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Economic Consequences of Reporting Transparency

Dissertation
zur Erlangung des Grades eines Doktors der Wirtschaftswissenschaften
(Dr. rer. pol.)

an der WHU – Otto Beisheim School of Management

31.3.2015

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List of abbreviations

AIC	Association of Investment Companies
CTA	Corporate Tax Act
EC	European Commission
E.g.	Exempli gratia (for example)
Et al.	Et alii (and others)
E.U.	European Union
GAAP	Generally Accepted Accounting Principles
HMRC	Her Majesty's Royal Customs
IAS	International Accounting Standard(s)
IFRS	International Financial Reporting Standard(s)
Max	Maximum
Min	Minimum
N	Number
NAICS	North American Industry Classification System
P.	Page
SEC	Securities and Exchange Commission
SIC	Standard industrial classification
SD	Standard deviation
U.K.	United Kingdom
U.S.	United States (of America)
U.S. GAAP	United States Generally Accepted Accounting Principles

1 Introduction

1.1 Transparency and financial reporting

This dissertation examines the economic consequences of reporting transparency. Specifically, it integrates theories from accounting, economics, and finance, to present evidence on the real effects of firms' reporting and disclosure activities. It adds to firm-specific and market-wide evidence on the economic consequences of reporting transparency by presenting evidence on how reporting transparency affects product market coordination of firms (chapter 2), product demand for UK investment trusts (chapter 3), and how it is associated with private firms' investment efficiency (chapter 4). Thereby, it speaks to policy makers, regulators, as well as standard setters, and answers the call for further research on real consequences of reporting transparency by Leuz and Wysocky (2008).

The concept of reporting transparency comprises the availability of firm-specific information obtainable to outsiders of the firm.¹ The availability of information plays a central role in efficient resource-allocation decisions within an economy since information asymmetries and agency costs impede efficient resource allocation (Bushman et al. 2004; Bushman et al. 2011). A prominent example of inefficient resource allocation is the "market for lemons" first introduced by Akerlof (1970). The seminal paper explores how market failure arises because outsiders cannot assess ex ante whether insiders report information truthfully. Under certain conditions, transparency can prevent the market from collapsing (Grossman and Hart 1980). Moreover, transparency can also decrease agency costs arising from the separation of ownership and

¹ Bushman et al. (2004) define the term corporate transparency as, "*the availability of firm-specific information to those outside publicly traded firms*" (p. 208).

control. Agency costs arise whenever one party (principal) engages another party (agent) to perform some service on her behalf, since a utility maximizing agent does not always act in the best interest of the principal (Jensen and Meckling 1976). Information enables economic agents to reduce contracting costs if they can rely on the provided information ex-post. In this regard, a firm's set of accounting standards forms part of its overall contracting technology (Watts and Zimmerman 1979, 1986).

Reporting transparency reduces information asymmetries and agency costs. Hence, information asymmetry and agency costs, both between a firm and its stakeholders, as well as among stakeholders, is crucially dependent on a firm's information environment. Reporting transparency allows investors to understand the real performance of the firm and enhances their ability to perceive the real situation of the firm which they base their actions on. Diamond (1985) suggest in an analytical model, that the firm's disclosure of information is welfare increasing since it reduces information costs and improves risk sharing. Moreover, Diamond and Verrecchia (1991) find that revealing public information to reduce information asymmetry reduces the firm's cost of capital by attracting demand from large investors due to the increased liquidity of the firm's shares. On the other hand, enhanced reporting transparency also bears costs when revealing proprietary information to the public. These costs are, for example, a decrease in market power or a loss of competitive edge due to new market entries following the release of proprietary information (Wagenhofer 1990).

Prior literature identifies differences in reporting transparency across countries that reflects national institutional characteristics. Hail and Leuz (2006), for instance, report that variation across countries in disclosure

requirements, securities regulation, and enforcement mechanisms influences cost of capital. In the same vein, several studies investigate economic consequences of the mandatory introduction of International Financial Reporting Standards (IFRS) in Europe in 2005, which is associated with an increase in reporting transparency (Daske et al. 2008, 2013; Hail et al. 2014; Gordon et al. 2012). In summary, these papers suggest that more transparent reporting benefits firms by increasing liquidity and decreasing cost of capital.²

Chapter two of this dissertation adds to the notion of the aforementioned work by examining how financial reporting transparency of firms in different countries affects product markets by using the cartel setting. Economic theory predicts that transparency might either prolong cartel duration through increased contracting efficiency or destabilize cartels due to earlier detection of deviating members. This study exploits variation in reporting transparency resulting from the use of international accounting standards (IFRS or U.S. GAAP) as opposed to national GAAP. The results suggest that following international accounting standards increases firms' likelihood of exiting the cartel in the next year by 84%. This finding can be explained by the enhanced ability of cartel members to detect cheating by their fellow members when their reports are more transparent. Consistent with this argument, additional tests reveal that transparency lowers cartel duration when the opportunity costs of cooperation and the likelihood of cheating are high.

This chapter adds to prior studies on the relationship between firms' competitive environment and the level of reporting transparency (Verrecchia 2001; Berger and Hann 2007) by providing empirical evidence consistent with

² For a more in-depth analysis of the current state of the literature on the economic consequences of financial reporting and disclosure regulation refer to, e.g. Leuz and Wysocki (2008) or Farvaque et al. (2011).

the theoretical predictions in Bagnoli and Watts (2010), that reporting transparency can affect industry coordination and competition. Secondly, this study adds to the general notion that reporting transparency affects the outcomes of implicit contracts by emphasizing the role of accounting transparency in monitoring an implicit product market contract. Additionally, this study extends prior economic literature that analyzes cartel duration and its determinants (Suslow 2005; Zimmerman and Connor 2005; Levenstein and Suslow 2011) by explicitly considering the effect of transparency on cartel duration. In the context of economic consequences of reporting transparency, the results point at the consumer welfare enhancing abilities of reporting transparency, since it fosters competition by reducing cartel sustainability. Hence, the analysis sheds light on whether transparent reporting can influence efficient resource allocation in an economy (Bushman et al. 2011).

Chapter three examines economic consequence of reporting transparency in the financial industry. More specifically, it examines whether voluntary disclosures by UK investment trusts affect the demand for the trusts' share. This chapter exploits the fact that UK investment trusts can choose to publicly disclose a complete list of stocks under management. However, some firms disclose their portfolios voluntarily. Since the information about the investment portfolios is competitively sensitive and proprietary in nature, revealing the portfolio of investments under management is comparable to showing a rather complete picture of the trust's operations. By examining these voluntary disclosures, the study isolates a feature of the firm's information environment that is directly under management's control. Further, the setting allows for inferences based on one important part of disclosure in one industry

and is arguably less noisy in comparison to multi-industry settings (Berger and Hann 2007; Botosan and Harris 2000; Botosan and Stanford 2005; Leuz 2004).

Most recently, Balakrishnan et al. (2014) find that managers actively manage the firm's information environment by providing voluntary disclosure to reap the benefits of improved liquidity. Their finding is in line with prior literature that shows investors prefer liquid shares and that voluntary disclosure can increase liquidity by reducing information asymmetry (Dye 1986; Amihud and Mendelson 2008, 1986; Diamond and Verrecchia 1991).

Apart from the benefits of voluntary disclosure there are also costs of revealing (proprietary) information. Proprietary costs represent the management's fear to lose the firm's competitive advantage or bargaining power to its competitors by revealing sensitive proprietary information (Hayes and Lundholm 1996; Lambert et al. 2007; Verrecchia 2001; Wagenhofer 1990; Dye 1986). Although there is theoretical evidence that proprietary costs are present, empirical evidence is relatively scarce.

Chapter three fills this gap in prior literature by examining the costs and benefits of voluntary disclosure of full portfolio holdings by UK investment trusts. This study utilizes the fact that investment trusts trade at a discount. The discount represents the difference between the market value of the investment trust's investments under management and the investment trust's own share price. Due to the inelastic supply curve of the investment trust's shares, changes in demand translate into changes in the discount. The results show, on average, voluntary disclosures increase the demand for the trusts' shares. However, there are costs for successful trusts that exhibit superior performance prior to the disclosure of their full portfolios. These trusts suffer from a

decrease in demand by revealing superior stock picking ability and market timing in the disclosed portfolio information.

This paper contributes to prior literature on voluntary disclosure (see, e.g. Healy and Palepu 2001; Beyer et al. 2010) by providing evidence on how voluntary disclosure is associated with changes in product demand. Furthermore, by utilizing the relation between the investment trust's discount and its relation to change in the trust's demand, it uses an approach in quantifying proprietary costs which distinguishes this study to prior disclosure studies (Verrecchia and Weber 2006; Beyer et al. 2010; Bamber and Youngsoon 1998).

Chapter four investigates how the quality of private firms' external information environment affects corporate investment efficiency. The quality of the firm's information environment has important implications for investment because a more transparent information environment can reduce agency conflicts by enhancing monitoring and it can help the firm to identify and exploit investment opportunities. To investigate whether the external information environment is associated with private firms' investment behavior, this study exploits variation in the availability of information on the number of local news media (print and online) at the city-level in Italy. The results suggest that a higher quality of the information environment reduces uncertainty about investments which leads to greater responsiveness of firms to their investment opportunities and higher investment efficiency. Additionally, the results highlight the importance of news media as an information dissemination channel for decision relevant information.

This study adds to literature on efficient resource allocation and corporate transparency (Bushman et al. 2004; Bushman and Smith 2001;

Francis et al. 2009; Lang and Maffett 2011), by investigating how private firms' information environment is associated with corporate investment efficiency. It also sheds light on the management's investment decision process and how managers obtain decision-relevant information (Badertscher et al. 2013; Shroff 2014; Shroff et al. 2014), by showing that regional news media coverage is an important channel that nourishes private firms' information environment. Likewise, it adds to literature in financial economics investigating the role of news media (Engelberg and Parsons 2011; Fang and Peress 2009; Peress 2014; Robert et al. 1987). Whereas prior literature focuses on capital market oriented (listed) firms, this study uses private firms to explore the role of news media in the firm's external information environment. It bears policy implications and speaks to policy makers because it shows a positive association between communication infra-structures and investment decisions by private firms that make up the gross of the economy and are fundamentally important.

Overall, the three empirical studies highlight different aspects of reporting transparency and its real effects. The findings provide important implications for efficient resource allocation in an economy. First of all, chapter two and three show product market related consequences of reporting transparency induced by transparent reporting and voluntary disclosures, whereas chapter four highlights the importance of news media as another distinct channel through which transparency affects the firms' investment decisions.

Chapter two presents evidence that reporting transparency is beneficial for product markets since it shows that it mitigates welfare decreasing coordination practices among firms. This finding speaks to regulatory

authorities in the field of competition policy. It highlights that capital market regulation in terms of improved transparency and enforcement complements competition policy. These benefits also result in potential remedies when the European Commission or local cartel authorities observe undesired levels of price coordination but cannot prove them to be illegal (e.g., coordination between fuel retail companies in Australia and Germany (Bundeskartellamt 2011)).

Chapter three subsumes both, the cost and benefits of reporting transparency by showing that on average it is associated with positive effects on demand for transparent trusts but that there are also negative consequences for trusts with superior performance. This adds to the notion that there is no “one-size-fits-all” solution when it comes to disclosure regulation. It further speaks to regulators since, while the majority of the public is eager to see more transparency, one should always account for potential negative implications of such regulation.

