0066254 |
| _cons      | -.0062215 | .0065399  | -0.95 | 0.342 | -.0190741 : 0.006631 |

Conclusion

We collected ESG-based data from 65 different firms in 7 different markets for 2007–2021. This resulted in 458 separate strings of news articles in the given time period. Using the CAR based on the market-adjusted model as a metric for the effect on the firm, we found that for a 3-day period, negative news has a weakly significant effect, while positive news has no effect at all. This is in line with previous research in principle. However, we demonstrate that this effect takes place only for the window (–1, +1), which is a new discovery. Given the international all-industry sample we used, we can claim with confidence that these results are universal and apply to companies from any market in any industry. Also we found a significant effect of the energy and oil industry variable on the CAR(0, 1).

However, we understand the limitations of our research. First of all, we did not take into account the severity effect. All news, including ESG, have different severity levels. Generating 2% more emissions than in the preceding year is obviously a much less severe infringement for a company than an accident that killed tens or hundreds of people and / or damaged the wildlife in a 2-km radius. So in principle, severity should be taken into account. The problem with assigning scores is that, to the best of our knowledge, there is no general scoring method that would be accepted by all / most academics and/or not be a subjective and biased metric. Secondly, having a wider range of markets, for example, the African and Oceanic SEs would make the results more robust. However, due to the lack of information, including that on ESG activity about them, it does not seem feasible at the moment. And thirdly, we hypothesize that the OLS model might not be the best model to describe the data due to the varying volatility of the stock returns through time. For that reason, we would want to turn to ARCH models to see whether they would fit the data better. We know that ARCH models fit regression models in which the volatility of a series varies through time. In the case of stock returns, periods of high and low volatility are usually grouped together. ARCH models estimate future volatility as a function of prior volatility. To accomplish this, arch fits models of autoregressive conditional heteroscedasticity (ARCH) by using conditional maximum likelihood. We also understand that there is an autoregressive pattern here, and that past variance and past volatility will contribute to future volatility.

We see that there is an apparent link of asset prices with an increase in volatility of returns (Figure 9).
Figure 9. Visual comparison of stock and index prices to their respective volatility
We selected one index and one stock from both markets (developed and emerging) to demonstrate the correlation in the fall in prices and increased volatility in returns. Apparently, every sharp fall is accompanied by a cluster of higher than average volatility, which stays at that level for a time. And once it falls back, it stays at that clustered level. Thus, this visually displays the autoregressive characteristic of the data and the visual evidence seems to indicate the expected form of asymmetry.

There is the question, however, of which specific ARCH model to choose. It is proven in R. Engle and V.K. Ng (1991) [1] that the ARCH and EGARCH models. This would perfectly describe the relationship between the given information. However, the lack of ESG information is holding us back for now. Unfortunately, ESG is a tendency that has just recently started developing and gaining popularity. This means that increasingly more news articles about firms are coming out every year. But for the ARCH model to work, we need ESG event points every day with no intervals. As ESG develops further, this will become a possibility in the future, but for now it is impossible. My hypothesis is that this is the reason why no other authors have employed or even mentioned ARCH models in their ESG research and use OLS as a standard regression. So, this point in particular is what we bring as a research goal for the years to come.

We find the results achieved in this research to be logical and fit for the reality we live in today. Evidently, investors do pay attention to the ESG-component of firms as of now, but it is not a deal-breaker. It is more like a “nice-to-have” than a “must”. When investors witness negative news, they sell in the short-term to avoid potential loss. However, they do not see the added value in positive ESG news, which is why there is no effect. From what we see in reality, the world is not at a point where ESG would play a decisive role in investment, which is why we find the results of this study unbiased and sound.

