

# **The signaling role of investor relations and stock index membership**

Inaugural dissertation

submitted to attain the academic degree

doctor rerum politicarum

(Doktor der Wirtschaftswissenschaften)

at the

ESCP Europe Business School Berlin

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Berlin

2019

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Day of disputation: August 22, 2019

*To Anne – thank you for the numerous ways you show your love and support*

*And to my parents – who have always been there for me*

*This thesis would not have been possible without the mentoring and invaluable advice of  
Prof. Houdou Basse Mama*

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*(The three manuscripts and their appendices are paginated separately)*

## List of Abbreviations

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c.p.	ceteris paribus (all else equal)
CEO	Chief executive officer
CSR	Corporate social responsibility
DAX	Deutscher Aktienindex
et al.	et alii (and others)
e.g.	exempli gratia (for example)
FTSE	Financial Times Stock Exchange Index
IR	Investor relations
IRMA	Investor Relations Magazine
i.e.	id est (that is)
MAD	Market Abuse Directive
MAR	Market Abuse Regulation
p.	page
pp.	pages
R&D	Research and development
ROA	Return on assets
ROE	Return on equity
U.S.	United States (of America)

# 1 Introduction

The aim of this thesis is to test the validity of two potential signals that might convey information on the investment appeal of a firm: investor<sup>1</sup> relations (IR) activity and selection index membership. In the following work, investment appeal is approximated by two firm characteristics that are of paramount interest to the providers of capital: a firm's (risk-adjusted) return prospects and a proper level of investor protection. While the first forms the basis for finding profitable investments, the latter facilitates the translation of a firm's returns into investors' returns. Firms that show above average performance in both seem to be high-quality investments. In fact, the importance of these two attributes follows directly from the prevalent problems of information asymmetry, information uncertainty, and agency conflicts. Typical means to mitigate these problems and convey information about a firm's characteristics are disclosure and corporate governance. However, since these do not perfectly resolve the frictions mentioned above, additional signals for firm quality are worth investigating.

While the results of this thesis are of immediate interest to investors, the findings are also relevant for companies. Reliable signals can help a firm to differentiate itself in the market for public capital and attain a competitive advantage by convincingly communicating a firm's own investment appeal. The findings of this thesis are also of interest to researchers, as the determinants of the cross-section of returns are not fully uncovered. Lastly, the findings are also relevant to other stakeholders (e.g., financial intermediaries or regulators) since these can also benefit from processing information from the two signaling channels examined in this thesis.

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<sup>1</sup> For the sake of clarity, investors are referred to as males in this article, although the information here applies equally to male and female investors.

This thesis consists of three manuscripts that provide evidence for and against the validity of investor relations activity and stock index membership as signals of firm quality. First, the thesis examines the use of firm investor relations as an indicator of firm quality. This effect is tested through two concomitants of firm quality: insider trading behavior, as an indicator for investor protection; and future market valuations, as an indicator of a firm's operating performance. The first two manuscripts document a positive impact of investor relations on firm quality in terms of both characteristics. Investor relations is associated with lower insider trading profits, which are a measure for weak investor protection, since they can be considered unfair enrichment of firm insiders at the expense of shareholders. Also, jointly with an increased breadth and foreignness of the shareholder base, investor relations grants firms an operating advantage since it mitigates future financing constraints, which increases operating performance by enabling the firm to pursue more profitable investment opportunities. However, the signaling role of IR is not universal, since there is also evidence that managers might use IR in a self-serving way.

In contrast, the common belief that selection index membership has a signaling role for firm quality could not be fully attested to. Focusing on firm quality in terms of long term operating success, the third manuscript shows that firms that are included in a German selection index show a poorer long-term performance than firms that exit a corresponding index. Collectively, the three manuscripts document that investors, as well as firms, should pay careful attention to the signaling role of investor relations and index membership for firm quality. While against common belief, selection index membership shows no clear association with firm quality; a signaling role can be attributed to investor relations. This motivates increased investor and firm attention on this boundary-spanning function.



## **2 The firm from an investor's perspective**

### **2.1 Firm quality**

In the market for public capital, firms are widely heterogeneous. Assuming a wealth-maximizing shareholder, two firm properties are of paramount interest to an investor: the firm's return prospects and its investor protection. First, the return prospects (e.g., McGuire et al. 1990) of a firm form the basis for future shareholder returns and are based on profitable investment opportunities of the firm. Thus, the decision of an investor to invest in a stock depends on his individual valuation of the firm's prospects. Second, even if a firm faces such profitable investment opportunities, a shareholder can profit from this only in an environment with sufficient investor protection (e.g., Giannetti and Koskinen 2010). Otherwise, these returns are not fully returned to the provider of capital, but rather might be spent on managerial self-serving behavior. The basic rules for investor protection are set by the legal environment and foster the development of a financial market. La Porta et al. (2002, p. 1147) argue that investors "recognize that, with better legal protection, more of the firm's profits would come back to them as interest or dividends as opposed to being expropriated by the entrepreneur who controls the firm". Consequently, investors are willing to pay higher prices for financial assets with better investor protection (e.g., Cremers and Ferrell 2014), enabling entrepreneurs that are committed to shareholder rights to better finance their investments externally. Apart from differing legal frameworks, there are significant differences of investor protection between individual firms. Through the channel of better access to finance, superior investor protection can even be a competitive advantage.

A firm's return prospects and its investor protection correspond to three basic problems of efficient capital allocation in a market: information asymmetry, information uncertainty and agency conflicts. The resulting market frictions are costly for the firm as well as the

investor. While investors and entrepreneurs would like to do business with each other, Healy and Palepu (2001, p. 407) explain that there are at least two reasons that complicate the matching of savings to business investment opportunities. First, an “information problem”. entrepreneurs have superior information on the value of their investment opportunities and incentives to overstate it. Second, an “agency problem”. After receiving an investment, there is incentive for entrepreneurs to expropriate the investor.

## **2.2 Information asymmetry, information uncertainty, and agency conflicts**

Most markets are characterized by informational gaps between the participants. Beginning in the 1970s, microeconomic theory started to formalize this concept and its consequences. These works culminated in the award of the Prize in Economic Sciences in Memory of Alfred Nobel, 2001, for Stieglitz, Akerlof, and Spence. In the setting of an investor’s capital allocation, information asymmetry is connected to the first firm quality property, namely return prospects. Information asymmetry reflects the fact that the investor has less accurate information about a firm’s investment opportunities and the resulting return prospects. In fact, managers even have incentives to exploit these informational gaps (e.g., Aboody and Lev 2000). In such a setting, information asymmetry has a series of negative implications. It leads to a higher cost of capital for all firms in a capital market (since investors require higher risk premia due to the uncertainty), which decreases profitability and leads firms to forego profitable investment opportunities, leading to reduced economic growth. Another negative consequence is adverse selection, as described by Akerlof’s (1970) “lemons problem”, which is particularly severe for firms with high profitability, since they face the risk of being priced too low if investors face uncertainty about the firms’ profitability. (Beyer et al. 2010). Through this channel, information asymmetry can lead to a market breakdown (Akerlof 1970) and even to a total stock market failure (Floros et al. 2018).

Information uncertainty reflects the limited ability of investors to correctly process and interpret given information. In contrast to information asymmetry, the information is available, but still outsiders are not able to efficiently process it and fully capture its implications for firm value (Zhang 2006; Jiang et al. 2005).

Based on information asymmetry and uncertainty, and related to investor protection, are agency conflicts. These conflicts are a direct consequence of the separation of ownership and control and the diverging interests of principals and agents (Jensen and Meckling 1976; Hill and Jones 1992). The possible occurrences of these conflicts are manifold. Shleifer and Vishny (1997) list the following examples of self-dealing behavior: executive perquisites, excessive compensation, transfer pricing, appropriation of corporate opportunities, self-serving financial transactions such as directed equity issuance or personal loans to insiders, and outright theft of corporate assets. Another vivid example of harmful agency conflicts is empire building by managers, leading to a non-optimal firm size (Hope and Thomas 2008). On a different note, Amihud and Lev (1981) document that manager-controlled firms engage more often in conglomerate mergers, which are not beneficial to stockholders, to reduce their own unemployment risk. However, Fama and Jensen (1983) argue that separating ownership and control offers the benefits of specialization, and is advisable if there are accompanying mechanisms to control the arising agency problems.