Chapter four presents evidence that a well-functioning external communication structure benefits efficient resource allocation by supporting private firms in the exploitation of investment opportunities. Underdeveloped communication infra-structures can hinder the flow of firm-specific information resulting in limited availability of decision relevant information to economic agents. Moreover, since private firms operate in an opaque environment compared to publicly listed firms and given that private firms make up a large proportion of a country’s investment, it is fundamental to understand the factors that drive efficient resource allocation of private firms. Therefore, this chapter speaks to policy makers and highlights the importance of a country’s communication environment.

1.2 Outline

This thesis comprises five chapters: an introduction, three empirical research papers, and an overall summary and conclusion. The autonomous structure of each chapter allows the reader to diverge from the order presented in this dissertation and to read each of the three studies separately.

Chapter two is co-authored with Professor Igor Goncharov. Therefore, it uses the first person plural, whereas, the remaining two single authored studies use the first person singular. The following outline summarizes the three empirical studies. Additionally, I insert acknowledgements for helpful comments and suggestions.

Chapter two investigates how financial reporting transparency impacts product market competition. This study highlights a welfare increasing consequence of transparent reporting since it shows that financial reporting transparency negatively affects industry coordination through cartels. This study greatly benefited from comments and suggestions from Dan Collins, Antonio De Vito, Begoña Giner, Stefan Hahn, Andreas Hoepner, Allan Hodgson, Katharina Hombach, Martin Jacob, Sara Keller, Laurence van Lent, Thomas Loy, Patrick McColgan, Maximilian Müller, Zacharias Sautner, Thorsten Sellhorn, Michael Stich, Harm Schütt, Jörg Werner, and workshop participants at the Frankfurt School of Finance, German Monopolies Commission (Monopolkommission), University of Gießen, WHU – Otto Beisheim School of Management, the 35th European Accounting Association meeting, the 27th European Economic Association meeting, and the Workshop on Empirical Research in Financial Accounting.

Chapter three examines the economic consequences arising from proprietary costs of voluntary disclosures. It is set in the UK investment trust

industry to show how the voluntary disclosure of full portfolio holdings affects the demand for the trust's shares. The results highlight the fact that additional disclosure increases the demand for shares, on average, but have detrimental effects on the demand for well performing trusts. This study greatly benefited from helpful comments and suggestions from Matthias Breuer, Charles Cullinan (Discussant), Joachim Gassen, Igor Goncharov, Katharina Hombach, Edith Leung, Maximilian Müller, Harm Schütt, David Veenman, Steven Young, workshop participants at the 29th EAA Doctoral Colloquium in Paris, at the University of Giessen, at the ERASMUS University Rotterdam, at WHU – Otto Beisheim School of Management, at the American Accounting Associations Meeting 2014, the 37th European Accounting Associations Meeting, and the 50th British Accounting and Finance Association Meeting. I also thank Pia Ehlig, Nelli Mirontschenko and Marius Beckermann for excellent research assistance.

Chapter four investigates how the quality of private firms' external information environment affects corporate investment efficiency. It emphasizes important implications of the firm's information environment for the exploitation of investment opportunities. The findings highlight the importance of news media as an information dissemination channel for decision relevant information and the importance of communication infra-structures in ensuring efficient resource allocation in an economy.

This study greatly benefited from comments and suggestions from Matthias Breuer, Antonio De Vito, Joachim Gassen, Igor Goncharov, Maximilian Müller, and workshop participants at the Humboldt University, and WHU – Otto Beisheim School of Management.

2 Does reporting transparency affect industry coordination?

Evidence from the duration of international cartels³

2.1 Introduction

In every product market, firms have incentives to coordinate their decisions, raise prices above the competitive level, and share collective profits, because industry coordination decreases the strategic uncertainties originating from competitive pressure (Porter 2005; Stigler 1964). However, firms face a trade-off: Coordination among firms is sustained as long as the gains from long-term mutual cooperation outweigh the immediate short-term gain from defection (Seale et al. 2006). While reporting transparency is predicted to affect this trade-off, there is no prior evidence on whether transparency facilitates industry coordination through increased contracting efficiency or impedes industry coordination due to the earlier detection of deviating members. We exploit an international sample of firms that were indicted by the European Commission for forming illegal cartels. The cartel setting allows us to observe the nature and duration of industry coordination, and to examine how reporting transparency affects industry coordination and competition.

To derive our predictions, we combine theories explaining the sustainability of cartels with prior literature on the role of accounting information in contracting (Ball et al. 2008; Beyer et al. 2010; Stigler 1964; Tirole 1988). The contracting theory perspective views reporting transparency

³ This chapter is based on Goncharov, I. and Peter, C. D. (2014), Does reporting transparency affect industry coordination? Evidence from the duration of international cartels, Working paper: Lancaster University - Management School, WHU – Otto Beisheim School of Management. This paper has not been presented at conferences in its current form, however, it has been presented and circulated under the titles “The effect of reporting transparency on cartel duration” and “Reporting transparency and cartel membership” at the following conferences: the 35th European Accounting Association meeting, the 27th European Economic Association meeting, the X Workshop on Empirical Research in Accounting and the 50th British Accounting and Finance Association Meeting.

as a mechanism to reduce contracting costs by making information for monitoring, enforcing, and verifying the cartel agreement readily available (e.g., Williamson 1973). Leslie (2004) concludes that contracting costs hinder firms in oligopolistic markets from forming cartels, because it is not cost-beneficial. Reporting transparency may decrease contracting costs by allowing for more efficient contracting between agents (Jensen and Meckling 1976; Lambert 2001; Beyer et al. 2010; Hölmstrom 1979). The use of accounting information for monitoring and verification purposes in contracting arrangements is well established (Ball et al. 2008; Beyer et al. 2010; Healy and Palepu 2001; Watts and Zimmerman 1986). Anecdotal evidence suggests that access to publicly available information is used in the cartel setting to verify self-reported numbers and to enforce the cartel agreement (Harrington Jr. 2006; Harrington and Skrzypacz 2011).⁴ As a result, reporting transparency may increase the cartel duration by decreasing the contracting costs of sustaining a cartel agreement.

Unlike the debt and compensation contracts examined in previous accounting literature, cartel agreements have no legal standing and depend on enforcement by the firms subject to the agreement. This is common to many forms of industry agreement. Furthermore, industry agreements are formed by otherwise competing firms that have strong incentives to benefit at the cost of their peers. In this regard, game theory views industry coordination as a prisoner's dilemma (Pepall et al. 2005): Each cartel member is tempted to employ a short-term dominant strategy and deviate from the agreement, since the opportunity costs of cooperation are high for individual firms (Pepall et al.

⁴ Both practices have been observed in the "Lysine Cartel", which used external auditors to verify self-reported sales, and in the "Carbonless Paper Cartel", which compared self-reported sales with actual sales numbers (Harrington and Skrzypacz 2011).

2005; Roberts 1985). Opaque reporting hides deviations from the cartel agreement, which lowers the likelihood of punishment by the fellow conspirators and prevents the breakdown of the cartel (González et al. 2013). Therefore, reporting transparency may increase the likelihood of detecting cheating firms, since it facilitates monitoring by fellow cartel members. Revealing cheating leads to price wars that end the cartel agreement (Levenstein 1997).⁵ We hypothesize that reporting transparency can either (1) increase coordination by giving cartel members additional means to monitor and sustain the cartel for a longer time span or (2) decrease coordination by enhancing the cartel members' ability to detect deviations from the cartel agreement, which in turn shortens the cartel duration. That is, the effect of transparency on cartel duration depends on whether the contracting benefits of transparent information outweigh the costs of discovering deviations from the cartel agreement.

We test our predictions using a comprehensive international sample of price-fixing cartels convicted of infringing Article 101 of the Treaty on the Functioning of the European Union. We obtain data on the duration and members of the cartel from the European Commission's website. We apply the Cox proportional hazard model to investigate how reporting transparency affects the cartel duration (Cox 1972). We use reporting under internationally acceptable accounting standards as our proxy for transparent reporting. Following an international accounting framework has several benefits in the cartel setting. First, cartel members are domiciled in different countries and international accounting standards facilitate the comparison of financial

⁵ For example, in 2013, Uralkali terminated the informal global-pricing cartel, which had existed for eight years and controlled up to 43% of the world potash market, after discovering that its partner was selling outside the partnership (*Reuters*, July 30 2013).

information across markets (Brochet et al. 2013). Second, previous literature shows that international standards demand increased levels of disclosure compared to local GAAP (Leuz and Verrecchia 2000; Daske and Gebhardt 2006). Third, international accounting standards reduce earnings management, which can be used to hide cheating behavior (Barth et al. 2008). We designate IFRS and U.S. GAAP as international accounting standards because the prior literature finds no difference between the informativeness of IFRS and U.S. GAAP financial statements (Leuz 2003) and because IFRS and U.S. GAAP are used in international accounting regulation (Cuijpers and Buijink 2005).⁶ Our models incorporate other determinants of cartel duration identified based on microeconomic and contracting theory (Stigler 1964; Suslow 2005; Levenstein and Suslow 2011; De 2010).

We find that a higher level of transparency, on average, is associated with a lower duration of cartel agreements. That is, cartels that apply international standards exhibit significantly lower durations than those that do not. This evidence is consistent with the enhanced ability of cartel members to detect cheating by their fellow members when their reports are more transparent. As our sample includes voluntary IFRS adopters, we use the identification strategy in Hail et al. (2014) to shed some light on the causal relationship between reporting transparency and cartel duration. Specifically, we follow Bhattacharya and Daouk (2002) and Jayaraman (2012) and employ the first prosecution under insider trading laws as an exogenous country-level event that increases reporting quality. We use this shock in a difference-in-

⁶ We acknowledge that there is also similar disclosure quality under U.K. GAAP as IFRS (Christensen et al. 2009). Our results are robust to excluding U.K. GAAP firms from the analysis and to categorizing them as transparent reporters. Furthermore, we report a robustness test that employs an alternative proxy for reporting transparency that captures the difference between IFRS and local GAAP.

differences research design and find that international standards have a stronger effect on cartel duration after this information shock.

We further investigate the role of reporting transparency in revealing cheating behavior using cross-sectional differences in the potential gains of deviating from the cartel agreement. Economic theory predicts that cheating is more likely to occur when the gains to be made from deviating from the cartel agreement are high (Lipczynski et al. 2005; Stigler 1964; Friedman 1971). These gains depend on market segmentation and the number of new geographic markets a firm can potentially gain when it deviates from the cartel agreement. As a result, we expect that transparency should lower cartel duration more for cartels operating in highly segmented markets than for cartels operating in fewer geographical markets. Our cross-sectional analysis supports this prediction: Cartels that operate in a greater number of geographic markets and report transparently have lower durations than cartels operating in environments with low opportunity costs of cooperation. Furthermore, when opportunity costs are low, reporting transparency leads to contracting benefits that allow cartel members to sustain the cartel agreement over a longer time span.