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## Appendix

### Appendix 1. List of initial S&P companies

| Company                          | Ticker | Country   | Industry              |
|----------------------------------|--------|-----------|-----------------------|
| Tencent Holdings                 | SEHK: 700 | China     | Communication         |
| Samsung Electronics              | KRX: 005930 | South Korea | Information Technology |
| Taiwan Semiconductor Manufacturing | TWSE: 2330 | Taiwan    | Information Technology |
| AIA Group                        | SEHK: 1299 | Hong Kong | Financial             |
| China Construction Bank          | SEHK: 939 | China     | Financial             |
| Ping An Insurance                | SEHK: 2318 | China     | Financial             |
| Industrial and Commercial Bank of China | SEHK: 1398 | China     | Financial             |
| China Mobile                     | SEHK: 941 | China     | Communication         |
| SK Hynix                         | KRX: 000660 | South Korea | Information Technology |
| Meituan-Dianping                 | SEHK: 3690 | China     | Consumer Discretionary |
| Hong Kong Exchanges and Clearing | SEHK: 388 | Hong Kong | Financial             |
| DBS Group                        | SGX: D05 | Singapore | Financial             |
| Oversea-Chinese Banking          | SGX: O39 | Singapore | Financial             |
| Bank of China                    | SEHK: 3988 | China     | Financial             |
| Hon Hai Precision Industry       | TWSE: 2317 | Taiwan    | Information Technology |
| United Overseas Bank             | SGX: U11 | Singapore | Financial             |
| CNOOC Limited                    | SEHK: 883 | China     | Energy                |
| CK Hutchison Holdings            | SEHK: 1 | Hong Kong | Industrials           |
| Link Real Estate Investment Trust | SEHK: 823 | Hong Kong | Real Estate           |
| Sun Hung Kai Properties          | SEHK: 16 | Hong Kong | Real Estate           |
| Hong Kong and China Gas          | SEHK: 3 | Hong Kong | Utilities             |
| MediaTek                         | TWSE: 2454 | Taiwan    | Information Technology |
| Singapore Telecommunications     | SGX: Z74 | Singapore | Communication         |
| Naver                            | KRX: 035420 | South Korea | Communication         |
| CK Asset Holdings                | SEHK: 1113 | Hong Kong | Real Estate           |
| CLP Holdings                     | SEHK: 2 | Hong Kong | Utilities             |
| China Life Insurance Company     | SEHK: 2628 | China     | Financial             |
| China Merchants Bank             | SEHK: 3968 | China     | Financial             |
| Shinhan Financial Group          | KRX: 055550 | South Korea | Financial             |
| Galaxy Entertainment Group       | SEHK: 27 | Hong Kong | Consumer Discretionary |
| Hang Seng Bank                   | SEHK: 11 | Hong Kong | Financial             |
| China Petroleum & Chemical       | SEHK: 386 | China     | Energy                |
| POSCO                            | KRX: 005490 | South Korea | Materials             |
| Xiaomi                           | SEHK: 1810 | China     | Information Technology |
| Company                     | Ticker   | Country       | Industry                      |
|-----------------------------|----------|---------------|-------------------------------|
| Hyundai Motor Company       | KRX: 005380 | South Korea   | Consumer Discretionary       |
| Celltrion                   | KRX: 068270 | South Korea   | Health Care                   |
| KB Financial Group Inc      | KRX: 105560 | South Korea   | Financial                     |
| CTBC Financial Holding      | TWSE: 2891 | Taiwan        | Financial                     |
| Hyundai Mobis               | KRX: 012330 | South Korea   | Consumer Discretionary       |
| Formosa Plastics Corporation| TWSE: 1301 | Taiwan        | Materials                     |
| Chunghwa Telecommunications | TWSE: 2412 | Taiwan        | Communication                 |
| LG Chem                     | KRX: 051910 | South Korea   | Materials                     |
| Nan Ya Plastics Corporation| TWSE: 1303 | Taiwan        | Materials                     |
| Formosa Chemicals & Fibre Corporation | TWSE: 1326 | Taiwan        | Information Technology       |
| Cathay Financial Holding    | TWSE: 2882 | Taiwan        | Financial                     |
| China Overseas Land and Investment | SEHK: 688 | China         | Real Estate                   |
| Sands China                 | SEHK: 1928 | Hong Kong     | Consumer Discretionary       |
