The Economic Role of Investor Relations in Different Legal and Financial Systems: Empirical Evidence from Germany and the UK

by

Dmitry Bazhutov, M.Sc.

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Dean: Prof. Dr. Nils Crasselt
Faculty 3 - Department of Economics, Schumpeter School of Business and Economics

1. Examiner
Prof. Dr. André Betzer
Chair of Finance and Corporate Governance, Schumpeter School of Business and Economics at the Bergische Universität Wuppertal

2. Examiner
Prof. Dr. Nils Crasselt
Chair of Managerial Accounting and Control, Schumpeter School of Business and Economics at the Bergische Universität Wuppertal

For my mother

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Contents

List of Abbreviations

2SLS	two-stage least squares
3SLS	three-stage least squares
AMEX	American Stock Exchange
AR	abnormal return
CapEx	capital expenditures
CAR	cumulative abnormal return
CEO	chief executive officer
CFO	chief financial officer
CG	corporate governance
CV	curriculum vitae
DAX	Deutscher Aktienindex
EPS	earnings per share
FCF	free cash flow
FE	fixed effects
FTSE	Financial Times Stock Exchange
IA	intangible assets
ICB	Industrial Classification Benchmark
IPO	initial public offering
IR	investor relations
IV	instrumental variables
M&A	merger and acquisition
NASDAQ	National Association of Securities Dealers Automated Quotation
NIRI	National Investor Relations Institute
NYSE	New York Stock Exchange
OLS	ordinary least squares
R&D	research and development
ROE	return on equity
SEO	seasoned equity offering
UK	United Kingdom
US	United States

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1 Introduction

1.1 Motivation and contribution

Public firms are today faced with high information demands from investors who want to better understand a company's business and assess its future perspectives. Consequently, firms' investor relations (IR) efforts, which aim to ensure appropriate corporate communication and interaction with financial markets, have received great attention from practitioners and scholars. An ongoing debate on the characteristics of successful IR activities has also appeared in the press. Articles on topics such as "*How to best communicate with shareholders*" (Forbes, 05/03/2016)[1] and "*Strategy talk key to investor relations*" (Financial Times, 02/27/2011)[2] emphasize the actual relevance of the IR function for all involved parties.

From a scientific point of view, IR primarily contributes to the alleviation of information asymmetries between firms and investors.[3] However, recent surveys among IR professionals indicate that the tasks of these professionals are not only restricted to information provision but also cover stock marketing duties as well as strategic assignments.[4] In summary, the "*role and responsibilities of the Investor Relations Officer (IRO) have changed dramatically over the last 15 years"* (Bloomberg 09/28/2015).[5] As such, a deep analysis of this crucial corporate function, which should ultimately facilitate a firm's financing on capital markets, appears to be necessary.

Furthermore, La Porta et al. (2000) as well as Leuz and Verrecchia (2000) suggest that the base level of investor protection and consequently the richness of the information environment typically differ across countries due to divergences in their legal and financial systems.[6] The magnitude of the IR function's economic relevance may therefore also be subject to deviation related to firms' origins, as Karolyi and Liao (2017) indicate with regard to firms' global IR activities.[7] However, to the best of this author's knowledge, no extensive research on this issue has been conducted to date. In this light, deeper empirical insights on the relevance of IR in different legal and market environments could help firms to structure corresponding activities in a more efficient and cost-saving way.

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[1] Forbes (05/03/2016): https://www.forbes.com/sites/robinferracone/2016/05/03/how-to-best-communicate-with-shareholders/#4df59b865c19.
[2] Financial Times (02/27/2011): https://www.ft.com/content/26c0a0e8-4112-11e0-bf62-00144feabdc0.
[3] cf. Kirk and Vincent (2014), p. 1438.
[4] cf. IR Magazine (02/22/2016): https://www.irmagazine.com/articles/people-careers/21276/five-functions-investor-relations/.
[5] Bloomberg (09/28/2015): https://www.bloomberg.com/professional/blog/the-changing-face-of-investor-relations/.
[6] cf. La Porta et al. (2000), p. 3; Leuz and Verrecchia (2000), p. 91.
[7] cf. Karolyi and Liao (2017), p. 28.

Recent empirical studies such as Kirk and Vincent (2014), Agarwal et al. (2015), Karolyi and Liao (2017) investigate the relation between IR and several corporate characteristics and outcomes. However, most of the previous studies do not consider the IR contribution over longer periods of time, which could actually make it possible to evaluate the economic effects of improvements or downturns in already established IR activities as well as to further address the endogeneity concerns that plague research on IR.[8]

To obtain a better understanding of the IR function and its facets, interviews with IR practitioners from German DAX 30 companies were conducted in the run-up to the present thesis.[9] These dialogues revealed that communication with investors is particularly important in relation to specific value-relevant corporate events, which could feature a high level of information asymmetry between firms and investors. Such events typically comprise merger and acquisition (M&A) activities or capital measures. The importance of information disclosure in M&As and seasoned equity offerings (SEOs) has been also emphasized in several previous studies,[10] although no empirical evidence exists concerning whether the quality of IR actually affects firm performance during these major corporate events.

In conclusion, it can be stated that while some research on IR has been conducted in the past, the above-outlined outstanding issues still have to be addressed to obtain a comprehensive overview of this versatile corporate function. However, the major challenge that appears in relation to IR analysis is finding an appropriate measure to determine its quality. In this context, communication with IR practitioners additionally revealed the existence of external measures that firms also intensively use to evaluate the quality of their interactions with market participants; these measures include IR rankings and awards that are based on the perceptions of analysts and investors and are granted by specialized survey providers. Similar proxies are also applied by the authors of some previous empirical studies, including Botosan and Plumlee (2002) and Bushee and Noe (2000) in relation to the US market. The present thesis follows this suggestion.

In general, the aim of this thesis is to empirically assess the economic relevance of IR quality in listed companies that are subject to different legal and financial systems. This study relies on a proprietary panel data that covers over 2700 yearly IR rankings from 2006 to 2014 for German and UK firms, which according to La Porta et al. (2000) are faced with divergent legal and financial frameworks (civil law and bank-based system vs. common law and market-based

[8] cf. Healey and Palepu (2001), p. 407.
[9] Due to confidentiality agreements, the dialogue partners are not mentioned by name.
[10] See Healey and Palepu (2001), pp. 420–421, for a summary.

system).[11] As such, the empirical analysis of the sample should make it possible to appropriately address the specified research objective, while extensively controlling for endogeneity concerns using fixed effects (FE) and instrumental variables (IV) approaches. An analysis is first conducted with regard to firm performance, stock liquidity, stock volatility, capital costs, and analysts' forecast characteristics. The impact of IR quality on M&A and SEO performance in both countries is also investigated, which addresses the lack of empirical evidence on IR effects in relation to such events. In summary, the present thesis offers new and fundamental insights into the value of corporate communication with financial markets providing contribution to the existing scientific literature on IR. An outline of the remainder of this thesis is presented in the following section.

1.2 Outline

The rest of the present thesis is structured as follows. The essential characteristics of IR are discussed in chapter 2, which starts by introducing the theoretical framework of the agency relation between a firm's managers and shareholders and elaborating the underlying issue of the information asymmetry between these parties. This section also deals with divergences in the information levels among investors themselves as well as the corresponding consequences concerning firm outcomes. The contribution of IR to the alleviation of each of the aforementioned issues, particularly through disclosure activities, is discussed accordingly. To complement the previous elaborations, the overall structure of IR departments and their relations to firms' C-suites are further characterized. Chapter 2.2 deals primarily with IR's stock marketing function and contribution to firm visibility. In this context, the role of IR in building sustainable relations with investors and compiling a desired shareholder base is highlighted. This chapter ends by examining the impact of the aforementioned IR activities on the outcomes of major corporate events, which typically feature intensive communication with investors. The third section of chapter 2 identifies the differences in IR relevance expected in countries with common and civil law origins, which are characterized by divergences in the base levels of investor protection and disclosure. Subchapter 2.3.1 begins with an introduction to the main characteristics of both legal environments and goes on with their projection on German and UK

[11] cf. La Porta et al. (2000), pp. 8, 17.

markets. In subchapter 2.3.2, firms' financing and ownership characteristics in market- and bank-based system are discussed and the link to the IR function is established. The general implications of previous elaborations on the present empirical study are derived at the end of this section.

Chapter 3.1 provides a review of existing empirical literature on the economic relevance of firms' IR activities. This section further discusses potential concerns regarding the data or methodological framework of respective studies, which in turn should be appropriately addressed in the scope of the present thesis. In addition, chapter 3.2 focuses on the endogeneity issue that is applicable to empirical investigations of the link between IR and corporate outcomes. In addition to an elaboration of potential sources of endogeneity (such as omitted variables, reverse causality, and measurement errors), this section introduces possible methodological solutions for this issue that are consequently applied within the present empirical analysis.

In chapter 4, testable hypotheses for the empirical investigation are developed based on insights gained in previous sections. This chapter is divided into four parts that deal separately with the expected impact of IR on firms' overall market performance, different value-generating channels, and corporate performance in the scope of M&A and SEO activities. The hypotheses for the German and UK samples are formulated separately and also cover predictions regarding the differences between the countries. After the respective hypotheses are introduced, the following sections each describe in detail the calculations of variables of interest and data collection processes. The same information is subsequently provided for the control variables used in the empirical analysis. The expectations regarding the correlations between these control measures, IR quality and corporate outcome variables introduced in this section complement the hypotheses on the main relations of interest. Chapters 4.2 to 4.4 then discuss the examined variables' descriptive statistics.

Chapter 5 introduces the regression analysis and event study approach methodologies that are used to investigate the hypotheses derived in chapter 4. In particular, section 5.1 describes the ordinary least squares (OLS) estimation procedure, the logistic regression, and the FE approach. The IV approach is discussed in chapter 5.2, which also elaborates on the two sets of instruments used in this thesis. The first set is derived from the study of Karolyi and Liao (2017) and relies on firms' IR resources. The second set of instruments, which is also in line with these authors' study, is based on measures related to geographical proximity to investors. The essential test procedures that should make it possible to assess the validity of the applied instruments are

presented at the end of this section. Finally, Chapter 5.3 deals with the event study methodology used to calculate the value effects attributed to M&A and SEO announcements.

The empirical findings of this thesis are reported and discussed in chapters 6 and 7. Chapter 6 presents the results related to firm performance, the cost of capital, stock liquidity, stock volatility, and analysts' forecasts characteristics. The results concerning the performance contribution of IR in the case of major corporate events are provided in chapter 7. The hypotheses from chapter 4 are evaluated at the end of each section, respectively. Chapter 8 provides evidence on the validity of IR rankings as a measure of IR quality.

A summary of the insights gained through the present thesis, a conclusion, and implications for future research are presented in chapter 9.

2 Fundamentals of IR activities

2.1 Information asymmetry reduction

In line with prevalent views on IR's function, one of its main contributions to firm performance (i.e., to market valuation) is the resolution of information asymmetries between a company and the financial community that is typically accompanied by a reduction in a firm's costs of capital.[12] As such, disclosure activities in the scope of the IR function can be seen as a valid corporate governance (CG) instrument.[13] No uniform definition of the CG concept itself is provided in the scientific literature. However, Tirole (2001) emphasizes that two broad views on CG, which are prevalent for either Anglo-Saxon countries (e.g., the UK) or continental European countries (e.g., Germany), can generally be distinguished.[14] The Anglo-Saxon view is based on the shareholder value concept and can be appropriately described using the definition provided by Shleifer and Vishny (1997), who interpret CG as "the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment."[15] In the context of the continental European view on CG, the target group whose interests should be promoted is expanded to all firm's stakeholders.[16] Because the interviews with IR professionals conducted as part of the current study and prior empirical research both indicate that IR activities are primarily geared toward a company's existing or potential shareholders,[17] this thesis focuses on this stakeholder group when further elaborating on IR as a CG instrument.

The general CG concept is closely linked to the theoretical framework of the agency problem that arises in companies due to the separation of ownership and control.[18] According to Jensen and Meckling (1976), an agency relationship occurs if a person (or group) conducts tasks on behalf of another individual(s) based on a contractual relation.[19] If this pattern is applied to a firm, stockholders as principals delegate the authority to run a company's business to managers, who represent the agents in such a relationship. The delegation of control rights to managers takes place, because the firm's owners need the agents' human capital (e.g., their expertise, networks,

[12] cf. Agarwal et al. (2015), p. 5.
[13] cf. Chang et al. (2014), p. 389.
[14] cf. on this and the following Tirole (2001), pp. 2–4.
[15] Shleifer and Vishny (1997), p. 737.
[16] cf. Tirole (2001), pp. 3–4.
[17] cf. Brennan and Tamarowski (2000), pp. 26–27; Bushee and Miller (2012), p. 873.
[18] cf. Shleifer and Vishny (1997), p. 738.
[19] cf. on this and the following Jensen und Meckling (1976), pp. 308–309.

and time) to receive an income from their investment.[20] However, an issue may arise if managers as utility-maximizing individuals, who are pursuing their own interests, do not fully act on behalf of shareholders.[21] The agent objectives that diverge from owner objectives may include consuming perquisites (for instance, by spending corporate funds on luxury means of transport) or building empires and enhancing one's own prestige (e.g., by acquiring firms that enlarge the company run by the manager but do not necessarily generate positive returns).[22] Managers may also be interested in reducing the work effort, safeguarding their jobs by investing in even unprofitable projects for which their specific know-how is required, or preventing corporate takeovers that in some cases may benefit stockholders. The conflicting incentives between managers and shareholders are particularly problematic because the information available to both parties naturally diverges: shareholders are not fully informed about the aims (i.e., hidden intentions) or activities (i.e., hidden actions) of managers that allow agents to follow their own goals.[23] Such information asymmetry combined with misaligned incentives of managers can ultimately result in owners' wealth reduction causing so-called agency costs, which also cover expenditures made by the principal or agent to overcome the aforementioned issues.[24] According to Healy and Palepu (2001), disclosure and respective institutions that encourage a flow of information toward shareholders play an important role in alleviating the outlined information and incentive problems.[25]

Furthermore, Brown and Hillegeist (2007) assert that enhanced disclosure helps to abolish information skewness among investors themselves, which could otherwise result in the adverse selection problem.[26] The issue of adverse selection is introduced by Akerlof (1970), who argues that if price-relevant information about a traded good is not symmetrically distributed among market participants (i.e., sellers and buyers), transaction conditions could be biased and several feasible transactions will not take place.[27] In the context of the microstructure of capital markets, information asymmetry leads to concern for a market maker, who has to provide liquidity to the stock market by ensuring that all sell or buy orders can be executed, to face an order of an

[20] cf. Shleifer and Vishny (1997), p. 740.
[21] cf. Jensen and Meckling (1976), p. 308.
[22] cf. on this and the following Tirole (2001), pp. 1–2.
[23] cf. Healy and Palepu (2001), pp. 407–408.
[24] cf. Jensen and Meckling (1976), p. 308.
[25] cf. Healy and Palepu (2001), p. 407.
[26] cf. Brown and Hillegeist (2007), p. 446.
[27] cf. Akerlof (1970), pp. 489–492.

investor with superior information causing him or her a loss.[28] The difference between the market maker's bid and ask prices, as his or her expected profit, consequently becomes larger with higher information asymmetry to compensate that individual for potential losses to the informed traders. Within the scope of the adverse selection problem, the lower stock liquidity linked to higher bid-ask spreads can ultimately be accompanied by an increase in a firm's cost of capital and a decrease in its market valuation.[29] For instance, firms suffering from these issues that aim to collect funds on the capital market usually have to discount the issue price to create incentives for investors to participate in capital actions that in turn result in lower proceeds and higher financing costs. As Brown and Hillegeist (2007) note, the quality of a firm's disclosure can help to mitigate the aforementioned problems attributed to an information advantage of some investors based on private information about the firm's value in two ways.[30] First, a higher disclosure level should attract more uninformed investors to trade on a firm's stock due to its enhanced market visibility, which is in turn accompanied by a decrease in the relative number of informed traders. Furthermore, as Diamond (1985) also argues, an enhanced disclosure level should reduce investors' incentives for private information searches, which typically bear substantial costs.[31] Therefore, the less information that investors can detect privately, the more symmetric the information distribution that should be observed among these market participants.[32] To summarize, a firm's disclosure tends to play an important role in alleviating the different kinds of information asymmetries that exist in relation to capital markets; however, to gain deeper insight into its functioning, the different forms of information provision have to be considered in the following step.

In general, firms can communicate with investors in a variety of ways; this may include meeting them personally, using conference calls, or relying on more ordinary options (e.g., financial reports and press releases).[33] In today's capital markets, firms can also provide information to their addressees through information intermediaries, such as financial analysts who follow particular companies and forward aggregated information to investors. Firms' provision of information to financial markets can basically be divided into two categories: mandatory and voluntary disclosure. Accounting standards, stock exchange requirements, and other contractual

[28] cf. on this and the following Glosten and Milgrom (1985), p. 72; Geoerge et al. (1991), pp. 625–626.
[29] cf. on this and the following Leuz and Verrecchia (2000), p. 92; Diamond and Verrecchia (1991), pp. 125–127. For further elaboration on this, see Copeland and Galai (1983), Merton (1987).
[30] cf. on this and the following Brown and Hillegeist (2007), p. 446.
[31] cf. Diamond (1985), p. 1089.
[32] cf. Brown and Hillegeist (2007), pp. 446–447.
[33] cf. on this and the following Healy and Palepu (2001), pp. 408–409, 411–414, 420, 432.

commitments constitute mandatory regulations prescribing the management a common language for the communication with investors and subsequently regulating at least the minimal level of quantity and quality of information that must be provided. These regulations focus primarily on the allocation of new (superior) information on value-relevant facts that are available to firm's management. In the absence of the previously mentioned issues (such as agency conflicts) or in presence of perfect contracts, no need for additional (legal) regulations would exist, because firms would produce an efficient level of voluntary disclosure by considering its costs and benefits. However, market imperfections result in a need for regulatory interventions that aim to protect both the interests of investors and overall economic efficiency. Certainly, as different countries and their respective financial systems have varying characteristics, such provisions differ around the world and might be incomplete leaving an information gap that can in turn be filled by a firm's voluntary disclosure aimed at addressing this residual information asymmetry. In this context, Healy and Palepu (2001) present several explanatory approaches for managers' incentives to provide investors with more information than required by existing regulations.[34] Firstly, voluntary disclosure may be promoted by a fear of job loss that motivates insiders to supply more information, for instance to avoid the company's undervaluation or to explain bad performance that can also reduce the risk of litigations with shareholders. Furthermore, because the remuneration of managers is frequently linked to stock performance (e.g., through stock compensation plans), insiders have natural incentives to improve liquidity and to prevent mis-valuations of stocks they hold in their own portfolios by making more forthcoming disclosures to financial markets.

In this regard, Kirk and Vincent (2014) emphasize that the management of communication and interaction between corporate executives and investors (as well as financial analysts) is the main task of a firm's IR department.[35] As such, IR officers are usually able to influence a firm's communication policies in accordance with existing laws—which enables them to exercise a considerable influence on the quality and quantity of a company's disclosure. In this context, Bollen et al. (2006) further stress that the functions of IR departments typically imply expanding and enhancing the methods and techniques used to provide information with the goal of reaching a broader audience in an efficient manner.[36] In this context, more timely, more transparent, and more comprehensible corporate statements can be seen as indicators of qualitatively sophisticated

[34] cf. on this and the following Healy and Palepu (2001), pp. 420–425.
[35] cf. on this and the following Kirk and Vincent (2014), pp. 1421–1422.
[36] cf. Bollen et al. (2006), p. 275.

corporate disclosure encouraged by responsible IR departments.[37] In addition, Bushee and Miller (2012) demonstrate that IR can positively contribute not only to qualitative aspects of information provision, but also to its overall quantitative level.[38] Their study provides empirical evidence of a positive link between the initiation of an IR program and the number of published press releases, announcements, and conference transcripts. This result suggests that the level of professionalism and time exposure attributed to communication with investors in the scope of the IR function is accompanied by a more regular and more forthcoming provision of value-relevant information. Furthermore, Brown and Hillegeist (2007) argue that voluntary IR activities (i.e., those not attributed to legal requirements) are often characterized by a forward-looking perspective that can be reflected, inter alia, in verbal statements concerning optimism about the future.[39] When such insights are provided during calls (or meetings) with analysts in particular, they can also help to decrease the information asymmetry between corporate insiders and investors if this private information is subsequently forwarded to all other interested parties after its disclosure to a small circle of attendees. A typical example of the aforementioned setting is financial analysts providing forecasts and recommendations to investors after respective calls (or meetings).[40] Financial analysts thus seem to add value to capital markets by gathering insights on covered firms and helping companies to transmit disclosed information to a broad base of addressees. On the other hand, analysts themselves benefit from a firm's enhanced provision of information, because voluntary disclosure naturally reduces their search efforts and costs for particularly private information. As such, a better quality and quantity of information provision can attract more analysts to follow a firm, which in turn enhances the allocation of information from IR disclosure activities to investors.

Activities related to IR were initially assigned to chief financial officers (CFOs); IR has been growing into a separate institution only since the 1980s.[41] However, IR is usually still subordinated to a firm's top executives, such as its CFO and chief executive officer (CEO). As such, IR departments work closely with C-level managers and sometimes perform only supportive functions in the scope of communication with investors and analysts. This is

[37] cf. Vlittis and Charitou (2012), p. 942.
[38] cf. on this and the following Bushee and Miller (2012), p. 880.
[39] cf. on this and the following Brown and Hillegeist (2007), p. 465.
[40] cf. on this and the following Healy and Palepu (2001), pp. 416–418.
[41] cf. on this and the following Kirk and Vincent (2014), p. 1423. For detailed elaboration of IR's historical development, see Brennan and Tamarowski (2000), pp. 26–27.

particularly the case for earnings calls,[42] which the IR team typically organizes. During the calls, this team is also usually responsible for guiding question and answer sessions with top executives. In addition, while Kirk and Vincent (2014) assert that the establishment and maintenance of close relations to investors during face-to-face meetings, road shows, and so forth primarily fall within the remit of IR departments,[43] Bushee et al. (2015) highlight that CEOs and CFOs are also sometimes engaged in such personal appointments—particularly if they aim to converse with large-scale investors.[44] An executive's objective during these meetings may be to promote the firm's shares to compel fund providers to expand their investments in the company or invest in its stock for the first time. He or she may also aim to pave the way for capital actions or to provide guidance. In conclusion, IR departments collaborate with executives on interactions with investors if managers' expertise and authority are required and seem to keep the remaining appointments at their own discretion. In this context, Dolphin (2004) claims that the IR function can also be seen as a marketing activity that in addition to providing information also entails tasks such as targeting investors and building and maintaining a firm's reputation.[45] Due to the significant priority of this marketing role for IR departments, it is intensively considered in the following chapter, particularly with respect to its potential consequences on firm performance.

2.2 Marketing function

According to Bushee and Miller (2012), an important element of IR activities is "to design a strategy for management communication, which is often characterized as finding the right way to tell the story to the right investors."[46] From this statement it can be derived that an important goal of IR is to identify and attract investors who are suitable for a firm's desired shareholder base and subsequently to maintain relations with these individuals.[47] The institutional investors who provide large amounts of funds to companies can constitute such a target group. Lev (2012) states that an increase in a firm's market visibility through IR activities that is accompanied by an attraction of institutional investors should result in increased demand for a firm's stock—and

[42] cf. Frankel et al. (2010), pp. 223–224.
[43] cf. Kirk and Vincent (2014), p. 1424.
[44] cf. on this and the following Bushee et al. (2015), p. 8.
[45] cf. Dolphin (2004), pp. 25–26.
[46] Bushee and Miller (2012), p. 871.
[47] cf. on this and the following Bushee and Miller (2012), pp. 868, 870–871.

consequently in a higher market valuation.[48] However, it must be emphasized that as financial markets feature different types of institutional investors, all of whom pursue different strategies and goals, firms have to differentiate between these groups when they compile their shareholder base. Bushee and Noe (2000) show within the empirical framework of their study that two types of institutional investors can generally be attracted by enhanced IR activities (or rather disclosure practices): those with a long-term investment horizon—and hence low fluctuations in their investment portfolios—and investors with a short-term investment perspective that results in high turnover within their investment holdings.[49] While long-term oriented institutional investors commonly encourage reducing a firm's stock volatility by potentially contributing to lower stock liquidity, institutional investors with a short-term horizon are often accountable for an increase in stock volatility that can be accompanied by higher liquidity. Both types of institutional investors can therefore be linked to both benefits and risks with regard to a firm's market performance. As a result, it appears to be necessary for IR representatives to compile an appropriate mix of these investors depending on the present corporate conditions. Laskin (2006) emphasizes that the IR instruments that aim to achieve this goal typically go beyond the forthcoming financial communication, which admittedly can positively contribute to firm attractiveness for market participants:[50] "investor relations is not about numbers any more, today's investor relations is about building and maintaining relationships."[51] In this context, the overall credibility of a firm's management and IR officers appears to play a crucial role in the market acceptance of information content provided in the scope of a firm's communication activities.[52] This applies in particular to a company's forward-looking statements, which market participants evaluate partially based on whether they can fully rely on what a firm's management and IR staff say. A close and trustful individual relationship to at least a firm's major shareholders that is promoted by IR activities (e.g., meetings and calls) may enable these concerns to be overcome and help to ensure that the firm's disclosure ultimately contributes to the fair value of its securities. In line with this, Hoffmann and Fieseler (2012) note that the IR function commonly entails image-building activities in addition to ordinary tasks.[53] Such activities typically aim to enhance the image of both the IR professionals and top management engaged in capital market

[48] cf. Lev (2012), pp. 52–53. See also Healy et al. (1999), p. 486.
[49] cf. on this and the following Bushee and Noe (2000), p. 200.
[50] cf. Agarwal et al. (2015), p. 1.
[51] Laskin (2006), p. 245.
[52] cf. on this and the following Laskin (2007), p. 28.
[53] cf. on this and the following Hoffmann and Fieseler (2012), pp. 141, 146, 149–150.

communication. In this regard, regular briefings of corporate executives by IR officers on the demands of the financial community may help a firm's management to find a common language with market participants. The expansion of a firm's communication aspects to non-financial dimensions yields further important IR characteristics relevant for its success. For instance, IR staff should ensure that it is constantly available for investors to be able to address their acute demands, for example by offering clarifications on current corporate topics. Furthermore, the enhanced competence and know-how of IR officers could increase proactive communication with investors, positively contribute to these staff members' image, and improve the assessment of the overall quality of their activities.

Hoffmann et al. (2011) recognize the carefully cultivated relationships to investors as a market-based asset that serves as a competitive advantage that ultimately allows a firm to materialize IR quality in enhanced shareholder value.[54] By using an empirical framework to look at shareholder activism events in different companies, their study investigates whether better IR quality actually induces a comprehensive mutual understanding between firms and investors. According to Becht et al. (2009), shareholder activism can be defined as "a range of actions taken by shareholders to influence corporate management and boards" that, inter alia, includes threatening the sale of shares or using of corporate voting rights to exert pressure on executives.[55] Shareholders can undertake such actions if a firm's management does not meet their expectations, which may also be partially attributed to inadequate IR activities (e.g., the targeting of investors whose goals are incompatible with those of the firm or falsely assessing investor demands).[56] The empirical results of Hoffmann et al. (2011) show a negative link between IR quality and shareholder activism events, which indicates that building relationships with (suitable) shareholders based on two-way communication can help IR departments and executives to overcome the aforementioned incidents. However, the IR function also includes recognizing when a specific relation causes high costs without having any future perspectives and consequently should be terminated in favor of other stockholders.

In general, within the framework of the marketing view on IR, investors can be seen as firms' customers.[57] In this context, the product that firms are primarily selling to investors is their stock, which is typically offered by listed companies in the scope of SEOs. As described in the previous

[54] cf. on this and the following Hoffmann et al. (2011), pp. 896–897.
[55] Becht et al. (2009), p. 3094, note 1.
[56] cf. on this and the following Hoffmann et al. (2011), pp. 899, 901.
[57] cf. Hanssens et al. (2009), p. 115.

chapter, enhanced firm disclosure can help to alleviate information asymmetry in the run-up to such capital actions and diminish the price drop that may follow an SEO announcement as a result of a firm's overvaluation signal.[58] Furthermore, disclosure can also be purposefully deployed to achieve better issuance conditions by marketing the stock before the corresponding offer.[59] According to Lang and Lundholm (2000), the main differences between the two aforementioned cases relates to objectives and the design of the disclosed information. However, this does not mean that the disclosure attributed to stock advertising activities contains any misleading statements. It may simply cover a more extensive bundle of facts about the corresponding firm and accompany a higher information issuance frequency, which, in compliance with Merton's (1987) theoretical model,[60] increases a firm's visibility for potential investors.[61] For instance, an IR department may more frequently provide detailed disclosure related to a firm's performance (including comprehensive comments of top executives) and initiate more proactive presentations to investors and analysts.[62] Clarkson et al. (1999) and Lang and Lundholm (2000) provide empirical evidence for this stock marketing technique by identifying an increase in firms' published statements before the announcements of SEOs.[63] In the scope of anecdotal evidence, IR professionals support these findings by indicating that the extensive disclosure and related activities undertaken prior to SEOs are often used to enhance the awareness of investors about a firm's stock, which results in a stock price increase and in turn raises the proceeds from these capital actions.[64] Furthermore, how the market reacts to the actual SEO announcement after a period of enhanced IR activities may also depend on the quality of the IR strategy. Thus, whether investors feel deceived when finding out the purpose of the previous extensive stock exposure that can be accompanied by a share price revision or whether they attribute the provided information content and achieved increase in firm visibility to a higher market value that would simultaneously lower the risk (or magnitude) of a post-announcement price drop.[65]

The patterns identified in IR marketing activities in the scope of SEOs also seem to apply to M&A transactions, particularly if the acquiring firm aims to pay for the target by offering its own

[58] cf. Myers and Majluf (1984), p. 188.
[59] cf. on this and the following Lang and Lundholm (2000), p. 626.
[60] cf. Merton (1987), p. 501.
[61] cf. Chang et al. (2008), p. 378.
[62] cf. Lang and Lundholm (2000), p. 627; Demos (2013), p. 1.
[63] cf. Clarkson et al. (1999), p. 128; Lang and Lundholm (2000), p. 629.
[64] cf. Lang und Lundholm (2000), pp. 630, 632, 656.
[65] cf. Lang und Lundholm (2000), p. 631.

stocks.[66] Ahern and Sosyura (2014) provide empirical evidence of increases in firms' disclosure, such as a higher number of press releases, as well as a more positive tone in publications during the negotiation period for M&A transactions. Their study consequently indicates that at least the bidders engaged in stock mergers tend to conduct active disclosure management that involves publications that are driven not necessarily by a firm's fundamentals but rather by stock marketing purposes with regard to the conditions of forthcoming acquisitions. The empirical findings additionally suggest that this strategy ultimately affects the merger outcomes of the involved parties, reducing the acquirer's takeover costs and accompanying a higher acquirer gain relative to the target gain attributed to the transaction's announcement. Investors' increased awareness of a firm results in at least a temporary boost of its stock price and at this point also appears to serve as the channel through which IR activities can contribute to corporate outcomes (in addition to alleviating information asymmetry).

Finally, Solomon (2012) demonstrates that active disclosure management is conducted in the scope of the IR function also in relation to other relevant corporate announcements.[67] The results of this study suggest that investors' awareness of statements is positively influenced by IR through the initiation of greater media coverage of corporate news (e.g., through personal connections to media representatives). The study also provides evidence of a positive value effect of higher media coverage induced by IR activities in relation to positive corporate announcements. The concerns stated in the literature regarding the sustainability of the value created by the aforementioned marketing activities, which in some cases may admittedly have a short-term horizon, constitute an empirical question that has to be addressed using appropriate firm performance measures.

The definition of IR provided by the National Investor Relations Institute (NIRI) summarizes the major fields of IR activities: "Investor relations is a strategic management responsibility that integrates finance, communication, marketing and securities law compliance to enable the most effective two-way communication between a company, the financial community, and other constituencies, which ultimately contributes to a company's securities achieving fair valuation."[68]

The (financial) disclosure, marketing, and communication aspects of IR have been outlined in the current and previous chapters of this thesis. To complement this, the influence that legal environments have on the operating principles and outcomes of IR is discussed next.

[66] cf. on this and the following Ahern and Sosyura (2014), pp. 241–245, 247, 276, 278–280, 288.
[67] cf. on this and the following Solomon (2012), pp. 599, 605, 631.
[68] NIRI (n.d.): https://www.niri.org/about-niri.

2.3 IR relevance in different legal and market environments

2.3.1 Implications on IR in common and civil law countries

As described in Chapter 2.1, the disclosure activities typically performed by IR departments should help to resolve information asymmetries between firms and market participants. La Porta et al. (2000) emphasize that the disclosure of financial information can be seen as a "key element of shareholder protection."[69] In this context, however, previous research shows that the base level of investor protection differs from country to country and depends on the varying law systems in each economy.[70] According to La Porta el al. (1998), the differences in law systems (i.e., in legal rules and their enforcement) are strongly linked to the origins of each country's legal environment.[71] Scholars generally distinguish between two legal families: common law, which has an English origin, and civil (or code) law, which arose from Roman law, and which can be further categorized in German, French, and Scandinavian origins.[72] It is important to note that although each country certainly has its own specific legal rules and codes that distinguish it from other countries around the world, the basic legal principles that underlie national laws make it possible to generally differentiate between the aforementioned legal families.[73] Common law has mainly influenced the legal principles of large economies such as the US and the UK, while the legal environments in Japan, South Korea, and naturally Germany originate from the German civil law.[74] Furthermore, the systems of several European countries (e.g., Spain and Italy) were affected by French civil tradition and those of Denmark or Finland by the Scandinavian civil law. The evidence provided by La Porta et al. (1998) indicates that countries with legal rules based on the common law tradition grant more protection to investors than countries from the civil law family (irrespective of concrete origin).[75] These researchers' results also show that the quality of accounting standards, which largely depends on disclosure rules, is higher in common law countries than in German civil law countries. These findings can at least to some extent be explained by the formation of the respective legal environments. In general, civil law is shaped by writings of scholars and by legislators, whereas common law is coined by courts' decisions

[69] La Porta et al. (2000), p. 23.
[70] cf. La Porta et al. (1998), p. 1151; La Porta et al. (2000), p. 24; Ball et al. (2000), p. 2; Djankov et al. (2008), p. 463.
[71] cf. La Porta et al. (1998), p. 1151.
[72] cf. Ball et al. (2000), p. 1; La Porta et al. (1998), p. 1115.
[73] cf. La Porta et al. (2008), p. 288.
[74] cf. on this and the following La Porta et al. (1998), pp. 1130–1131.
[75] cf. on this and the following La Porta et al. (1998), pp. 1120, 1140, 1141, 1151.

that are in turn embedded in legislature.[76] As such, judges in the common law system have to decide on cases that are not covered by existing legislature applying the previous decisions in leading cases within their judicial discretion.[77] Such a handling of new cases results in an ongoing extension of legal principles and rules that tends to reduce insiders' incentives to apply unanticipated practices that may harm investors' interests. On the other hand, as judges in civil law systems are expected to follow the existing legal rules, the legal system is generally less dynamic compared to common law. Furthermore, such a legal environment that relies on the "letter of the law" instead of "the spirit of the law"[78] might increase the willingness of insiders to act against investors' interests using legal loopholes.[79] An additional proposition based on historical evolution is that common law countries grant greater private property protection than civil law countries due to the weaker influence of the government (which also pursues its own political goals) on judicial objectives and experience fewer government interventions in market activities. Finally, according to Jaggi and Low (2000), broad-based corporate ownership and well-developed financial markets, which are typical outcomes of enhanced investor protection in common law countries, result in a higher disclosure demand from market participants—which in turn causes higher financial disclosure provisions in this legal environment.[80] The common law system thus appears to facilitate private enforcement mechanisms by ensuring that investors obtain the required firm information and are able to appropriately act on it.[81] In this context, Djankov et al. (2008) and Ball et al. (2000) also emphasize that high mandatory disclosure standards are a typical characteristic of the common law system, whereas in civil law countries information asymmetry tends to be alleviated particularly by closer corporate ties with key stakeholders.[82] Given that this thesis deals with the role of IR activities in German and UK firms, the question of whether the identified differences in investor protection and disclosure in common and civil law systems also apply to the same extent to these two specific countries arises.

The first indication regarding an answer to the aforementioned question can be derived from the empirical evidence provided by La Porta et al. (1998).[83] This study's results related to Germany

[76] cf. David and Brierley (1978), pp. 33, 308; La Porta et al. (1997), p. 1131.
[77] cf. on this and the following La Porta et al. (2000), pp. 9–10.
[78] Anderson and Gupta (2009), p. 70.
[79] cf. on this and the following La Porta et al. (2000), pp. 9, 12.
[80] cf. Jaggi and Low (2000), pp. 516–517.
[81] cf. Djankov et al. (2008), p. 463.
[82] cf. Djankov et al. (2008), p. 463; Ball et al. (2000), p. 2.
[83] cf. on this and the following La Porta et al. (1998), pp. 1122, 1130–1131, 1140, 1142–1143, 1147–1148.

and the UK are in line with its general findings on common and civil law environments. They indicate that in contrast to Germany, the UK grants a higher protection of shareholder rights measured on the basis of particular legal provisions. Furthermore, the results also show that the UK exhibits higher quality of accounting standards, which in turn ensures that corporate disclosure can be reliably interpreted. Finally, the empirical analysis suggests that the ownership structure in Germany is more concentrated (hence, characterized by a prevalence of blockholders) in comparison to the UK, which in contrast tends to have a more developed financial market. As noted earlier with regard to common law environment, both broader ownership and a sophisticated financial market structure seem to be the consequences of enhanced investor protection and to be related to enhanced disclosure regulations. Exactly this pattern can be observed in the results of La Porta et al. (1998) for UK firms and the opposite for German companies. Similar findings are also provided by Goergen and Renneboog (2003), who emphasize that "investors in the United Kingdom are substantially better protected than the ones in Germany."[84] Furthermore, Djankov et al. (2008) widely confirm the results presented by La Porta et al. (1998) using more recent data as well as further alternative measures for legal protection.[85] Even the evidence provided by Spamann (2010), who casts doubts on the reliability of the findings of La Porta et al. (1998) and Djankov et al. (2008) and offers a revisited investor protection measure, reveals that it can still be stated that the UK grants greater investor protection than Germany while additionally considering the development of legal provisions over time.[86] In addition, the analysis of Aubert and Louhichi (2015) provides empirical support for the more forthcoming financial disclosure environment of the UK as compared to Germany by stating that "UK firms must disclose more detailed and timely information."[87] Hope (2003) reports similar findings.[88]

In this context, survey results provided by Bushee and Miller (2012) indicate that if the base level of corporate disclosure in a country is already high, many IR professionals view changes (or rather improvements) in a firm's disclosure practices as commonly unnecessary.[89] This could particularly be because firms' disclosure practices often already meet high standards simply because they follow such a country's applicable legal provisions. In summary, the

[84] Goergen and Renneboog (2003), p. 142.
[85] cf. Djankov et al. (2008), pp. 441, 453–456; Spamann (2010), p. 475.
[86] cf. Spamann (2010), p. 475.
[87] Aubert and Louhichi (2015), p. 24.
[88] cf. Hope (2003), p. 251.
[89] cf. Bushee and Miller (2012), p. 874.

aforementioned studies provide important implications on the role of the IR function in UK and German companies. First, information asymmetries between firms, their investors, and information intermediaries in the UK tend to be lower due to high (mandatory) disclosure requirements; as such, lesser space for additional IR contribution, for instance through voluntary disclosure provision, seems to exist. Consequently, IR professionals in the UK may primarily contribute to a firm's success through their marketing function, which includes activities that particularly aim to attract investors and information intermediaries. The survey results of Bushee and Miller (2012) support this consideration by revealing that IR professionals assign the highest priority to such activities in US firms.[90] The value of IR quality can thus be primarily evident in situations in which firms' IR professionals have to directly communicate with market participants (e.g., in the scope of equity issues). On the other hand, the level of information asymmetry in the German market seems to be higher due to the weaker investor protection and disclosure environment; as a result, the alleviation of information skewness appears to play a more crucial role for IR within German firms. The contribution of IR quality to firm success should thus occur, besides the marketing function, through a reduction of the prevalent information imbalances that are typically reflected in financial metrics (e.g., firms' stock volatility or respective bid-ask spreads). As suggested by Anderson and Gupta (2009), beyond the legal origins the differences in investor protection and disclosure practices can be attributed to countries' financial systems.[91] As the financial systems of Germany and the UK generally differ, their (expected) impact on the IR function is discussed in the further course of this thesis.

2.3.2 Implications on IR in market- and bank-based financial systems

According to La Porta et al. (1997), the differences in financial systems around the world are closely linked to the differences in legal systems described in the previous chapter.[92] Shleifer and Vishny (1997) emphasize that the German market is characterized by permanent large shareholders and powerful banks, due to strong creditor protection and weaker stockholder rights (compared to the US) that are nonetheless still adequate for large shareholders to wield their

[90] cf. Bushee and Miller (2012), pp. 873–874.
[91] cf. Anderson and Gupta (2009), p. 61.
[92] cf. La Porta et al. (1997), p. 1131.

power.[93] In contrast, the UK features large numbers of investors acting on the equity market due to the extensive protection of shareholder rights.[94] The special status of major banks in Germany has been further promoted by their universal structure that allows them to conduct lending and securities business, while in the UK commercial and investment banking is typically sundered.[95] In conclusion, Allen and Gale (2000) state that the allocation of resources in the UK is dominated by financial markets, whereas in Germany banks play the main role in this process. The aforementioned differences in financing and ownership structures attributable to the different legal environments (i.e., civil and common law) ultimately make it possible to categorize countries as having either a bank-based financial system (e.g., Germany) or a market-based finance regime (e.g., the UK).[96]

The study of Ergungor (2004) extends the view on the formation of the different financial systems by providing evidence that the legal traditions themselves (and not merely the contents of laws) already support the emergence of differences in firms' primary financing sources.[97] This is because civil law courts' lack of flexibility and effectiveness with regard to interpreting and establishing legal rules that may result in investors being exploited—and thus being less willing to provide funds—can be overcome by banks that "can resolve conflicts and enforce contracts without court intervention" using their bargaining power.[98] Such power can emerge from the establishment of close relationships with borrowers accompanied by lower costs of loans and higher loan availability that debtors are rarely willing to jeopardize.[99] These patterns, which are prevalent in the German market, are also known as the German "Hausbank system."[100] On the other hand, the enhanced effectiveness and flexibility of the (UK) common law courts reduces the risk of investor exploitation and thus encourages capital market financing.[101] The above-described view on the close ties between financial systems and legal environments has received further empirical support, for instance from Demirgüç-Kunt and Maksimovic (2002).[102]

[93] cf. Shleifer and Vishny (1997), p. 770.
[94] cf. La Porta et al. (2000), p. 17; Shleifer and Vishny (1997), pp. 769–770.
[95] cf. on this and the following Allen and Gale (2000), pp. 4–5.
[96] cf. La Porta et al. (1997), p. 1137; La Porta et al. (2000), p. 17.
[97] cf. Ergungor (2004), pp. 2884–2885.
[98] Ergungor (2004), p. 2870.
[99] cf. Ergungor (2004), p. 2873.
[100] cf. Allen and Gale (2000), p. 4.
[101] cf. Ergungor (2004), p. 2873.
[102] cf. Demirgüç-Kunt and Maksimovic (2002), pp. 359–360.

