



Does a country`s corruption level affect the outcome of a corruption scandal?

An event study of the effects of a country`s level of corruption on firms`s cumulative abnormal returns resulting from the news about corruption

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ABSTRACT

By investigating the phenomenon of corruption, we found that corruption represents a huge cost on society. There exists extensive theory and literature on the costs of corruption, but costs on firm-level has been limited. Because of this, we wanted to expand this literature by looking at how a country's level of corruption would affect a firm's stock price reaction resulting from news about corruption.

With a manual collection process we identified 71 individual corruption cases from six countries within the time period from April 2010 to April 2015. Using the standard event study methodology, we found a significant negative stock market reaction to the news about a firm participating in corrupt activities. For our sample as a whole, the cumulative average abnormal return was -1.68% in the 7 days surrounding the event day. By doing a comparison between firms from more corrupt countries and firms from less corrupt countries, we did not find any evidence to say that the former should experience a more negative reaction on stock price than the latter.

In addition, our findings show that the size of the cumulative abnormal return resulting from news about corruption is positively influenced by the size of the firm. We also found evidence of an interaction effect, where an increasing price-book ratio will positively moderate the effect of the level of corruption. This indicates that a higher price-book ratio is beneficial in more corrupt countries.

Preface

This thesis is written as a part of our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH), and marks the end of 5 great years at NHH.

We sincerely express our gratitude to our supervisor, Seidali Kurtmollaiev, for constructive suggestions and criticism throughout the process. His accessibility throughout the final stages in the writing process was of great help and for this we thank him. Furthermore we would like to thank all of our family and friends for their support and motivational comments in the last months.

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1 Introduction

In March 2014, the former Petrobras executive Paulo Roberto Costa was arrested for money laundering. His testimony would later be essential to expose the largest corruption scandal Brazil had ever seen. Executives from the state-controlled oil company Petrobras and different construction companies had worked with Brazilian politicians on a two billion USD kickback scheme from 2004 to 2012. The construction companies bought contracts from Petrobras and charged an add-on, which then was divided not only between Petrobras executives and the construction companies, but also to Brazilian politicians. So what happened to the Petrobras stock after the revelation of this corruption scandal? After falling for four months prior to the announcement, it now doubled within six months. This rather unexpected reaction awakened our interest of how the financial markets are affected and react to corruption.

A World Bank-report released in 2005 attempted to get a dollar value on corruption (Kaufmann, 2005). They estimated a total cost of corruption ranging between \$600 billion to \$1.5 trillion. Another estimate done by Transparency International argued that the number could be as high as \$2.6 trillion. This is equal to more than 5% of the global gross domestic product (Transparency International, 2007). In addition they also estimated that in developing countries alone, the dollar value of bribes paid to corrupt officials is close to \$40 billion each year, and that 40 % of business executives has been approached and requested to pay a bribe when dealing with a public institution. (Transparency International, 2009). Not only is corruption the largest obstacle to economic and social development, it accounts for a too large part of the world economy to be overlooked (The World Bank, 2013).

That corruption is costly is supported by Murphy, Shleifer and Vishny (1993), who describe corruption as “sand in the wheels” of an economy. They argue that corruption can lead to high economic costs due to support given to inefficient producers and the allocation of resources away from their most productive usage (Murphy, Shleifer, & Vishny, 1993). Others like Nathaniel Leff (1964) and Samuel Huntington (1968) however say that corruption in some cases may work as an important mechanism in overcentralized bureaucracy, and act as a substitution for bad law. In other words, they argue that corruption may work as a ”greasing” mechanism, where there is economic value in terms of the additional productive transactions which occur on micro-level. They thus believe that these benefits may exceed the cost of engaging in corruption (Leff, 1964; Huntington, 1968).

Even so, research has shown that corruption have negative effects on various economic factors like GDP growth (Mauro, 1995), Foreign Direct Investment (Wei, 2000; Smarzynska & Wei, 2000; Abed & Gupta, 2002) and capital productivity (Lambdsdorff, 2003). While the literature on the country-level effects of corruption is well researched and has been a topic of interest for decades, the focus on more firm-specific effects has been lower. However, in the last years the amount of studies examining the effect of corruption on this level has grown. Many of the recent studies on firm level has been done by implementing the event study methodology to measure the stock markets reactions to news about corrupt activities¹.

The overall focus on these event studies has been to examine how the stock markets are reacting to news about corruption, and the results are showing significant negative reactions in a majority of the studies through various countries. A study done by Karpoff, Lee and Martin (2014) found a negative stock price reaction to news about corruption in US firms, and a similar study done by Sun and Zhang (2006) found negative reactions when looking at Chinese firms. Even though the different studies use similar methodology, comparing the results can be difficult. They investigate the reaction in different time periods, have different assumptions and it can be hard to argue that the stock price reaction would be the same way pre- and post the financial crisis. In addition they both used within-country samples, which means that the results only can be generalized to the respective samples. Investigating potential differences between how the markets react to these type of news, may be of importance to further expand our understanding of how the financial markets operate and broaden the theory on financial reactions to information.

In terms of comparing how the reaction to corruption would differ between countries, one could expect the level of corruption in the country to either amplify or diminish the original reaction. On one side, a firm from a more corrupt country is proven to be more likely to partake in corruption (Transparency International, 2009). This means that this risk should be reflected in a lower stock price. Following this logic one would expect a weaker reaction to the news of a firm being corrupt, since the risk should already be reflected in the stock price. On the other side, one could expect investors to be more likely to see one isolated act of corruption as a signal for larger underlying corruption culture, and thus amplify the reaction, if firms come from a more corrupt country (Bardhan, 1997; Rose-Ackerman, 1998).

¹ Some examples are: Rao, 1997; Gunthrope, 1997; Murphy, Shrieves, & Tibbs, 2004; Chen, Ding, & Kim, 2010.

We found these mechanisms interesting and sought out to examine this further. The purpose of this study is to examine if firms from countries characterized as more corrupt, will experience a modified reaction compared to firms from countries which are seen as less corrupt. To do this, we first want to use the event study methodology to see if our sample displays the same reactions to corruption as predicted by previous studies and economic theory.

Furthermore we want to investigate whether markets exhibit different reactions to news about firms being corrupt in countries with different general level of corruption. This will be done by using variation in the different countries corruption levels, to check if there is systematic differences in the stock price reaction between the countries.

At last, we want to explore if there are any other firm specific characteristics which possibly could influence the effect of the country's level of corruption. Some studies has shown that the market capitalization of the firm could diminish the effect of the news about corruption and other studies has shown that the sector in which the firm operates also could be of importance. By using OLS-regression, we thus also want to explore if firm characteristics like these could impact the effect of the country's level of corruption. We chose to focus on size in form of market capitalization, the capital intensity of the sector and the price-book ratio of the firm.

Our dataset originally consisted of 129 different companies from six countries which had been caught participating in corrupt activities between April 2010 and May 2015. By implementing a strict set of selection criteria's we reduced the size of our sample down to 71 firms. This study will contribute to the existing event study literature in terms of using an up-to-date data sample, and investigating possible differences in stock price reactions based on the level of corruption in the selected countries. In addition, it would complement and broaden economic theory in regards of how the financial markets react to negative news.

2 Theory and Hypothesis:

2.1 The Efficient Market Hypothesis

The most important underlying theory in event studies, is the proposition of efficient markets. The efficient market hypothesis states that an assets current price should fully reflect all the information that is available at the time. This means that the only time an asset price will change is when new information becomes available to the market. Since the inflow of new information in capital markets are unpredictable, this implies that no one should be able to consistently outperform the market, given that one has the same information available and the factor of luck is removed.

The efficient market hypothesis was first developed in the early 1900s, but it was not until Eugene Fama (1970) provided empirical evidence that the theory became widely accepted. He stated that there were three different forms of market efficiency: weak, semi-strong and strong form (Fama, 1970). In the weak form of market efficiency, prices only reflect information, which are possible to extract from historical prices and returns. This implies that trend analysis is useless in order to earn abnormal returns, since the benefit of analyzing historical returns already should be reflected in the stock.

The semi-strong form of efficiency states that in addition to historical data, all publicly available information regarding the firm's current and future prospects is reflected in the stock price. The strong form of market efficiency states that stock prices should reflect absolutely all information available about the firm. This includes historical prices, public information and insider-information. This form of efficiency is considered to be extreme, and should not be treated as anything else than a benchmark and a logical completion of possible forms of the efficient market hypothesis.

In our study we have assumed that the semi-strong form of market efficiency represents the information availability. By this assumption we propose that the market does not know that a firm has participated in corruption, and thus that the stock price does not reflect this information. By using the event study methodology, we aim to quantify the market reaction when this information about corrupt activities becomes publically available.

2.2 Corruption as a Phenomenon

A commonly used definition of corruption is “the abuse of public power for private benefits” (The World Bank, 1997). This definition focus on the public sector, but as Rose-Ackerman (1998) pointed out, corruption also exists in the interface between the public and private sector. Norad, which is using the Worlds Bank definition, provides an extended definition but adds; “It applies to any transaction between the public and the private sectors where public goods are illegally converted into private benefits” (NORAD, 2013). Norad’s definition includes the most important aspects of corruption, but it still relies on participation from the public sector. Therefore, we will use Transparency International’s definition of corruption “*the abuse of entrusted power for private gains*” (Transparency International, 2015). Not only is it a more cited definition (Ng D., 2006) (Kaufmann, 2005), it also opens for corruption in the private sector without public participation.

A further interpretation of Transparency International’s definition of corruption can be seen as the principal-agent-problem (Bardhan, 1997). This occurs when “a person or entity (agent) is able to make decisions on behalf of, or that impact, another person or entity (principal)” (Shailer, 2004). An example will be managers (agents) that are paid to make the best decisions for the shareholders (principals). However, the managers might *abuse its entrusted power* and act opportunistic *for private gain*, and the principal-agent problem occurs. This can happen since the manager has more information (asymmetric information) about the firm than the shareholders, and the shareholders have to *trust* the manager. In this study we will use the principal-agent problem as an analytical tool to help clarify corruption as a phenomenon, and keep in mind that not all forms of principal-agent problems can be seen as corruption.

The act of corruption can be carried out in a vast variety of ways, and even though Andvig and Fjeldstad (2001) suggest to divide corruption into five forms: bribery, fraud, embezzlement, extortion and favoritism, we have chosen to focus on bribery as the *corrupt act* in this study. The reasoning for this is that the action of either paying or receiving a bribe should be understood as the essence of what corruption really is (Amundsen, 1999). However, we also include some prevoius studies which has defined both bribery and fraud as the act of corruption. In many cases, bribery and fraud are partly overlapping or temporarily interchangeable with eachother (Andvig & Fjeldstad, 2001). This suggests that studies which has defined corruption as both bribery and fraud can contribute to the discussion of the effects of corruption, even though we focus only on bribery as the act of corruption. A short explanation of fraud will thus be included. The three other forms of corruption suggested by

Andvig and Fjeldstad (2001) will not be examined in this study since embezzlement from a legal perspective is regarded as theft, and extortion and favoritism are most common in the public sector (Andvig & Fjeldstad, 2001). This study will therefore mainly examine bribery.

Bribery can be defined as “giving or receiving a financial or other advantage in connection with the “improper performance” of a position of trust, or a function that is expected to be performed impartially or in good faith” (Lord, 2014). A financial advantage could include “kickbacks, gratitude, commercial arrangements, backsheesh, sweeteners, pay-offs or grease money” (Andvig & Fjeldstad, 2001). Other advantages could take the form as gifts, lavish treatment during business trips or tickets to special events (Lord, 2014). Another definition of bribery by Vargas and Hernandez (1999) is “A bribe is made when an official is offered or promised a payment for an action already carried out or is to be expected” (Vargas-Hernández, 1999). This payment could take form in different ways, either as a fixed sum, a percentage of a contract or as a favor. Both definitions have in common that the receiver usually is an empowered official or person who can negotiate contracts on behalf of either the public sector, private enterprises or in any other way can redistribute benefits so that it gains individuals or companies.