| PetroChina                  | SEHK: 857 | China         | Energy                        |
| KT&G                        | KRX: 033780 | South Korea   | Consumer Staples              |
| ALFA                        | BMV: ALFA A | Mexico        | Conglomerate                  |
| América Móvil               | BMV: AMX L | Mexico        | Telecommunications            |
| Banco Bradesco              | NYSE: BBD | Brazil        | Banking                       |
| Banco Santander Chile       | NYSE: BSAC | Chile         | Banking                       |
| Banco de Chile              | BCS: CHILE | Chile         | Banking                       |
| Banco do Brasil             | B3: BBAS3  | Brazil        | Banking                       |
| Bancolombia                 | NYSE: CIB | Colombia      | Banking                       |
| B3                          | B3: B3SA3  | Brazil        | Stock Exchange                |
| BRF S.A.                    | NYSE: BRF  | Brazil        | Food processing               |
| CCR S.A.                    | B3: CCRO3  | Brazil        | Transportation                |
| Cemex                       | BMV: CEMEX CPO | Mexico    | Cement                        |
| Cencosud                    | BCS: CENCOSUD | Chile        | Retail                        |
| Cielo S.A.                  | B3: CIEL3  | Brazil        | Financial services            |
| Compañía de Minas Buenaventura | NYSE: BVN | Peru          | Mining                        |
| Companhia Energetica de Minas Gerais (CEMIG) | NYSE: CIG | Brazil        | Energy                        |
| Companhia Siderúrgica Nacional | NYSE: SID | Brazil        | Steel                         |
| Companhia de Bebidas das Americas (AmBev) | NYSE: ABEV | Brazil        | Beverages                      |
| CPFL Energia                | NYSE: CPL  | Brazil        | Energy                        |
| Credicorp                   | NYSE: RAP  | Peru          | Banking                       |
| Ecopetrol                   | NYSE: EC   | Colombia      | Oil                           |
| Company                                      | Ticker              | Country   | Industry                        |
|----------------------------------------------|---------------------|-----------|---------------------------------|
| Grupo Elektra                                | BMV: ELEKTRA       | Mexico    | Retail                          |
| Empresa Brasileira de Aeronáutica (Embraer)  | NYSE: ERI          | Brazil    | Aerospace/Defense                |
| Empresas CMPC                                | BCS: CMPC          | Chile     | Paper/Pulp                      |
| Empresas Copec                               | BCS: COPEC         | Chile     | Energy                          |
| Enel Américas                                | NYSE: ENIA         | Chile     | Energy                          |
| Enel Generación Chile                        | NYSE: EOCC         | Chile     | Energy                          |
| Fomento Económico Mexicano (FEMSA)           | BMV: FEMSA UBDC    | Mexico    | Beverages                       |
| Gerdau                                       | NYSE: GGB          | Brazil    | Steel                           |
| Grupo Financiero Banorte                    | BMV: GFNORTE       | Mexico    | Banking                         |
| Grupo Televisa                              | BMV: TLEVISA CPO   | Mexico    | Media                           |
| Itaú Unibanco                                | NYSE: ITUB         | Brazil    | Banking                         |
| Itaúsa Investimentos Itau                    | B3: ITSA4          | Brazil    | Banking                         |
| LATAM Airlines Group                         | NYSE: LFL          | Chile/Brazil | Airline                      |
| Petrobras                                    | NYSE: PBR.A        | Brazil    | Oil                             |
| S.A.C.I. Falabella                           | BCS: FALABELLA     | Chile     | Retail                          |
| Sociedad Química y Minera de Chile           | NYSE: SQM          | Chile     | Agricultural Chemicals          |
| Southern Copper Corp.                        | NYSE: SCCQ         | Peru      | Mining                          |
| Ultrapar Participacoes S.A.                  | B3: UGPA3          | Brazil    | Energy                          |
| Vale                                         | NYSE: VALE.P       | Brazil    | Mining                          |
| Wal-Mart de México                           | BMV: WALMEX V      | Mexico    | Retail                          |