This is the first study to provide evidence on how reporting transparency affects industry coordination and product market competition. In this regard, our contribution is threefold. First, we add to prior work on the relationship between firms' competitive environment and the level of reporting transparency. Prior studies examine the effect of competition on the quantity and quality of disclosure (Verrecchia 2001; Berger and Hann 2007) or earnings management (Datta et al. 2013). Consistent with theoretical predictions in Bagnoli and Watts (2010), we show that the reverse effect is possible and that

reporting transparency can affect industry coordination and competition. Second, our study adds to the literature examining the use of accounting information in implicit contracts. Ball et al. (2008) show that the transparency of accounting information can influence non-formal contractual arrangements such as the ownership structure of the loan syndicates. We contribute to this stream of literature by pointing to the role of accounting transparency in monitoring an implicit product market contract. Third, we contribute to prior economic literature that analyzes cartel duration and its determinants (Suslow 2005; Zimmerman and Connor 2005; Levenstein and Suslow 2011) by explicitly considering the effect of transparency on cartel duration. From a policy standpoint, transparent reporting may have positive consumer welfare implications, since it fosters competition by reducing cartel sustainability. Therefore, our results are related to the debate on whether transparent reporting can influence efficient resource allocation in an economy (Bushman et al. 2011).

The paper proceeds as follows. Section 2 reviews literature on industry coordination, section 3 develops hypotheses, and section 4 reports on the research design. Section 5 presents the empirical results, which are followed by robustness tests in section 6. We conclude in section 7.

2.2 Product market coordination

Firms in oligopolistic product markets coordinate their actions because industry prices and outputs are determined by a firm conditional on the actions of its rivals. Collusion is widespread because it obviates the uncertainties of independent actions and reduces the complexity of interdependencies between firms (Lipczynski et al. 2005; Asch and Seneca 1976). Collusion varies in

degree, from the sole expectation that the rival will not act independently in its weakest form, to the strongest degree, where each firm sticks to an agreement as long as its rivals do so. Joint ventures, trade organizations, and illegal cartels are the most prominent examples of how firms coordinate their actions within product markets, and underline the richness of institutions that can promote industry coordination (Lipczynski et al. 2005). Other examples of industry agreements include informal expressions of trade practices, agreements to make similar announcements, and recognized and tolerated international cartels (Machlup 1952). The trade-off between cooperation to maximize long-term profits and defection to increase market share and profits at the cost of one's competitors is common to all forms of industry coordination.

A cartel is an agreement between firms from the same industry to fix prices or industry outputs, to allocate territories or to divide profits (OECD 2007). Oligopolists forming a cartel seek to act collectively as if they were a single monopolist, thus maximizing the joint profit. The optimal outcome is achieved by determining an industry output at which the industry's marginal costs equal the marginal revenues (Lipczynski et al. 2005). By doing this, cartels violate the cornerstones of competition policy. For example, Article 101 of the Treaty on the Functioning of the European Union prohibits both horizontal and vertical agreements, such as price fixing, production quotas, and agreements to share markets.

Cartels pose a severe threat to an economy because they harm competition and reduce welfare (Lipczynski et al. 2005; Tirole 1988; von Blanckenburg and Geist 2011). The impact on the general public of cartelization varies with the size of the cartelized market, the duration of the conspiracy, and price overcharges. For example, Connor and Bolotova (2006)

show that cartel prices in different industries exceed prices under (perfect) competition by between 7.1% and 49%. As a consequence, cartels are a top priority of antitrust policy around the globe. The European Commission imposed fines of €17.4 billion between 1990 and 2013 on firms that formed cartels.

The key measure of cartel success is cartel duration. Based on evidence from prior studies, it typically varies from 6.3 to 10.84 years depending on sample composition (Zimmerman and Connor 2005; 2011; De 2010). The average cartel duration in our sample is 10.68 years. The European Commission's cartel investigations are frequently triggered by an informal or formal complaint filed by competitors or customers. Critically, most of the cartels end due to one or more members applying for the leniency (amnesty) program, which offers reduced fines if a cartel member helps with the investigation. Many of these applications are the result of some cartel members deviating from the cartel agreement (De 2010).

The salient feature of cartel agreements is that they are not enforceable in court, and can only be enforced by cartel members. Enforcement of a cartel is difficult due to the members' temptation to deceive their fellow cartel members by undercutting the agreed-upon collusive price (Suslow 2005; Stigler 1964). Previous economic studies identify factors that can lead to deviations from the cartel agreement and affect cartel duration (De 2010; Levenstein and Suslow 2011; O'Brien et al. 2005; Spagnolo 2005; Suslow 2005; Zimmerman and Connor 2005). For example, De (2010) finds that demand growth and changes in the political environment destabilize cartels, while Levenstein and Suslow (2011) report that financial instability, entry of new cartel members, and changes in antitrust policy reduce cartel duration. In

summary, prior evidence supports the notion that cartel duration depends on the internal stability of the cartel agreement. However, none of the aforementioned studies investigates transparency as a means to either promote or impede coordination among firms, or the effect of this coordination on product market competition.

2.3 Hypothesis development

Oligopolistic markets exhibit different forms and degrees of coordination between firms (Machlup 1952). Firms coordinate their actions to reduce the uncertainty arising from interdependencies in strategic decisions and to decrease competitive pressure. However, in order to maximize profits, individual firms have incentives to deviate from the collusive agreements. Since cartel agreements are illegal, such deviations from the implicit contract cannot be prosecuted by official authorities. Rather, cartel members need to self-enforce the cartel. Thus, the costs of operating a cartel depend on the effort spent on policing member firms and the likelihood that deviations from the cartel can be detected (Lanning 1987).

Williamson (1973) interprets collusion as a problem of contracting. Contractual problems, like moral hazard, are often associated with information asymmetries and opportunism (Mahoney 2005). Uncertainty and information asymmetries between the cartel members increase the costs of sustaining a cartel (Williamson 1973; Stigler 1964). Leslie (2004) concludes that contracting costs hinder firms in oligopolistic markets from forming cartels, because doing so is not cost-beneficial. As a result, cartel members seek reliable information about their fellow members in order to monitor and police the cartel agreement (Telser 1980; Williamson 1974), and invest in information

gathering to improve the monitoring of individual firms' activities (Levenstein and Suslow 2006). Collecting such public information can be cost-beneficial compared to administering costly punishments and initiating price wars (Levenstein and Suslow 2006). As credibility of information is a critical determinant of cartel duration (Spar 1994), audited financial statements are likely to be an incremental source of information for cartel members (Harrington Jr. 2006). Anecdotal evidence from international cartels shows that cartel members use such publicly available accounting data. For example, the "Amino Acid Cartel" hired an accounting firm to monitor sales reports (Connor 2001; Harrington and Skrzypacz 2007), and the members of the "Carbonless Paper Cartel" used other cartel members' financial statement information to verify the accuracy of internally self-reported sales numbers (Harrington and Skrzypacz 2011).

Financial statements can reduce contracting costs by providing transparent, publicly observable, and verifiable information (Ball et al. 2008; Watts and Zimmerman 1986). Hence, transparent performance measures allow better screening and more efficient contracting between agents (Jensen and Meckling 1976; Lambert 2001; Beyer et al. 2010; Hölmstrom 1979). International accounting standards can help sustain a cartel agreement by allowing easier comparison of reported performance numbers across countries (Brochet et al. 2013). For example, international accounting standards can assist in the monitoring of market shares by unifying revenue recognition criteria. Furthermore, international accounting standards require greater disclosure than local GAAP (Daske and Gebhardt 2006). In this regard, IAS 14, which was applicable during our sample period, required geographic and business segment disclosure, which had the potential to reveal important

information for the enforcement of cartel agreements. Finally, international accounting standards lower earnings management and thus reduce the possible ways to hide cheating (Barth et al. 2013; Barth et al. 2008). Thus, reporting under an internationally accepted accounting framework may increase the sustainability of cartel agreements by decreasing contracting costs. We predict that an increase in reporting transparency positively affects cartel duration:

H1a: *The duration of cartel membership increases when a firm reports transparently.*

An alternative line of argument suggests that reporting transparency may decrease cartel duration because it will lead to the earlier discovery of non-compliance. Unlike debt or compensation contracts, the cartel contract has no legal standing and is formed by industry peers. Thus, noncooperation and cheating at the cost of one's rivals is a short-term dominant strategy among cartel members (Pepall et al. 2005; Roberts 1985). That is, there is a strong temptation for cartel members to undercut the agreed-upon cartel price to extract one-time gains (Suslow 2005). Furthermore, as cartel agreements are illegal and unenforceable, cartels lack an effective mechanism by which to control cheating (Orr and MacAvoy 1965).

Each cartel member's propensity to deviate from the cartel agreement depends on the difference between its private return and its share of the cartel's collective return. In the short-term, the private returns from cheating exceed the collective returns (Dick 1996). Successful cheating can only take place if the cheaters can hide their actions to avoid punishment by their fellow conspirators. Since cartel members cannot observe each other's past production levels, they base their actions on publicly observable information and their own production history (Abreu et al. 1986). Harrington and Skrzypacz (2011)

develop a model in which cartels are stable as long as they truthfully report their agreed-upon sales figures. Their model explains the cartel practice of verifying self-reported sales using publicly available information (Harrington and Skrzypacz 2011, 2007). Levenstein (1997) reports that publicly announced violations of a collusive agreement frequently lead to price wars that end the cartels. Therefore, once cheating is detected through more transparent reporting, price wars are likely to erupt and end the cartel agreement. We predict that reporting transparency may lower cartel duration because transparency increases the likelihood that cheating will be detected through better means of verification of self-reported numbers:

H1b: *The duration of cartel membership decreases when a firm reports transparently.*

Cartels are sustained as long as the discounted long-term benefits outweigh the gains of deviating from the cartel agreement (Friedman 1971; Levenstein and Suslow 2006). If reporting transparency destabilizes cartels by revealing cheating, the reduction in cartel duration should be more pronounced for cartels in which cheating is more likely to occur. Cheating is more likely when the potential gains to be made from cheating are high, which is the case when there is a greater number of product or geographical markets that a firm could capture by deviating from the cartel agreement (Stigler 1964; Levenstein and Suslow 2006).

To illustrate, consider an example of two cartels that consist of two and four firms, each having an equal market share of their respective cartel. Each cartel member has incentives to cheat and capture part of a rival's market share. In the case of the cartel that has two members, the maximum incremental gain of deviating from the cartel agreement is an increase in

market share of 50%. However, successful cheating can increase the market share by 75% when a cartel has four members. Similarly, a firm that colludes with three firms operating in three different countries can gain, through cheating, a larger geographical market than a firm in a cartel that operates in just two countries. Additionally, prior literature identifies diversity of business cultures and geographically dispersed production sites in international cartels to be factors that increase the information needed to detect cheating (Zimmerman and Connor 2005). International accounting standards can facilitate information gathering in the international setting by providing comparable information that can be used to detect deviations from the cartel agreement. We expect that transparent cartels operating in a greater number of geographic markets will have lower durations than transparent cartels operating in environments with low opportunity costs of cooperation:

H2: *Reporting transparency reduces the cartel duration of cartels, and more so for cartels with high opportunity costs of cooperation.*

2.4 Research design

2.4.1 Sample selection

The sample consists of all listed firms that infringed Article 101 of the Treaty on the Functioning of the European Union and were convicted by the European Commission between 1980 and 2010. As the information on cartel cases is disclosed only when the investigation is completed, the dates over which the cartels operated range between 1981 and 2005. Thus, our sample period largely precedes the period of mandatory IFRS adoption. Our sample selection procedure has implications for the interpretation of our results. The choice to adopt IFRS on a voluntary basis is not random, as prior literature

shows that the adoption of non-local GAAP is caused by capital market pressure and financing needs (Cuijpers and Buijink 2005; Goncharov and Zimmermann 2007). While these factors can be seen as exogenous to the cartel setting, we acknowledge the presence of possible selection bias.