When the main point of the bribe is to exchange monetary or non-monetary value for favorable treatment, fraud is the use of misleading information (trickery, swindle or deceit) to induce someone to turn over property or resources voluntarily. This is an act, which involves “a manipulation or distortion of information, facts and expertise, by public officials positioned between politicians and citizens, who seeks to draw a private profit” (Andvig, 2001).

2.3 Cost of corruption

It has been done extensive research on the negative effects of corruption, and the results are widely acknowledged in economic literature. Mauro (1995) showed that corruption has a negative impact on the level of investment and economic growth, and according to his results, countries with high levels of corruption experience significantly lower investment rates.

It has also been done comprehensive research on the effect of corruption and foreign direct investments (FDI). Studies done by Wei (2000) and Smarzynska and Wei (2000) shows that corruption might act like a tax, which deters FDI. Abed and Gupta (2002) further found that corruption significantly reduces the level of FDI inflows. In particular FDI to sophisticated technology suffer from corruption. This is mainly because investors fear that the

technological know-how can be leaked to competitors or the public by opportunistic and corrupt partners (Mauro, 1995).

Furthermore, corruption has been proven to have a significant negative impact on a country's capital productivity (Lambsdorff, 2003). The impact of corruption on the level of per capita GDP has also been extensively analyzed. All of these reports point to a significant negative relationship between corruption and the level of economic development (Ehrlich & Lui, 1999; Welsh, 2004; Neeman, Paserman, & Simhon, 2008).

In addition to all these costs to the country's economy, corruption also imposes various losses on a firm level. Some of these costs can be explained by the principal-agent problem, and the lower amount of trust to firms in more corrupt countries (Wei, 2000; Becker et al. 2011). To decrease the principal-agent problem, corporations are controlled and directed by different mechanisms, processes and relations (Shailer, 2004). The set of these mechanisms, processes and relations make up the term corporate governance. Porta, Lopez-de-Silanes, Shleifer & Vishny (1998) found evidence for higher corruption leads to increased agency problems and decreased regulatory oversight, since the opportunistic agent will benefit from making monitoring and controlling more difficult. A consequence of this is less efficient firms, lower firm profitability and lower investor protection (Porta et al., 1998). Ng, Qian and Dix (2008) support these findings and document that higher corruption is associated with worse corporate governance.

2.4 Hypothesis

When corporate governance is weaker and the credibility to the judicial system and legal enforcement is low, opportunistic activities become more likely and a consequence of this is decreased trust (Anderson & Tverdova, 2003; Uslaner, 2004). Trust has always been a fundamental factor for efficient financial markets as described by Fama (1970). Since the semi-strong form of market efficiency indicates that insider information is not available, investors have to rely on the information provided by the firm. If an investor (principal) doesn't trust the other part (agent) to honor its commitment and repay the investor, there will be no transaction, or the investor will demand a compensation for this risk. In the 2008 financial crises, this assurance was removed from the financial markets and led to falling stock prices and rocketing bond spreads (Guiso, 2010). Even though this example is not directly transferable to our study, it shows how important trust is in the financial markets. From this,

one would expect that firms being caught in corruption would experience falling stock prices, not only due to the direct costs (fees, legal costs etc.), but also due to the loss of credibility.

Various event studies have been conducted, and even though the evidence vary, we find proof for of a significant negative stock price reaction to news about a firm being corrupt. Karpoff et al (2014) examine all the 143 US firms caught for breaking the anti-bribery law “The Foreign Corrupt Practices Act of 1977” (FCPA) from 1978 until 2013, and find that firms experience a cumulative average abnormal return (CAAR) of -1.72% in the three days surrounding the day this information becomes publically available (event day). Rao (1997) find a much stronger stock market reaction when looking at only 16 US bribery cases between 1989 and 1993. He finds that firms on average show an abnormal return of -5.72% (Rao, 1997) on the event day. Studies from outside the US also show similar results. Arnold and Engelen (2007) find 57 corruption cases in Holland and Belgium in the period from 1994 to 2003, and by using the standard event study methodology they show that firms experience a CAAR of -1.77% for the three days surrounding the event day. A study of 155 Chinese firms caught in corruption between 1990 and 2002 share similar results with a CAAR of -1.4% in the three days surrounding the event day (Sun & Zhang, 2006).

While all the studies above showed statistically significant negative stock market reactions, some other studies find no significant results. A study done on 23 Chinese bribery cases conducted by Fan, Rui and Zhao (2008) indicates a negative reaction to news about a firm participating in corruption. Similarly, a study done by Bocek (2013) indicates the same using 60 bribery cases from the US. However, none of the results in these studies were significantly significant. Contrary to the other studies, Murphy, Shrieves and Tibbs (2004) find a positive reaction to news about bribery with a CAAR of 0.32%. However, this result was also not statistically significant.

All in all, we find it reasonable to expect a negative stock price reaction to the news of a firm being corrupt. We believe that this reaction will occur regardless of the firms` country of origin, and we define our first hypothesis as:

Hypothesis 1: *News about a firm being corrupt will result in negative cumulative average abnormal returns.*

Even though there seems to be a general effect of news about corruption, it is not clear how this reaction could differ between countries. The financial markets in countries with higher level of corruption are not only related with lower investor protection (Porta et al., 1998), poorer corporate governance (Ng et al. 2008) and less trust (Wei, 2000; Becker et al. 2011), but also face more “nervousity” from foreign investors (Pellegrini, Sergi & Sironi, 2015). Gelos and Wei (2005) find that during financial downturns, international funds flee non-transparent countries by a significant greater amount than their transparent counterparts. Even though Gelos and Wei’s (2005) results aren’t directly transferable to our study, their evidence indicates that firms from more corrupt countries might experience greater negative effects when trust is lost in the financial markets. Using the analogy to the financial crisis, we can try to illustrate this effect. During the financial crises in 2008, the stock market reacted significantly stronger to bad news than in the years before and after (Guiso, 2010). This indicates that markets with lower credibility amplifies the reaction of bad news.

One could expect a stronger reaction to firms from more corrupt countries for various reasons. Firstly, one could expect that an act of corruption by a firm from a less corrupt country could be seen as an exception rather than business as usual. On the other side, an act of corruption by a firm from a more corrupt country could indicate a deeper problem, since corruption may be seen as a normal way of doing business (Bardhan, 1997; Rose-Ackerman, 1998; Fisman & Miguel, 2007). Furthermore, news about a firm being corrupt can also increase the general mistrust to all other information provided by the firm. Chen, Ding, and Kim (2010) show that it is harder to estimate future earnings for firms previously associated with corruption, leading to a lower firm valuation. This effect is shown to be stronger in countries with higher levels of corruption (Chen et al., 2010). Lastly, the chance of being caught and prosecuted is seen as lower in countries with a higher level of corruption (Anderson & Tverdova, 2003; Uslaner, 2004). A consequence of this is that it becomes harder to remove opportunistic agents. Sun and Zhang (2006) looked at Chinese managers that was caught for corruption, and documented that rather than being punished for their actions, they got relocated or even promoted. To summarize, we expect a stronger reaction on firms from more corrupt countries since a single act of corruption might signal a larger underlying problem, it leads to general mistrust to the firm and uncertainty if the opportunistic agents will be removed or not.

Due to limited empirical evidence, it is hard to see whether our expectations are right or not, but the one study we found, suggests that they are right. A recent event study by Lin, Officer and Sun (2015) examines the stock market reactions to misconduct by firms listed in the US, but

headquartered in other countries. Not only looking at corruption cases, but also other forms of corporate misconduct, Lin et al. (2015) finds 242 cases from 29 different countries in the period from 1996 to 2011. Using standard event study methodology, the sample as a whole showed strongly significant abnormal return of -13.01% on the event day, which must be seen as a much stronger reaction than what was measured in the other studies above. With a focus on “spill-over effects”, Lin et al. (2015) examine the reaction to “intra-country peers” of the offending firms. They do so by creating portfolios of “innocent” firms from the same country as the offending firm, and see how US investors react to firms from the same country as an offending firm. Further they divided these portfolios into two groups (high corruption and low corruption) depending on the country’s perceived level of corruption. In the three days surrounding the event day, portfolios from the “high corruption”-portfolio showed a CAAR of -0.92% and the firms from the “low-corruption”-portfolio had a CAAR of -0.61%.

Lin et al. (2015) thus conclude that firms from more corrupt countries generates larger “spill-over effects” than firms from less corrupt countries on the announcement of corporate misconduct. These results supports the findings of Gelos and Wei (2005), which suggest that investors lose more trust to a corrupt firm if it comes from a country with a higher level of corruption. Based on these arguments, we find it reasonable to expect firms from more countries to show a larger (negative) reaction to news about being corrupt, and we define our second hypothesis as:

Hypothesis 2: The country’s level of corruption is negatively associated with the size of the cumulative average abnormal returns resulting from the news about a firm being corrupt.

A country’s level of corruption can be an important factor when investors evaluate how trustly a firm is, but other firm characteristics can also be of great importance. Lin et al. (2015) observed a large standard deviation on the CAAR within the different countries, and stressed the importance of controlling for firm-specific variables.

One of the most important firm-specific variables, consistently shown to be correlated with CAAR, is firm size (Murphy et al., 2004; Chen et al., 2005; Karpoff et al., 2014; Lin et al., 2015). These studies show that news about corruption tend to have a smaller effect on larger firms compared to smaller firms (Murphy et al. 2004). There are two main arguments for this: economics of scale and diversification. The costs related to lawsuits, fines, and other direct costs do not grow proportional with a firm’s market capitalization. This economics of scale

effect makes corruption relatively cheaper for larger firms (Murphy et al. 2004). The other factor is diversification; the larger the firm the less idiosyncratic risk. Larger firms tend to be more diversified in terms like industries, product lines, customer segments and location. If one part of the firm has participated in illegal corporate activities this might not affect other parts of the firm. From these arguments, we find it reasonable to assume that firms are associated with a higher level of trust than smaller firms. Following the logic that the lack of trust tends to amplify the reaction to bad news, one would expect to see a larger size-effect in more corrupt countries. Meaning that the benefit of being large is greater in more corrupt countries, we define our third hypothesis as:

Hypothesis 3. The effect of the country's level of corruption on the size of the cumulative average abnormal returns resulting from the news about a firm being corrupt will be positively moderated by the size of the company.

Another widely used firm-specific variable is sector (Cheung et al., 2011; Bocek, 2013; Karpoff et al., 2014), and we would expect some sectors to be more likely to experience opportunistic behavior than other. Leite and Weidmann (1999) suggest that firms in sectors with a higher level of capital intensity are more likely to be corrupt. Cross-checking sectors capital intensity level with Transparency International's Bribe Payers Index (BPI) supports that capital intensity and likelihood of corruption seem to be correlated. This may indicate that sectors with a high capital intensity is associated with a lower level of trust, and thus should display a stronger reaction to news about corruption. Even though studies done by Karpoff et al (2014) and Cheung et al (2011) show somewhat different results, sectors associated with a high level of capital intensity (construction, energy, mining, telecom, etc.) tends to show a stronger reaction to news about corruption than firms in more labor intensive sectors (informational technology, consumer services etc.).

Following the logic that lack of trust tend to amplify the reaction to bad news, we would expect to see a larger sector-effect in more corrupt countries. Implying that the disadvantage of being capital intensive is greater in more corrupt countries, we state our fourth hypothesis as follows:

Hypothesis 4. The effect of the country's level of corruption on the size of the cumulative average abnormal returns resulting from the news about a firm being corrupt will be negatively moderated by the level of capital intensity of the firm

A less commonly used control variable is the price-book ratio. This ratio is a multiple of the market value of equity over the book value of equity, and can tell us how investors value the firm compared to what it's worth on paper (Berk & DeMarzo, 2013). A firm with a price-book ratio of 1 is valued to the booked assets minus the booked liabilities, which means that the market value is equal to the accounting value of the firm. However, if a firm has a price-book ratio of 3, this means that the market values the firm to be worth three times more than what the accounting rules should suggest the value to be. This can happen if investors have a positive outlook for the firm, and that the firm will capture value that is not yet reflected by the accounting rules. For someone to pay three times what something is “worth in theory” indicates a high level of trust. Investors have to have confidence in that the firm will be able to grow in the future, and distribute the earnings in a fair manner. We can thereby assume that a higher price-book ratio indicates a higher level of trust from investors.

