Corruption Risk and Stock Market Effects: Evidence from the Defence Industry

Abstract

Motivated by the finding that corruption is rampant in the defence sector globally, we examine the stock market effects of firm-level corruption risk disclosure in the defence industry. We find that the disclosure of corruption risk scores have information content. Our multivariate tests show that the market reacts negatively to firms that have low corruption risk. Our study supports the 'greasing the wheels' hypothesis which suggests that corruption is a cost of doing business. Further, companies with low corruption risk experience lower stock price volatility after the disclosure of corruption risk scores. Finally, we also find that the disclosure of lower corruption risk is associated with an increase in firm-level market liquidity.

JEL Classification: G34 H83 D73

Keywords: Corruption risk, stock market reaction, information asymmetry, market liquidity

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1. Introduction

Corruption stories in the defence industry make regular headlines. According to Transparency International, the leading global civil society organisation monitoring corruption globally, the international arms trade is believed to be one of the three most corrupt businesses in the world. Further, according to Stockholm International Peace Research Institute (SIPRI), the think tank committed to global security, defence industry corruption accounts for about 40 percent of all corruption in global transactions. The Chief Executive Officer (CEO) of Italian defence company Finmeccanica was arrested for alleged corruption relating to the sale of helicopters to India worth €560 million.[1] The stock market reacted negatively to this incident reflecting the reputational loss consistent with prior work (Johnson et al., 2014; Sampath et al., 2018; Karpoff et al., 2008; Dyck et al., 2010). Figure 1 depicts abnormal returns of Finmeccanica surrounding this event.

While the stock market reaction to revelation of corrupt activities has been documented in the literature, there is a paucity of work regarding the level of corruption risk in a firm. This is because it is difficult to assess the level of corruption risk in a firm. On October 4, 2012, Transparency International (UK) publicly released the anti-corruption risk index (ACI) scores of 129 companies in the defence industry (TI, 2012). We utilise this event to examine the impact of corruption risk disclosure on the stock market. Thus,

[1] Source: http://www.bloomberg.com/news/2013-02-12/finmeccanica-chief-orsi-said-to-be-held-in-bribery-probe.html accessed on November 15, 2013.

our primary contribution to the literature is the examination of the stock market impacts of corruption risk in the defence industry using the unique cross-country data set provided by Transparency International UK (TI 2012). Our primary motivation is to investigate corruption risk as opposed to corruption perception based on surveys used in prior work (Judge et al., 2011; Beets, 2005; Ramdani and Van Witteloostuijn, 2012). A second motivation is to focus on a specific industry sector, viz., defence which is perceived to be one of the most corrupt business sectors.

Prior work has focused on the revelation of actual corruption scandals engaged by corporates. There is no work on the stock market effects of disclosure of corruption risk. While prior work has examined various determinants of corruption and its outcomes, little effort has gone into the stock market dimensions. How does the market react to corruption risk scores? Is the reaction to corruption risk different between countries with high and low institutional quality? We examine this issue in the context of the defence industry which is known to be one of the most corrupt sectors.

Defence companies are different from companies in other industries, being in a unique position to sustain corrupt practices, making a case for studying corruption risk in this industry. Firstly, there is considerable secrecy in defence spending in many countries and this lack of transparency encourages corruption in the defence sector. Other sectors do not face the same level of opacity. Secondly, there is a serious agency problem in the defence industry. The senior government officials of several countries seem to work on behalf of their leading defence companies and try to market military equipment sales to foreign governments.[2] This implicit nexus between senior government leaders and defence companies weakens governmental oversight, especially in the context of the arms trade. A case in point is the British arms manufacturer BAE which was investigated for bribing Saudi officials to buy fighter planes.[3] The *Guardian* reported that BAE gave a Saudi prince a £75 million airliner with flying expenses included as part of a British arms deal. Furthermore, the British government citing national interests scuttled the investigations undertaken by the Serious Fraud Office into BAE's alleged corruption. In the words of attorney general Lord Goldsmith, "**the rule of law** has been outweighed by a **wider public interest"[4].** Companies in other industries do not enjoy government support for their corrupt practices. Thirdly, defence companies sell mostly to foreign governments. This is not the case in other industries. Bribing foreign governments may not be so critical to winning deals in other industries. Finally, the technical complexity, inherent in many arms transactions, prevents civil society and institutional watchdogs from effective oversight of transactions in the defence sector. On account of these significant factors, disclosure of anti-corrupt practices should be more relevant in the defence industry compared to other sectors.

As a consequence of these serious impediments to effective oversight, accountability and enforcement, defence industry companies are able to engage in financial market misconduct with impunity that is often uncharacteristic in other industry sectors. These companies are often able to erect barriers to transparent oversight, avoid accountability

[2] Yahoo world news quoted (February 22, 2002), Praful Bidwai, an Indian journalist who specialises on defence issues who commented on British Prime Minister, Tony Blair, "It's disgraceful that Blair should have spent more than half his time in India [during his last visit] urging India to buy the jets." (The sale of jets Bidwai is referring to is 66 British-made hawk jets, at a cost equivalent to US$1.4 billion.)
[3]http://www.theguardian.com/baefiles/page/0,,2095831,00.html
[4] http://www.theguardian.com/baefiles/page/0,,2098531,00.html

and prevent enforcement of anti-corruption laws in force. These unique features of the industry motivate us to study the risk of corruption in the defence sector.

We justify the contribution of the paper by highlighting the new insights that we expect to gain from studying this issue. Firstly, governments cannot be relied upon to control corruption in the defence industry. Global civil society organisations such as TI take it upon themselves to reduce the level of corruption. We address the key issue of whether the disclosure of corruption risk scores by TI in the defence industry has a market impact. Secondly, we hope to answer the question of why countries with high institutional quality have several firms with high corruption risk in the defence industry. Could the market reaction to the disclosure of corruption risk scores have an impact? Thirdly, the predicted effect of corruption risk disclosure on stock prices is not straight forward. It could be positive or negative, depending on the level of institutional quality. Fourthly, the impact of disclosure of lower corruption risk on stock price volatility could be positive or negative depending on whether the effect of uncertainty in future revenues dominates the potential reduction in reputational loss. Finally, we study the impact of disclosure on stock market liquidity since the disclosure event is likely to reduce the information asymmetry for firms with low corruption risk.

We contribute to the literature on corruption in the following ways. Firstly, we study the stock market effects of disclosure of corruption risk scores by TI-UK. We examine the stock price reaction to the disclosure of corruption risk scores, followed by an analysis of long-run effects on stock market volatility and liquidity. Is low corruption risk beneficial to the stockholders of the firm? Since corporate corruption may be considered as an uncertainty reducing device, it implies that companies with high anti-corruption scores face greater business uncertainty resulting in negative stock price effects. We term this as "greasing the wheels effect". Another implication of corruption risk is that it may signify potential managerial misbehaviour. Companies with high corruption risk may be prone to high agency costs with managers expropriating shareholders' wealth in several ways. These include financial misrepresentation, earnings manipulation and outright fraud. We label this as the "managerial misbehaviour" effect. If low corruption risk signifies a lower probability of bribing to obtain fresh business, then it could be regarded negatively by the shareholders under the "greasing the wheels" view. Alternately, lower corruption risk could indicate that the firm's managers are less likely to steal from the firm. This could be perceived positively by the shareholders under the "managerial misbehaviour" view.

Secondly, we test whether the disclosure of corruption risk scores in the defence industry affects a firm's stock market volatility and liquidity. If corruption in the defence industry could be considered as a cost of doing business, then disclosing that a firm has low corruption risk could increase the level of uncertainty. Alternately, companies may be suggesting that they suffer from low levels of vulnerability by disclosing low levels of corruption risk. Further, the disclosure of low levels of corruption risk may reduce information asymmetry and increase a firm's liquidity. By identifying corruption risk as a significant determinant of liquidity, our research also adds to the literature that examines how firm decisions and characteristics affect stock liquidity (Heflin and Shaw, 2000; Cao et al., 2004; Grullon et al., 2004; Odders-White and Ready, 2006; Lipson and Mortal, 2007; Chang and Yu, 2010; Kale and Loon, 2011). There are no studies that examine the relation between firm-level corruption risk and firm-level stock market volatility or liquidity.

We conduct firm-level analysis using a final sample of 86 defence companies from 27 countries. We examine stock market effects of disclosure of corruption risk using Transparency International UK's public release of the anti-corruption risk (ACI) scores of companies in the defence industry on 4th October 2012. We augmented our sample with a revised report that was disclosed on 24th April 2015 by TI-UK (TI, 2015). The event study results show no significant abnormal returns for the full sample. However, when we examine sub-sample results, we find that abnormal returns are negative for firms based in the US or other countries with high institutional quality. Non-US companies experience positive abnormal returns when ACI scores are first released to the market.

In multivariate tests, we examine the impact of ACI scores on abnormal returns using several firm-level control variables and country-level variables. Overall, we find a statistically significant negative relation between the level of ACI scores and abnormal returns. Our multivariate regression results suggest that the stock market reacts negatively to firms scoring well on anti-corruption risk. Country-level institutional quality has no significant impact on abnormal returns. Overall, we find empirical support for the "greasing the wheels" effect. Empirical results suggest that defence companies in both developed and emerging countries with low corruption risk experience negative abnormal returns around the announcement of the ACI scores. The impact of corruption risk on abnormal returns survives tests that control for potential endogeneity.

Further, we find that firms with low corruption risk have lower stock price volatility in the post-disclosure period. These results suggest that lower corruption risk is associated with lower stock market volatility due to lower probability of future scandals. Our analysis on changes in market liquidity shows that disclosure of anti-corruption risk reduces information asymmetry. Companies that score higher on the anti-corruption risk have higher liquidity than companies with lower scores. Furthermore, in the one-year post-disclosure period, companies with higher scores experience sharper increases in liquidity compared to other companies. Our empirical results suggest that stock market liquidity increases when corruption risk is lower. Taken as a whole, our results are consistent with the view that corruption risk disclosures are informative to market participants.