The incurred agency costs, consisting of monitoring expenditures, bonding expenditures, and residual loss (according to Jensen and Meckling 1976), reduce the profits of an investment. To offset this loss, investors require a higher risk premium in the context of higher expected agency conflicts. These costs are even exacerbated by eroding trust, when investors observe self-serving management behavior. For instance, Stulz (1990) argues that in the absence of appropriate financing policies, investors' welfare is reduced through the agency costs of managerial discretion, based on under- or overinvestment.

### **2.3 Disclosure and governance**

To resolve the problems of information asymmetry, information uncertainty, and agency conflicts, firms as well as investors usually resort to disclosure and governance. The following section details how both work and why they are not sufficient to overcome the prevailing problems. Management uses disclosure to inform investors on firm performance and investor protection. In fact, several researchers argue that it is a direct consequence of the problems of information asymmetry and agency conflicts (e.g., Healy and Palepu 2001). Similarly, Beyer et al. (2010, p. 296) explain that disclosure “plays two important roles in market-based economies. First, it allows capital providers (shareholders and creditors) to evaluate the return potential of investment opportunities (the ex-ante or valuation role of accounting information). Second, accounting information allows capital providers to monitor the use of their capital, once committed (the ex-post or stewardship role of accounting information)”.

Disclosure is a means to mitigate information asymmetry and uncertainty, since it reduces the informational gaps between managers and investors through regulated reports and filings as well as voluntary publication of information. Empirical evidence for this is presented by Brown and Hillegeist (2007), who show how disclosure quality effects information asymmetry through a reduction of the amount of private information. This result is also supported by Eleswarapu et al. (2004), who show that information asymmetry has declined after the U.S. Regulation Fair Disclosure was enacted. However, disclosure is not enough to overcome the problems of information asymmetry and information uncertainty for at least two reasons: (i) some information cannot be perfectly disclosed (ii) disclosure does not guarantee effective assimilation and interpretation of the disclosed information by the investors.

First, and in conflict with the accounting principle of “full disclosure”, some information within a firm is difficult (sometimes even impossible) to disclose. Information on research and development (R&D) provide an illustration of two reasons why this is so difficult. Since investments in R&D are by nature unique to a specific firm, it is challenging to communicate their full implications for value to an outsider, who only has limited reference points to understand this information (e.g., Aboody and Lev 2000). Also, a certain level of information asymmetry arising from R&D needs to be maintained, since it constitutes a firm’s competitive advantage. Thus, the firm’s interest to protect proprietary data poses a limit to efforts of transparency. Due to the high potential for imitation, revealing too much information on a firm’s innovation could come at a substantial cost (Hall 2002; Brown and Martinsson 2018).

Second, even if disclosure makes firm information available, it only has limited impact on the ability of outsiders to efficiently assimilate and interpret this information. Investors face a vast amount of information and have only limited attention and processing power (Hirshleifer and Teoh 2003). Also, the established financial reporting models might not be fit to timely capture the increased pace of a global economy (Healy and Palepu 2001), leaving a residual uncertainty.

Disclosure not only affects information asymmetry, but also addresses agency conflicts by acting as a monitoring mechanism that disciplines managers. On a negative side, Hope and Thomas (2008) studied international firm operations and found evidence that an absence of appropriate disclosure encourages value-decreasing empire building. However, investors should also be cautious regarding disclosure, since there is also evidence for management’s strategic use of (discretionary) disclosure, for instance to “hype the stock” around equity offerings (Lang and Lundholm 2000, p. 626).

Corporate governance is designed as a mitigation device for the agency problem in the sense that it is a way for investors to protect their returns (e.g., Shleifer and Vishny 1997). On a country-level, “governance mechanisms include a country’s laws, its culture and norms, and the institutions that enforce the laws” (Aggarwal et al. 2010, p. 3131). Effective corporate governance on a firm-level is primarily executed through a capable board of directors that is aligned with the investor’s interests (Kosnik 1987). Consequently, some board characteristics (such as presence of management’s family members or reciprocity arrangements between directors and executives) reduce its effectiveness in protecting shareholders’ interests.

Investors indeed perceive governance as a channel to exercise control on the firm. For instance, Karpoff et al. (1996) show that firms which attract shareholder-initiated proxy proposals on corporate governance suffer from poor prior performance. Also, Leuz et al. (2010) show that foreign investors avoid firms with problematic governance structures (i.e., high insider control, origination in countries with weak institutions). But eventually the level of governance is by choice of the firm, and Dey (2008) finds that firms that face a higher level of agency conflicts also employ better governance structures. Researchers and practitioners are vocal about the positive effects of governance, and document e.g., that corporate governance reduces the cost of capital of a firm. This reduction works through multiple channels, like reduced agency cost (Ang et al. 2000), increased stock liquidity (Daily et al. 2003) or lower cost of debt (Ashbaugh-Skaife et al. 2006).

However, governance alone is not sufficient to overcome agency problems and warrant firm quality. Brickley and Zimmerman (2010) point out that there are several misconceptions regarding corporate governance that make it difficult to use it as a signal for firm quality. They claim that it is impossible to categorize the quality of corporate governance and even deduce best practices. This line of thought is supported by Armstrong et al. (2010, p. 228), who claim that there is “very little evidence on which governance structures are most efficient

for mitigating the various types of agency problems among managers, directors, and shareholders”. A vivid example for this ambiguity is provided by Donaldson and Davis (1991), who find that CEO duality (i.e., the CEO acting also as chairman of the board), which is generally considered a sign of bad governance, in fact increases the return on equity (ROE) to shareholders, due to removed role ambiguities and higher executive power, according to the stewardship theory as presented by Donaldson (1990).

## **2.4 Signaling**

Since disclosure and governance do not perfectly mitigate the issues of information asymmetry, information uncertainty, and agency conflicts, this thesis studies additional means of information available to an investor. The firm quality properties (in this case return prospects and investor protection) are not directly observable to investors. Thus, investors try to base their investment decision on additional information available to them. Since this additional observable information is often alterable by the firm, this setting qualifies as a classic signaling situation. In fact, it shows the four “elements of commonality in [signaling] situations” as described by Spence (1974, p. 297), for “markets and marketlike situations”<sup>2</sup>: (i) informational gap between a firm and investors, (ii) investors have limited knowledge on the firm’s risk-return prospects, (iii) investors respond to signals emitted by the firm, and (iv) the firm knows or anticipates the investors’ reaction to the signal.

Signaling theory gained influence in the 1970s, with Spence (1973) proposing it in a study on labor market inefficiencies. In the following years, signaling has been used in different contexts of information asymmetry. As Verrecchia (1983, p. 180) summarizes, “the idea that the possessor of superior information or insight will signal what he knows either directly or through his actions to achieve some economic benefit has been studied by a

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<sup>2</sup> In the setting at hand the firm sells stocks to an investor, who represents the buyer in this market.

number of economists in a variety of institutional settings”. Examples include Ross (1977) using it to justify voluntary disclosure, and Vermaelen (1981) finding that firms repurchase shares to signal undervaluation.

A signaling model (examples of the job market setting according to Spence (1974) are provided in brackets) comprises ex-ante unobservable basic attributes that lead to the expression of specific qualities of a “product” (e.g., a worker’s unobservable individual productivity, depending on his or her natural ability). The less informed party now uses observable signals, with the belief that they reflect the unobservable attribute. Consequently, the external party bases its decisions on a belief that the signal indicates a desired quality (the employer refers to a candidate’s education to assess the likelihood that she will have high productivity). For such a signal to be suitable, this underlying belief must be justified. This can be achieved, for example, through signals that have differential cost based on the underlying attributes (obtaining education is costlier for a candidate with lower natural ability). Knowing that signaling is hard to test empirically (Levy and Lazarovich-Porat 1995), this thesis does not claim to show a signaling equilibrium. The manuscripts test whether the underlying belief is empirically justified for two signals: investor relations and selection index membership. After a short motivation for these two signals below, a detailed study of their signaling role is deferred to the following chapter.