Furthermore, we use listed firms that were investigated and found to be members of cartels. This will lead to selection bias when the factors affecting the start of an investigation are correlated with reporting transparency and cartel duration. We note that there is no evidence that the European Commission uses financial statements to detect cartels. Most successful cartel investigations were triggered by cartel members breaking the cartel agreement and applying for the leniency program or by unofficial complaints from competitors or consumer associations (De 2010). For example, in our sample, about 50% of cartel members applied for the leniency program. In addition, we find that in 36% of our sample cases the investigation of the European Commission was initiated after the ending of the cartel. Thus, at least in some of our cases, the investigation could not have influenced the cartel duration.⁷ Our research design addresses the potential sample selection bias in two ways. First, we use an exogenous enforcement shock to control for the endogeneity of our transparency proxy, which allows us to identify a causal relationship between the use of international accounting standards and cartel duration (Gassen 2014). Second, we construct a proxy for the likelihood of successful investigation by the European Commission to control for the sample selection bias.

⁷ Unfortunately, we cannot separately use in our tests the subsample of firms that ended their cartel before the start of the investigation due to a lack of variation in our test variables in this subsample.

We hand-collect the data about the cartels from the Reports on Competition Policy and the Commission's website. We use the Commission's reports to calculate a cartel's duration based on the reported start and end date of the cartel. Furthermore, we use the reports to gather additional information about the number of cartel members and their identities, whether a cartel member is a repeat offender, whether one of the cartel members took part in the leniency program, whether there was a reduction in the fine, whether a cartel member was a whistleblower, and each cartel member's country of origin. We obtain data on GDP growth in each cartel member's country from the World Bank.

The initial hand-collected sample comprises 185 cartel firms. The final sample consists of the 131 firms for which accounting data are available on Worldscope. This corresponds to 186 cartel-firm observations, given that repeat offenders were part of more than one cartel. The total number of observations in the main analysis is 1,072 cartel-firm-years. Table 1 presents the sample distribution across countries, and the number of firm-years in which the cartel members followed international reporting standards.

Table 1: Sample distribution across countries

This table presents the distribution of cartel members (firm years) across countries and shows the frequency of IAS and local GAAP use in each country.

Country	N	%	Cum.	IAS	
				0	1
AUSTRALIA	5	0.47	0.47	5	0
AUSTRIA	11	1.03	1.49	7	4
BELGIUM	24	2.24	3.73	24	0
CZECH REPUBLIC	2	0.19	3.92	2	0
DENMARK	17	1.59	5.50	17	0
FINLAND	36	3.36	8.86	28	8
FRANCE	174	16.23	25.09	101	73
GERMANY	146	13.62	38.71	104	42
GREECE	3	0.28	38.99	3	0
HONG KONG	5	0.47	39.46	5	0
HUNGARY	10	0.93	40.39	0	10
ITALY	36	3.36	43.75	10	26
JAPAN	199	18.56	62.31	140	59
KOREA (SOUTH)	3	0.28	62.59	3	0
LUXEMBOURG	2	0.19	62.78	0	2
NETHERLANDS	75	7.00	69.78	72	3
NORWAY	3	0.28	70.06	3	0
SINGAPORE	1	0.09	70.15	1	0
SOUTH AFRICA	9	0.84	70.99	5	4
SPAIN	44	4.10	75.09	44	0
SWEDEN	25	2.33	77.43	20	5
SWITZERLAND	18	1.68	79.10	2	16
TAIWAN	6	0.56	79.66	6	0
UNITED KINGDOM	80	7.46	87.13	78	2
UNITED STATES	138	12.87	100.00	0	138
Total	1,072	100.00		680	392

Notes: IAS equals 1 if a firm follows international reporting standards according to Daske et al. (2013, online supplement) or U.S. GAAP; and 0 otherwise.

Table 2 reports descriptive statistics for the experimental and control variables. The average cartel duration is 10.68 years,⁸ which is close to the average of 10.84 years reported in De (2010). The mean cartel fine levied by the European Commission is €63.41 million. The average (median) cartel has 18.11 (13) member firms, and 37% of the sample firms report under international accounting standards.

⁸ The cartel duration remains stable over our sample period and there is a weak correlation between cartel duration and the time trend variable (Spearman correlation 8%).

Table 2: Descriptive statistics

This table presents descriptive statistics for the full sample of cartel members from 1981 to 2005.

N=1,072	MEAN	SD	P25	P50	P75	N
<i>DUR</i>	10.68	5.65	6.00	10.00	14.00	1,072
<i>LN(DUR)</i>	2.22	0.57	1.79	2.30	2.64	1,072
<i>IAS</i>	0.37	0.48	0.00	0.00	1.00	1,072
<i>LENIENCY</i>	0.50	0.50	0.00	0.00	1.00	1,072
<i>LN(FINE)</i>	12.81	26.52	0.47	2.79	10.59	1,072
<i>REPEAT</i>	0.49	0.50	0.00	0.00	1.00	1,072
<i>#MEMBER</i>	18.11	13.31	11.00	13.00	21.00	1,072
<i>LN(SIZE)</i>	15.78	1.54	14.78	15.83	17.01	1,072
<i>#SEG</i>	3.64	2.16	1.00	4.00	5.00	1,072
<i>GDP_GROWTH</i>	2.45	1.83	1.26	2.39	3.72	1,072
<i>REDUCTION</i>	17.69	28.88	0.00	0.00	30.00	1,072
<i>WHISTLE</i>	0.08	0.27	0.00	0.00	0.00	1,072
<i>ROA</i>	0.08	0.06	0.04	0.08	0.11	1,062
<i>LEV</i>	0.67	0.15	0.58	0.67	0.77	1,072
<i>INFO_EVENT</i>	0.80	0.39	1.00	1.00	1.00	1,072

Notes: *DUR* measures cartel duration in years. *LN(DUR)* is the natural logarithm of *DUR*. *IAS* is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. *LENIENCY* is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. *LN(FINE)* is the natural logarithm of the fine determined by the European Commission scaled by total assets. *REPEAT* is an indicator variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period, and 0 otherwise. *#MEMBER* is number of cartel members. *LN(SIZE)* is the natural logarithm of total assets in US\$. *#SEG* is the number of reported segments. *GDP_GROWTH* is the percentage change of each country's GDP. *REDUCTION* is the relative reduction of the fine granted by the European Commission for cooperating in the investigation. *WHISTLE* equals 1 if the company reported cartel membership to the European Commission; and 0 otherwise. *LEV* is the firm's leverage measured as the ratio of total liabilities to total assets. *ROA* is the firm's return on assets calculated as the ratio of earnings before interest and taxes to total assets.

2.4.2 Survival analysis

We use the survival analysis technique to investigate determinants of cartel duration measured in years. Since lifetime data often violates the normality distribution, we estimate our models using Cox proportional hazard regression. This method is commonly applied in duration analysis because it does not assume any underlying distribution (De 2010; Jenkins 2004; Levenstein and Suslow 2011; Cox 1972; Lambert 2007; Cleves et al. 2008).

We estimate the hazard rate, which reveals the probability of exit from a state in the next time period given survival up to that time (De 2010; Levenstein and Suslow 2011; Cleves et al. 2008). The hazard rate is one plus the marginal effect of changing the explanatory variable by one unit. We tabulate the estimated hazard coefficients, which can be transformed into the hazard rate by calculating the exponential of the coefficient (Cleves et al. 2008). Thus, a *positive* coefficient represents a higher hazard rate, which implies a *reduction* in the firms' duration of membership of the cartel. For instance, if the coefficient of *IAS* in model (1) is 0.18, firms following an international accounting standard face a 20% higher hazard of exiting the cartel in the next year than local GAAP firms ($\exp(0.18)=1.20$ and $1.20-1=0.20$). In our baseline model the hazard function for firm i is given by:

$$h(t) = h_0(t) \exp(\beta_1 IAS_{it} + \beta_2 LENIENCY_{it} + \beta_3 FINE_{it} + \beta_4 REPEAT_{it} + \beta_5 MEMBER_{it} + \beta_6 LN(SIZE)_{it} + \beta_7 SEG_{it} + \beta_8 GDP_GROWTH_{it} + \text{Fixed Effects}) \quad (1)$$

where $h_0(t)$ denotes the baseline hazard function and t is the elapsed time since the firm first became part of the cartel. We assume that the cartel is terminated when the first cartel member exits the cartel.⁹ Prior evidence shows that international accounting standards increase transparency by requiring comparable information to be provided and by mandating more informative disclosure (Daske et al. 2013; Lang et al. 2012; Byard et al. 2011). We conjecture that a cartel reports more transparently if at least one cartel member follows international accounting standards.¹⁰ We use a dummy variable *IAS*

⁹ In 14 percent of the sample cases, cartels survive for more than one year after the first firm exits the cartel. Our results are qualitatively similar when we assume that cartel is terminated when the last firm exits the cartel (see De 2010).

¹⁰ Note that we can only observe data on publicly-traded cartel members, and thus we exclude private firms. However, private firms were only recently required to use IFRS in some countries. Thus, the coding of our test variable is not affected by our sample selection.

that equals one if the company follows an international reporting standard (IFRS or U.S. GAAP), based on Worldscope and Daske et al. (2013). A positive coefficient on *IAS* shows that transparency lowers cartel duration as predicted by hypothesis 1b (Suslow 2005; De 2010). Hypothesis 1a predicts that transparency reduces contracting costs and increases cartel duration ($\beta_I < 0$).

We use a set of control variables predicted to affect cartel duration. First, changes in the antitrust policy and enforcement affect cartel duration. To control for changes in the E.U.'s antitrust policy, we focus on the use of the leniency program, which guarantees a reduction in the fine associated with an infringement. The introduction of a leniency program was expected to increase the likelihood of cartel breakdowns because it gives firms incentives to self-report their own antitrust violations in exchange for a reduction in the fine (Brenner 2009). However, Harrington and Chang (2009) predict and find that, if the leniency policy is effective, then the duration of the detected cartels should increase. In this case, the leniency program gives cartel members a means to punish defecting cartel members because cartels notifying the European Commission about the existence of the cartel pay a reduced fine, while the cheater has to face the full penalty. We use an indicator variable that equals one for cartel firms that participated in the leniency program and predict a negative coefficient on *LENIENCY*. We also use the natural logarithm of imposed fines as a proportion of total assets ($LN(FINE)$) to control for changes in the enforcement of antitrust policies. Higher fines can be a result of stricter enforcement, which destabilizes cartels, or they can sustain cartels by increasing the costs of breaking them up (Connor 2004).