We derive some unique insights from our study. Firstly, some studies report negative abnormal returns when corruption scandals are disclosed to the public, ostensibly due to the loss of corporate reputation. Another stream (Zeume, 2017) suggests that affected firms experience adverse stock market impact when regulations regarding corruption become more stringent. Zeume (2017) attributes the loss in firm value to the loss in business to competing firms not affected by the change in regulations. Our results, which show negative abnormal returns for firms with low corruption risk, are consistent with this view. Secondly, it appears that firms make a choice between instituting controls for corruption risk and adopting an apathetic attitude towards corruption risk. Firms with strict controls on corruption risk experience negative abnormal returns in the short-run but enjoy lower stock market volatility and higher stock market liquidity over the long-run. One of the implications of our research is that voluntary corruption control measures can only go so far since non-compliant firms stand to benefit by gaining business contracts lost by low corruption firms.

The rest of the paper is organised as follows. In the next section, we review the relevant literature and describe the theoretical underpinnings that guide our empirical tests. In section 3 we describe the data and our sample selection. Our empirical results are contained in section 4. The final section concludes.

2. Theoretical Underpinnings and Hypotheses Development

In order to derive testable implications, we survey the literature focussing first on firm-level factors followed by institutional factors (commonly referred to as country-level factors in the literature) and stock market effects. The principal variable of interest in our study is firm-level corruption risk. We believe that firm-level corruption risk should be affected by institutional level and firm-level factors. Further, we expect the stock market to react to information about corruption risk. Therefore, we divide our theoretical discussion into three parts. In the first section, we analyse firm-level drivers. In the second section, we survey the literature on the institutional level drivers of corruption risk. Finally, in the last section, we examine the stock market effects of corruption risk.

2.1 Firm-Level Drivers of Corruption Risk

Martin et al. (2007) use World Bank enterprise-level survey to investigate firm-level factors that induce a firm's manager to bribe, and document that perceived greater financial constraints and perceived competitive intensity were significant drivers of the decision to bribe. Aterido and Hallward-Driemeier (2010) in their work of developing and high-income economies find that smaller companies suffer more than large companies from corruption and that corrupt practices reduce employment in large companies. Asiedu and Freeman (2009) find that firm-level corruption in Latin America, Sub-Saharan Africa, and Transition countries adversely affects investment growth. Vale and Branco (2019) investigate firm-level determinants of anti-corruption disclosure in emerging country multinationals and find that listed firms operating in many countries disclose more information about anti-corruption information.

Krishnamurti et al. (2019) extend this literature by examining specific firm-level determinants of firm-level corruption. In their analysis, they include visibility, profitability, and shareholding. They find that large companies which are more visible will be less corruption-prone and therefore have less corruption risk. This is because the loss of reputation will be larger for more visible companies as compared to less visible companies (Johnson et al., 2014). Further, they also suggest that companies which are more profitable would have lower corruption risk, especially in the defence industry context. This is because more profitable companies are not in desperate need of fresh orders to survive and therefore do not need to resort to bribery. They also propose that managerial shareholding will have an adverse effect on firm-level corruption risk in the defence industry. From an agency theory point of view (Jensen and Meckling, 1976; Himmelberg et al., 1999), managers with large shareholdings have incentives to increase the profitability of the firm in order to increase their compensation and wealth. Consequently, they would be open to corrupt practices in order to procure more orders for the firm. Therefore, they have less incentives to establish strict procedures and controls pertaining to corruption, particularly in the defence industry where paying bribes may be considered as a cost of doing business. They find empirical evidence consistent with this proposition.

2.2 Institutional Drivers of Corruption Risk

Several papers have examined the cross-country determinants of corruption.[5] Empirical evidence suggests that country-level factors such as economic development, political institutions, civil society, and culture appear to impart a significant influence on corruption measured at the country level. Cross-country studies on corruption also emphasise political institutions and legal systems (Agarwala and Goodell, 2009; Triesman, 2000; Gerring and Thacker, 2004; Sung, 2004; Lederman et al, 2005; Brunetti and Weder, 2003; Chowdhury, 2004; Méndez and Sepúlveda, 2006; and Freille et al, 2007). Blanc et al. (2017) examine the influence of media exposure and country-level press freedom on anti-corruption disclosure using the world's largest multinationals and find that media exposure and country-level press freedom are positively associated with anti-corruption disclosure. Islam et al. (2018) examine anti-corruption disclosure using two global telecommunication companies and show that there is a positive association between anti-corruption disclosure and activities of the media and non-governmental organization initiatives. In our empirical tests, we, therefore, control for institutional quality attributes. We include a number of indicators of institutional quality such as regulatory quality, the rule of law, voice and accountability, government effectiveness and political stability (La Porta et al. 2006; Baughn et al., 2010).

2.3 Stock Market Effects of Corruption Risk Disclosure

There is sparse empirical work on the stock market effects of corruption. Wong (2009) and Sampath et al. (2018) provide empirical evidence suggesting that when companies are investigated for suspected corrupt activity, the market-adjusted stock price reaction was negative. While public disclosure of potentially illegal activity has adverse stock market impacts, several company officials routinely claim that "you have to pay bribes to get work", making a business case for indulging in corporate corruption. When FARO Technologies Inc.

[5] See for instance Husted and Estudios (1999), Triesman (2000), Gerring and Thacker (2004), Lederman et al. (2005) and Freille et al. (2007).

faced a securities class action suit for alleged violation of the Foreign Corrupt Practices Act, it made the following statement admitting that halting illegal payments would affect its business:

"*Depending on how this matter is resolved, the Company's sales in China could be significantly impacted. The termination of certain personnel and the cessation of improper payments in China may have a significant adverse effect on future operations in China because such action could negatively influence the decisions of a significant number of customers of the Chinese subsidiary to do business with that subsidiary. The potential magnitude of the loss of sales in China as a result of potential violations of the Foreign Corrupt Practices Act cannot be estimated at this time.*" (as cited in Wong, 2009)

Thus, corporate corruption may be considered as a mechanism by which uncertainty in the business environment may be reduced. Corruption may therefore be considered as grease that oils the wheels of commerce. Prior literature on corruption posits that firms engage in corrupt activities depending on where they operate and, in many countries, corrupt firms often find it easier to operate, innovate, and secure future cash flows (Kim, 2014). Firms are therefore incentivised to '*grease the wheels*' in corrupt political environments by efficiently navigating through bureaucratic hurdles that facilitates them to add value by communicating specialised knowledge to uninformed or overburdened policymakers (Leys, 1970; Leff, 1964; Grossman and Helpman, 2001). Me'on and Weill (2009) suggest that corruption may be an efficient grease, especially in deficient institutional environments.

Despite the massive adverse publicity associated with corporate corruption, several firms in the defence industry continue to engage in unethical practices around the globe. The focus of our paper is therefore on the anti-corruption index which measures the level of corruption risk embedded in a firm due to its systems and processes.

An alternate view of corruption risk is that it may signify potential managerial misbehaviour. Companies with high corruption risk may be more susceptible to high agency costs with managers stealing shareholders' wealth in different ways such as financial misrepresentation, earnings manipulation and outright fraud. We label this as the "managerial misbehaviour" effect. We argue that companies, which score high on the anti-corruption index, have low levels of corruption risk, implying that the firm has a lower probability of engaging in corrupt activities in the future (Healy and Serafeim, 2016).

The observed stock price effect will depend on the relative strength of "greasing the wheels" versus "managerial misbehaviour" effects. Under the "greasing the wheels" premise, low corruption risk is expected to have negative stock market effects since anti-corruption systems are expected to adversely impact future business prospects in defence industry companies. On the other hand, we expect that companies with high scores on the anti-corruption index (ACI) have a lower propensity of managerial misbehaviour. Thus the disclosure of high scores is expected to have a positive stock market effect under the "managerial misbehaviour" view.

Under the "greasing the wheels" view, we propose the following hypothesis:

Hypothesis 1a: In the context of the defence industry, companies with lower corruption risk will experience negative stock price reaction as compared to companies with higher corruption risk, ceteris paribus.

Under the "managerial misbehaviour" view, we advance the following hypothesis:

Hypothesis 1b: In the context of the defence industry, companies with lower corruption risk will experience positive stock price reaction as compared to companies with higher corruption risk, ceteris paribus.

Companies in countries with high institutional quality will have mechanisms to limit managerial misbehaviour. Thus, in developed markets, which are characterised by high institutional quality, we expect the "greasing the wheels" effect to dominate, resulting in a negative stock price reaction. However, in emerging markets, often characterised by poor institutional quality, the disclosure of high ACI scores may signal that the firm is committed to limiting managerial misbehaviour and may, therefore, have a positive stock market effect. In the emerging markets, since both "greasing the wheels" and "managerial misbehaviour" effects are expected to operate, the resulting price impact is an empirical issue. We, therefore, control for institutional quality variables in our regressions.

We next consider the impact of corruption risk on stock price volatility. There are two different views regarding the impact of corruption risk on stock price volatility. One stream argues that corruption may be viewed as a mechanism for reducing political risk. In line with this view, Boubakri et al. (2012) find that politically connected firms have lower political risk resulting in lower costs of equity and that this relationship is stronger in countries with lower levels of democracy, lower stock market development, lower press freedom and higher levels of corruption. Another view suggests that firms resorting to corruption face higher uncertainty due to uncertain and changing political policies. For instance, when corrupt officials were charged in China, firms connected with them experienced steep fall in stock prices (Liu et al., 2017). This finding suggests that corruption may not always reduce political risk. It may, in fact, be a source of additional political risk.