According to the National Investor Relations Institute (NIRI 2017), investor relations (IR) “is a strategic management responsibility that [...] enable[s] 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”. Investors value a firm’s investor relations efforts as a window to the capital market. Penning (2011, p. 627) shows that investors value investor relations to satisfy their need for information and describes IR even as the “most useful source of information about management”. But the



attention of investors is not only directed at the financial information transmitted through IR. For instance, IR is one of the most important non-financial factors in the formation of a company's image among equity analysts (Hoffmann and Fieseler 2012). Also, investors seem to be more interested in the direct access to management offered by IR, than in increased disclosure (Bushee and Miller 2012). Finally, the finding that high quality investor relations work is able to expand a firm's investor base (e.g., Kirk and Vincent 2014 and Bushee and Miller 2012) and analyst coverage (Brennan and Tamarowski 2000), attests to the fact that investors and analysts value the quality of a firm's IR beyond the underlying information.

For companies, IR is a means to “distinguish themselves and create a competitive advantage” as well as “rebuild investor confidence” (Allen 2002, p. 206; Dolphin 2004). Also, IR increases visibility among the financial community. Amir-Aslani et al. (2016, p. 4) claim that IR has “become a process of capturing attention by conveying information faster, better, more clearly than ever before”. The quality of IR can be set by the firm. The allocated IR budget, the extent of hiring high-quality staff, training, as well as managerial effort and attention show that IR quality is indeed a costly signal, determined by the firm. Firms' interest in the effectiveness of their IR as a signal is underlined by the fact that “Investor perception studies” and “Feedback from the financial community” are among the top-ranked evaluation criteria of IROs (Ragas and Laskin 2014, p. 173).

Selection index membership is regularly recommended as a second signal for firm attractiveness in the financial press. The usual argument is that an index addition increases the demand for a stock, particularly by funds that track indices (e.g., Frankfurter Allgemeine Sonntagszeitung 2016). Among the alleged positive long-term effects are increased liquidity (e.g., Frankfurter Allgemeine Zeitung 2016) as well as operating benefits for the firm. The Süddeutsche Zeitung (2018) explains: “The DAX ennobles a company, it is good for the image of the company and its board. The index members face a broader public interest and

also find more consideration internationally. DAX bosses have more influence and faster access to politics. Investors looking for investment opportunities are particularly interested in these firms and index-tracking funds have to buy their shares” (unofficial translation by the author). The purest use of index membership as a signal is, in fact, the capital allocation by index tracking funds, where index membership is the main selection criteria for an investment. As of January 2018 (forecast), assets under management of such index products account for more than 4.2 trillion U.S. dollars with a compound annual growth rate of more than 20% in the last 10 years (own computation from Deutsche Bank AG 2017 and EY 2017).

Admittedly, index membership is only a choice by the firm to a limited extent. However, several firms claim that index membership is a strategic goal and that they are actively trying to fulfill the necessary conditions. For instance, German automotive supplier *HELLA* notes in the annual report 2014/2015 that the “increase of the free float [...] marks yet another milestone for *HELLA* on the path to its mid-term goal of being admitted to the MDAX” (HELLA 2015). In addition, Helmut Schmale, CFO of the German process technology company *GEA Group AG* states that his “dream is the promotion to the DAX” (Börsenzeitung 2010), when asked what his goals are. Udo Müller, CEO of *Ströer SE* comments after increasing the free-float market capitalization by 30%: “We are delighted that we selected an appropriate time and scope for our stock placement, which allowed Ströer to be accepted onto the MDAX on a fast-entry basis” (STRÖER 2015). The efforts of German solar park and windfarm investor *Capital Stage* to acquire their competitor *CHORUS* are a recent and similar example. The management argues for the “common goal to grow in operations and create the opportunity to be included in the MDAX” after the acquisition (Capital Stage 2016).

Managers are also vocal about the positive capital market effects associated with index membership. For instance, Wolfgang Schäfer, CFO of *Continental*, predicts that the re-entry

of *Continental* into the DAX will lead to increased demand for its stocks, due to purchases by index-tracking funds (Frankfurter Allgemeine Zeitung 2012). Collectively, this evidence justifies the consideration of stock index membership as a signal for firm quality.

There are several other potential signals for firm quality, which are beyond the scope of this thesis. Prominent examples include corporate social responsibility (CSR) (Milgrom and Roberts 1986; Akpinar et al. 2008), corporate reputation (Roberts and Dowling 2002; Tirole 1996), and certification (Kisgen 2006). While stock index membership can also be interpreted as a kind of certification, the most important capital-market relevant certification a firm attains is its credit rating. Examples for financial means for signaling include IPO underpricing (Allen and Faulhaber 1989) and the commitment to cash outflows (Ravid and Sarig 1991). In addition, very specific firm characteristics can be used as a signal; examples include a firm's innovative capabilities (Basse Mama 2018) or the presence of strategic alliances (Nicholson et al. 2002).

### **3 Description of research manuscripts**

The core of this thesis are three manuscripts. The first manuscript “The multifaceted role of a firm’s commitment to high-quality investor relations in constraining insider trading” and second manuscript “Future market valuations: The joint influence of a firm’s investor relations and investor base” examine whether the belief in investor relations as a signal for firm quality is justified. The first manuscript uses insider trading as an indicator for poor investor protection and documents the effect of investor relations on insider trading. The second manuscript shows that firms attain a higher valuation if they show superior investor relations and certain characteristics of the shareholder base. The third manuscript “What’s in the news? The ambiguity of the information content of index reconstitutions in Germany” tests whether the belief in selection index membership as an indicator for future firm performance is justified. The sections below provide the relevant context on investor relations, selection indices, as well as insider trading and a firm’s shareholder base.

#### **3.1 The signaling role of investor relations**

As a “strategic management function” (NIRI 2017), investor relations (IR) is a two-way flow of information between a company and its target audience: current and potential shareholders as well as information intermediaries (i.e., analysts and the press).<sup>3</sup> Managing the interface between a firm and the capital market results in at least three tasks: First, IR sets a firm’s disclosure policy to fulfil the capital markets informational needs by providing timely and reliable information. Second, IR builds credibility of and support for the management’s vision and strategy (Brennan and Tamarowski 2000). Lastly, IR not only disseminates financial firm information but grants the capital market access to management and empowers

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<sup>3</sup> IR even plays an increasingly important role in communicating with fixed income investors (Lowis and Streuer) or credit rating agencies (Griep 2004).

the shareholder with a voice within the company. To fulfill these tasks, modern IR “integrates finance, communication, marketing and securities law compliance” (NIRI 2017).

IR aims to reach the following strategic goals for the company: First, shareholder diversification and an increase in the shareholder base. In particular, attracting new (institutional) shareholders is a goal for IR. For instance, a report of BNY Mellon (2012) states that IR is increasingly targeting sovereign wealth funds as potential long-term investors. Second, an overall increase in the firm’s visibility, which is mostly achieved through attracting more analysts and increasing coverage by other information intermediaries (e.g., financial press). Lastly, IR seeks to gain the trust of the capital market, which comprises securities law compliance. Consequently, IR does not pursue a short-term price optimization, but aims at a fair capital market valuation through reduction of informational frictions and an improvement of liquidity which also leads to a reduced cost of capital for the company.