Earlier studies which has mentioned this measurement have divided opinions on how firms with different price-book ratios react to news about corruption. Murphy et al. (2004) argues that firms with a higher price-book ratio will experience a greater loss (more negative reaction) since more of their value comes from expectations about future earnings and the firm value is relatively less tangible. More in line with our expectations, Karpoff et al. (2014) suggests the opposite based on higher level of trust to firms with a high price-book ratio. Based on the same logic we have used in the other hypothesis, (lower level of trust tend to amplify the reaction to bad news) one could expect that firms with a lower price-book ratio would experience a more negative stock price reaction in more corrupt countries. Implying that there is an advantage having a high price-book ratio in more corrupt countries, we state our fifth hypothesis as:

Hypothesis 5. The effect of the country's level of corruption on the size of the cumulative average abnormal returns resulting from the news about a firm being corrupt will be positively moderated by the firm's P/B ratio

3 Method

3.1 Event study Methodology

The efficient market hypothesis has led to the rise of event studies as a financial research methodology. If stock prices truly reflect all currently available information, then changes in price must reflect the addition of new information into the market. Hence, event studies would enable us to observe and analyze the impact of an event on a firm's stock price (Bodie, Kane, & Marcus, 2014). According to Fama himself, event studies are “the cleanest evidence we have on efficiency” (Fama, 1991).

In earlier work, an event study was referred to as a semi-strong-form test of market efficiency (Fama, 1970). The whole purpose of the event study was to examine how fast stock or security prices would reflect new public information. Public information was defined as news related to e.g. earning announcements, announcement of mergers or acquisitions or other financing decisions.

The basic method of conducting an event study has not changed notably, and is still largely based on the classic studies stemming from the late 1960s. The main intention is to evaluate the impact of an event by measuring the associated abnormal returns. When doing an event study, we take make basic assumptions:

- The market is semi-strong efficient
- The event was unanticipated
- There were no confounding effects during the event window

While there is no unique structure to each event study, there often is a general flow of analysis. Our event study is performed using the event study methodology described in MacKinlay (1997), but also supplemented by Strong (1992).

3.2 Define the event of interest and identify the time periods

The first step in doing an event study is to define the event of interest, and to identify the period over which the stock prices of the firms included in the event will be examined. This time period includes the estimation window, and the event window. The estimation window should always be before the event window. Let $\tau = 0$ represent the announcement day. The estimation window is then the time period between $[T1, T2]$, and the event window is the time period between $[T3, T4]$. This is illustrated in figure 3.1 below:

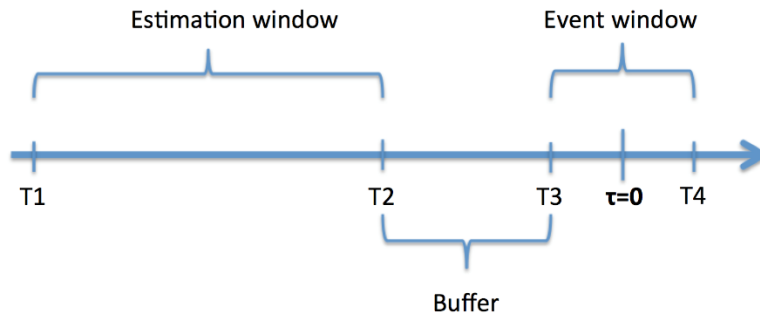


Figure 3.1 – Adapted from MacKinlay 1997: Estimation window is defined as T1 to T2, between T2 and T3 is a buffer, and event window is defined as T3 to T4. Event day is $\tau=0$

The length of the estimation window should be determined so that it is long enough to lower the variance of the daily returns to a minimum, while being short enough to include only the most recent price movement and thus avoid changes in systematic risk (Strong, 1992).

MacKinlay (1997) uses a 120-day estimation period for daily returns, but other authors have used estimation periods between 60 and 600 days, depending on the data used in the study.

In addition, one also needs to define the event window. The event window is the time period around the event of interest, and is used to analyze the abnormal returns. This window follows the estimation window, and includes the event day. It is customary to define the event window to be larger than the specific day of interest, because this allows estimation of the periods surrounding the event (MacKinlay, 1997). This makes it possible to investigate if market managers manage to acquire information prior to the event, and to identify whether or not there is a delayed price response. In practice, the event window could vary between several days, to a time period, which only includes at least the day of the event. MacKinlay (1997) suggests using a $[-1, +1]$ window, however other windows are also common.

It is important to specify the event window and event day as accurately as possible in order to obtain a precise measurement of the effect of the event. Strong (1992) states “in many event studies in practice, accuracy of event dates is likely to be more important than sophistication in modeling or statistical techniques”. Three problems may arise in this context. First of all, it might be that some major announcements, which may have a large effect on the stock price, are made after the market closes. Since the market only can react to the news the following trading day, it is essential to include the nearest trading day in the analysis of abnormal or event specific returns.

Secondly, it is possible that the information was not new to all market participants. The market may have expected the event before it was officially announced, or some participants may even had inside information on the event. A solution to this issue may be to increase the time period before the actual event if information leakage is more likely.

The third problem is related to confounding events. Confounding events is when different events that might impact the stock price, happens in the same time period as the event you want to analyze. It then becomes problematic to isolate the effect from the event you are analyzing and the effect from the confounding event. Not only can this confounding event affect the magnitude of the results, but it can also change the sign of the abnormal return (McWilliams, Siegel, & Teoh, 1999). Because of this, controlling for such events is an important step when conducting any event study.

Furthermore, MacKinlay argues the importance to avoid an overlap between the estimation window and the event window in order to prevent the event from influencing the estimation of normal returns and hence abnormal returns (MacKinlay, 1997). Hence we always leave a buffer of 30 to 50 days between the estimation window and the event window, so that our normal return estimation remains uncontaminated by the event.

3.3 Estimating normal returns

Before we are able to estimate the abnormal return, we need to choose a normal return model. MacKinlay (1997) describes two different choices for modeling the normal return – statistical models and economic models. Based on empirical findings by MacKinlay (1997) and Brown and Weinstein (1985) which found that event studies with economic models were less powerful than using statistical models, we choose to focus exclusively on statistical models (MacKinlay, 1997; Brown & Weinstein, 1985). For the statistical models, one assumes that returns are jointly multivariate normal, independently and identically distributed over time. This assumption is sufficient for the statistical models to be correctly specified (MacKinlay, 1997).

There are two common statistical models for modeling normal return – the *constant mean return model* and the *market model*. The constant mean return model is considered to be the simpler of the two. With this model, one assumes that the mean return of a given security is constant over time. One thus uses a constant return parameter and a disturbance term to define normal returns. So the constant mean return model assumes that the mean return of a stock is constant over time.

The market model however relates stock return to the return of the market portfolio. The model assumes a stable linear relation between the stock return and the market return. The linear specification follows from the joint normality assumption. By removing the portion of the return which is related to variation in the market return, one reduces the variance of the abnormal return. This can again lead to a higher possibility of detecting event effects. Because of this, the market model is most often used by researchers and viewed as an improvement over the constant mean return model (MacKinlay, 1997). Based on this, we choose to use the market model, which says that for any given security i the marked model is:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

$$E(\varepsilon_{it}) = 0 \quad \text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2$$

Where R_{it} and R_{mt} are the t -period returns on security i and the market portfolio respectively. ε_{it} is the zero mean disturbance term, and α_i , β_i , and $\sigma_{\varepsilon_i}^2$ are the parameters of the market model.

3.4 Computing and analyzing abnormal returns

To measure the true effect of the event's impact on stock price, one cannot simply use the observed market returns to analyze how the market react to an announcement. In order to measure the true effect, one has to take away the systematic part of the stock price movement, and look at the event-specific unsystematic return component. This unsystematic return component is what we refer to as abnormal return.

In other words the abnormal return is the actual ex-post return of the security over the event window minus the normal return of the security over the event window (MacKinlay, 1997). The normal return is defined as the expected *predicted* return if the event never took place.

For firm i , and the event date τ the abnormal return can be written as:

$$AR_{it} = R_{it} - E(R_{it}|X_{\tau})$$

Where AR_{it} is the abnormal return, R_{it} is the actual return, and $E(R_{it}|X_{\tau})$ is the normal return respectively for time τ . X_{τ} is the conditional information for a normal return model.

In the market model, the abnormal return can be written as:

$$\widehat{AR}_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

Where $AR_{i\tau}$ is the abnormal return and R_{it} is the actual return. α_i , and β_i , are the estimated parameters from the market model for security i .

Since the abnormal return is the disturbance term of the marked model calculated on an out of sample basis, the abnormal returns will be jointly normally distributed with a zero conditional mean and a conditional variance $\sigma^2(AR_{i\tau})$ where:

$$\sigma^2(\widehat{AR}_{i\tau}) = \sigma_{\varepsilon_i}^2 + \frac{1}{L_1} \left[1 + \frac{(R_{m\tau} - \widehat{\mu}_m)^2}{\widehat{\sigma}_m^2} \right]$$

The equation above illustrates that the conditional variance consist of two components: the disturbance variance $\sigma_{\varepsilon_i}^2$ and the additional variance from sampling error in the market model parameters. L_1 is the length of the estimation window and is defined as $L_1 = (T_2 - T_1)$. One thus see that with increasing L_1 , the second component will approach zero. This allows the variance of the abnormal return to be approximated to $\sigma_{\varepsilon_i}^2$ as the sampling error of the parameter vanishes with increasing L_1 . As a result:

$$\sigma^2(AR_{i\tau}) \approx \sigma_{\varepsilon_i}^2$$

3.5 Aggregation of abnormal returns

In order to come to any conclusions about the event of interest, the abnormal returns have to be aggregated. We often aggregate the abnormal return observations across two different dimensions: through time, and across securities. This is usually done by first aggregations through time for an individual security, and then aggregation both across securities and through time.

First the abnormal returns are aggregated across time for each individual security i . By doing this one finds the individual security's cumulative abnormal return. This is defined as CAR_i

The event window is defined as the time period between T_3 and T_4 . The CAR_i is then estimated from T_3 to T_4 where $T_3 < \tau_3 \leq \tau_4 \leq T_4$ (MacKinlay, 1997). The accumulative abnormal return for security i from T_3 to T_4 , is defined by:

$$CAR_i(\tau_3, \tau_4) = \sum_{\tau=\tau_3}^{\tau_4} AR_{i\tau}$$

Further it can be shown that as L_1 increases, the variance and distribution of CAR is:

$$\sigma_i^2(\tau_3, \tau_4) = (\tau_4 - \tau_3 + 1)\sigma_{\varepsilon_i}^2$$

$$C\hat{A}R_i(\tau_3, \tau_4) \sim N(0, \sigma_i^2(\tau_3, \tau_4))$$

The abnormal return also needs to be aggregated across the different securities before it is possible to do tests on the sample. By doing a test on only one event sample, makes it very unlikely to enable us to draw any conclusions about the overall effect on the event. We thus also need to calculate the average abnormal return for all i securities at each τ of the event window. The average abnormal return for each event period is:

$$\overline{AR}_t = \frac{1}{N} \sum_{\tau=1}^N AR_{i\tau}$$

And for large L_1 , the variance of the average abnormal return is:

$$Var(\overline{AR}_t) = \frac{1}{N^2} \sum_{\tau=1}^N \sigma_{\varepsilon_i}^2$$

Finally, the sum of the average abnormal returns over the τ days in the event window is used to find the cumulative average abnormal return. This $CAAR_t$ are useful to statistical analysis, due to the fact that it illustrates the effect of the abnormal returns. For any interval in $[T_3, T_4]$ the $CAAR$ is:

$$\overline{CAAR}_t(\tau_3, \tau_4) = \sum_{\tau=\tau_3}^{\tau_4} \overline{AR}_\tau$$

The variance of the $CAAR_t$ is:

$$Var(\overline{CAAR}(\tau_3, \tau_4)) = \sum_{\tau=\tau_3}^{\tau_4} Var(\overline{AR}_\tau)$$

3.6 Determination of statistical significance

In order to determine the statistical significance of our results, we have to use tests to make sure that we have the statistical power necessary to avoid type 1 and type 2 errors. A type 1 error is that one makes an incorrect rejection of a true H_0 (a false positive), while a type 2 error is the failure to reject a false H_0 (a false negative).