Companies with low corruption risk have low risk of reputational loss due to public disclosure of corrupt deals. In general, they are expected to have a stable business environment compared to companies with high corruption risk. In the words of SEC commissioner A.A. Sommer:

"…if a corporation has secured a clearly material amount of business by bribing those in control of a country rather than through more conventional means, such as competitive excellence, is this something that is important for investors to know? Might it be argued that such business is more vulnerable, more fragile, and more susceptible to loss than business secured through more customary means?" (as cited in Wong, 2009)

The above quote implies that companies indulging in corrupt behaviour may be more vulnerable and susceptible to political risk than companies, which follow ethical practices. Companies disclosing high ACI scores, signifying low corruption risk, may be signalling that they are less vulnerable to political risk than companies with high corruption risk. Therefore, we expect companies with low corruption risk to have lower stock market volatility.

There is mixed evidence on the impact of corruption on volatility. Zhang (2012) documents a positive correlation between country-level corruption perception and market-level volatility. Chen et al. (2018) find that crackdown on political corruption in China results in lower crash price risk. Lau et al. (2013) show a negative relation between market-level volatility and firm-level corruption using a sample of emerging market companies. There is no research that has examined the relation between firm-level corruption risk and firm-level stock market volatility.

Taking these views into account, we put forward the following hypothesis:

Hypothesis 2: In the context of the defence industry, companies with lower corruption risk will experience lower stock price volatility as compared to companies with higher corruption risk, ceteris paribus.

Based on hypothesis 2, we expect stock price volatility to be lower for companies with lower corruption risk.

From a theoretical perspective, disclosure of information reduces information asymmetry between informed and less-informed investors. Prior research suggests that a reduction in information asymmetry is associated with a reduction in adverse selection risk which results in an improvement in liquidity (Glosten and Milgrom, 1985; Kyle, 1985). Uninformed investors are less concerned about trading with more informed investors when there is more disclosure of information. Empirical literature generally finds a positive association between better voluntary disclosure and liquidity, consistent with the predictions of theoretical work (Leuz and Verrecchia, 2000). Further, managerial surveys indicate that managers believe that disclosure improves liquidity (Graham et al., 2005).

Recent works also posit a negative relation between political uncertainty / policy uncertainty and liquidity (Nagar et al., 2019; Marshall et al., 2017; Duong et al., 2018). In a similar vein, we expect a negative relation between corruption risk and liquidity. There is no current study that examines the relation between corruption risk and liquidity. In the context of corruption risk disclosure, we argue that voluntarily disclosing information will result in a reduction in information asymmetry. This effect will be stronger for firms that disclose lower levels of corruption risk. The reduction in information asymmetry will result in an increase in liquidity due to the reduction in adverse selection risk (Verrecchia, 2001).

We therefore posit:

Hypothesis 3: In the context of the defence industry, companies with lower corruption risk will experience higher liquidity as compared to companies with higher corruption risk, ceteris paribus.

3. Data, Sample Selection, and Measurement

3.1 Sample selection

Our sample is drawn from Transparency International UK's two reports on defence companies' anti-corruption index (TI, 2012 and TI, 2015). The TI reports covered 129 and 163 defence industry companies from 31 and 47 countries in 2012 and 2015 respectively. TI-UK scored each firm on corruption risk based on a comprehensive questionnaire in relation to the companies' ethics and anti-corruption systems[6]. TI-UK published these results and corresponding anti-corruption indexes on 4th October 2012 and 24th April 2015[7].

Our initial sample consists of 292 defence companies. We exclude private and state-owned firms due to missing share market data. We also remove 127 companies from the 2015 sample that were included in the 2012 sample. This is to ensure that we only include the first-time disclosure of anti-corruption scores. We match the resulting sample with DataStream and Osiris and Mint Global databases to obtain stock market and firm-level variables. After excluding companies that had missing data, we have a final sample of 86 companies from 27 countries. The list of countries included in our sample is provided in Appendix A.

3.2. Data used and measurement

3.2.1 Firm-level data

The average score of transparency of the anti-corruption index is the principal variable of interest. Scoring was done at the firm level by Transparency International (UK) based on 34

[6] Please see TI (2012) and TI (2015). The full report is freely downloadable from Transparency International's website.

[7] Please see http://www.transparency.org/news/feature/defence_companies_and_disclosure_how_are_they_doing for details.

questions belonging to the following five sub-categories: leadership, governance, and organisation; risk assessment; company codes and policies; training; and personnel and helplines. Using publicly available data, a TI assessor evaluated each firm against "model answers" for each assessment item. The questions, in TI-UK's view, cover the basic systems and processes a defence industry company should have in order to inculcate zero tolerance for corruption in all its dealings.

According to TI-UK, the following seven issues are the most distinguishing ones separating the "good" companies from the "bad":

1. The extent to which the company publicly reports information on its ethics and anti-corruption program.

2. Company leadership speaking up against corruption, internally and externally.

3. How the board assures themselves of the effectiveness of their anti-corruption program.

4. How the company carries out corruption risk assessments.

5. How the company manages corruption risk in third parties.

6. How the company trains its staff, especially those in exposed roles.

7. How the company follows up whistleblowing information.

Each firm was placed into one of six bands ranging from A (very low level of corruption risk) to F (critical level of corruption risk) based on the aggregate scores. The range of scores for each band is reproduced in Appendix C. We use the average anti-corruption risk score for the sample companies in our analysis.

In order to assess what ACI actually measures, we examined the nature of questions covered in the questionnaire. In our assessment, ACI reflects a firm's disclosure of anti-corruption systems in place and the commitment of top management in eradicating corrupt practices from their companies. The ACI score, in our view, is a measure of control of operational risk with respect to corrupt practices in the company. Further, the questions are carefully designed to avoid country-level biases and represent firm-level corruption risk. We note that some companies in countries with strong institutions have low ratings, assuring us that country-level biases do not dominate the scoring process. We do acknowledge a couple of potential limitations of the ACI score. Firstly, we cannot rule out the potential for a firm to falsely disclose good practices when pursuing bad ones. Secondly, we cannot completely rule out rater biases. However, these drawbacks exist in any study that uses publicly disclosed information and uses human raters.

We use three dependent variables – abnormal stock returns (ABR), change in liquidity measure (RIL) and change in stock price volatility (STD_R). For assessing the abnormal return around the disclosure of corruption risk scores, we use the following formula for the market model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt} \qquad (1)$$

where R_{jt} is observed return for company j at time t, α_j is a constant for company j, β_j is the beta of security j, R_{mt} is observed returns on the market index on time t, and ε_{jt} is the residual error term. We use the most widely used share index of each country (all ordinaries index) as the market index. The estimation period runs from 260 days prior to the announcement day to 61days before the announcement day (-260 to -61). The dependent variable, ABR is defined as the 4-day abnormal returns from the day before the announcement to 2 days after the announcement date of anti-corruption score disclosure.

We use Amihud's (2002) illiquidity measure (which takes into account the impact of trade order on returns)[8]. Data were downloaded using DataStream for the period around the announcement of the anti-corruption risk index, which occurred on 4th October 2012 and 24th April 2015. For constructing the above stock liquidity measures, we use daily data from one year prior to the announcement to one year after. To estimate Amihud's illiquidity measure, we construct the ratio of absolute stock return to dollar volume using the following formula:

$$\text{Amihud illiquidity } ILI_{iy} = 1/D_{iy} \sum_{t=1}^{Diy} \left|\text{Returns}_{iyd}\right| / [VO_{iyd} * P_{iyd}] \quad (2)$$

where D_{iy} is the number of days for which data is available for stock i in year y. The absolute return for stock i on day d of the year y equals to $\left|Return_{iyd}\right|$. Trading volume and closing price of stock i on day d of year y are denoted by VO_{iyd} and P_{iyd} respectively. These two variables ($VO_{i,y,d}$ and $P_{i,y,d}$) are multiplied to get dollar value of trading volume. The absolute return on stock i on day d of the year y is divided by the calculated dollar value of trading volume to get daily illiquidity measure. The yearly average of the measure is calculated before and after the announcement. The ratio of Amihud's (2002) illiquidity measure one-year post-disclosure to one-year pre-disclosure of anti-corruption index is computed (RIL). In our tests, we also include the ratio of standard deviation of returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index (STD_R).

We use various firm-level variables such as firm size, firm age, managerial share ownership and stock liquidity measures as control variables. We construct our firm-level variables using data from DataStream, Osiris and Mint Global databases. Firm size (SIZ) is measured as the book value of total assets in US Dollars, while firm profitability is measured by return on assets

[8] Prior studies such as Kale and Loon (2011) use Amihud's illiquidity measure to assess stock market liquidity.

(ROA). Firm age (AGE) is calculated from its incorporation and managerial share ownership (MSO) is the proportion of ordinary shares held by all executives.

3.3 Measures of Institutional Quality

We use a range of institutional quality variables to construct a composite index (derived from factor analysis of institutional quality variables) of institutional quality (INQ). We use the Worldwide Governance Indicators (2012 update)[9](WGI) which cover over 200 countries and territories and which measure six dimensions of governance ranging from approximately -2.5 (weak) to 2.5 (strong) governance performance. We include Voice and Accountability (VAC), Political Stability and Absence of Violence/Terrorism (POS), Government Effectiveness (GVE), Regulatory Quality (REQ) and Rule of Law (RUL). The aggregate indicators are based on several hundred individual underlying variables, taken from a wide variety of data sources including surveys of households and companies, commercial business information providers, non-government organisations and public sector organisations. We use the Corruption Perceptions Index (CPI), also sourced from Transparency International, which ranks countries/territories based on how corrupt their public sector is perceived to be. A country/territory's score indicates the perceived level of public sector corruption on a scale of 0 - 10, where 0 means that a country is perceived as highly corrupt and 10 means that a country is perceived as very clean. Since the country level governance indicators are strongly correlated between themselves, we construct INQ, a composite index derived from factor analysis of institutional quality variables. INQ is used in our empirical tests as a control variable to capture the effects of institutional quality. A detailed description of these variables and the sources from which the data were collected are listed in Appendix B.