To fulfill its tasks and reach the goals above, IR engages in various activities. In addition to the mandatory financial reporting, disclosure requirements and shareholders’ meetings, IR uses other formats such as roadshows, investor conferences, and analyst meetings. Especially important are one-on-one meetings with the firm’s management. For instance, de Jong et al. (2007) provide an example of a firm’s successful IR strategy, which allowed executives to spend three weeks on investor meetings each year. All these are complemented by online activities, as documented by Hoffmann et al. (2018). Examples of digital instruments used include IR websites (97%), webchats (66%), and Social Media (22%)<sup>4</sup>.

Since the effects of disclosure have been widely studied, it is crucial to note that IR is more than disclosure. In a global survey, 51% of 817 companies did not rank effective disclosure among their top three IR priorities (BNY Mellon 2012). Bushee and Miller (2012)

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<sup>4</sup> The percentage in brackets reflects the fraction of companies in the report which employ these instruments.

document that the key driver of successful IR is “direct access to management, rather than increased disclosure”. The two-way communication character is unique to IR and attests to the growing demand of shareholders for a dialogue on firms’ long-term perspectives. Moreover, Chapman et al. (2018) claim that pure disclosure is not sufficient for investors and analysts to assess the impact of the provided information on firm value. The same authors show that IR teams indeed facilitate information assimilation by the market and that firms with (experienced) IR officers have lower price volatility as well as lower forecast dispersion and higher forecast accuracy. Thus, IR plays a unique role that exceeds disclosure.

While the growth of IR in practice attests to its usefulness to firms, scientific evidence for IR effects is rather limited.<sup>5</sup> Brennan and Tamarowski (2000) show that IR reduces analysts’ cost of information, thereby attracting more analysts and leading to more accurate forecasts. The increased analyst following reduces information asymmetry, thus leading to more liquidity, resulting in reduced cost of capital and increased stock prices. In addition to confirming an increased analyst following, higher liquidity and valuation, Kirk and Vincent (2014) also document an increase in voluntary disclosures and higher institutional ownership for firms with more professional IR.

However, the role of IR in a firm is at least partly ambiguous. There is the evidence for a strategic use of IR by insider Hong and Huang (2005, p. 1) who observe that “managements (“insiders”) of many corporations, especially small or newly-public firms, invest considerable resources in investor relations” and find that “insiders may undertake such investments not necessarily to improve the share price, but to enhance the liquidity of their block of shares”. This is indeed self-serving behavior, since the cost of IR is borne by all shareholders, while insiders, as large block-holders, reap a relatively higher proportion of the benefits of increased liquidity. Similar self-serving motives are implied by Chahine et al. (2017) in the setting of an

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<sup>5</sup> See Bassen et al. (2010) for a comprehensive overview.

IPO. Additionally, Basse Mama and Kotchoni (2017) observe that high-quality IR may widen the information asymmetry among traders potentially stemming from private meetings of management with a select group of investors.

The first manuscript tests the impact of IR on insider trading, where a low level of insider trading is a sign of a firm's commitment to shareholder rights. If high-quality IR reduces insider trading, then the belief in IR as a signal for good investor protection is justified. In the European Union, insider trading is illegal under the Market Abuse Regulation (MAR) (European Parliament 2014), which has been directly applicable since July 2016 and aims to increase investor confidence and market integrity. For the sake of this study and in line with the data we use, we rely on the definition of insider trading from the preceding legal framework provided by the Market Abuse Directive (MAD) from 2003.<sup>6</sup> Both regulatory regimes rely on the concept of *inside information*, which is private "information of precise nature [...] relating to one or more [...] financial instruments and which, if it were made public would be likely to have a significant effect on the prices of those financial instruments" (European Parliament 2003, p. 17). Any trade based on such inside information is considered a criminal offence. Consequently, an insider must not necessarily be a member of the firm's management team. Apart from the obvious straw men, a tippee can even be a large shareholder (Maug 2002).

While insider trading is illegal in most capital markets, the exact definitions, the penalties, and the level of enforcement vary substantially across jurisdictions (Thompson 2013). Bainbridge (1998) summarizes that the arguments in favor of such regulation of insider trading are traditionally based on (i) fairness considerations or (ii) property rights in information. The self-serving behavior of insiders to generate returns at the expense of other

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<sup>6</sup> The new regulation extends the MAD to new instruments and platforms. Furthermore, it grants more investigative and sanctioning power to regulators.

shareholders constitutes an unfair exploitation of an informational advantage. While these arguments “have had little traction in the law and economics community” (Bainbridge 1998 p. 2), the second consideration is quite a bit stronger. The use of inside information can be considered theft of corporate property, which is harmful to the security issuer. The European Parliament (2003, p. 16) argues that insider trading harms market integrity and investor confidence, which “are prerequisites for economic growth and wealth”. Several studies support this perspective and find, for instance, that insider trading leads to a higher cost of equity (Bhattacharya and Daouk 2002) or discouraged corporate investment, and reduction of the overall economic efficiency (Manove 1989).

Still, whether insider trading should be combated at all is controversial.<sup>7</sup> The suggested positive effects of insider trading include faster price discovery, thus, more informative prices (Meulbroek 1992). However, this is a rather weak argument: Aktas et al. (2007 p. 1391) argue that this effect might not outweigh the “price paid by uninformed agents”, especially since disclosure requirements could also contribute to market efficiency. As an additional argument, Manne (1966) suggests that insider trading might be a compensation for the information production by managers (Bainbridge 1998). And while other studies show that outsiders can profitably apply strategies that follow insiders’ trading movements (Giamouridis et al. 2008) their returns are still inferior to the insiders’ returns. Despite these conflicting views, regulators are committed to combating insider trading, as illustrated by the recent changes in the EU extending the regulation from a 10-page document in 2003 to 61 pages today.

Insiders are not completely prohibited from trading stocks they potentially have information about, leading to the distinction between illegal insider trading and the legal *directors dealing*. As a protective measure, information on directors’ dealings of management and their relatives need to be published. While these transactions are not illegal, studies still

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<sup>7</sup> Bhattacharya (2014) provides an overview on this ongoing debate.



document higher profits to directors' dealings transactions (Ravina and Sapienza 2010) than the market returns. Given the position of the trader, an informational advantage is not surprising. This raises the moral issue again, even if there is no specific inside information involved. In addition to higher insider returns, researchers also found that insiders take self-serving actions that are potentially harmful to the company while trying to optimize their trading profits. These actions include the timing of voluntary disclosures (Cheng and Lo 2006) as well as earnings management (Sawicki and Shrestha 2008, 2014) around trade dates. Thus, companies with a high extent of (legal) directors' dealings still face a risk of negative investor sentiment.

The first manuscript uses insider trading as an example of managerial opportunism at the expense of the shareholder. Weak investor protection due to insider trading is in line with the view of insider trading as "unfair expropriation of uninformed investors" (Gao et al. 2014, p. 149). Moreover, Batten et al. (2018, p. 779), claim in the context of insider trading that "compliance cannot replace ethics". Thus, insider trading is not simply a product of misaligned firm policies, but a valid indicator of the lack of the management's commitment to shareholder rights. In the signaling context, this is the underlying unobservable property of interest to the investor, for which IR serves as a signal, if it reduces insider trading.

The second manuscript tests whether superior IR is associated with higher future valuation. If so, it would be a suitable signal for positive return prospects of a firm. The suggested channel through which such an association is transmitted is the breadth and foreignness of a firm's investor base. The primary audience of IR are investors and their intermediaries. Accordingly, recent reports on IR (e.g., IRMA 2016; BNY Mellon 2012) highlight that the primary goals of IR revolve around the investor base. In fact, its breadth and the foreignness are two major dimensions companies seek to extend. Considering the amount of corporate resources allocated to achieving these targets of IR, it is crucial to present

evidence, if IR is indeed effective in doing so. Also, it needs to be discussed whether achieving such diversification benefits the company. To this end, the second manuscript uses the hypothesis that a broader and more international investor base and higher-quality IR jointly lead to higher future market valuations.