The literature on event study tests is very rich, and the variety of significance tests is increasing. In general, significance tests can be grouped in parametric and non-parametric

tests. The parametric tests assume that the different firms' abnormal returns are normally distributed. This assumption is not made by non-parametric tests. It is common for event studies to complement parametric tests with non-parametric tests to double-check the results. We are including a non-parametric test, because this test will be able to provide us with information about the amount of firms with positive and negative returns.

We decided to look at 3 different statistical tests to check whether or not the news about a firm being corrupt will result in statistical significant negative accumulative average abnormal return. These tests were:

Parametric tests.

- A cross sectional T-test
- Standardized cross-sectional test / BMP test

Non-parametric test:

- Sign test

An important feature about the sign test, is the way we interpret the test if the results are insignificant. If this test shows an insignificant ratio but the parametric tests show a significant abnormal return, then we know that there might be other factors, such as firm characteristics, that would be involved in moderating the cumulative average abnormal return. This would then imply that our sample consists of firms with an equal ratio of positive and negative returns, which shows different sizes of abnormal returns depending on firm characteristics.

As earlier mentioned, analysis is normally performed to specify if the abnormal return in the event period is significantly different from zero, and thus not just a results of chance. By the general principles of statistics, the H_0 thus maintains that there is no cumulative average abnormal returns in the event window, while the alternative hypothesis H_1 the opposite.

$$H_0: CAAR_{t,i} = 0$$

$$H_1: CAAR_{t,i} \neq 0$$

Where the t is the event window used, and i is indicating group.

3.6.1 Cross-sectional T-test

To be able to test the null hypothesis that the event does not affect return, a two-sided cross-sectional t-test is used. The statistical properties of the CAARt are assumed to be

$$\overline{CAAR}(\tau_3, \tau_4) \sim N[0, \text{var}(\overline{CAAR}(\tau_3, \tau_4))]$$

And any inferences about the CAAR can be drawn using this to test the null hypothesis. The test used to test this hypothesis is based on the assumptions that there is no correlation across the abnormal returns of the different securities. Furthermore, if there is clustering or overlaps in the event window of the included securities, correlation between abnormal returns across the different events may occur. With no overlaps or clustering and the maintained distributional assumptions made previously, the abnormal returns across the different securities will be independent (MacKinlay, 1997). This was checked for, and we did not have any clustering or overlaps in any of our event windows.

Because the real value of $\sigma^2_{\epsilon i}$ is unknown, it is necessary to use an estimator to calculate the variance of average abnormal returns. MacKinlay (1997) argues that the usual sample variance measure of the $\sigma^2_{\epsilon i}$ from the market model regression is an appropriate choice (MacKinlay, 1997).

Using this to calculate the variance of the average abnormal returns, the test statistic for testing H_0 is given by:

$$\tau_{CAAR} = \sqrt{N} \frac{CAAR}{S_{CAAR}}$$

Where S_{CAAR} is the standard deviation of the cumulative abnormal returns across the sample. This distributional result is asymptotic with respect to the number of securities i , and the length of the estimation window. However, as explained by Brown and Warner (1985), the cross-sectional test is prone to be influenced by event-induced volatility and cross-sectional correlation, and thus has low statistical power.

3.6.2 Standardized cross-sectional test or BMP-test

Boehmer, Musumeci and Poulsen (1991) proposed another cross-sectional test, which they called the BMP-test. This test is a standardized cross-sectional method, which is robust to the variance created by the event itself. This test has become more popular in recent years, due to the fact that it has been found to be more robust with respect to the possible volatility changes connected with the event (Kolari & Pynnönen, 2010).

The test statistic for testing H_0 is given as:

$$Z_{BMP} = \sqrt{N} \frac{\overline{SCAR}}{S_{\overline{SCAR}}}$$

Where \overline{SCAR} is the average standardized accumulated abnormal return across the N different firms, with a standard deviation of:

$$S_{\overline{SCAR}}^2 = \frac{1}{N-1} \sum_{i=1}^N (SCAR_i - \overline{SCAR})^2$$

The advantages of using the standardized cross-sectional T-test is that it takes into account several of the problems associated with the normal cross-sectional T-test. This test accounts for event-induced volatility and serial correlation (Kolari & Pynnönen, 2010).

3.6.3 Sign test

To supplement the parametric tests, event studies normally report non-parametric tests. In our study we will be using a sign-test, which have the advantage that it does not rely on symmetry of the abnormal return distribution. The sign test was introduced by Cowan (1992) and tries to test if the ratio of positive cumulative abnormal returns present in the event window significantly differs from a ratio P . The ratio P is the ratio of positive abnormal return in the event window, and N is the number of firms (Cowan, 1992).

This test is well specified to test whether or not the amount of positive and negative observations differs from what would be expected from the data. Based on the efficient market hypothesis, one would expect the abnormal returns to follow a random walk. This implies that the amount of positive and negative abnormal returns would be expected to be 50%.

The test statistic for the sign test is given as:

$$t_{sign} = \sqrt{N} \left(\frac{\hat{p} - 0.5}{\sqrt{0.5(1 - 0.5)}} \right)$$

Where the H_0 is that the ratio $P = 0.5$.

3.7 OLS regression

In order to provide an answer for our hypotheses regarding characteristics that may affect the cumulative abnormal return in the event windows, we are going to use a regression.

Following Holthausen and Leftwich (1986), we will use an OLS-regression to check if there are any firm characteristics that may explain any cross-sectional variation in cumulative abnormal return. The firm characteristics we are going to control for are the level of corruption, the size of the company, the firms P/B ratio, and the capital intensity of the firm. By using OLS-regression and interaction variables, allows us to also check if there are any significant differences within each subsample.

There are several assumptions that need to be satisfied in order for an OLS-regression to provide unbiased and efficient coefficients which can justify a causal relationship. Most of these assumptions are about the residuals and are presented below:

- 1) Normality of residuals
- 2) The correct specification
- 3) Homoscedasticity of residuals
- 4) No autocorrelation

After controlling for normality, we found the distribution to satisfy the assumption of normality. To check the correct specification, we ran a Ramsey's regression error specification test, which test if a model who includes additional nonlinearities fits the data better. This was done directly in STATA and we could reject the null hypothesis that we had a wrongly specified model. Correcting for potential heteroscedasticity and autocorrelation was done by using robust standard errors.

The regression will then be performed on the different firm characteristics, and potential differences will be expressed through significant coefficients.

3.8 Overview of choices

This section will provide a brief summary of our choices regarding to the standard event study methodology. We defined our event of interest as the announcement of corruption. The event day ($\tau = 0$) is defined as the first trading day the news about corruption became publicly available to the market in which the firm operates. This ensured that the market was able to react on the information the same day. Furthermore we decided to use several different event windows ranging from five days before to five days after the event day. This was because we

wanted to check if there were any differences in cumulative average abnormal return on medium and short event windows. This also enables us to capture the effect of the corruption announcement both prior to, and post event date. Including days before the event date, allows us to check if there has been any leakages of information, while including days after the announcement date makes it possible to see if there is a delayed market reaction

The parameters α_i and β_i are estimated by using ordinary least square (OLS), using the daily returns for each company from 250 trading days prior to the announcement date for each event. As recommended by MacKinlay, we leave a buffer of 45 days between the end of the estimation window and the start of the event window. This implies that our estimation window is $[-250, -50]$, and thus contains 200 trading days. We further assume that an estimation window L_1 of 200 trading days is enough to apply the approximation estimation of the variance of abnormal returns.

Daily stock prices were obtained from Bloomberg for all trading days in the period from -250 until +5. We used adjusted closing price calculated daily return from these stock prices.

In regards of confounding events we checked for the following events:

- Joint Ventures, mergers or acquisitions
- Changes in top management
- Dividends or stock repurchases
- Earning announcements
- Changes in credit ratings

Firms with any of these news in the period from 5 days before until 5 days after the event was excluded from the final sample. This made it possible to marginalize the problem of confounding events.

4 Data sample

4.1 The firms and markets

The sample in this study consists of firms from the US, UK, Brazil, Russia, India and China. In order to examine the effect of corruption level on firms stock price returns, we had to divide our sample into two groups based on the country's corruption level. This was done by using Transparency International's CPI index and database for 2014. This measure has been used in earlier studies made by both Fisman and Miguel (2007) and DeBacker, Heim and Tran (2012). The CPI index ranks different countries based on the perceived level of corruption among its own citizens and the opinions of institutions such as the World Bank and the World Economic Forum. Countries, which have a low level of perceived corruption, will be ranked high on the index, and countries, which have a high level of perceived corruption, will be ranked low on the index.

There are several reasons why we decided to focus on these six countries. First of all, all of the countries are major world economies. This assured us that we would have a great access to information. It also made it reasonable to assume semi-strong market efficiency as implied by the efficient market hypothesis. To further ensure that our data was updated and trusted, we decided to look exclusively at firms listed at a stock exchange. The following stock exchanges were included: NASDAQ (US), NYSE (US), London Stock Exchange (UK), BOVESPA (Brazil), MICEX (Russia), BSE India, HKEX (China) and SSE (China). Even though there are other stock exchanges in some of the countries, we only used the largest or the second largest exchange in our thesis. This way we ensured that the liquidity and analytical coverage of the markets were sufficient.

Furthermore, the countries of Brazil, Russia, India and China have all been deemed to be at a similar stage of economic development. In economic literature they are often referred to as the BRIC-countries (O'Neill, 2001). This acronym has later been used as a symbol to illustrate the apparent shift in global economic power away from the developed economies, like the US and UK, towards these emerging markets. The inter-group relationship between BRIC-countries and more developed countries has thus been a popular research subject in the recent years. We decided to use the US and UK as an opposing group to the BRICs, since these countries also seemed to be at the same stage of economic development.

When checking for the level of corruption using the CPI index, we noticed a clear difference in corruption levels between the countries. The BRIC-countries were concentrated at the

lower end of the index with an average CPI score of 36, while the US and UK were ranked much higher with an average score of 76 (Transparency International, 2014). This indicated that the BRIC-countries in general seemed to have a high level of perceived corruption, while the perceived corruption in non-BRIC countries were much lower.

This led us to the following grouping of the countries:

Less corrupt countries – consisting of firms listed in the US and UK.

More corrupt countries – consisting of firms listed in Brazil, Russia, India and China.

4.2 Time horizon

We are choosing to focus on corruption scandals from the last 5 years. The financial crisis in 2008 can be seen as an extraordinary event, so including the immediate time period after this crisis to estimate normal returns could lead to severely biased estimates and wrong conclusions. We could have included the period before 2008, but we wanted to make this thesis as updated and relevant as possible. The time horizon in the study is from April 2010 until April 2015, and the sample was collected and completed in May 2015.

4.3 Data collection process

As stated in the introduction, the reason for this thesis is to see how news about corruption scandals affects the stock prices of firms from countries with different levels of corruption. Therefore we needed to find sufficient *new* corruption scandals. A comprehensive manual search and selection process was conducted in May 2015 using the search engine Factiva.

The search word used were: “Corruption”, “Bribe”, “Bribery”, “Bribing”, “kick back” and “kick-back”.

Over our five year period, these searches resulted in a high amount of hits for many firms. To correctly implement the event study methodology, the resulting firms from the given stock exchanges had to undergo a more thorough selection process.

4.4 Selection criteria

With thousands of hits on the different search words over the five-year period, an initial screen was needed. Many of the hits were duplicates from different newspapers, updates about the same case or information not related to corruption. We then did an initial screen manually using three different steps:

-
- 1) A firm within our scope that was related to any of the search words was marked
 - 2) A search with the firm and the search words were done, and the most relevant article found skimmed through
 - 3) If the firm did not seem to be involved in corruption (within our scope) another article was skimmed through, if there were still no reason to believe that this firm had been related to corruption the firm was dropped.