| Amcor                                        | AMC                 | Australia | Materials                       |
| ANZ Bank                                     | ANZ                 | Australia | Financials                     |
| BHP                                          | BHP                 | Australia/UK | Materials                  |
| Brambles                                     | BXB                 | Australia | Industrials                    |
| Commonwealth Bank                            | CBA                 | Australia | Financials                     |
| CSL                                          | CSL                 | Australia | Health Care                    |
| Goodman Group                                | GMG                 | Australia | Real Estate                    |
| Insurance Australia Group                    | IAG                 | Australia | Financials                     |
| Macquarie Group                              | MQG                 | Australia | Financials                     |
| National Australia Bank                      | NAB                 | Australia | Financials                     |
| Rio Tinto                                    | RIO                 | Australia/UK | Materials                  |
| Scentre Group                                | SCG                 | Australia | Financials                     |
| South32                                      | S32                 | Australia | Materials                       |
| Suncorp                                      | SUN                 | Australia | Financials                     |
| Telstra                                      | TLS                 | Australia | Telecommunication Services      |
| Transurban                                   | TCL                 | Australia | Industrials                    |
| Company                        | Ticker | Country    | Industry           |
|-------------------------------|--------|------------|--------------------|
| Wesfarmers                    | WES    | Australia  | Consumer Staples   |
| Westpac                       | WBC    | Australia  | Financials         |
| Woodside Petroleum            | WPL    | Australia  | Energy             |
| Woolworths                    | WOW    | Australia  | Consumer Staples   |
| TOYOTA MOTOR CORP             |        | Japan      | Consumer Durables  |
| SOFTBANK GROUP CORP           |        | Japan      | Communications     |
| SONY GROUP CORPORATION        |        | Japan      | Consumer Durables  |
| KEYENCE CORP                  |        | Japan      | Electronic Technology |
| NIPPON TEL & TEL CORP         |        | Japan      | Communications     |
| FAST RETAILING CO LTD         |        | Japan      | Retail Trade       |
| RECRUIT HOLDINGS CO LTD       |        | Japan      | Technology services |
| NIDEC CORPORATION             |        | Japan      | Producer manufacturing |
| KDDI CORPORATION              |        | Japan      | Communications     |
| SHIN-ETSU CHEMICAL CO         |        | Japan      | Process Industries |
| NINTENDO CO LTD               |        | Japan      | Consumer Durables  |
| TOKYO ELECTRON                |        | Japan      | Electronic Technology |
| MITSUBISHI UFJ FINANCIAL GROUP INC |    | Japan      | Finance            |
| CHUGAI PHARMACEUTICAL CO      |        | Japan      | Health Technology  |
| SOFTBANK CORP                 |        | Japan      | Communications     |
| DAIKIN INDUSTRIES             |        | Japan      | Producer manufacturing |
| TAKEDA PHARMACEUTICAL CO LTD  |        | Japan      | Health technology  |
| MURATA MANUFACTURING CO       |        | Japan      | Electronic technology |
| HONDA MOTOR CO                |        | Japan      | Consumer Durables  |
| DENSO CORP                    |        | Japan      | Producer Manufacturing |
| Nestle SA Reg                 |        | Switzerland| Consumer Staples   |
| ASML Holding NV               |        |            | Information Technology |
| Roche Hldgs AG Ptg Genus      |        | Switzerland| Healthcare         |
| Novartis AG Reg               |        | Switzerland| Healthcare         |
| LVMH-Moet Vuitton             |        | France     | Consumer Durables  |
| Unilever                      |        | UK         | Consumer Staples   |
| SAP SE                        |        | Germany    | Information technology |
| Siemens AG                    |        | Germany    | Industrials        |
| AstraZeneca Plc               |        | UK         | Healthcare         |
| HSBC Holdings Plc             |        | UK         | Financials         |