This hypothesis is connected to previous research in two ways. First, Merton's (1987) market segmentation hypothesis claims that increasing the shareholder base makes more investors aware of a stock and leads to better risk sharing, lower cost of capital, and, eventually, higher market valuations. The market segmentation hypothesis (Errunza and Losq 1985), on the other hand, proposes that global markets are not perfectly integrated and thus there is potential for improved risk-sharing through an international investor base. This would also translate into higher future valuations.

The main hypothesis of Manuscript 2 seeks to uncover a link between the return prospects of a firm and the quality of its investor relations through changes in the investor base. Interestingly, there is also a connection to the protection of shareholder rights forming a link to the results of the first manuscript. For IR to have an impact on valuation through the shareholder base, a firm needs to be truly committed to shareholder rights.

### **3.2 The signaling role of stock index membership**

The membership in an equity selection index is often also interpreted<sup>8</sup> as a signal of firm quality. Since a technical prerequisite of index membership is the fulfillment of the reporting requirements of the relevant stock exchange segment, membership is clearly an indicator for a certain standard of transparency. However, there is no difference in transparency requirements between index and non-index members that are listed in the same stock market segment. Hence, in terms of transparency, stock index membership is simply a fragment of the signal of

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<sup>8</sup> Section 2.4. presents examples for such an interpretation.

being listed. In terms of a firm's return prospects, stock index membership plays a different role. In fact, the members in a country's top selection index are the most visible firms, and becoming part of this group is often seen as a positive signal. While a short-term price run-up of index additions is well documented (e.g., Chen et al. 2004; Zhou 2011), index membership is also supposed to carry long-term information about a company's return prospects. For instance, Cai (2007, p. 115) summarizes: "[...] the combined evidence suggests that the S&P 500 index additions convey favorable information about the added stock and its industry". And Brisker et al. (2013, p. 1787) explain the observable reduction of cash holdings of added firms with these firms "becoming more visible, less uncertain, and less constrained to raise cheap external capital."

Similarly, exclusion from this select group carries a negative connotation. For instance, the exclusion of *Deutsche Bank AG* from the Euro Stoxx 50 was interpreted by Handelsblatt (2018) as a reputational damage and loss of attractiveness. Thus, the third manuscript offers a detailed analysis of the long-run operating performance of firms after a change in their index membership status to test the underlying belief that index membership can convey information on positive return prospects.

An equity selection index is a "capitalization-weighted average of a specific and relatively static list of securities" (Lo 2016, p. 21).<sup>9</sup> The composition of this list is determined based on a set of transparent criteria such as rankings in market-capitalization, free-float liquidity, and formal requirements (e.g., country of incorporation or membership in a specific stock exchange listing segment). The major and original function of indices is to present aggregate information on stock market developments. For instance, the S&P 500 is computed from the stock prices of the 500 leading U.S. companies, which contribute approximately 80%

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<sup>9</sup> While there are also other weighting schemes, as illustrated by the most prominent equally-weighted Dow Jones index, Lo (2016) refers to this as the standard definition.

of the total U.S. market capitalization.<sup>10</sup> Apart from this original function, indices are also used “as a benchmark for performance evaluation, attribution, and enhancements” as well as “to construct passive investment vehicles and as building blocks for portfolio management” (Lo 2016, p. 21). There is also a link between index performance and investor attention (e.g., Vozlyublennaiia 2014), and the investment volume linked to indices is more than 4.2 trillion U.S. dollars (Deutsche Bank AG 2017) and attests to the economic relevance of indices.

The Dow Jones Industrial Average, created in 1884, is considered the first equity index of relevance. In contrast to most modern indices, it is equally-weighted. Today, there are indices for a multitude of regions, industries, and strategies. For many countries, the index providers offer a hierarchy of indices to cover large-, mid-, and small-cap firms. The focus of the third research manuscript is the German Prime Standard selection indices DAX, MDAX, SDAX and TecDAX, which are created by *Deutsche Börse AG*.<sup>11</sup> The criteria for index selection comprise formal factors<sup>12</sup> and a ranking of market capitalization and order book volume. (Deutsche Börse AG 2018a). The DAX contains the 30 largest and most actively traded companies and has been computed since 1988. The MDAX comprises 50 mid-cap issues from traditional sectors that rank below the DAX. The SDAX comprises the next 50 issues from traditional sectors and is ranked below the MDAX. The TecDAX tracks the 30 largest and most liquid issues from technology sectors beneath the DAX.

To uncover the effect of index membership, researchers focus on companies that are newly included or deleted from an index. Such index changes are usually triggered by a

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<sup>10</sup> <https://us.spindices.com/indices/equity/sp-500> (Accessed August 18, 2018)

<sup>11</sup> In September 2018, Deutsche Börse AG (2018b) announced two major changes to the DAX index family. First, the different treatment of the traditional and technology sector was unified, DAX companies can now also become member of the TecDAX and TecDAX companies can now also be members of SDAX and MDAX. Second, the size of MDAX was increased to 60 and the size of SDAX was increased to 70 companies. While leaving the basic mechanics of the index landscape untouched, this results in a more streamlined hierarchy of DAX/MDAX/SDAX that covers stocks from all segments.

<sup>12</sup> The indices are open to companies with legal headquarters in Germany. If the legal headquarters is in the European Union or in an EFTA state, a company can still be included if its operating headquarters is in Germany and a major share of its stock exchange turnover happens at the Frankfurt Stock Exchange.

change in the underlying (free-float market-capitalization and liquidity) rankings. Previous studies attest to multiple effects of index changes, and Cooper and Woglom (2002, p. 2) summarize that “the key puzzle in this literature is to explain [the] pattern of abnormal returns and its relationship to the efficient markets hypothesis (EMH)”, which is either done through trading or fundamental effects. Using the event-study methodology (see e.g., Binder 1998 for an overview), several researchers attest to a positive (negative) short-term stock price reaction to an index addition (deletion) (Jain 1987; Shleifer 1986; Harris and Gurel 1986). The cumulative abnormal excess returns of the index change event are usually significant in the low percentage point range for a month after the event and there is a partial reversal within the next months. This observation is usually explained by increased demand from index-tracking funds and the price pressure hypothesis, which explains negative price reactions following a deletion: “when the size of the trade is large [...], there is a belief that the price of the stock must fall to induce investors to purchase these additional shares” (Scholes 1972, p. 180). Harris and Gurel (1986) find an immediate price increase after an addition that is nearly fully reversed after 2 weeks, which they interpret as evidence for the PPH.

A long-term price performance effect is consistent with the hypothesis of downward sloping demand curves. Since addition to the index generates demand from index funds that is not driven by information, an increase of price points to downward sloping demand curves. An alternative explanation for the long-term price increase is the information hypothesis, stating that an offer to buy a large block may signal good news about the stock, thus entailing a price increase (Shleifer 1986). On a different note, Hedge and McDermott (2003, p.413) find that index additions are associated with a “sustained increase in liquidity” due to lower transaction costs and reduced information asymmetry.

Research manuscript 3 examines the effects of index membership in Germany, and specifically addresses the question of whether the previously documented price effects of

index reconstitutions can be confirmed in the setting DAX-index hierarchy. The manuscript also explores if such market reactions are different for different types of index changes within the hierarchy (e.g., promotions/demotions between indices of varying prestige or outright entries/exits). To do so, the manuscript follows the classic event-study methodology (e.g., Binder 1998). Eventually, reasons for variations in the long-term returns between these differing events are presented. In addressing the questions above, the manuscript helps to assess the viability of stock-index membership as a signal for a firm's return prospects and, ultimately, firm quality.

There are two other relevant studies concerning index effects in the German capital market: Gerke et al. (2001), who use a sample of 26 additions and 24 deletions to the DAX to show for additions positive abnormal returns building up before the announcement date that are persistent until after the effective date and negative abnormal returns for deletions. In a similar study for the second-tier index, MDAX, Gerke and Fleischer (2003) also find positive (negative) abnormal returns for additions (deletions). However, both these studies were conducted before a major reorganization of the German index landscape in 2003. Also, while previous studies have mostly focused on additions and treated deletions as a mirrored effect, recent studies document asymmetric price reactions (Chan et al. 2013; Zhou 2011; Biktimirov and Li 2014), which also motivates the subsection of additions and deletions to differential treatment in the third research manuscript.