A reason for being dropped could be that a firm had been convicted for corruption 10 years ago (outside our scope) or that a firm was interviewed regarding the costs of corruption, but had no involvement in corruption what so ever. However, a firm would not be dropped if it was corrupt 10 years ago, but first within the last 5 years this became known. After the initial selection/screening we were left with 129 different cases. Further selection was then conducted, and for a case to make it to the final sample it had to fulfill the following criteria's:

- First news about the given corruption scandal had to be within our scope (It could not only follow up on the same case)
- The firm or its direct subsidiary had to be mentioned explicit in relations to corruption the article. However, the firm didn't have to be officially charged with corruption.
- The firm had to be listed on the same stock exchange for at least one year before the first announcement (i.e. it could not go from a private to public company or vice versa.)
- A firm could not be in the sample more than once. However, various firms could be related to the same scandal. This would then lead to one case for each firm.
- There should be no confounding events 5 days before until 5 days after

After the final selection our sample ended up consisting of 71 unique cases, which will be further investigated in our study. A detailed table describing each of these cases is found in Table C.1 in Appendix.

4.5 Descriptive analysis

Distribution of cases by country

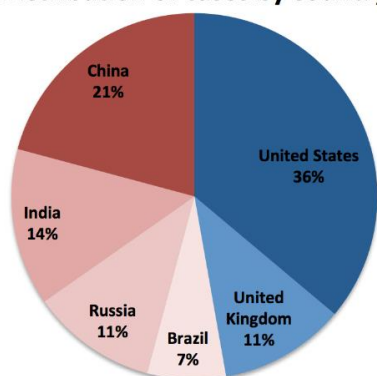


Figure 4.1- Distribution of firms by country

Distribution of cases on Sectors

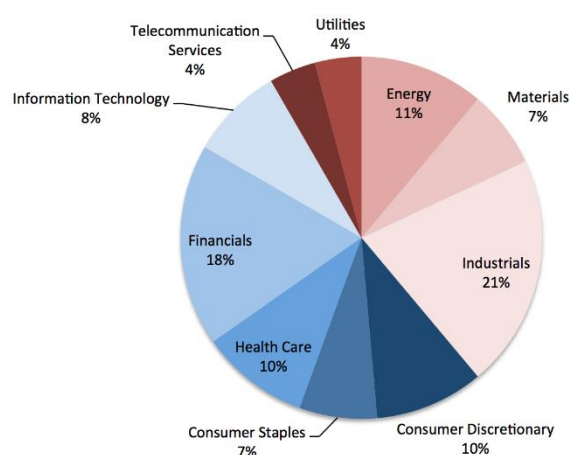


Figure 4.2-Distribution of firms by sectors

We classified each individual case with the respective event date, country, stock exchange, company name, company ticker, market capitalization in USD one year prior to event date, price-to-book ratio, and sector.

The 71 different cases are evenly distributed between in the less-corrupt group and the more-corrupt group with 34 and 37 individual cases respectively. Figure 4.1 shows a complete distribution of cases by country.

Using the Global Industry Classification Standard's 10 sectors, the groups was divided into 10 different groups. These were: Information technology, Financials, Health Care, Consumer Staples, Consumer Discretionary, Telecommunication, Utilities, Energy, Materials and Industrial. The distribution of companies and the relative size of the sectors is illustrated in figure 4.2.

In order to check for capital intensity, we also had to divide the firms into either capital intensive sectors or labor intensive sectors. Capital intensive sectors are sectors which requires a substantial amount of capital for production. They are further characterized by involving a high level of fixed cost, and industries capable of generating a high level of profit. Based on this, we decided on the following grouping of sectors:

Capital intensive – Telecommunications, Energy, Materials, Industrials, Financials and Utilities

Labor intensive – Consumer discretionary, Consumer staples, Health care, and Information technology

The sample can also be categorized according to their respective market capitalization. This is illustrated for each country, and for each of the groups in table 4.1. All numbers are listed in USD millions.

| Values in USDm | Average market capitalization | Min. | Max. |
|--------------------|-------------------------------|------------|--------------|
| By country | | | |
| US | \$34 580,00 | \$382,00 | \$178 964,00 |
| UK | \$33 820,00 | \$24,00 | \$112 777,00 |
| Brazil | \$36 167,00 | \$890,00 | \$117 741,00 |
| Russia | \$32 239,00 | \$1 959,00 | \$93 761,00 |
| India | \$13 207,00 | \$66,00 | \$52 228,00 |
| China | \$52 545,00 | \$1 965,00 | \$249 235,00 |
| By group | | | |
| Less-corrupt group | \$34 401,00 | \$24,00 | \$148 964,00 |
| More-corrupt group | \$35 763,00 | \$66,00 | \$249 235,00 |

Table 4.3 - Market capitalization by country and by group. All values in USDm

As shown, the average market capitalization for the US (\$34.5 USD billion), UK (\$33. USD billion), Brazil (\$36 USD billion) and Russia (\$32 USD billion) is very similar. However, the average market capitalization for India (\$13 USD billion) and China (\$53 USD billion) differ much from the other countries. Nonetheless, we see that the group-averages are quite similar. Also, the largest firm in our sample is 100 times larger than the smallest firm. Even though there are large differences in size, it seems to be divided more or less evenly in the different groups.

4.6 Measures

d_Corrupt – This is a dummy variable, which are representing our two mutually exclusive groups [Less-corrupt, More-corrupt]. The variable will take the numerical value of 1 if the company is in the more-corrupt group, and the value of 0 if it is in the less-corrupt group.

Marketcap_USDbn – This variable contains data on the market capitalization of the firm in USD. The variable is measured in USD billion.

d_Sector – This is a dummy variable, which are representing our two mutually exclusive groups [Capital intensive, Labor intensive]. The variable will take the value of 1 if the company operates in a capital intensive sector, and the value of 0 if the company operates in a labor intensive sector.

PBratio – This variable contains data on the price/book-ratio of the firm.

d_Corrupt x MktUSDbn – This is a moderation variable, which is defined as the dummy for *d_Corrupt* multiplied with the market capitalization of the firm. The moderation variable will only take value if the company is in the more-corrupt group. This variable can be interpreted as the within-group effect of increasing the *Marketcap_USDbn*-variable with one unit..

d_Corrupt x d_Sector – This is a moderation variable, which is defined as the dummy for *d_Corrupt* multiplied with the dummy for sector. This moderating variable will be equal to 1 if the company operates in a *capital intensive* sector in the more-corrupt group, and 0 otherwise. This variable can be interpreted as the within-group effect of operating in a capital intensive sector

d_Corrupt x PBratio – This is a moderation variable, which is defined as the dummy for *d_Corrupt* multiplied with the price-book ratio of the firm. This moderating variable will only take value if the company is in the more-corrupt group. The variable can be interpreted as the within-group effect of the price-book ratio.

Constant – This is the constant term from the OLS-regression.

ε_i – Is the error term.

5 Results

5.1 Event study results

In the first hypothesis, we tested if news about a firm being corrupt would result in a negative accumulative average abnormal return. This was done by implementing the event study methodology, and checking for significant abnormal returns using the t-test and the BMP-test.

Results full sample

| Event window | CAART | T-Test | BMP-test | Sign-test | Ratio of negative events |
|-----------------|---------|------------|-----------|-----------|--------------------------|
| [-5, 5] | -1,52 % | -1,796 * | -1,874 * | -1,068 | 0,577 |
| [-3, 3] | -1,68 % | -2,459 *** | -2,552 ** | -1,305 | 0,563 |
| [-1, 1] | -0,90 % | -1,572 | -1,440 | -1,068 | 0,577 |
| [-1, 5] | -1,09 % | -1,541 | -1,852 * | -1,068 | 0,577 |
| Number of firms | | 71 | 71 | 71 | 71 |

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.1 - Results from event study on full sample

Table 5.1 displays the results from using the event study methodology on the full sample. In the [-3, 3] event windows the ratio of negative events was 56.3%, and in the other three the ratio was 57.7%. The cumulate average abnormal return was all negative, and in the interval between -1.68% and -0.90%.

The significance level vary depending on which statistical test and event window we are using. The sign-test gives no significant results for any of the event windows, and the results from the [-1, 1] window is not significant for any of the tests. This indicates that there is a somewhat even distribution of positive and negative CAR, which again would mean that there are other firm characteristics that might be relevant. Both the t-test and the BMP-test indicates significant abnormal returns in the [-5, 5] and the [-3, 3] windows. In the [-1, 5] window, only the BMP-test indicates significant abnormal return. The results thus indicate that there seems to be a significant abnormal return in the medium event windows.

The figure 5.1 illustrates the average abnormal return and the cumulative average abnormal return for all of our firms in the [-5, 5] and [-3, 3] window.

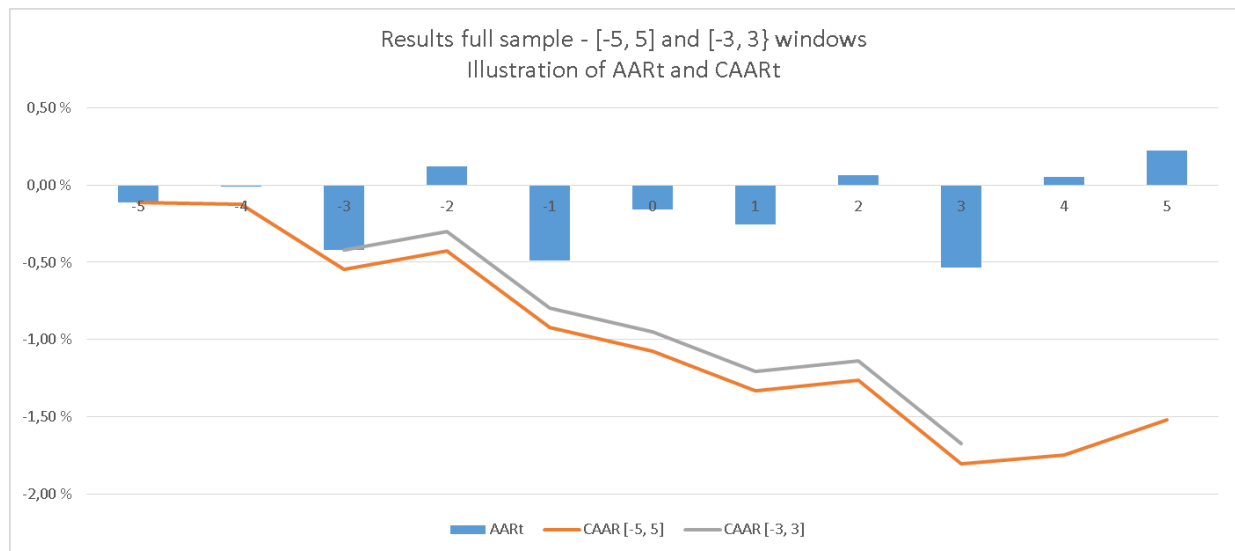


Figure 5.2- Illustration of AARt and CAARt for the full sample (71 firms)

In figure 5.2, we can see that the CAARt starts to fall approximately 2 days before the event day in both of the event windows, and then continues a downwards drift before stabilizing around an abnormal return of -1.50%. The largest falls in average abnormal return happens the day before the event and three days after, which represents falls of -0.49% and -0.54% respectively. The largest negative cumulative average abnormal return occurs three days after the event days in both windows, where the CAARt is -1.80% in the [-5, 5] window and -1.68% in the [-3, 3] window. A full table of the individual AARt and CAAR at time t in each event window can be found in table A.1 in Appendix.

We also tested the individual event window specific CAARs in each of the groups to see if there was a significant reaction in both of our groups. The conclusion was the both of our groups showed a significant reaction in the [-3, 3] window. These results and graphical illustrations of AARt and CAARt in both groups can be found in table A.2 – A.5 and B.1 – B.3 in Appendix.

6.2 Regression results

In our second hypothesis, we wanted to test whether or not the country's level of corruption is negatively associated with the size of the cumulative abnormal return (CAR) for a firm. The CAR should not be mixed with the cumulative average abnormal return (CAAR) which we used in the event studies. To do this, we used the standard event study methodology to calculate the CAR for each of our firms in the respective event windows. These calculations would be used as the dependent variable in our OLS-regression.