Second, we control for the cartel's internal organizational structure. Repeat offenders most likely experience higher scrutiny from external parties since they have previously formed cartels (De 2010). Thus, being a repeat offender is predicted to reduce cartel duration. We use an indicator variable that equals one if a cartel member is a repeat offender and zero otherwise (*REPEAT*). We also control for the number of cartel members (*#MEMBER*) because the number of cartel members has been shown to impact cartel duration (Levenstein and Suslow 2011; Stigler 1964; Posner 1970). While theory predicts that cartel duration should decrease with respect to the number of cartel members, empirical evidence so far has been unable to unambiguously document this effect (De 2010).

Third, we use information from the financial statements of public firms included in our sample to proxy for characteristics of the cartel firms. We include the natural logarithm of total assets (*LN(SIZE)*) to control for size effects. Larger firms may face higher reputational losses as a result of the detection of the cartel, which should reduce their incentive to cheat and increase their monitoring efforts. Financial statements aggregate information across different segments; some of these segments will be a part of the cartel, while a firm may compete in other segments outside of the cartel. A higher number of segments may reduce the informativeness of financial statements in respect of the segments that are part of the cartel. We use each firm's number of reported segments (*#SEG*) to control for this effect.

Fourth, we note that macroeconomic fluctuations, which impose a shock of the cartel members' economic environment, can affect cartel stability. Cartel stability may decrease because cartel members may not be able to differentiate the exogenous macroeconomic shock from the actual cheating

behavior of fellow cartel members (Levenstein and Suslow 2011; Green and Porter 1984; Suslow 2005). We use GDP growth to control for economy wide factors influencing cartel duration.

2.4.3 Identification strategy

Our sample includes firms that *choose* to adopt IFRS. Furthermore, prior literature shows that high-quality accounting rules lead to higher transparency only when they are sufficiently enforced (Ball et al. 2003; Daske et al. 2013). To control for the endogeneity of *IAS*, we follow the identification strategy in Hail et al. (2014) and use the first enforcement of insider trading from Bhattacharya and Daouk (2002) as an exogenous shock that increases accounting quality. The first enforcement of insider trading has been shown to improve reporting quality, increase analyst following, increase the scope of analyst forecasts, and lead to more informative share prices (Bushman et al. 2005; Hail 2007; Fernandes and Ferreira 2009; Jayaraman 2012). Moreover, the use of insider trading enforcement is advantageous from an econometric perspective because it shows considerable variation across countries and is exogenous to individual firms (Bhattacharya and Daouk 2002; Jayaraman 2012). The earliest year of insider trading enforcement in our sample is 1961, in the United States, and the latest is 1996, in Australia, Greece, and Italy. We use the difference-in-differences research design to shed light on the causal effect of reporting transparency on cartel duration, and augment the hazard model (1) with an indicator variable for the first year of insider trading enforcement (*INFO_EVENT*) and an interaction term $IAS \times INFO_EVENT$. We focus on the interaction term coefficient, which shows whether the cartel

duration increases (hypothesis 1a) or decreases (hypothesis 1b) with significant improvements in the company's information environment.

2.5 Results

2.5.1 Testing of hypotheses 1a and 1b

To examine whether reporting transparency affects cartel duration, we first conduct a univariate test and compare the mean cartel duration of firms that follow international accounting standards against that of firms that report under local GAAP. Hypothesis 1a predicts that reporting transparency increases cartel duration by decreasing contracting costs. Hypothesis 1b predicts that duration decreases because reporting transparency facilitates the detection of cheating. The results of this analysis are reported in panel A of Table 3 and show that the mean duration for firms' following international standards (9.48 years) is significantly lower than that for firms following local GAAP (11.37 years; t-stat. 5.43). This evidence supports hypothesis 1b and suggests that reporting transparency decreases cartel duration.

We next use the hazard model (1) to control for other determinants of cartel duration. The coefficient on *IAS* in panel B of Table 3 shows whether reporting transparency reduces contracting costs and thereby increases each firm's stay in the cartel or whether it enables cartel members to detect cheating earlier since the one-time gains of cheating outweigh the potential benefits of staying in the cartel. We report the estimated hazard coefficients and associated z-statistics based on standard errors clustered at the cartel-firm level. We find that our main test variable *IAS* satisfies the proportional hazard assumption of the Cox model (Schoenfeld residuals test $\chi^2 = 0.00$, $p = 0.97$).

Table 3: Reporting transparency and cartel membership duration

This table examines whether reporting transparency affects cartel membership duration. Panel A compares the mean cartel duration between the sub-sample of firm-years following international accounting standards and a sub-sample of firms that follow local GAAP. Panel B reports the results of Cox proportional hazard model. The dependent variable is the hazard rate. A positive coefficient implies a positive impact on the hazard rate and thus a lower expected lifetime of the firm in the cartel. Negative coefficients imply longer expected cartel duration.

<i>Panel A. International accounting standards and average cartel duration</i>						
Sample		Mean cartel duration	t-stat.			
International accounting standards		9.48 years	5.43			
Local GAAP		11.37 years				
<i>Panel B: Cox proportional hazard model</i>						
	Predicted sign	(1)	(2)	(3)	(4)	(5)
<i>IAS</i>	+/-	0.61* (1.84)	1.01* (1.89)	1.00* (1.86)	0.91* (1.78)	1.01* (1.89)
<i>LENIENCY</i>	-	-1.12*** (2.88)	-1.71*** (4.12)	-1.79*** (3.92)		-1.71*** (4.12)
<i>LN(FINE)</i>	+/-	-0.02** (2.03)	-0.06*** (3.95)	-0.06*** (3.96)	-0.05*** (3.85)	-0.06*** (3.95)
<i>REPEAT</i>	+	-0.37 (1.05)	-1.37* (1.94)	-1.41* (1.91)	-1.04* (1.56)	-1.37* (1.94)
<i>#MEMBER</i>	+/-	-0.01 (1.10)	-0.02 (0.92)	-0.02 (0.88)	-0.02 (1.01)	-0.02 (0.92)
<i>LN(SIZE)</i>	-	-0.31** (2.22)	-0.41 (1.60)	-0.40 (1.55)	-0.41* (1.78)	-0.41 (1.60)
<i>#SEG</i>	+/-	0.09 (1.24)	0.06 (0.67)	0.05 (0.59)	0.03 (0.33)	0.06 (0.67)
<i>GDP_GROWTH</i>	+	0.03 (0.36)	0.39* (1.90)	0.40* (1.83)	0.31 (1.58)	0.39* (1.90)
<i>WHISTLE</i>	+			0.37 (0.51)		
<i>REDUCTION</i>	-				-0.01* (1.65)	
<i>ROA</i>	-				-0.43 (0.14)	
<i>LEV</i>	+				-0.67 (0.37)	
<i>GOOD_CG</i>	+/-					6.05*** (4.75)
Country, industry, and year fixed effects		No	Included	Included	Included	Included
Pseudo R ²		6%	36%	36%	36%	36%
N		1,072	1,072	1,072	1,062	1,058

Notes: *IAS* is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. *LENIENCY* is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. *LN(FINE)* is the natural logarithm of the fine determined by the European Commission scaled by total assets. *REPEAT* is an indicator variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period and 0 otherwise. *#MEMBER* is

[continued]

number of cartel members. $LN(SIZE)$ is the natural logarithm of total assets in US\$. $\#SEG$ is the number of reported segments. GDP_GROWTH is the percentage change of each country's GDP. $REDUCTION$ is the relative reduction of the fine granted by the European Commission for cooperating in the investigation. $WHISTLE$ equals 1 if the company reported cartel membership to the European Commission; and 0 otherwise. LEV is the firm's leverage measured as the ratio of total liabilities to total assets. ROA is the firm's return on assets calculated as the ratio of earnings before interest and taxes to total assets. $GOOD_CG$ is an indicator variable which equals 1 if the cartel firm's country of origin has high value of the anti-director-rights index; and 0 otherwise. Z-statistics are reported in parentheses and are based on robust standard errors clustered by cartel-firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

We use the introduction of the leniency program by the European Commission to control for changes in the cartel enforcement environment. Our results show that the coefficient on *LENIENCY* is negative and statistically significant (column (1): coeff. -1.12 , z-stat. 2.88). This result supports the prediction in Harrington and Chang (2009) that the leniency policy, if effective, should increase the duration of any detected cartel. Furthermore, we find that levied fines ($LN(FINE)$) prolong the lifetime of cartels (column (1): coeff. -0.02 , z-stat. 2.03). This finding is consistent with our prediction that higher fines increase the costs of breaking a cartel up. Finally, we find a positive and statistically significant coefficient on repeat offenders (*REPEAT*) in columns (2) to (5). This suggests that repeat offenders exhibit longer time spans in cartels, which contradicts our predictions but may be explained by the fact that repeat offenders are more experienced with cartel coordination and avoiding prosecution. In all specifications the coefficients on the other control variables have the predicted signs but are not significant at the conventional level.

Turning to our test variable, we find a positive and significant coefficient on the indicator for following international accounting standards (column (1): coeff. 0.61 ; z-stat. 1.84). This result supports our univariate analysis and confirms that higher reporting transparency reveals cheating by

cartel members, which destabilizes cartels. The exponential of the coefficient ($\exp(0.61)=1.84$) is the hazard ratio, which equals one plus the marginal effect for firms following an international standard. Thus, we estimate that the likelihood of leaving the cartel in the next year increases by 84% ($=1.84-1$) for firms following an international reporting standard, holding other control variables constant. To alleviate concerns that our results may be driven by country and industry characteristics or changes in cartel regulation over time, column (2) introduces controls for the country, industry (based on the Fama-French 10 industry classification), and year fixed effects.¹¹ We find that the coefficient on *IAS* remains positive when we use fixed effects. These findings support hypothesis 1b.

We next use a broader set of control variables to assess the robustness of our results to other possible determinants of cartel duration. In column (3), we include an indicator variable to control for the whistleblowing in the cartel (*WHISTLE*), as whistleblowers attract the attention of regulators and reduce cartel duration. The results in column (4) stem from the use of the relative reduction in the fine, granted to firms that cooperate with the investigation (*REDUCTION*), instead of *LENIENCY*, to more directly model the firm benefits due to the introduction of the leniency program. Similar to our finding for *LENIENCY*, we predict that a reduction in the fine should increase cartel duration. Column (4) uses return on assets (*ROA*) and firm leverage (*LEV*) as further controls for firm-specific incentives. Financial distress may increase incentives to cheat since additional profits may help to overcome liquidity shortfalls or prevent covenant violations (Busse 2002; Levenstein and Suslow

¹¹ Including fixed effects does not allow us to identify the effect of countries with a small number of data points. Therefore, we replicated our results using countries with at least 20 data points. These additional tests did not change the inferences of our analysis.

2011). We use firm leverage (*LEV*) as our proxy for proximity to covenant violations and the availability of financing to cover short-term liquidity needs. We use *ROA* as a proxy for the financial health of the company.

Finally, results in González et al. (2013) show that corporate governance affects price fixing and other types of illegal corporate behavior. Our previous models control for country fixed effects, and thus cross-country variation in governance and enforcement. La Porta et al. (1998) show the importance of the legal protection of investor rights as a country-level corporate governance mechanism. Therefore, we additionally control for cross-country variation in investor protection and classify countries into high versus low investor protection regimes based on the median split of the anti-director-rights index (La Porta et al. 1998; La Porta et al. 2000).¹² The resulting indicator variable *GOOD_CG* takes the value of one if the country has high investor protection and zero otherwise. Column (5) reports a positive and statistically significant coefficient on *GOOD_CG*; cartel members from countries with high corporate governance standards exhibit lower time spans in cartels. Critically, we continue to find that reporting transparency reduces cartel duration after including additional control variables.