### **3.3 Data and methodology**

Manuscript 1 and Manuscript 2 use a measure for IR quality based on a questionnaire of the Investor Relations Magazine (IRMA). The ranking methodology as reported by IRMA (2016) is reported in Online Appendix 6 of Manuscript 1. In short, analysts and portfolio managers are asked to nominate firms for awards, based on a set of ranking categories that

reflect different dimensions contributing to IR quality. The number of nominations a company receives over the categories is translated into a score that is used for ranking the companies. Every company that receives at least a score of 25 points is reported in the study. This methodology is consistent for IRMA investor perception studies around the world.

The use of IRMA ratings is not new to the literature and e.g., Peasnell et al. (2011, p. 90) “consider [IRMA] to be the best measure of investor relations quality in the market”. More details on the IRMA ranking, its strengths, weaknesses, and use in previous literature are presented on page 19 of the first research manuscript. The overall IRMA rating score is used in both studies to compute a yearly fractional IR rank that is adjusted for differences in industry.

Manuscript 1 uses a sample of 343 companies from four European countries (France, Germany, Italy, and U.K.), and spans the 2009–2015 period. The insider trading activity measures are based on mandatory reports by the companies filed with the regulatory authorities. The data includes the traded security, the name of the insider, trading volume, trading date, reporting date, and name of the stock exchange. This information was aggregated by the data provider 2IQ Research GmbH<sup>13</sup>. A full description of the data and the applied preprocessing is listed in the third section of the first manuscript. In Manuscript 2, the sample spans 344 U.S. companies from 2008–2017. Ownership data is obtained from Capital IQ<sup>14</sup>, where yearly detailed information on investors and their respective shares is available. The analyses in Manuscript 3 are based on index membership data obtained from Deutsche Börse AG<sup>15</sup>. The document “Historical Index Compositions of the Equity- and Strategy Indices of Deutsche Börse”<sup>16</sup> provides all index changes since the inception of the DAX in 1987 until the end of the study, in 2013. The final study sample after data cleaning consists of

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<sup>13</sup> <https://www.2iqresearch.com/>

<sup>14</sup> <https://www.capitaliq.com>

<sup>15</sup> <http://deutsche-boerse.com/>

<sup>16</sup> [http://www.dax-indices.com/EN/MediaLibrary/Document/Historical\\_Index\\_Compositions.pdf](http://www.dax-indices.com/EN/MediaLibrary/Document/Historical_Index_Compositions.pdf)

507 index reconstitution events. An overview of the sample data of the three research manuscripts is given in Table 1, below.

For all three manuscripts, most additional financial data (e.g., stock prices, market values, market indices etc.) is taken from Thomson Reuters Datastream<sup>17</sup> and supplemented by additional data sources, as indicated. All derived hypotheses are tested empirically. In addition to the standard approaches of univariate tests and multivariate (panel) regressions, the event study conducted in Manuscript 1 adds to the methodological diversity of this work.

**Table 1** Overview on sample data of the research manuscripts

Research Manuscript	Sample size	Years	Country
<b>Manuscript 1:</b> <i>The multifaceted role of a firm's commitment to high-quality investor relations in constraining insider trading</i>	343 firms	2009–2015	France, Germany, Italy, UK
<b>Manuscript 2:</b> <i>Future market valuations: The joint influence of a firm's investor relations and investor base</i>	344 firms	2008–2017	U.S.
<b>Manuscript 3:</b> <i>What's in the news? The ambiguity of the information content of index reconstitutions in Germany</i>	507 index reconstitution events	1990–2013	Germany

Table 1 provides an overview on the relevant sample data used for the empirical studies in the three research manuscripts.

<sup>17</sup> <https://financial.thomsonreuters.com/>



## 4 Research manuscripts

### 4.1 Manuscript 1

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Title: The multifaceted role of a firm's commitment to high-quality investor relations in constraining insider trading

Authors: Houdou Basse Mama  
Stefan Müller

Status: 2<sup>nd</sup> Revise and Resubmit (Journal of Business Ethics)

Journal ranking: B (VHB-JOURQUAL 3)

*The manuscript is available upon request*

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## 4.2 Manuscript 2

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Title: Future market valuations: The joint influence of a firm's investor relations and investor base

Authors: Houdou Basse Mama  
Stefan Müller

Status: Under Review (Journal of Financial and Quantitative Analysis)

Journal ranking: A (VHB-JOURQUAL 3)

*The manuscript is available upon request*

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## 4.2 Manuscript 3

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Title: What's in the news? The ambiguity of the information content of index reconstitutions in Germany

Authors: Houdou Basse Mama  
Stefan Müller  
Ulrich Pape

Status: Published (Review of Quantitative Finance and Accounting)

Journal ranking: B (VHB-JOURQUAL 3)

DOI: <https://doi.org/10.1007/s11156-017-0617-1>

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## **5 Conclusion**

This thesis presents insights into the signaling role of investor relations and stock index membership. Evidence supporting the signaling role of stock index membership is at best mixed, and the claim that index membership is a signal for future corporate performance cannot be supported as seen in the third manuscript. In contrast, the potential of investor relations as a signal for firm quality in terms of investor protection as well as future return prospects is largely supported by the first two studies in this thesis. This support is not unanimous, since there is also evidence pointing to a “dark side” of IR (e.g., the use for moral licensing). All the more, these mixed results are relevant since the IR function is still a relatively new area of research. Laskin (2007, p. 268) claims that “not much research has been done in the area of investor relations” and “the research on the investor relations’ contribution to the bottom line of organizations is virtually non-existent”. This is a substantial gap in the literature, since IR is not just a facet of disclosure, but requires separate consideration. The specific contributions of the three manuscripts are detailed in the following.

### **5.1 Contributions**

The first manuscript studies how differences in the quality of firms’ IR influence the trading activity of insiders. The main finding is a reduction of profitability of insider trades as well as the in the rate of opportunistic transactions associated with high-quality IR. Interestingly, the influence of IR is more pronounced for sales transactions compared to purchases.

In this regard, high-quality IR is a new channel to mitigate the private consumption of benefits of insiders and thus a viable signal for investor protection. This view on the function of IR is new and the manuscript identifies the reduction of information uncertainty as a main transmission channel for these effects. Better IR-facilitated information processing reduces

the information gap between insiders and outsiders leading to less profitable insider trading opportunities. The manuscript takes a novel approach, since previous work does not consider the concept of information uncertainty in the context of insider trading. In this regard the manuscript complements the findings of van Geyt et al. (2014), who identify IR as the most effective channel for corporate communications to reduce the financial incentives (i.e., profitability) of insiders for opportunistic trading.

The first manuscript mostly supports the belief in IR as a signal for firms with a high degree of investor protection. However and rather surprisingly, the manuscript also points to a dark side of IR: High-quality IR increases the profitability of insider sales in the presence of high information asymmetry or high firm visibility. The manuscript presents evidence that could be interpreted as stealth trading of insiders (e.g., Barclay and Warner 1993): insiders realize returns by trading smaller volumes with a higher frequency. This warns against an unconditional positive view on IR in terms of its mitigating effect on insider trading. While investors can very well use IR as a valid signal for a firm's commitment to investor protection, they still need to be aware of its imperfections, since insiders might use it to grant themselves a moral license to misbehave (Klotz and Bolino 2013).