When testing the hypotheses regarding the effect of the country's level of corruption, we had to run the following regressions:

Model (1) represents a regression on CAR_t using only the control variables and the direct effect. The regression model is defined as:

$$CAR_t = \alpha + \beta_1 * d_{corrupt} + \beta_2 * Marketcap_{USDbn} + \beta_3 * d_{Sector} + \beta_4 * PBratio + \varepsilon_i$$

Model (2) represents a regression on CAR_t using the control variables, the direct effect, and adding interaction variables to test for moderation effects. This can be considered to be our main regression model and is defined as:

$$CAR_t = \alpha + \beta_1 * d_{corrupt} + \beta_2 * Marketcap_{USDbn} + \beta_3 * d_{Sector} + \beta_4 * PBratio + \beta_5 * (d_{corrupt} * Marketcap_{USDbn}) + \beta_6 * (d_{corrupt} * d_{Sector}) + \beta_7 * (d_{corrupt} * PBratio) + \varepsilon_i$$

In both regressions ε_i is an error term.

The table 5.3 illustrates the results from running these to regressions on the CAR for all of our event windows.

| RESULTS FROM RUNNING REGRESSION ANALYSIS | | | | | | | | |
|--|----------------------|----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
| Event window | [-5, 5] | | [-3, 3] | | [-1, 1] | | [-1, 5] | |
| <u>Direct effects</u> | | | | | | | | |
| <i>d_Corrupt</i> | -0.0143 (-0.736) | -0.0598 (-1.177) | -0.00157 (-0.0993) | -0.0464 (-1.085) | 0.00757 (0.575) | -0.0190 (-0.474) | -0.0132 (-0.878) | -0.0575 (-1.208) |
| <u>Control variables</u> | | | | | | | | |
| <i>Marketcap_USDbn</i> | 0.000219* (1.682) | 0.000267 (1.600) | 0.000201** (2.002) | 0.000165 (1.358) | 0.000104 (1.232) | 9.99e-05 (1.077) | 0.000168 (1.529) | 0.000185 (1.515) |
| <i>d_Sector</i> | -0.0151 (-0.894) | -0.0268 (-1.241) | -0.00986 (-0.738) | -0.0110 (-0.659) | -0.00407 (-0.369) | -0.0140 (-1.106) | -0.00335 (-0.243) | -0.00756 (-0.501) |
| <i>PBratio</i> | 0.00115 (0.233) | -0.00400 (-0.761) | 0.00250 (0.673) | -0.000614 (-0.170) | 0.00502 (1.514) | -0.00210 (-0.668) | 0.000735 (0.182) | -0.00326 (-0.831) |
| <u>Moderation variables</u> | | | | | | | | |
| <i>d_Corrupt * MktUSDbn</i> | | 2.01e-05 (0.0671) | | 0.000146 (0.622) | | 6.83e-05 (0.350) | | 6.07e-05 (0.236) |
| <i>d_Corrupt * d_Sector</i> | | -0.0198 (-0.595) | | 0.000127 (0.00483) | | -0.0174 (-0.794) | | -0.00572 (-0.208) |
| <i>d_Corrupt * PBratio</i> | | 0.0336* (1.828) | | 0.0255* (1.723) | | 0.0203 (1.299) | | 0.0282 (1.637) |
| Constant | -0.00997 (-0.428) | 0.0102 (0.430) | -0.0233 (-1.353) | -0.0118 (-0.729) | -0.0255* (-1.739) | -0.0113 (-0.845) | -0.00987 (-0.554) | 0.00401 (0.217) |
| Observations | 71 | 71 | 71 | 71 | 71 | 71 | 71 | 71 |
| R-squared | 0.051 | 0.118 | 0.051 | 0.113 | 0.049 | 0.108 | 0.037 | 0.102 |
| Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1 | | | | | | | | |

Table 5.3 - Results from running regression analysis

The results show that the *direct effect* of corruption level is negative in all of our event windows. The coefficient of “d_Corrupt” represents the effect of the country’s level of corruption. A negative coefficient is in line with the expectation of a negative relationship between the level of corruption and the size of the CAR. This would indicate that the effect of being caught by corruption itself would be amplified if the firm is located in a country with a higher level of corruption. The general trend in the data seems to support this, since most of our coefficients are negative. However, none of the coefficients are statistically significant and based on this we cannot say that the estimated coefficients differs from zero. Statistically this means that we do not find adequate evidence for rejecting our null hypothesis. Thus hypothesis 2 is not supported.

The results also shows that the *control variable* for market capitalization has positive coefficients in all of our event windows. A positive coefficient indicates that the general effect of an increase in market capitalization, would diminish the size of the CAR. In model (1) we see that we get significant coefficients in both the [-5, 5] and the [-3, 3] window. These coefficients are significant at a 10%- and 5%-level respectively. In these cases, a \$1bn increase in market capitalization is predicted to positively affect the CAR by 0.0219% and 0.0201%. This is in line with the expectation that an increasing market capitalization would have a diminishing effect on the size of the CAR. However, we see that when running model (2), the control variables in all event windows yields insignificant results. This means that the effect is significant, but disappears when we account for other variables in our main model. The sign of the coefficients remains the same, so the predicted direction of the effect remains the same. Because we have insignificant coefficients in model (2), we cannot draw any statistical conclusions about the general effect of size.

The results further show that all of the coefficients for the *moderation variable* between the level of corruption and the size of the market capitalization is positive. The moderation variable coefficients can be interpreted as the difference-in-difference effect. A positive coefficient will indicate that an increasing market capitalization, would positively moderate the effect of the country’s level of corruption on the size of the CAR. This would be in line with our expectations in hypothesis 3. Since all of the coefficients for the moderation variable between level of corruption and size of market capitalization is insignificant, we do not have evidence to reject our null hypothesis. Thus hypothesis 3 is not supported.

Looking at the *control variable* for capital intensity, we see that the coefficients is negative in all of our event windows and in both of our models. A negative coefficients indicates that the general effect of operating in a capital intensive sector, would have a negative effect on the size of the CAR. This is in line with our expectations of a negative relationship between being in a capital intensive sector and the effect of being caught for corruption. The results for the control variable is however not significant in any of the event windows, meaning that we cannot draw any statistical conclusions of the general effect of capital intensity.

With regard to the *moderation variable* between the level of corruption and the capital intensity of the firm, we see that the coefficients is negative in all of our event windows except the [-3, 3] window. The moderation variable can be interpreted as the difference-in-difference effect, and a negative coefficient predicts that being in a more capital intensive sector, would negatively amplify the effect of the country's level of corruption on the size of the CAR. This is in line with our expectations in hypothesis 4. The moderation variable do however, not yield any significant coefficients in the event windows and thus gives us no evidence to reject our null hypothesis. Because of this hypothesis 4 is not supported.

Lastly, we see that the coefficient for the *control variable* for the price-book ratio is positive for all event windows in model (1) and negative in all event windows in model (2). The coefficient can be interpreted as the effect on the CAR if the price-book ratio increased with one unit. A negative coefficient will in this case indicate that the effect of an increasing price-book ratio, will have a negative effect on the size of the CAR. A positive coefficient would have the reversed relationship. The results show that none of the coefficients have significant values, and because of this we cannot comment with significant inference about the general effect of the price-book ratio. We do however notice, that when controlling for more variables, the coefficients changes sign from positive, to negative.

When looking at the *moderation variable* between the level of corruption and the price-book ratio, the results show that all of the coefficients are positive. This moderation variable coefficient can be understood as the difference-in-difference effect, and a positive effect indicates that an increasing price-book ratio would positively moderate the effect of the country's level corruption on the size of the CAR. Such a relationship would support our expectations in hypothesis 5. The results show significant coefficients on a 10% level in the [-5, 5] and [-3, 3] window, and the coefficients predicts that the effect of the country's level of corruption on the size of the CAR resulting from corrupt activities will be positively

moderated by the firms P/B-ratio. This effect estimated to be 3.36% in the [-5, 5] window and 2.55% in the [-3, 3] window.

Based on these results, we find sufficient evidence to reject the null hypothesis of no moderation effect in the [-5, 5] and [-3, 3] window. Even though we don't get significant results in the [-1, 1] and [-1, 5] window, we see that the sign is corresponding and can say that the results indicates the same effect. This means that hypothesis 5 is supported.

6 Discussion and conclusion

The purpose of this study was to examine if firms from countries characterized as more corrupt would experience a modified reaction compared to firms from countries which are seen as less corrupt. This was done by examining whether markets exhibited different reactions to news about firms being corrupt in countries with different levels of corruption. We also checked for specific firm characteristics to see if the reaction of being caught in corrupt activities would be moderated by either market capitalization, capital intensity or price-book ratio.

Our results support the already existing studies done on the effect of corruption, concluding that there seems to be a general negative effect on stock price from news about a firm being corrupt. We have estimated the cumulative average abnormal return in four different event windows, in which two of them result in significant negative effects. In our $[-5, 5]$ and $[-3, 3]$ windows we have found evidence that, on average, the cumulative average abnormal return is -1.68% and -1.52% respectively. This corresponds with already existing studies done on the subject, such as the study done by Karpoff et al (2014) which finds a negative CAAR of -1.72% . Based on this we conclude that the stock market reactions to news of corruption in a firm is negative, regardless of the country's corruption level.

Another interesting observation is that our sample seems to have a longer reaction than previous studies. The cumulative average abnormal return we see after examining the seven days surrounding the event, is in the most other studies observed in only three days. So instead of a sudden and clear reaction on the announcement day, we see that the sample starts falling three days before, and keeps falling until three days after the event day. The fact that we see negative reactions the days before the announcement can indicate leakages to the market and that some investors react before the information becomes publically available. Also the longer reaction after the announcement day suggests that the markets are not as efficient as the efficient market hypothesis indicates.

Exploring this further, the regression results do however not indicate that there is a significant difference in the reactions based on the country's level of corruption. We do however notice that all of our coefficients in the different event windows are negative, which may indicate a negative relationship. In neither of our event windows do we find sufficient evidence for the CAR being moderated by the country's level of corruption. This contradicts the results found by Lin et al (2015) which found a significantly different CAAR between the

high-corruption and-low corruption groups. However, this might be explained by the difference samples, and due to the fact that Lin et al. (2015) only is US-listed firms in US markets, while we use the market in which the country actually operates.

There could be some possible reasons for this difference. Pellegrini et al. (2015) suggested that foreign investors are more “nervous” in countries with a higher level of corruption, and from this we initially expected a stronger reaction in these countries. Another way of considering Pellegrini et al. (2015) argument could be that nervous investors may already have priced the risk of “corruption” if the level of corruption is high, and thus show an expectation to these types of news. If this were the case, then the news would not come as such a surprise, which could result in a more disciplined reaction.

Even though we don’t find sufficient evidence for a stronger reaction to firms from more corrupt countries, we can’t conclude by saying that a country’s level of corruption doesn’t affect the reaction. Both groups show very similar reactions until 2 days after the announcement, but then start to differ. This might indicate that if one uses longer event windows and look at the more long term effects, one could examine if there is a more short term reaction in the less corrupt countries while there is a more long term effect in more corrupt countries.

Furthermore our results supports the research done by Murphy et al (2004) and Chen et al (2005) which finds that that news about corruption seems to have a smaller effect on large firms. This complements the economies of scale and diversification arguments, where large firms on average have less idiosyncratic risk. This result was somewhat expected. If the act of corruption imposes somewhat fixed costs in terms of fines and legal expenses, then large firms would be much more capable in paying these costs. Another explanation might be that large firms often has a much more structured system, which means that they could be more efficient in removing the people behind the corrupt acts and thus “clearing” their name faster. Large firms may also have own public-relation departments, which would put them in a position to counter the potential reputational damages created by the corruption scandal. One might not expect that much smaller firms would have such systems in place, and thus the reputational damages might be much higher.

We expected that the advantage of being a large company would be greater in a more corrupt country, however we don’t find evidence for firm size moderating the effect of a country’s corruption level. However, the sign of the coefficients are all positive, which indicates that

there is trend where large firms in more corrupt countries show an extra size effect. This result was somewhat surprising, because we expected that the advantages of being a large firm would be significantly amplified when operating in a more corrupt country. A possible explanation might be that the advantage of being large, already is so great that it does not matter whether you are operating in a more corrupt country or not. In addition, perhaps the business environment for such large firms is so equal, that there in reality is no difference between the firms. This could suggest a strong international connection among large firms, and the effects of reputational losses in forms of decreased sales and increased costs is identical in a cross-national perspective.