Admittedly, both financial systems have several specific advantages and disadvantages, which are summarized in a study by Levine (2002).[103] According to that research, an important characteristic of banks that have established (long-term) relationships to respective firms is the ability to directly acquire information about these companies (e.g., by looking at their books) or their management (e.g., through face-to-face interaction). In the scope of this practice, banks can perform a monitoring function that can help, for instance to alleviate managerial opportunism, and should reduce the need for firms' public market disclosure.[104] Similar arguments can also be related to large shareholders (such as families), which are typical in the German market.[105] However, banks (as well as other large stakeholders) may pursue their own goals, such as private benefits of control, to the detriment of (minority) shareholders—which could ultimately result in their expropriation.[106] For instance, banks may collaborate with a firm's management or extract informational rents instead of exercising efficient monitoring.[107] Because banks typically do not immediately forward information obtained through their "Hausbank" relationship (if at all) to the public market and the legal shareholder protection related to disclosure provisions is less extensive in the civil law environment,[108] other investors seem to suffer from a substantial information disadvantage. However, this disadvantage can be alleviated by more forthcoming and transparent (voluntary) disclosure in the scope of the IR function to enable investors to decide on their investments using the most recent and comprehensive information. In contrast, the UK's market-based system, which is characterized by a large number of diversified stock market participants, tends to facilitate the acquisition, aggregation, and transmission of signals and information to investors.[109] This allows to lower information costs and to overcome the aforementioned issues associated with the German bank-centered system. Furthermore, the equity market in the UK offers a good setting for the market of corporate control (as an important external CG instrument); in this setting, underperforming managers have to reckon with the risk of corporate takeover, which should reduce their incentives for managerial opportunism.[110] In this context, Anderson and Gupta (2009) demonstrate that the overall level of CG tends to be higher in countries that have a combination of common law and market-based systems than in those

[103] cf. on this and the following Levine (2002), pp. 399–400.
[104] cf. Anderson and Gupta (2009), pp. 64, 70.
[105] cf. Shleifer and Vishny (1997), p. 754; Andres (2008), p. 433.
[106] cf. Shleifer and Vishny (1997), pp. 758–759.
[107] cf. Levine (2000), p. 400; Shleifer and Vishny (1997), p. 761.
[108] cf. Levine (2002), p. 399.
[109] cf. on this and the following Allen and Gale (2000), p. 435; Levine (2002), p. 400.
[110] cf. Allen and Gale (2000), p. 5.

with a combination of civil law and bank-centered regimes.[111] As Beekes and Brown (2006) indicate, higher CG quality seems in turn to be accompanied by more informative corporate disclosure,[112] which positively contributes to the already high base level of information provision legally required in common law countries. In line with what was elaborated in the previous chapter, information asymmetry appears to be considerably lower in the UK market than in Germany, which results in less room for IR to contribute to a firm's success through this channel. The aforementioned view is further supported by Bushman et al. (2004), whose results show that corporate transparency in relation to governance and financial items is generally higher in countries that exhibit characteristics usually attributed to common law system, market based-system, or both.[113] It is also supported by Brown and Hillegeist (2007), whose findings indicate that public disclosure is more important in settings that are characterized by higher firm-investor information asymmetry,[114] which has been ascertained for the German market. Finally, because the capital market appears to constitute the major financing source for UK firms, IR in the UK may become particularly important for acquisition and supporting investors, as in the case of capital issues. Anderson and Gupta (2009) call for additional research concerning how firms in market-based/common law and bank-centered/civil law systems can improve their corporate governance practices in response to their specific environments.[115] The present thesis contributes to this claim by investigating the relevance of the IR function for shareholder wealth within these system combinations in Germany and the UK.

[111] cf. Anderson and Gupta (2009), pp. 71, 77.
[112] cf. Beekes and Brown (2006), p. 422.
[113] cf. Bushman et al. (2004), pp. 244–245.
[114] cf. Brown and Hillegeist (2007), pp. 445, 472–473.
[115] cf. Anderson and Gupta (2009), p. 77.

3 Literature

3.1 Literature review on IR studies

As shown in chapter 2, some channels through which a firm's IR activities can basically generate value for shareholders have been identified in the existing scientific literature on IR. Before the additional contribution to the existing results is provided in this thesis, the major findings of previous empirical studies are presented in this chapter. These results are further used to facilitate the development of hypotheses for the present sample of German and UK firms.

The measures typically used by scientific researchers to capture either the effects of a reduction in information asymmetry levels or the impact of IR marketing activities on market awareness of a firm's stock are briefly summarized here. The stock volatility and liquidity proxies are usually deployed in relevant studies to measure the impact of at least one of the two aforementioned IR practices that could ultimately affect a firm's cost of capital and stock performance (as a final outcome). In addition, several measures related to analyst forecasts are frequently used to assess the quantitative and qualitative levels of information provision in the scope of the IR function. The set of deployed variables covers, inter alia, analyst dispersion regarding a firm's future earnings and forecast accuracy. The number of analysts following a firm is also commonly used as a proxy for its visibility among market participants. In this context, previous studies dealing with the IR function ordinarily rely on datasets that deviate in relation to the size and local origin of the investigated firms as well as the time period covered. As such, these dataset characteristics are also discussed in this chapter to identify potential issues in previous research and to provide possibly suitable solutions at a later stage.

Firm performance, visibility, and stock liquidity

The study of Dennis (1973) is one of the first empirical investigations of IR activities and their outcomes.[116] In this study, the author assesses the impact of independent IR firms, which were hired to conduct IR operations, on the stock prices of respective US client companies.[117] Using data on stock price performance before and after the corresponding recruitments, the study fails to measure any significant effect of IR firms on clients' market valuation. However, according to Dennis (1973) as well as to Farragher et al. (1994), due to the consideration of only IR activities

[116] cf. Farragher et al. (1994), p. 404.
[117] cf. on this and the following Dennis (1973), pp. 373, 379.

performed by external agents, the results of this study are admittedly limited and difficult to project onto modern listed firms (which typically employ their own IR staff and may be only sometimes supported by external IR firms).[118]

Bushee and Miller (2012) use the same identification strategy as Denis (1973), namely the recruitment of external service firms, to assess the value of IR in small, less visible companies.[119] In contrast to the study of Denis (1973), considering a US dataset that covers recruitments for 210 firms between 1998 and 2004 this empirical investigation shows a significant market value increase for firms that initiate IR programs. The study also identifies the channels through which the ascertained value increase can be explained. The provided empirical evidence suggests that initiated IR programs increase the overall level of firms' disclosure as well as the awareness of investors, media, and analysts about these companies—which makes possible to overcome the lack of market visibility and difficulties in forming appropriate shareholder base related to the investigated firms. However, with reference to Bushee and Miller (2012) as well as to Agarwal et al. (2015), the results obtained for small less visible companies cannot be simply generalized for larger listed firms, which usually already have well-developed IR strategies and departments.[120]

Vlittis and Charitou (2012) exploit announcements of new IR officer appointments and external IR firm recruitments to measure the value effects of IR investments.[121] Using 146 announcements made between 1999 and 2005 by US-listed firms and applying the event study methodology, Vlittis and Charitou (2012) find significantly positive value effects of IR investments around the announcements. Market participants thus seem to evaluate the extension of IR resources as a positive signal, which is corroborated by this study's additional results on further market outcomes. The study also shows a significant increase in firms' stock liquidity (interpreted as an information asymmetry reduction) and a systematical increase in firm visibility after IR investments. However, Agarwal et al. (2015) emphasize that the firms in the sample of Vlittis and Charitou (2012) are also relatively small, which means the generalizability of these results is limited (similar to the findings of Bushee and Miller, 2012).[122] Furthermore, the identified value effects seem to not persist in the long run, as indicated by insignificant changes in the one-year post-announcement performance.[123]

[118] cf. Farragher et al. (1994), p. 404; Dennis (1973), p. 373.
[119] cf. on this and the following Bushee and Miller (2012), pp. 875–877, 880–891.
[120] cf. Agarwal et al. (2015), pp. 2–3; Bushee and Miller (2012), p. 893.
[121] cf. on this and the following Vlittis and Charitou (2012), pp. 949–950, 955, 965–968.
[122] cf. Agarwal et al. (2015), pp. 2–3.
[123] cf. Vlittis and Charitou (2012), p. 964.

Kirk and Vincent (2014) primarily concentrate their research on more established firms that have implemented internal professional IR to draw conclusions about the value of these investments for shareholders.[124] Applying a dataset that covers US firms from 1996 to 2009, their study finds that firms that practice professionalized IR significantly outperform their counterparts in relation to market valuation. The results also reveal a significant increase in firms' disclosure activities concerning management earnings forecasts and press releases after the establishment of professional IR. In addition, the corresponding firms seem to experience an increase in liquidity and visibility relative to the control sample. By using a natural experiment setting that relies on the exogenous shock of the introduction of the Regulation Fair Disclosure in the US, the study can widely confirm the results obtained in the previous analysis. However, the authors admit that their definition of professionalized IR (which is based on NIRI membership) does not necessarily imply that non-member firms do not have well-established IR teams that actively communicate with market participants. In summary, the study of Kirk and Vincent (2014) extends the existing literature by considering the relevance of internal IR for well-developed firms, but the IR measure they deploy appears to be subject to some concerns.

Agarwal et al. (2015) investigate a broad US sample that comprises all firms listed on the NYSE, Amex, or NASDAQ stock exchanges for a three-year period from 2000 to 2002.[125] Using the "best overall IR" awards provided by analysts and investors as its IR measure, this study shows that better IR quality is accompanied by higher valuation multiples for all firms—hence for large as well as small, less visible companies. However, in contrast to Kirk and Vincent (2014), Agarwal et al. (2015) find a significantly positive relation between IR quality and firms' stock liquidity/visibility for small firms only, which leaves the question on value driving channels for large firms open. Furthermore, the authors admit that the study covers only a short time period in the past due to the non-availability of IR data for recent years; as such, the results may not be fully applicable to the contemporary IR framework.

Further empirical evidence concerning the causal effects of IR is provided by Chang et al. (2008).[126] Their study uses data on the internet IR activities of 290 Australian firms in 2005 to establish a link between IR quality and information asymmetry levels, proxied by a stock liquidity measure (in particular, the weighted bid-ask spread). The analysis initially suggests that a significantly negative relation exists between the both above-mentioned variables, which

[124] cf. on this and the following Kirk and Vincent (2014), pp. 1427, 1437–1438, 1441–1450, note 7.
[125] cf. on this and the following Agarwal et al. (2015), pp. 6, 8, 11–14, 16–17.
[126] cf. on this and the following Chang et al. (2008), pp. 382, 385–389.

indicates that IR has a positive information and liquidity effect; however, further investigation considering, inter alia, analyst following and institutional ownership uncovers new insights. The study reveals that these factors seem to strongly predict the quality of IR (e.g., because IR activities have to meet market demands); as such, they appear to be not solely its outcomes, as usually assumed. After the researchers instrumentalize IR quality through analyst and investor measures, their initially postulated negative effect of IR on information asymmetry disappears, hence uncovering a possible endogenous relation between the evaluated variables that casts doubt on the results of studies that do not control for this issue. Similar concerns are also stated by Hong and Huang (2005), who show in the scope of their theoretical model that the liquidity needs and size of equity stakes held by corporate insiders may also positively affect the extent of IR activities—which points to an additional agency conflict that may impede the identification of IR's true value.[127]

Analyst forecasts

Chang et al. (2014) provide additional contribution to the IR literature by focusing on the relation between the properties of analyst forecasts and IR disclosure. Their study relies on qualitative and quantitative IR measures and explicitly considers time periods of uncertainty, when the need for disclosure is reasonably high.[128] Using IR awards granted to 370 Australian firms by analysts and fund managers in 2005 and 2009 as the qualitative measure, the analysis reveals that better quality IR has a negative effect on the forecast error (i.e., the difference between actual and forecasted earnings), which emphasizes the importance of IR's informational function. This result is in line with the findings of Lang and Lundholm (1996), who consider approximately 732 US firms during the period 1985–1989,[129] and Hope (2003), who investigates a sample of 890 firms from 22 countries for the years 1991 and 1993.[130] However, according to Chang et al. (2014), the ascertained effect is only valid for firms with low levels of disclosure, which is reminiscent of the evidence provided by Bushee and Miller (2012) and Vlittis and Charitou (2012).[131] While Chang et al. (2014) as expected additionally find an increase in firms' disclosure during the 2008–2009 global financial crisis, they fail to establish any link between disclosure and the dispersion of

[127] cf. Hong and Huang (2005), pp. 1, 25.
[128] cf. on this and the following Chang et al. (2014), pp. 372, 382–387.
[129] cf. Lang and Lundholm (1996), pp. 474, 487–490.
[130] cf. Hope (2003), pp. 251, 264.
[131] cf. on this and the following Chang et al. (2014), pp. 382–389.

analyst forecasts. However, the latter result contradicts the empirical evidence on the negative relation between these variables presented in previous literature, for instance by Lang and Lundholm (1996) and Farragher et al. (1994), who undertake a correlation analysis for 136 large US firms from 1982 to 1988.[132] The divergences in the results of empirical studies dealing with the properties of analyst forecasts may be attributed, besides the differences in the sample periods, the size of the investigated firms, and the methodology applied, to the different country-specific settings applicable to the sample companies as discussed by Aerts et al. (2007).

In the aforementioned study, Aerts et al. (2007) show that firms from North America exhibit a higher involvement in web-based performance disclosure than their counterparts from continental Europe, which ultimately results in its stronger negative impact on the dispersion of analyst forecasts.[133] Using a sample of 894 firms for the year 2002 and applying the simultaneous equations approach, this study also uncovers that the level of importance assigned to a firm's disclosure in explaining the forecast deviation is influenced by the number of analysts following a company. In the scope of an investigation of the link between IR and forecast dispersion, it therefore appears to be reasonable to account for analyst coverage, which can be related to both variables of interest. However, the results of Aerts et al. (2007) have one major limitation, namely the fact that, in addition to web-based disclosure, firms can generally use other communication channels to provide the same information to the market. In this context, Aerts et al. (2007) mention, inter alia, press releases and telephone or face-to-face conferences with market participants, all of which can serve as substitutes for web activities. As such, internet-based disclosure can be used as an indicator of IR quality but is admittedly only a part of this multifarious function.

Cost of capital

Another branch of scientific literature on IR deals with the direct link between IR activities and firms' cost of capital. Botosan (1997) investigates this relation with a self-constructed annual reports' disclosure index that is applied as a proxy for all firms' disclosure activities.[134] Using a sample that covers 122 US manufacturers in 1990, this study establishes a negative link between greater disclosure levels and costs of equity capital for less visible firms. However, according to the author, the finding about disclosure's positive role in reducing capital costs (through reducing

[132] cf. Farragher et al. (1994), pp. 406, 410–411; Lang and Lundholm (1996), pp. 487, 490.
[133] cf. on this and the following Aerts et al. (2007), pp. 1307, 1316–1321.
[134] cf. on this and the following Botosan (1997), pp. 323, 325, 345–347.

information asymmetry, improving firm visibility, or both) is subject to several limitations that should be addressed in subsequent research. Botosan (1997) argues that the self-constructed measure may fail to capture a firm's overall disclosure level and that results may not be generalizable given that they are only obtained for companies in a single industry for one year.

Botosan and Plumlee (2002) address the above-mentioned concerns by investigating a broad sample of 668 US firms from 1986 through 1996.[135] Again, the results of this study suggest that greater disclosure provided in annual reports is linked to a reduction in the cost of equity capital, which supports the findings of Botosan (1997). However, in explicitly considering the overall IR function, Botosan and Plumlee (2002) find no significant relation between the quality of IR and firms' cost of capital. A potential explanation for this surprising result may be that expansive IR activities attract more transient institutional investors, who contribute to a higher volatility of the relevant stock that may fully offset the benefits concerning capital costs that are usually attributed to the IR function. Heflin et al. (2015), who use nearly the same dataset as Botosan and Plumlee (2002) while also controlling for earnings quality in their analysis, provide empirical evidence that even shows that IR has a significantly positive impact on the cost of equity capital.[136]

Whereas all aforementioned studies rely on US data to assess the relation between firms' cost of capital and IR (or disclosure) activities, Francis et al. (2005) investigate a sample drawn from 34 countries excluding US firms to eliminate the impact of US legal and financial systems on disclosure effectiveness.[137] Using 672 observations covering the years 1993 and 1995, the study establishes a negative and significant link between a firm's higher voluntary disclosure level and cost of equity and debt capital, which confirms the study's corresponding hypothesis.[138] The findings of Francis et al. (2005) also suggest that the cost of equity capital is already lower in countries with higher investor protection.[139] This is generally in line with the predictions noted in chapter 2.3 of the present thesis, the empirical investigation of which might help to clarify the mixed picture created by the above-described studies.

Stock volatility

The volatility of stock prices is a further subject of empirical investigations dealing with IR and corresponding disclosure activities. In this context, Leuz and Verrecchia (2000) analyze a sample

[135] cf. on this and the following Botosan and Plumlee (2002), pp. 24, 34, 39.
[136] cf. Heflin et al. (2015), p. 48.
[137] cf. on this and the following Francis et al. (2005), p. 1129.
[138] Sengupta (1998) provides the same evidence for the cost of debt of US firms.
[139] cf. Francis et al. (2005), p. 1156.

from 1997 of 102 German firms that had committed themselves to an international reporting regime—and hence higher disclosure levels.[140] While this study finds that the committed firms experience a decrease in the information asymmetry components of their cost of capital (namely, a decrease of bid-ask spreads and an increase in share turnover), it is unable to establish the same link for price volatility as an additional information asymmetry proxy. Leuz and Verrecchia (2000) argue that the absence of significant results concerning this measure may on the one hand be attributable to the sensitivity of stock deviation to factors entirely unrelated to information asymmetry and on the other hand be linked to differences in the types of institutional investors attracted by firms' disclosure activities. In particular, improvements in IR (or disclosure) may be accompanied by an increase in the holdings of investors with a short-term investment horizon, who in turn have a positive impact on stock volatility as ascertained by Bushee and Noe (2000) for US firms between 1982 and 1996.[141]

Further evidence on the link between stock price volatility and IR practices is provided by Rieks and Lobe (2009), who investigate 258 German firms that have been included in the DAX, MDAX, SDAX, and TecDAX indices from 2002 to 2007.[142] Using rankings awarded by analysts to firms for their overall IR activities, this study establishes a positive link between IR quality and direct liquidity measures, which has also been shown for the US companies. In a next step, the study considers both the stock return volatility and share trading volume of investigated firms. The findings reveal a significantly negative relation between these measures and the level of IR quality, which contradicts the previous empirical evidence. According to Rieks and Lobe (2009), this result supports the view that IR practices can help to reduce the divergence of investors' opinions by reducing information asymmetry between firms and investors as well as among investors themselves. In addition, the study is unable to find any evidence for the perception that higher IR quality predominantly attracts short-term oriented investors. The observed deviation in prior study results may also be attributed at this point to the differences in the investigated time periods or firms' local origins.

Further studies

The framework of the IR function as well as its impact on corporate outcomes are investigated in a few other empirical studies, which are summarized here. Bollen et al. (2006), Hassink et al.

[140] cf. on this and the following Leuz and Verrecchia (2000), pp. 99, 102, 120–121.
[141] cf. Bushee and Noe (2000), p. 200.
[142] cf. on this and the following Rieks and Lobe (2009), p. 7.

(2007), D'Amato and Cacia (2013), Feng and Wan (2013), Bagnoli et al. (2014), Koehler (2014), Trabelsi et al. (2014), and Gajewski and Li (2015) provide evidence on the contribution of Internet-based IR activities (particularly with regard to the contents of corporate websites) to the information environment and thus to the alleviation of information asymmetries. Some empirical insights are also provided into the drivers of different disclosure levels (Frankel et al., 1995; Gelb, 2000; Gelb and Strawser, 2001). Further studies investigate determinants of the existence of firms' internal IR departments and officers (Marston, 1996; Rao and Sivakumar, 1999) or deal with events that enable IR staff and management to have individual interactions with market participants, such as analyst and investor days (Kirk and Markov, 2016) and investor conferences (Green et al., 2014). In contrast, Peasnell et al. (2011) reveal the limits of even the best IR departments during high-profile corporate scandals.[143] Finally, van Geyt et al. (2014) find that high-quality disclosure reduces the profitability of insider trading. This supports the theoretical prediction of Baiman and Verrecchia (1996), who expect managers' informational advantages to be reduced by enhanced information flows to investors.[144]

One of the most recent and comprehensive studies on the economic effects of IR is provided by Karolyi and Liao (2017), who address a large number of questions raised in previous scientific literature. Several predictions and methodological procedures in the present thesis are derived from that study due to its well-developed framework. Karolyi and Liao (2017) use the results of BNY Mellon's 2012 Investor Relations Survey, which includes 773 firms located in 59 countries, to develop an IR score for each firm based on its responses related to 25 attributes concerning its IR activities.[145] As a first step, this study establishes a significantly positive link between total IR activities and a firm's market performance proxied by Tobin's Q. In the next step, Karolyi and Liao (2017) show that activities with global outreach (i.e., activities related to foreign markets) in particular are positively related to firm performance. Furthermore, by splitting the investigated sample into firms from countries with high (low) disclosure standards, regulations against self-dealing among corporate insiders, and overall rule of law levels, they determine that the positive link between global IR activities and Tobin's Q is stronger for firms with weaker disclosure provisions and lower investor protection. The IR effect is hence economically higher for these firms, whereas the subsample of companies from countries with higher disclosure and investor protection standards suffers from a lack of significant results. In addition, the absence of a

[143] cf. Peasnell et al. (2011), pp. 85–86.
[144] cf. Van Geyt et al. (2014), pp. 4, 12–13; Baiman and Verrecchia (1996), pp. 13–14, 17.
[145] cf. on this and the following Karolyi and Liao (2017), pp. 2, 15–16, 20–22.

statistically significant IR effect for the subsample of firms that are cross-listed in the US (which typically accompanies a commitment to higher firm transparency) corroborates the above-mentioned insights. As such, these findings basically support the prediction stated in chapter 2.3 with regard to heterogeneity in the economic role of IR attributed to legal and market environments. However, in this context a question arises as to how cross-country differences may actually come about—and thus whether significant divergences exist with regard to IR's relevance for several value-driving channels identified in the scientific literature (which may be more or less pronounced in a specific legal and market setting). The present thesis aims to shed light on this issue, thereby complementing the first evidence on cross-country IR differences provided by Karolyi and Liao (2017).

Using their full sample of firms, Karolyi and Liao (2017) further show that higher global IR activities are positively related to firms' foreign analyst following, institutional ownership, and global equity issuance.[146] Karolyi and Liao (2017) also report a negative significant relation between the implied cost of capital and overall IR efforts. On the other hand, relying on several proxies, they are unable to establish a strong positive relation of IR activities to stock liquidity, which is frequently suggested in prior empirical research. In the scope of additional tests, Karolyi and Liao (2017) uncover that IR activities are not merely a proxy for overall firm-level CG. This result is important for interpreting IR as a separate value-creating function.

In addition to deep investigation of the IR function, the analysis conducted by Karolyi and Liao (2017) is characterized by its comprehensive empirical framework. In particular, the study uses the fraction of IR budget allocated for external support, number of IR department members, and IR officers' base salaries for instrumentalizing firms' IR measure to address potential endogeneity concerns related to the link between IR and corporate outcomes.[147] It also deploys the distances between firms and foreign investors as an additional instrumental variable based on the concepts of proximity to investors and cost of travel. Due to the convincing design of this analysis, the present thesis relies on similar instruments to alleviate endogeneity concerns and provide conclusive evidence. In this context, the problems related to the endogeneity of variables in empirical research as well as respective solutions are introduced in the next chapter.

[146] cf. on this and the following Karolyi and Liao (2017), pp. 23, 25–26.
[147] cf. on this and the following Karolyi and Liao (2017), pp. 16–17, 19.

3.2 Endogeneity concerns in empirical studies

Endogeneity is a serious issue in the scope of accounting, finance, and corporate governance research that can distort empirical results and thus prevent causal inference.[148] With regard to IR and disclosure research, Healy and Palepu (2001) and Core (2001) voice similar doubts concerning whether studies that do not appropriately account for this issue provide any valuable insights.[149] In this context, Wintoki et al. (2012) emphasize that it is admittedly difficult to find (explanatory) factors that are fully exogenous and allow a clear link of interest to be established.[150] Endogeneity problems particularly arise because the variables included in an empirical model are often subject to simultaneous determination and measurement errors; the model may also suffer from the omission of further important variables.[151] From a statistical point of view, all of these issues can lead to a correlation between an explanatory variable and the error term of a regression model that in turn causes biased and inconsistent regression estimates.[152] The statistical relevance of this problem is discussed in detail in the methodology section of the present thesis, while the reasons for endogeneity, particularly vis-à-vis IR analysis, are explained in this chapter.

Simultaneity

The simultaneity issue means that an explanatory measure's expected impact on the outcome variable could also exist in the reverse direction.[153] As such, either the outcome variable itself can be the driver of the link to the explanatory measure (which is known as reverse causality) or both variables can be simultaneously determined distorting the empirical model's results.[154] An example of a simultaneous relation frequently mentioned in the context of CG literature is provided by Hermalin and Weisbach (2003). These researchers state that firms typically select a specific board composition to enhance their financial performance so that firm valuation can be affected by board structure, while performance itself can affect the choice of the respective directors.[155] A similar argument can be made regarding the relation between firm performance

[148] cf. Gippel et al. (2015), p. 143; Roberts and Whited (2013), p. 502.
[149] cf. Core (2001), p. 441; Healy and Palepu (2001), p. 430.
[150] cf. Wintoki et al. (2012), p. 581.
[151] cf. Gippel et al. (2015), p. 143.
[152] cf. Roberts and Whited (2013), p. 494.
[153] cf. Roberts and Whited (2013), p. 499.
[154] cf. Wintoki et al. (2012), p. 586.
[155] cf. Hermalin and Weisbach (2003), p. 8.

and IR quality, where IR is expected to drive this link. According to Healy and Palepu (2001), increased disclosure activities may also be encouraged by good company performance, for instance because firms are more willing to communicate with the capital market during good times.[156] In this setting, the positive relation between firm value and IR assessed within the empirical analysis may result from the performance itself rather than from good IR. Similar simultaneity (or reverse causality) issues are also conceivable for other expected outcomes of enhanced IR, as suggested by Core (2001).[157]

Measurement errors

Endogeneity problem may also arise if the empirical model contains measurement errors in the proxies it uses for factors that are difficult to measure or even to observe.[158] In the case of a measurement error in an explanatory variable (that is the difference between the value of the proxy and true value reflected in the error term), the explanatory variable's estimated effect suffers from a so-called familiar attenuation bias that shrinks the coefficient of interest downwards toward zero. In addition, the coefficients of other explanatory variables may also be biased by a measurement error in the proxy, however in either direction depending on the correlation among covariates. Roberts and Whited (2012) emphasize that CG research in particular frequently has to rely on proxy measures, for instance to approximate diverse quality aspects. This problem seems to also be inherent in studies on IR and disclosure, which often rely on rankings to proxy IR quality, the extent of respective activities, or both.[159] Some researchers use self-constructed IR indices, for example deploying survey data (e.g., Karolyi and Liao, 2017);[160] others use nominations for best IR (e.g., Agarwal et al., 2015)[161] or IR rankings provided directly by analysts (e.g., Brown and Hillegeist, 2007; Rieks and Lobe, 2009).[162] Further measures are based on factor such as memberships in IR associations, as used by Kirk and Vincent (2014).[163] According to Core (2001), such IR proxies can also obviously be subject

[156] cf. on this and the following Healy and Palepu (2001), pp. 430–431.
[157] cf. Core (2001), p. 446.
[158] cf. on this and the following Roberts and Whited (2013), pp. 501–504.
[159] cf. Core (2001), p. 452.
[160] cf. Karolyi and Liao (2017), p. 3.
[161] cf. Agarwal et al. (2015), p. 6.
[162] cf. Brown and Hillegeist (2007), p. 450; Rieks and Lobe (2009), p. 6.
[163] cf. Kirk and Vincent (2014), p. 1427.

to measurement concerns that in relation to IR indices and ratings particularly arise from the possibility of judgment errors.[164]

Omitted variables

An additional major source of endogeneity in the scope of empirical studies is the omission of important factors that affect the explanatory as well as the outcome variable.[165] While investigating a research question, scholars are typically faced with the issue that the analyzed objects (such as firms) are heterogeneous regarding a wide range of different characteristics, some of which can admittedly be hard to quantify.[166] If relevant factors correlated with both variables of interest are not included in the analysis as explanatory measures, they consequently occur in the model's error term that in turn will be naturally correlated with the affected explanatory variable—which constitutes an endogeneity problem. Hermalin and Weisbach (2003) provide an example of the omitted variable bias in the scope of CG research, once again relying on the relation between firm performance and board characteristics.[167] They argue that both firm performance and board composition may be causally determined by a CEO's previous performance (or more generally, a CEO's ability); as such, omitting this factor, which is obviously not easy to measure, may yield spurious results that indicate an ostensible link between firm value and board characteristics. The same issue may arise in the context of IR analysis, where firm outcomes and IR quality could depend on a CEO's skills. The research of Custódio and Metzger (2014) provides evidence for this by indicating that CEOs who are financial experts tend to communicate better with the financial market, while simultaneously affecting the firms' financing and investment characteristics in another manner than their non-financial expert counterparts.[168] According to Chang et al. (2008), more obvious factors also exist, the omission of which can lead to incorrect conclusions.[169] For instance, previous research indicates that firm size positively affects a company's disclosure activities as well as analysts' forecast properties.[170] As such, the model estimates may be biased if the study does not appropriately account for the size of investigated firms.

[164] cf. Core (2001), p. 452.
[165] cf. Wintoki et al. (2012), p. 586.
[166] cf. on this and the following Roberts and Whited (2013), p. 498.
[167] cf. on this and the following Hermalin and Weisbach (2003), p. 8.
[168] cf. Custódio and Metzger (2014), pp. 125, 133–135.
[169] cf. Chang et al. (2008), p. 377.
[170] cf. Lang and Lundholm (1993), p. 269. For further elaboration, see Chang et al. (2008), p. 377.

Methodological solutions

Given that endogeneity is a recognized issue in various research areas, several techniques that should allow to at least alleviate the corresponding concerns have been introduced in previous empirical studies.[171] The first approach considered in this thesis deals particularly with the problem of the omitted variable bias that results from the unobserved heterogeneity that is constant over time.[172] This statistical method, which is known as FE estimation, makes it possible to eliminate the fixed component of unobserved differences (e.g., across firms), while requiring a panel structure of the sample data.[173] The main characteristic of the panel data is that it additionally covers several time points (e.g., years) for the investigated cross-section.[174] If such a data structure is available, the FE estimation is conducted by demeaning all variables in the model relying on the individual mean values obtained from the considered time period for each group of observations.[175] Gormely and Matsa (2014) emphasize that in the presence of unobserved heterogeneity, the FE approach provides consistent estimates and is well suited to address existing concerns, inter alia in finance research. However, this method also has some limitations; in particular, the FE approach does not make it possible to identify the effects attributed to explanatory variables that do not vary over time and cannot account for time-variant unobserved heterogeneity. The concerns attributed to the last issue can be at least partially addressed by including adequate control variables in the research model, as indicated in previous elaborations on firm size.[176]

Another statistical method capable of dealing with the endogeneity of explanatory variables is the IV approach. According to Larcker and Rusticus (2010), IV estimation can help to address several causes of endogeneity; in addition to the omitted variables bias, it also addresses both measurement errors and simultaneity (or reverse causality) concerns.[177] This is because in an IV setting, the endogenous explanatory variable has to be instrumentalized (or proxied) by an exogenous instrument (or a set of those instruments) that is not correlated with the error term. As such, instruments' impacts on the explained variable have to come solely through their effect on the instrumentalized variable.[178] This further implies that the instruments must be correlated with

[171] cf. Gippel et al. (2015), pp. 143–144.
[172] cf. Wooldridge (2013), p. 444, 466.
[173] cf. Wintoki et al. (2012), pp. 586–587.
[174] cf. Wooldridge (2013), p. 10.
[175] cf. on this and the following Gormley and Matsa (2014), pp. 631, 650.
[176] cf. Wintoki et al. (2012), p. 588.
[177] cf. on this and the following Larcker and Rusticus (2010), pp. 186–187, note 3.
[178] cf. Reeb et al. (2012), p. 214.

the endogenous variable of interest after the impacts of other variables included in the model are netted out.[179] Once such instruments have been identified, the most common approach in scientific research, namely two-stage least squares (2SLS) can be implemented. As a first step, the instruments and other exogenous variables (controls) in the model are used to predict the endogenous variable's values. At the second stage, these predicted values are used to replace the endogenous measure and estimate the impact on the outcome variable. A few other estimation methods, such as three-stage least squares (3SLS) and the Heckman approach, also rely on instrumental variables.[180] However, analogous to 2SLS estimation, they all have to deal with the issue of finding appropriate exogenous instruments in the context of the investigated research question.[181] As recognized in the scientific literature, the study of Bennedsen et al. (2007) provides a good example of well-suited instruments.[182] This study investigates the impact of family CEO succession on firm performance, assuming the succession variable to be endogenous.[183] To alleviate the omitted variable bias and reverse causality concerns, Bennedsen et al. (2007) use the gender of the departing CEO's firstborn child as their instrument for the succession decision. In this regard, it is difficult to imagine that the child's gender affects firm outcomes, while the study empirically shows a higher probability for the appointment of a family CEO if the departing CEO's firstborn child is male. This instrument thus seems to be truly exogenous as well as relevant in the case of CEO succession; as such, the negative effect of family succession on performance assessed in this study can be seen as causal.[184] In the context of voluntary disclosure research, several studies (e.g., Leuz and Verrecchia, 2000; Brown and Hillegeist, 2007; Chang et al., 2008) introduce different instruments that should help to establish causal inference. However, according to Larcker and Rusticus (2010), most of these instruments, which frequently comprise financial ratios or analyst and investor properties, are selected in an arbitrary way and may not meet the exogeneity assumption.[185] By introducing IR resources (i.e., the budget for external help, the number of IR staff, and IR staff base salaries) as the instruments for IR activities, Karolyi and Liao (2017) attempt to avoid the aforementioned concerns.[186] This set of instruments appears to be better suited to comply with the exogeneity requirement in the

[179] cf. on this and the following Roberts and Whited (2013), pp. 512–513.
[180] cf. Larcker and Rusticus (2010), p. 187.
[181] cf. Agarwal et al. (2015), p. 14; Larcker and Rusticus (2010), p. 189.
[182] cf. Roberts and Whited (2013), p. 514; Wintoki et al. (2012), p. 586, note 2.
[183] cf. on this and the following Bennedsen et al. (2007), pp. 647, 688–689.
[184] cf. Roberts and Whited (2013), pp. 514–515.
[185] cf. Larcker and Rusticus 2010, pp. 187, 198–198.
[186] cf. on this and the following Karolyi and Liao (2017), pp. 16–17, 19

context of IR research, although Karolyi and Liao (2017) also voice some doubts. More specifically, they assert that the application of these instruments may be linked to the issue that IR resources are at a firm's discretion and thus could be related to firm value. In consequence, following Karolyi and Liao (2017) the present thesis does not only rely on this set of instruments; it also deploys measures based on proximity to investors and ease of traveling for IR officers and management, as presented and motivated in the methodology section. The next chapter first develops hypotheses on the economic relevance of IR and describes the sample data.

4 Hypotheses, measures, and sample data

4.1 IR quality and firm performance

4.1.1 Hypotheses

Fundamental expectations concerning whether IR activities generate value are highly dependent on whether the potential benefits of IR can outweigh the costs attributed to this function.[187] As already indicated in previous chapters of this thesis, IR can contribute to shareholder wealth and consequently to a firm's market performance through several channels. In short, IR can help to both reduce the level of information asymmetry through (voluntary) disclosure and increase a firm's market visibility and recognition. The establishment and maintenance of (close) relationships to market participants and the formation of a stable shareholder base can also be seen as important outcomes of the IR function. In line with Brennan and Tamarowski (2000), all of this may ultimately result in lowering a firm's cost of capital and increasing its market valuation.[188] On the other hand, Hong and Huang (2005) point out that IR activities can be accompanied by substantial costs, which in the first instance include expenses related to information production and dissemination as well as to attracting and supporting investors and analysts.[189] In addition, the time that top executives and other involved parties expend on IR activities generates opportunity costs. Furthermore, firm insiders may exploit IR to achieve personal goals (e.g., a higher liquidity of their stakes) that do not necessarily benefit other shareholders to the same extent, even though the corresponding costs are borne by all stockholders. In addition, Agarwal et al. (2015) state that not all of the outcomes of good IR necessarily create value for shareholders.[190] For instance, higher firm visibility may also be value-destroying if it leads to market over-optimism accompanied by lower firms' future returns. Lang and Lundholm (2000) further emphasize that stock marketing activities do not necessarily contribute to persistent value increase due to downward corrections by the market.[191] Finally, IR investments may represent sunk costs for already renowned firms that are intensively followed by analysts and exhibit only a low information asymmetry level.[192]

[187] cf. Agarwal et al. (2015), pp. 4–5.
[188] cf. Brennan and Tamarowski (2000), pp. 30, 37.
[189] cf. on this and the following Hong and Huang (2005), pp. 1–2.
[190] cf. on this and the following Agarwal et al. (2015), p. 5.
[191] cf. Lang and Lundholm (2000), p. 623.
[192] cf. Agarwal et al. (2015), p. 5.

Indeed, some of the empirical studies presented in chapter 3.1 (e.g., Dennis, 1973; Rieks and Lobe, 2009) are unable to establish a positive link between IR and firm value, whereby none of these studies report a systematically negative relation. On the other hand, most of the recent empirical results—such as those of Vlittis and Charitou (2012), Kirk and Vincent (2014), and Agarwal et al. (2015)—suggest that better IR does significantly enhance market performance for both small and well-developed companies, which indicates that IR's benefits seem to outweigh its costs and consequently enhance shareholder wealth. The present thesis provides additional contribution to existing studies on the performance relevance of IR by considering a recent time period of 10 years for a broad panel dataset that comprises German and UK firms and thereby extending the empirical results mainly reported for the US market with evidence concerning European firms. Motivated by the question of whether IR as a potentially costly function is worthwhile, the expectation in this thesis is formulated in line with the majority of previous IR studies:

$H_{1.1}$: *Better IR quality is associated with higher firm performance in Germany and the UK*

Furthermore, as previously elaborated in chapter 2.3 and indicated in the study of Karolyi and Liao (2017), the extent of IR's value contribution may deviate among countries due to divergences in their legal and market environments. In line with the implications provided by the studies of La Porta et al. (1998, 2000), Ball et al. (2000), and Djankov et al. (2008), the level of (residual) information asymmetry seems to be higher in the case of German firms (which act in a civil law and bank-based environment) compared to UK companies (which are subject to common law traditions and a market-based financial system). One could consequently expect that IR activities that deal with information provision are more relevant for German companies and therefore provide a higher contribution to firms' market valuation. On the other hand, in line with Lev (2012) and Bushee and Miller (2012), IR activities that aim to raise firm visibility among market participants and ultimately to attract investors may have a similar performance impact in both countries—or have even higher relevance in the UK due to firms being more reliant on market financing. Nevertheless, because the information aspect of IR in particular appears to be tangential to a variety of value-generating channels (as indicated in the literature review), this thesis expects a higher value impact of IR for German firms in comparison to UK companies:

$H_{1.2}$: *The positive link between IR quality and firm performance is stronger for German firms in comparison to UK firms*

The empirical investigation of this prediction contributes to the existing literature by providing evidence on the differences in the relevance of IR quality for companies based in two developed countries characterized by divergent financial market systems and law environments.

4.1.2 Measure of IR quality and its practical relevance

The present thesis uses IR firm rankings obtained from the Extel WeConvene (formerly Thomson Reuters) survey, which is the world's largest study of this kind,[193] to measure the quality of the IR activities of German and UK listed firms. According to the interviews undertaken with IR professionals, the results of the Extel survey are highly regarded by practitioners and constitute an appropriate external measure of firms' IR performance. The practical relevance of the Extel rankings becomes further apparent through a review of the IR web portals of several German and UK companies (e.g., BASF AG, Deutsche Telekom AG, or Daily Mail, and General Trust plc), all of which prominently present the results achieved in this survey to highlight the firm's IR performance.[194] The validity of the rankings is further encouraged by the survey approach, which in contrast to Karolyi and Liao (2017) does not rely on information that firms provide on their own IR activities and instead uses the perceptions of individuals from buy-and sellside firms (who are the direct addressees of IR practices and can provide independent and sound opinions on the quality of companies' IR). This is particularly true seeing as the surveyed individuals from sellside firms are typically analysts who work for brokerage or research firms and cover the evaluated companies, whereas the respondent buyside firms ordinarily represent institutional investors (who usually constitute the primary target group of IR departments). A similar IR measure is also used in the empirical studies of Heflin et al. (2015), Rieks and Lobe (2009), Brown and Hillegeist (2007), and Botosan and Plumlee (2002).

In particular, participants in the Extel survey are asked to vote on the overall IR quality of evaluated companies using a scale from 1 to 5, while considering major IR aspects such as the quality of service, website/webcasting, one-on-one meetings, non-deal roadshows, formal

[193] cf. Thomson Reuters (06/17/2014): http://thomsonreuters.com/en/press-releases/2014/thomson-reuters-announces-2014-extel-survey-results.html.

[194] cf. BASF (n.d.): https://www.basf.com/en/company/investor-relations/awards.html,
Deutsche Telekom (n.d.): https://www.telekom.com/en/investor-relations/service/awards,
Daily Mail and General Trust (11/26/08): http://www.dmgt.com/news-and-media/news-articles/2008/26-11-2008.

disclosure, the proactivity of senior executives, and business knowledge/insights.[195] Given that respondents may come from the same buy- or sellside firm, the votes of individuals from the same institution are combined to obtain an average vote for that firm. After the votes of all participating buy- and sellside firms are calculated, they are weighted using the European assets under management in the case of buyside firms and by applying previous years' Extel brokerage rankings for votes submitted by sellside companies. This weighting scheme should help to account for the market presence of respective participants. Finally, companies are ranked relative to their counterparts on the basis of the aggregated scores for each evaluated firm. The stock indices that have included the respective companies in the given year are used for the classification. For the German market, firms are compared within the DAX, MDAX, SDAX, and TecDAX indices.[196] For UK firms, the FTSE 100, FTSE 250, and FTSE Small Cap indices are applied.[197] Due to the indices' requirements concerning factors such as the constituents' (free float) market capitalization and share turnover, this approach ensures that a firm is ranked against companies that exhibit, inter alia, a comparable size. This addresses the issue of the variation in IR quality simply being an outcome of the investigated firms' different development levels. In the end, the aforementioned approach yields each firm's position in the given year, with a value of 1 being assigned to the firm in the first place (indicating the best IR quality) and, for instance in the case of DAX-listed firms, the company with the worst IR performance receiving a value of 30.

The results of the Extel survey, which is conducted both online and in paper form, are obtained for the time period from 2006 to 2014. The final dataset used in this thesis covers rankings for 199 German firms and 338 UK companies for which the required data is available. Overall, the German sample covers 1143 firm-year observations and the UK sample contains 1651. Furthermore, the rankings are matched to firms' outcomes potentially affected by IR activities

[195] cf. on this and the following Extel (n.d.) https://www.extelsurveys.com//IRBenchmarks/IRBenchmarksHome.aspx, DIRK (06/13/2013): https://www.dirk.org/dirk_webseite/static/uploads/130613_final_DIRK_Extel_2013_English.pdf, DIRK (05/10/11): https://www.dirk.org/dirk_webseite/static/uploads/100511_-_extel_ir_2010_report_deutsch_final.pdf.

[196] The DAX index contains the 30 largest stocks listed on the Prime Standard of the Frankfurt Stock Exchange. The MDAX index comprises the following 50 companies and the SDAX the next 50 firms sorted by size. The TecDAX index includes the 30 largest technology companies after the firms already covered by the DAX index. See Deutsche Börse (n.d.) http://www.deutsche-boerse-cash-market.com/dbcm-en/primary-market/being-public/indices.

[197] The FTSE 100 index contains the 100 firms listed on the London Stock Exchange that have the highest market capitalization. The FTSE 250 index comprises the next 250 firms and FTSE Small Cap index nearly 280 subsequent companies sorted by their market capitalization. See FTSE Russell (n.d.): http://www.ftse.com/products/indices/uk.

(e.g., market performance), as well as to other corporate characteristics that are introduced later in this thesis. In this context, it should be noted that the Extel survey is typically conducted during a period between February and early May.[198] Consequently, the IR rankings are matched to the firm characteristics of the fiscal year ending before, during, or directly after the evaluation period. For instance, if a firm's fiscal year ends in December 2007, the IR ranking obtained for this firm within the 2008 Extel study is used to approximate its IR performance in 2007. Furthermore, the results of the same study are matched to the firm's characteristics from the fiscal year ending, e.g., in April 2008, because the corresponding votes of the buy- and sellside firms obviously refer to IR activities performed during that fiscal year, irrespective of its overlap with the evaluation period. This procedure ultimately makes it possible to create an appropriate panel structure for the present sample.

Validity test

As described earlier in this chapter, the Extel IR rankings appear to be an appropriate measure of IR performance. To further validate this proxy, the present thesis conducts an empirical analysis motivated by previous empirical studies on management turnover. As suggested by Coughlan et al. (1985), if managers' activities do not positively contribute to shareholder wealth, a change in the management team's composition could be expected.[199] Using past abnormal stock performance (relative to a market index) as the measure of management performance, these researchers show that the probability of CEO dismissal declines with higher firm market performance. Warner et al. (1988) provide similar evidence.[200] Following this basic idea and assuming that the Extel rankings adequately measure IR quality (or performance), one should expect that the probability of IR manager turnover is negatively linked to better Extel survey results. Furthermore, while a firm's management team is typically led by the CEO, the head of IR is his or her counterpart in the IR department and bears primary responsibility for the company's IR activities.[201] In consequence, the following hypothesis is tested in the scope of the empirical analysis:

$H_{1.3}$: *The probability of head of IR turnover is inversely related to IR quality*

[198] cf. DIRK (06/13/2013): https://www.dirk.org/dirk_webseite/static/uploads/130613_final_DIRK_Extel_2013_English.pdf, DIRK (05/07/07): https://www.dirk.org/dirk_webseite/static/uploads/070520_-_extel_ir_study_2007.pdf.
[199] cf. for this and the following Coughlan and Schmidt (1985), pp. 46, 48, 60–63.
[200] cf. Warner et al. (1988), p. 461.
[201] cf. Vlittis and Charitou (2012), p. 945.