Overall, our results support hypothesis 1b and show that cartel duration is negatively associated with the members' reporting transparency. We next use the time of the first enforcement of insider trading laws to infer the causal relationship between our transparency proxy and cartel duration. Prior studies suggest that higher transparency is only effective when appropriately enforced (Ball et al. 2003; Daske et al. 2013). Therefore, we use an external shock to

¹² We lose 14 cartel-firm-years due to the unavailability of the anti-director-rights index for the Czech Republic, Hungary, and Luxembourg.

enforcement, which has been shown to affect reporting quality (Bushman et al. 2005; Hail 2007; Fernandes and Ferreira 2009; Jayaraman 2012). The interaction term between *INFO_EVENT* and *IAS* shows the incremental effect of transparency for *IAS* firms after the introduction of insider trading laws. The positive coefficient of the interaction term is consistent with hypothesis 1b. We report the results of our identification test in Table 4.

Table 4: Exogenous shock to reporting quality and cartel membership duration

This table examines the causal relationship between reporting transparency and cartel duration using a difference-in-differences design. Columns (1) and (2) report results of the Cox proportional hazard model estimations, where the dependent variable is the hazard rate. A positive coefficient implies a positive impact on the hazard rate and thus a lower expected lifetime of the firm in the cartel. Negative coefficients imply a longer expected life. Columns (3) and (4) report the coefficients of the OLS estimation with $-1 \times \ln(DUR)$ as the dependent variable.

	Predicted signs	<i>Hazard model</i>		Dependent variable: $-1 \times \ln(DUR)$	
	Hazard	(1)	(2)	(3)	(4)
<i>IAS</i>	+/-	-0.13 (0.26)	-0.99 (1.59)	-0.10** (2.20)	-0.09* (1.81)
<i>INFO_EVENT</i>	+/-	-1.25*** (2.69)	-0.20 (0.21)	-0.10 (1.11)	-0.08 (0.85)
<i>IAS</i> × <i>INFO_EVENT</i>	+/-	1.39*** (2.91)	2.61*** (3.02)	0.33*** (3.08)	0.34*** (3.33)
<i>LENIENCY</i>	-		-1.59*** (3.57)		-0.11 (1.28)
<i>LN(FINE)</i>	+/-		-0.06*** (4.09)		-0.00 (1.44)
<i>REPEAT</i>	+		-1.38** (2.31)		0.04 (0.50)
<i>#MEMBER</i>	+/-		-0.02 (0.94)		-0.01* (2.00)
<i>LN(SIZE)</i>	-		-0.56** (2.53)		-0.06 (1.16)
<i>#SEG</i>	+/-		0.02 (0.25)		0.02 (1.06)
<i>GDP_GROWTH</i>	+		0.38** (2.26)		-0.00 (0.38)
Country, industry, and year fixed effects		Included	Included	Included	Included
Pseudo R ²		29%	37%		
Adj. R ²				41%	43%
N		1,072	1,072	1,072	1,072

Notes: *IAS* is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. *INFO_EVENT* equals 1 starting from the first date of insider trading law enforcement; and 0 otherwise. *LENIENCY* is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. *LN(FINE)* is the natural logarithm of the fine determined by the European Commission scaled by total assets. *REPEAT* is an indicator variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period, and 0 otherwise. *#MEMBER* is number of cartel members. *LN(SIZE)* is the natural logarithm of total assets in US\$. *#SEG* is the number of reported segments. *GDP_GROWTH* is the percentage change of each country's GDP. Z-statistics (hazard model) and t-statistics (OLS) are reported in parentheses and are based on robust standard errors clustered by cartel-firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Columns (1) and (2) report the results for the proportional hazard model. We find that the coefficient on the interaction term $IAS \times INFO_EVENT$ is positive and significant at the conventional level (coeff. 2.61; z-stat. 3.02). This result is in line with our prior findings that transparency reduces cartel duration, because it reveals deviations from the cartel agreement. An untabulated joint test of the main and interaction effects suggests that the overall effect of following international standards in the aftermath of insider trading enforcement increases the hazard rate. The combined coefficient is positive and is about two standard errors away from zero (coeff. 1.26; z-stat 1.95).

Table 4 also reports the results of the linear probability model (OLS) to provide a different presentation of our results. We caution the reader to interpret these results with care, as OLS assumptions are violated in our setting. The OLS model uses the natural logarithm of cartel duration as the dependent variable ($LN(DUR)$). We multiply the dependent variable by minus one to enable a similar interpretation of the coefficient signs. We expect and find a negative and statistically significant coefficient on the interaction term $IAS \times INFO_EVENT$ (coeff. 0.34, t-stat. 3.33). This result suggests that being more transparent decreases cartel duration and gives further support to hypothesis 1b.

2.5.2 Testing of hypothesis 2

Our prior results show that reporting transparency, on average, destabilizes cartels and lowers cartel duration. Hypothesis 2 predicts that, in this case, the effect of reporting transparency should be more pronounced in cartels with high gains to be made from cheating, than in cartels with lower

potential gains. Furthermore, we argue that potential gains from cheating are a function of the number of geographic markets that a cartel firm could potentially acquire by deviating from the cartel agreement. Firms typically have a strong presence in their home market and look to enter other countries where their competitors are domiciled. Therefore, we look at the country of domicile of each cartel member and count the number of different countries in each cartel. We then assign firms into quintiles based on the number of different countries in their cartel, and compare those with the highest number of different countries (4th and 5th quintiles) to those with the lowest number of countries (1st and 2nd quintiles). We augment equation (1) with dummy variables capturing a high and low number of different countries (*LOW_CHEAT* and *HIGH_CHEAT*, respectively), and the interactions between each of these dummy variables and *IAS*. Table 5 reports the estimation results without fixed effects in columns (1) and (2) and those after controlling for fixed effects in columns (3) and (4).

Table 5: Cross-sectional differences in cheating gains and cartel duration

This table explores whether the effect of reporting transparency on cartel duration is conditional on cross-sectional differences in potential gains of deviating from the cartel agreement. Panel A reports results of the Cox proportional hazard model, where the dependent variable is the hazard rate. A positive coefficient implies a positive impact on the hazard rate and thus a lower expected lifetime of the cartel. Negative coefficients imply a longer expected life. Panel B tests hypothesis 2 and reports the z-test of the null hypothesis: $IAS + IAS \times LOW_CHEAT = IAS + IAS \times HIGH_CHEAT$ (based on the estimates from columns (1) and (2) and columns (3) and (4)).

Panel A: Cox proportional hazard models

	Predicted sign	(1)	(2)	(3)	(4)
<i>IAS</i>	+/-	1.11*** (2.67)	0.38 (0.77)	1.84** (2.39)	0.28 (0.49)
<i>LOW_CHEAT</i>	+/-	0.27 (0.51)		1.08 (1.62)	
<i>IAS</i> × <i>LOW_CHEAT</i>	-	-1.25* (1.71)		-2.43** (2.47)	
<i>HIGH_CHEAT</i>	+/-		1.25** (2.36)		1.23 (1.64)
<i>IAS</i> × <i>HIGH_CHEAT</i>	+		0.42 (0.61)		1.01 (1.44)
<i>LENIENCY</i>	-	-1.24*** (3.16)	-1.13*** (2.82)	-2.04*** (4.13)	-1.96*** (4.30)
<i>LN(FINE)</i>	+/-	-0.02* (1.83)	-0.02** (1.97)	-0.06*** (3.37)	-0.05*** (3.51)
<i>REPEAT</i>	+	-0.37 (1.02)	-0.24 (0.71)	-1.30* (1.80)	-1.42** (2.11)
<i>#MEMBER</i>	+/-	-0.02 (1.27)	-0.05** (2.40)	-0.02 (0.80)	-0.06 (1.61)
<i>LN(SIZE)</i>	-	-0.33** (2.43)	-0.27* (1.93)	-0.56* (1.73)	-0.37 (1.24)
<i>#SEG</i>	+/-	0.11 (1.50)	0.07 (0.99)	0.06 (0.62)	0.07 (0.77)
<i>GDP_GROWTH</i>	+	-0.05 (0.58)	-0.00 (0.05)	0.37* (1.76)	0.30 (1.47)
Country, industry, and year fixed effects		No	No	Included	Included
Pseudo R ²		7%	9%	38%	39%
N		1,072	1,072	1,072	1,072

Panel B: Z-test of the null hypothesis: $IAS + IAS \times LOW_CHEAT = IAS + IAS \times HIGH_CHEAT$

	Column (1) vs. (2)	Column (3) vs. (4)
Z-test of high vs. low cheating gains	3.57 (p<0.01)	4.12 (p<0.01)

Notes: *IAS* is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. *LOW_CHEAT* equals 1 if the number of countries of origin within the cartel is in the 1st and 2nd quintile and 0 otherwise. *HIGH_CHEAT* equals 1 if the number of countries of origin within the cartel is in the 4th and 5th quintile, and 0 otherwise. *LENIENCY* is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. *LN(FINE)* is the natural logarithm of the fine determined by the European Commission scaled by total assets. *REPEAT* is an indicator variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period, and 0 otherwise. *#MEMBER* is number of cartel members. *LN(SIZE)* is the natural logarithm of total assets in US\$. *#SEG* is

[continued]

the number of reported segments. GDP_GROWTH is the percentage change of each country's GDP. Z-statistics are reported in parentheses and are based on robust standard errors clustered by cartel-firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Columns (1) and (3) examine the relationship between reporting transparency and cartel duration for firms with low potential gains to be made from cheating. In this set-up, the coefficient of the interaction term $IAS \times LOW_CHEAT$ shows the *incremental* effect of reporting transparency on cartel duration for cartels with low cheating gains relative to other cartels. The sum of the coefficients on IAS and $IAS \times LOW_CHEAT$ shows the effect of transparent reporting for the subsample of firms with low potential gains from cheating. Similarly, the coefficient on $IAS \times HIGH_CHEAT$ in columns (2) and (4) shows the incremental effect of reporting transparency on cartel duration for firms with high opportunity costs of sustaining the cartel agreement relative to other firms. The sum of coefficients on IAS and $IAS \times LOW_CHEAT$ shows the effect for cartels with a high cheating likelihood. Hypothesis 2 predicts that the coefficient on $HIGH_CHEAT \times IAS$ will be higher than the coefficient on $LOW_CHEAT \times IAS$. That is, reporting transparency reduces cartel duration, and more so for cartels with high opportunity costs of cooperation.

Columns (3) and (4) of Table 5 report a positive coefficient on $HIGH_CHEAT \times IAS$. Consistent with hypothesis 2 and our prior evidence, we further find that cartel duration is lower when cartel members report transparently and have high opportunity costs of cooperation: This effect is measured by the sum of the coefficients on IAS and on the interaction term $HIGH_CHEAT \times IAS$ and equals 0.79 (z-stat. 1.65) and 1.29 (z-stat. 1.93) in columns (2) and (4), respectively. We report a formal test of hypothesis 2 at the

bottom of Table 5. We predict and find that the effect of reporting transparency is more pronounced when cartel members have high gains to be made from cheating than when cartel members have low opportunity costs of cooperation (0.79 in column (2) vs. -0.14 in column (1); z -stat. 3.57). This evidence supports hypothesis 2.