The results regarding sector suggest a negative relationship between operating in a capital intensive sector and the size of the CAR. All of the coefficients for sector is negative, thus implying that sectors with a high level of capital intensity tends to react stronger on news about corruption. This partly supports the findings for Cheung et al. (2011) and Karpoff et al. (2014), however our findings do not find a significant relationship. A possible explanation might be that the lack of trust and the amplified reaction based on this, is not as large as we expected and thus that there really is no difference between the sectors. Furthermore, if the profits are much higher in the capital intensive industries then the investors might decide to partially “overlook” the fact that one has been caught for corruption. In the same manner, our data suggests that there is a negative cost from operating in a capital intensive sector in more corrupt countries, but neither these results are statistically significant.

In term of the effect of an higher price-book ratio, our findings suggest that the general effect of having a higher price-book ratio would lead to a more negative reaction. This is based on the fact that all of the coefficients in model (2) was negative. These results are in line with the arguments presented by Murphy et al. (2004), which suggests that firms with a higher price-book ratio would experience a greater loss since a larger part of their firm value comes from estimations about future earnings. However, we do find that having a larger price-book ratio in more corrupt countries is positively affecting the size of the CAR, meaning that our expectations in hypothesis 5 was correct. Our results thus support the findings of Karpoff et al (2014). This could suggest that firms with a high price-book ratio in more corrupt countries are associated with a higher level of trust and this decrease the reaction.

In conclusion, we see that corruption in general would affect the firms performance trough reactions in the stock price. We have found results supporting the already existing literature

on firm-level costs of corruption, and contributed with new findings with regards to showing that corruption has an overall effect on all firms, regardless of country of operation. While our findings signals a reaction in the medium length event windows, we believe we have sufficient evidence to conclude with an overall general effect within a 7-day period around the event day.

Our main focus was to investigate the relationship between a country`s level of corruption and the effect on stock price reactions, but we did not find sufficient evidence to prove a causal relationship between the two. Hence we had to conclude that the results signal a negative relationship, but we cant provide evidence that the difference is large enough to not just be a product of chance. In addition we find that firm size seem to positively affect the size of the CAR, but the within group effect is not large enough to say that there is a signifciant additional effect of being large in more corrupt countries. Regarding the price-book ratio we find that there seem to be an positive additional effect of having a higher price-book ratio in more corrupt countries. All in all our findings implies that firms face a penaltiy for violating the trust given to them from investors.

So what could really explain what happened to the Petrobras stock? Based on our research we are still somewhat surprised. Nothing from our findings indicate that a massive positive reaction should be a reasonable response to a corruption scandal. Perhaps the investors already had such a low degree of trust to the company, and expected that it was just a matter of time before a corruption scandal would occur. This could have led to a massive undervaluation of the firm. When the news of corruption then hit the markets, the investors might have gained a renewed confidence in the company, through the belief of starting over with clean sheets. Or perhaps it was other underlying factors which can validate such a reponse. The perplexity of this problem, points to the continued importance of expanding the theory on the firm-level costs of corruption.

7 Limitations

7.1 Small sample

A limitation with our study may be the sample size. Statistical inference in the event study methodology is largely dependent on the number of observations in the sample. When determining statistical inference using the standard t-test, the normality assumption is important. When the sample size is very small, there is reason to believe that the assumption of normality does not hold. This is especially true when the sample size is less than 30 observations. In our thesis we have a sample which consists of 71 different firms. Under the central limit theorem, this is well within the needed sample size. Even when dividing the sample into our two subsamples with 34 and 37 observations, we still have a sample size which exceeds the needed number of observations for assuming normality. As Brown and Warner (1985) also showed that even in event studies with sample sizes as small as 5 observations, the standard parametric tests for significance are still well specified (Brown & Warner, 1985). The sample collected is also the whole population of firms, within our selection criteria's, that were caught for corruption. This means that to further increase our sample size, we would have had to implement sub-standard selection criteria's compared to other event studies. To us, this was not an acceptable solution. Another way to increase it would be to include more countries, however this would have led to more problems in regards to the correlation between development and level of corruption.

7.2 Correlation between development and level of corruption

The main purpose with our study was to check whether or not a country's level of corruption could affect how the market reacts to news that a firm has been involved in corrupt activities. The problem with the country's corruption level, is that it often confounds with the level of economic development. If this correlation is high, then we cannot be completely sure that we are studying the effect of the country's level of corruption or the effect of the country's level of development on stock price. Even though we have a small sample of countries, we have marginalized this problem by using countries that share the similar characteristics in terms of economic development. An example is in terms of sheer economic weight. The BRIC economies are the four largest economies outside of the OECD, and they are the only emerging economies with an annual GDP profit over 1\$ trillion (OECD, 2013). Furthermore the BRIC countries all have economies with large financial markets, something which reduces the gap with the more developed countries. Due to these similarities one can assume that they are well integrated in the global economy, and thus share the similar characteristics in terms

of market efficiency. By including the countries we have in our sample, we have tried to minimize the variance in development, while maintaining a difference in the countries corruption level.

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9 Appendix

| EVENT STUDY - FULL SAMPLE | | | | | | |
|---------------------------|---------|---------|---------|---------|---------|---------|
| Event window | | [-5, 5] | | [-1, 5] | [-3, 3] | [-1, 1] |
| Day | AARt | Day | CAARt | CAARt | CAARt | CAARt |
| -5 | -0,11 % | -5 | -0,11 % | - | - | - |
| -4 | -0,01 % | -4 | -0,13 % | - | - | - |
| -3 | -0,42 % | -3 | -0,55 % | - | -0,42 % | - |
| -2 | 0,12 % | -2 | -0,43 % | - | -0,30 % | -0,49 % |
| -1 | -0,49 % | -1 | -0,92 % | -0,49 % | -0,79 % | -0,65 % |
| 0 | -0,16 % | 0 | -1,08 % | -0,65 % | -0,95 % | -0,90 % |
| 1 | -0,25 % | 1 | -1,33 % | -0,90 % | -1,21 % | - |
| 2 | 0,07 % | 2 | -1,27 % | -0,84 % | -1,14 % | - |
| 3 | -0,54 % | 3 | -1,80 % | -1,37 % | -1,68 % | - |
| 4 | 0,05 % | 4 | -1,75 % | -1,32 % | - | - |
| 5 | 0,23 % | 5 | -1,52 % | -1,09 % | - | - |
| Total CAARt | | | -1,52 % | -1,09 % | -1,68 % | -0,90 % |

Table A.1 – Full table of individual AARt and CAARt for full sample

| EVENT STUDY - LESS CORRUPT FIRMS | | | | | | |
|----------------------------------|---------|---------|---------|---------|---------|---------|
| Event window | | [-5, 5] | | [-1, 5] | [-3, 3] | [-1, 1] |
| Day | AARt | Day | CAARt | CAARt | CAARt | CAARt |
| -5 | 0,26 % | -5 | 0,26 % | - | - | - |
| -4 | -0,09 % | -4 | 0,17 % | - | - | - |
| -3 | -0,47 % | -3 | -0,30 % | - | -0,47 % | - |
| -2 | 0,00 % | -2 | -0,30 % | - | -0,47 % | -0,51 % |
| -1 | -0,51 % | -1 | -0,81 % | -0,51 % | -0,98 % | -0,65 % |
| 0 | -0,14 % | 0 | -0,95 % | -0,65 % | -1,12 % | -0,84 % |
| 1 | -0,18 % | 1 | -1,13 % | -0,84 % | -1,30 % | - |
| 2 | -0,15 % | 2 | -1,28 % | -0,99 % | -1,45 % | - |
| 3 | 0,10 % | 3 | -1,18 % | -0,89 % | -1,36 % | - |
| 4 | 0,26 % | 4 | -0,92 % | -0,63 % | - | - |
| 5 | 0,28 % | 5 | -0,64 % | -0,35 % | - | - |
| Total CAARt | | | -0,64 % | -0,35 % | -1,36 % | -0,84 % |

Table A.2 – Full table of individual AARt and CAARt for less corrupt group

EVENT STUDY - MORE CORRUPT FIRMS

| Event window | | [-5, 5] | | [-1, 5] | | [-3, 3] | | [-1, 1] | |
|--------------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| Day | AARt | Day | CAARt | CAARt | CAARt | CAARt | CAARt | CAARt | CAARt |
| -5 | -0,46 % | -5 | -0,46 % | - | - | - | - | - | - |
| -4 | 0,06 % | -4 | -0,40 % | - | - | - | - | - | - |
| -3 | -0,38 % | -3 | -0,78 % | - | - | -0,38 % | - | - | - |
| -2 | 0,23 % | -2 | -0,55 % | - | - | -0,15 % | -0,47 % | - | - |
| -1 | -0,47 % | -1 | -1,02 % | -0,47 % | -0,62 % | -0,65 % | - | - | - |
| 0 | -0,18 % | 0 | -1,20 % | -0,65 % | -0,80 % | -0,96 % | - | - | - |
| 1 | -0,32 % | 1 | -1,51 % | -0,96 % | -1,12 % | - | - | - | - |
| 2 | 0,26 % | 2 | -1,25 % | -0,70 % | -0,85 % | - | - | - | - |
| 3 | -1,12 % | 3 | -2,37 % | -1,82 % | -1,97 % | - | - | - | - |
| 4 | -0,14 % | 4 | -2,51 % | -1,95 % | - | - | - | - | - |
| 5 | 0,18 % | 5 | -2,33 % | -1,78 % | - | - | - | - | - |
| Total CAARt | | | -2,33 % | -1,78 % | -1,97 % | -0,96 % | | | |

Table A.3 – Full table of individual AARt and CAARt for more corrupt group

RESULTS - LESS CORRUPT GROUP

| Event window | CAARt | T-Test | BMP-test | Sign-test | Ratio of negative events |
|-----------------|---------|--------|----------|-----------|--------------------------|
| [-5, 5] | -0,64 % | -0,598 | -0,424 | 0,000 | 0,500 |
| [-3, 3] | -1,36 % | -1,630 | -1,670 * | -1,372 | 0,588 |
| [-1, 1] | -0,84 % | -1,315 | -1,246 | -0,686 | 0,559 |
| [-1, 5] | -0,35 % | -0,493 | -0,422 | 0,000 | 0,500 |
| Number of firms | | 34 | 34 | 34 | 34 |

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A.4 –Results from event study on less corrupt group

RESULTS - MORE CORRUPT GROUP

| Event window | CAARt | T-Test | BMP-test | Sign-test | Ratio of negative events |
|-----------------|---------|----------|-----------|-----------|--------------------------|
| [-5, 5] | -2,33 % | -1,927 * | -2,035 ** | -1,480 | 0,622 |
| [-3, 3] | -1,97 % | -1,907 * | -1,937 * | -0,493 | 0,541 |
| [-1, 1] | -0,96 % | -1,143 | -0,932 | -0,822 | 0,568 |
| [-1, 5] | -1,78 % | -1,593 | -1,954 * | -1,480 | 0,622 |
| Number of firms | | 37 | 37 | 37 | 37 |

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5 - Results from event study on more corrupt group