To assess the validity of this prediction, a unique sample containing information on IR officers is compiled for the full sample period from 2006 to 2014.[202] The heads of IR for each given firm-year are identified by scanning corporate websites (also using the "Wayback Machine", which makes it possible to browse past versions of websites), annual reports, and the "Hoppenstedt Aktienfuehrer" database, as well as by consulting the information provided in the Extel IR surveys. Given that information on the exact or at least approximate date of head of IR turnover is not available for all cases, an advanced search for related announcements is conducted via the LexisNexis database (which can be used to browse news articles, publications, and other materials from a variety of origins, including wire services). Lastly, this hand-collected dataset is complemented by a Google search. Following prior studies, IR rankings applicable to the fiscal year before a head of IR change are used to evaluate the link between IR quality and turnover probability.

4.1.3 Firm performance proxy

In line with several empirical studies on the value relevance of CG characteristics (e.g., Morck et al., 1988; Yermack, 1996; Kaplan and Zingales, 1997; La Porta et al., 2002; Gompers et al., 2003; Bebchuk et al., 2009), Tobin's Q is used as the market-based firm performance proxy in the present thesis. Tobin (1969), who first introduced this measure in the scope of his theoretical study, defines Q as "the value of capital relative to its replacement cost."[203] In the context of financial metrics, Tobin's Q consequently indicates a firm's relative price by putting its market value in relation to the replacement costs of its assets:[204]

$$Tobin's\ Q = \frac{Market\ value\ of\ equity + Market\ value\ of\ debt}{Replacement\ costs\ of\ assets} \quad (1)$$

According to Morck et al. (1988), one of the main advantages of applying Tobin's Q in the context of CG studies is that this ratio makes it possible to assess whether a firm "has valuable intangible assets in addition to physical capital, such as monopoly power (…), goodwill, a stock

[202] As the analysis of IR turnovers is only conducted to support the validity of the IR measure, which is the same for both investigated countries, the verification test is limited to German companies for which the required data is available from the aforementioned sources.
[203] Tobin (1969), p. 21.
[204] cf. Yermack (1996), pp. 190, 192; Chung and Pruitt (1994), p. 70.

of patents, or good managers."[205] If a firm owns such intangible resources, Tobin's Q should theoretically exceed a value of 1, because the capital market would assign a higher value to the firm that would be accompanied by an increase in the numerator.[206] The quality of a firm's IR can also be considered as an intangible factor that may contribute to the part of the market valuation that goes beyond the firm's measurable assets. For instance, Karolyi and Liao (2017) as well as Vlittis and Charitou (2012) rely on Tobin's Q as a performance measure in the scope of their IR analyses.

However, because some components of Tobin's Q are admittedly hard to quantify, empirical studies usually deploy approximations of this ratio.[207] Estimating the replacement costs of a firm's assets poses a particular challenge, which is typically resolved by using the book values of company's assets. The same applies to the market value of a firm's debt, which is frequently assumed to be equal to its book value. Chung and Pruitt (1994) show that such approximation of Tobin's Q has moderate requirements regarding the data and the calculation effort, while it almost completely explains the variability of this ratio obtained by more complex techniques. As such, the approximate Tobin's Q is used in the present thesis:[208]

$$Approximate\ Tobin's\ Q = \frac{Market\ value\ of\ all\ shares\ outstanding + Book\ value\ of\ debt}{Book\ value\ of\ total\ assets} \quad (2)$$

where the market value of shares is calculated by multiplying the firm's stock price by the number of outstanding shares. For multiple equity securities, the value of each security is determined separately.[209] In the next step, these values are cumulated to the full market value of the firm's equity. For this thesis, all stock prices, numbers of shares, and book values referring to fiscal year-ends are extracted from the Thomson Reuters Datastream.

According to Vlittis and Charitou (2012), Tobin's Q is also used in scientific research as a proxy for the growth opportunities of a firm that are incorporated into its market value in accordance with investors' expectations.[210] Given that firms with more growth opportunities may profit more

[205] Morck et al. (1988), p. 296.
[206] cf. Lindenberg and Ross (1981), p. 2.
[207] cf. on this and the following Kaplan and Zingales (1997), p. 177; Gompers et al. (2003), p. 126; Bebchuk et al. (2009), p. 800.
[208] cf. Chung and Pruitt (1994), p. 71.
[209] The value of outstanding preferred stocks is calculated as the liquidating value. Cf. Chung and Pruitt (1994), p. 71.
[210] cf. on this and the following Vlittis and Charitou (2012), p. 952.

from IR activities (e.g., through reduced financing costs) and may be consequently more engaged in IR, endogeneity issues may arise. As such, the present thesis appropriately accounts for the growth opportunities of the sample firms to alleviate the aforementioned concerns and establish a less noisy relation between IR and firm performance. Further control variables deployed in this analysis are introduced in the next chapters.

4.2 IR quality and common value-generating channels

4.2.1 Hypotheses

The contribution of IR to firm value discussed in the previous section can be encouraged through several channels, as shown by the empirical studies presented in chapter 3.1. However, the results of these studies, which are primarily conducted in relation to the US market or a set of pooled countries, are mixed; as such, it is still not clear whether major omitted factors (e.g., country-specific settings) drive the outcomes of that research and are responsible for the identified differences. The main contribution of this part of the present thesis concerns the disentanglement of IR effects on firms' major financial metrics with regard to the base level of information and prevalent financial structures in a given country. Using the most recent panel data available for German and UK firms, this thesis is the first to perform such a broad and deep analysis in trying to identify the relevance of IR activities in different market environments. Corresponding hypotheses are derived below.

Stock volatility

The divergences in empirical results on the impact of IR on firms' stock volatility are revealed through the significantly negative effect found by Rieks and Lobe (2009) for the German market and the mixed evidence presented by Bushee and Noe (2000) for US firms (which even indicates an increase of stock volatility in the case of IR improvements).[211] In general, the main reason that good IR may negatively affect the volatility of firms' stocks is the reduction of information asymmetries between firms and their shareholders as well as among investors themselves.[212] More forthcoming information provision should therefore align investors' expectations and

[211] cf. Rieks and Lobe (2009), p. 24; Bushee and Noe (2000), pp. 187, 200.
[212] cf. on this and the following Leuz and Verrecchia (2000), p. 99.

ensure a fair firm valuation, thereby reducing stock price fluctuations. On the other hand, as Bushee and Noe (2000) suggest, enhanced IR may attract more transient institutional investors with high turnover in their portfolios, who in turn positively contribute to stock volatility.[213] However, on the contrary Bushee and Miller (2012) show that IR activities tend to attract long-term rather than short-term investors, which makes this relation appear more obscure.[214]

Consideration of the aforementioned predictions and empirical evidence yields divergent expectations on the link between IR and stock volatility for German and UK firms. First, because German companies seem to suffer from greater information asymmetry issues, higher quality IR should contribute more to the reduction of their stock volatility than in comparison to their UK counterparts. Furthermore, the inconsistent empirical results on the formation of the shareholder base and this base's role for the stock deviation may be related to the fact that high-quality IR is linked to an intensive shareholder base management—which aims to achieve an equilibrium between liquidity and the volatility of firm's stock by selecting suitable investors in accordance with a firm's current requirements.[215] As a result, the ownership of short- and long-term investors should on average yield a zero-net effect on stock volatility, which is in line with elaborations of Bushee and Noe (2000).[216] Here improving the information environment still seems to be the main channel through which IR quality may affect stock volatility, whereby the extensive relationship management conducted in the scope of good IR could, for instance additionally help to avoid conflicts between firms and their shareholders as suggested by Hoffmann et al. (2011)—and thereby contribute to less volatile stock prices.[217] In summary, one can also expect at least a non-positive relation between better IR and volatility for UK firms. These considerations lead to the following hypotheses:

$H_{2.1}$: *Better IR quality is associated with lower stock volatility for German firms*

$H_{2.2}$: *Better IR quality is either not or negatively associated with stock volatility for UK firms*

$H_{2.3}$: *The (negative) link between IR quality and stock volatility is stronger for German firms in comparison to UK firms*

[213] cf. Bushee and Noe (2000), p. 187, 200.
[214] cf. Bushee and Miller (2012), p. 884.
[215] cf. Lev (2012), p. 52; Diamond and Verrecchia (1991), p. 1348.
[216] cf. Bushee and Noe (2000), p. 200.
[217] cf. Hoffmann et al. (2011), pp. 4, 6.

Analyst following, forecast dispersion, and forecast error

As discussed in chapter 2.2, in addition to contributing to information provision, IR activities may also aim to enhance firm visibility and recognition among market participants, which can in turn help to improve the company's ability to raise funds and form its desired shareholder base. Following the theoretical work of Merton (1987), which assumes that market participants invest only in stocks about which they are aware,[218] several empirical studies additionally predict that market participants' awareness of a company ultimately enables the firm to lower its financing costs.[219] In this context, information intermediaries such as financial analysts serve as an important link between companies and financial markets (e.g., by providing reports and estimates on firm performance as well as specific investment recommendations).[220] Firms may thus have an incentive to attract more analysts to cover their stocks and increase their recognition among potential investors.[221] The extensive support of analysts, which may include activities such as calls and meetings with IR and management representatives, can positively contribute to the aforementioned goal.[222] Furthermore, prior empirical studies have found that a higher number of analysts following a firm is linked to less dispersed and more accurate estimates concerning the company's future earnings.[223] Potential investors may ultimately anticipate the more consistent views of analysts on a firm's prospects, which in turn may result in their more congruent beliefs about firm performance.[224] In this context, a more informative company disclosure as an element of better IR practice can also help to expand the analyst coverage by reducing analysts' efforts and costs linked to information searches.[225] In addition, more sophisticated disclosure not only encourages the reduction of the information asymmetry level, which makes more accurate estimates possible; it also enhances the reliability of the disclosed information, which can result in higher analysts' agreement being reflected in their forecasts.

The results of previous empirical studies such as Agarwal et al. (2015), Kirk and Vincent (2014), and Lang and Lundholm (1996) widely support the prediction concerning the positive relation between IR and analyst following. In contrast, the empirical evidence on the link between IR and analyst dispersion is mixed and seems to depend on the study setting. For instance, Chang et al.

[218] cf. Lehavy and Sloan (2008), p. 328.
[219] cf., amongst others, Bushee and Miller (2012), p. 870; Kirk and Vincent (2014), p. 1425.
[220] cf. Chang et al. (2014), p. 366.
[221] cf. Aerts et al. (2007), p. 1305.
[222] cf. Bollen et al. (2006), p. 275.
[223] cf. Hope (2003), p. 261; Aerts (2007), pp. 1316–1319.
[224] cf. Lang and Lundholm (1996), p. 490.
[225] cf. on this and the following Brennan and Tamarowski (2000), p. 30.

(2014) argue that they may be unable to establish the expected relation due to the predominance of small firms with a limited analyst following in the scope of their sample.[226] However, this issue does not appear to apply to the broad sample of companies analyzed in the present thesis. Aerts et al. (2007) also do not present significant results for their sample of continental European firms.[227] This is presumably due to their application of a web-based disclosure measure that obviously captures only a part of IR functions and does not consider, for instance the quality of conference calls and meetings—and as such fully neglects individual communication with analysts. The rankings used in the present study, on the other hand, reflect the overall quality of IR and consequently allow this concern to be overcome. Furthermore, in contrast to Hope (2003), Farragher et al. (1994) are not able to establish a link between IR and accuracy of earnings forecasts in the scope of their correlation analysis.[228] This could be attributable to the omission of important explanatory variables such as firm size and analyst coverage, which are consequently taken into account in the present analysis.

In addition to the differences in the settings of the previous studies, the divergences among the empirical results may be further ascribed to the different information environments applicable to the investigated firms. In line with Aerts et al. (2007), the analysts covering German companies may face higher costs related to the gathering of information compared to UK firms, due to the less sophisticated base level of existing disclosure provisions.[229] In turn, the higher information asymmetry level in Germany offers more scope for (voluntary) IR disclosure, which makes it possible to reduce information search costs and encourages more accurate forecasts; as a result, better IR should more severely affect analysts' estimates and coverage in the case of German firms. In summary, while the potential goal of enhancing a firm's market visibility can be equally attributed to the IR activities of German and UK companies, the information aspect seems to be more important for German firms. One can therefore expect a positive link between IR and analyst following for firms from both countries, whereas the negative relation between IR and forecast dispersion or forecast error should primarily appear for German companies. Consequently, the following hypotheses are tested in the present thesis:

$H_{3.1}$: Better IR quality is associated with higher analyst following for German firms

[226] cf. Chang et al. (2014), p. 365.
[227] cf. on this and the following Aerts et al. (2007), p. 1320.
[228] cf. on this and the following Farragher et al. (1994), p. 410.
[229] cf. Aerts et al. (2007), pp. 1305–1307.

$H_{3.2}$: Better IR quality is associated with higher analyst following for UK firms

$H_{3.3}$: Better IR quality is associated with lower analysts' forecast dispersion for German firms

$H_{3.4}$: Better IR quality is either not or negatively associated with analysts' forecast dispersion for UK firms

$H_{3.5}$: Better IR quality is associated with lower analysts' forecast error for German firms

$H_{3.6}$: Better IR quality is either not or negatively associated with analysts' forecast error for UK firms

$H_{3.7}$: The links between IR quality and analyst coverage, forecast dispersion, and forecast error are stronger for German firms in comparison to UK firms

Stock liquidity

Stock liquidity usually exhibits a close connection to the conditions on which companies can raise new capital.[230] This is because less liquid firms must frequently offer discounts to their investors to compensate them for the higher risk attributed to the illiquidity of shares. As such, IR activities typically aim to address issues that result in low stock liquidity (e.g., information asymmetry and limited firm visibility) to improve a firm's financing terms. As suggested in prior scientific literature, enhanced firm disclosure reduces the risk of investors and market makers facing a sell or buy order coming from market participants who have better or private information, which subsequently increases the firm's stock attractiveness and decreases the respective bid-ask spread.[231] Furthermore, investors should have higher incentives to invest in more prominent firms linked to lower information search costs and reduced expropriation risks, thereby increasing the overall trading activities in corresponding stocks.[232]

Results of empirical studies undertaken by authors such as Leuz and Verrecchia (2000), Vlittis and Charitou (2012), and Kirk and Vincent (2014) widely confirm the positive relation between IR activities and firms' stock liquidity. In contrast, Karolyi and Liao (2017) present mixed evidence concerning this relation, which essentially indicates the absence of the expected link.[233] On the one hand, this finding may be attributed to the substantial differences between the sample

[230] cf. on this and the following Leuz and Verrecchia (2000), p. 92.
[231] cf. Brown and Hillegeist (2007), p. 446; Chang et al. (2008), p. 382.
[232] cf. Agarwal et al. (2015), p. 1.
[233] cf. Karolyi and Liao (2017), p. 26.

firms pooled from different countries; on the other hand, it may be related to the fact that the OLS regression conducted within the scope of the bid-ask spread analysis does not appropriately account for the endogeneity issues emphasized by Chang et al. (2008).[234]

Following the predictions commonly made in the scientific literature and considering the fact that IR should positively contribute to firm visibility and the level of trading activities in a firm's stock in different legal and market environments, a positive relation between IR quality and stock liquidity is expected for German as well as for UK firms. However, because investors in a bank-based financial system and civil law environment may profit more from enhanced information provision that is accompanied by a lower probability of information-based trading by individual investors and hence lower divergences between the bid and ask prices,[235] IR is expected to have a more pronounced impact for German firms. The following hypotheses are thus evaluated in this thesis:

$H_{4.1}$: *Better IR quality is associated with higher stock liquidity for German firms*

$H_{4.2}$: *Better IR quality is associated with higher stock liquidity for UK firms*

$H_{4.3}$: *The positive link between IR quality and stock liquidity is stronger for German firms in comparison to UK firms*

Cost of capital

In the scientific literature on IR (and disclosure), researchers usually expect a negative relation between this corporate function and the cost of (equity) capital;[236] however, previous empirical results do not always support this prediction. As mentioned in the scope of developing hypotheses on other potential good IR outcomes, IR could also reduce a firm's cost of capital for two main reasons. First, more informative firm disclosure should negatively affect the level of private information among investors and the extent of hidden information between investors and a firm's management, thus simultaneously reducing the uncertainty factor and lowering the discount (or return) claimed by market participants with regard to an investment in the firm.[237] The second channel through which IR could affect capital costs is a firm's better recognition by

[234] cf. Chang et al. (2008), p. 386.
[235] cf. Beck and Levine (2002), p. 148; La Porta et al. (2002), p. 1165, note 12.
[236] cf., amongst others, Diamond and Verrecchia (1991), p. 1325; Brennan and Tamarowski (2000), pp. 34–37.
[237] cf. Botosan (1997), p. 325; Leuz and Verrecchia (2000), p. 92; Diamond and Verrecchia (1991), pp. 125–127.

investors and analysts, which as suggested by the model of Merton (1987) can ultimately increase the attractiveness of its stock to fund providers.[238]

The empirical results of Botosan (1997), Botosan and Plumlee (2002), Francis et al. (2005) as well as Heflin et al. (2015) reveal that the different components of a firm's communication with capital markets seem to have different effects on its equity costs. While all of the aforementioned studies establish a negative link between the quality of disclosure in annual reports and the cost of equity capital, the absence of such a link—or even a positive relation—between capital costs and explicit IR activities (e.g., individual communication) has also been reported. However, these results (particularly the latter) may be not applicable to more recent time periods, because they were obtained for the era before serious legal disclosure provisions (e.g., Regulation Fair Disclosure in the US) were introduced and individual communication with some market participants was possibly linked to a risk of information disadvantages for investors (and thus to potentially higher equity costs).[239]

The model presented by Hong and Huang (2005) provides additional insights into the role of IR for firms' capital costs by indicating that enhanced IR does not always necessarily lead to a decrease in these costs.[240] As such, the improvements of other stock characteristics (e.g., visibility and liquidity) caused by IR activities may be not appropriately valued by a firm's marginal investors; as a result, the effect would not be transmitted to capital costs to the same degree. Leuz and Verrecchia (2000) further stress that the mixed results of previous studies on IR and the cost of equity capital may be attributed to the fact that the investigated US firms (which are comparable to UK companies) already operate in a rich information environment; in consequence, they expect to see an effect on the information asymmetry component of the cost of capital primarily for German companies.[241] While Karolyi and Liao (2017) are able to establish a negative link between IR activities and the cost of equity capital for a broad sample of 59 countries on average,[242] as explained above the differences between the constituents may be significant. When these considerations and results are applied to the present data, particularly for UK companies, one could expect IR to have only a moderate—if any—effect on the cost of equity capital. As a result, the following hypotheses are tested in the scope of the present empirical analysis:

[238] cf. Bushee and Miller (2012), p. 870.
[239] cf. Heflin et al. (2015), p. 23.
[240] cf. on this and the following Hong and Huang (2005), pp. 21, 22.
[241] cf. Leuz and Verrecchia (2000), p. 92.
[242] cf. Karolyi and Liao (2017), p. 26.

$H_{5.1}$: Better IR quality is associated with lower cost of equity capital for German firms

$H_{5.2}$: Better IR quality is either not or negatively associated with the cost of equity capital for UK firms

$H_{5.3}$: The (negative) link between IR quality and the cost of equity capital is stronger for German firms in comparison to UK firms

In addition to investigating the link between IR and the implied cost of capital by relying on yearly panel data, new insights may be obtained by directly considering the announcements of firms' capital actions. This analysis is introduced in the further course of this thesis. First, in the next chapter, the variables used in the present study to proxy for the different IR value-generating channels are discussed.

4.2.2 Relevant proxies

Stock volatility

Following the studies of Leuz and Verrecchia (2000) and Bushee and Noe (2000), in this thesis the standard deviation of daily stock returns calculated over a year's time is applied to measure the stock price volatility of the investigated firms.[243] To account for the price deviation attributed to capital actions such as stock splits as well as to dividend payments (due to the ex-dividend effect), a stock's total return index is used to calculate respective returns. This index, which is obtained from the Thomson Reuters Datastream, reflects the stock performance adjusted by a factor for corporate actions and assuming the reinvestment of dividend payments in the stock (neither of which actually changes the financial situation of shareholders). An adjusted daily return is thus calculated as follows:[244]

$$Adj\ R_t = \frac{TRI_t}{TRI_{t-1}} - 1 \tag{3}$$

where TRI is the (cumulative) total return index that, for instance, in case of a dividend payment can be defined as:

[243] cf. Leuz and Verrecchia (2000), p. 105; Bushee and Noe (2000), p. 180.
[244] Definitions and formulas are obtained from the Thomson Reuters Datastream. In addition, cf. Campbell et al. (1997), p. 12.

$$TRI_t = TRI_{t-1} * \frac{P_t + D_t}{P_{t-1}} \quad (4)$$

where P_t is the stock price on the ex-dividend date, P_{t-1} is the price on the day before, and D_t is the value of the corresponding dividend payment.

The empirical standard deviation (volatility) of the adjusted daily returns for a firm i is then calculated for each given year j of the sample:[245]

$$Stock\ volatility_{i,j} = \sqrt{\frac{\sum_{t=1}^{T}(Adj\ R_{i,t} - \overline{Adj\ R_i})^2}{T-1}} \quad (5)$$

where $\overline{Adj\ R}$ is the arithmetic mean of the firm's adjusted returns in the respective year and T is the number of days for which returns in the year j are available.

In addition, according to Bushee and Noe (2000), the time period to which the IR (or disclosure) rankings refer must be carefully taken into account when the volatility measure is being calculated.[246] In line with the elaboration in chapter 4.1.2 of the present thesis, Bushee and Noe (2000) argue that if the rankings are awarded and released in the course of the year, they likely do not only refer to the preceding calendar year but also cover a part of the actual year. This is why they choose the middle of the year as a cut-off date for their sample, which they use to calculate the relevant measures (including stock volatility). Other researchers apply a similar technique, such as Botosan and Plumlee (2002).[247] However, as completion of the survey and publication of the corresponding results used by Bushee and Noe (2000) occurred only in the second half of the year, this approach is not applicable to the current analysis (which relies on the Extel survey that is always conducted in the first half of each year). Because the majority of the firms in the present sample have a fiscal year that ends in December, April can be seen as an appropriate cut-off date. In most cases, this date makes it possible to consider the effects attributed to the disclosure of firms' annual reports for the preceding year, as noted by Bushee and Noe (2000).[248] Furthermore, because the Extel survey's evaluation period typically ends sometime around April, the quality of IR activities—and thus their contributions to things such as the alleviation of information asymmetry as reflected in stock volatility—may be closely considered by voting parties until this

[245] cf., for instance, Brown and Warner (1980), p. 250.
[246] cf. on this and the following Bushee and Noe (2000), pp. 179–180.
[247] cf. Botosan and Plumlee (2002), p. 27.
[248] cf. Bushee and Noe (2000), p. 179.

month. In light of the aforementioned arguments, the end of the time period used to calculate the yearly standard deviation of daily returns in this thesis is the end of March. This is also in line with the suggestions provided in the empirical literature on the calculation of other proxies used in the present analysis,[249] which are introduced below.

Analyst following, forecast dispersion, and forecast error

To calculate the variables related to the characteristics of analysts and their forecasts, the present thesis uses data from the Thomson Reuters I/B/E/S database, which has been frequently utilized in prior empirical research on IR.[250] The information on the historical analyst earnings forecasts provided in the I/B/E/S database makes it possible to assess whether firms' actual annual earnings met analysts' expectations. Following studies of Lang and Lundholm (1996), Hope (2003), and Chang et al. (2014), the forecast error (or accuracy) is defined as the absolute difference between the actual earnings (or net income) per outstanding share (EPS) and the forecasted value ($E(EPS)$) for a firm i deflated by its stock price (P):[251]

$$Forecast\ error_{i,j} = \frac{\left|EPS_{i,j} - E(EPS_{i,j})\right|}{P_{i,j}} \tag{6}$$

where j refers to the fiscal year for which the actual value and forecasts were provided.

The closing stock price at the end of each fiscal year (as obtained from the Thomson Reuters Worldscope database) is used as the deflator to enhance the results' comparability among the investigated companies.[252] The absolute value of the forecast error is also calculated, because a smaller variation of the measure in either direction generally indicates more consistent forecasts.[253] In accordance with prior studies, the expected EPS is defined as the mean earnings forecast for the respective fiscal year.[254]

The forecast dispersion among analysts in the given year is approximated for each firm using the standard deviation of EPS forecasts, which is calculated using the forecasted values and mean

[249] cf., for instance, Claus and Thomas (2000), pp. 1637–1638.
[250] cf., for instance, Bushee and Miller (2012), p. 875; Chang et al. (2014), p. 372; Aerts et al. (2007), p. 1307.
[251] Chang et al. (2014), p. 376; cf. also Lang and Lundholm (1996), p. 476; Hope (2003), p. 245.
[252] cf. Lang and Lundholm (1996), p. 476.
[253] cf. Farragher et al. (1994), p. 406.
[254] cf. Lang and Lundholm (1996), p. 477; Hope (2003), p. 245.

earnings forecast introduced above. In addition, as suggested in prior studies, the standard deviation is deflated by the fiscal year's closing price analogous to the forecast error:[255]

$$Forecast\ dispersion_{i,j} = \frac{Standard\ deviation\ of\ forecasts_{i,j}}{P_{i,j}} \quad (7)$$

In line with Chang et al. (2014), all observations based on fewer than two analyst forecasts are excluded from the analysis to avoid biased results.[256] Furthermore, following Bushee and Noe (2000), the forecast dispersion is normalized using the natural logarithm.[257] The corresponding firm's analyst following is defined as the natural logarithm of the number of analysts who have provided an EPS forecast in the given year.[258] Finally, this analyst coverage measure is also included in the analysis of the forecast error and dispersion, as suggested by Aerts et al. (2007).[259]

Stock liquidity

In the scope of IR and disclosure studies, a firm's stock liquidity is frequently proxied by the respective bid-ask spread.[260] It is commonly assumed that this spread in particular makes it possible to explicitly measure the adverse selection costs that result from asymmetric information allocation, as pointed out in chapter 2.1.[261] The present thesis follows the prior literature and consequently relies on bid-ask spreads as a liquidity measure. However, according to Roll (1984), while information on quoted bid-ask spreads is typically available for a variety of firms, "the actual trading is done mostly within the quotes."[262] As such, he suggests to calculate the effective bid-ask spread using the market prices of respective securities.[263] In the context of IR studies, researchers such as Karolyi and Liao (2017) follow this approach and use the bid-ask estimator proposed by Corwin and Schultz (2012), which is based on the investigated firms' daily high and

[255] Chang et al. (2014), p. 376; cf. also Lang and Lundholm (1996), p. 476.
[256] cf. Chang et al. (2014), p. 376.
[257] cf. Bushee and Noe (2000), p. 180.
[258] cf. Lang and Lundholm (1996), p. 476.
[259] cf. Aerts et al. (2007), p. 1321.
[260] cf., for instance, Leuz and Verrecchia (2000), p. 93; Vlittis and Charitou (2012), p. 952; Kirk and Vincent (2014), p. 1431; Karolyi and Liao (2017), p. 13.
[261] cf. Leuz and Verrecchia (2000), p. 99.
[262] Roll (1984), p. 1127.
[263] cf. Roll (1984), p. 1127.

low prices.[264] Because this estimator outperforms other measures that are based on low-frequency data, it is calculated to proxy for firms' liquidity in the present study.[265]

The Corwin and Schultz estimator is based on an assumption that the high prices are generally initiated by buyers and the low prices are initiated by sellers; as a result, the daily high and low prices incorporate a stock's bid-ask spread as well as its fundamental volatility.[266] It is also assumed that in contrast to the incorporated spread, the volatility component rises proportionately with the trading time period. In this case, the high-low price ratio for a single period of two days and the high-low price ratios on the respective sequential single dates enable to solve for the spread component.

In the first step, the factor γ is calculated using the observed high (H^o) and low (L^o) prices for a single two-day period (t and $t+1$):[267]

$$\gamma = \left[ln\left(\frac{H^o_{t,t+1}}{L^o_{t,t+1}} \right) \right]^2 \tag{8}$$

Next, the factor β is computed using the sum of the high-low ratios on both days:

$$\beta = E\left\{ \sum_{\tau=0}^{1} \left[ln\left(\frac{H^o_{t+\tau}}{L^o_{t+\tau}} \right)^2 \right] \right\} \tag{9}$$

The factor α is then estimated by relying on the differences between the aforementioned parameters:

$$\alpha = \frac{\sqrt{2\beta} - \beta}{3 - 2\sqrt{2}} - \sqrt{\frac{\gamma}{3 - 2\sqrt{2}}} \tag{10}$$

Finally, the spread estimate is given by the following term:

$$Spread = \frac{2(e^a - 1)}{1 + e^a} \tag{11}$$

where e is a mathematical constant.

[264] cf. Karolyi and Liao (2017), p. 13.
[265] cf. Corwin and Schultz (2012), p. 719.
[266] cf. on this and the following Corwin and Schultz (2012), pp. 719, 722.
[267] Corwin and Schultz (2012), pp. 723–725.

Corwin and Schultz (2012) assert that in contrast to the high-low ratios of two consecutive days, the high-low price ratio for a single period of two days incorporates the overnight return.[268] This could inflate this ratio as well as its variance compared to the application of two one-day periods, thus the spread portion would be underestimated. An adjustment for the overnight stock price movements thus seems essential and is consequently conducted in the present thesis. The amendment is done by first determining whether the day *t+1* low is higher than the closing price on day *t* for each bundle of sequential days. If it is, the difference between the day *t+1* low and the closing price *t* is assumed to be the overnight change and subtracted from the low as well as the high on the day *t+1*. In turn, the overnight price fall is indicated by the negative difference between the day *t+1* high and the day *t* close, which is then used to increase both the day *t+1* high and low. Corwin and Schultz (2012) suggest that this adjustment approach dominates alternative methods. Finally, in rare cases where the daily high and low are equal or the spreads are negative, the respective observations are dropped from the analysis.

In the last step, the estimated daily spreads are averaged over a one-year period beginning in April and ending in March of the following year (in line with the calculation of the volatility measure) to obtain the final liquidity proxy.[269] The data on the daily high, low, and closing prices required for calculating the spread estimator is obtained from the Thomson Reuters Datastream.

Cost of capital

Prior empirical studies on the relation between IR and capital costs primarily use the expected internal rate of return of the investigated securities to proxy for firms' cost of equity capital, which cannot directly be observed.[270] Several approaches to estimating the implied cost of equity capital are introduced in the literature (e.g., by Claus and Thomas, 2001; Gebhardt et al., 2001; Easton, 2004), and all of these studies rely on analyst earnings forecasts to explain the respective security prices (P) in the scope of a valuation equation. The present thesis follows the study of Karolyi and Liao (2017) and estimates the cost of equity capital by applying the residual income valuation model developed by Claus and Thomas (2001).[271] All of the data required for this approach is available in the Thomson Reuters Datastream (accounting, price, and yield data) and

[268] cf. on this and the following Corwin and Schultz (2012), p. 726.
[269] The mean of daily bid-ask spreads is a common measure that is also used, e.g., by Vlittis and Charitou (2012), p. 956; Karolyi and Liao (2017), p. 13.
[270] cf. on this and the following Francis et al. (2005), p. 1146.
[271] cf. Karolyi and Liao (2017), p. 26.

the I/B/E/S database (analyst forecasts). The general equation used to derive the Claus and Thomas measure (k_{CT}) for the year j is given as follows:[272]

$$P_j = bv_j + \sum_{\tau=1}^{5} \frac{ae_{j+\tau}}{(1+\boldsymbol{k_{CT}})^{\tau}} + \frac{ae_{j+5}(1+g_{ae})}{(\boldsymbol{k_{CT}} - g_{ae})(1+\boldsymbol{k_{CT}})^{5}} \tag{12}$$

where bv_j is the book value of equity and g_{ae} is the constant rate within the terminal value beyond year $j+5$, which indicates the growth of the abnormal earnings $ae_{j+\tau}$. These abnormal earnings are in turn defined for each period as follows:

$$ae_{j+\tau} = FEPS_{j+\tau} - \boldsymbol{k_{CT}} bv_{j+\tau-1} \tag{13}$$

The abnormal earnings (or residual income) therefore constitute the difference between the consensus of analyst forecasts on a firm's earnings per share ($FEPS$) and the charge for the cost of equity.

The calculation is based on the "clean surplus" relation, which sets the requirement for all changes in book value that do not result from direct transactions between a company and its shareholders (such as dividend payments) to be incorporated into accounting earnings; as such, the expected book value of equity can be expressed as follows:[273]

$$\begin{aligned} bv_{j+\tau} &= bv_{j+\tau-1} + FEPS_{j+\tau} - D_{j+\tau} \\ &= bv_{j+\tau-1} + FEPS_{j+\tau}(1 - DPR_{j+\tau}) \end{aligned} \tag{14}$$

where $D_{j+\tau}$ constitutes the dividends and $DPR_{j+\tau}$ is the corresponding payout (or market dividends to earnings) ratio.

Admittedly, some transactions under the prevalent accounting rules in Europe may not satisfy the "clean surplus" assumption. However, Claus and Thomas (2001) assert that such discrepancies are typically not incorporated into the earnings forecasts made by analysts if they arise ex post.

Furthermore, using an international sample that covers Germany, the UK, France, and the US, Isidro et al. (2006) provide empirical evidence that general violations of the assumption do not

[272] Claus and Thomas (2001), pp. 1635–1636.
[273] cf. on this and the following Claus and Thomas (2001), p. 1635.

notably bias the results of the residual income valuation models or cause substantive issues in inter-country analyses that rely on this valuation approach.[274]

As proposed by Claus and Thomas (2001), to calculate the cost of capital measure, the analyst earnings estimates and stock prices are collected as of the cut-off date.[275] This should ensure that most of the sample companies have already set up their balance sheets in which the equity book values (bv_j) are provided. The last date in March seems to be a suitable date for this purpose; it is in line with the cut-off date chosen for the calculation of the volatility and liquidity measures and meets the suggestions of Claus and Thomas (2001). This residual income valuation model requires forecasts for the five forthcoming years, although explicit forecasts—particularly for the years $j+3$ to $j+5$—are frequently not available. Following Claus and Thomas (2001), the missing forecasts are calculated using the earnings growth forecast for the next five years (g_5) obtained as of the aforementioned cut-off date:[276]

$$FEPS_{j+\tau} = FEPS_{j+\tau-1}(1+g_5) \tag{15}$$

whereas negative earnings forecasts are not deployed to generate estimates for the following years.

Furthermore, Hou et al. (2012) propose using the dividend payout ratio in the year j to estimate the future book values of equity ($bv_{j+\tau}$) instead of assuming a rigid value of 50% as suggested by Claus and Thomas (2001).[277] Because applying the actual dividend payout ratio appears to be a more realistic and accurate approach, it is adopted in the present thesis. In addition, the 10-year risk-free rate attributed to the year j is applied to approximate the abnormal earnings growth (g_{ae}) following the year $j+5$.[278] In line with Claus and Thomas (2001), the risk-free rates equal the 10-year German or UK government bond yields, respectively. Finally, using the aforementioned inputs, the implied cost of equity capital (k_{CT}) is derived from the P_j equation by applying an iterative procedure that seeks for its best possible solution.

[274] cf. Isidro et al. (2006), p. 341.
[275] cf. on this and the following Claus and Thomas (2001), pp. 1637–1638.
[276] Claus and Thomas (2001), p. 1638.
[277] cf. Hou et al. (2012), p. 524.
[278] cf. on this and the following Claus and Thomas (2001), pp. 1640–1641.

4.2.3 Essential control variables

Given that this thesis's outcome variables (e.g., capital costs) may be further related to factors other than IR quality (e.g., firm size), the major variables introduced in the empirical literature as additional predictors of the relevant dependent variables are considered in the present analysis. The advantage of using such control variables in the scope of an empirical study is the possibility to measure the effect of interest while holding the introduced controls constant.[279] In addition, including further predictors that might be correlated with both explained and explanatory variables can help to alleviate endogeneity concerns that arise from the omitted variables bias, as described in chapter 3.1. The next step entails defining the considered control variables and hypothesizing their link to variables of interest.

Firm size

Almost all studies mentioned in the literature review of this thesis control for firm size effects in their empirical analyses. Following inter alia Bushee and Miller (2012) and Karolyi and Liao (2017), in the present study the size of the investigated companies is measured by the natural logarithm of firms' total assets as reported on their balance sheets.[280] The corresponding data is derived from the Thomson Reuters Worldscope database. To make the measure comparable for German and UK companies, the total assets of UK firms are converted into euro.

In the scope of an investigation of IR's impact on firm performance that accounts for firm size, one could expect a negative relation between firm performance and the natural logarithm of total assets, because according to Agrawal and Knoeber (1996) larger companies tend to have lower growth opportunities.[281] Furthermore, firm size might be inversely associated to equity risk and thus to cost of equity capital, as suggested by Francis et al. (2005).[282] Because large firms might have higher market recognition—and hence also higher media and analysts coverage[283]—they could exhibit higher stock liquidity and presumably lower volatility, as indicated by Bushee and Noe (2000) and Leuz and Verrecchia (2000).[284] The evidence provided by Hope (2003), who finds primarily a negative link between firm size and forecast accuracy, and Lang and Lundholm (1996), who report an inverse relation, makes the link between forecast characteristics and firm

[279] cf. Wooldridge (2013), pp. 12, 72.
[280] cf. Bushee and Miller (2012), p. 877; Karolyi and Liao (2017), p. 14.
[281] cf. Agrawal and Knoeber (1996), p. 385.
[282] cf. Francis et al. (2005), p. 1147.
[283] cf. Vlittis and Charitou (2012), p. 954.
[284] cf. Bushee and Noe (2000), p. 193; Leuz and Verreccia (2000), pp. 107–108.

size appear less clear.[285] In this context, Hope (2003) emphasizes that firm size may proxy for a variety of other factors for which expectations cannot be easily derived.[286] Nevertheless, most prior studies predict a positive relation between IR activities or quality and firm size.[287] Lang and Lundholm (1993) provide several explanations for this expectation.[288] First, because IR (or disclosure) costs may have a fixed component, the respective costs per unit of size diminish with firm size. In addition, large firms might have better opportunities (and lower expenditures) to reach market participants inter alia through information intermediaries, who are more aware of larger companies. Furthermore, larger firms might have higher incentives to resolve information asymmetries, because they are subject to both more information-based trading and higher litigation costs.[289] Numerous researchers—including Chang et al. (2014) and Karolyi and Liao (2017), to mention just a few—substantiate the aforementioned prediction with empirical evidence.[290]

Finance structure

To proxy for the finance structure of the sample firms that could substantially influence the outcome variables, the present analysis uses the firm leverage obtained from the Thomson Reuters Worldscope database and calculated for a firm i and year j by applying the following formula:[291]

$$Leverage_{i,j} = \frac{(Long\text{-}Term\ Debt_{i,j} + Short\text{-}Term\ Debt_{i,j})}{Shareholders\ Equity_{i,j}} \tag{16}$$

The link between leverage and Tobin's Q is difficult to predict in the scope of an empirical study. This is because on the one hand, leverage may have a disciplinary effect on managers, thereby reducing agency problems and enhancing firm performance; on the other hand, it may be linked to higher (equity) risk and bankruptcy concerns, which negatively affect a firm's market value.[292] The expectation for the positive value effect of debt is based on the free cash flow (FCF)

[285] cf. Hope (2003), p. 259; Lang and Lundholm (1996), p. 487.
[286] cf. Hope (2003), pp. 250.
[287] cf., for instance, Chang et al. (2014), p. 379; Kirk and Vincent (2014), p. 1430.
[288] cf. on this and the following Lang and Lundholm (1993), pp. 250–251.
[289] See for more details King et al. (1990) and Skinner (1994).
[290] cf. Karolyi and Liao (2017), p. 17; Chang et al. (2014), p. 379.
[291] Numerous empirical studies on IR control for the firm's financial structure using this leverage measure, e.g., Kirk and Vincent (2014), p. 1431; Aerts et al. (2007), p. 1310.
[292] cf. Jong (2002), pp. 35–37; Vlittis and Charitou (2012), p. 967.

hypothesis introduced by Jensen (1986), who argues that fixed debt payments reduce the cash flow that could be inefficiently spent by managers (e.g., on unfavorable projects).[293] Previous empirical results concerning the debt-performance relation are also inconsistent.[294] With regard to the cost of equity capital, it appears to be more likely that equity costs increase with higher leverage due to increased risk for shareholders as residual income recipients.[295] Gebhardt et al. (2001) support this argument with empirical evidence.[296] According to Aerts et al. (2007), because higher-leveraged firms are less involved in equity financing, they may be less visible for analysts, media, and investors and suffer from higher information asymmetry linked to adverse selection issue, as indicated by Bharath et al. (2009).[297] As such, one could expect greater leverage to have a negative relation with analyst following, stock liquidity, and forecast accuracy and a positive correlation with forecast dispersion and stock volatility. These predictions are mostly confirmed in empirical studies on IR.[298] Ultimately, when the aforementioned arguments are considered, a positive link between firms' leverage and IR quality can be expected in this thesis's empirical study. This is because the higher risk for investors implied through extensive leverage, a higher information asymmetry, and lower firm visibility may increase the need for a firm to enhance its IR activities. Moreover, the potential disciplining of a firm's management through more leverage should not outweigh these effects.

Profitability

Following Hope (2003), the return on equity (ROE) is included in the present analysis as a measure of a firm's profitability. It is extracted from the Thomson Reuters Worldscope database and defined as follows:[299]

$$ROE_{i,j} = \frac{Net\ income_{i,j}}{\frac{1}{2}\sum_{j=-1}^{0} Shareholders'\ Equity_{i,j}} \tag{17}$$

It can naturally be expected that a firm's profitability is positively related to its market performance (Tobin's Q).[300] Furthermore, Francis et al. (2005) argue that good financial

[293] cf. Jensen (1986), p. 324.
[294] cf., for instance, Agrawal and Knoeber (1996), p. 392; Jong (2002), p. 52.
[295] cf. Tirole (2001), p. 4.
[296] cf. Gebhardt et al. (2001), p. 151.
[297] cf. Aerts et al. (2007), p. 1311; Bharath et al. (2009), pp. 3238–3239.
[298] cf., for instance, Karolyi and Liao (2017), pp. 43, 51–52; Bushee and Noe (2000), p. 193.
[299] cf. Hope (2003), p. 247.

performance should be accompanied by a lower cost of capital, because the default risk decreases.[301] They substantiate this prediction by providing strong empirical evidence of a negative relation between the cost of equity capital and the profitability ratio. In this context, it seems plausible that more profitable firms (which are linked to rosier future prospects) become more visible to analysts and investors, as also shown by Kirk and Vincent (2014);[302] as such, ROE could be positively linked to analyst following and stock liquidity. Bushee and Noe (2000) also indicate that more profitable firms tend to have lower stock volatility, whereas Chang et al. (2014) show that negative earnings are linked to higher dispersion and less accurate analyst forecasts.[303] However, the relation between ROE and IR appears to be less unambiguous. On the one hand, management and IR team members may be more communicative during periods of higher earnings; on the other hand, the demand for higher IR quality and more extensive activities may arise during periods of weak results.[304] As such, no direct prediction is made for this thesis.