[9] Obtained from www.govindicators.org. See http://data.worldbank.org/data-catalog/worldwide-governance-indicators. Also, see Kaufmann et al. (2009).

3.4 Research Design and Models

We estimate the following multivariate models to investigate the relationship between corruption risk and stock market effects. Firstly, we study the relationship between corruption risk and stock market reaction around the announcement of anti-corruption risk disclosure.

$ABR = \beta_0 + \beta_1 ACI + \beta_2 SIZ + \beta_3 ROA + \beta_4 AGE + \beta_5 DIS + \beta_6 EXP + \beta_7 MSO + \beta_8 IDR + \beta_9$ Country-level factors $+ \varepsilon$ (1)

Our dependent variable, ABR, comprises the four-day abnormal return around the announcement of anti-corruption disclosure from the day before announcement to two days after the announcement[10].

Second, we run the following regression to investigate the relationship between changes in stock return volatility and anti-corruption risk disclosure. The dependent variable for equation (2) is STD_R, the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of the anti-corruption index.

$STD\_R = \beta_0 + \beta_1 ACI + \beta_2 SIZ + \beta_3 ROA + \beta_4 AGE + \beta_5 DIS + \beta_6 EXP + \beta_7 MSO + \beta_8$ Country-level factors $+ \varepsilon$
(2)

Finally, the relationship between stock market liquidity changes and anti-corruption risk disclosure is examined used the model shown in equation (3). RIL is the ratio of Amihud's

[10] All variables used in this study are described in Appendix B.

(2002) illiquidity measure one-year post disclosure to one year prior to disclosure of the anti-corruption index.

$$RIL = \beta_0 + \beta_1 ACI + \beta_2 SIZ + \beta_3 ROA + \beta_4 AGE + \beta_5 DIS + \beta_6 EXP + \beta_7 MSO + \beta_8 \text{ Country-level factors} + \varepsilon \quad (3)$$

4. Empirical Results

4.1 Descriptive Statistics and Correlation Matrix

Descriptive statistics of the firm level and economic and institutional factors are shown in Table 1. When examining Panel A of Table 1 we find that along the dimensions of institutional factors, all variables except political stability (POS) are statistically different at the 1% level of significance between the Low and High ACI classification groups. Countries with higher institutional quality as proxied by VAC, GVE, REQ, and RUL tend to have lower corruption risk. The composite institutional quality factor (INQ) also shows similar results. We control for institutional quality in our regressions since the stock price reaction to the disclosure of corruption risk is expected to vary depending upon the level of institutional quality in that country.

From Panel B, we find that companies classified as "Low" in terms of anti-corruption risk (ACI) had lower comparable mean and median scores than companies classified as "High" on firm-level variables such as firm size (SIZ) and Return on Assets (ROA). Managerial Share ownership (MSO) was the only firm-level variable which had a higher mean score between Low and High ACI groups (32.74 compared to 21.66). The variables ACI, SIZ, and ROA are statistically different between groups using the Mann Whitney rank-sum (MW) test. MSO and STD_R show weakly statistically significant differences between low and high ACI samples.

ABR and RIL are not significantly different between low and high ACI companies. We control for firm-level variables in our regression tests.

Insert Table 1 here

In Table 2, we report correlations between the variables used. Overall, we find that ACI is strongly positively correlated with institutional factor level variables such as the composite index of Institutional Quality (INQ). ACI tends to be higher in developed countries such as the US, and major arms exporting countries. ACI has a 0.36 correlation with firm size (SIZ), indicating that large companies tend to have a lower level of corruption risk. ACI is also higher in companies that voluntarily publicly disclose anti-corruption information (DIS). ABR, the abnormal stock returns around disclosure of corruption risk score, is negatively correlated to EXP (-0.20) and USD (-0.42) suggesting that stock price reaction is more negative in the U.S. and arms exporting countries. STD_R, the ratio of idiosyncratic risk post-disclosure to pre-disclosure is negatively correlated with EXP (-0.23) denoting that volatility reduces the most in arms exporting countries. RIL, the ratio of Amihud's illiquidity measure post-disclosure to pre-disclosure, is negatively correlated with EXP (-0.25) suggesting that liquidity improves for low risk companies in arms exporting countries. Most other correlations are low and do not indicate any serious problems of multicollinearity.

Insert Table 2 here

4.2 Stock market reaction to the disclosure of anti-corruption risk scores

Transparency International UK first disclosed publicly the anti-corruption risk scores of companies in the defence industry on October 4, 2012. Subsequently, they published a second report on 24th April 2015. We conduct an event study centred on this event and present our results in Table 3. We only include first time disclosures. For the total sample, we find positive but insignificant abnormal returns of 0.39% during the four-day window (-1 to +2). We use a four-day window since our sample is cross country and therefore the release of the report is likely to occur at different points in time due to time zone differences.

We show subsample results based on sample splits such as developing versus developed markets, the US versus non-US, and High versus Low Institutional quality samples. We find positive and statistically significant abnormal returns of 1.31% for the developing market sub-sample. For the developed market subsample, we find positive but insignificant abnormal returns. When we split the sample into US and Non-US companies, we find that US companies experience significant abnormal returns of -1.01% while non-US companies have positive abnormal returns of 1.53% that are statistically significant. We find qualitatively similar results when we bifurcate the sample based on institutional quality.

Overall, these results show that the public disclosure of anti-corruption scores constitutes new information, as evidenced by the stock price reaction. Interestingly, the results are different when we partition the sample based on the economic development status, institutional quality and US-base. The results suggest that disclosure of anti-corruption scores is viewed positively in developing/non-US/low institutional quality countries but is considered negatively in developed/US/high institutional quality countries. In order to explore this issue further, we conduct multivariate regressions using the four-day abnormal returns as the dependent variable.

Insert Table 3 here

4.2.1 Impact of anti-corruption risk scores on abnormal returns

Motivated by the differences of subsample results, we conduct OLS regressions using the four-day abnormal returns as the dependent variable and report the results in Table 4. In the baseline regression (Model 1) we use ACI as the principal independent variable and include a number of control variables. ACI has a (significant at 5% level) negative effect on abnormal returns suggesting that companies with low corruption risk experience negative stock market reaction. To understand this effect more clearly, we estimate several models that explicitly control for institutional differences. In model 2, we use a dummy variable DEV if the firm is from a developed country. DEV is not statistically significant. The interaction term ACI*DEV is also not statistically significant. We find support for Hypothesis 1a which argues that companies with lower corruption risk will experience negative stock price reaction as compared to companies with higher corruption risk, ceteris paribus. This result suggests that the "greasing the wheels" effect dominates the "managerial misbehaviour" effect. We find no support for Hypothesis 1b which suggests that companies with low corruption risk will experience positive stock reaction when ACI scores are released.

In model 3, we use USD – an indicator variable for US-domiciled companies and its interaction with ACI. Both USD and ACI*USD are not statistically significant. In model 4, we include INQ and ACI*INQ. The results are qualitatively similar. Overall, our results imply that the negative stock price reaction to low corruption risk is not driven by institutional factors. Our results suggest that the "greasing the wheels" effect is supported. Under the "greasing the wheels" proposition, low corruption risk is expected to have negative stock price reaction since anti-corruption systems are expected to adversely impact future business prospects in the defence sector.

Insert Table 4 here

4.3 Impact of disclosure of anti-corruption risk scores on stock return volatility

We assess the long-run impact of disclosure of anti-corruption risk scores on stock return volatility. Figure 2 shows the pattern graphically in stock return volatility before and after the disclosure for stocks with low and high corruption risk. It is seen that low corruption risk stocks (i.e. companies with high ACI scores) experience a more dramatic decline in volatility compared to high corruption risk stocks. Our multivariate results are reported in Table 5. In order to ensure the robustness of our results, we use two proxies for volatility. The first proxy variable is STD_R, the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption risk scores by TI-UK. The second proxy BETA_R, is the ratio of BETA one-year post-disclosure to one-year pre-disclosure of the anti-corruption index. We use these proxies of volatility as dependent variables in our models.

The main independent variable is ACI, the average transparency anti-corruption scores. We also include a number of control variables, including institutional quality measures. Overall, we find that companies with low corruption risk experience a significant reduction in stock market volatility. We find qualitatively similar results using both proxies of volatility. Large companies tend to experience a significant increase in volatility in the post-disclosure period. As before, we use a number of interaction variables. The main result is that companies disclosing low corruption risk have significantly lower volatility in the year after disclosure. This finding supports Hypothesis 2, which states that companies with lower corruption risk will experience lower stock price volatility as compared to companies with higher corruption risk, ceteris paribus[11]. We do not find a consistent impact of institutional quality on this risk reduction effect. Our findings are in-line with the findings of Chen et al. (2018) who find that crack-down on corruption in China reduces the stock price crash of affected firms. In a similar vein, our main finding is that disclosure of lower corruption risk leads to lower stock price volatility. We find qualitatively similar results when we use BETA_R as the dependent variable. Firms with lower corruption risk have lower levels of systematic risk, suggesting that political risk associated with corruption is lowered when firms disclose high ACI scores.

Insert Table 5 here

Insert Figure 2 here

4.4 Impact of disclosure of anti-corruption risk scores on stock market liquidity

Finally, we examine the impact of corruption risk disclosure on market liquidity. In Table 6, we display univariate results comparing liquidity measures one-year before and one-year after disclosure of corruption risk scores by Transparency International for the overall sample and the subsamples based on ACI. Overall, illiquidity, as measured by Amihud's (2002) illiquidity measure, decreases after disclosure. On closer examination, it appears that the decrease is largely due to companies with high ACI scores. We get similar results when we use a half-yearly window, except that overall illiquidity goes up in the post-disclosure period driven by companies with high corruption risk. Summing up, it appears that liquidity improves post-disclosure, mostly driven by companies with low corruption risk. Figure 3 pictorially depicts the relationship between liquidity improvement and ACI score before and after the disclosure.