| Royal Dutch Shell             |        | Netherlands| Oil and gas        |
| L'Oreal                       |        | France     | Consumer Durables  |
| Company                              | Ticker | Country   | Industry               |
|--------------------------------------|--------|-----------|------------------------|
| Anheuser-Busch Inbev                 |        | Belgium   | Consumer Durables      |
| Medtronic                            |        | Ireland   | Health Technology      |
| Total S.A.                           |        | France    | Oil and gas            |
| Prosus                               |        | Netherlands | Communication    |
| Novo Nordisk                         |        | Denmark   | Healthcare             |
| Accenture                            |        | Ireland   | Information technology |
| BP                                   |        | UK        | Oil and gas            |
| Sanofi                               |        | France    | Healthcare             |
| Shopify Inc                          | SHOP-T | Canada    | Information Technology |
| Royal Bank of Canada                 | RY-T   | Canada    | Financials             |
| Toronto-Dominion Bank                | TD-T   | Canada    | Financials             |
| Canadian National Railway Co.        | CNR-T  | Canada    | Railroads              |
| Enbridge Inc                         | ENB-T  | Canada    | Oil & gas              |
| Bank of Nova Scotia                  | BNS-T  | Canada    | Banking                |
| Brookfield Asset Management Inc CLA Lv | BAM-A-T | Canada    | Financials             |
| Bank of Montreal                     | BMO-T  | Canada    | Financials             |
| Canadian Pacific Railway Limited     | CP-T   | Canada    | Railroads              |
| Te Energy Corp                       | TRP-T  | Canada    | Oil & gas              |
| Thomson Reuters Corp                 | TRI-T  | Canada    | Consulting             |
| Canadian Imperial Bank of Commerce   | CM-T   | Canada    | Financials             |
| BCE Inc                              | BCE-T  | Canada    | Communication          |
| Manulife Fin                         | MFC-T  | Canada    | Financials             |
| Barrick Gold Corp                    | ABX-T  | Canada    | Mining                 |
| CDN Natural Res                      | CNQ-T  | Canada    | Oil & gas              |
| Alimentation Couche-Tard Inc Cl B Sv | ATD-B-T | Canada    | Consumer Staples       |
| Constellation Software Inc          | CSU-T  | Canada    | Information Technology |
| Nutrien Ltd                          | NTR-T  | Canada    | Basic Materials        |
| Suncor Energy Inc                    | SU-T   | Canada    | Oil & gas              |
| Apple Inc                            | AAPL   | USA       | Information Technology |
| Microsoft Corporation                | MSFT   | USA       | Information Technology |
| Amazon.com Inc                       | AMZN   | USA       | Consumer discretionary |
| Facebook Inc. Class A                | FB     | USA       | Communication          |
| Alphabet Inc. Class A                | GOOGL  | USA       | Communication          |
| Alphabet Inc. Class C                | GOOG   | USA       | Communication          |
| Tesla Inc                            | TSLA   | USA       | Consumer discretionary |
| Berkshire Hathaway Inc. Class B      | BRK.B  | USA       | Financials             |
| JPMorgan Chase & Co.                 | JPM    | USA       | Financials             |
| Company                             | Ticker | Country | Industry           |
|------------------------------------|--------|---------|--------------------|
| Johnson & Johnson                  | INJ    | USA     | Healthcare         |
| NVIDIA Corporation                 | NVDA   | USA     | Information Technology |
| Visa Inc. Class A                  | V      | USA     | Information Technology |
| UnitedHealth Group Incorporated    | UNH    | USA     | Healthcare         |
| Home Depot Inc.                    | HD     | USA     | Consumer discretionary |
| Mastercard Incorporated Class A    | MA     | USA     | Information Technology |
| Procter & Gamble Company           | PG     | USA     | Consumer staples   |
| Walt Disney Company                | DIS    | USA     | Communication      |
| PayPal Holdings Inc                | PYPL   | USA     | Information Technology |
| Bank of America Corp               | BAC    | USA     | Financials         |
| Intel Corporation                  | INTC   | USA     | Information Technology |