Opportunities and uncertainty

In line with prior empirical studies on IR, the present analysis also considers variables that capture different aspects of firms' future opportunities as well as uncertainty about their prospects.[305] In particular, this study controls for the following variables, the components and descriptions for which are all obtained from the Thomson Reuters Worldscope database:

$$CapEx\ intensity_{i,j} = \frac{Capital\ expenditures_{i,j}}{Total\ assets_{i,j}} \tag{18}$$

where the capital expenditures (CapEx) particularly cover funds spent for fixed assets, such as for "property, plant and equipment, investments in machinery and equipment" that are not related to acquisitions.

$$R\&D\ intensity_{i,j} = \frac{Research\ \&\ Development\ expenditures_{i,j}}{Total\ assets_{i,j}} \tag{19}$$

[300] cf. Anderson and Reeb (2003), p. 1313.
[301] cf. on this and the following Francis et al. (2005), pp. 1147, 1157.
[302] cf. Kirk and Vincent (2014), p. 1448.
[303] cf. Bushee and Noe (2000), p. 193; Chang et al. (2014), p. 383.
[304] cf. Kirk and Vincent (2014), p. 1431.
[305] cf., for instance, Karolyi and Liao (2017), p. 14; Kirk and Vincent (2014), p. 1431; Aerts et al. (2007), p. 1312.

where the research and development (R&D) expenses constitute funds used to improve or develop products/technologies and hence cover all costs for both basic and applied research and subsequent development processes. However, Koh and Reeb (2015) note that a well-known phenomenon exists in the empirical research, namely that some firms do not report any information on their R&D expenses in their financial statements.[306] The common way to interpret this missing data, which is applied in leading scientific journals such as *The Journal of Finance* and *The Accounting Review*, is to assume that missing R&D information indicates that the firm in question lacks R&D activities or only marginally engages in them. This technique typically entails setting the missing values to 0 while including a dummy variable that takes a value of 1 if a missing value has been replaced and 0 otherwise. As information on R&D expenses is missing for some firms in the present sample, this approach is applied in this thesis to avoid losing certain observations and thus obtaining potentially biased results related to the main link of interest.
The further control variables are as follows:

$$IA\ intensity_{i,j} = \frac{Intangible\ assets_{i,j}}{Total\ assets_{i,j}} \tag{20}$$

where intangible assets (IA) constitute non-physical assets, such as goodwill (i.e., the cost above the value of assets acquired), patents, and trademarks.

$$Average\ sales\ growth_{i,j} = \frac{1}{3}\sum_{\tau=-2}^{0}\left[\frac{Sales\ or\ Revenues_{i,j+\tau}}{Sales\ or\ Revenues_{i,j+\tau-1}} - 1\right] \tag{21}$$

where following Karolyi and Liao (2017), the average sales growth is calculated for the last three fiscal years.[307]
As suggested in prior literature, the above-listed measures can be seen as indicators of the presence of valuable projects, investment opportunities, or products that are beneficial for shareholders but typically linked to uncertainty and possibly subject to substantial information asymmetries between firms and their investors.[308] This is particularly the case because most intangible assets as well as R&D and CapEx expenses are frequently not recognized in detail in

[306] cf. on this and the following Koh and Reeb (2015), pp. 74, 92.
[307] cf. Karolyi and Liao (2017), p. 12.
[308] cf. Vlittis and Charitou (2012), p. 967; Kirk and Vincent (2014), p. 1422.

corresponding financial reports.[309] With regard to a firm's market performance, one could expect a positive relation to the aforementioned variables, because they all can be related to a firm's positive growth prospects. However, prior research also shows that the valuation of future opportunities can naturally highly depend on investors' perceptions concerning the quality of products, projects, or investments and may differ between industries.[310] In summary, no direct prediction is made for the relation between Tobin's Q and R&D, CapEx, or IA intensities for the present analysis. The same applies to the link to capital costs. In contrast, positive sales growth may constitute a more obvious indicator for market participants; as such, it could be expected to have a positive relation to a firm's market performance and a negative one to its cost of equity capital, in line with the findings of Karolyi and Liao (2017).[311] With regard to analyst coverage, Barth et al. (2001) suggest that financial analysts could have higher incentives to cover firms with less transparent assets, because such companies could allow to provide more profitable advice to investors accompanied by higher rewards to analysts.[312] On the other hand, analysts might be faced with higher information search costs if they follow these firms. Nevertheless, it appears to be plausible that the information asymmetry aspect incorporated into the aforementioned measures should lead to higher discrepancies in the perceptions that analysts and investors have of a firm's perspectives, which would increase stock volatility. As Kirk and Vincent (2014) demonstrate, IR seems consequently to become more important for firms that are linked to higher uncertainty and greater growth opportunities; as such, a positive relation between the corresponding variables and IR quality can be expected for the present study.[313]

Firm age

A further firm characteristic that empirical studies identify as a relevant factor for a company's outcomes is firm age.[314] Following Rieks and Lobe (2009), firm age is defined as the number of years since the company's initial public offering (IPO).[315] For the German companies considered in the present study, IPO date information is extracted from the "Hoppenstedt Aktienfuehrer"

[309] cf. Barth et al. (2001), p. 2.
[310] cf. Chung et al. (1998), pp. 41–42.
[311] cf. Karolyi and Liao (2017), pp. 40, 52.
[312] cf. on this and the following Barth et al. (2001), pp. 1–2.
[313] cf. Kirk and Vincent (2014), p. 1422.
[314] cf., for instance, Pástor and Veronesi (2003), p. 1751; Adams et al. (2005), p. 1412.
[315] cf. Rieks and Lobe (2009), p. 10.

database; for UK firms, it is taken directly from the London Stock Exchange's website. The data is complemented by information from corporate websites.

One could expect that younger, less developed firms have higher stock volatility, lower stock liquidity, higher disagreement among analysts, less accurate forecasts, and potentially a higher cost of capital;[316] however, the relation to firm performance and IR quality is less clear. Similar to uncertainty measures, the market performance of young firms may be a function of risk and the quality of future perspectives as assessed by market participants; as such, no general expectation can be stated. This also applies to IR quality. On the one hand, mature firms may have over time established well-developed IR departments that are characterized by extensive activities and a higher quality than what exists in young firms; on the other hand, as the demand for a more informative IR function may especially arise in younger firms and thus encourage them to improve their IR activities, the link is difficult to predict.

Strategic holdings

To account for the fact that firms may relate to complex corporate networks in which one company can have a substantial stake in another and thus be able to exert an influence on its strategies, corporate cross-holdings are considered in the present analysis.[317] In the case that a company can influence the activities of another firm (particularly in the scope of a parent-subsidiary relation), one could expect its impact on corporate outcomes and potentially on the IR strategy of the owned firm. Following Elshandidy et al. (2013), strategic holdings are defined as the percentage of total issued shares (of at least 5%) held by one firm in another.[318] Related data is obtained from the Thomson Reuters Datastream. As discussed by Adams and Ferreira (2008), cross-ownerships may create value for shareholders of both firms; however, the owned firm may also be potentially subject to exploitation by opportunistic controlling shareholder to the detriment of other investors.[319] Because the empirical evidence on this issue is mixed, this thesis does not formulate an explicit prediction on the matter.

[316] cf. Pástor and Veronesi (2003), p. 1776; Kirk and Vincent (2014), p. 1431.
[317] cf. on this and the following Gordon (1938), pp. 385–386; La Porta et al. (2000), p. 14.
[318] cf. Elshandidy et al. (2013), p. 325.
[319] cf. on this and the following Adams and Ferreira (2008), pp. 69, 83.

US cross-listings

Several empirical studies on IR suggest that cross-listings on foreign stock exchanges, particularly on major US stock exchanges (namely the NYSE and NASDAQ), may significantly affect a firm's IR activities, financial outcomes, and other corporate characteristics.[320] To account for this effect, the present analysis considers the cross-listings on NYSE and NASDAQ collected for German firms from the "Hoppenstedt Aktienfuehrer" database and for UK firms from annual reports and the Thomson Reuters Eikon database.

Lang et al. (2003) summarize the consequences attributed to cross-listing on US stock exchanges. First, the respective firms become subject to extended disclosure and litigation environment that is oriented toward shareholder demands (see also the discussion in chapter 2.3) and to higher enforcement by the Securities and Exchange Commission.[321] Furthermore, such companies are typically confronted with more scrutiny and pressure from analysts, investors, and auditors than in their domestic market. This could ultimately have a positive impact on several value-generating channels and thus increase a firm's market performance. In this context, Lang et al. (2003) provide empirical evidence that cross-listed firms have a higher analyst following and greater forecast accuracy and market valuation. In summary, with regard to the results of the present thesis, it can be expected that US cross-listings facilitate the quality and consistency of analyst forecasts, increase firms' visibility and liquidity, reduce the cost of capital, and ultimately enhance firm performance.

Fixed effects

The panel structure of the present data (which covers time-series data for the investigated firms) makes it possible to additionally control for year-specific effects, such as the impacts of political and economic risks or investor sentiment on the explained measures.[322] As such, dummy variables for each year of the present sample (omitting a reference year) that take a value of 1 in the respective year and 0 otherwise are included in the analysis to account for the average effects of different time periods.[323]

[320] cf., for instance, Karolyi and Liao (2017), pp. 1, 20–21; Kirk and Vincent (2014), p. 1433; Aerts (2007), pp. 1309, 1311.
[321] cf. on this and the following Lang et al. (2003), pp. 317–319.
[322] cf. Chang et al. (2014), p. 377; Heflin et al. (2015), p. 22; Rieks and Lobe (2007), pp. 13, 37.
[323] cf. Wooldridge (2013), pp. 433–436.

Furthermore, firms' characteristics may be generally heterogeneous across industries. In this context, Aerts et al. (2007) suggest that companies can basically have a different appeal to investors and analysts depending on a firm's industry affiliation.[324] Industry-related differences could be also applicable to firms' IR activities. For instance, Botosan (1997) argues that companies in the pharmaceutical industry typically provide more information about their R&D activities and intangible assets (thereby reducing the uncertainty component) than their counterparts in other sectors.[325] Following Karolyi and Liao (2017), Kirk and Vincent (2014), and Aerts et al. (2007), the present analysis includes dummy variables that take a value of 1 if a firm refers to a specific industry and 0 otherwise (omitting a reference industry).[326] The industry classifications of the sample firms are derived from the two-digit Industrial Classification Benchmark (ICB) codes, which cover broad industry areas such as chemicals, telecommunications, and technologies. The ICB codes are obtained from the Thomson Reuters Worldscope database.

Finally, in line with Bushee and Noe (2000), the present thesis controls for specific index-related fixed effects.[327] To this end, a set of dummy variables that indicates whether a firm was a constituent of DAX, MDAX, TecDAX, FTSE 100, FTSE 250, or FTSE Small Cap indices is included in the regression analysis (omitting a reference index). Each respective variable takes a value of 1 if a firm was listed in the specific index within the given year and 0 otherwise. The information on index listings is extracted directly from the Extel surveys and complemented using the Thomson Reuters Datastream database. Several arguments exist for including index dummies in the empirical model. First, these dummies make it possible to control for the different listing criteria of each index as indicators of heterogeneity across firms. Moreover, Bushee and Noe (2000) argue that investors (and also presumably analysts) may have preferences for firms listed in specific indices, which would lead to heterogeneity induced by the index listings themselves.[328] They substantiate this prediction with empirical evidence.

Alternative explanations

This section discusses the factors that could serve as substitutive explanations for the expected impact of IR quality on corporate characteristics and outcomes and introduces the respective

[324] cf. Aerts et al. (2007), p. 1312.
[325] cf. Botosan (1997), p. 327.
[326] cf. Karolyi and Liao (2017), p. 14; Kirk and Vincent (2014), p. 1432; Aerts et al. (2007), p. 1308.
[327] cf. Bushee and Noe (2000), p. 183.
[328] cf. on this and the following Bushee and Noe (2000), pp. 182, 185.

controls. The appropriate consideration of these alternative effects in the present analysis should at least partially rule out concerns about observing a spurious correlation. This thesis accounts for two common concerns in the empirical literature, namely individual managerial characteristics and social ties.

In this context, the empirical study of Betrand and Schoar (2003) establishes a link between the assorted management styles of CEOs, which are attributable to individuals' characteristics, and differences in firm performance.[329] This issue is further investigated by Custódio and Metzger (2014), who analyze whether a CEO's financial background in particular has an impact on corporate strategies and thus contributes to corporate success. They demonstrate that CEOs who are financial experts are indeed more financially sophisticated and capable inter alia of raising cash and debt during difficult market conditions, which is ultimately beneficial for shareholders.[330] Furthermore, Bamber et al. (2010) examine the relation between managers' personal backgrounds and firms' voluntary disclosure choices. They determine that managers promoted from accounting/finance provide more prudent and precise management earnings forecasts (which may range from general impression to point forecasts).[331] To summarize, the financial backgrounds of top managers and related corporate strategies may help firms to meet investors' disclosure demands and could positively affect different corporate characteristics and outcomes. It is hence conceivable that the results of the present thesis are driven not by IR quality per se—which should be attributable to several factors, in particular the activities of firms' IR officers—but rather by the individual characteristics of top management. To address this serious concern (which if true would require a reinterpretation of the study results), the analysis includes a variable that indicates if a CEO is a financial expert; it takes a value of 1 if yes and 0 otherwise. Following Custódio and Metzger (2014), the CEO is identified as a financial expert if he or she was previously employed by a banking or investment company or a large auditing firm (such as KPMG or PricewaterhouseCoopers) or worked as an accountant, treasurer, vice president of finance, or even a company's CFO.[332] The necessary CEO data for the investigated firms (including previous work experience) is hand-collected from annual reports, the "Hoppenstedt

[329] cf. Bertrand and Schoar (2003), p. 1205.
[330] cf. Custódio and Metzger (2014), p. 152.
[331] cf. Bamber et al. (2010), pp. 1140, 1156.
[332] cf. Custódio and Metzger (2014), p. 129.

Aktienfuehrer" database, CVs from corporate websites, and other sources (e.g., the LexisNexis database).[333]

Considering the findings of prior empirical literature reveals that social ties between analysts and IR senior executives could constitute an additional concern with regard to IR studies. Cohen et al. (2010) provide empirical evidence that school ties (i.e. attendance of the same institution) between senior corporate executives and analysts seem to enhance the direct management-analyst information flow, which gives the analysts in question an information advantage and allows them to outperform on their investment advice.[334] Cohen et al. (2008) report similar results for social ties between members of corporate boards and mutual fund managers, who seem to make higher investments in the affiliated firms and consequently can achieve a higher performance compared to other investments.[335] In this context, Laskin (2014) argues that in the past firms commonly hired IR officers who were previously employed as financial analysts.[336] The situation in which analysts cover firms where their former colleagues are now IR executives seems to provide an ideal setting for the social ties issue described above. Consequently, one could argue that such relationships may give the connected analysts an information advantage that could result in more precise and less dispersed analyst forecasts, which might in turn attract more investors to trade on the stock and potentially contribute to the market valuation. Furthermore, because analysts are major addressees of the Extel IR survey and the connected analysts may have an incentive to provide higher IR quality ratings for their former colleagues, the expected positive effects of better IR may be simply an outcome of social networks. To control for this concern, the previous work experience of heads of IR departments—who are typically in close communication with analysts and have the best access to a firm's management as well as to price-sensitive information—is obtained from official announcements of new head of IR appointments in LexisNexis as well as from CVs gathered from corporate websites and other sources. If a head of IR previously held an analyst position, the corresponding dummy variable considered in the present analysis takes a value of 1; otherwise it is 0.[337]

[333] As the financial expert variable is only introduced to rule out the concern of the alternative explanation, it is only calculated for German companies.
[334] cf. Cohen et al. (2010), pp. 1434–1435.
[335] cf. Cohen et al. (2008), p. 951.
[336] cf. Laskin (2014), p. 212.
[337] Analogous to the "Financial expert CEO" dummy, this variable is calculated only for the German firms.

4.2.4 Sample data and descriptive statistics

Tables 1 and 2 provide descriptive statistics related to the German and UK samples. These tables contain information on all of the outcome variables investigated in the first part of the present analysis as well as on the respective explanatory measures. The maximum number of observations available for the German sample is 1143; for the UK sample, it is 1651. First, the statistics indicate that UK firms exhibit higher market valuation as measured by Tobin's Q. The mean (median) value of Tobin's Q in the UK is 1.9196 (1.4612), whereas the corresponding value in Germany is 1.6151 (1.2848). The average cost of equity capital in the UK (9.24%) is slightly lower than in Germany (9.44%), but the opposite is suggested by the median values. Following the previous elaborations of the legal and financial systems as well as the level of information asymmetry prevalent in Germany and the UK, one should clearly expect higher stock return volatility and more dispersed and inaccurate analyst earnings forecasts for the German market. This expectation is confirmed by the respective descriptive statistics: the mean (median) value of stock volatility is 2.43% (2.21%) for German firms and 2.09% (1.82%) for UK companies. In addition, the analyst forecast error and forecast deviation (standardized by the stock price) are noticeably higher in German firms (4.04% and 1.57%) than in UK companies (1.76% and 0.94%) on average. The identified differences in the forecast properties are also supported by the corresponding medians. The respective mean values reveal that analyst coverage is slightly lower in the UK than in Germany (15.0731 vs. 16.8697), whereas the medians suggest comparable coverage in the two countries (15 vs. 15). Surprisingly, the mean (median) value of estimated bid-ask spreads is higher for UK companies than for German firms, namely 1.21% (1.05%) vs. 1.02% (0.90%). However, as Leuz and Verrecchia (2000) emphasize, a large number of spread determinants may go beyond the information asymmetry aspect;[338] as such, investigating stock liquidity in the scope of a multiple regression analysis could clarify the differences in liquidity across firms. With regard to corporate fundamentals, the civil law and bank system characteristics of the German market become apparent by looking at items such as the mean value of firms' leverage, which substantially exceeds the respective average for UK companies (1.2503 vs. 0.8102). Similar insights are also provided by the corresponding median values (0.6246 vs. 0.5255). On the other hand, it can be noted that UK firms are on average larger and have less concentrated strategic ownership, a higher US cross-listing rate, higher sales growth, and higher profitability (according to the ROE measure). The variables used as proxies

[338] cf. Leuz and Verrecchia (2000), p. 108.

for a firm's future opportunities (and corresponding uncertainty) such as R&D and CapEx intensities do not notably deviate across samples, although the intangible assets relative to firm size are on average approximately 5% higher in the UK. Firm ages in German and UK firms differ only slightly according to the mean and median values, which presumably indicates that firms of nearly the same development level are compared in the present analysis. It can also be stated that the aforementioned statistics are widely in line with the values presented by researchers such as Karolyi and Liao (2017) and Aerts et al. (2007),[339] which may indicate that the data used in this thesis is of sufficient quality.

With regard to the properties of IR, it is noteworthy that neither the budgets nor the number of IR team members substantially differ between Germany and the UK on average, although IR managers in the UK seem to enjoy slightly higher remuneration than their German counterparts. In summary, as no significant disparities in firms' IR resources can be ascertained between the countries, the expected differences in the IR outcomes in Germany and the UK seem unlikely to be a simple consequence of resource divergences. While the distance variables are discussed in detail in chapter 5.2, the statistics on financial expert CEOs reveal that German companies have a CEO with significant prior financial experience in 31.28% of the all firm-year observations. This is nearly 10% lower than what Custodio and Metzger (2014) report for the sample of US firms, and the difference might be linked to the peculiarities of market- and bank-based financial systems.[340] The portion of heads of IR who have gathered experience as analysts is 13.65% in the present sample. This statistic seems to reflect the trend in IR departments to rely more on the communication skills of IR officers rather than to focus only on financial background, as Laskin (2014) emphasizes.[341] Finally, the head of IR turnover rate in German firms over the entire sample period is 11.83%, which is in line with the information provided in interviews by IR professionals that the fluctuation rate for heads of IR is considerably lower than for other IR department members. The second part of the present thesis's empirical analysis is introduced next.

[339] cf. Karolyi and Liao (2017), p. 39; Aerts et al. (2007), p. 1315.
[340] cf. Custodio and Metzger (2014), p. 131.
[341] cf. Laskin (2014), p. 212.

Table 1: Descriptive statistics for the German sample

	N	mean	stand dev	25th percentile	median	75th percentile
Tobin's Q	1143	1.6151	1.0013	1.0437	1.2848	1.7265
Implied cost of equity capital	1013	0.0944	0.0344	0.0752	0.0903	0.1086
Bid-ask spread	1143	0.0102	0.0046	0.0069	0.0090	0.0124
Stock volatility	1141	0.0243	0.0105	0.0170	0.0221	0.0287
Analyst following (abs)	1136	16.8697	9.7309	9	15	24
Forecast error	1111	0.0404	0.1104	0.0038	0.0112	0.0309
Forecast dispersion (st)	1114	0.0157	0.0484	0.0039	0.0073	0.0138
Firm size (in € million)	1143	42800	187000	798.448	2134.938	10500
ROE	1143	0.1087	0.2208	0.0548	0.1247	0.1883
Leverage	1143	1.2503	2.4218	0.2480	0.6246	1.2189
R&D intensity	1143	0.0244	0.0410	0	0.0049	0.0365
CapEx intensity	1143	0.0432	0.0403	0.0175	0.0345	0.0568
IA intensity	1143	0.1841	0.1787	0.0391	0.1250	0.2979
Sales growth	1143	0.1313	0.3608	0.0272	0.0764	0.1422
US cross-listing	1143	0.0892	0.2852			
Firm age	1143	24.8994	24.1548	8	14	44
Strategic holdings	1143	0.1171	0.2107	0	0	0.15
IR budget	260	2.2192	1.2833	1	2	3
IR remuneration	260	2.3731	1.2062	2	3	4
IR employees (abs)	260	3.2077	1.9120	2	3	4
Distance to airport (km)	1113	30.4584	25.0654	10.8669	22.9601	47.4035
Distance to Frankfurt (km)	1113	204.5443	118.3671	128.2977	187.3188	301.3452
Financial expert CEO	1135	0.3128	0.4638			
Head of IR analyst	901	0.1365	0.3435			
Turnover head of IR	1124	0.1183	0.3231			

Tobin's Q is calculated as the sum of the market value of outstanding shares and the book value of debt divided by the book value of total assets. *Implied cost of equity capital* is estimated applying the approach proposed by Claus and Thomas (2001). *Bid-ask spread* is calculated following Corwin and Schultz (2012). *Stock volatility* is the standard deviation of adjusted daily stock returns. *Analyst following (abs)* is the number of analysts who provide forecasts on the firm's earnings. *Forecast error* is measured as the absolute difference between the actual earnings per share and the forecasted earnings per share divided by the stock price. *Forecast dispersion (st)* is the standard deviation of earnings forecasts deflated by the stock price. *Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers. *Distance to airport (km)* measures the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt (km)* measures the distance between the firm's headquarter location and Frankfurt. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise. *Turnover head of IR* is a dummy variable that equals one if a head of IR change occurred during the fiscal year and zero otherwise.

Table 2: Descriptive statistics for the UK sample

	N	mean	stand dev	25th percentile	median	75th percentile
Tobin's Q	1651	1.9196	3.0369	1.0849	1.4612	2.0861
Implied cost of equity capital	1335	0.0924	0.0436	0.0646	0.0979	0.1166
Bid-ask spread	1645	0.0121	0.0052	0.0086	0.0105	0.0141
Stock volatility	1625	0.0209	0.0099	0.0145	0.0182	0.0245
Analyst following (abs)	1627	15.0731	7.1714	10	15	20
Forecast error	1413	0.0176	0.0626	0.0032	0.0070	0.0146
Forecast dispersion (st)	1378	0.0094	0.0206	0.0021	0.0041	0.0085
Firm size (in € million)	1651	52200	251000	1020.369	2919.251	9147.856
ROE	1651	0.2818	1.0417	0.0856	0.1636	0.2641
Leverage	1651	0.8102	8.0499	0.2053	0.5255	1.0573
R&D intensity	1651	0.0147	0.0464	0	0	0.0022
CapEx intensity	1651	0.0413	0.0434	0.0097	0.0291	0.0567
IA intensity	1651	0.2354	0.2221	0.0323	0.1746	0.4107
Sales growth	1651	0.2582	2.9937	0.0281	0.0842	0.1617
US cross-listing	1651	0.1333	0.3400			
Firm age	1651	23.0854	20.7692	7	16	38
Strategic holdings	1651	0.0307	0.0947	0	0	0
IR budget	155	2.1290	1.3373	1	2	3
IR remuneration	155	2.7871	1.5708	2	2	4
IR employees (abs)	155	3.1032	1.8939	2	3	4

Tobin's Q is calculated as the sum of the market value of outstanding shares and the book value of debt divided by the book value of total assets. *Implied cost of equity capital* is estimated applying the approach proposed by Claus and Thomas (2001). *Bid-ask spread* is calculated following Corwin and Schultz (2012). *Stock volatility* is the standard deviation of adjusted daily stock returns. *Analyst following (abs)* is the number of analysts who provide forecasts on firm's earnings. *Forecast error* is measured as the absolute difference between the actual earnings per share and the forecasted earnings per share divided by the stock price. *Forecast dispersion (st)* is the standard deviation of earnings forecasts deflated by the stock price. *Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers.

4.3 IR quality and M&A performance

4.3.1 Hypotheses

Ahern and Sosyura (2014) as well as Bushee and Miller (2012) suggest that IR plays a particularly important role in major corporate events, which include a firm's M&A activities.[342] This thesis is the first to investigate whether better IR is in fact associated with an improved M&A performance for acquiring firms. Furthermore, the present analysis assesses whether the potential IR impact on capital market reactions to M&A announcements varies across countries with different legal origins and financial systems. As a first step, the corresponding hypotheses are derived from existing literature on M&A performance and its determining factors.

The main contribution of IR activities to an acquirer's stock price reaction attributed to M&A announcements is the reduction of the information asymmetry between the bidder's management and the investment community, which primarily exists with regard to the conditions of the deal and its expected future benefits for shareholders.[343] This information is typically provided by IR officers and managers in the scope of official deal announcements and related conferences with investors and analysts. As indicated by the interviewed IR professionals, some IR departments additionally publish voluntary presentations that provide a comprehensive overview of a deal and enable information on the acquisition potentially provided by the target firm to be double-checked. Such presentations become particularly important for less known targets, due to a higher divergence of opinion among market participants. However, it is not only the provision of information on a deal's characteristics (e.g., its purpose or expected synergy gains) that can positively contribute to alleviating uncertainty among market participants; the credibility of the provided information also plays a role.[344] In this context, the image of the management and IR team, which is built up before the actual transaction announcement through the implementation of appropriate IR strategies, may contribute to a higher probability that disclosed information will be seen as reliable.[345] Investors' concerns about the deal's contribution to shareholder wealth could be primarily linked to the threat of overpayment for the target.[346] According to Morck et al. (1990), managers may be willing to pay a price for a target firm that exceeds its value to shareholders if they expect private benefits from the transaction. A typical agency conflict may

[342] cf. Ahern and Sosyura (2014), p. 248; Bushee and Miller (2012), p. 871.
[343] cf. Healey and Palepu (2001), pp. 420–421.
[344] cf. Dutordoir et al. (2014), p. 89.
[345] cf. Hoffmann and Fieseler (2012), p. 149.
[346] cf. on this and the following Morck et al. (1990), p. 31.

thus arise when managers use an acquisition to pursue their own goals (e.g., entrenchment), as described by Shleifer and Vishny (1989).[347] In this case, managers could make specific investments that, for instance, require their personal know-how and could result in better job security and higher compensation. In addition, in line with the prediction of Jensen (1986), managers of firms with large FCFs may engage in value-destroying M&As due to empire building motives that are potentially linked to factors such as higher prestige and remuneration.[348] Roll (1986) also suggests that managers may overpay for a target because they could be affected by hubris that results in the distorted perception of knowing a target firm's true value and being able to reveal it.[349]

A further information asymmetry aspect relates to the payment structures of M&A deals. According to Travlos (1987), managers of the acquiring firm prefer a company's stock as the payment currency if they think that the respective shares are overvalued but pay with cash in the event of an undervaluation.[350] As such, the choice of payment type in an M&A transaction could constitute a signal to the market about the managers' beliefs regarding a company's true value. Based on an assumption that managers are better informed about a firm's actual value than shareholders, one would expect on average a negative acquirers' stock price reaction to the announcements of M&As paid with equity and higher returns for the announcements of cash deals. However, as Martin (1996) demonstrates, other reasons may also drive the management's decision to use stock instead of cash for payment purposes, such as profitable investment opportunities or risk sharing motives (including the goal to share any revaluation effects after the acquisition with the target).[351] Furthermore, selecting the cash payment method may be simply related to the high amount of cash available in a firm, although the choice entails the above-described risk of being involved in a value-destroying transaction. As such, clarifying the motives for a payment choice in the scope of an M&A announcement may help market participants to correctly assess the respective signal effects so that investors can positively value this additional information.

In addition, IR may contribute to an acquirer's M&A performance by raising its visibility among investors and analysts prior to the transaction. As Ahern and Sosyura (2014) suggest, a run-up in the acquirer's stock price achieved through the active dissemination of information could make it

[347] cf. on this and the following Shleifer und Vishny (1989), pp. 123–125.
[348] cf. Jensen (1986), p. 328; Shleifer and Vishny (1997), p. 756.
[349] cf. Roll (1986), pp. 199–200.
[350] cf. on this and the following Travlos (1987), pp. 944–945.
[351] cf. on this and the following Martin (1996), pp. 1229–1231, 1242.

possible to attain better condition terms in deals paid with stock, which should positively contribute to shareholder value.[352] However, because such activities may be related to higher stock price reversals when the presumable purpose of the enhanced information exposure is revealed, IR could also serve as a counterbalance to this investor response through the application of an appropriate announcement strategy (e.g., by explicitly highlighting the beneficial condition terms achieved in the scope of the deal). Furthermore, irrespective of the deal's payment type, M&A transactions may generally offer firms a good environment for attracting investors and analysts, because such major corporate events are often prominently reported in the media and intensively tracked by the investment community, as Draper and Paudyal (2008) argue.[353] Firms with high-quality IR strategies may thus use the increased market attention resulting from M&A announcements to engage in stock marketing activities. If IR takes advantage of such an environment, it may reach more addressees by disseminating information about the firm (as in the absence of such event) and additionally decrease the level of information asymmetry.[354] In summary, a larger number of investors facing fewer adverse selection concerns could become aware of a firm, which could ultimately result in a positive contribution to the acquirer's market performance around the event.

Furthermore, Goergen and Renneboog (2004) emphasize that M&A characteristics can differ depending on the legal and financial environments prevalent in the home countries of the firms involved in respective transactions.[355] Based on the considerations of that study, one could expect that the higher degree of investor protection, more developed market for corporate control, greater transparency and disclosure requirements, and consequently lower information asymmetry level prevalent in the UK as compared to in continental Europe (particularly in Germany) could ultimately lead to disclosure activities having only a marginal effect on the announcement returns of UK acquirers. In addition, in line with the results of the aforementioned study, it could be expected that UK firms are engaged in more M&A transactions and subject to better performance than German companies. As discussed above, in addition to the information aspect, acquirer performance may also be positively affected by improvements in the acquirer's market visibility that are encouraged by good IR and arise separately from the origins of the respective firms. To summarize, because increases in information level and investor awareness

[352] cf. Ahern and Sosyura (2014), pp. 277–280.
[353] cf. Draper and Paudyal (2008), p. 377.
[354] cf. Draper and Paudyal (2008), p. 377.
[355] cf. on this and the following Goergen and Renneboog (2004), pp. 23–24, 38–39.

through better IR quality can be attributed to German companies and the information channel seems to be less applicable to UK firms, slightly different hypotheses with regard to the M&A performance of German and UK acquirers are evaluated in the scope of the present analysis:

$H_{6.1}$: *Better IR quality is associated with higher M&A announcement returns for German acquirers*

$H_{6.2}$: *Better IR quality is either not or positively associated with M&A announcement returns for UK acquirers*

$H_{6.3}$: *The (positive) link between IR quality and M&A announcement returns is stronger for German acquirers in comparison to UK acquirers*

4.3.2 Sample construction and essential control variables

The Thomson Reuters SDC Platinum database is used in this thesis to obtain information on relevant M&A deals for German and UK acquirers in the period from 2006 to 2014. Following suggestions of Fuller et al. (2002) and Netter et al. (2011), only completed deals of non-financial firms with at least a $1 million[356] deal value and transactions with a clear-cut change of control in which the acquirer purchased more than 50% of a firm's shares are considered.[357] In the next step, M&A deals are matched with the Extel IR rankings and control variables described in chapter 4.2.3. The IR rankings are allocated to M&A transactions by applying the same procedure as, for instance, for the volatility measure in this thesis. All transactions within a time period of 12 months ending in March are thus matched with IR rankings that were awarded shortly after the end of this period. Accounting data, such as the total assets of acquiring firms, refers to the fiscal year before the respective M&A transactions. This procedure ensures that the corresponding control variables reflect a firm's financial characteristics before the M&A deal, the completion of which could have had a significant impact on the financial metrics. Finally, in line with previous empirical studies, the present analysis considers major deal characteristics as additional control variables. All deal properties are obtained from the Thomson Reuters SDC Platinum database and introduced in the further course of this chapter. Characteristics of the final sample are briefly summarized thereafter.

[356] All dollar amounts presented in this thesis are in US dollars.
[357] cf. Netter et al. (2011), p. 2319; Fuller et al. (2002), p. 1770.

Deal size

Following Asquith et al. (1983), Moeller et al. (2004), and Masulis et al. (2007), the deal value (excluding fees and expenses) relative to the acquirer's market value of equity (as obtained from the Thomson Reuters Worldscope database)[358] is used to measure transaction size.[359] Employing the acquirer's market value as the denominator seems to be reasonable, because the gains from the acquisition should be capitalized in accordance with acquirer size.[360] While Travlos (1987) reports a negative empirical relation between relative deal size and the acquirer's value effects, Asquith et al. (1983) and Moeller et al. (2004) find a significantly positive relation.[361] Moeller et al. (2004) further show that larger firms seem to pay higher premiums for their targets as well as to be also involved in value-destroying acquisitions, which is consistent inter alia with the empire building hypothesis.[362] Given that relative deal size is typically larger for small acquirers and value effects may be a function of deal volume, one could predict a positive relation for this measure and bidders' announcement returns.

Industry relation

In line with the studies of Fuller et al. (2002) and Goergen and Renneboog (2004), the present analysis includes a dummy variable that takes a value of 1 if the acquirer and target firm operate in the same industry.[363] On the one hand, transactions conducted in the same industry could be positively related to acquirer returns due to the possibility of higher synergy gains based on economies of scale, the target's easier integration into the acquiring firm, and the experience of the acquirer's management team in the respective business area.[364] On the other hand, the diversification effect of cross-industry deals might also be generally seen as beneficial for the acquirer's shareholders due to the potential operating risk reduction and development of new revenue sources. However, this effect may be strongly related to the firm's pre-existing degree of diversification. Furthermore, Morck et al. (1990) suggest that self-interested managers may be inclined to overpay in cross-industry deals if the transactions allow them to improve their job security, for example by developing new business opportunities that might not otherwise yield

[358] This study relies on the market value of equity 10 days prior to the announcement of a transaction.
[359] cf. Asquith et al. (1983), p. 122; Moeller et al. (2004), pp. 216–217; Masulis et al. (2007), p. 1856.
[360] cf. Asquith et al. (1983), p. 122.
[361] cf. Travlos (1987), p. 960; Asquith et al. (1983), p. 138; Moeller et al. (2004), p. 226.
[362] cf. on this and the following Moeller et al. (2004), pp. 208, 226.
[363] cf. Fuller et al. (2002), p. 1787; Goergen and Renneboog (2004), p. 35.
[364] cf. on this and the following Draper and Paudyal (2008), pp. 398–399.

any benefits to shareholders.[365] In this context, the empirical evidence on the link between intra-industry deals and acquirer returns is mixed: some studies report a positive relation and others the absence of such a link.[366] In light of the findings and suggestions in the relevant scientific literature, no direct prediction on the link between acquirers' M&A performance and the industry relation of the target and bidding firms is made in the present thesis.

Cross-border deals

Many researchers—including Fuller et al. (2002), Goergen and Renneboog (2004), and Rossi and Volpin (2004), to name only a few—suggest additionally accounting for the domicile of the acquirer and target firms in the scope of investigating M&A transactions.[367] As such, a dummy variable coded with a value of 1 if the transaction can be classified as a cross-border deal and 0 otherwise is included in the present analysis. According to Drapper and Paudyal (2008), an acquisition of a foreign target may be linked to a more complex transaction procedure as well as to greater challenges and higher risks related to managing a foreign business in comparison to a domestic deal.[368] Following this argumentation, a negative average impact of cross-border deals on the acquirers' announcement returns could be expected. On the other hand, foreign entity acquisitions may be linked to several benefits for domestic firms. Scholes and Wolfson (1990) and Kang (1993) suggest that the tax system, in particular the corporate tax rate, in the target firm's domicile country can provide foreign acquirers with a valuable tax advantage if they come from a country with higher corporate taxation.[369] Scholes and Wolfson (1990) also empirically demonstrate that the tax argument indeed can help to explain the higher level of M&A activities attributed to foreign investors in a country established a tax-favorable policy from the foreigners' point of view. Furthermore, Danbolt (2004) argues that foreign acquisitions can help firms to overcome trade barriers and thus facilitate their access to new markets.[370] Such transactions may be particularly valuable if the acquirer's home currency is stronger than the currency of its target. In this context, the empirical results of previous studies are also mixed. For instance, Goergen and Renneboog (2004) report a negative empirical link between domestic transactions and the

[365] cf. Morck et al. (1990), pp. 32–33.
[366] cf. Draper and Paudyal (2008), pp. 398–399; Fuller et al. (2002), p. 1787; Goergen and Renneboog (2004), p. 36; Masulis et al. (2007), pp. 1868, 1875.
[367] cf. Fuller et al. (2002), p. 1786; Goergen and Renneboog (2004), p. 9; Rossi and Volpin (2004), p. 278.
[368] cf. on this and the following Draper and Paudyal (2008), p. 399.
[369] cf. on this and the following Scholes and Wolfson (1990), pp. 141–144, 157–158; Kang (1993), p. 348.
[370] cf. on this and the following Danbolt (2004), pp. 86–87.

announcement returns of European bidders, whereas the results of Moeller and Schlingemann (2005) suggest lower returns in the case of cross-border deals conducted by US acquirers.[371] Seeing as the data used by Goergen and Renneboog (2004) better fits the present sample and a number of reasonable arguments exist for predicting a positive link between acquirers' M&A performance and foreign transactions, this relation is consequently expected for this thesis.

Status of the target firm

Fuller et al. (2002), Moeller et al. (2004), and Masulis et al. (2007) demonstrate that acquirers' M&A returns additionally differ for public and private targets (or subsidiaries).[372] They report a (more) negative relation for the target firm's public status and bidder returns attributed to the acquisition announcement. According to Fuller et al. (2002), this link can be explained by the liquidity discount on private firms, which allows an acquirer to achieve a better price in the transaction and hence to raise the returns for its shareholders.[373] The fact that private firms are more difficult to buy and sell and consequently less attractive could result in the acquirer having a bargaining advantage during the negotiation period and therefore in the aforementioned discount on the purchase price. In contrast, publicly traded firms could exhibit a higher number of interested bidders, which allows target firms to negotiate a higher price that potentially includes a liquidity premium. Furthermore, the link between the target's private status and announcement returns can be more pronounced if the acquirer's stock is used as the transaction currency. This is because a typical closely held private company paid for with the acquirer's shares could have incentives to monitor the acquirer's management after becoming a substantial shareholder, which creates additional shareholder value. Due to the clear findings of prior literature and widely unanimous empirical evidence, a negative link between the public status of target firms and acquirers' announcement returns is expected for this thesis. To assess this relation, a dummy variable coded with a value of 1 if the target is a publicly traded firm and 0 otherwise is considered in the present analysis.

[371] cf. Goergen and Renneboog (2004), pp. 36–38; Moeller and Schlingemann (2005), p. 533.
[372] cf. on this and the following Fuller et al. (2002), p. 1792; Moeller et al. (2004), pp. 212, 215; Masulis et al. (2007), p. 1858.
[373] cf. on this and the following Fuller et al. (2002), pp. 1765, 1784, 1792.

Payment type

As discussed in chapter 4.3.1, the choice of payment method in the scope of an M&A transaction can constitute a signal to the market regarding how a firm's management perceives the company's actual value. A stock offer can thus be interpreted as an overvaluation signal, whereas a cash offer can indicate undervaluation.[374] As such, one could expect acquirers' announcement returns to be negatively related to the stock payment method and positively to cash payment option. However, as Martin (1996) suggests, a firm's management may have other motives for using a specific payment method; the market reaction attributable to the payment choice may also depend on the target's public or private status, as elaborated in the previous section.[375] The empirical results concerning the link between M&A performance and payment type differ among scientific studies. While Draper and Paudyal (2008) find a more positive impact of cash offers on acquirer returns,[376] Goergen and Renneboog (2004) report a negative relation between cash payment and bidders' announcement performance.[377] Furthermore, Travlos (1987) indicate a negative impact of stock payment on acquirer returns,[378] whereas Fuller et al. (2002) show a negative effect of equity offers for deals that involve a public target and a positive effect for transactions that include private firms.[379] In summary, while economic theory mainly suggests a positive (negative) relation between deals paid with cash (equity) and acquirers' announcement returns, the results of previous studies indicate that this relation is still an empirical question. Two separate dummy variables are included in the present analysis to account for the differences in payment structures: the first takes a value of 1 for deals paid with cash and 0 otherwise; the second accounts for cases in which stock is used as deal currency.

Further controls

Researchers such as Martynova and Renneboog (2008) argue that the outcomes of M&A transactions may depend on whether the target becomes fully or partially acquired.[380] This deal characteristic could be particularly important in cross-border deals, because a full acquisition implies a switch in the target's nationality in accordance with international law. Such a switch

[374] cf. Travlos (1987), pp. 944–945.
[375] cf. Martin (1996), pp. 1229–1231, 1242.
[376] cf. Draper and Paudyal (2008), p. 396.
[377] cf. Goergen and Renneboog (2004), p. 36.
[378] cf. Travlos (1987), p. 960.
[379] cf. Fuller et al. (2002), pp. 1764, 1787.
[380] cf. on this and the following Martynova and Renneboog (2008), pp. 200–201.

results in the de facto occurrence of spillover effects (e.g., with regard to CG standards related to the acquirer) and thereby potentially affects the extent of the synergy value. To appropriately control for this and other effects that depend on the size of the stake in the target firm held by the acquirer after a transaction, the present analysis includes a variable that contains information on this stake level.

As suggested by Hite et al. (1987), Maksimovic and Phillips (2001), and Slovin et al. (2005), acquirers' announcement returns may additionally depend on whether a share deal or asset deal (including the acquisition of entire assets or partial business units) is conducted.[381] The preference for a specific deal form can be driven by specific conditions such as the extent of the expected synergy gains or the target's current financial situation, which can ultimately be reflected in the market's reaction to the deal announcement. To account for the basic deal forms, a dummy variable that takes a value of 1 in the case of an asset deal and 0 otherwise is added to the analysis.

Furthermore, firm acquisitions can be roughly divided into hostile and friendly takeovers. These types of acquisitions are frequently considered in prior empirical studies because of their (presumable) value relevance for the involved firms, for instance due to the higher overpayment risk in hostile takeovers from the perspective of the bidder's shareholders.[382] However, as in the present sample none of the transactions for which the required data is available constitute hostile acquisitions, it is not necessary to account for this issue. The absence of hostile transactions in the sample is widely in line with the results of Moeller et al. (2007), who report only 2.5% hostile acquisitions in their broad sample of 4322 transactions.[383] In the scope of the next section, descriptive statistics related to the present M&A sample are described in more detail.

4.3.3 Sample data and descriptive statistics

The descriptive statistics related to the M&A activities of German and UK firms are presented in tables 3 and 4. In line with the expectations derived from the study of Goergen and Renneboog (2004), UK firms appear to conduct significantly more transactions than their German

[381] cf. on this and the following Hite et al. (1987), pp. 229–230, 251; Maksimovic and Phillips (2001), p. 2020; Slovin et al. (2005), p. 2385.
[382] cf., for instance, Moeller et al. (2004), p. 211; Martynova and Renneboog (2008), p. 211.
[383] cf. Moeller et al. (2007), p. 2054.

counterparts (553 vs. 148).[384] However, the average value effects attributed to M&A announcements are more positive for German acquirers (1.1%) than for UK acquirers (0.66%).[385] This can be linked to the fact that the German sample covers larger transactions (as indicated by the absolute deal size) that are consequently related to more pronounced market reactions. However, the medians of the value effects reveal a much smaller difference between German and UK firms (0.49% vs. 0.34%). In this context, the mean (median) deal size for German companies is $1228.599 ($250.5805) million, whereas the respective value for UK firms amounts to $401.908 ($45.062) million. It can be additionally noted that cross-border deals, which could require a more detailed transaction explanation from the perspective of shareholders, dominate both the German and UK samples—although they are even more prevalent among German firms (77.03% vs. 62.93%). In contrast, deals that involves targets from the same industry occur slightly more frequently in the UK sample than in the German one (32.37% vs. 27.70%). Regarding the payment type in M&A transactions, the present data indicates that UK firms rely more on pure cash payment than their German counterparts (68.90% vs. 43.92%), whereas German companies rely slightly more on stock as the deal currency (4.73% vs. 1.45%). The finding of the predominance of pure cash financing is in line with the results of researchers such as Goergen and Renneboog (2004);[386] however, the sample companies seem to have reduced their pure stock payments over time, presumably due to the negative signals they send to the market with regard to a firm's stock overvaluation (as discussed in the previous chapter). In addition, German firms have greater involvement in transactions with publicly listed targets than UK companies (15.54% vs. 11.94%), whereas asset deals are more prevalent in the UK (62.93% vs. 44.59%). The high percentage of asset deals in the present sample is in accordance with the findings of researchers such as Netter et al. (2011), who report an asset deal percentage of even over 70% for the US market.[387] Finally, full acquisition of the target seems to appear slightly more frequently in the UK sample than in the German one, as indicated by the statistics on the ultimate ownership. The descriptive statistics on the fundamental data of acquirers reveals that on average, M&A deals in the German sample tend to be conducted by larger firms than in the UK sample; this is in line with the higher deal values identified for German firms. In the following section, the third and final part of the present thesis's empirical analysis is introduced.

[384] cf. Goergen and Renneboog (2004), pp. 23–24.
[385] For detailed elaborations on the calculation of value effects, refer to chapter 5.3.
[386] cf. Goergen and Renneboog (2004), p. 14.
[387] cf. Netter et al. (2011), p. 2323.