[11] We find qualitatively similar results when we use the ratio of idiosyncratic risk one-year post-disclosure to on-year pre-disclosure of the anti-corruption index. These results are available from the authors upon request.

Insert Figure 3 here

Insert Table 6 here

We examine cross-sectional determinants of improvements in liquidity in the one-year after the TI disclosure event. The dependent variable is RIL, the ratio of Amihud's (2002) illiquidity measure one-year post-disclosure to one year prior to the disclosure of the anti-corruption index. Our results are reported in Table 7. In the first model, we find that ACI has a significant negative effect on RIL, suggesting that companies with low corruption risk experience improvements in liquidity after the disclosure of ACI scores. We find that disclosure of anti-corruption risk reduces information asymmetry for companies that score high on the anti-corruption risk. In the one-year period post-disclosure, companies with higher scores experience sharper increases in liquidity compared to other companies. ACI remains significant when we include an indicator variable (DEV) that takes the value of 1.0 for companies in developed countries and an interaction term ACI*DEV. DEV is also significantly negative implying that the decline in the illiquidity of low corruption risk companies is somewhat stronger in developed countries. In both models 1 and 2, ACI retains its negative impact. Overall, our results are supportive of Hypothesis 3 which argues that companies with lower corruption risk will experience higher liquidity as compared to companies with higher corruption risk, ceteris paribus.

Insert Table 7 here

4.5 Robustness Checks

We check the robustness of our main results to alternate models/specifications. Firstly, we use an alternate measure of liquidity. Second, we address potential endogeneity in our results.

We report these results in Tables 7 and 8.

In models 3 and 4 of Table 7, we use an alternate measure for illiquidity. We follow the methodology outlined in Corwin and Schultz (2012) to construct the high-low spread measure (Corwin and Schultz, 2012). We use daily data sourced from DataStream (DataStream variables ph and pl) to construct the high-low price spread. The Corwin-Schultz high and low price spread (HLS) is defined as follows:

HLS = $\frac{2(e^{\propto}-1)}{1+e^{\propto}}$

Where α = $\frac{\sqrt{2\beta}-\sqrt{\beta}}{3-2\sqrt{2}} - \sqrt{\frac{\gamma}{3-2\sqrt{2}}}$, β is $\left\{\sum_{j=1}^{1}\left[ln\left(\frac{H_{t+1}^{0}}{L_{t+1}^{0}}\right)\right]^{2}\right\}$, which is sum of expected squared ratio of high and low prices ratio for two consecutive days. γ equals to $\left[\left(\frac{H_{t,t+1}}{L_{t,t+1}}\right)\right]^{2}$ a squared ratio of high and low prices over a range of two days.

$$HLS = \beta_0 + \beta_1 ACI + \beta_2 SIZ + \beta_3 ROA + \beta_4 AGE + \beta_5 DIS + \beta_6 EXP +^{12} \beta_7 MSO + \beta_8 \text{Country-level factors} + \varepsilon \quad (4)$$

Our results are robust to using this alternate measure of illiquidity.

In Table 8, we provide the results of two-stage least-squares analysis (2SLS) to address potential endogeneity. The dependent variable in the first-stage (model 1) is ACI, which is the average transparency anti-corruption score obtained from the Transparency International UK website. We follow prior literature in choosing the average score of the anti-corruption risk score at country and regional levels after removing focal firm while computing the instrument variables (Cheng et al., 2014; Krishnamurti et al. 2018; Kim et al. 2020). In these calculations, the instruments vary across country and regional levels given that the level of ACI of the focal firm could be influenced by the other firm's ACI in the same country and region. In the second

[12] Following the approach of TI-UK, we classify the world into the following regions – North America, South America, EU and Western Europe, Eastern Europe and Central Asia, Middle East and North Africa, Sub-Saharan Africa and Asia-Pacific.

stage results, we use ABR, STD_R, and HLS as dependent variables. We use a number of control variables as in earlier tables.

First stage:

$$ACI = \beta_0 + \beta_1 ACI\_Country\ Average + \beta_2 ACI\_Regional\ Average + \beta_3 SIZ + \beta_4 ROA + \beta_5 AGE + \beta_6 DIS + \beta_7 EXP + \beta_8 MSO + \beta_9 IDR + \beta_{10} Country\text{-}level\ factors + \varepsilon \quad (5)$$

Second stage:

$$ABR/STD\_R/HLS = \beta_0 + \beta_1 Instrumented\ ACI + \beta_2 SIZ + \beta_3 ROA + \beta_4 AGE + \beta_5 DIS + \beta_6 EXP + \beta_7 MSO + \beta_8 IDR + \beta_9\ Country\text{-}level\ factors + \varepsilon \quad (6)$$

We find that the instrumented ACI has a statistically significant impact on ABR (1% level) once we control for potential endogeneity. Our results also indicate that ACI continues to retain its negative impact on STD_R, suggesting that our results are robust to controls for endogeneity. Further, using HLS as the dependent variable, ACI has a significantly negative impact. We assess the strength and validity of both instrumental variables used in 2SLS. In Models 2, 3 4 of Table 8, the under-identification test of Kleibergen-Paap rk LM statistic is significant, suggesting that the instrumental variables are not under identified. The weak identification test of the Kleibergen-Paap Wald rk F statistics are also significant across all models, indicating that the instrumental variables are not weakly identified. In addition, the Hansen J statistic (over identification test of all instruments) are insignificant for all models, revealing that the selected instrumental variables are valid. Overall, when we control for endogeneity, we find support for hypothesis 1a, which is consistent with greasing the wheels view and hypotheses 2 and 3, which state that anticorruption risk disclosure reduces volatility and improves liquidity. Our results are consistent with the view that corruption risk disclosures are informative to market participants and the disclosures affect the liquidity and volatility of the shares.

Insert Table 8 here

5.0 Conclusion

While prior studies have used actual or perceived corruption at the firm and/or economic/institutional level, our work is the first one to focus on the risk of corruption. Our emphasis is on the defence industry which is regarded as being more susceptible to corruption by several influential commentators. Corruption risk is not the same as corruption. While related cases of corruption result in reputational losses for the concerned firm, corruption risk indicates the potential for corruption in the future with the possibility of future reputational loss. As such, other things being equal, companies which score high on the corruption risk measure are more likely to experience episodes of corruption in the future.

Our results show that the disclosure of corruption risk is informative to market participants. The stock market reaction to the disclosure of corruption risk scores differs between countries with low and high institutional quality. On further examination, we find that firms with low corruption risk experience negative abnormal returns during the announcement period. Our results are consistent with the existence of the "greasing the wheels" effect. Our results suggest that defence industry firms with low corruption risk are potentially subject to greater business uncertainty and the stock market views this negatively. This finding helps us to understand why several firms in countries with high institutional quality continue to have high corruption risk.

The disclosure of corruption risk score has some positive effects. We find that the post-disclosure volatility of stock prices reduces for companies with low corruption risk. This finding implies that defence industry companies with low corruption risk scores are signalling that they are not as vulnerable to business loss resulting in reduced stock price volatility.

Finally, the liquidity of low-risk companies improves subsequent to the disclosure while other companies generally show a decrease in liquidity. This finding suggests that disclosure of corruption risk lowers information asymmetry for low-corruption risk companies. These results are robust to the use of alternate model specifications and controls for potential endogeneity.

Our findings could have potential policy implications. It would be naïve to expect that more stringent anti-corruption regulations would reduce the occurrence of corruption. This is because companies with low proclivity to corruption may lose business contracts to potential competitors who are more willing to engage in corruption. Another problem is the inconsistency in the enforcement of anti-corruption regulations. When some countries are lax about enforcing anti-corruption regulations, firms in countries with more stringent enforcement will tend to suffer from loss of business. Thus, efforts to close the gap in enforcing regulations are a prerequisite to improving global governance.

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Appendix A

List of Countries

Developed Markets	Emerging Markets
Finland	Brazil
France	Bosnia and Herzegovina
Germany	Bulgaria
Ireland	China
Israel	India
Italy	Malaysia
Japan	Russian Federation
Netherlands	South Africa
Norway	South Korea
Spain	Taiwan
Sweden	Turkey
Switzerland	Ukraine
United Kingdom	The United Arab Emirates
United States	

Appendix B: Variable Definitions and Sources

Variable name	Abbreviation	Classification Level	Description of variable	Source
Anti-corruption risk index	ACI	Firm-level	The average score of transparency of anti-corruption scores	http://government.defenceindex.org/sites/default/files/documents/GI-exec-summary-english.pdf
Market Model Abnormal Returns	ABR	Firm-level	The 4-day abnormal returns from the day before the announcement to the 2 day after announcement date of the anti-corruption index announcements.	Calculated using data from DataStream
Idiosyncratic risk	IDR	Firm-level	The idiosyncratic risks are calculated as the standard error of the market model regression of daily stock returns over the period from day -260 to day -62 for each anti-corruption index firm	Calculated using data from DataStream
Total risk	STD_R	Firm-level	STD_R is the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for total risk.	Calculated using data from DataStream
systematic risk (beta)	BETA_R	Firm-level	BETA_R is the ratio of beta of daily market returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for systematic risk.	Calculated using data from DataStream
The ratio of Amihud's (2002) illiquidity measure	RIL	Firm-level	The ratio of Amihud's (2002) illiquidity measure one-year post-disclosure to one-year pre-disclosure of anti-corruption index.	Calculated using DataStream
Institutional Quality	INQ	Economic/Institutional level	A composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL).	Calculated with Institutional Quality Indices derived from www.govindicators.org and http://www.transparency.org/cpi2011/results/
Firm size	SIZ	Firm-level	Firm size measured as total assets	Osiris Bureau van Dijk and Mint Global
Firm age	AGE	Firm-level	The age of the firm calculates its incorporation year to 2012	Osiris Bureau van Dijk and Mint Global