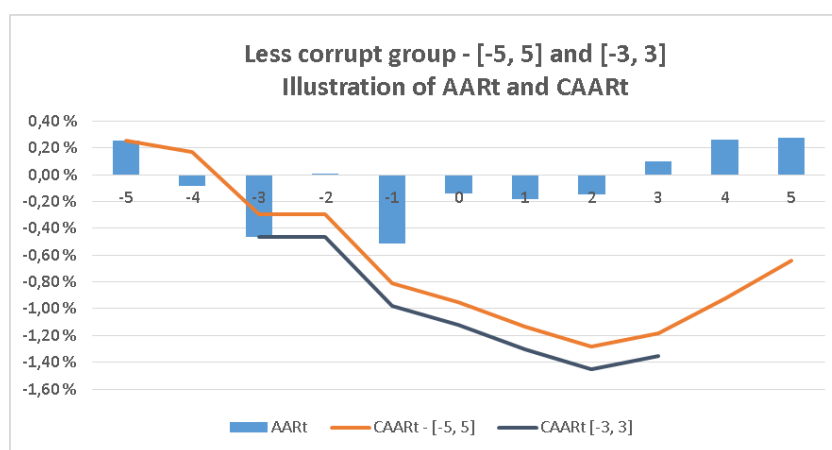


Figure B.1 - Illustration of AARt and CAARt for less corrupt group

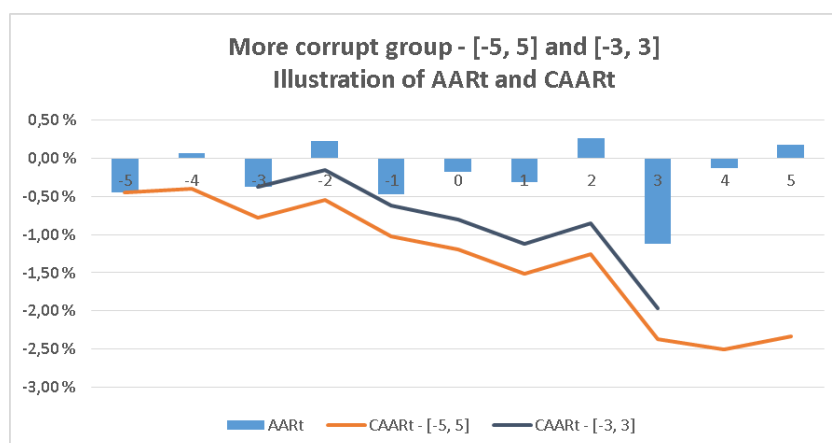


Figure B.2 - Illustration of AARt and CAARt for more corrupt group

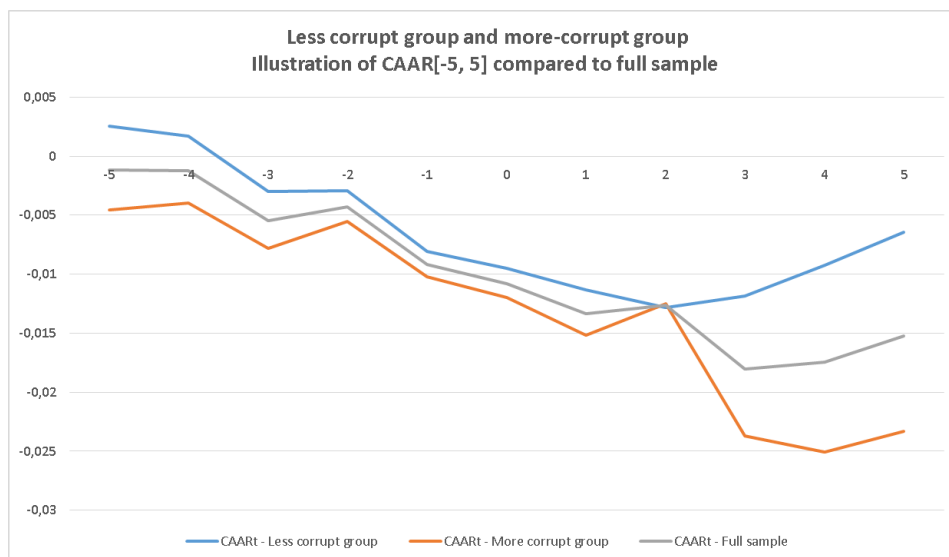


Figure B.3 - Illustration of CAAR [-5, 5] for less corrupt and more-corrupt group compared to full sample

A detailed table of the firms in our data sample is listed on the next two pages.

Table C.1 – Complete list of firms from dataset

| Case# | Date of announcement | Company name | Country | Sector | MarketCap USDm | P/B |
|-------|----------------------|---------------------------------|----------------|------------------------|----------------|-------|
| 1 | 24.02.2015 | Goodyear Tire & Rubber Company | United States | Consumer Discretionary | 6 558,79 | 5,348 |
| 2 | 17.12.2014 | Avon | United States | Consumer Staples | 7 339,37 | 5,099 |
| 3 | 15.12.2014 | Bruker Corp | United States | Information Technology | 3 118,11 | 3,593 |
| 4 | 05.12.2014 | Sirius XM Holdings | United States | Consumer Discretionary | 22 640,04 | 3,765 |
| 5 | 03.11.2014 | Bio-Rad Laboratories | United States | Health Care | 3 510,78 | 1,488 |
| 6 | 27.10.2014 | Layne Christensen Company | United States | Industrials | 394,34 | 1,089 |
| 7 | 28.07.2014 | Smith & Wesson | United States | Consumer Discretionary | 713,02 | 3,114 |
| 8 | 11.07.2014 | Wynn Resorts | United States | Consumer Discretionary | 13 295,42 | 4,244 |
| 9 | 09.04.2014 | Hewlett-Packard | United States | Information Technology | 43 196,10 | 1,212 |
| 10 | 09.01.2014 | Alcoa | United States | Materials | 9 690,19 | 0,705 |
| 11 | 20.12.2013 | Archer-Daniels-Midland Company | United States | Consumer Staples | 18 459,60 | 1,083 |
| 12 | 24.10.2013 | Stryker Corporation | United States | Health Care | 19 876,91 | 2,465 |
| 13 | 22.10.2013 | Diebold | United States | Information Technology | 1 934,92 | 2,273 |
| 14 | 22.04.2013 | Ralph Lauren Corporation | United States | Consumer Discretionary | 15 809,93 | 4,424 |
| 15 | 16.04.2013 | Parker Drilling Company | United States | Industrials | 610,90 | 1,541 |
| 16 | 12.03.2013 | Hewlett-Packard Company | United States | Information Technology | 47 510,83 | 1,372 |
| 17 | 20.12.2012 | Eli Lilly and Company | United States | Health Care | 48 128,16 | 3,251 |
| 18 | 16.08.2012 | Oracle Corporation | United States | Information Technology | 139 149,70 | 4,360 |
| 19 | 07.08.2012 | Pfizer | United States | Health Care | 129 983,43 | 1,599 |
| 20 | 13.10.2011 | Watts Water Technologies | United States | Industrials | 1 292,68 | 1,290 |
| 21 | 03.05.2011 | Rockwell Automation | United States | Industrials | 8 939,57 | 4,598 |
| 22 | 08.04.2011 | Johnson & Johnson | United States | Health Care | 178 964,03 | 3,507 |
| 23 | 24.03.2011 | Ball Corporation | United States | Industrials | 4 977,72 | 3,074 |
| 24 | 18.03.2011 | International Business Machines | United States | Information Technology | 166 766,02 | 7,548 |
| 25 | 10.02.2011 | Tyson Foods | United States | Consumer Staples | 5 848,16 | 1,064 |
| 26 | 31.01.2011 | Maxwell Technologies | United States | Industrials | 382,08 | 6,021 |
| 27 | 14.07.2014 | Sweett Group | United Kingdom | Industrials | 24,05 | 0,581 |
| 28 | 23.12.2013 | Rolls-Royce Holdings | United Kingdom | Industrials | 26 721,58 | 3,093 |
| 29 | 15.06.2013 | GlaxoSmithKline | United Kingdom | Health Care | 112 776,67 | 9,250 |
| 30 | 08.01.2013 | Lloyds Banking Group | United Kingdom | Financials | 27 833,87 | 0,388 |
| 31 | 30.08.2012 | Barclays | United Kingdom | Financials | 33 895,66 | 0,627 |
| 32 | 06.02.2012 | Smith & Nephew | United Kingdom | Health Care | 10 039,40 | 3,639 |
| 33 | 20.12.2011 | Aon Corporation | United Kingdom | Financials | 14 955,05 | 1,898 |
| 34 | 27.07.2011 | Diageo | United Kingdom | Consumer Staples | 44 311,12 | 6,554 |

| Case# | Date of announce | Company name | Country | Sector | MarketCap US\$M | P/B |
|-------|------------------|--|---------|----------------------------|-----------------|-------|
| 35 | 22.03.2015 | Banco Bradesco SA | Brazil | Financials | 52 234,17 | 1,721 |
| 36 | 06.03.2015 | Braskem S.A | Brazil | Industrials | 4 793,50 | 2,216 |
| 37 | 20.03.2014 | Petroleo Brasileiro SA | Brazil | Energy | 117 741,03 | 0,742 |
| 38 | 19.11.2013 | Brookfield Incorporacoes | Brazil | Industrials | 890,06 | 0,722 |
| 39 | 02.11.2013 | Embraer S.A. | Brazil | Industrials | 5 176,80 | 1,525 |
| 40 | 01.09.2014 | GAO Gazprom | Russia | Energy | 93 761,40 | 0,404 |
| 41 | 14.11.2013 | Gazprom Neft(formerly: Sibneft) | Russia | Energy | 21 289,14 | 0,924 |
| 42 | 24.09.2013 | Moscow United Electroc Grid Company (MOE Russia | Russia | Utilities | 1 959,29 | 0,637 |
| 43 | 14.02.2013 | RusHydro OAO | Russia | Utilities | 11 020,48 | 0,546 |
| 44 | 20.11.2012 | Rostelecom | Russia | Telecommunication Services | 15 177,17 | 2,188 |
| 45 | 10.09.2012 | OAO VTB Bank | Russia | Financials | 26 070,99 | 1,905 |
| 46 | 06.07.2012 | Aeroflot | Russia | Industrials | 2 845,02 | 2,392 |
| 47 | 25.01.2012 | Rosneft Oil Company OJSC | Russia | Energy | 85 788,15 | 0,740 |
| 48 | 07.08.2014 | Ultratech Cement Ltd. | India | Materials | 7 359,99 | 3,363 |
| 49 | 05.08.2014 | Prakash Industries Ltd | India | Materials | 65,73 | 0,232 |
| 50 | 02.08.2014 | Syndicate bank | India | Financials | 742,68 | 0,558 |
| 51 | 03.03.2014 | Punjab National Bank | India | Financials | 4 874,09 | 1,076 |
| 52 | 11.02.2014 | Reliance Industries Ltd | India | Energy | 52 228,30 | 1,315 |
| 53 | 25.11.2013 | State Bank of India Ltd. | India | Financials | 25 227,71 | 1,323 |
| 54 | 07.03.2013 | Larsen & Toubro Ltd | India | Industrials | 15 055,92 | 4,018 |
| 55 | 22.02.2013 | Ruchi Soya Industries Ltd | India | Consumer Staples | 645,46 | 1,595 |
| 56 | 21.12.2012 | Bharti Airtel Ltd. | India | Telecommunication Services | 24 160,86 | 2,784 |
| 57 | 02.04.2015 | CNOOC | China | Energy | 67 342,86 | 1,471 |
| 58 | 07.02.2015 | China Petrochemical | China | Energy | 86 329,66 | 1,010 |
| 59 | 03.02.2015 | Bank of Beijing Company | China | Financials | 10 353,98 | 0,846 |
| 60 | 31.01.2015 | China Minsheng Banking | China | Financials | 33 051,87 | 0,982 |
| 61 | 25.12.2014 | Dongfeng Motor Corporation | China | Consumer Discretionary | 14 088,48 | 1,536 |
| 62 | 16.09.2014 | Aluminium Corporation of China | China | Materials | 7 314,64 | 0,880 |
| 63 | 12.08.2014 | Shanghai Bailian Group(formerly: Shanghai Fr China | China | Consumer Discretionary | 1 964,76 | 1,029 |
| 64 | 11.07.2014 | Bank of China | China | Financials | 121 398,74 | 0,934 |
| 65 | 17.04.2014 | China Resources (Holdings) | China | Utilities | 14 080,92 | 1,743 |
| 66 | 02.12.2013 | China Southern Airlines Company | China | Industrials | 5 026,01 | 0,981 |
| 67 | 21.10.2013 | China Railway Construction Corporation | China | Industrials | 9 957,11 | 0,661 |
| 68 | 27.08.2013 | PetroChina Company | China | Energy | 249 236,07 | 1,430 |
| 69 | 20.03.2013 | Agricultural Bank of China | China | Financials | 135 919,93 | 1,353 |
| 70 | 24.05.2012 | Chinese Estates Holdings | China | Financials | 3 240,34 | 0,731 |
| 71 | 31.05.2011 | China Unicom | China | Telecommunication Services | 28 866,36 | 1,033 |