Table 3: Descriptive statistics for German M&As

	N	mean	stand dev	25th percentile	median	75th percentile
CAR -1...1 (value effect)	148	0.0110	0.0401	-0.0088	0.0049	0.0269
Deal size (in $ million)	148	1228.599	2835.72	42.25	250.5805	814.6675
Cross-border deal	148	0.7703	0.4221			
Intra-industry deal	148	0.2770	0.4490			
Cash payment	148	0.4392	0.4980			
Stock payment	148	0.0473	0.2130			
Public target	148	0.1554	0.3635			
Final ownership	148	0.9631	0.1048			
Asset deal	148	0.4459	0.4988			
Firm size (in € million)	148	22700	40400	1100	5650	22000
ROE	148	0.1239	0.2064	0.0695	0.1450	0.2030
Leverage	148	0.6902	1.1872	0.2443	0.5207	0.8980
R&D intensity	148	0.0323	0.0427	0.0007	0.0176	0.0451
CapEx intensity	148	0.0447	0.0333	0.0218	0.0367	0.0546
IA intensity	148	0.2685	0.1789	0.1230	0.2342	0.4317
Sales growth	148	0.1315	0.2214	0.0483	0.0964	0.1637
US cross-listing	148	0.2095	0.4083			
Firm age	148	29.7230	24.0424	11	17	59
Strategic holdings	148	0.0620	0.1351	0	0	0.06
IR budget	41	2.5610	1.3793	2	3	4
IR remuneration	41	2.3415	1.0632	2	2	3
IR employees (abs)	41	3.3415	1.7834	2	3	4
Distance to airport (km)	147	29.7833	24.2343	12.5740	22.4691	32.4618
Distance to Frankfurt (km)	147	202.6234	122.4448	91.3644	187.6617	304.0464
Financial expert CEO	148	0.2230	0.4177			
Head of IR analyst	122	0.2377	0.4274			

CAR -1...1 (value effect) is the acquirer's three-day cumulated abnormal stock return around the M&A announcement. *Deal size (in $ million)* is the total value of the transaction. *Cross-border deal* is a dummy variable that equals one in the case of the acquisition of a foreign target and zero otherwise. *Intra-industry deal* is a dummy variable that equals one if the acquirer and the target firm operate in the same industry and zero otherwise. *Cash payment* is a dummy variable that equals one if cash is used as the deal currency and zero otherwise. *Stock payment* is a dummy variable that equals one if stock is used as the deal currency and zero otherwise. *Public target* is a dummy variable that equals one if the target firm is a publicly traded company and zero otherwise. *Final ownership* is measured as the equity stake in the target firm held by the acquirer after the transaction. *Asset deal* is a dummy variable that equals one if the deal is conducted via the acquisition of target's assets and zero otherwise. *All of the following corporate characteristics refer to the acquiring firm. In addition, all accounting variables refer to the fiscal year prior to the transaction. Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers. *Distance to airport (km)* measures the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt (km)* measures the distance between the firm's headquarter location and Frankfurt. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 4: Descriptive statistics for UK M&As

	N	mean	stand dev	25th percentile	median	75th percentile
CAR -1...1 (value effect)	553	0.0066	0.0342	-0.0128	0.0034	0.0228
Deal size (in $ million)	553	401.908	1508.389	15	45.062	173
Cross-border deal	553	0.6293	0.4834			
Intra-industry deal	553	0.3237	0.4683			
Cash payment	553	0.6890	0.4633			
Stock payment	553	0.0145	0.1195			
Public target	553	0.1194	0.3245			
Final ownership	553	0.9785	0.0869			
Asset deal	553	0.6293	0.4834			
Firm size (in € million)	553	9356.973	23000	776.071	2300	5800
ROE	553	0.3221	0.6987	0.1374	0.2021	0.3557
Leverage	553	0.3818	8.0424	0.2069	0.5248	0.8654
R&D intensity	553	0.0259	0.0616	0	0.0008	0.0288
CapEx intensity	553	0.0423	0.0446	0.0158	0.0302	0.0513
IA intensity	553	0.3267	0.1986	0.1633	0.3125	0.4804
Sales growth	553	0.1240	0.1167	0.0559	0.1052	0.1807
US cross-listing	553	0.1646	0.3711			
Firm age	553	25.3996	19.6940	9	20	40
Strategic holdings	553	0.0155	0.0531	0	0	0
IR budget	64	2.2188	1.2783	1	3	3
IR remuneration	64	2.5625	1.2956	2	2	3
IR employees (abs)	64	2.9375	1.4351	2	2	4

CAR -1...1 (value effect) is the acquirer's three-day cumulated abnormal stock return around the M&A announcement. *Deal size (in $ million)* is the total value of the transaction. *Cross-border deal* is a dummy variable that equals one in the case of the acquisition of a foreign target and zero otherwise. *Intra-industry deal* is a dummy variable that equals one if the acquirer and the target firm operate in the same industry and zero otherwise. *Cash payment* is a dummy variable that equals one if cash is used as the deal currency and zero otherwise. *Stock payment* is a dummy variable that equals one if stock is used as the deal currency and zero otherwise. *Public target* is a dummy variable that equals one if the target firm is a publicly traded company and zero otherwise. *Final ownership* is measured as the equity stake in the target firm held by the acquirer after the transaction. *Asset deal* is a dummy variable that equals one if the deal is conducted via the acquisition of target's assets and zero otherwise. *All of the following corporate characteristics refer to the acquiring firm. In addition, all accounting variables refer to the fiscal year prior to the transaction*. *Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers.

4.4 IR quality and SEO performance

4.4.1 Hypotheses

As discussed previously (e.g., in chapter 2.2), IR may further become particularly valuable in the scope of firms' equity offerings, where the quality of communication with existing and new investors could be reflected in the market's reaction to announcements of such corporate actions. The present thesis is the first to analyze the relation between firms' SEO performance and IR activities and disentangle the related value effects (if any) for firms that come from different legal and financial systems. In this section, the expectations on the aforementioned links are elaborated.

According to Lang and Lundholm (2000), two major aspects of IR, namely the alleviation of information asymmetry between firms and investors and the application of appropriate strategies to raise investors' awareness, could also be potential value drivers in the scope of SEO announcements.[388] As Walker and Yost (2008) suggest, information asymmetry related to SEOs may exist in relation to a company's true value and the value of utilizing realized proceeds.[389] The first concern regarding a firm's actual value can be primarily ascribed to Myers and Majluf (1984), who argue that if a company's management possesses superior information that indicates that the firm's stock is overvalued, managers tend to raise new capital by relying on equity offerings.[390] Because SEOs could consequently signal to the market that a firm is overvalued, one should expect on average a negative stock price reaction to SEO announcements assuming investor rationality. Among others, Masulis and Korwar (1986) and Kalay and Shimrat (1987) empirically substantiate this prediction by providing evidence of negative announcement returns for issuing firms.[391] They also show that such market reaction indeed seems to be related to information asymmetry and the negative signal attributed to these capital actions.[392] In this context, Lang and Lundholm (2000) suggest that better firm disclosure practices before equity offerings could lessen residual information asymmetry and hence alleviate negative value effects at the time of SEO announcements.[393] In addition, as in M&A transactions, a firm's management and IR team could communicate with investors and analysts directly in the scope of SEO

[388] cf. Lang and Lundholm (2000), p. 630.
[389] cf. Walker and Yost (2008), pp. 376–377.
[390] cf. on this and the following Myers and Majluf (1984), pp. 188, 220.
[391] cf. on this and the following Masulis and Korwar (1986), pp. 116–117; Kalay and Shimrat (1987), p. 125.
[392] For further conceivable issues that may be linked to raising new equity (in addition to stock overvaluation), see Kalay and Shimrat (1987), pp. 111–112.
[393] cf. Lang and Lundholm (2000), p. 631.

announcements to resolve market participants' different concerns (e.g., on stock overvaluation), for instance by providing plausible arguments as to why additional capital should be raised by issuing new equity instead of debt and by generally elaborating a capital action's purpose. In this sense, Walker and Yost (2008) suggest that if from the investors' perspective a firm does not seem to have an appropriate purpose for raising equity capital, a (more) negative market reaction to the corresponding announcement could be expected.[394] This is particularly the case because in line with the agency theory, managers may use the SEO proceeds to enhance their own wealth to the detriment of shareholders. For instance, Berger et al. (1997) provide evidence that entrenched managers try to avoid higher levels of leverage and consequently prefer equity over debt, for example to avert higher firm risk and consequently reduce performance pressure and enhance their own job security.[395] Furthermore, investors may face a risk that managers use proceeds to engage in empire-building activities, as suggested by Jensen (1986), or enjoy perks at the expense of shareholders.[396] The empirical study of Walker and Yost (2008) shows that provision of specific information on the usage of collected funds in the scope of SEO disclosure differs across firms.[397] Whereas some companies provide detailed plans for the utilization of new capital, others disclose only little or no information. These researchers' study also provides evidence that companies that are specific about their investment intentions for the collected funds experience value increases when equity offers are announced, while firms with hazy disclosure are subject to value losses. The extent of both effects is linked to the size of the intended programs. These empirical results highlight the importance of disclosure quality in the scope of SEOs, particularly due to concerns related to agency issues. In addition, Leuz and Verrecchia (2000) stress that good IR quality can help to decrease adverse selection concerns and thereby contribute to higher stock liquidity in the run-up to capital actions, which should in turn allow firms to reduce the discount on the new equity they frequently offer to create incentives for market participants to invest in less liquid stock.[398] As such, firms with more sophisticated IR may collect more funds and exhibit higher SEO performance.

The stock marketing activities of IR can further contribute to firms' SEO performance by boosting market participants' awareness of the corresponding firms.[399] In line with Merton

[394] cf. on this and the following Walker and Yost (2008), pp. 376–377.
[395] cf. Berger et al. (1997), pp. 1414, 1436.
[396] cf. Jensen (1986), p. 328; Tirole (2001), p. 1.
[397] cf. on this and the following Walker and Yost (2008), pp. 376, 384–386.
[398] cf. Leuz and Verrecchia (2000), p. 92.
[399] cf. Lang and Lundholm (2000), p. 630.

(1987), an increase in the amount of information disclosed, a higher frequency of more forthcoming communication with investors and analysts (e.g., during conferences and meetings), as well as a higher presence in the media can increase overall firm visibility in the run-up to a capital action and result in a higher stock price.[400] This can in turn make it possible to raise funds on better conditions and enhance SEO performance. However, Lang and Lundholm (2000) emphasize that when information about an equity offering becomes public, investors may assume that enhanced IR activities served an opportunistic purpose and consequently revalue a firm's stock—which might be reflected in a larger price drop being attributed to the SEO announcement.[401] While Lang and Lundholm (2000) provide evidence of these patterns, Clinton et al. (2014) find that greater disclosure (e.g., via forward-looking statements) prior to SEOs typically enriches the information environment and is associated with higher stock returns in the run-up to SEOs, which subsequently do not suffer from reversals.[402] Furthermore, as already highlighted in the scope of developing hypotheses on M&A performance, an appropriate IR strategy during SEO announcements can counterbalance investors' potentially negative assessments of prior stock marketing activities; as a result, market participants may attribute a firm's higher visibility to a sustainable increase in its market value and at least a less negative stock price reaction may occur. In this context, the credibility of management and the IR team built up before the capital action could play an important role for investors' perception.[403]

In line with previous elaborations concerning the importance of IR quality in different countries, the IR contribution to SEO performance may also deviate depending on country-specific settings. With regard to divergences in the financing structures of firms that are subject to different law origins and financial systems, Aktas et al. (2016) point out that whereas firms in Germany (which has a banked-based system) tend to exhibit a higher concentration of ownership and higher reliance on banks for raising external funds, UK companies have more dispersed ownership structures and stronger ties to financial markets as a financing source.[404] In this context, Foley and Greenwood (2010) provide evidence that firms from countries with higher investor protection (e.g., the UK), exhibit more dispersed ownership on average and seem to rely more on equity financing (thus, SEOs) when they face valuable growth opportunities; in contrast,

[400] cf. on this and the following Merton (1987), p. 501; Lang and Lundholm (2000), pp. 627–628.
[401] cf. on this and the following Lang and Lundholm (2000), p. 623.
[402] Clinton et al. 2014, p. 59. However, this study relies on the SEO issue date as the reference day (which is more relevant for shelf offerings).
[403] cf. Hoffmann and Fieseler (2012), p. 149.
[404] cf. Aktas et al. (2016), pp. 1–2.

companies from countries with lower investor protection (e.g., Germany) are more likely to seek debt financing.[405] In conclusion, the encouragement of successful SEO implementation—through either sophisticated stock marketing techniques, more intensive and forthcoming communication with a larger number of (potential) equity investors, or a combination thereof—appears to be one of the major IR tasks in the UK and its extent should be higher than in Germany. As such, a higher contribution of better IR quality to SEO performance could be expected for UK firms than for German companies. However, due to the higher information asymmetry concerns applicable to German firms and the identified importance of IR activities in addressing them, a more conservative expectation concerning the differences between Germany and the UK is stated for the present analysis. The following hypotheses are thus tested in this thesis:

$H_{7.1}$: *Better IR quality is associated with higher SEO announcement returns for German issuers*

$H_{7.2}$: *Better IR quality is associated with higher SEO announcement returns for UK issuers*

$H_{7.3}$: *The positive link between IR quality and SEO announcement returns for UK issuers does not substantially differ from that for German issuers or is even stronger*

4.4.2 Sample construction and essential control variables

Following researchers such as Lee and Masulis (2009) and Kim and Purnanandam (2014), the present thesis uses the Thomson Reuters SDC database to obtain information on SEOs of German and UK firms within the time period of 2006 to 2014.[406] In line with the aforementioned studies, only completed SEOs for which a filing date of the offer is available are included in the sample. Furthermore, as suggested by Kalay and Shimrat (1987) and Kim and Purnanandam (2014), all pure secondary offerings are excluded from the analysis given that they constitute stock sales by existing shareholders and thus do not entail the actual issuance of any primary shares.[407] The matching procedure used in relation to the data on SEOs, Extel IR rankings, and corporate fundamentals corresponds to the process described in the scope of the introduction to the M&A analysis. The procedure entails matching SEOs filed from April to March in each year with IR rankings awarded subsequent to the end of this time span. Furthermore, the accounting data

[405] cf. Foley and Greenwood (2010), pp. 1231, 1259.
[406] cf. Lee and Masulis (2009), p. 449; Kim and Purnanandam (2014), p. 1027.
[407] cf. Kalay and Shimrat (1987), p. 113; Kim and Purnanandam (2014), p. 1027.

obtained for the fiscal year before the actual equity offering is used to avoid a bias in fundamentals through the completion of the SEO. Prior empirical research additionally suggests controlling for some SEO characteristics that may have an impact on the corresponding value effects. The following sections introduce these features and discuss expectations related to their impacts.

Offer size

Prior empirical studies on SEOs (e.g., Asquith and Mullins, 1986; Jegadeesh et al., 1993; Slovin et al., 2000) suggest controlling for the (relative) size of the investigated equity offerings as a value-relevant factor, defined as the amount of the SEO proceeds divided by the firm's market value prior the filing date.[408] Following this suggestion, the present analysis considers the relative size of equity offerings, as calculated using information on SEO proceeds from the Thomson Reuters SDC database and the market value of equity from the Worldscope database.[409] Based on the signaling model of Myers and Majluf (1984), Krasker (1986) predicts that negative stock price reactions to SEO announcements should be stronger for equity offers that aim to collect more funds.[410] In contrast, Slovin et al. (2000) argue that an equity offering's larger size could be related to a stronger decrease in ownership concentration; in this case, a firm may become subject to higher external monitoring that could in turn create value for current shareholders.[411] This argument should particularly apply to German companies, which tend to exhibit more concentrated ownership structure (as previously discussed). The empirical evidence regarding this relation is also heterogeneous. Whereas researchers such as Asquith and Mullins (1986) and Bayless and Chaplinsky (1996) report a negative link between relative offer size and value effects attributed to SEO announcements,[412] Jegadeesh et al. (1993) and Slovin et al. (2000) find a positive relation.[413] In summary, because both of the aforementioned perspectives appear to be reasonable and the results may further depend on the origin of the investigated firms, no direct prediction on the link between relative offer size and SEO announcement returns is made in the present thesis.

[408] cf. Asquith and Mullins (1986), p. 80; Jegadeesh et al. (1993), p. 171; Slovin et al. (2000), p. 176.
[409] Analogous to M&A analysis, the market value obtained 10 days prior the filing date is used in this thesis.
[410] cf. Krasker (1986), p. 102.
[411] cf. Slovin et al. (2000), p. 177.
[412] cf. Asquith and Mullins (1986), p. 80; Bayless and Chaplinsky (1996), p. 274.
[413] cf. Jegadeesh et al. (1993), p. 171; Slovin et al. (2000), p. 177.

Use of proceeds

Following Masulis and Korwar (1986), Slovin et al. (2000), and Walker and Yost (2008), several intended uses of proceeds announced in the scope of SEOs and specified in the Thomson Reuters SDC database are taken into account in the present analysis.[414] The respective purposes are covered by separate dummy variables that take a value of 1 if the proceeds should be used for corporate acquisitions, debt reduction, or working capital strengthening and 0 otherwise. Each objective is introduced below.

First, utilizing proceeds to strengthen working capital typically implies higher firm cash holdings, which may raise additional agency concerns assuming managers' opportunistic behavior.[415] In this regard, cash holdings may be used for private benefits that would ultimately harm shareholder value. However, Kalcheva and Lins (2007) provide evidence that more cash being available to a firm's management is related to lower market value only if country-level investor protection is weak.[416] In consequence, the aforementioned argument should primarily apply to German firms. On the other hand, Mikkelson and Partch (2003) demonstrate that firms that hold a persistent level of cash and thus follow a conservative financial policy exhibit higher growth and intensified investment activities.[417] To summarize, while the relation between SEO announcement performance and working capital as an intended usage of proceeds is not easy to predict, the link should be more positive (or less negative) for UK firms due to their lower agency concerns in comparison to German companies. This is in line with Kalcheva and Lins (2007).

With regard to the relation between the use of SEO proceeds for debt reduction and announcement returns, a negative link can be generally expected. In this context, Masulis (1983) as well as Masulis and Korwar (1986) suggest that decreased firm leverage constitutes a negative signal about managers' expectations concerning future earnings.[418] This is because when a firm has a weaker financial situation, its interest payments linked to outstanding debt may result in a threat of financial distress. To avoid this problem, a firm's management can aim to replace debt with equity that should be anticipated by rational investors and consequently reflected in SEO performance. This argumentation is closely linked to the evidence provided by Berger et al. (1997), which suggests that self-interested and entrenched managers prefer lower levels of leverage due to the lower performance pressure attributed to debt payments and higher job

[414] cf. Masulis and Korwar (1986), p. 97; Slovin et al. (2000), p. 176; Walker and Yost (2008), p. 376.
[415] cf. on this and the following Mikkelson and Partch (2003), p. 277.
[416] cf. Kalcheva and Lins (2007), p. 1087.
[417] cf. Mikkelson and Partch (2003), p. 275.
[418] cf. on this and the following Masulis (1983), pp. 115, 125; Masulis and Korwar (1986), p. 93.

security.[419] The empirical results concerning the link between debt reduction as the intended use of proceeds and SEO announcement returns are also widely consistent. For instance, Slovin et al. (2000) and Walker and Yost (2008) report a negative relation—although their findings partially suffer from a lack of statistical significance.[420]

The link between SEO announcement returns and the use of proceeds for M&A activities is less obvious. Walker and Yost (2008) suggest that investment activities as an intended use of proceeds are generally positively assessed by shareholders and hence positively linked to respective value effects.[421] On the other hand, as discussed in section 4.3.1, an acquisition itself can be subject to substantial information asymmetry and managerial opportunism concerns that could justify an inverse relation. As such, no direct prediction is made for this analysis. In the next chapter, descriptive statistics related to SEOs of German and UK firms are introduced.

4.4.3 Sample data and descriptive statistics

Tables 5 and 6 provide descriptive statistics concerning SEOs of German and UK firms. The numbers of observations for the German and UK samples that cover all required information are 130 and 120, respectively. In line with the predictions of Myers and Majluf (1984) as well as previous empirical evidence (e.g., Kim and Purnanandam, 2014),[422] the average value effects attributed to SEO announcements are negative for issuing firms from both Germany and the UK (-1.18% vs. -1.31%), which indicates the negative signal effect of equity offerings.[423] This evidence is supported by the corresponding median values of -1.25% for Germany and -1.44% for the UK. In addition, as predicted in chapter 4.4.1, the magnitude of UK SEOs (which were identified as a primary financing source in the market-based financial system) significantly exceeds the magnitude in Germany (which is characterized by a bank-based regime). The corresponding mean (median) offer size is $801.297 ($158.368) million in Germany and $1759.552 ($260.772) million in the UK. However, it should be noted that firms in the UK sample are on average larger than their German counterparts, which could at least partially

[419] cf. Berger et al. (1997), pp. 1411, 1414, 1436.
[420] cf. Slovin et al. 2000, p. 174; Walker and Yost (2008), pp. 382–383.
[421] cf. Walker and Yost (2008), pp. 382–383.
[422] cf. Myers and Majluf (1984), p. 188; Kim and Purnanandam (2014), p. 1030.
[423] For detailed elaborations o the calculation of value effects, see chapter 5.3.

explain the divergences in offer size. These differences could also underlie the slightly higher negative average market reaction to the announcements of UK companies.

Table 5: Descriptive statistics for German SEOs

	N	mean	stand dev	25th percentile	median	75th percentile
CAR -1...1 (value effect)	130	-0.0118	0.0723	-0.0506	-0.0125	0.0143
Offer size (in $ million)	130	801.297	2114.758	60.781	158.368	550.542
Use: Debt	130	0.1077	0.3112			
Use: Working capital	130	0.0385	0.1931			
Use: Acquisition	130	0.2923	0.4566			
Firm size (in € million)	130	91400	333000	680.758	1698.384	6557.000
ROE	130	-0.0168	0.3485	-0.0101	0.0732	0.1458
Leverage	130	2.2185	3.5499	0.3993	1.0311	2.2852
R&D intensity	130	0.0259	0.0700	0	0	0.0320
CapEx intensity	130	0.0499	0.0636	0.0119	0.0358	0.0564
IA intensity	130	0.1431	0.1842	0.0048	0.0758	0.1859
Sales growth	130	0.2013	0.6490	0.0023	0.0944	0.1998
US cross-listing	130	0.1385	0.3467			
Firm age	130	23.7154	24.7478	7	12	50
Strategic holdings	130	0.0916	0.1670	0	0	0.1
IR budget	27	2.6296	1.2449	2	3	4
IR remuneration	27	2.2222	1.0500	2	2	3
IR employees (abs)	27	2.8889	1.7614	2	2	3
Distance to airport (km)	129	25.8228	22.8050	9.7390	17.0544	35.7253
Distance to Frankfurt (km)	129	214.7283	136.8386	113.0383	221.3916	309.2442
Financial expert CEO	130	0.4615	0.5005			
Head of IR analyst	105	0.1143	0.3197			

CAR -1...1 (value effect) is the issuer's three-day cumulated abnormal stock return around the SEO announcement. *Offer size (in $ million)* is the amount of SEO proceeds. *Use: Debt* is a dummy variable that equals one if the SEO proceeds should be used for the debt reduction and zero otherwise. *Use: Working capital* is a dummy variable that equals one if the SEO proceeds should be used for the strengthening of working capital and zero otherwise. *Use: Acquisition* is a dummy variable that equals one if the SEO proceeds should be used for M&A activities and zero otherwise. *All accounting variables below refer to the fiscal year prior to the SEO. Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers. *Distance to airport (km)* measures the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt (km)* measures the distance between the firm's headquarter location and Frankfurt. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 6: Descriptive statistics for UK SEOs

	N	mean	stand dev	25th percentile	median	75th percentile
CAR -1...1 (value effect)	120	-0.0131	0.1265	-0.0455	-0.0144	0.0382
Offer size (in $ million)	120	1759.552	4413.763	92.507	260.772	849.217
Use: Debt	120	0.1917	0.3953			
Use: Working capital	120	0.0833	0.2775			
Use: Acquisition	120	0.4333	0.4976			
Firm size (in € million)	120	211000	587000	979.784	2321.155	12900
ROE	120	0.2789	1.3181	0.0363	0.1451	0.2091
Leverage	120	0.3681	17.3836	0.4037	0.7359	2.3155
R&D intensity	120	0.0150	0.0756	0	0	0.0004
CapEx intensity	120	0.0439	0.0673	0.0038	0.0233	0.0506
IA intensity	120	0.1997	0.2345	0.0056	0.0999	0.3578
Sales growth	120	0.1528	0.4193	0.0123	0.0716	0.1833
US cross-listing	120	0.1750	0.3816			
Firm age	120	26.6000	23.2229	7	19.5	46
Strategic holdings	120	0.0198	0.0608			
IR budget	10	2.1000	1.1005	1	2	3
IR remuneration	10	2.5000	1.6499	1	2	4
IR employees (abs)	10	3.9000	2.3781	2	3	6

CAR -1...1 (value effect) is the issuer's three-day cumulated abnormal stock return around the SEO announcement. *Offer size (in $ million)* is the amount of SEO proceeds. *Use: Debt* is a dummy variable that equals one if the SEO proceeds should be used for the debt reduction and zero otherwise. *Use: Working capital* is a dummy variable that equals one if the SEO proceeds should be used for the strengthening of working capital and zero otherwise. *Use: Acquisition* is a dummy variable that equals one if the SEO proceeds should be used for M&A activities and zero otherwise. *All accounting variables below refer to the fiscal year prior to the SEO. Firm size (in € million)* is measured as the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *IR employees (abs)* is the number of the firm's IR managers.

Furthermore, while the usage of new equity capital as a (potential) acquisition currency is more frequently stated in SEOs related to UK firms than to German companies (43.33% vs. 29.23%), the usage of proceeds to strength working capital occurs less frequently in both samples (8.33% and 3.85%). In addition, the deployment of proceeds to reduce a firm's debt is more frequently stated in the SEOs of UK firms than in those of German companies (19.17% vs. 10.77%), which seems to be in line with UK firms' higher reliance on equity financing. Finally, SEO as a financing source seems to be used particularly by higher leveraged (2.2185) German firms (in comparison to the overall sample in this thesis) that have a CEO with significant financial

experience. In this context, the high leverage characteristic of German issuers may indicate a necessity (rather than a preference) for equity financing due to the higher costs of raising additional debt. The methodology used to provide further insights on the investigated variables is discussed in the following chapter.

5 Methodology

5.1 Regression analysis and fixed effects

In the scope of the present thesis, the regression approach is applied to test the different hypotheses formulated. The aim of this method is to assess the change in the explained variable when the predictor variable increases by one unit.[424] The simple linear regression model can be outlined as follows:[425]

$$y = \alpha + \beta x + \varepsilon \tag{22}$$

where y constitutes the predicted (dependent) variable, x is the explanatory (independent) variable, α represents the constant term (intercept parameter), ε is the error or disturbance term, and β is the slope parameter of interest. In other words, given the linear function of the model, β indicates the ceteris paribus link between y and x, while α provides information on the constant level of y. Furthermore, the error term captures all unobserved factors that besides x affect y.

Estimation of relevant parameters

To estimate the regression parameters α and β, the OLS approach is typically applied.[426] When the error term (ε) has an expected value of zero and is uncorrelated with the independent variable (exogeneity), hence $E[\varepsilon] = 0$ and $Cov[\varepsilon|x] = 0$, the function's slope parameter can be estimated by dividing the covariance between the predicted variable and explanatory variable by the variance of the independent variable:[427]

$$\hat{\beta} = \frac{Cov\,(x,y)}{Var\,(x)} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} \tag{23}$$

where $\bar{x}$ and $\bar{y}$ constitute the sample means and x_i and y_i the respective observations within the dataset. The constant parameter is then estimated using the calculated $\hat{\beta}$ value and the sample means:

[424] cf. Wooldridge (2013), p. 29.
[425] cf. Wooldridge (2013), pp. 20–21, 25.
[426] cf. on this and the following Angrist and Pischke (2009), p. 35; Wooldridge (2013), p. 27.
[427] Wooldridge (2013), pp. 26–27.

$$\hat{a} = \bar{y} - \hat{\beta}\bar{x} \tag{24}$$

The aim of an OLS estimation is to determine the most suitable approximation that makes it possible to minimize the sum of squared residuals, which are defined as the differences between the actual and the estimated values of y:[428]

$$\sum_{i=1}^{n}(y_i - \hat{y}_i)^2 = \sum_{i=1}^{n}(y_i - \hat{a} - \hat{\beta}x_i)^2 \rightarrow min! \tag{25}$$

The squaring of the residuals is necessary because otherwise the errors with opposite signs would counteract each other.

However, the assumptions regarding the properties of the error term (ε) made in the scope of the simple regression model typically do not hold;[429] further important variables related to y that might additionally be correlated with the independent variable of interest usually exist. A multiple regression analysis that considers relevant covariates is frequently conducted to alleviate this concern. The general form of the multiple regression can be expressed as follows:[430]

$$\mathrm{y} = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k + \varepsilon \tag{26}$$

where k indicates the number of explanatory variables included in the model.

If further relevant regressors are taken into account, the estimated $\hat{\beta}$ coefficient on the variable of interest can be interpreted as the change in y when the respective independent variable changes by one unit (or in the case of a dummy variable, takes a value of 1), while all other factors in the model are held constant (i.e., ceteris paribus).[431] This constitutes the first step in addressing the omitted variables bias and endogeneity concerns.[432] To facilitate the interpretation of estimated coefficients for German and UK firms in the present thesis, the IR rankings (higher values of which initially indicate lower rating of IR quality) are multiplied by -1; after this transformation, an increase in ranking (i.e., less negative value) indicates better IR quality.

Furthermore, to disentangle the IR effect for firms from Germany and the UK, the regression analysis of the pooled sample includes in addition to a country dummy (that takes a value of 1 in

[428] Wooldridge (2013), p. 28.
[429] cf. Wooldridge (2010), pp. 3–4, 10.
[430] Angrist and Pischke (2009), p. 36; Wooldridge (2013), p. 67.
[431] cf. Wooldridge (2010), p. 3; Wooldridge (2013), p. 219.
[432] cf. Roberts and Whited (2013), pp. 498–499.

the case of German companies) an interaction term between this dummy variable and IR rankings. In line with Francis et al. (2005), the coefficient on IR rankings multiplied by the country dummy should reflect country-specific differences (if any) in the association of IR quality with several dependent variables.[433] The respective regression model can be outlined as follows, where β_1 is the parameter of primary interest:[434]

$$y = \alpha + \beta_1(IR\ rank * country) + \beta_2 IR\ rank + \beta_3 country + \ldots + \beta_k x_k + \varepsilon \qquad (27)$$

Finally, following empirical studies by researchers such as Hope (2003), Jegadeesh and Livnat (2006), and Bushee and Miller (2012), each analysis in this thesis contains a regression specification that relies on a winsorized version of the dependent variable.[435] The winsorization procedure is applied for robustness purposes and should help to control for potential outliers that may drive the results of the current study. While different levels of winsorization are common in empirical research (e.g., 1% and 99%, 2.5% and 97.5%, or 5% and 95%), this thesis relies on a moderate level of 2.5% and 97.5%. As a result, all values of the dependent variable above the 97.5th percentile are transformed into the value of the 97.5th percentile and all values below the 2.5th percentile are set to the value of the 2.5th percentile.[436] Winsorization thus decreases the variation of the dependent variable attributed to the values at both tails of distribution and makes it possible to estimate regression coefficients that are less affected by extreme values of y.

Statistical significance

In this thesis, the statistical significance of the obtained results (i.e., whether it can be assumed that the relationships between variables derived from the investigated samples are also applicable to the overall population) is assessed using the two-sided test that is common in empirical research, even if a straight prediction regarding the sign of the coefficient exists.[437] While the null hypothesis (H_0: $\beta = 0$) predicts the absence of any relation between the dependent variable and independent measure, the alternative hypothesis (H_1: $\beta \neq 0$) implies an effect that differs from zero. The rejection of the null hypothesis is assessed using the test statistic—or rather the

[433] cf. Francis (2005), p. 1144.
[434] cf. Angrist and Pischke (2009), p. 50; Wooldridge (2013), pp. 190–191.
[435] cf. on this and the following Hope (2003), p. 246; Jegadeesh and Livnat (2006), p. 152; Bushee and Miller (2012), p. 897.
[436] cf. on this and the following Tukey (1962), p. 18; Kennedy et al. (1992), p. 173.
[437] cf. on this and the following Wooldridge (2013), pp. 114–115, 120–121.

corresponding p-value—for each coefficient as well as the overall significance level specified for the present analysis. In line with the majority of the empirical studies on IR and disclosure described within this thesis, the significance level of 10% is chosen as the maximal probability for the false rejection of the null hypothesis in the present analysis. The value of the test statistic is defined as follows:[438]

$$t = \frac{\hat{\beta}}{SE(\hat{\beta})} \tag{28}$$

where SE constitutes the standard error of the slope parameter.[439]

Seeing as this standard error is usually subject to heteroscedasticity, which means that the variance of the regression residuals incorporated in $SE(\hat{\beta})$ depends on the different levels of the explanatory variables, the OLS assumption of homoscedasticity is violated and the test statistic may be seriously biased.[440] To address this issue, for instance, Angrist and Pischke (2015) suggest applying the robust standard errors, which permits the possibility that the variance of residuals is conditional on the regressors' specific values.[441] Consequently, all test statistics reported in the scope of the present thesis are based on the robust standard errors introduced by White (1980).

Finally, to be able to directly assess the statistical significance of the results, a p-value that indicates "the probability of observing a t statistic as extreme as we did *if the null hypothesis is true*" [442] is computed for each test statistic. As such, the H_0 that states the absence of any relation is rejected if the p-value is smaller than 10% and retained otherwise. In line with previous research, the 1%, 5%, and 10% levels of statistical significance are reported in this thesis.

Fixed effects

As emphasized in chapter 3.2, besides the observable covariates included in the multiple regression, other relevant factors that are omitted but correlated with both the independent and the dependent variables could exist, which would give rise to the endogeneity issue and biased

[438] Wooldridge (2013), p. 114.
[439] Using an analogous procedure, the z-statistic that relies on the (standard) normal distribution is calculated, e.g., in the scope of the logistic or IV regressions. See, for instance, Wooldridge (2010), pp. 101–104.
[440] cf. Wooldridge (2013), pp. 258–260.
[441] cf. Angrist and Pischke (2015), p. 97.
[442] Wooldridge (2013), p. 126.

estimates in the regression analysis. A FE regression within the framework of a panel dataset makes it possible to control for such factors that are attributed to individual firms and do not vary over time.[443] Because in a (unbalanced) panel multiple observations are available for (at least several) investigated firms, the error term $\varepsilon_{i,t}$ of the regression function for each firm i at timepoint t can be separated into two components, as shown below:[444]

$$y_{i,t} = \beta_1 x_{i,t} + \beta_2' controls_{i,t} + \omega_{i,t} + \mu_i \quad (29)$$

where $\omega_{i,t}$ constitutes the time-variant (idiosyncratic) component and μ_i the fixed constituent of the error term; $controls_{i,t}$ is a vector of control variables.

The FE transformation is conducted by computing the average of the aforementioned function over time for each individual firm and subtracting it from the initial equation:[445]

$$y_{i,t} - \bar{y}_i = \beta_1(x_{i,t} - \bar{x}_i) + \beta_2'(controls_{i,t} - \overline{controls_i}) + \omega_{i,t} - \bar{\omega}_i + \mu_i - \mu_i \quad (30)$$

As the constant unobserved heterogeneity term ($\mu_i = \bar{\mu}_i$) becomes eliminated, an OLS estimation can subsequently be applied relying on the variation in the variables of interest within the individual firms and avoiding the potential endogeneity bias caused by time-invariant omitted factors. To the best of this author's knowledge, this thesis is the first to appropriately control for firm FE in the scope of IR analysis.

A similar idea applies to the consideration of other FE introduced in chapter 4.2.3, namely the time, index, and industry effects. The dummy variables approach is implemented in the present analysis to account for the facts that an outcome variable's values may additionally be explained by characteristics of a specific industry or stock market index to which the respective firms relate or that the outcomes may simply follow a time trend that is applicable to the entire sample.[446] Obviously, all previously mentioned factors could also be correlated with the independent measures; as such, considering these superordinate FE makes it possible to further alleviate endogeneity concerns. In this context, each dummy variable accounting for a particular industry, index, or year takes a value of 1 if a specific characteristic applies to the respective firm-year observation and 0 otherwise. Furthermore, each set of dummies is assigned a reference category

[443] cf. Angrist and Piscke (2009), p. 221.
[444] cf. Wooldridge (2013), p. 444.
[445] cf. Wooldridge (2013), pp. 466–467.
[446] cf. Angrist and Pischke (2015), pp. 194–195.

(e.g., the year 2006 for the time FE) that is consequently omitted from the regression, which avoids perfect collinearity in the data (which is also known as the dummy variable trap).[447] The basic regression equitation with all three FE settings can be expressed as follows:

$$y_{i,t} = \alpha + \beta_1 x_{i,t} + \beta_2' controls_{i,t} + \delta' industry_i + \vartheta' index_{i,t} + \gamma' year_t + \varepsilon_{i,t} \qquad (31)$$

where ϑ, δ, and γ constitute the coefficients on the specific FE characteristics.

Finally, the approach accounting for firm FE that was introduced at the beginning of this section can be combined with other FE controls to adequately account for different sources of heterogeneity.[448] This is done in the present analysis. However, it should be noted that in the case of a joint application of FE, industry effects are not included in the regression model; this is because they would otherwise typically become omitted due to their time-invariant character. To provide robust inference in this thesis, the IV analysis described in the next chapter is also conducted for each outcome variable. Before this statistical method is introduced in detail, the logistic regression used in the scope of the head of IR turnover investigation is briefly outlined for the sake of completeness.

Logistic regression

As the head of IR turnover variable is binary and thus takes a value of 1 or 0, applying a simple OLS estimation would give rise to several issues.[449] First, while the OLS coefficients could be interpreted as partial effects on the probability that the dependent variable takes a value of 1, the estimated probabilities in the model may exceed 100% or fall below 0%. Furthermore, since the error terms are also binary, the heteroscedasticity issue naturally arises. The OLS regression is still applicable when heteroscedasticity-robust standard errors are used, but a better-suited approach is frequently applied in the scientific research, namely logistic regression.

In the scope of a logistic regression, the aforementioned issues are addressed by transforming the binary dependent variable to logits.[450] In the first step, the probability for the dependent variable having a value of 1 ($p(y = 1)$), which is derived from the sample, is used to calculate the respective odds by dividing this probability by the converse probability ($1 - p(y = 1)$). The

[447] cf. Wooldridge (2013), p. 220.
[448] cf. Wooldridge (2013), p. 467.
[449] cf. on this and the following Wooldridge (2013), pp. 241–242.
[450] cf. Menard (2010), pp. 14–15.

application of the natural logarithm on the odds yields the logit, which can basically take any positive and negative values and hence offsets the disadvantages of the limited binary variable. The general logistic regression model can be expressed as follows:[451]

$$\ln\left[\frac{p(y\ =\ 1)}{1-p(y\ =\ 1)}\right] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k + \varepsilon \qquad (32)$$

where the β coefficients indicate the (ceteris paribus) change in the logit conditional on the change of x by one unit.[452] The coefficients' signs can be directly interpreted, which provides information of interest on the types of relations between independent variables and the probability that the outcome variable takes a value of 1. The further transformation of the results for detailed interpretation purposes is not discussed in the present thesis due to the lack of relevance to the investigated hypotheses.[453]

5.2 Instrumental variables approach

Chapter 3.2 has already provided initial insights into the idea of an IV regression that relies on exogenous instrument(s) to predict the values of the endogenous variable of interest, which should ultimately help to establish the link between the dependent variable and the predicted explanatory measure and avoid several sources of endogeneity concerns.[454] The instruments naturally have to be correlated with the endogenous explanatory variable of interest. Furthermore, the exclusion restriction applicable to this approach requires that the instruments are uncorrelated with the error term. If such instrumental variables have been found, the 2SLS approach can be applied by "substituting the first-stage equation (…) into the causal relation of interest."[455] As an initial step, the fitted values of the explanatory variable are thus obtained from the following first-stage OLS estimation:[456]

[451] Menard (2010), p. 14.
[452] cf. on this and the following Wooldridge (2013), p. 566.
[453] For more details on the transformation of the coefficients as well as on the special case of Pseudo R^2, see Wooldridge (2013), pp. 566–571.
[454] cf. Angrist and Pischke (2009), pp. 115–116, 121.
[455] Angrist and Pischke (2009), p. 121.
[456] Angrist and Pischke (2009), p. 121; Angrist and Pischke (2015), p. 133.

$$\hat{x}_{i,t} = \hat{\alpha} + \hat{\beta}_1{}' \text{instruments}_{i,t} + \hat{\beta}_2{}' controls_{i,t} \quad (33)$$

where instruments is the vector of the exogenous variable(s) and $\hat{x}$ constitutes the fitted value of the endogenous regressor. The second stage then relies on the predicted values ($\hat{x}$**)** to establish the link of interest:[457]

$$y_{i,t} = \alpha + \beta_{2SLS}\, \hat{x}_{i,t} + \beta_2{}' controls_{i,t} + \varepsilon_{i,t} \quad (34)$$

In this context, the vector of control variables is the same in both stages. With regard to the assessment of the results' statistical significance, the standard errors of the second stage are adjusted to the fact that the endogenous regressor (instead of the fitted values) has to be used to construct the respective residuals.[458] In the case of good instruments, the second stage yields consistent estimates that are subject to at least fewer endogeneity concerns. However, the identification of such exogenous variables that are related to x and fulfill the exclusion restriction appears to be the greatest challenge.[459] This thesis relies on two sets of instruments, which are presented below.

Instruments

Following Karolyi and Liao (2017), the first set of instruments covers the investigated firms' IR resources, namely the number of IR team members, their remuneration, and the IR budget.[460] The data required to construct the instruments is obtained from the Extel IR surveys, which ask firms to provide information on these characteristics (which are typically not made public). While the number of IR team members who directly communicate with market participants is measured in absolute terms (normalized using the natural logarithm), the information on IR salaries and budgets is given in bands. In relation to the remuneration variable, this means that IR managers' salaries are classified into seven categories: less than €50,000; €50,000–70,000; €71,000–100,000; €101,000–120,000; €121,000–150,000; €151,000–200,000; and more than €200,000. To create a variable that can be used in the empirical analysis, the lowest category (€50,000) receives a value of 0 and the highest (more than €200,000) the value of 6. The remaining remuneration categories are coded accordingly within this range. Because budget data on external

[457] Angrist and Pischke (2015), p. 133.
[458] cf. Angrist and Pischke (2009), p. 140; Angrist and Pischke (2015), pp. 133–134.
[459] cf. Roberts and Whited (2013), p. 515.
[460] cf. Karolyi and Liao (2017), pp. 16–17.

IR help is only available for two years within the scope of the full sample, the present thesis relies on information concerning firms' overall IR budgets, which is typically provided together with the salary data. The IR budgets are categorized as follows: less than €250,000; €250,000–500,000; €500,000–1,000,000; €1,000,000–2,000,000; and more than €2,000,000. The respective budget variable considered in the analysis is coded analogous to the salary variable: a value of 0 is assigned to the lowest category (€250,000) and a value of 4 to the highest (over €2,000,000). Similar to Karolyi and Liao (2017), because not all of the firms covered by the survey provided answers to the relevant questions and some queries were not included every year, the number of observations in the overall sample for which the information on all three variables is available drops to 415 firm-years.[461] With regard to the relevance of these instruments, following Karolyi and Liao (2017) it can be expected that larger and better remunerated IR teams with a higher budget have more overall capabilities to provide more and better IR services. Compliance with the exclusion restriction is based on the assumption that no omitted factors that are correlated with both the IR resources and the dependent variable (e.g., firm performance) exist. As one could argue that this assumption is strong, an additional set of instruments is deployed in the present thesis.