Profitability	ROA	Firm-level	Companies' profitability calculated as return on assets	Osiris Bureau van Dijk and Mint Global
Exporting Companies	EXP	Firm-level	An indicator variable that equals to 1 if a firm belongs to one of the major arms exporting nations: USA, Russia, France, Germany, the UK, and China, and 0 otherwise	http://government.defenceindex.org/sites/default/files/documents/GI-exec-summary-english.pdf
Disclosing Companies	DIS	Firm-Level	An indicator variable that equals to 1 if a firm is disclosing additional internal anti-corruption information for public and 0 otherwise.	http://government.defenceindex.org/sites/default/files/documents/GI-exec-summary-english.pdf
Managerial share ownership	MSO	Firm-level	The proportion of shareholding held by accompanying management	Osiris Bureau van Dijk
Idiosyncratic risk	IDR	Firm-level	IDR is the idiosyncratic risk measured as the standard error of the market model regression of daily stock returns over the period from day -260 to day – 61 for each anti-corruption disclosing firm.	Calculated using data from DataStream
Companies in developed countries	DEV	Firm-level	DEV is an indicator variable that equals to 1 if a firm belongs to a developed country and 0 otherwise.	Based on World Bank Classification
Companies in the US	USD	Firm-level	USD is an indicator variable that equals to 1 if a firm from the US and 0 otherwise.	Classified using data from DataStream
Corwin and Schultz High Low price spread	HLS	Firm-level	The ratio of high and low price spread for a year post to the year prior to the anti-corruption index announcement date.	Calculated using data from DataStream
CPI	CPI	Economic /Institutional level	Corruption Perceptions Index (CPI), which ranks countries/territories based on how corrupt their public sector is perceived to be. A country/territory's score indicates the perceived level of public sector corruption on a scale of 0 - 10, where 0 means that a country is perceived as highly corrupt and 10 means that a country is perceived as very clean.	http://www.transparency.org/cpi2011/results/
Voice and Accountability	VAC	Economic/Institutional level	One of the dimensions of the Worldwide Governance Indicators (WGI). The WGI cover over 200 countries and territories, measuring six dimensions of governance. The Voice and accountability Index reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. The estimate of governance ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance.	www.govindicators.org

Political Stability	POS	Economic/Institutional level	The political Stability index reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. The estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	www.govindicators.org
Government Effectiveness	GVE	Economic/Institutional level	Government Effectiveness reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation. The estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong)	www.govindicators.org
Regulatory Quality	REQ	Economic/Institutional level	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong)	www.govindicators.org
Rule of Law	RUL	Economic/Institutional level	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong)	www.govindicators.org

Appendix C: Average transparency anti-corruption scores (ACI) by firm-level obtained from Transparency International UK website

Band	Upper Score %	Lower Scores %	Average Scores %
A	100	83.3	91.65
B	83.2	66.7	74.95
C	66.6	50.0	58.30
D	49.9	33.3	41.60
E	33.2	16.7	24.95
F	16.6	0.0	8.30

Figure 1. Stock Price Reaction to Finmeccanica's CEO's arrest on February 12, 2013

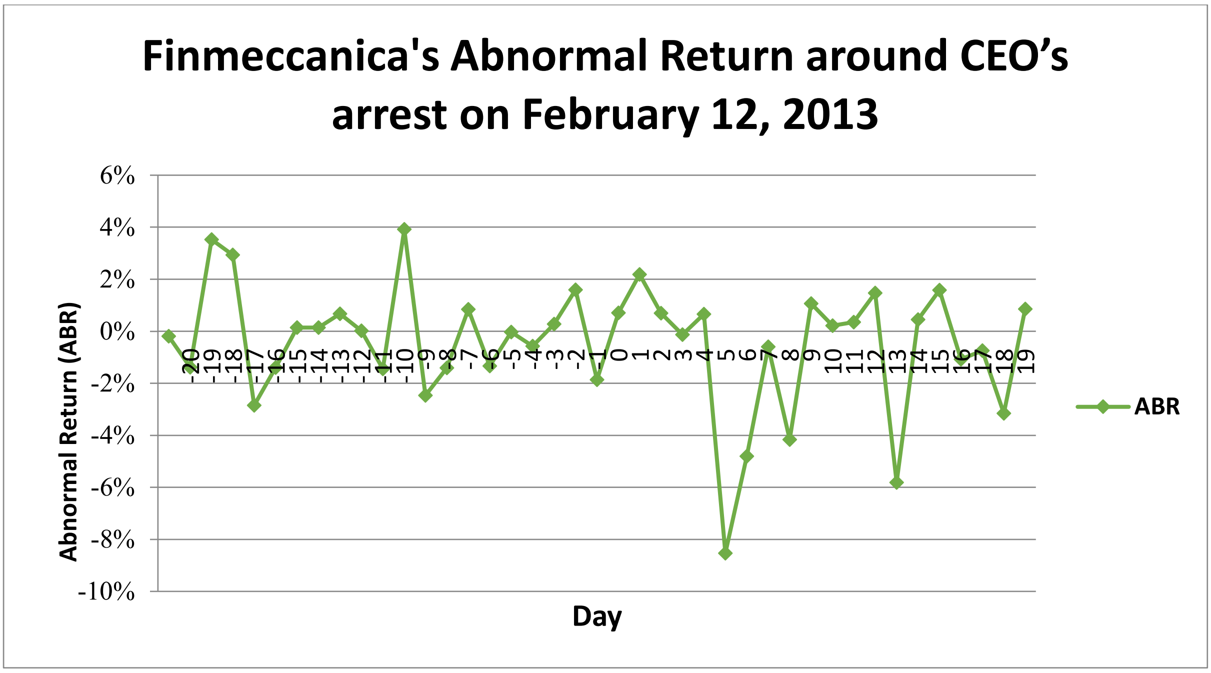

Figure 2. Anti-corruption Index and volatility

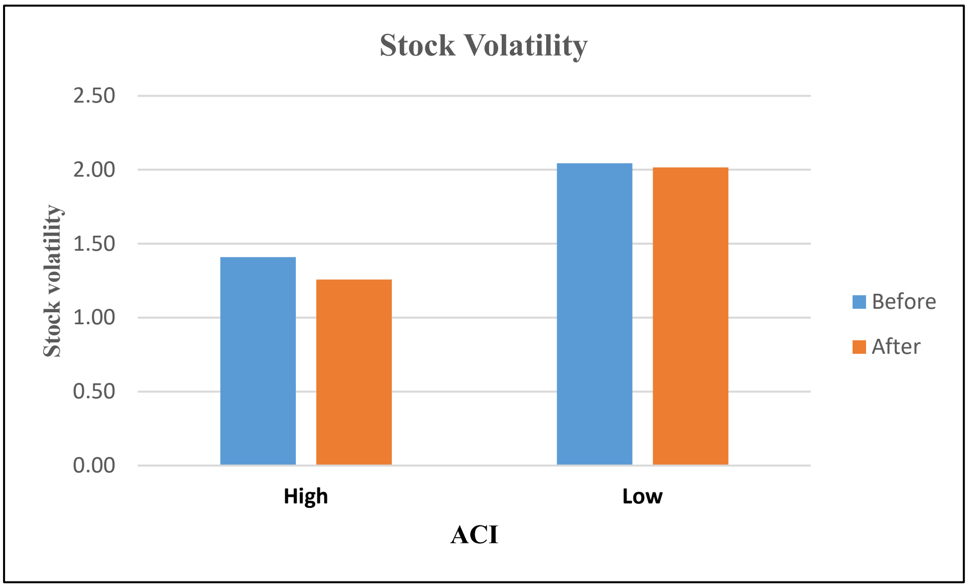

Figure 3. Anti-corruption Index and Illiquidity

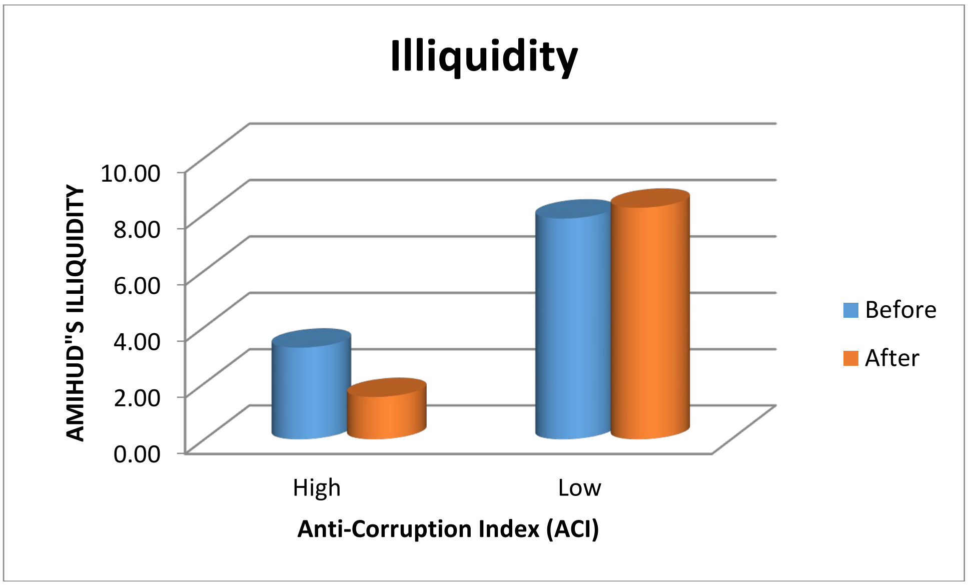

Table 1. Descriptive statistics

	ALL		ACI				MW test
			Low		High		
	Mean	Median	Mean	Median	Mean	Median	
Panel A:Economic and Institutional Factors							
CPI	6.84	7.10	6.45	7.10	7.29	7.10	2.21**
VAC	1.09	1.13	1.01	1.13	1.18	1.13	3.16***
POS	0.61	0.54	0.66	0.54	0.57	0.54	1.86*
GVE	1.29	1.41	1.17	1.36	1.43	1.41	4.37***
REQ	1.27	1.49	1.09	1.11	1.47	1.49	4.28***
RUL	1.38	1.59	1.21	1.39	1.58	1.59	4.45***
INQ	0.16	0.48	-0.15	0.28	0.51	0.48	4.48***
Panel B: Firm-Level factors							
Firm-level variables							
ACI	44.92	41.60	28.93	33.28	63.30	58.30	8.23***
ABR	0.41	0.47	0.82	0.71	-0.06	0.14	0.95
SIZ	6.90	6.77	6.81	6.62	7.01	6.97	2.13**
ROA	7.19	6.83	6.44	4.97	8.05	8.54	2.17**
AGE	50.30	42.00	49.23	42.00	51.52	41.18	0.12
MSO	27.59	15.68	32.74	26.38	21.66	11.48	1.89*
RIL	1.00	0.90	1.07	0.94	0.92	0.88	0.98
STD_R	0.88	0.86	0.94	0.90	0.82	0.82	2.46**