The findings on potential stealth trading have implications for regulators as well. They should critically assess the common practice of triggering investigations based on trade volume. Currently "investigations [are] following large trading volumes or large price movements or both" (DeMarzo et al. 1998, p. 602). An indicator for manipulative behavior listed in ANNEX I of the current Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (MAR) is "the extent to which orders to trade given or transactions undertaken represent a significant proportion of the daily volume of transactions in the relevant financial instrument, [...] in particular when those activities lead to a significant change in their prices". Also, the penalty for insider trading violations

depends on the severity of the violation (which is among others determined by the size of the trade). Accordingly, Article 19(8) of the MAR lists a volume threshold, under which transactions do not need to be disclosed. In the presence of the results of insiders of high-quality IR-firms trading more frequently in smaller lots, such detection policies seem not to be sufficient.

A contribution in terms of data used in manuscript one, is that the study is based on a full sample of insider sell and buy transactions. Previous studies largely used to omit insider sell transactions (e.g., Gao et al. 2014), with reference to the fact that sales might be driven by an insider's need for liquidity. Since sales transactions are more prone to litigation risk (e.g., Cheng and Lo 2006) and due to the differential results for both types of transactions in manuscript one, future standard procedure should be to investigate both types of transactions.

The second manuscript provides evidence that high-quality investor relations which shapes a firm's shareholder base is an effective signal for a firm's future valuation and hence a signal for firm quality. In particular, the study finds that firms with higher-quality IR trade at a premium if they succeed in creating a broader domestic institutional ownership base. A similar effect is observed relative to higher foreign institutional holdings. It is noteworthy that these effects are contingent on the firms exercising effective stakeholder management. The manuscript contributes by showing how high-quality IR and a wider domestic investor base or increased international holdings is associated with higher future valuations. In fact, this effect even offsets shareholder base related valuation discounts (e.g., Choi et al. 2013).

The second contribution of Manuscript 2 aligns with the findings of the first research manuscript on investor relations being an indicator for investor protection. The main hypothesis of Manuscript 2 uncovers a link between the return prospects of a firm and the quality of its investor relations program through changes in the investor base. Interestingly, there is also a connection between the protection of shareholder rights linking to the results of

the first manuscript. For IR to impact valuation through the shareholder base, a firm needs to be committed to shareholder rights. These suggested positive effects are observed only for firms with higher CSR performance.

The second research manuscript also contributes a potential means for how high-quality IR and the investor base can impact future market valuation: Financing constraints. While access to external financing is essential for firm growth, a firm that cannot secure all the external financing to carry out planned investments is financially constrained. The consequence are suboptimal investment levels which will adversely affect the operating performance and hamper the long-run growth of financially-constrained firms (Clementi and Hopenhayn 2006). The direct consequence are lower subsequent stock returns (Lamont et al. 2001). Thus, it is of interest to identify mechanisms through which firms can relax the financing constraints they face. The third research manuscript extends findings by Bodnaruk and Östberg (2013) and documents that IR jointly with increases in the shareholder base reduce financing constraints, leading to better operational options for the firm.

The third manuscript studies transitions within the DAX index family in Germany. There are at least three main contributions of this study to the literature. First, while most previous studies focus on one major index, manuscript three presents a study of a complete index hierarchy. Such a design enables a finer, new classification of index change events depending on the index history of an added or deleted stock. The newly introduced categories are: Outright Entries, Outright Exits, Promotions, and Demotions. The manuscript uncovers notable differences between these categories and differences between the indices of the DAX family and warns against treating index reconstitutions as a homogeneous group as it was done in several previous studies. A notable exception is the research design of Biktimirov and Li (2014), who use a split between upward and downward additions for changes to the FTSE SmallCap index.

Second, the third research manuscript offers empirical results not only in the short-term, but also on the long-run operating performance in terms of return on assets. There are only few other studies on the long-term operating performance among index members. For instance, Chan et al. (2013) find that stocks added to the S&P 500 index show a better operating performance than their industry, but this effect is reduced over time after addition.

Lastly, studying index reconstitutions in Germany provides new valuable insight. Index reconstitutions in the DAX family are rule-based, and thus likely predictable. Therefore, these events should have less information content than changes to, e.g. the S&P 500 where discretion plays a major role (e.g., Arnott and Vincent 1986; Kim and Verrecchia 1991; Geppert et al. 2011). The DAX index family underwent in March 2003 the largest reorganization so far<sup>18</sup>, intended to improve transparency and investor protection and ultimately regain investor confidence after drastic negative stock returns over the years before 2003 (Wilkens and Wimschulte 2005). The effects of this strengthening of the information environments of the German stock market have not been studied in an index context and it is unclear how it affects market responses to index reconstitutions, particularly in the Prime Standard Segment. Specifically, enhanced transparency is expected, c.p., to lower information asymmetries, thus decreasing earnings surprises (Chen et al. 2007) and ultimately market reactions to firm-related news. The results from the manuscript support this prediction and the reorganization of the German stock market in 2003 indeed seemed to have increased transparency and thus is accompanied by a more pronounced anticipation effect. The corresponding results (i.e., a stock price effects split by year 2003) are presented as Online Appendix 4 of the first manuscript.

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<sup>18</sup> The changes of the recent reorganization in 2018 are of smaller scope and likely to have minimal impact on transparency and investor protection.



Additionally, the study offers an overview of abnormal returns from other studies. This comparison can be found in the third manuscript's Online Appendix 2a for the most prestigious indices and Online Appendix 2b for indices of lesser prestige. In addition, the study specifically relates its results to the figures reported in the studies of Mase (2007) on FTSE 100, Chen (2006) and Biktimirov and Li (2014) on Russell 1000, as well as Zhou (2011), Chen et al. (2004), and Lynch and Mendenhall (1997) on S&P 500 reconstitutions.

Regarding the signaling role of index membership, the study results warn against such an interpretation. In fact, the long-term negative abnormal returns for new index members (see e.g., Online Appendix 4 of the manuscript) attests to the underperformance of such stocks. This finding is further supported by the decreasing operating performance (in terms of ROA and ROE) for additions and increasing operating performance for deletions after the index change event (see Online Appendix 5 and 6 of the manuscript). This finding is consistent with the idea of Chan et al. (2013) that the S&P 500 constituents are selected from better-performing firms and that this performance differential decreases after the addition. We argue that firms are added at the peak of their performance and cannot sustain this performance in the long-run. Thus, index membership is not a signal for future attractiveness, but more a consequence of the past success.

The results in the third manuscript show that long-term operating performance declines for added stocks and increases for deleted stocks subsequent to the year of stock addition or deletion. In contrast, firms are deleted from the index during their worst performance stage but tend to recover somewhat in the long term, displaying a U-shaped pattern from year  $t - 5$  to year  $t + 5$ . Cross-sectional regression analysis shows that this difference in operating performance partly explains the difference between the long-term returns of deleted stocks and added stocks. Also, the results are consistent with Cooper and Woglom (2002), who conducted a long-term price study and attribute the negative long-term reactions to increased

volatility among index members. These results are consistent with efficient market theory, since as index membership is a result of size and liquidity, both bad indicators for unobservable quality attribute (in this case return prospects).

Thus, the belief that index membership can inform about a firm's future performance and thus investment appeal cannot be supported, even though it is often interpreted in such a way, as documented in Section 3.2. For instance, the financial press mostly considers index membership as a valid and positive signal for investors. However, the media seems not to be oblivious to the effects documented in the third manuscript. On the occasion of exclusion of the media company *PRO Sieben Sat 1* after only two years of index membership, the *Süddeutsche Zeitung* (2018) published an article explaining that the intense monitoring leads to „stronger market reactions, due to small strategic corrections or slip-ups“ (unofficial translation by the author). A similar perspective by an equity analyst was cited in the introduction to the third research manuscript. A summary of the research questions and contributions of the three manuscripts is given in Table 2 below.