The second set of instruments relying on geographical proximity, which is in line with the further instrumental variable used in the analysis of Karolyi and Liao (2017), namely the weighted average distance between the capital city of a firm's country and the headquarter city of foreign investors,[462] is primarily motivated by the studies of Card (1995) and Giroud (2013). Card (1995) uses the proximity to a college as an instrument for the level of education to establish a causal link between completed schooling and the wages subsequently earned by individuals.[463] The idea behind this instrument is that students living far from college are subject to a higher cost of education, which in turn reduces their engagement in schooling. Giroud (2013) investigates the impact of changes in the traveling time between firms' headquarters and their plants on shifts in investments and productivity at the plant level.[464] The decrease in traveling time between headquarter locations and plants is derived from the introduction of new flight routes. According to Giroud (2013), the main idea behind investigating this relation is that proximity—or rather an ability to reach a firm's plant more quickly—should facilitate its monitoring and retrieving

[461] cf. on this and the following Karolyi and Liao (2017), p. 17.
[462] cf. Karolyi and Liao (2017), p. 19.
[463] cf. on this and the following Card (1995), pp. 201–202.
[464] cf. on this and the following Giroud (2013), pp. 861–863.

information about its current conditions. In brief, monitoring and information acquisition become less costly. Considering the frameworks of the aforementioned empirical studies and following their arguments, the present thesis uses the distances from firms' headquarters to the closest international airports as an exogenous instrument. With regard to this measure, it could be expected that a firm is able to provide more and better services and information to related investors and analysts (irrespective of whether they are domestic or international) if its headquarter location allows top managers and IR team members to swiftly reach an airport that offers a flight to various market participants around the world. In this context, Bushee et al. (2015) provide empirical evidence that flights undertaken by firms' officers indeed seem to enhance the information flow to investors.[465] Furthermore, proximity to an airport could also naturally make firms themselves more attractive for investor and analyst visits related to public or private meetings. As such, the information acquisition costs may decrease for market participants and the direct interactions between firms and market participants may be enhanced. In summary, firms' airport proximity should positively contribute to the assessment of firm's IR and thus be related to higher IR rankings on average. The second instrumental variable based on geographical proximity relies on the distance between headquarter locations and a country's financial center (i.e., Frankfurt in the case of Germany). This instrument is based on the idea that most large institutional investors and analysts are typically based in such cities. In this regard, Bushee et al. (2011) provide empirical evidence that IR presentations and conferences held in financial centers yield more information content due to the presence of more sophisticated audiences.[466] Furthermore, Coval and Moskowitz (1999) and Malloy (2005) demonstrate that information flows seem to be stronger if a firm and related investors or analysts are located nearby.[467] Following this empirical evidence and analogous to the elaborations on distances to airports, one could expect that direct proximity to the location of a large number of investors and analysts allows for more comprehensive IR services, activities, and information provision, which should be positively assessed in the scope of rankings on IR quality. Distances between firms and financial centers are similarly used as an instrumental variable in empirical research undertaken by authors such as Ebeke and Lu (2015).[468] The joint consideration of distances to the next airport and a country's financial center in the scope of IV regression analysis should make it

[465] cf. Bushee et al. (2015), p. 2.
[466] cf. Bushee et al. (2011), p. 1165.
[467] cf. Coval and Moskowitz (1999), p. 2045; Malloy (2005), p. 719.
[468] cf. Ebeke and Lu (2015), p. 209, note 8.

possible to account for the reachability of most domestic as well as foreign investors and analysts; as such, the measures are used together as a vector of instrumental variables. While the relevance of these instruments for IR quality measure appears to be given according to previous elaborations (the statistical validation is introduced later in this thesis), it additionally seems plausible that the distance variables are subject to fewer concerns related to violations of the exclusion restriction, as also suggested by Ebeke and Lu (2015).[469] Because distance calculations require information on firms' headquarter locations over the whole sample period (starting from 2006), they are only done for German companies for which this data is directly available in the "Hoppenstedt Aktienfuehrer" database. Simply projecting the current headquarter locations of UK companies onto preceding years appears to not be appropriate, because as apparent from the German sample some firms could have shifted their headquarters during this time period. Using the exact addresses of German firms' headquarters, the information on corresponding longitudes and latitudes required for the distance calculations is obtained from Google Maps. The same information is also obtained for all international airports in Germany and the bank district in Frankfurt. By applying the great-circle distance formula (Haversine equation), the distances between two points (1 and 2) are calculated as follows:[470]

$$\Delta longitude = longitude_2 - longitude_1 \tag{35}$$

$$\Delta latitude = latitude_2 - latitude_1 \tag{36}$$

$$\alpha = \sin^2\left(\frac{\Delta latitude}{2}\right) + \cos(latitude_1) * \cos(latitude_2) * \sin^2\left(\frac{\Delta longitude}{2}\right) \tag{37}$$

$$c = 2 * atan2(\sqrt{\alpha}, \sqrt{1-\alpha}) \tag{38}$$

$$Distance\ in\ km = R * c \tag{39}$$

where R is the mean radius of the earth, or 6,371 kilometers.

Using a matching algorithm, distances to the nearest airport and Frankfurt (both normalized by the natural logarithm) are assigned to each sample firm. This set of instruments is used for the analysis of the relation between IR and major firm outcomes (e.g., Tobin's Q and cost of capital) as well as the announcement returns attributed to M&As and SEOs. Due to the panel structure of

[469] cf. Ebeke and Lu (2015), p. 209, note 8.
[470] Kifana and Abdurohman (2012), pp. 656–657.

the thesis's main sample as well as the sufficient number of observations available, a further methodological procedure is applied to further satisfy the exclusion restriction. This procedure is explained below.

Fixed effects 2SLS estimator

As Wooldridge (2010) notes, within the framework of the IV approach, the instruments are assumed to be uncorrelated with the time-variant as well as constant error terms.[471] However, even if the first aspect of this assumption is likely to be satisfied, one could argue that any fixed unobserved factors (e.g., historical components) that are correlated with both the instruments and the explained variable may exist. To address this concern with regard to the distance measures, the within transformation is conducted within the scope of the IV 2SLS estimator. Analogous to the FE approach described in chapter 5.1, all variables—including instruments—become demeaned before the actual 2SLS procedure is applied. This transformation eliminates the model's fixed error component attributed to individual heterogeneity across firms and makes it possible to consider only the within variation in distances that naturally comes from headquarter location changes. Nearly 13% of the unique firms in the final sample are subject to such headquarter changes within the investigated period. In contrast to the consideration of actual distances (which also contain the constant component), it could be expected that firms that move further away from airports and Frankfurt have to enhance inter alia their disclosure activities and conference calls to compensate for their increased distance to investors and analysts, which on average could even yield (at least temporary) improvements in the assessment of overall IR quality. Before the respective results can be closely analyzed, it is necessary to ensure that the preferred instruments are appropriate in a statistical sense. To this end, common tests that should ascertain the validity of the instruments used in the present thesis are briefly introduced in the next section.

Instrument validity tests

Angrist and Pischke (2009) emphasize that weak instruments and the overidentifying restrictions can cause the most bias to 2SLS estimators.[472] The first concern is related to the assumption of instrument relevance and deals with the issue that only a weak relation exists between the

[471] cf. on this and the following Wooldridge (2010), pp. 353–354.
[472] cf. on this and the following Angrist and Pischke (2009), pp. 205, 213.

endogenous explanatory variable of interest and the preferred instruments. To assess whether a sufficient correlation exists, Angrist and Pischke (2009) suggest considering the instruments' joint significance at the first stage using the corresponding *F*-statistic. It should therefore be tested whether the included set of instruments has a significant impact on the endogenous variable while controlling for other factors in the model.[473] The respective H_0 hypothesis consequently posits that all β parameters attributed to the instrumental variables equal zero, whereas H_1 predicts the opposite. Because the single t-statistics are not appropriate for assessing the validity of H_0, the *F*-statistic is calculated using the sum of squared residuals (SSR) from the full model (f) as well as from the specification excluding the respective instruments (e):[474]

$$F = \frac{\frac{(SSR_e - SSR_f)}{(df_e - df_f)}}{\frac{SSR_f}{df_f}} \tag{40}$$

where df $(n - k - 1)$ provides the degrees of freedom for each model with k estimated parameters and n observations.

Consequently, the value of the *F*-statistic indicates the relative growth in SSR in the case of switching from the full to the restricted model, which almost always occurs when explanatory variables are excluded from the regression.[475] Whether this relative increase makes it possible to reject the H_0 hypothesis at the chosen significance level (which would indicate the instruments' relevance) can be assessed using the corresponding *p*-value, similar to the t-test. In the next step, the concern related to the overidentification issue should be appropriately addressed in the scope of the IV analysis.

While a specific instrument's exogeneity cannot be directly tested, applying several instruments in the IV analysis makes it possible to investigate whether there are more instruments than required to estimate consistent parameters and thus to assess whether at least some of the instruments seem to not satisfy the exogeneity requirement.[476] In this context, the main idea is to test whether a correlation exists between the instruments and the residuals of the estimation (besides the sampling error). In line with Sargan (1958), the general testing procedure entails

[473] cf. on this and the following Wooldridge (2013), pp. 135–137.
[474] Wooldridge (2013), p. 138.
[475] cf. on this and the following Wooldridge (2013), pp. 137–139.
[476] cf. on this and the following Wooldridge (2013), pp. 514–515.

obtaining 2SLS residuals and then regressing them on all exogenous variables in the model.[477] The respective R^2 of this regression is used to derive the test statistic (nR^2), which is compared with the values from the χ^2 distribution. The R^2 of the regression constitutes the explained sum of squares (SSE) relative to the overall sum of squares (SST) and hence the portion of variation in the dependent variable that is explained by the model constituents (this value is reported in the scope of all regression models)[478]:[479]

$$R^2 = \frac{SSE}{SST} = 1 - \frac{SSR}{SST} \tag{41}$$

The test for overidentification within the framework of 2SLS indicates that at least some of instruments are endogenous if the H_0 hypothesis, which states the absence of correlation between instruments and residuals, can be rejected using the nR^2 statistic.[480] As in the case of other tests, the corresponding *p*-value makes it possible to assess the retention or rejection of this hypothesis. However, the test does not indicate which instruments violate the exogeneity assumption. Furthermore, while the above-described test procedure is subject to the homoscedasticity assumption, Wooldridge (1995) and Hansen (1982) provide heteroscedasticity-robust versions of this test that are consequently primarily considered in the present analysis.[481] In the next step, the methodology applied to assess firm performance in the scope of M&As and SEOs is presented.

5.3 Event study analysis

In general, the event study approach aims to measure the impact of a certain event on firm value.[482] The underlying framework of this empirical method constitutes the theory of efficient capital markets proposed by Fama (1970),[483] who defines a market as efficient if "security prices at any time "fully reflect" all available information."[484] Fama (1970) distinguishes three different

[477] cf. on this and the following Wooldridge (2010), pp. 134–135.
[478] cf. Wooldridge (2013), pp. 36, 76.
[479] Wooldridge (2013), p. 36.
[480] cf. on this and the following Wooldridge (2010), pp. 135–136.
[481] For more details concerning these statistics, refer to the both papers.
[482] cf. Campbell et al. (1997), p. 149.
[483] cf. Shleifer (2000), pp. 6–7.
[484] Fama (1970), p. 383.

types of information efficiency: weak, semi-strong and strong form.[485] Weak information efficiency means that the information on historical price movements is fully reflected in the actual security prices. The semi-strong form posits that in addition to historical trading data, all other publicly available information (e.g., announcements of corporate events) is also fully incorporated in the security prices. Finally, the strong type of information efficiency implies that the security prices also fully reflect private (i.e., insider) information in addition to the previously described information content. Following a majority of the empirical studies introduced in chapters 4.3.1 and 4.4.1, the present thesis relies on public announcements of M&As and SEOs to measure the value effects attributed to these corporate events. Seeing as the purpose of the present analysis is to investigate the relation between IR quality and individual value effects, the procedure for assessing the average announcement effects on the entire sample is not discussed.

Basic setting

In the scope of event study methodology, an event's impact on the stock price of investigated firm i on day t is measured by calculating the so-called abnormal return (AR)—or the difference between the actually realized security return (R) and its expected (or normal) return ($E[R]$)[486]:[487]

$$AR_{i,t} = R_{i,t} - E\left[R_{i,t}\middle|X_t\right] \tag{42}$$

where X_t constitutes the conditioning information that depends on the choice of the model for the estimation of normal returns.

A common approach to calculating the expected returns is the market model, in the framework of which the conditioning information is typically the return of a market index.[488] As such, the idea of using this model for AR calculation is to eliminate the expected variation in the stock price attributed to its (assumed) linear relation to the stock market's development to obtain a stock price change that can be solely ascribed to the event of interest. The relation between stock returns and market returns is assessed by applying a linear regression (see chapter 5.1) within an estimation window that represents the time period prior the actual event. The historical information on stock returns (as the dependent variable) and market returns (as the regressor) is

[485] cf. on this and the following Fama (1970), p. 383.
[486] cf. MacKinlay (1997), p. 15.
[487] MacKinlay (1997), p. 15.
[488] cf. on this and the following MacKinlay (1997), pp. 15, 18.

thus used to estimate the OLS regression coefficients $\hat{\alpha}$ and $\hat{\beta}$, which are subsequently applied to the event period to predict the security's expected return. In this context, the AR for each firm i on day t can be defined as follows:[489]

$$AR_{i,t} = R_{i,t} - \left(\hat{\alpha}_i + \hat{\beta}_i R_{M,t}\right) \tag{43}$$

where $R_{M,t}$ is the contemporaneous return of the market index.

The announcement date of a specific event (i.e., the day on which the information becomes public) is typically used as the respective event date ($t = 0$).[490] Naturally, the event date must be a trading day that exhibits stock and market prices;[491] as a result, event dates attributed to non-trading days (e.g., Saturday) are shifted to the next trading date (e.g., Monday). Furthermore, MacKinlay (1997) points out that information on a corporate event might reach market participants only after the close of trading on the event day.[492] To account for this issue, the event window is usually expanded and the abnormal returns are calculated for day $t = 0$ as well as for the subsequent trading date $t = 1$. In addition, seeing as market participants may also obtain information on a corporate event prior to its official announcement (e.g., through media channels), it is also common to account for the stock returns on the day before the actual announcement $t = -1$. To measure the full announcement effect arising over an event window covering multiple days (here, three days), the cumulative abnormal return (CAR) is thus calculated for each firm as follows:[493]

$$CAR_i(-1 \dots 1) = \sum_{t=-1}^{t=1} AR_{i,t} \tag{44}$$

Finally, the individual $CARs$ are used as the dependent variable in the scope of the regression analysis to investigate the sources of variation in the value effects.[494] The individual settings of the event studies conducted in the present analysis are briefly introduced below.

[489] Brown and Warner (1980), p. 253.
[490] cf. Campbell et al. (1997), p. 151.
[491] cf. Brown and Warner 1985, p. 6.
[492] cf. on this and the following MacKinlay (1997), pp. 14–15, 35.
[493] MacKinlay (1997), p. 21.
[494] cf. MacKinlay (1997), p. 33.

Present settings

In line with previous elaborations in this thesis as well as empirical studies by researchers such as Jegadeesh et al. (1993) and Netter et al. (2011), the three-day event window (-1…1) is applied to measure the value effects of M&As and SEOs in the present study.[495] Furthermore, following Moeller et al. (2004), an estimation window covering 200 trading days (-220…-21) is used in the scope of the market model to estimate the expected stock returns of the investigated securities.[496] Instead of using simple stock prices to calculate returns, this thesis relies on a total return index that makes it possible to account for splits and dividend payments (as discussed in chapter 4.2.2). In addition, as suggested by MacKinlay (1997), the total returns of broad stock indices are utilized to calculate the expected returns.[497] In the case of the German firms, the CDAX index, which according to Deutsche Börse AG "measures the performance of the entire German stock market and is ideal for analysis purposes,"[498] serves as the market portfolio. For the UK firms, the FTSE All-Share Index, which reflects "98-99% of UK market capitalization,"[499] is used as the market proxy. Data on the time series of all total returns is obtained from the Thomson Reuters Datastream database. In the final step, the relation between IR quality and individual $CARs$ is investigated by applying the regression approach. In the next chapters, the empirical results related to this issue and other research questions investigated in this thesis are presented and discussed.

[495] cf. Jegadeesh et al. (1993), p. 160; Netter et al. (2011), p. 2327.
[496] cf. Moeller et al. (2004), p. 205.
[497] cf. MacKinlay (1997), p. 18.
[498] Deutsche Börse (2015): http://www.dax-indices.com/EN/MediaLibrary/Document/Guide_Equity_Indices.pdf, p. 16.
[499] FTSE Russell (n.d.): http://www.ftse.com/products/indices/uk.

6 Results on firm performance and related channels

6.1 Link between IR quality and firm performance

Table 7 provides the regression results on the relation between the quality of IR in German companies and Tobin's Q as the measure of firm performance. Columns 1–7 cover different models and specifications used in this thesis to assess the link of interest, whereas columns 8 and 9 contain the results of the first stages of the IV analyses. As indicated by the simple pooled OLS regression (specification 1)—which includes all firm-level controls introduced in this thesis as well as the year, index, and industry FE—the IR measure is positively correlated with Tobin's Q and this relation is highly statistically significant at the 1% level. The respective β-coefficient shows that a one rank better IR quality is accompanied (ceteris paribus) by a 0.0121 higher Tobin's Q on average. Given that the difference of one rank constitutes only a small discrepancy in IR quality, this link's economic relevance can be better assessed, for instance, when a more considerable difference of 10 ranks is assumed. In this case, the firm's market performance is 0.121 higher, which appears to be a reliable and economically significant effect if the 1.6151 mean value of Tobin's Q in the German sample is taken into account. The OLS analysis, which relies on a winsorized version of Tobin's Q (specification 2) that should reduce the impact of outliers, reveals a slightly weaker coefficient of 0.0106; however, as this is still statistically (at the 1% level) and economically significant, it supports the previous result. Model 3, which covers the firm FE estimation, makes it possible to better address endogeneity concerns by controlling for time-invariant unobserved heterogeneity and also indicates a positive IR relation to firm performance. In this context, it is notable that despite the elimination of all firm time-invariant factors, the regression still yields a considerable IR effect of 0.0057 that is statistically significant at the 5% level. Specification 4 reports the results of the IV analysis, which uses firm-individual IR resources as instruments. The validity of the deployed instruments is indicated by the results (the first stage) provided in column 8 of the table. The test of the joint relevance of IR budget, remuneration, and number of employees (Prob>F) is highly significant at the 1% level (0.0022). This result is also supported by the pronounced effect of individual coefficients on IR remuneration and employees. In addition, the instruments pass the overidentification test (Prob>$\chi 2$) proposed by Wooldridge (1995), as the test statistic does not allow the H_0 hypothesis (which assumes the exogeneity of all instruments) to be rejected. The corresponding second stage of the IV analysis reveals a statistically significant (at the 10% level) and positive impact of

better IR on Tobin's Q (0.0523) that is even higher than the OLS and FE regression estimates.[500] The results of an additional IV analysis that relies on FE estimation as well as distances to airports and Frankfurt as instruments (which should further alleviate endogeneity concerns) are reported in column 5. The validity of these two instruments is substantiated by the significant result of the test for the joint relevance of instruments (0.0014) and the lack of significance of the overidentification test (0.4336), as reported in column 9. An additional interesting finding is the positive and significant coefficient on the distance to Frankfurt variable (5.1605) at the first stage, which indicates that firms that move away from Frankfurt seem to enhance their overall IR activities/quality, presumably to compensate for the higher distance to the majority of institutional investors based in this financial center. The evaluation of the primary link of interest, namely between IR and firm performance, reveals that the respective coefficient on IR quality in the IV FE estimation (0.0251) is still positive, economically relevant, and highly statistically significant at the 1% level. Specifications 6 and 7 ultimately account for alternative explanations attributed to the relation between IR and Tobin's Q, relying on FE estimations. While recruiting a head of IR with analyst experience does not seem to be significantly related to Tobin's Q, the employment of a financial expert CEO surprisingly has a statistically negative link to firm performance. This finding may be attributable to the fact that the benefits ascribed by Custódio et al. (2014) to such CEOs in the scope of the US common law and market-based market environment are less applicable to German firms and the presence of CEOs' pronounced financial abilities comes at the expense of other skills that are important for German companies.[501] Nevertheless, IR's positive impact on firm performance still holds even when these two explanatory variables are controlled for. In summary, the models that account for several explanatory factors and sources of endogeneity provide strong support for the first part of the $H_{1.1}$ hypothesis, which expects the positive contribution of IR to firm value in Germany. The benefits of better and more intensive communication with investors, higher transparency, and higher firm visibility seem to outweigh the corresponding costs and thus enhance shareholder wealth in German firms on average. Insights into the question of whether this link is also applicable to UK companies are provided in table 8.

[500] The higher coefficient in the IV setting is in line with the more pronounced effect of IR in the IV analysis of Karolyi and Liao (2017), pp. 17–18.
[501] cf. Custodio et al. (2014), p. 149.

Table 7: Results on the link between IR quality and firm performance in Germany

Tobin's Q	(1) OLS	(2) OLS winsorized	(3) Firm FE	(4) IV IR resources	(5) IV Distances	(6) Firm FE Alternative 1	(7) Firm FE Alternative 2	(8) First stage IV IR resources	(9) First stage IV Distances
IR ranking	**0.0121*** (4.513)**	**0.0106*** (5.281)**	**0.0057** (2.375)**	**0.0523* (1.743)**	**0.0251*** (2.688)**	**0.0055** (2.318)**	**0.0077*** (3.374)**		
Firm size	-0.3834*** (-9.320)	-0.3306*** (-10.431)	-0.4145*** (-4.429)	-0.5665*** (-3.135)	-0.3685*** (-4.540)	-0.4267*** (-4.719)	-0.4114*** (-4.243)	1.0263 (0.939)	0.1877 (0.145)
ROE	0.8199*** (3.031)	0.6555*** (2.928)	0.2419 (1.299)	0.8372 (1.044)	0.0705 (0.451)	0.2128 (1.210)	0.1656 (1.023)	8.3382** (1.998)	8.3580*** (4.058)
Leverage	0.0174 (1.167)	0.0128 (0.996)	0.0121 (0.709)	0.0273 (0.647)	-0.0011 (-0.066)	0.0111 (0.693)	0.0106 (0.712)	-0.1515 (-0.263)	0.4874* (1.922)
R&D intensity	4.6272*** (4.003)	3.1401*** (4.013)	-2.2033 (-0.916)	0.6915 (0.292)	-2.9447 (-1.542)	-2.0995 (-0.873)	-2.5211 (-0.901)	3.6234 (0.142)	-6.2609 (-0.337)
CapEx intensity	-0.6373 (-1.068)	-0.4293 (-0.858)	0.4941 (0.734)	-2.2835 (-0.761)	0.6378 (0.884)	0.3675 (0.550)	0.6885 (1.014)	12.0617 (0.453)	-9.0293 (-0.690)
IA intensity	-0.5736*** (-3.075)	-0.3810** (-2.514)	-2.3908*** (-4.744)	-0.3420 (-0.618)	-1.9430*** (-4.553)	-2.3892*** (-4.614)	-2.2949*** (-4.185)	1.5136 (0.308)	-14.7371** (-2.515)
Sales growth	0.1903** (1.994)	0.1735** (1.994)	0.1320* (1.759)	0.6722 (1.081)	0.1130* (1.781)	0.1291* (1.780)	0.1319 (1.320)	5.1714 (0.835)	0.5442 (0.469)
US cross-listing	0.3166*** (3.628)	0.2889*** (3.628)	0.0654 (0.926)	0.3620** (2.248)	0.1233 (1.369)	0.0469 (0.692)	0.0547 (0.594)	0.2608 (0.113)	-2.6911 (-1.642)
Firm age	-0.0004 (-0.423)	0.0002 (0.288)	0.0208** (2.093)	0.0005 (0.142)	0.0142 (1.479)	0.0225** (2.242)	0.0175* (1.966)	0.0496 (1.284)	0.0852 (0.483)
Strategic holdings	0.1522 (1.470)	0.1379 (1.584)	0.0227 (0.127)	-0.3084 (-0.959)	-0.0472 (-0.294)	0.0336 (0.187)	0.0680 (0.476)	7.5242** (2.204)	3.2114 (0.906)
Financial expert CEO						-0.1483* (-1.798)			
Head of IR analyst							-0.1003 (-1.224)		
IR employees								4.4571** (2.200)	
IR budget								-0.6547 (-0.958)	
IR remuneration								1.4779*** (2.745)	
Distance to airport									-1.7093 (-1.345)
Distance to Frankfurt									5.1605*** (3.421)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Prob>F	
Industry FE	**Yes**	**Yes**	No	**Yes**	No	No	No	0.0022	0.0014
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Prob>χ2	
Firm FE	No	No	**Yes**	No	**Yes**	**Yes**	**Yes**	0.1225	0.4336
Observations	1,143	1,143	1,143	260	1,097	1,135	901	260	1,097
R-squared	0.405	0.470	0.257	0.213	0.145	0.269	0.280	0.411	0.141

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Tobin's Q* is calculated as the sum of the market value of outstanding shares and the book value of debt divided by the book value of total assets (in (2) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's Head of IR was previously employed as analyst and zero otherwise. *IR employees* is the natural logarithm of the number of the firm's IR managers. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one. *Distance to airport* is the natural logarithm of the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt* is the natural logarithm of the distance between the firm's headquarter location and Frankfurt.

Table 8: Results on the link between IR quality and firm performance in the UK and on cross-country differences

Tobin's Q	(1) OLS	(2) OLS winsorized	(3) Firm FE	(4) IV IR resources	(5) First stage IV IR	(6) OLS interaction	(7) OLS interaction winsorized	(8) Firm FE interaction winsorized
IR ranking	**0.0105*** **	**0.0058*** **	**0.0034***	**0.0205** **		0.0067*** **	0.0049*** **	0.0009
	(4.278)	**(6.952)**	**(1.839)**	**(2.239)**		(3.407)	(6.164)	(1.001)
Interaction (IR*Country)						**0.0095*** **	**0.0088*** **	**0.0058*** **
						(2.696)	**(4.437)**	**(2.848)**
Firm size	-0.8318*** **	-0.4665*** **	-0.5867*** **	-0.3037*** **	0.9462	-0.6374*** **	-0.4090*** **	-0.4112*** **
	(-6.230)	(-22.215)	(-3.260)	(-6.078)	(0.491)	(-7.972)	(-24.558)	(-7.036)
ROE	1.0816*	0.0917*** **	0.5940	0.0304	-0.5875	1.1281**	0.1224*** **	0.0297
	(1.939)	(3.553)	(1.316)	(0.420)	(-0.370)	(2.009)	(3.792)	(1.414)
Leverage	0.0412	0.0055*** **	0.0209	0.0051	-0.1257	0.0409*	0.0064*** **	0.0024*** **
	(1.634)	(3.666)	(1.317)	(0.969)	(-1.202)	(1.651)	(3.529)	(2.617)
R&D intensity	-0.3211	0.6914	0.4837	16.8707*** **	-326.0306**	1.5171	1.4492*** **	-1.5579
	(-0.240)	(1.318)	(0.219)	(2.768)	(-2.075)	(1.327)	(3.136)	(-1.233)
CapEx intensity	-2.8008*	0.5497	0.2456	2.0228*	-59.3822	-1.7036*	0.3397	0.6327
	(-1.732)	(1.177)	(0.227)	(1.645)	(-0.675)	(-1.819)	(1.000)	(1.604)
IA intensity	-2.1679*** **	-0.0839	-2.1218*	0.0445	27.4040*	-1.4947*** **	-0.0837	-1.3440*** **
	(-2.812)	(-0.822)	(-1.856)	(0.091)	(1.875)	(-2.887)	(-1.004)	(-4.192)
Sales growth	-0.0056	-0.0051*	0.0843**	0.5543	-25.0127	-0.0010	-0.0026	0.0372*** **
	(-1.261)	(-1.904)	(2.470)	(1.019)	(-1.473)	(-0.314)	(-0.705)	(4.874)
US cross-listing	0.1290	0.4693*** **	-0.0316	-0.0925	12.3855*	0.2948**	0.4011*** **	0.0947
	(0.528)	(7.339)	(-0.110)	(-0.509)	(1.833)	(2.406)	(7.988)	(1.575)
Firm age	-0.0061**	-0.0010	0.0270	0.0031	-0.1098	-0.0030**	-0.0003	-0.0422
	(-2.566)	(-1.337)	(0.419)	(1.359)	(-1.212)	(-2.308)	(-0.594)	(-1.593)
Strategic holdings	-1.2831	-0.1357	-5.1012	-0.0235	14.5065	0.1770	0.1781**	-0.0978
	(-1.465)	(-0.821)	(-1.242)	(-0.047)	(0.613)	(0.981)	(2.291)	(-0.625)
IR employees					9.3649*			
					(1.972)			
IR budget					0.0948			
					(0.050)			
IR remuneration					1.7858*			
					(1.705)			
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	Prob>F	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	No	**Yes**	0.0740	**Yes**	**Yes**	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	Prob>χ2	**Yes**	**Yes**	**Yes**
Firm FE	No	No	**Yes**	No	0.5029	No	No	**Yes**
Country	No	No	No	No		**Yes**	**Yes**	No
Observations	1,651	1,651	1,651	155	155	2,794	2,794	2,794
R-squared	0.334	0.536	0.178	0.652	0.496	0.315	0.482	0.298

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Tobin's Q* is calculated as the sum of the market value of outstanding shares and the book value of debt divided by the book value of total assets (in (2), (7), and (8) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *IR employees* is the natural logarithm of the number of the firm's IR managers. *IR budget* contains five categories, where the value of zero is assigned to the lowest budget category and the value of four to the highest one. *IR remuneration* covers seven categories of the IR managers' salaries, where the value of zero is assigned to the lowest category and the value of six to the highest one.

Specification 1 in table 8, which contains the results of a OLS regression for UK companies that relies on the same setting of firm-level controls and FE as in the case of German firms, reveals a positive (0.0105) and statistically significant (at the 1% level) β-coefficient for the link between

IR quality and Tobin's Q in the UK context. The positive contribution of better IR to firm value thus seems to also be applicable to UK firms, although the magnitude of the effect is smaller than in Germany (as consistently indicated by all specifications in table 8). Model 2, which uses the winsorized version of Tobin's Q, supports the previous finding, while the regression coefficient shrinks to 0.0058 but remains significant at the 1% level. The firm FE estimation in specification 3 substantiates the OLS results, indicating a slightly weaker relation (the β-coefficient is 0.0034 and significant at the 10% level). With regard to the IV estimates reported in column 4, the corresponding first stage in column 5 reveals a similar link between IR resources and IR quality for UK firms compared to the results for German companies. The instruments pass the test for joint significance (Prob>F: 0.0740) as well as the overidentification test (Prob>χ2: 0.5029). However, the relation between IR rankings and corresponding instruments is weaker than in the German case. Finally, the second stage of the IV analysis shows a positive effect of better IR quality on Tobin's Q (0.0205) that is statistically significant at the 5% level. Overall, the results for the UK support the second part of the $H_{1.1}$ hypothesis, which can consequently be seen as entirely confirmed. While IR quality appears to matter for firm performance in both countries and has a considerable economic effect, the extent of the impact seems to differ across countries (as also predicted by the $H_{1.2}$ hypothesis). To assess the potential differences between Germany and the UK, the interaction analysis is applied in this thesis; the results are reported in specifications 6, 7, and 8 in table 8.

In model 6, which relies on the pooled OLS regression, the interaction between IR rankings and the country dummy—which takes a value of 1 for German companies and 0 for UK firms—reveals a positive (0.0095) and statistically significant (at the 1% level) difference between the countries. As such, on average a one rank better IR quality is accompanied by a 0.0095 higher Tobin's Q in Germany compared to the UK. In specification 2, which uses the winsorized version of Tobin's Q to reduce the impact of the outliers, the interaction effect remains present (0.0088) at the highly considerable 1% significance level. Furthermore, to appropriately account for unobserved heterogeneity across firms in the scope of the interaction analysis, column 8 presents the results of the FE estimation. The coefficient on the interaction term in this specification is still positive (0.0058) and highly statistically significant (at the 1% level) even after the FE transformation. Hypothesis $H_{1.2}$ thus receives strong empirical support, which emphasizes the higher importance of IR for firm performance in Germany. In line with the elaborations in chapter 4.1.1—which are derived from studies such as those by La Porta et al. (1998, 2000),

Djankov et al. (2008), and Karolyi and Liao (2017)—this result can be attributed to the lower level of investor protection and private enforcement mechanisms in Germany. This situation results in higher information asymmetry among firms and market participants, which in turn leads to higher contribution of IR activities to the alleviation of these issues and ultimately to the market value of German firms in comparison to UK companies. While hypotheses $H_{1.1}$ and $H_{1.2}$ have been confirmed, the relations of further factors to Tobin's Q and IR quality are briefly presented below for the sake of completeness.

As predicted in chapter 4.2.3, firm size exhibits a strong negative and statistically significant link to Tobin's Q in both the German and UK samples, which could be explained by the lower growth opportunities that investors attribute to larger firms.[502] In line with this explanation, the sales growth variable is positively and widely significantly related to firm performance in the German sample as well as in the scope of the FE estimation for UK firms. The link between intangible assets and Tobin's Q is almost significantly negative in both samples, which may be attributed to uncertainty about the actual value of such assets.[503] Naturally, firms' accounting performance (measured by ROE) and market performance are positively correlated in both countries, although this relation is not continuously significant. The positive—and in some cases significant—coefficients on the US cross-listings in the German sample meet the previous expectation and may reflect the fact that being listed on the US market makes German firms subject to higher demands on investor protection, which in turn positively contribute to their market value.[504] The effect of US cross-listings on UK firms is less clear, because the corresponding coefficients switch signs and are negative as well as statistically insignificant in both the FE and the IV regressions. However, this result is in line with the previous elaborations on the differences between legal origins and financial systems. Given that the regression coefficients on other control variables are mostly insignificant or inconsistent, they are not further discussed. According to the first stages of the IV analyses, ROE can be pointed out as a significant determinant of IR quality in the German sample. The positive effect of accounting performance on IR could arise because firms may communicate more with capital markets during good times.[505] In the scope of the UK sample, R&D intensity in particular appears to significantly

[502] cf. Agrawal and Knoeber (1996), p. 385.
[503] cf. Barth et al. (2001), p. 2.
[504] cf. Lang et al. (2003), pp. 317–319.
[505] cf. Kirk and Vincent (2014), p. 1431.

affect IR quality. Since this chapter has identified the value relevance of IR quality for both German and UK firms, results concerning the potential value drivers are presented below.

6.2 Link between IR quality and stock volatility

The empirical results on the link between the volatility of stock returns and IR quality are presented in tables 9 and 10. To start, table 9 provides the respective insights on German companies. Specification 1, which covers the model with firm FE, indicates a negative relation between IR quality and the standard deviation of stock returns. The corresponding regression coefficient reveals that an improvement in IR ranking, for instance by 10 ranks, is accompanied (ceteris paribus) by a decrease of stock volatility of 0.06% on average, which appears to be a moderate economic effect. This result is statistically significant at the 5% level. Specification 2, which relies on the winsorized value of stock volatility, provides a slightly smaller regression coefficient on IR that is nonetheless still statistically significant at the same level. The results therefore do not seem to be driven by outliers. To further address endogeneity concerns, column 3 contains the results of the IV analysis. For brevity, the first stage—which has already been shown and discussed in the scope of the results on Tobin's Q—is not separately reported. In this context, the overidentification test indicates the validity of instruments also with regard to the stock volatility analysis (Prob>χ2: 0.7570). The corresponding effect of IR quality on stock return deviation in the IV specification, which is still negative and significant at the 10% level, is more pronounced. The inclusion of additional explanatory variables related to previous occupations of the CEO and head of IR in specifications 4 and 5 does not cause any substantial changes in the results, which substantiates the previous findings. In summary, the regression analysis provides strong support for hypothesis $H_{2.1}$, which predicts a reduction in stock return volatility of German firms in the case of better IR quality, even though the effect is of a lesser magnitude. This result can be explained in particular by improvements in the information environment related to better IR and the subsequent decrease of uncertainty among investors.[506]
Table 10 reports the findings for the UK sample. Specification 1, which relies on the FE estimation, reveals at the 5% level significant and negative coefficient on IR rankings that constitutes a lower effect than found in the German sample. The increase in IR quality by 10

[506] cf. Leuz and Verrecchia (2000), p. 99; Bushee and Noe (2000), p. 172.

ranks corresponds (ceteris paribus) to a decrease in stock return deviation by 0.03% on average. In addition, when the winsorized version of return volatility is used in specification 2, the magnitude of the effect shrinks and the coefficient becomes insignificant. As such, the existence of extreme values of the dependent variable seems to partially drive the results of the first model. Furthermore, the IV analysis, which is still valid according to the overidentification test (Prob>χ2: 0.9970), reveals a negative but also insignificant coefficient that amounts to exactly half of the value ascertained for German firms in line with the FE results. In summary, while a negative relation between IR quality and stock volatility appears to be consistent with the theory, the basic differences in the information environments between Germany and the UK diminish the contribution of more forthcoming communication with investors for UK firms. This is reflected in the UK sample's lower and partially insignificant regression coefficients, which are generally in accordance with the prediction of the $H_{2.2}$ hypothesis. To provide further insights into the country differences, specifications 4, 5, and 6 present the results of the analyses relying on interaction terms.

As expected in the scope of hypothesis $H_{2.3}$, the effect of the interaction term on stock volatility reported in column 4, which covers the pooled OLS estimates, is negative and highly significant at the 1% level. This indicates that the contribution of better IR to less volatile stock returns is higher in Germany than in the UK on average. This finding is supported by the significant and identical coefficient in specification 5, which relies on winsorized dependent variable. Furthermore, column 6, which covers the results of the FE estimation that accounts for unobserved heterogeneity, also suggests a more pronounced effect in the case of German firms (significant at the 10% level). In conclusion, similar to the findings attributed to Tobin's Q, substantial differences in the IR relevance for German and UK companies have also been identified with regard to the stock price deviation. In the next step, the relevance of other explanatory variables is briefly discussed.

In line with researchers such as Bushee and Noe (2000), firm size, ROE, and firm age are negatively associated with the stock return volatility of German firms (e.g., because larger, more mature, and more profitable firms are subject to less uncertainty about their prospects, which are typically reflected in the stock price).[507] The relation concerning firms' profitability is also partially applicable to UK firms. Furthermore, consistent with the aforementioned effects, German firms that exhibit higher growth, which is characteristic of younger and smaller

[507] cf. Bushee and Noe (2000), p. 193.

companies, have higher stock return volatility. Finally, CapEx intensity in the German sample is negatively linked to stock return deviation, which provides evidence against the assumption that higher uncertainty is attributable to such expenditures. In the next section, results related to IR relevance for the properties of analyst forecasts are presented and discussed.

Table 9: Results on the link between IR quality and stock volatility in Germany

Stock volatility	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) Firm FE Alternative 1	(5) Firm FE Alternative 2
IR ranking	**-0.00006****	**-0.00005****	**-0.00028***	**-0.00006****	**-0.00006***
	(-2.032)	**(-1.999)**	**(-1.867)**	**(-2.189)**	**(-1.785)**
Firm size	-0.00159*	-0.00190**	0.00050	-0.00177**	-0.00152
	(-1.708)	(-2.410)	(0.813)	(-1.979)	(-1.442)
ROE	-0.00639**	-0.00385**	-0.01017***	-0.00639**	-0.00591**
	(-2.363)	(-2.482)	(-3.481)	(-2.427)	(-2.010)
Leverage	-0.00003	0.00004	-0.00004	-0.00005	-0.00009
	(-0.092)	(0.145)	(-0.112)	(-0.178)	(-0.287)
R&D intensity	-0.02744	-0.02211	-0.01235	-0.03009*	-0.03904**
	(-1.624)	(-1.243)	(-0.831)	(-1.805)	(-2.339)
CapEx intensity	-0.01758**	-0.01298**	0.00529	-0.01431**	-0.01975**
	(-2.485)	(-2.057)	(0.344)	(-2.180)	(-2.469)
IA intensity	0.00204	0.00214	-0.00810***	0.00237	0.00438
	(0.497)	(0.571)	(-2.716)	(0.585)	(0.983)
Sales growth	0.00255***	0.00228***	0.00166	0.00250***	0.00231***
	(5.742)	(6.651)	(0.507)	(5.701)	(3.124)
US cross-listing	-0.00149	-0.00144	-0.00056	-0.00148	-0.00302**
	(-1.423)	(-1.534)	(-0.492)	(-1.430)	(-2.290)
Firm age	-0.00036***	-0.00033***	0.00001	-0.00037***	-0.00035***
	(-3.756)	(-3.693)	(0.285)	(-3.859)	(-3.252)
Strategic holdings	0.00002	0.00072	-0.00327	-0.00027	-0.00084
	(0.013)	(0.463)	(-1.616)	(-0.153)	(-0.403)
Financial expert CEO				0.00121	
				(1.454)	
Head of IR analyst					-0.00070
					(-0.614)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Observations	1,141	1,141	260	1,133	899
R-squared	0.680	0.682	0.693	0.686	0.686
Prob>F			0.0022		
Prob>χ2			0.7570		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Stock volatility* is the standard deviation of adjusted daily stock returns (in (2) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 10: Results on the link between IR quality and stock volatility in the UK and on cross-country differences

Stock volatility	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**-0.00003****	**-0.00001**	**-0.00014**	-0.00003***	-0.00002***	-0.00001
	(-2.244)	**(-1.242)**	**(-1.234)**	(-3.697)	(-3.020)	(-1.341)
Interaction (IR*Country)				**-0.00006*****	**-0.00006*****	**-0.00004***
				(-2.607)	**(-2.855)**	**(-1.783)**
Firm size	0.00069	0.00002	0.00063	0.00037**	0.00018	-0.00076
	(0.833)	(0.033)	(0.877)	(2.207)	(1.392)	(-1.580)
ROE	-0.00039	-0.00028	-0.00215**	-0.00072**	-0.00057**	-0.00035
	(-1.512)	(-1.481)	(-2.549)	(-2.249)	(-2.333)	(-1.518)
Leverage	0.00000	-0.00000	-0.00015**	0.00002	0.00001	-0.00000
	(0.206)	(-0.099)	(-2.449)	(0.817)	(0.675)	(-0.001)
R&D intensity	0.00160	-0.00654	-0.07301	0.01676***	0.01521***	-0.00899
	(0.131)	(-0.605)	(-1.343)	(3.630)	(3.840)	(-0.947)
CapEx intensity	0.00849	-0.00259	-0.02116	0.01157**	0.00997***	-0.00522
	(0.646)	(-0.365)	(-1.169)	(2.315)	(2.598)	(-0.977)
IA intensity	-0.00381	-0.00282	0.00131	-0.00142	-0.00175**	0.00003
	(-0.923)	(-1.158)	(0.250)	(-1.637)	(-2.343)	(0.015)
Sales growth	0.00036***	-0.00008**	-0.00336	0.00016**	0.00010***	0.00006
	(5.656)	(-2.458)	(-0.627)	(2.154)	(3.217)	(0.554)
US cross-listing	0.00131	0.00114*	-0.00016	-0.00083**	-0.00073**	-0.00015
	(1.300)	(1.686)	(-0.056)	(-2.064)	(-2.010)	(-0.227)
Firm age	0.00038*	0.00026	-0.00007**	-0.00003***	-0.00003***	0.00023
	(1.728)	(1.533)	(-2.328)	(-5.386)	(-4.983)	(1.487)
Strategic holdings	-0.00442	0.00069	-0.00299	-0.00090	-0.00038	0.00128
	(-1.516)	(0.269)	(-0.563)	(-0.976)	(-0.449)	(0.885)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	**Yes**	**Yes**	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	No	No	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,625	1,625	155	2,766	2,766	2,766
R-squared	0.632	0.689	0.689	0.591	0.618	0.672
Prob>F			0.0740			
Prob>χ2			0.9970			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Stock volatility* is the standard deviation of adjusted daily stock returns (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

6.3 Link between IR quality, analyst following, forecast dispersion, and forecast error

Tables 11 and 12 report the results on the link between IR quality and analyst following for German and UK firms, respectively. Specification 1 in table 11, which relies on the FE estimation, shows a positive relation between better IR quality and the natural logarithm of the number of analysts following German firms. The respective regression coefficient (0.0041) is significant at the 5% level. The magnitude of this link only slightly decreases (to 0.0039) when the winsorization approach (which accounts for extreme values) is applied in model 2. Endogeneity concerns are further addressed in specification 3, which comprises the IV analysis (the overidentification test is passed with Prob>χ2: 0.4895). In the scope of this model, the link between IR quality and analyst following is still positive and significant at the 10% level. Finally, specifications 4 and 5 consider the alternative explanations based on the previous occupations of the CEO and head of IR. However, these variables do not significantly affect the results presented above. In summary, hypothesis $H_{3.1}$, which expects a positive relation between better IR and analyst following in the case of German firms, can be seen as confirmed. The identified link to higher firm visibility can be attributed to attracting analysts by providing better support and reducing these individuals' information search costs.[508]

Table 12 presents insights on the aforementioned link for UK firms. It is directly apparent that the positive β-coefficient on IR rankings is substantially smaller in all specifications than in the German sample and even insignificant in model 1, which relies on the FE estimation. When extreme values are accounted for in specification 2, IR quality's effect on the logarithm of analyst following becomes more pronounced (0.0008) and also statistically significant at the 10% level. The existences of this significantly positive but comparatively weak link for UK firms is also indicated by the IV analysis in specification 3. However, as the Prob>χ2 value of 0.0252 reveals that the instruments do not pass the overidentification test for this specific analysis, the corresponding result is not reliable. In summary, hypothesis $H_{3.2}$, which expects that better IR is positively related to analyst coverage in UK firms, receives partial support. The differences between the German and UK samples are further investigated in the scope of the interaction analyses in specifications 4, 5, and 6.

[508] cf. Brennan and Tamarowski (2000), p. 30.