This table presents descriptive statistics by economic and institutional level factors (Panel A) and for firm-level factors (panel B) for total sample of 106 unique defence companies from 25 countries and split by anti-corruption risk index classification as reported by Transparency International (TI) comprising categories of either Low anti-corruption risk index score (less than 50% median score) or High anti-corruption risk index (median score of 50% or more).. GDP is the logarithm of gross domestic product dollar estimates derived from purchasing power parity (PPP) calculations, per capita. IND is individualism. PWD is power distance. INQ is a composite index derived from factor analysis of Institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). ACI is the average transparency anti-corruption scores (ACI) by firm-level obtained from Transparency International UK website. ABR defined as the 4-day abnormal returns from the day before the announcement to the 2 day after announcement date of anti-corruption disclosure. SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. MSO is managerial ownership as proportion of shares own by company directors. RIL is the ratio of Amihud's (2002) illiquidity measure one-year post-disclosure to one year prior to disclosure of the anti-corruption index. STD_R is the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for total risk. All variables are defined in Appendix B. The reported values are means and medians of the respective variables with Mann Whitney (MW) test statistics indicating where there are significant differences in the rank sums between groups at either the 1%, 5% or 10% level of significance; ***, ** and * respectively.

Table 2. Correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	ACI	1.00													
2	ABR	-0.26**	1.00												
3	STD_R	-0.34***	0.07	1.00											
4	RIL	-0.17	-0.13	0.12	1.00										
5	SIZ	0.36***	0.09	0.06	0.34***	1.00									
6	ROA	0.06	-0.11	-0.27**	-0.29***	-0.29***	1.00								
7	AGE	0.18	0.27***	0.06	0.02	0.10	0.27***	1.00							
8	DIS	0.49***	-0.07	0.02	0.00	0.22**	0.05	0.11	1.00						
9	EXP	0.32***	-0.20*	-0.44***	-0.25**	0.19**	0.05	0.05	0.17*	1.00					
10	MSO	0.01	0.15	-0.04	-0.16	0.07	-0.02	0.03	0.05	0.08	1.00				
11	IDR	-0.15	0.06	-0.19*	-0.32***	-0.43***	0.35***	-0.17	-0.15	-0.02	0.19*	1.00			
12	INQ	0.51***	-0.16	-0.38***	-0.18	0.17*	0.14	0.23**	0.29***	0.42***	-0.12	-0.09	1.00		
13	DEV	0.59***	-0.14	-0.33***	-0.14	0.18*	0.05	0.24***	0.24***	0.41***	-0.13	-0.08	0.84***	1.00	
14	USD	0.42***	-0.42***	-0.25**	-0.07	0.01	0.12	-0.01	0.10	0.48***	-0.25***	0.03	0.38***	0.43***	1.00

This table provides the results of correlations. ACI is the average transparency anti-corruption score obtained from Transparency International UK website. ABR is the 4-day abnormal returns from the day before the announcement to the 2 day after announcement date of anti-corruption disclosure. STD_R is the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for total risk. RIL is the ratio of Amihud's (2002) illiquidity for a year post to the year prior to anti-corruption index announcement date. SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. DIS is an indicator variable which takes 1 if a firm disclosing anti-corruption information publicly and 0 otherwise. EXP is an indicator variable which takes 1 if a firm belongs to one of the major exporting nations and 0 otherwise. MSO is managerial ownership as proportion of shares own by company directors. IDR is the idiosyncratic risk measured as standard error of the market model regression of daily stock returns over the period from day -260 to day – 61 for each anti-corruption disclosing firm. INQ is a composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). DEV is an indicator variable that equals to 1 if a firm belongs to a developed country and 0 otherwise. USD is an indicator variable that equals to 1 if a firm from the US and 0 otherwise. . *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 3. Price reaction to defence companies' anti-corruption risk index announcement

			Developed vs developing		US vs non-US		Institutional quality	
		ALL	Developed	Developing	US	Non-US	High	Low
ABR	Mean%	0.39	0.19	1.31	-1.01	1.53	-0.38	1.80
	Median%	0.47	0.14	0.64	-0.33	1.05	-0.03	1.38
	SRT	(1.59)	(0.42)	(2.89)***	-4.60***	6.29***	-2.84***	6.53***
N		86	70	16	38	48	55	31

This table reports mean and median abnormal returns for sample companies employing the market model for defence companies anti-corruption index announcements date (MM) for the period 2012. ABR is one day before the announcement date to two days after the announcement day (-1 MM + 2). The results are also partitioned based on developed versus and developing country, companies in US and median institutional quality scores. Significance levels of mean abnormal returns are reported using the standardised residual t-tests SRT with *, ** and *** indicating statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4. Abnormal returns and anti-corruption risk index

Model	1	2	3	4
Constant	-0.0947 (-2.21)**	-0.0882 (-2.00)**	-0.0275 (-0.78)	-0.0716 (-1.67)*
ACI	-0.0004 (-2.01)**	-0.0011 (-1.34)	-0.0002 (-1.09)	-0.0005 (-2.00)**
SIZ	0.0110 (2.11)**	0.0115 (2.16)**	0.0027 (0.63)	0.0093 (1.81)*
ROA	0.0006 (0.75)	0.0007 (0.80)	0.0003 (0.39)	0.0006 (0.78)
AGE	0.0110 (2.54)**	0.0116 (2.43)**	0.0077 (2.24)**	0.0082 (1.90)*
DIS	0.0042 (0.46)	0.0046 (0.50)	-0.0002 (-0.03)	0.0062 (0.71)
EXP	-0.0086 (-0.93)	-0.0092 (-0.95)	-0.0019 (-0.25)	-0.0105 (-1.14)
MSO	0.0001 (0.76)	0.0001 (0.72)	0.0000 (-0.11)	0.0000 (-0.21)
IDR	0.2396 (0.68)	0.2646 (0.75)	0.2342 (0.87)	0.4183 (1.23)
DEV		-0.0181 (-0.82)		
ACI*DEV		0.0007 (0.88)		
USD			-0.0212 (-0.96)	
ACI*USD			0.0000 (0.12)	
INQ				-0.0094 (-0.95)
ACI*INQ				0.0001 (0.35)
F-statistic	2.24	1.85	2.43	2.01
N	86	86	86	86
Adjusted R^2	0.1048	0.0912	0.1444	0.1066

This table reports multivariate regression results. The dependent variable is ABR defined as the 4-day abnormal returns from the day before the announcement to the 2 day after announcement date of anti-corruption disclosure. The independent variables are defined as follows. ACI is the average transparency anti-corruption score obtained from Transparency International UK website. SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. DIS is an indicator variable which takes 1 if a firm disclosing anti-corruption information publicly and 0 otherwise. EXP is an indicator variable which takes 1 if a firm belongs to one of the major exporting nations and 0 otherwise. MSO is managerial ownership as proportion of shares own by company directors. IDR is the idiosyncratic risk measured as standard error of the market model regression of daily stock returns over the period from day -260 to day – 61 for each anti-corruption disclosing firm. DEV is an indicator variable that equals to 1 if a firm belongs to a developed country and 0 otherwise. ACI*DEV is an interaction variable between ACI and DEV. USD is an indicator variable that equals to 1 if a firm from the US and 0 otherwise. ACI*USD is an interaction variable between ACI and USD. INQ is a composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). ACI*INQ is an interaction variable between ACI and INQ. Definitions of all variables are provided in Appendix B. Reported beneath each coefficient estimate (in parenthesis) are the t-statistics using White heteroskedasticity-consistent standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively

Table 5. Determinants of changes in stock volatility a year after the announcement of anti-corruption risk index