Finally, we report the results for cartels with low gains to be made from cheating in columns (1) and (3). We find that the coefficient on the interaction term $IAS \times LOW_CHEAT$ is negative and statistically significant (column (1): coeff. -1.25 ; z -stat. 1.71; column (3): coeff. -2.43 , z -stat. 2.47). We also find that the sum of the coefficients on IAS and $IAS \times LOW_CHEAT$ is negative, suggesting that reporting transparency prolongs the duration of cartels with low opportunity costs of cooperation. However, the sum of coefficients is not significant at the conventional level. Jointly, these results provide weak support for hypothesis 1a and show that reporting transparency can have contracting benefits and prolong the duration of cartels with relatively low potential gains from cheating.

Overall, we find that transparent reporting prompts an earlier detection of deviations from the cartel agreement, which initiates the break-up of the cartel. Such a break-up is likely when cartel firms have high gains to be made from violating the cartel agreement. However, cartels with low opportunity costs of coordination may enjoy some contracting benefits as a result of transparent reporting and thus endure longer.

2.6 Robustness tests

2.6.1 Cartel duration and selectivity issues

This analysis uses a sample of convicted cartel members. Hence, our sample is not random, because it omits firms that participated in the cartel but were not indicted by the European Commission for their anticompetitive behavior. As a result, our results may suffer from omitted variable bias if reporting transparency is correlated with the likelihood of being prosecuted by the European Commission. We use the two-stage Heckman estimation method to control for the selection bias.¹³ In the first stage, we model the likelihood of being indicted by the European Commission, that is, the likelihood of being included in our main test sample. We then include the estimate of the inverse Mills ratio (*MILLS*) as an additional explanatory variable in equation (1) to control for the omitted variable problem (Heckman 1979).

$$\begin{aligned} \text{Prob}(\text{DETECT} = 1) = & \alpha_0 + \beta_1 \text{DIST}_{it} + \beta_2 \text{LN}(\text{SIZE})_{it} \\ & + \beta_3 \text{SALES_GROWTH}_{it} + \beta_4 \text{ROA} \\ & + \beta_5 \text{CASES}_{it} + \text{Fixed effects} + \varepsilon_{it} \end{aligned} \quad (2)$$

Equation (2) is a Probit regression that models the likelihood of being indicted by the European Commission. The dependent variable (*DETECT*) is an indicator variable that equals one for all cartel firm-years and zero for the (non-cartel) control firms. Ideally, we would like to have used a sample of control firms that participated in the cartels but were not prosecuted by the European Commission. However, as such cases are not observable we use a matched sample of control firms that are similar to our cartel firms in a number

¹³ We are not aware of prior studies that have used this or some other approach to deal with the selection bias in the context of the Cox proportional hazard model. The two-stage Heckman method was developed for linear probability models, but was later shown to be applicable for the non-linear probit regression (Rivers and Vuong 1988). Furthermore, the use of the two-stage approach allows us to control for the likelihood that a firm is included in our sample, and thus to address the omitted variable in the second-stage Cox proportional hazard model.

of important characteristics. We match the convicted cartel members to firms from same countries based on the four-digit SIC code, year, and size resulting in 1,072 control firm-year observations.

The identification restriction of our two-stage model requires us to identify at least one independent variable in the first-stage regression that is predicted to explain the detection by the European Commission but is not correlated to the firm's duration in the cartel (Lennox et al. 2011). We use the firm's distance from the European Commission (*DIST*) to identify the equation system, since it is likely to increase the odds of being indicted by the European Commission but not to influence the cartel's duration.¹⁴ Previous literature predicts that the proximity of a firm to its regulator affects the effectiveness of regulation (DeFond et al. 2011). For example, Kedia and Rajgopal (2011) find that regulation is most effective when it is local. We predict that firms at a greater geographic distance (based on their headquarters) from the regulator's main office in Brussels are less likely to be indicted by the European Commission.

Equation (2) further controls for the firm size ($LN(SIZE)$) since larger firms are more visible to the regulator, competitors, and consumers, increasing the likelihood of informal complaints. We use the firm's sales growth (*SALES_GROWTH*), which may signal abnormally high product prices set by the cartel agreement. The firm's return on assets (*ROA*) measures profitability, which may reveal to competitors, consumers, or the regulator that a firm is abusing its market power. We use the number of cartel cases detected in a given year (*#CASES*) to proxy for the stringency of the European

¹⁴ We find that *DIST* is correlated with the likelihood of cartel detection ($p < 0.01$) and is not correlated with cartel duration ($p = 0.58$).

Commission's enforcement. We also include industry and year fixed effects to control for time-invariant industry and year-specific effects.

Table 6: Cartel duration and selection bias

This table controls for sample selection bias using the two-stage procedure: Panel A reports results of the first stage probit estimation using a sample of cartel firms (N = 1,072) and a sample of firms matched by country, year and four-digit SIC code (N = 1,072). The dependent variable is *DETECT* which equals 1 for cartel firms indicted by the European Commission for forming an illegal cartel; and 0 otherwise. Panel B shows the results of the second-stage proportional hazard model that includes the inverse Mills ratio. In the Cox proportional hazard model estimations, the dependent variable is the hazard rate and a positive coefficient implies a positive impact on the hazard rate and thus a lower expected lifetime of the firm in the cartel.

<i>Panel A: First-stage</i>	Predicted signs	Probit	
<i>DIST</i>	–	–0.06**	
		(2.33)	
<i>LN(SIZE)</i>	+	0.31***	
		(4.62)	
<i>SALES_GROWTH</i>	+	0.68***	
		(3.50)	
<i>ROA</i>	+	0.84	
		(1.03)	
<i>#CASES</i>	+	0.07	
		(0.46)	
Industry and year fixed effects		Included	
Pseudo R ²		17%	
N		2,144	

<i>Panel B: Second stage</i>	Predicted signs	Hazard model	
		(1)	(2)
<i>IAS</i>	+/-	0.98*	–1.08*
		(1.77)	(1.66)
<i>INFO_EVENT</i>	+/-		–0.09
			(0.08)
<i>IAS</i> × <i>INFO_EVENT</i>	+/-		2.66***
			(2.91)
<i>LENIENCY</i>	–	–1.74***	–1.63***
		(3.91)	(3.22)
<i>LN(FINE)</i>	+/-	–0.06***	–0.06***
		(3.92)	(3.93)
<i>REPEAT</i>	+/-	–1.33*	–1.33**
		(1.87)	(2.29)
<i>#MEMBER</i>	+/-	–0.02	–0.02
		(0.95)	(0.93)
<i>LN(SIZE)</i>	–	–0.51	–0.74**
		(1.56)	(1.96)
<i>#SEG</i>	+/-	0.06	0.03
		(0.69)	(0.34)
<i>GDP_GROWTH</i>	+	0.38*	0.36**
		(1.86)	(2.25)

<i>[continued]</i>			
<i>MILLS</i>	+/-	-0.47 (0.55)	-0.75 (0.80)
Country, industry, and year fixed effects		Included	Included
Pseudo R ²		36%	37%
N		1,072	1,072

Notes: DIST is the distance in miles (in th.) between the firm's location (headquarter) and the European Commission's headquarter in Brussels. LN(SIZE) is the natural logarithm of total assets in US\$. SALES_GROWTH is the firm's sales growth measured as (Salest-1)/Salest-1. ROA is the firm's return on assets measured as the ratio of earnings before interest and taxes to total assets. IAS is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. LENIENCY is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. LN(FINE) is the natural logarithm of the fine determined by the European Commission scaled by total assets. REPEAT is an indicator variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period, and 0 otherwise. #MEMBER is number of cartel members. #SEG is the number of reported segments. GDP_GROWTH is the percentage change of each country's GDP. MILLS is the inverse Mills ratio calculated based on the estimates from the first stage probit regression in panel A. Z-statistics are reported in parentheses and are based on robust standard errors clustered by cartel-firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A of Table 6 reports the results of the first-stage probit regression. We find that the proximity to the regulator increases the likelihood of being indicted. We also find that larger firms and firms with higher sales growth are more likely to have their cartels detected. We use the coefficient estimates from this first-stage regression to calculate the inverse Mills ratio (*MILLS*), which we include in equation (1) as an additional regressor. Panel B of Table 6 replicates the results of Tables 3 and 4 after controlling for the selection bias. We continue to find that transparent reporting under international accounting standards reduces cartel duration (column (1): coeff. 0.96, z-stat. 1.74). This finding supports hypothesis 1b. Column (2) shows that this result is not sensitive to our additional control for the voluntary nature of IFRS adoption using the difference-in-differences research design (coeff. 2.76, z-stat. 2.90). Untabulated results reveal that we continue to find support for

hypothesis 2 after controlling for the inverse Mills ratio.¹⁵ Overall, controlling for a selection bias does not alter our prior inferences.

2.6.2 Alternative test variables: Country-level transparency

We employ two alternative country-level metrics as alternative measures of reporting transparency. First, we use a proxy for the extent of countries' compliance with IFRS, and substitute *IASUSE* for *IAS*. *IASUSE* is based on Bhattacharya, Daouk, and Welker (2003) and varies between 0 and 2, where 0 identifies countries that do not use IFRS, 1 is assigned to countries that use IFRS as the basis for their own reporting standards, and 2 is assigned to countries that adopt IFRS. Using this variable circumvents the concern that we assign local GAAP that are very similar to IFRS to the non-IFRS group in our main tests. Also, this variable does not assume IFRS and U.S. GAAP to be similar. Second, we use a variable that measures a country's disclosure level. Higher scores for this variable correspond to greater disclosure requirements in annual reports (Bhattacharya et al. 2003). We use an indicator variable for high disclosure requirements based on the median split (*DISCLOSURE*). We use this alternative measure to broadly capture reporting transparency, as it counts the number of disclosed items in the annual report. Furthermore, greater disclosure requirements in accounting standards are associated with enhanced earnings informativeness (Bhattacharya et al. 2003). In line with our previous results and hypothesis 1b, we predict positive coefficients on *IASUSE* and *DISCLOSURE*.

Table 7 reports positive and statistically significant coefficients on *IASUSE* (coeff. 3.27; z-stat. 2.34) and on *DISCLOSURE* (coeff. 2.79; z-

¹⁵ The Z-tests of hypothesis 2 shown at the bottom of Table 5 have a p-value < 0.01 after controlling for the selection bias.

stat.1.92).¹⁶ This result provides further support for hypothesis 1b and shows that firms domiciled in countries with accounting standards that are more comparable to IFRS and with greater disclosure requirements spend less time in cartels.

Table 7: Alternative measures of reporting transparency

This table shows whether reporting transparency affects cartel duration using alternative measures of reporting transparency. The table reports results of the Cox proportional hazard model. The dependent variable is the hazard rate. A positive coefficient implies a positive impact on the hazard rate and thus a lower expected lifetime of the firm in the cartel. Negative coefficients imply longer expected cartel duration.