**Table 2** Overview on research questions and contributions of the research manuscripts

Research Manuscript	Research Questions	Main Findings/Contributions
<b>Manuscript 1:</b> <i>The multifaceted role of a firm's commitment to high-quality investor relations in constraining insider trading</i>	<ul style="list-style-type: none"> <li>• What is the influence of cross-sectional differences in the quality of firms' IR on profitability, intensity, and incidence of IT?</li> <li>• Through which channels do the effects operate?</li> </ul>	<ul style="list-style-type: none"> <li>• IR reduces financial incentives for IT by reducing information uncertainty</li> <li>• IR is a means to curb managerial misconduct through information and litigation risk channels</li> <li>• Insiders of high-quality IR firms likely engage in stealth trading</li> </ul>
<b>Manuscript 2:</b> <i>Future market valuations: The joint influence of a firm's investor relations and investor base</i>	<ul style="list-style-type: none"> <li>• What are the valuation implications of firms' efforts to court selected shareholders through IR?</li> </ul>	<ul style="list-style-type: none"> <li>• High-quality IR can enhance firm value, by offsetting a valuation discount to ownership breath</li> <li>• High-quality IR is complementary to a credible commitment to stakeholder rights (e.g., through CSR)</li> <li>• Firms with a broader domestic investor base and higher international holdings face lower financing constraints</li> </ul>
<b>Manuscript 3:</b> <i>What's in the news? The ambiguity of the information content of index reconstitutions in Germany</i>	<ul style="list-style-type: none"> <li>• Are there (a)symmetric stock price responses to index reconstitutions in the DAX index landscape?</li> <li>• Do the market responses differ for different types of index reconstitutions?</li> <li>• Do the effects depend on the index prestige?</li> <li>• What drives long-term return differentials between index additions and deletions?</li> </ul>	<ul style="list-style-type: none"> <li>• Beyond previous research, give a full picture of short-, mid-, and long-term stock performance around index reconstitutions</li> <li>• Index reconstitutions do not necessarily convey unambiguous signals about the long-run investment appeal of a stock</li> <li>• Investors would profit from holding on to stocks removed from a benchmark index for a longer time-period</li> <li>• While changes to the DAX and MDAX have temporary price effects, stock price responses to promotions/demotions for lesser-known indices show permanent effects</li> </ul>

Table 2 provides an overview on the research questions and major contributions of the three research manuscripts

## **5.2 Limitations and future research**

This thesis presents evidence for the signaling role of investor relations. To test the informativeness of IR, two measures for investor protection and a firm's return prospects are used: insider trading in the first manuscript and future market valuation in the second manuscript. The signaling role of stock index membership cannot be confirmed in the third manuscript, where a firm's return prospects are measured by future ROE and ROA. Naturally, the selected set of indicators for investor protection and a firm's return prospects is limited. Studying additional indicators would be a promising avenue of inquiry for further research. Also, investigation of other firm quality characteristics could add to the presented results.

Further need for research following from the first manuscript is mostly related to the potential "dark side" of IR. The presented evidence on stealth trading is consistent with other recent findings that question an all-positive view on IR. For instance, Hong and Huang (2005) find that insiders profit more than proportionally from liquidity increases resulting from IR activities or Cohen et al. (2017) show that firms use IR activities to favor bullish analysts. While IR is a valid signal for firm quality, the evidence on stealth trading and a potential self-serving use of IR point out the need to further explore the true determinants of individual and organizational ethics. This is even more important, since other means to mitigate opportunistic behavior are at best incomplete, or as Batten et al. (2018, p. 779) put it: "it is our strong belief that compliance cannot replace ethics". One study on this way is Beams et al. (2003, p. 320) who find "that guilt had the greatest effect on intent to trade based on insider information. Expected gain, cynicism, and perceptions of the fairness of laws were also significantly associated with the intent to trade". In addition, it would be relevant to further explore the mechanisms, as well as the overall net-effect of this negative impact IR can have on insider trading.

On a different note, the empirical study in the first manuscript is based on 4 European stock markets and does not permit a generalization without reservations. This is for at least two reasons: First, Bhattacharya and Daouk (2002) point out that “only one in three countries has enforced [insider trading] laws”. Such different levels of enforcement as well as differences in the legislation lead to a different market environment impacting at least the litigation risk channel, but more likely all the investigated mechanism for the impact of IR on insider dealing. Second, the cultural perception of insider trading varies a lot across countries. For instance, Statman (2009) finds in a study on the cultures of insider trading, that in the Chinese culture, insider trading is not perceived as immoral, which is a basic assumption in the theoretical framework of the first manuscript, but rather a useful business information. Thus, the implications here are also likely to be different due to the disciplinary channel supposedly not working as in the European setting. While this view might seem opposed to the predominant perspective in Europe, one should note that it is surprisingly similar to the arguments against insider trading restrictions presented by Manne (1966), who proposed insider trading as a suitable means for rewarding managers and bringing information in the market.

The second manuscript uses ownership data for U.S. companies. Since the ownership composition of the U.S. market is rather different compared to, for instance, Europe, it is not possible to simply generalize the findings. At least two factors are to be considered: (i) According to the U.S. Department of the Treasury (2016), the average percentage of foreign investors’ holdings in the U.S. is leveling out at about 15% of the U.S. stock market. This fraction is much lower compared to other developed countries. For instance, in Germany more than 50% of DAX shares were owned by foreign investors in the recent years (EY 2018). Therefore, overcoming marking segmentation would likely have a larger effect in the U.S. and the findings might not be as pronounced using a non-U.S. sample. (ii) The investor relations

function in the U.S. is more professionalized and older (Hoffmann et al. 2018b) likely leading to more pronounced effects in non-U.S. markets with less professionalized IR functions, weaker capital market institutions and more concentrated corporate ownership (Brochet et al. 2018). To evaluate how these two offsetting factors interact, additional studies with international samples would be needed to find the results for international markets.

Methodologically, the use of questionnaire to determine investor relations quality is in good tradition (e.g., Agarwal et al. 2016). Still, the specific configurations of IRMA add at least two limitations: (i) a response bias, since participants self-select to complete the survey and (ii) an equal-weighted scoring under different categories which might have differing relation to IR quality (Peasnell et al. 2011). Similarly, while the Kaplan and Zingales (1997) KZ4-index is a widely accepted measure for financing constraints, it is not undisputed (e.g., Farre-Mensa and Ljungqvist 2016). Thus, a confirmation based on other measures for financing constraints (e.g., Klepsch and Elsas 2017) could give additional evidence for the interplay of financial constraints with IR and investor base.

Considering the third manuscript, the results can largely be generalized to other indices, due the similar design of many indices. This is also supported by the comparable empirical results of other studies. However, there are still subtle differences between different indices. The consequences of these differences are not fully explored yet. For instance, an important difference comparing the S&P500 to the DAX is that the former aims to include best companies of all sectors while the DAX follows a ranking across all industries. On top of that, the third manuscript finds a lot of heterogeneity in the events from the four selected German indices. Here a study on the determinants of these differences and could add to the insight on the workings of an index hierarchy. The manuscript also confirms the existence of an anticipation effect before the announcement of index reconstitutions. Such an effect is

consistently observed in index studies. Given the rules-based nature of the German index environment, the DAX might offer a suitable testbed for further studies on this anticipation.

The data on the effects of institutional holdings does not paint a clear picture, thus it would be relevant to uncover the determinants of institutional behavior around index reconstitutions qualitatively or with more comprehensive quantitative data. Relatedly, the effect of index-tracking funds is often referred to as a reason for abnormal returns related to index reconstitutions. A qualification of this effect would also be a promising avenue of further research, given the (rising) economic relevance of such investment devices. Methodologically, the third manuscript suffers from the limitations of an event-study, which can be “sensitive to even small changes in the research design” (McWilliams et al. 1999, p. 340). This is particularly true for the long-term accuracy of the study, where the abnormal return modeling and statistical significance of abnormal returns are two exemplary issues that “become critically important with long horizons” (Kothari and Warner 2007, p. 20).

Finding and testing of signals for firm quality is a highly relevant topic. This thesis adds insights on investor relations and equity index membership to the existing research, which already comprises studies on the related areas of governance (e.g., Core et al. 1999) and a firm’s social performance (e.g., Luo et al. 2015). For future research the identification and study of additional signals remains of interest.

## 6 References

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