Model	1	2	3	4
Dependent variable	STD_R		BETA_R	
Constant	1.1195 (5.66) ***	1.2315 (7.38) ***	3.2097 (4.27)***	2.9124 (3.29)***
ACI	-0.0031 (-2.76) ***	-0.0094 (-2.45) **	-0.0269 (-2.99)***	-0.0299 (-3.26)***
Size	0.0118 (0.49)	0.0125 (0.62)	-0.2619 (-2.52)***	-0.2263 (-1.80)*
ROA	-0.0044 (-1.11)	-0.0041 (-1.82) *	0.0444 (4.43)***	0.0423 (3.82)***
AGE	-0.0068 (-0.31)	-0.0038 (-0.20)	-0.1471 (-2.53)**	-0.1228 (-2.17)**
DIS	0.0704 (1.60)	0.0732 (2.03) *	-0.2467 (-2.20)**	-0.2238 (-1.84)*
EXP	-0.1688 (-3.58) ***	-0.1700 (-2.18) **	-0.2434 (-1.45)	-0.3376 (-1.80)*
MSO	-0.0012 (-1.71) *	-0.0012 (-1.42)	0.0029 (1.45)	0.0040 (1.68)
DEV		-0.181 (-1.53	0.0655 (0.25)	-0.0478 (-0.17)
ACI*DEV		0.0072 (1.88) *	0.0273 (3.06)***	0.0306 (3.24)***
USD				0.5103 (1.43)
ACI*USD				-0.0050 (-0.98)
INQ			-0.2363 (-2.09)**	-0.2589 (-2.29)**
F-statistic	4.87	3.82	16.35	4.12
N	82	82	71	71
R-squared	0.3156	0.3449	0.4386	0.4599

This table reports multivariate regression results. The dependent variables are STD_R and BETA_R. STD_R is the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for total risk. BETA_R is the ratio of BETA one-year post-disclosure to one-year pre-disclosure of anti-corruption index. The independent variables are defined as follows. ACI is the average transparency anti-corruption score obtained from Transparency International UK website. SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. DIS is an indicator variable which takes 1 if a firm disclosing anti-corruption information publicly and 0 otherwise. EXP is an indicator variable which takes 1 if a firm belongs to one of the major exporting nations and 0 otherwise. MSO is managerial ownership as proportion of shares own by company directors. DEV is an indicator variable that equals to 1 if a firm belongs to a developed country and 0 otherwise. ACI*DEV is an interaction variable between ACI and DEV. USD is an indicator variable that equals to 1 if a firm from the US and 0 otherwise. ACI*USD is an interaction variable between ACI and USD. INQ is a composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). Definitions of all variables are provided in Appendix B. Reported beneath each coefficient estimate (in parenthesis) are the t-statistics using White heteroskedasticity-consistent standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6. Stock market liquidity changes and anti-corruption risk index

			ALL	ACI		MW test
				Low	High	
ILI	Pre 1 year	Mean Median	4.89 0.45	7.07 0.70	2.91 0.37	0.98
	Post 1 year	Mean Median	4.30 0.54	7.43 0.79	1.46 0.38	1.09
WSR test Pre. Vs. post 1 year			2.60***	1.18	2.51**	
ILI	Pre half a year	Mean Median	4.38 0.49	5.52 0.69	3.35 0.41	0.86
	Post half a year	Mean Median	5.01 0.52	9.00 0.75	1.39 0.38	1.08
WSR test Pre. Vs. post 1 year			2.47**	1.67*	2.30**	
N			84	40	44	

This table reports means and medians of defence companies categorised by anti-corruption risk index classification as reported by Transparency International (TI) as either Low anti-corruption risk band D or E or F or high anti-corruption band A or B or C. The high and low ACI is calculated based on median ACI scores. This table presents non-parametric Mann Whitney (MW) test statistics for the difference in median liquidity across the two different groups. ILI is defined as Amihud's (2002) illiquidity. This table also provides non-parametric Wilcoxon Signed Ranked (WSR) test for the difference in median liquidity between pre and post-anti-corruption announcements.

Table 7. Determinants of changes in stock liquidity a year after the announcement of anti-corruption risk index

Model	1	2	3	4
Dependent variable	RIL		HLS	
Constant	0.8829 (1.36)	1.6657 (2.09)**	0.0536 (0.05)	-0.0208 (-0.02)
ACI	-0.0037 (-1.80)*	-0.0181 (-2.03)**	-0.0126 (-1.95)*	-0.0057 (-2.12)**
SIZ	-0.0106 (-0.13)	-0.0289 (-0.28)	0.1992 (1.42)	0.2060 (1.40)
ROA	0.0067 (0.66)	0.0000 (0.00)	-0.0039 (-0.48)	-0.0036 (-0.40)
AGE	0.0495 (1.58)	0.0390 (1.41)	0.0019 (0.07)	0.0164 (0.40)
DIS	-0.0136 (-0.16)	-0.0317 (-0.32)	-0.0852 (-0.94)	-0.1168 (-1.14)
EXP	-0.0192 (-0.14)	-0.0762 (-0.46)	-0.1753 (-1.43)	-0.1641 (-1.30)
MSO	-0.0013 (-1.06)	-0.0011 (-0.58)	-0.0023 (-1.40)	-0.0023 (-1.44)
DEV	0.2092 (1.62)	-0.5650 (-1.92)*	0.1085 (0.53)	
ACI*DEV		0.0184 (2.15)**	0.0067 (0.95)	
INQ	-0.3448 (-4.69)***			0.0154 (0.21)
ACI*INQ	0.0061 (3.37)***			0.0021 (0.98)
F-statistic	17.25	1.84	7.36	1.85
N	85	85	85	85
R-squared	0.1795	0.1526	0.3235	0.3125

This table reports multivariate regression results. The dependent variables are RIL and HLS. RIL is the ratio of Amihud's (2002) illiquidity measure one-year post-disclosure to one year prior to disclosure of the anti-corruption index. HLS is the ratio of high and low price spread one-year post-disclosure to one-year after announcement date of anti-corruption index. The independent variables are defined as follows. The independent variables are defined as follows. ACI is the average transparency anti-corruption score obtained from Transparency International UK website. SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. DIS is an indicator variable which takes 1 if a firm disclosing anti-corruption information publicly and 0 otherwise. EXP is an indicator variable which takes 1 if a firm belongs to one of the major exporting nations and 0 otherwise. MSO is managerial ownership as proportion of shares own by company directors. DEV is an indicator variable that equals to 1 if a firm belongs to a developed country and 0 otherwise. ACI*DEV is an interaction variable between ACI and DEV. INQ is a composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). ACI*INQ is an interaction variable between ACI and INQ. ACD*INQ is an interaction variable between ACD and INQ. Definitions of all variables are provided in Appendix B. Reported beneath each coefficient estimate (in parenthesis) are the t-statistics using White heteroskedasticity-consistent standard errors. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 8: Corruption risk and capital market effect: 2SLS with Instrumental Variables (IVs)

	First-stage	Second-stage		
Model	**1**	**2**	**3**	**4**
Dependent variables	**ACI**	**ABR**	**STD_R**	**HLS**
Constant	-34.5013 (-1.82)*	-0.0502 (-1.26)	1.3628 (6.17)***	0.0685 (0.08)
Regional ACI average excluding focal firm	0.6753 (2.25)*			
Country ACI average excluding focal firm	0.4060 (1.68)*			
ACI_Instrumented	4.8231 (2.23)*	-0.0008 (-2.69)***	-0.0062 (-2.60)***	-0.0096 (-2.23)**
SIZ	4.8231 (2.23)*	0.0090 (1.49)	-0.0033 (-0.14)	0.2172 (1.86)*
ROA	-0.5200 (-1.82)*	0.0005 (0.56)	-0.0007 (-0.15)	-0.0043 (-0.78)
AGE	-0.4336 (-0.24)	0.0070 (1.88)*	-0.0071 (-0.31)	0.0085 (0.20)
DIS	13.8452 (3.89)***	0.0096 (1.15)	0.1055 (2.18)**	-0.0516 (-0.58)
EXP	-2.7970 (-0.75)	-0.0102 (-1.57)	-0.1383 (-2.54)**	-0.1516 (-1.52)
MSO	-0.0778 (-1.52)	0.0000 (-0.36)	-0.0014 (-1.86)*	-0.0026 (-2.11)**
IDR	104.3835 (0.95)	0.3966 (1.14)	-2.9349 (-1.52)	2.1481 (0.67)
INQ	0.7832 (0.48)	-0.0003 (-0.09)	-0.0040 (-0.09)	0.1279 (1.80)*
Observations	85	85	82	85
R-squared	0.6045	0.1893	0.2677	0.2843
F-statistics	20.74	3.29	4.51	1.78
Instrument diagnostics tests:				
Kleibergen-Paap Wald rk F statistic		36.099	20.183	26.215
Kleibergen-Paap rk LM statistic		21.258***	10.842***	9.575***
Hansen J statistic (over identification test of all instruments):		0.198 (pv=0.6560)	0.129 (pv=0.7198)	0.264 (pv=0.6075)

This table provides the results of two-stage least squared regression using an instrumental variable approach. The dependent variable in the first stage (model 1) is ACI, which is the average transparency anti-corruption score obtained from Transparency International UK website. Country and regional ACI average excluding focal firm is the instrumental variable. The dependent variables in the second stages (model 2, 3 and 4) are the ABR, STD_R and HLS respectively. ABR is the 4-day abnormal returns from the day before the announcement to the 2 day after announcement date of anti-corruption disclosure. STD_R is the ratio of standard deviation of daily returns one-year post-disclosure to one-year pre-disclosure of anti-corruption index as a proxy for total risk. HLS is the ratio of high and low price spread one-year post-disclosure to one-year after announcement date of anti-corruption index. Control variables: SIZ is size of firm measured as logarithm of total assets. ROA is profitability of firm calculated as returns on total assets. AGE is age of firm measured as from its incorporation. DIS is an indicator variable which takes 1 if a firm disclosing anti-corruption information publicly and 0 otherwise. EXP is an indicator variable which takes 1 if a firm belongs to one of the major exporting nations and 0 otherwise. MSO is managerial ownership as proportion of shares owned by company directors. IDR is the idiosyncratic risk measured as standard error of the market model regression of daily stock returns over the period from day -260 to day – 61 for each anti-corruption disclosing firm. INQ is a composite index derived from factor analysis of institutional quality variables comprising Corruption perception index (CPI), Voice and Accountability Index (VAC), Political Stability Index (POS), Government Effectiveness Index (GVE), Regulatory Quality Index (REQ) and Rule of Law index (RUL). *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.