Colour code – highlighted yellow – excluded.
### Appendix 2. Final list of S&P companies used in research

| Company                                      | Country     | Industry                | Index      |
|----------------------------------------------|-------------|-------------------------|------------|
| Accenture                                   | Ireland     | Information Technology  | Europe350  |
| Anheuser-Busch Inbev                         | Belgium     | Consumer Durables       | Europe350  |
| ASML Holding NV                              | Netherlands | Information Technology  | Europe350  |
| AstraZeneca Plc                              | UK          | Healthcare              | Europe350  |
| BRF S.A.                                    | Brazil      | Food processing         | LATAM40    |
| Canadian National Railway Co.               | Canada      | Railroads               | TSX60      |
| CEMEX, S.A.B. de C.V.                        | Mexico      | Cement                  | LATAM40    |
| China Mobile                                 | China       | Communication           | Asia50     |
| China Overseas Land & Investment Limited    | China       | Real Estate             | Asia50     |
| CK Asset Holdings                           | Hong Kong   | Real Estate             | Asia50     |
| CK Hutchison Holdings                       | Hong Kong   | Industrials             | Asia50     |
| CLP Holdings                                 | Hong Kong   | Utilities               | Asia50     |
| CNOOC Limited                                | China       | Energy                  | Asia50     |
| Companhia Energética de Minas Gerais         | Brazil      | Energy                  | LATAM40    |
| Companhia Siderúrgica Nacional               | Brazil      | Steel                   | LATAM40    |
| Ecopetrol S.A.                               | Colombia    | Oil                     | LATAM40    |
| Enel Américas S.A.                           | Chile       | Energy                  | LATAM40    |
| Enel Generación Chile S.A.                   | Chile       | Energy                  | LATAM40    |
| Falabella S.A.                               | Chile       | Retail                  | LATAM40    |
| FAST RETAILING CO LTD                        | Japan       | Retail Trade            | TOPIX150   |
| Formosa Plastics Corporation                 | Taiwan      | Materials               | Asia50     |
| Gerdau S.A.                                  | Brazil      | Steel                   | LATAM40    |
| Goodman Group                                | Australia   | Real Estate             | ASX50      |
| Home Depot Inc.                              | USA         | Consumer discretionary  | S&P500     |
| Hon Hai Precision Industry                  | Taiwan      | Information Technology  | Asia50     |
| HONDA MOTOR CO                               | Japan       | Consumer Durables       | TOPIX150   |
| Hyundai Motor Company                        | South Korea | Consumer Discretionary  | Asia50     |
| Intel Corporation                            | USA         | Information Technology  | S&P500     |
| L’Oreal                                      | France      | Consumer Durables       | Europe350  |
| LATAM Airlines Group S.A.                   | Chile       | Airline                 | LATAM40    |
| LG Chem, Ltd.                                | South Korea | Materials               | Asia50     |
| Link Real Estate Investment Trust            | Hong Kong   | Real Estate             | Asia50     |
| LVMH-Moet Vuitton                            | France      | Consumer Durables       | Europe350  |
| Mastercard Incorporated Class A              | USA         | Information Technology  | S&P500     |
| Medtronic                                    | Ireland     | Health Technology       | Europe350  |
| NIPPON TEL & TEL CORP                        | Japan       | Communications          | TOPIX150   |
| Novartis AG Reg                              | Switzerland | Healthcare              | Europe350  |
| Company                                      | Country    | Industry            | Index       |
|----------------------------------------------|------------|---------------------|-------------|
| Novo Nordisk                                 | Denmark    | Healthcare          | Europe350   |
| Nutrien Ltd                                  | Canada     | Basic Materials     | TSX60       |
| PetroChina Company Limited                   | China      | Energy              | Asia50      |
| Petróleo Brasileiro S.A. - Petrobras         | Brazil     | Oil                 | LATAM40     |
| POSCO                                        | South Korea| Materials           | Asia50      |
| Procter & Gamble Company                     | USA        | Consumer staples    | S&P500      |
| Roche Hldgs AG Ptg Genus                     | Switzerland| Healthcare          | Europe350   |
| Samsung Electronics                          | South Korea| Information Technology| Asia50    |
| Sands China Ltd.                             | Hong Kong  | Consumer Discretionary| Asia50    |
| SAP SE                                       | Germany    | Information technology| Europe350 |
| Siemens AG                                   | Germany    | Industrials         | Europe350   |
| Sociedad Química y Minera de Chile S.A.      | Chile      | Agricultural Chemicals| LATAM40   |
| Sony Group Corporation                       | Japan      | Consumer Durables   | TOPIX150    |
| South32 Limited                              | Australia  | Materials           | ASX50       |
| Southern Copper Corporation                  | Peru       | Mining              | LATAM40     |
| Sun Hung Kai Properties                      | Hong Kong  | Real Estate         | Asia50      |
| Taiwan Semiconductor Manufacturing           | Taiwan     | Information Technology| Asia50    |
| TAKEDA PHARMACEUTICAL CO LTD                 | Japan      | Health technology   | TOPIX150    |
| Telstra Corporation Limited                  | Australia  | Telecommunication Services| ASX50  |
| Tencent Holdings                             | China      | Communication       | Asia50      |
| Toyota Motor Corporation                     | Japan      | Consumer Durables   | TOPIX150    |
| Unilever                                     | UK         | Consumer Staples    | Europe350   |
| Vale S.A.                                    | Brazil     | Mining              | LATAM40     |
| Visa Inc. Class A                            | USA        | Information Technology| S&P500    |
| Walt Disney Company                          | USA        | Communication       | S&P500      |
| Wesfarmers Limited                           | Australia  | Consumer Staples    | ASX50       |
| Woodside Petroleum Ltd                       | Australia  | Energy              | ASX50       |
| Woolworths Group Limited                     | Australia  | Consumer Staples    | ASX50       |
## Appendix 3. Industry grouping into categories

| Industry                   | Group / category |
|----------------------------|------------------|
| Agricultural Chemicals     | 1                |
| Airline                    | 2                |
| Basic Materials            | 3                |
| Cement                     | 3                |
| Communication              | 4                |
| Communications             | 4                |
| Consumer discretionary     | 5                |
| Consumer Durables          | 5                |
| Consumer staples           | 5                |
| Energy                     | 6                |
| Food processing            | 5                |
| Health Technology          | 7                |
| Healthcare                 | 7                |
| Industrials                | 8                |
| Information Technology     | 10               |
| Information technology     | 10               |
| Materials                  | 3                |
| Mining                     | 3                |
| Oil                        | 6                |
| Railroads                  | 2                |
| Real Estate                | 11               |
| Retail                     | 5                |
| Retail Trade               | 5                |
| Steel                      | 3                |
| Telecommunication Services | 4                |
| Utilities                  | 5                |

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