Table 11: Results on the link between IR quality and analyst following in Germany

Analyst following	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) Firm FE Alternative 1	(5) Firm FE Alternative 2
IR ranking	**0.0041****	**0.0039****	**0.0137***	**0.0040****	**0.0037***
	(2.257)	**(2.337)**	**(1.656)**	**(2.146)**	**(1.817)**
Firm size	0.3406***	0.3368***	0.1037***	0.3413***	0.3023***
	(4.618)	(4.628)	(2.810)	(4.606)	(3.846)
ROE	-0.0622	-0.0511	-0.7372***	-0.0586	-0.0884
	(-0.824)	(-0.717)	(-3.547)	(-0.774)	(-1.084)
Leverage	-0.0187	-0.0137	-0.0525**	-0.0184	-0.0235
	(-1.032)	(-0.940)	(-2.047)	(-1.014)	(-1.055)
R&D intensity	2.6856**	2.6980**	-1.4281	2.6211**	2.2117
	(2.209)	(2.222)	(-1.275)	(2.169)	(1.541)
CapEx intensity	0.1864	0.1885	0.6730	0.2157	-0.2340
	(0.227)	(0.232)	(0.654)	(0.233)	(-0.260)
IA intensity	0.0726	0.0597	0.2603	0.0692	0.0350
	(0.262)	(0.219)	(1.428)	(0.246)	(0.112)
Sales growth	-0.0482	-0.0546	0.2059	-0.0474	-0.0366
	(-0.911)	(-1.038)	(0.962)	(-0.892)	(-0.922)
US cross-listing	0.0413	0.0458	-0.1035	0.0466	0.0943
	(0.513)	(0.558)	(-1.474)	(0.586)	(1.152)
Firm age	0.0347***	0.0340***	-0.0032**	0.0345***	0.0366***
	(4.040)	(4.195)	(-2.524)	(4.017)	(3.991)
Strategic holdings	-0.1452	-0.1025	-0.5019***	-0.1439	-0.2932**
	(-1.419)	(-1.101)	(-2.691)	(-1.374)	(-2.329)
Financial expert CEO				0.0523	
				(1.184)	
Head of IR analyst					0.0055
					(0.085)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Observations	1,136	1,136	259	1,128	895
R-squared	0.260	0.281	0.674	0.262	0.236
Prob>F			0.0024		
Prob>χ2			0.4895		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings (in (2) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 12: Results on the link between IR quality and analyst following in the UK and on cross-country differences

Analyst following	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**0.0007**	**0.0008***	**0.0079***	0.0044***	0.0044***	0.0008*
	(1.380)	**(1.814)**	**(1.652)**	(9.561)	(10.233)	(1.692)
Interaction (IR*Country)				**0.0065*****	**0.0059*****	**0.0027***
				(4.304)	**(4.650)**	**(1.797)**
Firm size	0.1532***	0.1410***	0.0165	0.1136***	0.1038***	0.1967***
	(3.350)	(3.239)	(0.560)	(13.179)	(13.233)	(5.458)
ROE	0.0063	0.0060	-0.0263	0.0201**	0.0189**	0.0044
	(0.592)	(0.559)	(-0.987)	(1.966)	(1.968)	(0.411)
Leverage	-0.0002	-0.0002	-0.0008	0.0001	0.0002	-0.0003
	(-0.587)	(-0.601)	(-0.502)	(0.100)	(0.312)	(-0.742)
R&D intensity	-0.1311	-0.0882	3.1912	0.6841***	0.5653**	0.6885
	(-0.142)	(-0.096)	(1.304)	(2.808)	(2.494)	(0.791)
CapEx intensity	0.9398**	0.7178*	0.2516	0.1852	0.2030	0.4443
	(2.109)	(1.826)	(0.359)	(0.704)	(0.901)	(1.061)
IA intensity	0.1850	0.1082	-0.2127	0.0815	0.0623	0.0255
	(1.113)	(0.756)	(-0.874)	(1.555)	(1.357)	(0.191)
Sales growth	-0.0104***	0.0037**	0.1928	-0.0140***	-0.0113***	0.0005
	(-5.196)	(1.983)	(0.628)	(-2.752)	(-4.594)	(0.159)
US cross-listing	0.0555	0.0442	0.0930	0.0137	0.0150	0.0419
	(0.775)	(0.640)	(0.814)	(0.578)	(0.674)	(0.854)
Firm age	-0.0100	-0.0117	-0.0002	0.0005	0.0005	-0.0149
	(-0.561)	(-0.671)	(-0.127)	(1.443)	(1.630)	(-0.835)
Strategic holdings	-0.2547	-0.2461	0.0132	-0.0931	-0.0524	-0.1515*
	(-1.200)	(-1.325)	(0.029)	(-1.146)	(-0.788)	(-1.873)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	**Yes**	**Yes**	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	No	No	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,627	1,627	155	2,763	2,763	2,763
R-squared	0.336	0.352	0.633	0.614	0.649	0.300
Prob>F			0.0740			
Prob>χ2			0.0252			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

The regression coefficient on the interaction term (0.0065) in the scope of model 4, which is based on OLS estimation, indicates that better IR quality contributes more to analyst coverage in Germany than in the UK on average. This result is highly significant at the 1% level. A similar value is obtained by deploying the winsorized version of the dependent variable in the scope of model 5; specification 6, which relies on the FE estimation, indicates a lower difference (0.0027) that is still significant at the 10% level. These empirical results are in line with the prediction of

the $H_{3.7}$ hypothesis and can be attributed, for instance, to the fact that the higher information asymmetry level in Germany allows IR disclosure to contribute more to reducing analysts' information search costs and consequently to attracting analysts to cover respective stocks. In the next step, insights into the corresponding analyst forecast dispersion are provided.

Table 13 reports the results for German firms. The firm FE model in column 1 as well as specification 2 using winsorized dependent variable indicate a negative (-0.0072 and -0.0064) and significant (at the 5% level) link between IR quality and dispersion of earnings forecasts. As such, better IR quality appears to go along with more consistent estimates that can be ascribed to more comprehensive support of analysts and more informative disclosure resulting in more congruent beliefs among analysts.[509] Specification 3, which relies on the IV analysis (the instruments pass the overidentification test with Prob>χ2: 0.9650), also indicates a decrease in forecast dispersion due to better IR, whereat this relation becomes statistically insignificant. The same applies to specification 5 accounting for the previous occupation of the head of IR as analyst that itself, however, does not significantly contribute to the explanation of forecast dispersion. Therefore, the lack of significance in both specifications may be simply attributed to the noticeable reduction in the number of observations. Model 4, which considers the financial expertise of CEOs, still indicates a negative and significant link of interest. Overall, the $H_{3.3}$ hypothesis, which expects a negative relation between better IR and forecast dispersion for German firms, receives at least partial support from this study's empirical results.

Table 14 provides the respective results for UK companies. Specification 1, which applies the firm FE regression, and model 2, which uses the winsorized dependent variable, both indicate a negative significant relation between IR rankings and forecast dispersion (-0.0033 and -0.0026) at the 5% significance level; nonetheless, in the scope of the IV analysis the coefficient is statistically insignificant and even positive (the overidentification test is passed with Prob>χ2: 0.6079). However, the reliability of the IV results appears to be limited, as indicated by the test for the joint significance of instruments (Prob>*F*: 0.1996). This can be particularly attributed to the missing data for some forecasts for the investigated firms, which results in an additional loss of 30 observations compared, for instance, to the Tobin's Q analysis and ultimately in a reduction of the instruments' explanatory power. Analogous to the case of German firms, hypothesis $H_{3.4}$ appears to be rather supported in favor of a negative link between analyst dispersion and better IR quality in the UK, although this observation is subject to concerns mentioned above.

[509] cf. Lang and Lundholm (1996), p. 486.

Table 13: Results on the link between IR quality and forecast dispersion in Germany

Forecast dispersion	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) Firm FE Alternative 1	(5) Firm FE Alternative 2
IR ranking	**-0.0072****	**-0.0064****	**-0.0202**	**-0.0073****	**-0.0042**
	(-2.306)	**(-2.157)**	**(-1.145)**	**(-2.355)**	**(-1.249)**
Analyst following	0.1381	0.1201	-0.1510	0.1292	0.1886*
	(1.409)	(1.315)	(-1.075)	(1.297)	(1.708)
Firm size	0.2449*	0.2724**	0.3135***	0.2457*	0.1321
	(1.891)	(2.411)	(3.990)	(1.945)	(0.994)
ROE	-1.0985***	-0.9764***	-1.7092***	-1.0736***	-1.0420***
	(-3.380)	(-3.664)	(-5.223)	(-3.425)	(-3.227)
Leverage	-0.0021	-0.0121	0.0152	-0.0052	-0.0077
	(-0.045)	(-0.317)	(0.440)	(-0.113)	(-0.145)
R&D intensity	3.2070	3.4288	3.6076**	2.9470	1.2359
	(1.084)	(1.173)	(1.963)	(1.001)	(0.508)
CapEx intensity	-2.9504***	-2.4020**	-0.3191	-2.2287**	-3.5847***
	(-2.748)	(-2.371)	(-0.189)	(-2.336)	(-3.631)
IA intensity	1.3004***	1.2680***	-0.8019**	1.3375***	1.3585***
	(2.813)	(3.222)	(-2.353)	(2.997)	(3.011)
Sales growth	0.0279	0.0027	-0.2009	0.0184	-0.0118
	(0.153)	(0.021)	(-0.481)	(0.103)	(-0.086)
US cross-listing	-0.0105	0.0360	-0.1066	-0.0033	0.0741
	(-0.063)	(0.282)	(-0.761)	(-0.021)	(0.398)
Firm age	-0.0103	-0.0148	-0.0026	-0.0124	0.0021
	(-0.584)	(-0.912)	(-1.182)	(-0.696)	(0.112)
Strategic holdings	0.2982	0.3085	-0.2573	0.2499	0.3140
	(0.974)	(1.103)	(-0.910)	(0.827)	(0.928)
Head of IR analyst					0.1248
					(0.985)
Financial expert CEO				0.1923	
				(1.619)	
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Observations	1,114	1,114	256	1,106	874
R-squared	0.398	0.399	0.546	0.390	0.421
Prob>F			0.0035		
Prob>χ2			0.9650		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Forecast dispersion* is the natural logarithm of the standard deviation of earnings forecasts deflated by the stock price (in (2) winsorized at the 2.5% and 97.5% levels). *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings. *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 14: Results on the link between IR quality and forecast dispersion in the UK and on cross-country differences

Forecast dispersion	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**-0.0033****	**-0.0026****	**0.0097**	-0.0024**	-0.0020*	-0.0022*
	(-2.500)	**(-2.026)**	**(0.440)**	(-2.065)	(-1.837)	(-1.721)
Interaction (IR*Country)				**-0.0088*****	**-0.0081*****	**-0.0069****
				(-3.115)	**(-3.142)**	**(-2.304)**
Analyst following	0.1120	0.0928	-0.8336***	0.0696	0.0343	0.1120
	(0.957)	(0.829)	(-2.576)	(1.229)	(0.678)	(1.501)
Firm size	0.2832***	0.2646***	0.0559	0.2385***	0.2271***	0.2629***
	(2.818)	(2.891)	(0.522)	(11.885)	(12.350)	(3.870)
ROE	-0.0164	-0.0122	-0.2918***	-0.0680**	-0.0583**	-0.0372
	(-0.851)	(-0.712)	(-2.938)	(-2.079)	(-2.044)	(-1.522)
Leverage	0.0026	0.0025	-0.0122**	0.0020	0.0020	0.0024
	(1.279)	(1.226)	(-1.977)	(0.681)	(0.766)	(1.071)
R&D intensity	-1.6388	-1.8344	3.7943	2.9037***	2.7740***	1.3713
	(-0.765)	(-0.890)	(0.451)	(5.028)	(5.215)	(0.716)
CapEx intensity	2.0357*	2.2233**	2.0191	0.6205	0.7380	-0.7533
	(1.842)	(2.200)	(0.592)	(1.082)	(1.355)	(-0.849)
IA intensity	0.3947	0.3862	-0.2072	0.0112	-0.0007	0.7962***
	(0.882)	(0.890)	(-0.246)	(0.094)	(-0.006)	(2.692)
Sales growth	-0.0073	-0.0050	-0.0823	0.0058***	0.0051***	-0.0104
	(-0.982)	(-0.715)	(-0.103)	(2.963)	(3.051)	(-1.088)
US cross-listing	0.1943	0.1834	-0.0495	-0.0537	-0.0431	0.0553
	(1.128)	(1.097)	(-0.099)	(-0.856)	(-0.725)	(0.426)
Firm age	0.0512	0.0502	-0.0037	-0.0035***	-0.0032***	0.0626*
	(1.513)	(1.496)	(-0.644)	(-4.233)	(-4.077)	(1.915)
Strategic holdings	0.1348	0.2408	-0.0293	-0.1479	-0.1256	0.3492
	(0.294)	(0.540)	(-0.028)	(-1.246)	(-1.136)	(1.363)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	**Yes**	**Yes**	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	No	No	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,378	1,378	125	2,492	2,492	2,492
R-squared	0.280	0.280	0.634	0.390	0.402	0.306
Prob>F			0.1996			
Prob>χ2			0.6079			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Forecast dispersion* is the natural logarithm of the standard deviation of earnings forecasts deflated by the stock price (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings. *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

On the other hand, specifications 4, 5, and 6 in table 14 provide strong evidence for hypothesis $H_{3.7}$, which expects German firms to have a more pronounced negative link between better IR and forecast deviation than UK companies due to the higher information asymmetry issues attributed to a civil law and bank-based environment. The respective coefficients on the interaction term

between IR ranking and the country dummy are negative (-0.0088 and -0.0081) in both OLS specifications and statistically significant at the 1% level, which indicates a higher IR effect in the case of German firms on average. Similar insights are provided by model 5, which relies on the FE estimation and yields a slightly lower coefficient of -0.0069 that is significant at the 5% level. These results are also supported by the descriptive statistics for both samples discussed in chapter 4.2.4, which reveal that the average forecast standard deviation in the UK sample is noticeably lower than in the German case. This could be attributed to the fact that the more sophisticated initial information environment linked to higher investor protection standards in the UK already contributes to more consistent forecasts, which in turn leave less space for IR contribution (as indicated by the results on the interaction term). The findings on the forecast error reported in tables 15 and 16 are discussed below.

Specification 1 in table 15, which considers the firm FE, suggests a negative relation between better IR quality and forecast error in the scope of earnings estimates concerning German firms. The respective coefficient (-0.0009) is statistically significant at the 5% level. Model 2, which relies on winsorized forecast errors, substantiates this result by indicating a slightly lower negative coefficient (-0.0006) that is significant at the 1% level. The IV regression in specification 3, which further diminishes endogeneity concerns, supports the previously ascertained effect. The coefficient in this analysis is still negative and significant at the 5% level and the application of the instruments appears to be valid according to the overidentification test (Prob>χ2: 0.5482). The significant negative link between better IR quality and the inaccuracy of analyst estimates is also present in models 4 and 5, which take account of alternative explanations. To summarize, hypothesis $H_{3.5}$, which expects the identified relation, can consequently be seen as confirmed. In line with Lang and Lundholm (1996), firms' ongoing and more informative communication with the markets reduces the level of information asymmetry and thus positively contributes to the predictability of their future earnings.[510] An additional interesting result is the significantly positive relation between CEOs' previous financial experience and the forecast error, as identified in model 4. Following Bamber et al. (2010), however, this finding may simply reflect the higher conservatism of disclosure that is typically

[510] cf. Lang and Lundholm (1996), p. 489.

attributed to financial experts,[511] which can in turn lead to a higher absolute deviation of analysts' earnings forecasts from the true value.

Table 15: Results on the link between IR quality and forecast error in Germany

Forecast error	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) Firm FE Alternative 1	(5) Firm FE Alternative 2
IR ranking	**-0.0009****	**-0.0006*****	**-0.0031****	**-0.0009****	**-0.0009***
	(-2.180)	**(-2.969)**	**(-2.501)**	**(-2.235)**	**(-1.695)**
Analyst following	0.0034	0.0022	0.0260	0.0022	0.0037
	(0.322)	(0.349)	(1.623)	(0.211)	(0.315)
Firm size	0.0040	0.0159*	0.0083	0.0028	-0.0124
	(0.185)	(1.659)	(1.481)	(0.131)	(-0.562)
ROE	-0.1353	-0.0745**	-0.1052***	-0.1342	-0.1347
	(-1.624)	(-2.234)	(-2.863)	(-1.637)	(-1.505)
Leverage	0.0065	0.0000	0.0086	0.0062	0.0067
	(0.699)	(0.001)	(1.142)	(0.680)	(0.649)
R&D intensity	-0.0196	0.0991	0.0715	-0.0678	0.0120
	(-0.097)	(0.692)	(0.477)	(-0.345)	(0.056)
CapEx intensity	-0.2587	-0.1117	-0.1544	-0.2139	-0.3640
	(-1.355)	(-1.594)	(-1.073)	(-0.963)	(-1.485)
IA intensity	0.0414	0.0608**	-0.0477**	0.0464	0.0452
	(0.779)	(1.981)	(-2.104)	(0.888)	(0.838)
Sales growth	0.0195	0.0043	0.0394	0.0189	0.0328
	(0.697)	(0.484)	(1.142)	(0.668)	(1.574)
US cross-listing	0.0054	0.0007	0.0149	0.0078	0.0127
	(0.500)	(0.081)	(1.122)	(0.697)	(0.769)
Firm age	0.0001	-0.0013	0.0002	-0.0002	0.0015
	(0.032)	(-1.077)	(0.699)	(-0.097)	(0.674)
Strategic holdings	0.0212	0.0157	0.0266	0.0168	0.0100
	(0.696)	(0.832)	(0.906)	(0.522)	(0.312)
Head of IR analyst					-0.0276
					(-1.197)
Financial expert CEO				0.0328**	
				(2.426)	
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Observations	1,111	1,111	255	1,103	870
R-squared	0.164	0.188	0.283	0.164	0.179
Prob>F			0.0057		
Prob>χ2			0.5482		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Forecast error* is measured as the absolute difference between the actual earnings per share and the forecasted earnings per share divided by the stock price (in (2) winsorized at the 2.5% and 97.5% levels). *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings. *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

[511] cf. Bamber et al. (2010), p. 1156.

Table 16: Results on the link between IR quality and forecast error in the UK and on cross-country differences

Forecast error	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**-0.0002**	**-0.0000**	**0.0013**	-0.0001	-0.0001*	-0.0001*
	(-1.288)	**(-1.207)**	**(0.339)**	(-1.194)	(-1.845)	(-1.726)
Interaction (IR*Country)				**-0.0004**	**-0.0004*** **	**-0.0005*** **
				(-1.445)	**(-3.607)**	**(-3.234)**
Analyst following	0.0078	-0.0019	-0.1349**	0.0108*	0.0021	0.0009
	(1.153)	(-0.744)	(-2.156)	(1.871)	(1.101)	(0.311)
Firm size	0.0106	0.0017	0.0001	0.0035	0.0027***	0.0059*
	(0.748)	(0.660)	(0.004)	(1.456)	(3.443)	(1.799)
ROE	-0.0054	-0.0004	-0.0977**	-0.0089**	-0.0027**	-0.0023*
	(-1.125)	(-0.746)	(-2.336)	(-1.990)	(-2.235)	(-1.684)
Leverage	-0.0001	0.0000	-0.0055**	0.0002	0.0001	0.0000
	(-0.406)	(0.988)	(-2.131)	(0.456)	(0.965)	(0.431)
R&D intensity	-0.1384	-0.0536	0.1093	0.0103	0.0427**	0.0290
	(-0.905)	(-0.958)	(0.084)	(0.333)	(2.267)	(0.411)
CapEx intensity	0.0196	0.0117	0.0285	-0.0818	-0.0245	-0.0336
	(0.483)	(0.557)	(0.067)	(-1.501)	(-1.182)	(-1.132)
IA intensity	-0.0616	-0.0052	-0.0836	-0.0096	-0.0047	0.0120
	(-1.103)	(-0.424)	(-0.602)	(-0.971)	(-1.152)	(0.854)
Sales growth	0.0001	0.0006***	0.1257	0.0006	0.0004	0.0004
	(0.375)	(4.150)	(0.798)	(1.100)	(1.479)	(0.944)
US cross-listing	0.0027	-0.0052	0.0213	0.0050	0.0025	-0.0003
	(0.370)	(-1.464)	(0.285)	(1.217)	(1.067)	(-0.050)
Firm age	0.0019	0.0002	-0.0012	-0.0001**	-0.0001**	0.0009
	(0.681)	(0.159)	(-1.454)	(-2.424)	(-2.206)	(0.522)
Strategic holdings	-0.0018	0.0003	0.1181	-0.0054	-0.0005	0.0156
	(-0.121)	(0.026)	(0.885)	(-0.495)	(-0.102)	(1.025)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	**Yes**	**Yes**	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	No	No	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,413	1,413	128	2,524	2,524	2,524
R-squared	0.049	0.088	0.351	0.111	0.192	0.101
Prob>F			0.4081			
Prob>χ2			0.3232			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Forecast error* is measured as the absolute difference between the actual earnings per share and the forecasted earnings per share divided by the stock price (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Analyst following* is the natural logarithm of the number of analysts who provide forecasts on the firm's earnings. *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

The results of the FE estimation reported in the first column of table 16 demonstrate a negative (-0.0002) but insignificant relation between better IR quality and forecast error for UK firms. The regression coefficient, which is generally lower compared to what is found for the German market, becomes even smaller and remains insignificant when the winsorized version of the

dependent variable is introduced in specification 2. The IV regression results in column 3 instead indicate a positive insignificant link between the aforementioned variables. However, this analysis suffers from the same issue as the IV analysis of the forecast dispersion, namely the lack of the instruments' joint explanatory power as suggested by the Prob>*F*-value of 0.4081. In summary, the $H_{3.6}$ hypothesis appears to be supported regarding the absence of a relation between IR quality and forecast error for UK firms. This finding also seems to be in line with the descriptive statistics for both samples, which suggest that the average forecast error for UK companies is already noticeably lower than it is for German firms—which might leave less space for sophisticated IR practices to further contribute to forecast quality in the UK.

The differences between German and UK firms with regard to IR's relation to forecast error are additionally evaluated in specifications 4, 5, and 6 in table 16, which rely on the interaction analysis. The OLS coefficient on the interaction term in specification 4 is negative (-0.0004), which indicates a more pronounced link between better IR quality and forecast error in Germany on average—which is in line with the aforementioned findings on the individual samples. However, this result suffers from a lack of significance. On the other hand, the stronger effect of IR quality in the case of German firms becomes more evident when outliers are accounted for in specification 5, as indicated by the interaction coefficient (which is significant at the 1% level). Model 6, which considers firm FE, supports the latter result by revealing an even larger significant difference (-0.0005). The previous findings on the stronger effect that better IR quality has on analyst coverage and forecast dispersion in German companies as compared to UK firms is thus complemented by the similar insight on forecast error, which ultimately makes it possible to confirm the $H_{3.7}$ hypothesis. In summary, the higher base level of information asymmetry applicable to the German market, which allows for higher IR contribution inter alia to analysts having lower information search costs and more congruent and consistent expectations,[512] appears to be a plausible explanation for the cross-country differences identified with regard to the relevance of better IR quality for several forecast properties. Results concerning forecast characteristics' relations to other independent variables are briefly discussed below.

In line with the elaborations of Vlittis and Charitou (2012) and the prediction made in the present thesis, firm size is positively and significantly associated with analyst coverage in both the German and UK samples.[513] This finding can be attributed to the fact that larger firms are typically more visible and consequently have more analysts following them. A similar

[512] cf. Lang and Lundholm (1996), p. 489; Brennan and Tamarowski (2000), p. 30.
[513] cf. on this and the following Vlittis and Charitou (2012), p. 954.

explanation also appears to apply to the identified positive relation between firm age and analyst coverage in Germany, because more mature firms frequently constitute larger and more established entities.[514] Furthermore, higher R&D intensity, which can be linked to more future opportunities but also to higher uncertainty, seems to attract more analysts in the case of German firms. This result is in line with Barth et at. (2001), who associate higher uncertainty with an opportunity for analysts to achieve higher rewards by providing advice on respective companies, which increases their incentives to cover such firms.[515] This relations' lack of significance in the UK sample could be interpreted as additional evidence of a lower base level of information asymmetry in the common law environment. With regard to forecast dispersion, this variable appears to be positively related to firm size in both the German and UK samples. One possible explanation of this finding is that the more complex earnings composition in a larger firm can induce more divergent opinions. In accordance with the expectation stated in chapter 4.2.3, firm profitability is negatively linked to forecast dispersion. This result is in line with the idea that analysts' opinions are more congruent in relation to well-running companies. Furthermore, the higher intensity of intangible assets is positively linked to forecast dispersion in German firms, which seems plausible due to the higher uncertainty about the value of this type of asset.[516] The divergent results on CapEx intensity may be attributed to the specific characteristics of the respective long-term assets, as elaborated by Chung et al. (1998).[517] Finally, higher firm profitability is widely negatively linked to forecast error, which indicates that well-running firms' earnings are easier to predict.[518] Surprisingly, analyst following is almost not related to forecast properties in either country. This result might be attributable to the fact that while a firm's higher visibility should improve the congruence and precision of analyst forecasts, the larger number of estimates might suffer from a higher probability of divergent opinions. After this extensive evaluation of the hypotheses on analyst following and forecast characteristics, the predictions concerning IR's relevance to stock liquidity are assessed in the next step.

[514] cf. Pástor and Veronesi (2003), p. 1767
[515] cf. Barth et al. (2001), p. 2.
[516] cf. Barth et al. (2001), p. 2.
[517] cf. Chung et al. (1998), pp. 41–42.
[518] cf. Aerts et al. (2007), p. 1308.

6.4 Link between IR quality and stock liquidity

Table 17 provides the results for German firms concerning the relation between IR quality and stock liquidity, which is proxied by estimated bid-ask spreads as proposed by Corwin and Schultz (2012). Model 1, which considers firm FE, reveals a negative coefficient on IR rankings; this indicates a negative link between better IR quality and bid-ask spreads, which indicates that better IR quality appears to go along with higher stock liquidity. This relation is statistically significant at the 10% level. The regression coefficient suggests that an increase in IR quality by 10 ranks is accompanied (ceteris paribus) by a -0.02% decrease in spread on average, although this appears to constitute an effect of lesser economic magnitude. Specification 2, which accounts for extreme values of the dependent variable, still indicates a negative link between better IR and spreads but slightly misses the 10% significance level. In the scope of the IV analysis in specification 3 (overidentification test is passed with Prob>χ2: 0.9888) and model 4 (which considers the prior financial experience of CEOs), the negative and significant coefficient (at the 5% and 10% levels) supports the existence of a positive IR effect on stock liquidity. In contrast the negative coefficient on IR quality is insignificant in specification 5, which controls for the analyst experience of heads of IR and relies on a reduced number of observations. To summarize, because the obtained evidence is not fully consistent, hypothesis $H_{4.1}$, which expects a positive relation between better IR and stock liquidity to be reflected in lower bid-ask spreads for German companies, can be seen as at least partially supported concerning a moderate economic effect. The identified link is generally in line with the idea that better IR can help to increase overall firm visibility, reduce information asymmetry, and decrease the risk of trading based on private information, which encourages overall trading activities in the respective shares and decreases the bid-ask spreads.[519] Furthermore, while Karolyi and Liao (2017) are unable to establish a link between IR and bid-ask spreads in the scope of cross-sectional data,[520] the present panel analysis—which relies inter alia on FE estimations—uncovers that some effect seems to exist, although it might be hard to identify due to variety of other factors (e.g., omitted time-invariant variables) having an impact on spreads.

Table 18 contains the results for IR's relevance to the stock liquidity of UK firms. Specification 1, which covers the FE estimation, indicates a significant negative relation (at the 10% level) between better IR quality and bid-ask spreads, although it is weaker than in the German sample.

[519] cf. Agarwal et al. (2015), p. 1; Brown and Hillegeist (2007), p. 446; Chang et al. (2008), p. 382.
[520] cf. Karolyi and Liao (2017), pp. 26, 51.

The regression coefficient in both model 2, which relies on winsorized dependent variables, and specification 3, which covers the IV analysis (Prob>χ2: 0.5474), also suggests that better IR is negatively linked to spreads—but it suffers from a lack of significance in both cases. The absence of significance is less surprising due to the overall moderate relation between IR and spreads, which appears less pronounced when the dependent variable's variance or the number of observations is reduced. In summary, hypothesis $H_{4.2}$, which expects a positive link between better IR quality and stock liquidity in UK firms, receives only limited support concerning a very small effect.

Table 17: Results on the link between IR quality and stock liquidity in Germany

Bid-ask spread	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) Firm FE Alternative 1	(5) Firm FE Alternative 2
IR ranking	**-0.00002***	**-0.00002**	**-0.00015***	**-0.00002****	**-0.00002**
	(-1.828)	**(-1.601)**	**(-1.799)**	**(-2.017)**	**(-1.373)**
Firm size	-0.00077*	-0.00075*	0.00069**	-0.00086*	-0.00101**
	(-1.711)	(-1.816)	(2.092)	(-1.922)	(-2.014)
ROE	-0.00162**	-0.00104	-0.00468***	-0.00165**	-0.00141*
	(-2.281)	(-1.436)	(-3.238)	(-2.325)	(-1.812)
Leverage	-0.00009	-0.00007	-0.00010	-0.00010	-0.00008
	(-0.765)	(-0.628)	(-0.530)	(-0.855)	(-0.603)
R&D intensity	-0.01766**	-0.01503*	-0.00472	-0.01820**	-0.02702***
	(-1.995)	(-1.678)	(-0.587)	(-2.071)	(-3.347)
CapEx intensity	-0.00438*	-0.00333	-0.00216	-0.00329	-0.00596**
	(-1.757)	(-1.340)	(-0.265)	(-1.383)	(-2.321)
IA intensity	-0.00169	-0.00122	-0.00657***	-0.00156	-0.00051
	(-0.776)	(-0.591)	(-3.889)	(-0.715)	(-0.223)
Sales growth	0.00116***	0.00107***	0.00277	0.00114***	0.00155***
	(3.391)	(3.604)	(1.408)	(3.310)	(5.086)
US cross-listing	-0.00014	-0.00013	-0.00002	-0.00019	-0.00085
	(-0.217)	(-0.214)	(-0.024)	(-0.295)	(-1.160)
Firm age	-0.00015***	-0.00015***	0.00001	-0.00015***	-0.00012**
	(-3.259)	(-3.328)	(0.694)	(-3.282)	(-2.434)
Strategic holdings	-0.00044	-0.00028	-0.00058	-0.00051	-0.00065
	(-0.582)	(-0.390)	(-0.590)	(-0.694)	(-0.722)
Financial expert CEO				0.00002	
				(0.078)	
Head of IR analyst					-0.00062
					(-1.152)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Observations	1,143	1,143	260	1,135	901
R-squared	0.613	0.612	0.596	0.622	0.622
Prob>F			0.0022		
Prob>χ2			0.9888		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Bid-ask spread* is calculated following Corwin and Schultz (2012) (in (2) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the

firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 18: Results on the link between IR quality and stock liquidity in the UK and on cross-country differences

Bid-ask spread	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**-0.00001***	**-0.00001**	**-0.00005**	-0.00001***	-0.00001***	-0.00000
	(-1.833)	**(-1.371)**	**(-0.857)**	(-3.400)	(-3.846)	(-0.364)
Interaction (IR*Country)				**-0.00002***	**-0.00002**	**-0.00002***
				(-1.704)	**(-1.593)**	**(-1.726)**
Firm size	0.00017	-0.00005	0.00031	0.00028***	0.00020***	-0.00042*
	(0.452)	(-0.166)	(0.974)	(3.712)	(3.102)	(-1.807)
ROE	-0.00013	-0.00011	-0.00110***	-0.00035***	-0.00029***	-0.00010
	(-1.424)	(-1.322)	(-4.518)	(-2.723)	(-2.760)	(-1.138)
Leverage	-0.00001	-0.00001*	-0.00008***	-0.00000	-0.00001	-0.00001**
	(-0.991)	(-1.863)	(-4.434)	(-0.422)	(-0.699)	(-2.328)
R&D intensity	0.00453	0.00303	-0.03040	0.00575***	0.00552***	-0.00465
	(0.745)	(0.515)	(-1.161)	(2.968)	(3.238)	(-0.844)
CapEx intensity	-0.00178	-0.00273	-0.00699	0.00287	0.00313*	-0.00325
	(-0.434)	(-0.776)	(-0.788)	(1.389)	(1.655)	(-1.300)
IA intensity	-0.00076	-0.00057	-0.00049	-0.00159***	-0.00154***	-0.00004
	(-0.470)	(-0.423)	(-0.201)	(-3.539)	(-3.979)	(-0.031)
Sales growth	-0.00039***	-0.00032***	-0.00140	0.00003**	0.00003**	-0.00021***
	(-15.151)	(-13.925)	(-0.627)	(2.229)	(2.002)	(-3.290)
US cross-listing	0.00066	0.00068	-0.00048	-0.00007	-0.00002	0.00010
	(1.062)	(1.153)	(-0.329)	(-0.342)	(-0.120)	(0.243)
Firm age	0.00011	0.00010	-0.00003*	-0.00001***	-0.00001***	0.00010
	(1.229)	(1.238)	(-1.865)	(-3.849)	(-3.467)	(1.395)
Strategic holdings	-0.00215	-0.00071	-0.00170	-0.00008	0.00000	0.00027
	(-1.518)	(-0.578)	(-0.620)	(-0.173)	(0.008)	(0.391)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,645	1,645	155	2,788	2,788	2,788
R-squared	0.722	0.749	0.781	0.586	0.596	0.676
Prob>F			0.0740			
Prob>χ2			0.5474			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Bid-ask spread* is calculated following Corwin and Schultz (2012) (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

As mentioned above, the estimated coefficients indicate a more pronounced relation between better IR and liquidity for German firms and thus support hypothesis $H_{4.3}$; the results of the interaction analysis reported in columns 4, 5, and 6 of table 18 generally substantiate this finding.

The OLS coefficient on the interaction term in specification 4 reveals a stronger negative link between IR rankings and bid-ask spreads for German firms compared to UK companies on average. This cross-country difference is significant at the 10% level. Model 5, which uses the winsorized version of spreads, still shows a negative but insignificant coefficient, whereas the FE estimation in column 6 again yields a statistically significant difference (at the 10% level). The identified variation with regard to IR's effect on stock liquidity in Germany and the UK can be particularly attributed to higher information asymmetry in the case of German firms; this is linked inter alia to a higher probability of information-based trading, which allows for a higher IR contribution. For the sake of completeness, the relation of stock liquidity to further variables introduced in the present analysis is briefly discussed below.

As expected, more mature, larger, and more profitable firms, which as Kirk and Vincent (2014) and Vlittis and Charitou (2012) suggest should also be more visible to market participants,[521] exhibit higher stock liquidity (and hence lower bid-ask spreads) in the German sample and partially in the case of UK companies. The negative relation between all intensity variables (e.g., R&D) and spreads (which is significant in Germany) may simply reflect the fact that hidden opportunities induce more frequent trading in corresponding shares.[522] Finally, sales growth, which is typically higher for younger and smaller companies, consistently exhibits a positive link to bid-ask spreads in Germany. On the other hand, the negative link identified in the UK may again reflect the difference in the information environment or specific trading preferences. In the next section, the results related to the cost of equity capital are presented.

6.5 Link between IR quality and cost of equity capital

Table 19 provides insights into the link between IR quality in German firms and the implied cost of equity capital, which are estimated following Claus and Thomas (2001). Specification 1, which considers firm FE, indicates a relation between these variables that is negative and highly statistically significant (at the 1% level). The coefficient on IR rankings equals -0.0003, which corresponds to an average decrease of 0.3% in the cost of equity capital when IR quality increases by 10 ranks (ceteris paribus). This effect appears to be reliable as well as economically significant. A slightly lower effect of 0.2% that is still significant at the 1% level is indicated by

[521] cf. Kirk and Vincent (2014), p. 1448, Vlittis and Charitou (2012), p. 954.
[522] cf. Kirk and Vincent (2014), p. 1448.

the second specification, which accounts for outliers. However, in the scope of specification 3, which covers the IV analysis (instruments pass the overidentification test with Prob>χ2: 0.2337), the negative coefficient becomes insignificant. Because previous empirical studies suggest that IR is a significant determinant of the cost of capital, a substantial question arises as to whether these prior results suffer from endogeneity (as indicated by the insignificant coefficient in model 3) or whether the finding in the present IV analysis is simply driven by a reduced number of observations. To address this issue, the firm FE IV regression, which relies on the distances to Frankfurt and the next airport as instruments and thus makes it possible to investigate a higher number of observations, is additionally conducted; the corresponding results are reported in column 4. The application of these instruments appears to be valid according to the overidentification test (Prob>χ2: 0.1622) as well as the test for their joint significance (Prob>*F*: 0.0018). This additional IV analysis reveals a negative coefficient on IR quality that is significant at the 10% level. As such, this result ultimately alleviates the aforementioned endogeneity concerns and substantiates the negative link between better IR quality and the cost of equity capital. Specifications 4 and 5, which account for alternative explanations, yield similar insights by reporting negative and highly significant coefficients on IR ranking. With regard to the $H_{5.1}$ hypothesis, it can be stated in summary that better IR quality appears to diminish the cost of equity capital on average in Germany. On the one hand, this can be attributable to IR's contribution to reducing information asymmetry and consequently the uncertainty factor faced by market participants, which allows firms to decrease the discount (or return) claimed in the scope of respective investments; on the other hand, it may stem from the increase in a firm's visibility and attractiveness to investors.[523] In conclusion, hypothesis $H_{5.1}$ can be seen as confirmed. Furthermore, the present analysis surprisingly indicates a positive and significant relation between financially well-versed CEOs and the implied cost of equity capital. However, this result is in line with the negative effect of financial expert CEOs identified in the scope of the Tobin's Q analysis and may reflect the fact that such CEOs skills are less beneficial in the German civil law and bank-based environment (e.g., due to specific firms' financing characteristics). In the next step, the validity of the $H_{5.2}$ hypothesis concerning the UK market is evaluated using the results provided in table 20.

[523] cf. Botosan (1997), p. 325; Leuz and Verrecchia (2000), p. 92; Diamond and Verrecchia (1991), pp. 125–127; Bushee and Miller (2012), p. 870.

Table 19: Results on the link between IR quality and the cost of equity capital in Germany

Implied cost of equity capital	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) IV Distances	(5) Firm FE Alternative 1	(6) Firm FE Alternative 2
IR ranking	**-0.0003*** **	**-0.0002*** **	**-0.0010**	**-0.0019***	**-0.0003*** **	**-0.0004*** **
	(-2.786)	**(-2.888)**	**(-1.331)**	**(-1.760)**	**(-2.802)**	**(-3.094)**
Firm size	0.0156***	0.0131***	0.0078***	0.0153***	0.0156***	0.0144***
	(4.740)	(4.889)	(2.942)	(3.782)	(4.730)	(3.938)
ROE	-0.0003	-0.0028	0.0133	0.0129	0.0000	-0.0021
	(-0.038)	(-0.498)	(1.199)	(1.177)	(0.002)	(-0.278)
Leverage	-0.0004	-0.0008	0.0035**	0.0006	-0.0004	-0.0001
	(-0.310)	(-1.041)	(2.130)	(0.565)	(-0.315)	(-0.069)
R&D intensity	0.1343	0.0320	-0.0671	0.1338	0.1301	0.1941
	(1.280)	(0.483)	(-0.834)	(1.389)	(1.245)	(1.402)
CapEx intensity	0.0001	0.0178	0.0254	-0.0170	0.0022	-0.0236
	(0.002)	(0.724)	(0.400)	(-0.420)	(0.057)	(-0.626)
IA intensity	-0.0084	-0.0087	0.0220	-0.0288	-0.0081	-0.0090
	(-0.562)	(-0.637)	(1.412)	(-1.176)	(-0.551)	(-0.539)
Sales growth	0.0200***	0.0133***	-0.0137	0.0207***	0.0200***	0.0253***
	(4.577)	(5.942)	(-0.980)	(3.594)	(4.549)	(7.184)
US cross-listing	0.0030	0.0031	0.0041	-0.0015	0.0033	0.0064
	(0.619)	(0.848)	(0.896)	(-0.274)	(0.669)	(0.988)
Firm age	-0.0024***	-0.0023***	-0.0002**	-0.0020***	-0.0025***	-0.0022***
	(-5.030)	(-5.276)	(-2.196)	(-3.122)	(-5.099)	(-3.967)
Strategic holdings	0.0014	0.0025	-0.0284**	0.0051	0.0009	-0.0003
	(0.147)	(0.297)	(-2.398)	(0.467)	(0.095)	(-0.025)
Financial expert CEO					0.0043*	
					(1.909)	
Head of IR analyst						-0.0038
						(-0.622)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
Observations	1,013	1,013	246	966	1,006	811
R-squared	0.388	0.423	0.479	0.165	0.388	0.382
Prob>F			0.0010	0.0018		
Prob>χ2			0.2337	0.1622		

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Implied cost of equity capital* is estimated applying the approach proposed by Claus and Thomas (2001) (in (2) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise.

Table 20: Results on the link between IR quality and the cost of equity capital in the UK and on cross-country differences

Implied cost of equity capital	(1) Firm FE	(2) Firm FE winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized	(6) Firm FE interaction winsorized
IR ranking	**-0.0000**	**-0.0000**	**-0.0010**	-0.0001**	-0.0001**	-0.0000
	(-0.619)	**(-0.368)**	**(-1.642)**	(-2.382)	(-2.140)	(-0.543)
Interaction (IR*Country)				**-0.0001**	**-0.0001**	**-0.0002****
				(-1.306)	**(-0.952)**	**(-2.426)**
Firm size	0.0078***	0.0055***	0.0036	0.0059***	0.0052***	0.0086***
	(3.220)	(2.728)	(1.062)	(7.640)	(7.957)	(4.909)
ROE	-0.0007	-0.0004	0.0001	0.0007	0.0010	-0.0002
	(-1.525)	(-1.227)	(0.034)	(0.817)	(1.448)	(-0.521)
Leverage	0.0001	0.0001*	-0.0003	0.0005***	0.0004***	0.0001*
	(1.436)	(1.734)	(-1.074)	(2.714)	(2.893)	(1.915)
R&D intensity	0.0042	0.0010	-0.2041	-0.0620***	-0.0703***	0.0247
	(0.078)	(0.028)	(-0.715)	(-2.995)	(-3.880)	(0.776)
CapEx intensity	0.0474	0.0536*	-0.2572**	-0.0552***	-0.0396**	0.0414**
	(1.577)	(1.839)	(-2.501)	(-2.703)	(-2.206)	(1.978)
IA intensity	0.0252**	0.0244***	0.0104	0.0023	0.0042	0.0086
	(2.479)	(2.836)	(0.329)	(0.549)	(1.135)	(1.010)
Sales growth	0.0054	0.0042	-0.0947***	0.0004**	0.0003***	0.0115***
	(1.070)	(1.193)	(-2.728)	(2.272)	(3.083)	(4.294)
US cross-listing	-0.0028	0.0030	0.0187	-0.0024	-0.0018	0.0028
	(-0.448)	(0.838)	(1.169)	(-0.934)	(-0.783)	(1.045)
Firm age	0.0017*	0.0012*	0.0001	0.0001**	0.0001***	0.0013**
	(1.787)	(1.873)	(0.420)	(1.969)	(2.931)	(2.139)
Strategic holdings	0.0064	0.0086	-0.0174	-0.0310***	-0.0283***	0.0034
	(0.679)	(0.905)	(-0.402)	(-7.603)	(-7.885)	(0.474)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	No	No	**Yes**	No	No	No
Index FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Firm FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
Country	No	No	No	**Yes**	**Yes**	No
Observations	1,335	1,335	153	2,348	2,348	2,348
R-squared	0.410	0.476	0.635	0.360	0.402	0.415
Prob>F			0.0965			
Prob>χ2			0.8535			

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *Implied cost of equity capital* is estimated applying the approach proposed by Claus and Thomas (2001) (in (2), (5), and (6) winsorized at the 2.5% and 97.5% levels). *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

Specification 1 in table 20, which relies on the firm FE estimation, indicates a negative but only marginal and statistically insignificant link between IR rankings and the implied cost of equity capital for UK firms. Similar insights are provided by the results of specification 2, which accounts for extreme values of the dependent variable. In addition, the IV analysis in the third column (the overidentification test is passed with Prob>χ2: 0.8535) still indicates a negative but insignificant coefficient on IR quality. These results are in line with the elaborations of Leuz and

Verrecchia (2000) and the expectation of the $H_{5.2}$ hypothesis, which assumes that a generally lower information asymmetry component is incorporated into the capital costs of UK firms on average and it can consequently only be marginally affected by IR activities that result in the absence of a significant link between IR quality and equity costs.[524] The higher firm visibility attributed to better IR and its contribution to the lower cost of equity capital can be partially responsible for the ascertained negative regression coefficients, but the effect seems to be insufficient to provide them with statistical power.

Columns 4, 5, and 6 in table 20 report the results of the interaction analysis for German and UK firms. In models 4 and 5, the OLS regression coefficients on the interaction term are negative in both specifications (-0.0001), which is in line with the more pronounced negative link between IR and capital costs identified in the German sample in the previous analyses. However, this difference between Germany and the UK appears to be statistically insignificant. By addressing endogeneity concerns and the data's panel structure in model 6 (which relies on the FE estimation), the even higher interaction effect (-0.0002) turns significant at the 5% level. As such, it provides strong support for hypothesis $H_{5.3}$, which expects a higher relevance of IR quality in Germany and can overall be seen as confirmed. Insights on other variables that are significantly linked to the cost of equity capital in both countries are described below.

The regression results concerning the link between implied equity costs and firm size indicate a positive relation between both variables for German and UK firms, although as Hope (2003) suggests this may be attributable to a number of factors proxied by firm size.[525] The prominent positive link between sales growth and cost of equity capital in the German sample can be particularly ascribed to the fact that younger firms with higher growth are subject to more uncertainty and risk, which is reflected in higher equity premiums.[526] This explanation is in line with the finding on firm age, which exhibits a negative link to the cost of capital. In the case of UK firms, the IA intensity in particular appears to be strongly positively linked to equity costs, which can be attributed to a lesser transparency of intangible assets accompanied by higher uncertainty.[527] The findings on the contribution of IR quality to M&A and SEO performance, which is a topic that has not yet been examined by any other empirical study on IR, are presented in the next chapter.

[524] cf. Leuz and Verrecchia (2000), p. 92.
[525] cf. Hope (2003), p. 250.
[526] cf. Kirk and Vincent (2014), p. 1422.
[527] cf. Barth et al. (2001), p. 2.

7 Results on M&A and SEO performance

7.1 Link between IR quality and M&A performance

Table 21 provides the results on the link between IR quality and M&A performance for German acquirers. All specifications rely on three-day CAR as the measure of value effects and account for year, industry, and index FE as well as for deal and firm characteristics. Specifications 5 and 6 additionally control for alternative explanations. Finally, column 7 reports the results of the first stage of the IV analysis. Specification 1 indicates that IR quality is positively linked to abnormal announcement returns attributed to M&A transactions. The OLS regression coefficient on IR rankings is 0.0009 and significant at the 5% level. As such, a 10 ranks better IR quality is accompanied (ceteris paribus) by a 0.9% higher M&A performance on average. This effect appears to be reliable and economically significant. A similar link is indicated by model 2, which accounts for extreme values of the dependent variable. The respective coefficient on IR rankings is only slightly lower than in the first specification (0.0008) and still significant at the 5% level. Specification 3, which relies on the IV analyses using IR resources as instruments, still indicates a positive and significant link (at the 1% level) between IR rankings and abnormal announcement returns. However, it should be noted that this model is based on only 41 observations, which reduces its overall reliability; as such, that the respective results are reported primarily for the sake of completeness. To further alleviate endogeneity concerns and substantiate the previous results, an additional IV analysis that relies on a significantly higher number of observations is conducted using the distances to Frankfurt and the next airport as instruments. As expected in chapter 5.2, the first stage in column 7 indicates that both proximity measures are negatively and significantly (at the 5% level) linked to IR rankings. Higher distances—which should reflect worse conditions for face-to-face communication with market participants related to higher costs and lower meeting frequency—thus accompany lower IR quality on average. These instruments appear to be valid according to the test for the joint significance of instruments (Prob>F: 0.0225) and the overidentification test, which fails to reject the H_0 hypothesis and indicates the exogeneity of all instruments (Prob>χ2: 0.2163). The results of the corresponding second stage are reported in column 4. In line with the findings from the previous models, the coefficient on IR rankings is still positive (0.003) and significant at the 10% level, which indicates an even more pronounced positive relation between IR quality and announcement performance attributed to M&As. Specifications 5 and 6 additionally account for the financial experience of CEOs and

the analyst experience of heads of IR. The regression coefficients on both variables are positive but statistically insignificant. Moreover, the inclusion of these measures in the analysis does not affect the previous results on the effect of IR quality, which has the same magnitude as in model 1 (0.0009) and remains significant at the 5% and 10% levels, respectively. In summary, these findings provide strong support for hypothesis *H6.1*, which predicts that better IR quality is accompanied by higher announcement returns for German acquirers. As extensively discussed in chapter 4.3.1, the positive contribution of better IR to M&A performance can be explained by the reduction of information asymmetry between an acquiring firm and investors with regard to a deal's future benefits as well as its conditions.[528] Furthermore, good IR may allow a firm to conduct transactions on better terms, which in the case of deals paid with stock can be achieved through a stock price run-up before a transaction.[529] Finally, higher firm visibility in the case of major corporate events, inter alia in the media, can generally be used in more sophisticated IR to disseminate information about a firm and attract investors and analysts.[530] Insights on IR's contribution to the M&A performance of UK acquirers are provided below.

Specification 1 in table 22 indicates a positive link (0.0001) between IR quality and abnormal announcement returns for UK acquirers that is substantially weaker compared to the relation identified in the scope of the German sample. Furthermore, this result is statistically insignificant. Model 2, which relies on winsorized dependent variables, supports this finding by showing the absence of a significant link between IR quality and acquirers' M&A performance. The IV analysis in specification 3 even indicates a negative regression coefficient on IR rankings, although it is still insignificant. With regard to this IV analysis, however, it should be noted that its explanatory power appears to be reduced due to a lower number of observations, analogous to the IV model applied in the case of German acquirers. Overall, the results for UK acquirers support the elaborations in the scope of the *H6.2* hypothesis regarding the absence of a significant effect of IR quality. As such, the more rigorous requirements on investor protection, transparency, and disclosure that are applicable to UK acquirers seem ultimately to diminish IR's contribution to M&A announcement returns.[531] In addition, due to the lower fraction of deals paid with stock in the UK sample, the previously mentioned benefits of pre-deal IR activities—

[528] cf. Healey and Palepu (2001), pp. 420–421.
[529] cf. Ahern and Sosyura (2014), pp. 277–280.
[530] cf. Draper and Paudyal (2008), p. 377.
[531] cf. Goergen and Renneboog (2004), pp. 38–39.

which can contribute to better transaction terms—may be less applicable to the investigated firms.

Table 21: Results on the link between IR quality and M&A performance in Germany

CAR -1_1	(1) OLS	(2) OLS winsorized	(3) IV IR resources	(4) IV Distances	(5) OLS Alternative 1	(6) OLS Alternative 2	(7) First stage IV Distances
IR ranking	**0.0009****	**0.0008****	**0.0083*****	**0.0030***	**0.0009****	**0.0009***	
	(2.107)	**(2.098)**	**(5.075)**	**(1.863)**	**(2.230)**	**(1.816)**	
Relative deal size	0.0272***	0.0258***	-0.0780**	0.0273***	0.0258**	0.0241**	-0.0089
	(2.723)	(2.700)	(-2.472)	(2.877)	(2.563)	(2.166)	(-0.004)
Cross-border deal	0.0080	0.0072	-0.0529**	0.0061	0.0074	-0.0074	1.0736
	(0.810)	(0.775)	(-2.412)	(0.622)	(0.744)	(-0.667)	(0.407)
Intra-industry deal	-0.0011	-0.0039	-0.0270**	-0.0068	0.0009	-0.0023	2.7399
	(-0.089)	(-0.365)	(-2.278)	(-0.567)	(0.078)	(-0.217)	(1.152)
Cash payment	0.0160**	0.0156**	0.0334***	0.0195**	0.0152**	0.0045	-2.0311
	(2.114)	(2.158)	(3.936)	(2.567)	(2.007)	(0.542)	(-1.117)
Stock payment	-0.0189	-0.0173	-0.3581***	-0.0137	-0.0222	0.0012	-1.1995
	(-0.779)	(-0.768)	(-5.629)	(-0.660)	(-0.931)	(0.040)	(-0.273)
Public target	-0.0300**	-0.0301**	0.1214**	-0.0320**	-0.0288**	-0.0121	0.3027
	(-2.301)	(-2.337)	(2.102)	(-2.560)	(-2.130)	(-0.845)	(0.095)
Final ownership	0.0425	0.0426	-0.1073	0.0761*	0.0352	0.0336	-11.8690
	(1.193)	(1.219)	(-1.492)	(1.697)	(0.970)	(0.865)	(-1.231)
Asset deal	-0.0010	-0.0029	0.0198	-0.0027	0.0001	-0.0026	-0.1930
	(-0.110)	(-0.354)	(0.707)	(-0.294)	(0.014)	(-0.274)	(-0.085)
Firm size	-0.0058	-0.0057	-0.0117*	-0.0090*	-0.0033	-0.0061	1.1588
	(-1.041)	(-1.079)	(-1.903)	(-1.698)	(-0.591)	(-0.947)	(0.992)
ROE	-0.0170	-0.0150	-0.3470***	-0.0190	-0.0194	0.0148	4.9646
	(-0.615)	(-0.611)	(-3.821)	(-0.707)	(-0.738)	(0.615)	(0.774)
Leverage	0.0016	0.0014	0.1168***	0.0037	0.0014	0.0023	-0.7143
	(0.534)	(0.528)	(3.184)	(1.103)	(0.499)	(0.738)	(-0.797)
R&D intensity	-0.0119	0.0056	1.2478***	-0.0481	-0.0305	-0.0476	36.3889
	(-0.080)	(0.041)	(3.082)	(-0.328)	(-0.209)	(-0.308)	(1.305)
CapEx intensity	-0.1008	-0.1051	-2.2230***	-0.1255	-0.0632	-0.1300	13.4993
	(-0.959)	(-1.011)	(-7.264)	(-1.346)	(-0.568)	(-1.110)	(0.350)
IA intensity	-0.0071	0.0006	-0.7790***	-0.0296	0.0053	-0.0071	4.6502
	(-0.233)	(0.021)	(-7.187)	(-0.820)	(0.181)	(-0.220)	(0.518)
Sales growth	0.0568***	0.0406**	-0.5266***	0.0457**	0.0573***	0.0135	6.2046*
	(2.860)	(2.539)	(-5.018)	(2.447)	(2.966)	(0.194)	(1.808)
US cross-listing	0.0116	0.0095	-0.1329***	0.0194	0.0134	0.0047	-1.7642
	(0.967)	(0.823)	(-2.810)	(1.387)	(1.109)	(0.367)	(-0.570)
Firm age	0.0005**	0.0005**	-0.0021**	0.0006**	0.0005**	0.0002	-0.0189
	(2.364)	(2.419)	(-2.017)	(2.420)	(2.375)	(0.505)	(-0.296)
Strategic holdings	-0.0987**	-0.0920**	-0.4883***	-0.1636**	-0.0878**	-0.1025**	27.0097***
	(-2.282)	(-2.299)	(-8.424)	(-2.473)	(-2.112)	(-2.126)	(3.224)
Financial expert CEO					0.0162		
					(1.532)		
Head of IR analyst						0.0053	
						(0.521)	
Distance to airport							-3.1763**
							(-2.144)
Distance to Frankfurt							-2.9641**
							(-2.284)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	Prob>F
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	0.0225
Index FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	Prob>$\chi 2$
							0.2163
Observations	148	148	41	147	148	122	147
R-squared	0.435	0.428	0.975	0.254	0.451	0.356	0.542

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *CAR -1...1* is the

acquirer's three-day cumulated abnormal stock return around the M&A announcement (in (2) winsorized at the 2.5% and 97.5% levels). *Relative deal size* is defined as the ratio of the deal value and the acquirer's market value of equity. *Cross-border deal* is a dummy variable that equals one in the case of the acquisition of a foreign target and zero otherwise. *Intra-industry deal* is a dummy variable that equals one if the acquirer and the target firm operate in the same industry and zero otherwise. *Cash payment* is a dummy variable that equals one if cash is used as the deal currency and zero otherwise. *Stock payment* is a dummy variable that equals one if stock is used as the deal currency and zero otherwise. *Public target* is a dummy variable that equals one if the target firm is a publicly traded company and zero otherwise. *Final ownership* is measured as the equity stake in the target firm held by the acquirer after the transaction. *Asset deal* is a dummy variable that equals one if the deal is conducted via the acquisition of target's assets and zero otherwise. *All of the following corporate characteristics refer to the acquiring firm. In addition, all accounting variables refer to the fiscal year prior to the transaction. Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise. *Distance to airport* is the natural logarithm of the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt* is the natural logarithm of the distance between the firm's headquarter location and Frankfurt.

Table 22: Results on the link between IR quality and M&A performance in the UK and on cross-country differences

CAR -1_1	(1) OLS	(2) OLS winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized
IR ranking	**0.0001**	**0.0001**	**-0.0053**	0.0001	0.0001
	(1.169)	**(1.364)**	**(-1.469)**	(0.991)	(1.233)
Interaction (IR*Country)				**0.0005***	**0.0005***
				(1.732)	**(1.790)**
Relative deal size	0.0246*	0.0173	0.2637	0.0146**	0.0114*
	(1.760)	(1.347)	(1.000)	(2.088)	(1.881)
Cross-border deal	0.0051	0.0042	0.0537*	0.0044	0.0040
	(1.499)	(1.409)	(1.902)	(1.392)	(1.424)
Intra-industry deal	-0.0034	-0.0026	-0.0326*	-0.0017	-0.0018
	(-1.070)	(-0.879)	(-1.666)	(-0.561)	(-0.648)
Cash payment	0.0017	0.0019	0.0052	0.0033	0.0030
	(0.508)	(0.641)	(0.426)	(1.099)	(1.162)
Stock payment	-0.0056	0.0016		-0.0115	-0.0069
	(-0.187)	(0.081)		(-0.586)	(-0.523)
Public target	-0.0122**	-0.0084	-0.0126	-0.0120**	-0.0091**
	(-2.007)	(-1.603)	(-0.299)	(-2.374)	(-2.064)
Final ownership	-0.0159	-0.0184	0.0944	-0.0125	-0.0118
	(-1.125)	(-1.400)	(0.632)	(-0.884)	(-0.919)
Asset deal	-0.0024	-0.0016	-0.0264	-0.0019	-0.0019
	(-0.584)	(-0.433)	(-0.763)	(-0.516)	(-0.580)
Firm size	-0.0034	-0.0035*	-0.0215	-0.0032*	-0.0032**
	(-1.528)	(-1.828)	(-1.174)	(-1.763)	(-1.999)
ROE	0.0029	0.0018	-0.0989	0.0022	0.0017
	(0.672)	(0.556)	(-1.223)	(0.545)	(0.559)
Leverage	0.0003	0.0002	-0.0039	0.0003	0.0002
	(0.815)	(0.681)	(-0.845)	(0.851)	(0.862)
R&D intensity	-0.0137	-0.0031	1.1655	0.0015	0.0091
	(-0.382)	(-0.090)	(0.797)	(0.041)	(0.275)
CapEx intensity	-0.0057	-0.0063	1.2053	-0.0226	-0.0168
	(-0.136)	(-0.165)	(1.322)	(-0.588)	(-0.483)
IA intensity	-0.0036	-0.0060	0.0515	-0.0120	-0.0122
	(-0.295)	(-0.571)	(0.452)	(-1.222)	(-1.417)
Sales growth	-0.0031	-0.0006	0.2530	0.0253	0.0153
	(-0.169)	(-0.039)	(0.841)	(1.229)	(1.223)
US cross-listing	-0.0088	-0.0087	0.0811	-0.0060	-0.0067
	(-1.133)	(-1.334)	(1.125)	(-1.025)	(-1.340)
Firm age	-0.0000	-0.0000	-0.0003	0.0001	0.0001
	(-0.239)	(-0.041)	(-0.231)	(0.695)	(0.772)
Strategic holdings	-0.0172	-0.0257	0.1348	-0.0577***	-0.0539***
	(-0.582)	(-0.971)	(0.231)	(-3.393)	(-3.583)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Index FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Country	No	No	No	**Yes**	**Yes**

Observations	553	553	64	701	701
R-squared	0.108	0.108	-	0.131	0.130

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *CAR -1...1* is the acquirer's three-day cumulated abnormal stock return around the M&A announcement (in (2) and (5) winsorized at the 2.5% and 97.5% levels). *Relative deal size* is defined as the ratio of the deal value and the acquirer's market value of equity. *Cross-border deal* is a dummy variable that equals one in the case of the acquisition of a foreign target and zero otherwise. *Intra-industry deal* is a dummy variable that equals one if the acquirer and the target firm operate in the same industry and zero otherwise. *Cash payment* is a dummy variable that equals one if cash is used as the deal currency and zero otherwise. *Stock payment* is a dummy variable that equals one if stock is used as the deal currency and zero otherwise. *Public target* is a dummy variable that equals one if the target firm is a publicly traded company and zero otherwise. *Final ownership* is measured as the equity stake in the target firm held by the acquirer after the transaction. *Asset deal* is a dummy variable that equals one if the deal is conducted via the acquisition of target's assets and zero otherwise. *All of the following corporate characteristics refer to the acquiring firm. In addition, all accounting variables refer to the fiscal year prior to the transaction. Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

While the results for the two samples indicate that the relevance of IR for M&A performance differs between German and UK acquirers, the matter is further assessed in specifications 4 and 5, which rely on the interaction analysis. Model 4 in table 22 reveals a positive (0.0005) and significant (at the 10% level) regression coefficient on the interaction term, which indicates that better IR quality contributes more to abnormal stock performance for German acquirers than for UK acquirers on average, which is in line with the prior findings. The investigation of winsorized CAR in specification 5 yields the same statistically significant result. In summary, hypothesis $H_{6.3}$, which expects this difference between the German and UK samples due to the aforementioned country-specific characteristics, receives strong empirical support in the present analysis. Findings on the relations between important M&A characteristics (as introduced in chapter 4.3.2) and the abnormal performance attributed to deal announcements are briefly discussed below.

As expected, relative deal size is widely positively and significantly linked to M&A performance in Germany and the UK. First, this relation could be attributable to the fact that a deal's larger size could simply be related to higher expected benefits for a firm and its shareholders.[532] Furthermore, the identified effect may arise because the relative deal size should be higher for smaller acquirers (ceteris paribus), who Moeller et al. (2004) assert tend to pay lower premiums and be less involved in value-destroying M&As—which is more beneficial for shareholders.[533] This argument is also supported by the negative link ascertained for firm size and abnormal stock performance in both countries. In line with the previous prediction, the empirical results indicate

[532] cf. Asquith et al. (1983), p. 123.
[533] cf. Moeller et al. (2004), pp. 208, 226.

a negative relation between the public status of target firms and the announcement returns of both German and UK acquirers. This finding can be ascribed to both the higher price frequently paid for publicly listed targets due to their liquidity and the higher number of potential bidders in comparison to private firms that are in turn typically subject to respective discount.[534] Furthermore, the choice of payment method also appears to matter for value effects attributed to the deal announcements of German acquirers. In accordance with the common theoretical prediction, cash as the deal currency is associated with a significantly positive abnormal stock price reaction for bidders on average. This finding can be attributed to the positive signaling effect of cash payments, which are typically preferred when management perceives the acquiring firm's stock as being undervalued.[535] As the relevance of other control variables is less clear due to changes in the signs of the respective regression coefficients or a lack of significance, these variables are not further discussed. In the next chapter, empirical evidence related to the contribution of IR quality to the SEO performance of German and UK firms is provided and discussed.

7.2 Link between IR quality and SEO performance

Table 23 presents the results on the link between IR quality and abnormal announcement performance for German issuers. Analogous to the M&A analysis, the three-day CAR is used as the dependent variable and all specifications—except for model 3—account for year, industry, and index FE as well as for firm and equity offering characteristics. Column 7 contains the results of the first stage of the IV analysis. Specification 1 reveals a positive coefficient of 0.0003 on IR rankings, which indicates that a 10 ranks better IR quality is accompanied (ceteris paribus) by a 0.3% higher abnormal SEO announcement performance on average. However, this link is not statistically significant, as indicated by the low value of the test statistic (0.452). A lack of significance of the positive coefficient on IR quality (0.0002) can also be observed in model 2, which accounts for outliers. The IV analysis in specification 3, which relies on IR resources as instruments, also reveals an insignificant and even negative relation (-0.0001) between the three-day CAR and IR rankings. However, similar to the elaborations in the scope of the M&A analysis, the insights provided by this IV model suffer from less explanatory power due to the

[534] cf. Fuller et al. (2002), pp. 1765, 1784, 1792.
[535] cf. Travlos (1987), pp. 944–945.

low number of observations.[536] The IV analysis in specification 4, which is based on the distances to both the next airport and Frankfurt as instruments, should make it possible to overcome the aforementioned concern using a significantly higher number of observations. Furthermore, the proximity instruments appear to be valid according to the test for their joint significance (Prob>*F*: 0.0676) as well as the overidentification test (Prob>χ2: 0.8734). Nonetheless, the results of this additional analysis still indicate a negative (-0.0002) and insignificant link between IR quality and CARs. Models 5 and 6, which introduce alternative explanations, also suggest the absence of a significant relation between both variables of interest. In summary, the empirical results provide evidence against hypothesis $H_{7.1}$, which predicts a (significantly) positive association between IR quality and abnormal stock price reactions attributed to SEO announcements in Germany. This finding may be attributed to the fact that German companies, which are subject to a bank-based financial system and consequently pronounced debt financing (as also indicated by the descriptive statistics in chapter 4.2.4),[537] ascribe lower capacities to communication in the scope of announcements of overall relatively smaller scaled SEOs (as suggested by the descriptive statistics in chapter 4.4.3); as such, no consistent or significant IR effect can be inferred from the analyses. Whether a significant relation between SEO performance and IR quality exists for UK companies is evaluated in table 24.

Specification 1 reveals a positive link (0.0018) between better IR quality and three-day CAR for UK firms, which is much stronger than the effect identified for German companies. Furthermore, the regression coefficient is significant at the 10% level. This result indicates that a 10 ranks better IR quality is accompanied (ceteris paribus) by a 1.8% higher abnormal SEO announcement performance on average. This effect appears to be highly economically significant. Specification 2, which accounts for extreme values of the dependent variable, provides a somewhat lower coefficient (0.0012) that is statistically significant at the 5% level and still economically relevant. The IV analysis in model 3, which relies on a very small number of observations and is considered only for the sake of completeness, supports the previous finding of a positive and significant relation between IR rankings and CARs in the UK sample.[538] In summary, the $H_{7.2}$ hypothesis, which expects the empirically identified positive effect of IR for UK issuers, can be

[536] In addition, due to collinearity issues, the index and year FE as well as all firm-level controls are not considered in this model.
[537] cf. Aktas et al. (2016), pp. 1–2.
[538] Due to collinearity issues, the index and time FE as well as all firm-level controls are not considered in this model.

seen as confirmed. The ascertained relation can be ascribed to IR's positive contribution to either the information environment or market participants' awareness of the issuing firm (or both).[539] As such, more forthcoming communication with investors can help to reduce the information asymmetry related to a firm's true value and thereby alleviate concerns stemming from the potential overvaluation signal sent to the market in the case of an equity offering announcement.[540] In addition, IR can contribute to resolving doubts on the usage of additional funds, which in line with the agency theory could be assumed to be utilized by self-interested managers to pursue their own goals.[541] It can also help firms to raise funds on better terms by contributing positively to higher stock prices before equity offers (e.g., by enhancing firm visibility).[542] As suggested by the results in tables 23 and 24, the IR effect with regard to SEO performance differs across the two investigated samples. Further insights on these cross-country differences are provided by specifications 4 and 5 in table 24, which rely on the interaction analysis.

Model 4 reveals a negative (-0.0019) and significant (at the 5% level) coefficient on the interaction term. This result indicates that the contribution of better IR quality to SEO announcement performance is significantly higher in the UK sample than in the German sample on average. This finding is supported by the negative (-0.0012) and significant (at the 10% level) coefficient identified in the scope of model 5, which is based on a winsorized version of the CARs. In summary, hypothesis $H_{7.3}$ can be seen as confirmed regarding a stronger (positive) relation between IR quality and SEO performance for UK issuers. The ascertained difference could be attributed to the more significant role that equity financing plays in the UK's market-based system,[543] where greater importance is assigned to IR activities in the case of SEO events—which results in their higher contribution to announcement returns.

[539] cf. Lang and Lundholm (2000), p. 630.
[540] cf. Walker and Yost (2008), pp. 376–377; Myers and Majluf (1984), pp. 188, 220.
[541] cf. Walker and Yost (2008), pp. 376–377.
[542] cf. Lang and Lundholm (2000), p. 630; Merton (1987), p. 501.
[543] cf. Aktas et al. (2016), pp. 1–2; Foley and Greenwood (2010), pp. 1231, 1259.

Table 23: Results on the link between IR quality and SEO performance in Germany

CAR -1_1	(1) OLS	(2) OLS winsorized	(3) IV IR resources	(4) IV Distances	(5) OLS Alternative 1	(6) OLS Alternative 2	(7) First stage IV Distances
IR ranking	**0.0003**	**0.0002**	**-0.0001**	**-0.0002**	**0.0005**	**-0.0009**	
	(0.452)	**(0.383)**	**(-0.037)**	**(-0.066)**	**(0.826)**	**(-1.087)**	
Relative offer size	-0.0433	-0.0468	-0.1998**	-0.0484	-0.0462	-0.0599	-4.8411
	(-1.152)	(-1.450)	(-2.341)	(-1.476)	(-1.305)	(-1.584)	(-1.096)
Use: Debt	-0.0446	-0.0448*	0.0071	-0.0409*	-0.0440	-0.0758**	-2.6051
	(-1.614)	(-1.748)	(0.125)	(-1.654)	(-1.581)	(-2.071)	(-0.450)
Use: Working capital	-0.0145	-0.0074	0.1289***	-0.0165	-0.0165	-0.0223	1.4409
	(-0.674)	(-0.403)	(3.016)	(-0.923)	(-0.783)	(-0.839)	(0.192)
Use: Acquisition	0.0209	0.0094	-0.0079	0.0199	0.0162	0.0322	-1.4433
	(1.193)	(0.631)	(-0.242)	(1.345)	(0.970)	(1.409)	(-0.430)
Firm size	-0.0197*	-0.0110		-0.0195**	-0.0205**	-0.0179	1.5990
	(-1.963)	(-1.291)		(-2.309)	(-1.990)	(-1.544)	(0.995)
ROE	-0.0475*	-0.0309		-0.0545**	-0.0450*	-0.0669**	3.3058
	(-1.736)	(-1.345)		(-2.381)	(-1.703)	(-2.160)	(0.758)
Leverage	-0.0008	-0.0018		-0.0008	-0.0004	0.0012	0.0755
	(-0.183)	(-0.446)		(-0.236)	(-0.103)	(0.200)	(0.162)
R&D intensity	-0.0603	-0.0092		-0.1783	-0.0656	-0.1080	18.7585
	(-0.487)	(-0.090)		(-1.532)	(-0.544)	(-0.765)	(0.741)
CapEx intensity	-0.0949	-0.0927		-0.1169	-0.0841	-0.2242	-22.1519
	(-0.729)	(-0.808)		(-0.892)	(-0.697)	(-0.993)	(-0.817)
IA intensity	0.0325	0.0210		0.0288	0.0329	0.0287	-4.7770
	(0.512)	(0.378)		(0.556)	(0.533)	(0.358)	(-0.444)
Sales growth	0.0067	0.0059		0.0065	0.0060	0.0119	2.3688
	(0.539)	(0.561)		(0.521)	(0.521)	(0.763)	(1.273)
US cross-listings	-0.0002	-0.0204		0.0128	-0.0003	-0.0135	0.5642
	(-0.005)	(-0.837)		(0.495)	(-0.011)	(-0.343)	(0.103)
Firm age	0.0009*	0.0005		0.0009**	0.0009*	0.0013***	-0.0868
	(1.908)	(1.302)		(1.994)	(1.932)	(2.715)	(-1.276)
Strategic holdings	-0.0993**	-0.0634		-0.0945**	-0.1091**	-0.0935	11.2187
	(-2.009)	(-1.600)		(-1.988)	(-2.181)	(-1.458)	(1.491)
Financial expert CEO					-0.0225		
					(-1.327)		
Head of IR analyst						-0.0158	
						(-0.466)	
Distance to airport							-3.2505**
							(-2.295)
Distance to Frankfurt							0.5854
							(0.496)
Year FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	Prob>F
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	0.0676
Index FE	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	Prob>χ2
							0.8734
Observations	130	130	27	129	130	105	129
R-squared	0.459	0.401	0.558	0.460	0.471	0.566	0.473

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *CAR -1...1* is the issuer's three-day cumulated abnormal stock return around the SEO announcement (in (2) winsorized at the 2.5% and 97.5% levels). *Relative offer size* is defined as the ratio of the amount of SEO proceeds and the issuer's market value. *Use: Debt* is a dummy variable that equals one if the SEO proceeds should be used for the debt reduction and zero otherwise. *Use: Working capital* is a dummy variable that equals one if the SEO proceeds should be used for the strengthening of working capital and zero otherwise. *Use: Acquisition* is a dummy variable that equals one if the SEO proceeds should be used for M&A activities and zero otherwise. *All accounting variables below refer to the fiscal year prior to the SEO. Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst* is a dummy variable that equals one if the firm's head of IR was previously employed as analyst and zero otherwise. *Distance to airport* is the natural logarithm of the distance between the firm's headquarter location and the next international airport. *Distance to Frankfurt* is the natural logarithm of the distance between the firm's headquarter location and Frankfurt.

Table 24: Results on the link between IR quality and SEO performance in the UK and on cross-country differences

CAR -1_1	(1) OLS	(2) OLS winsorized	(3) IV IR resources	(4) OLS interaction	(5) OLS interaction winsorized
IR ranking	**0.0018***	**0.0012****	**0.0515****	0.0015**	0.0008**
	(1.847)	**(2.097)**	**(2.245)**	(2.239)	(2.366)
Interaction (IR*Country)				**-0.0019****	**-0.0012***
				(-2.382)	**(-1.968)**
Relative offer size	0.0445	0.0341	2.7618*	0.0112	0.0119
	(0.924)	(0.848)	(1.654)	(0.392)	(0.476)
Use: Debt	-0.0132	-0.0225	-1.0717**	-0.0186	-0.0170
	(-0.369)	(-0.689)	(-2.491)	(-0.953)	(-1.082)
Use: Working capital	0.1159**	0.0895**	0.8347***	0.0714***	0.0428**
	(2.472)	(2.532)	(5.974)	(2.683)	(2.441)
Use: Acquisition	-0.0015	0.0087	0.0626	0.0016	0.0010
	(-0.046)	(0.351)	(0.806)	(0.122)	(0.102)
Firm size	-0.0192	-0.0101		-0.0261**	-0.0140**
	(-1.033)	(-0.909)		(-2.469)	(-2.579)
ROE	0.0485	0.0165		0.0051	-0.0032
	(0.730)	(0.386)		(0.174)	(-0.178)
Leverage	0.0042	0.0015		0.0011	0.0001
	(0.802)	(0.434)		(0.485)	(0.073)
R&D intensity	-0.2531	-0.3418		-0.1286*	-0.1197*
	(-0.916)	(-1.479)		(-1.755)	(-1.874)
CapEx intensity	-0.1065	-0.1190		-0.0828	-0.0575
	(-0.411)	(-0.466)		(-0.605)	(-0.552)
IA intensity	0.0276	0.0400		-0.0210	-0.0143
	(0.294)	(0.555)		(-0.491)	(-0.406)
Sales growth	0.0008	0.0097		-0.0074	-0.0063
	(0.026)	(0.356)		(-0.761)	(-0.855)
US cross-listings	-0.0556	-0.0223		-0.0050	-0.0006
	(-0.818)	(-0.475)		(-0.181)	(-0.034)
Firm age	-0.0003	-0.0003		0.0003	0.0002
	(-0.552)	(-0.868)		(1.313)	(0.905)
Strategic holdings	-0.0076	0.0560		-0.0160	-0.0085
	(-0.045)	(0.439)		(-0.382)	(-0.255)
Year FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Index FE	**Yes**	**Yes**	No	**Yes**	**Yes**
Country	No	No	No	**Yes**	**Yes**
Observations	120	120	10	250	250
R-squared	0.352	0.389	0.742	0.246	0.229

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking is obtained from the Extel survey and is multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Interaction (IR*Country)* is the product of the IR ranking and the country dummy that equals one for the German firms and zero for the UK companies. *CAR -1...1* is the issuer's three-day cumulated abnormal stock return around the SEO announcement (in (2) and (5) winsorized at the 2.5% and 97.5% levels). *Relative offer size* is defined as the ratio of the amount of SEO proceeds and the issuer's market value. *Use: Debt* is a dummy variable that equals one if the SEO proceeds should be used for the debt reduction and zero otherwise. *Use: Working capital* is a dummy variable that equals one if the SEO proceeds should be used for the strengthening of working capital and zero otherwise. *Use: Acquisition* is a dummy variable that equals one if the SEO proceeds should be used for M&A activities and zero otherwise. *All accounting variables below refer to the fiscal year prior to the SEO. Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms.

With regard to the performance relevance of different equity offering characteristics, the strengthening of working capital as the intended use of proceeds appears to be positively linked

to stock price reactions attributed to SEO announcements by UK firms, whereas a negative but insignificant relation can be stated for German companies. This result is in line with the prediction that due to Germany's lower investor protection, the potential benefits ascribed to a higher amount of liquid funds at the disposal of a firm's management can be offset by related agency concerns.[544] In addition, a negative and partially significant relation is apparent between debt reduction as the stated use of proceeds and CARs in both samples. This finding, which meets the previous expectation, can be ascribed to both the negative signal of debt reduction on management's perception about a firm's future financial situation and the fact that self-interested entrenched managers typically prefer lower leverage.[545] In the last empirical section of this thesis, the robustness of the IR measure used in this analysis is ascertained.

[544] cf. Mikkelson and Partch (2003), pp. 275, 277; Kalcheva and Lins (2007), p. 1087.
[545] cf. Masulis (1983), pp. 115, 125; Masulis and Korwar (1986), p. 93.; Berger et al. (1997), pp. 1411, 1414, 1436.

8 Robustness check

The practical relevance of Extel IR rankings as a measure of IR quality has been extensively discussed in chapter 4.1.2. Furthermore, hypothesis $H_{1.3}$ has been derived to empirically test the validity of the IR proxy. This hypothesis predicts that if IR rankings actually reflect the level of firms' IR quality, a better position in this ranking should be related to a lower head of IR turnover probability. Table 25 provides results regarding this prediction, relying on logistic regressions applied in the scope of the German sample. Analogous to other models used in this thesis, the regressions include industry, index, and year FE and firm characteristics. The coefficient on one-year lagged IR rankings is negative (-0.0243) and significant at the 5% level, which indicates that the probability of head of IR turnover is inversely related to IR quality in the preceding year. This statistically significant negative relation also remains present in specifications 2 and 3, which account for the previous occupation of former head of IR and actual CEO. Finally, to confirm the robustness of the previously ascertained link, specification 4 uses changes in IR rankings as explanatory variable. This analysis is based on the idea that the positive (less negative) difference between IR rankings in the last two years indicates an improvement (lesser decline) in a firm's IR quality—which should be related to a lower head of IR turnover probability. The negative (-0.0240) and significant (at the 10% level) coefficient on the changes in the IR ranking (i.e., Delta IR ranking) empirically confirms this expectation and substantiates the findings of models 1 to 3. In conclusion, it can be stated that hypothesis $H_{1.3}$ is supported by the present study's results and that the IR rankings applied in this thesis appear to be an appropriate proxy for a firm's IR quality.

Table 25: Results on the head of IR turnover

Head of IR turnover	(1) Logistic	(2) Logistic Alternative 1	(3) Logistic Alternative 2	(4) Logistic Alternative 3
IR ranking (lagged)	**-0.0243****	**-0.0214****	**-0.0243****	
	(-2.562)	**(-2.000)**	**(-2.565)**	
Delta IR ranking				**-0.0240***
				(-1.700)
Firm size	0.1359	0.2036	0.1309	0.2663
	(1.187)	(1.627)	(1.137)	(1.638)
ROE	-0.0444	-0.2954	-0.0261	0.2321
	(-0.065)	(-0.451)	(-0.038)	(0.311)
Leverage	-0.1066**	-0.0865	-0.1083**	-0.0089
	(-2.298)	(-1.547)	(-2.331)	(-0.095)
R&D intensity	3.5015	1.4928	3.3692	-1.6314
	(0.851)	(0.296)	(0.817)	(-0.239)
CapEx intensity	-1.3966	-2.0373	-0.7382	-1.7911
	(-0.509)	(-0.660)	(-0.241)	(-0.440)
IA intensity	1.4845*	1.8312**	1.5202*	2.1977*
	(1.777)	(2.021)	(1.772)	(1.953)
Sales growth	-0.0012	-0.0615	-0.0094	0.7218
	(-0.004)	(-0.155)	(-0.028)	(0.788)
US cross-listing	-0.1398	0.0858	-0.1477	-0.7633
	(-0.275)	(0.152)	(-0.292)	(-1.048)
Firm age	-0.0029	-0.0067	-0.0029	-0.0074
	(-0.535)	(-1.155)	(-0.537)	(-1.038)
Strategic holdings	0.3945	0.3371	0.3817	-0.5666
	(0.775)	(0.595)	(0.749)	(-0.854)
Head of IR analyst (lagged)		-0.2046		-0.8527*
		(-0.582)		(-1.882)
Financial expert CEO			0.0024	-0.1353
			(0.010)	(-0.379)
Year FE	**Yes**	**Yes**	**Yes**	**Yes**
Industry FE	**Yes**	**Yes**	**Yes**	**Yes**
Index FE	**Yes**	**Yes**	**Yes**	**Yes**
Observations	964	756	957	599
Pseudo R-squared	0.071	0.086	0.070	0.111

Robust test statistics are reported in parentheses.

***, **, * denote statistical significance at the 1%, 5%, and 10% level.

IR ranking (lagged) is obtained from the Extel survey referring to the preceding year and multiplied by minus one; as such, the higher (less negative) ranking indicates a better IR quality. *Delta IR ranking* measures the difference between the firm's IR rankings of the last two years. *Head of IR turnover* is a dummy variable that equals one in the case of a change of the head of IR and zero otherwise. *Firm size* is measured as the natural logarithm of the total value of assets reported on the balance sheet. *ROE* is defined as the ratio of the net income and the average shareholder's equity. *Leverage* is calculated as the sum of long- and short-term debt divided by the shareholder's equity. *R&D intensity* is measured as the ratio of the research and development expenses and the book value of total assets. *CapEx intensity* is defined as the ratio of the capital expenditures and the book value of total assets. *IA intensity* is calculated as the ratio of the intangible assets and the book value of total assets. *Sales growth* is the average sales growth for the last three fiscal years. *US cross-listing* is a dummy variable that equals one if the firm's stock is listed on the NYSE or NASDAQ and zero otherwise. *Firm age* is the number of years since the firm's IPO. *Strategic holdings* measure the percentage of the firm's issued shares held by other firms. *Financial expert CEO* is a dummy variable that equals one if the firm's CEO has a significant financial expertise and zero otherwise. *Head of IR analyst (lagged)* is a dummy variable that equals one if the (former) firm's head of IR was previously employed as analyst and zero otherwise.

9 Summary and conclusion

The empirical evidence on IR's economic relevance provided by previous studies is not fully consistent, which could be attributed to the differences in sample compositions, the origins of the investigated firms, and not least to endogeneity issues. The objective of the present thesis was to empirically investigate the relevance of IR in German and UK firms, which are subject to different legal and financial systems. By considering a broad panel dataset that covers a substantial part of the equity markets in two countries (one with a civil law and bank-based system, the other with a common law and market-based system), the present thesis contributes to a deeper understanding of differences in IR's impact on major corporate characteristics and outcomes. Furthermore, this empirical study relies on FE and IV regressions to alleviate endogeneity concerns and provide more clear-cut evidence. In addition to investigating the overall value relevance of IR quality and its impact on related value-generating channels, the present analysis is the first to shed light on IR's contribution to firm performance in the case of specific corporate events. The related hypotheses developed in the scope of this thesis have been widely supported by the empirical results, which are summarized below.

The analysis of the link between Tobin's Q and the IR rankings of sample firms has revealed a positive and economically substantial relation between firms' market performance and better IR quality in Germany and the UK that is still apparent after either deducing firm FE or applying different sets of instrumental variables. However, the magnitude of the IR effect differs in the two countries. In particular, the interaction analysis shows that better IR quality provides a significantly higher contribution to the market valuation of German firms compared to UK companies on average. This finding is in line with the expectation that higher levels of investor protection and private enforcement mechanisms, as elaborated by La Porta et al. (1998, 2000) and Djankov et al. (2008), as well as the general market characteristics applicable to common law and market-based system result in an already lower base level of information asymmetry in the UK—which in turn leaves less space for IR contribution. In addition, the results of this study provide insights into the specific channels through which IR can positively contribute to firm value. In the case of German companies, better IR quality is widely and significantly linked to lower equity capital costs, lower stock volatility, higher stock liquidity, higher analyst following, lesser dispersion of analysts' forecasts, and lower forecast error; however, the effects on stock volatility and liquidity appear to be of a lesser magnitude. The ascertained significant economic relevance of IR in Germany can be primarily attributed to the reduction of existing information

asymmetries and the enhancement of firm visibility among market participants. The findings on the aforementioned channels for UK firms diverge from those for the German market. While the relations between better IR and the cost of equity capital, stock volatility, and liquidity as well as forecast error have almost the expected signs, they appear to be mainly not significant. On the other hand, better IR quality is widely significantly associated with a lower forecast dispersion and higher analyst coverage, which is typically related to firm visibility. On average, the magnitude of these IR effects in the UK sample is significantly lower in comparison to in German firms, as indicated by the interaction analyses. Overall, the findings support the prediction of IR's lower economic relevance in the UK—particularly with regard to the alleviation of information asymmetry—due to that country's legal and market environment. The present analysis further provides evidence concerning whether IR quality matters in relation to M&As and SEOs conducted by German and UK firms.

To assess the relevance of IR in the scope of respective transaction and offering announcements, this thesis relies on abnormal stock returns as the performance measure. The analysis of M&As conducted by German firms provides strong evidence of a significantly positive link between better IR quality and abnormal announcement returns. The positive contribution of better IR to shareholder wealth can be attributed to reduced information asymmetries between German acquirers and investors concerning a deal's future benefits as well as its transaction conditions through more forthcoming communication and disclosure. Furthermore, IR activities can help acquiring firms to achieve better deal terms or attract new investors by taking advantage of increased market attention. On the other hand, no significant, systematic relation between IR quality and abnormal announcement returns has been identified for UK acquirers. This result, which is also supported by the significant cross-country differences identified in the scope of the interaction analysis, could again be primarily related to the higher base level of investor protection and disclosure in the UK compared to Germany, which diminishes IR contribution on average.

However, entirely different patterns have been identified for the relation between IR quality and announcement performance attributed to SEOs in both countries. While better IR quality in the UK sample is positively and significantly linked to abnormal announcement returns, a lack of a systematic relation has to be stated for German companies. The interaction analysis has substantiated these results by showing that IR's contribution to SEO performance in the UK sample is significantly higher compared to the German sample on average. This result can be

particularly attributed to the crucial role that equity financing plays for firms that are acting in a market-based system, which appears to be of a lesser magnitude in the case of a bank-based environment that is characterized by more pronounced debt financing. These elaborations are widely supported by descriptive statistics in the present thesis that indicate a larger debt component in the financing structures of German firms compared to UK companies as well as a smaller average size of SEOs for the German market. In consequence, greater importance of this specific event type in the UK could be related to a stronger effect of IR quality. In this regard, IR can contribute to SEO performance, for instance by alleviating concerns with regard to a firm's true value that arise due to an overvaluation signal potentially being sent to the market by a company's choice to issue equity or by clarifying the equity offering's purpose to reduce concerns regarding a firm's management using collected funds opportunistically. The contribution of IR to better conditions of equity offerings through stock marketing techniques can be seen as an additional value driver.

In summary, significant differences have been identified in this thesis with respect to the relevance of IR in the two markets investigated (i.e., Germany and the UK). These insights do not only contribute to the state of knowledge in the scientific literature; they also have implications for practitioners related to how their activities can contribute to corporate success on capital markets. As such, the findings could be helpful for organizing the (costly) IR function in a more efficient way, depending not least on the corresponding legal and market environment. Additional research on individual components of IR activities, such as one-to-one meetings between investors and IR officers, could further extend the understanding of this complex corporate function. Moreover, IR's relevance may differ not only between common and civil law countries; it may also vary within the legal families of civil law itself. As such, investigation and comparison of IR effects in countries in the French, Scandinavian, and German legal families could yield further valuable insights. Another interesting research question that was derived from the interviews with IR practitioners and could be addressed by future empirical studies deals with IR's contribution to a firm's shareholder base quality (i.e., an appropriate mix of long- and short-term investors). Finally, further research could be conducted on the relevance of IR quality in the case of other important corporate events that affect shareholder wealth, such as the introduction of share repurchase programs. In this context, the elaborations and findings in the present thesis suggest that legal and market factors as well as endogeneity issues should also be taken into

careful account in future research to ensure that the subsequent findings provide conclusive empirical evidence related to IR.

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