	Predicted sign	<i>Hazard model</i>	
		(1)	(2)
<i>IASUSE</i>	+/-	3.27** (2.34)	
<i>DISCLOSURE</i>	+/-		2.79* (1.92)
<i>LENIENCY</i>	-	-1.68*** (3.97)	-1.68*** (3.97)
<i>LN(FINE)</i>	+/-	-0.36 (1.62)	-0.36 (1.62)
<i>REPEAT</i>	+	-1.42** (1.99)	-1.42** (1.99)
<i>#MEMBER</i>	+/-	-0.03 (1.10)	-0.03 (1.10)
<i>LN(SIZE)</i>	-	0.11 (1.31)	0.11 (1.31)
<i>#SEG</i>	+/-	-0.05*** (4.08)	-0.05*** (4.08)
<i>GDP_GROWTH</i>	+	0.36* (1.78)	0.36* (1.78)
Country, industry, and year fixed effects		Included	Included
Pseudo R ²		35%	35%
N		1,049	1,055

Notes: *IASUSE* equals 1 if a cartel firm's country of domicile uses IFRS as the basis for their own reporting standards, 2 if countries adopt IFRS, and 0 otherwise according to (Bhattacharya et al. 2003). *DISCLOSURE* is an indicator which equals 1 if the disclosure level is greater than the sample median; and 0 otherwise. The disclosure scores are from Bhattacharya et al. (2003). *IAS* is an indicator variable which equals 1 if a firm follows IFRS or U.S. GAAP; and 0 otherwise. *LENIENCY* is an indicator variable which equals 1 if the respective cartel member made use of the leniency program, and 0 otherwise. *LN(FINE)* is the natural logarithm of the fine determined by the European Commission scaled by total assets. *REPEAT* is an indicator

¹⁶ The number of observations decreases because *IASUSE* is not available for the Czech Republic, Greece, Hungary, and Taiwan, and *DISCLOSURE* is not available for the Czech Republic, Greece, Hungary, and Luxembourg.

[continued]

variable which equals 1 if a cartel firm takes part in a cartel more than once during the sample period, and 0 otherwise. *MEMBER* is number of cartel members. *#SEG* is the number of reported segments. *GDP_GROWTH* is the percentage change of each country's GDP. Z-statistics are reported in parentheses and are based on robust standard errors clustered by cartel-firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

2.7 Summary and discussion

This study investigates whether reporting transparency affects product market coordination and competition. We use cartels, because cartel members coordinate their product market actions. We conjecture that the application of international accounting standards (IFRS or U.S. GAAP) increases a cartel's reporting transparency. We predict that greater transparency may be beneficial for the monitoring and enforcing of the cartel agreement, reducing contracting costs and increasing cartel duration. Alternatively, more transparency may facilitate the detection of cheating behavior. Since cheating is the short-term dominant strategy for cartelists, being more transparent would lead to the (earlier) detection of cheaters, destabilizing the cartel and lowering cartel duration.

Overall, our results show that, following an internationally accepted accounting framework on average reduces cartel duration. Thus, transparent reporting prevents welfare-reducing coordination among firms. Since the choice to follow IFRS is endogenous, we use an exogenous shock to enforcement in a difference-in-differences research design and investigate the causal effect of reporting transparency on cartel duration. Furthermore, we control for the selection bias stemming from the fact that we only include indicted cartels in our analysis. We continue to find that following international reporting standards decreases a firm's time spent in a cartel. We next use cross-sectional variation in the potential gains of deviating from the cartel agreement

to investigate the role of reporting transparency in revealing cheating behavior. We find that cartels operating across multiple geographical markets have more to gain from cheating and have lower duration when cheating is revealed through transparent reporting, relative to cartels with low gains to be had from cheating. We also find that, when the opportunity costs of cooperation are low, reporting transparency leads to contracting benefits, which allow firms to sustain cooperation over a longer period of time.

Our findings are relevant for antitrust authorities because reducing cartel duration increases product market competition and can therefore be beneficial for economies through the enhancement of resource allocation and efficiency. In this regard, our results point to spillover effects between capital market regulation and product markets, and show that improvements in reporting transparency and enforcement can complement competition policy. Furthermore, our results suggest transparency and disclosure as potential remedies when the European Commission or local cartel authorities observe undesired levels of price coordination but cannot prove them to be illegal (e.g., coordination between fuel retail companies in Australia and Germany (Bundeskartellamt 2011)).

3 Proprietary costs of full portfolio disclosure for UK investment trusts¹⁷

3.1 Introduction

The large body of literature which examines voluntary disclosure suggests that managers disclose information if the benefits of disclosure outweigh its costs (Verrecchia 2001; Healy and Palepu 2001; Dye 1986; Guercio and Tkac 2002; Leuz and Verrecchia 2000). Among costs associated with disseminating more information to the public are most importantly proprietary costs which reflect important information to outside parties, and especially competitors (Dye 1986; Darrough and Stoughton 1990; Berger and Hann 2007; Harris 1998).

In this study I examine the costs of voluntary disclosure of full portfolio holdings by UK investment trusts. The disclosure of information is especially important in the financial sector since revealing the portfolio of investments is comparable to showing a rather complete picture of the operations. Recently, there has been a debate whether disclosures in the financial sector may have detrimental economic consequences (Goldstein and Sapra 2013). Especially for investment trusts, which are closed-end, it has been argued that more transparency is desirable to make them more comparable to their open ended counterparts. The main argument is that more transparency enables the investor to better assess the quality of the product provider and its performance. Furthermore, investors are more likely to invest, if the investment product had clearer labelling so that the investor exactly knows what she is buying (Beard

¹⁷ This chapter is based on Peter, C.D. (2014b), Proprietary costs of full portfolio disclosure for UK investment trusts, Working paper, WHU – Otto Beisheim School of Management. This paper has been presented at the American Accounting Associations Meeting 2014, the 37th European Accounting Associations Meeting, and the 50th British Accounting and Finance Association Meeting.

and Idzikowski 2012; Miller 2013). Ultimately, this raises the question whether more transparency translates into an increasing demand for the product: investment trusts' shares.

The UK investment trust industry gives me the opportunity to directly observe how an increase in transparency through voluntary disclosure affects product demand. Since investors in open end trust's trade shares directly with the trust itself, open end trusts must create new shares to meet investors' demand or redeem shares from investors that want to sell their shares. In contrast to this, investment trusts sell a fixed number of shares through an initial public offering (IPO). After the IPO, the amount of shares outstanding does not change as long as there are no repurchases or share issues (Yang 2012). Therefore, investors trade shares among existing shareholders and new investors on the secondary market. Furthermore, the investment trusts' portfolio does not change as a result of changes in demand or supply of their shares. Hence, the fixed number of shares outstanding results in a perfectly inelastic supply function (Malkiel 1977; Wei 2007). With respect to mandatory disclosure requirements, listing rules on the London Stock Exchange require investment trusts only to give a comprehensive and meaningful analysis of the portfolio (LR 15.6.2 (6)). That is why there is no obligation to fully disclose portfolios publicly, although many trusts do so voluntarily.

Investment trusts have been shown to trade at a discount to their respective net asset value (NAV). The net asset value discount (from here onwards: discount) is the difference between the trust's NAV (value of the investment portfolio) and the current market value of its shares. Thus, based on the inelastic supply function, changes in demand for the share are accompanied by changes in the discount (Malkiel 1977). Previous studies have explained the

discount with liquidity differences between the trusts' shares and its underlying investment portfolio. If the trust is more liquid than its investments it trades at a premium, and if not, it trades at a discount (Datar 2001; Cherkes et al. 2009). Economic theory puts forward the argument that increased disclosure reduces information asymmetry and thereby affects a firm's stock liquidity and cost of capital (Healy and Palepu 2001). Furthermore, it identifies increasing quantity and/or quality of voluntary disclosure to be beneficial because it reduces information asymmetry between insiders and outsiders or buyers and sellers of a firm's shares (Leuz and Verrecchia 2000; Botosan 1997). Additionally, recent evidence suggests that on average individuals invest more into firms with higher disclosure quality (Lawrence 2013). Based on this line of argument, I form my first prediction that trusts' voluntarily disclosing full portfolio holdings exhibit changes in demand, observable as changes in the discount.

The superior performance of some trusts has been shown to derive from the stock picking ability and market timing of the manager (Wermers 2000; Cuthbertson et al. 2008; Daniel et al. 1997). Releasing full portfolio holdings may enable competitors or other investors to infer trading strategies or free-ride on this information. For example, Frank et al. (2004) show that funds mimicking an actively managed fund achieve returns that are undistinguishable from those of an active managed one after expenses of the actively managed fund. Consequently, due to equal performance, investors perceive less managerial ability. Hence, investors' updates of managerial ability cause prices to change and the discount to move (Wei 2007; Berk and Stanton 2007). The

proprietary costs are therefore observable as the reduction in demand for the product (the trust's share) reflected as changes in the discount.¹⁸

However, proprietary costs arising through additional disclosures may negatively affect product demand. Prior literature identifies the management's fear of losing the firm's competitive advantage or bargaining power to its competitors by revealing sensitive proprietary information as the main driver behind not disclosing all relevant information voluntarily (Hayes and Lundholm 1996; Lambert et al. 2007; Verrecchia 2001; Wagenhofer 1990; Dye 1986). Whereas the proprietary costs argument in industrial firms seems to be less pronounced, several studies from the financial industry suggest that the release of proprietary information about the investment portfolio harms the competitive position. This manifests in non-disclosure of informed positions before investment managers have fully reaped the benefits of their private information (Huddart et al. 2001; Agarwal et al. 2013; Aragon et al. 2013).

By disclosing the full portfolio holdings trusts reveal their investment strategy and allow competitors to infer trading strategies. This in turn, may severely reduce the impact of the managements' stock picking ability or market timing. Evidence from the mutual fund setting suggests that by releasing proprietary information about the fund's portfolio holdings to the public the fund loses its informational advantage. Especially, top performing funds suffer from disclosing more information about their portfolio compared to top performing funds that disclose less (Parida and Teo 2011; Ge and Zheng 2006; Brown and Gregory-Allen 2012). Chay and Trzcinka (1999) show that trusts selling at a discount underperform trusts selling at a premium, suggesting that

¹⁸The costs associated with printing or disclosing the portfolio lists are trivial since every trust has these for regular business activities. Therefore, real costs of disclosing the list do not interfere with my measure of proprietary costs.

discounts reflect expectations of managerial ability. If the manager loses her informational advantage through disclosure, future performance may decrease due to copycat trusts (Frank et al. 2004) or front-running activities by arbitrageurs (Wermers 2001). Consequently, investors perceive less managerial ability which ultimately translates into a decrease in demand for the investment trust's shares reflected by a change in the discount (Wei 2007; Berk and Stanton 2007).

Based on these arguments, I expect, information asymmetry to decrease, however, the loss of the perceived competitive edge of the investment trust leads to lower demand for the trust's shares. Therefore, decreasing information asymmetry by disseminating proprietary information may lead to a widening of the discount. Nonetheless, it is an empirical question how the tradeoff between the benefits of less information asymmetry and the costs of releasing proprietary information affects product demand.

To test whether the release of full portfolio holdings affects product market demand I exam the association between full disclosure and the trust's discount. The results show a positive association between voluntary disclosure and product demand, on average. This finding is in line with a recent study by Lawrence (2013) who finds that individuals invest more in firms with clear and concise disclosures. Next, I identify situations where proprietary information by the trust is very likely to affect product demand. Using cross-sectional differences in past returns and portfolio turnover, I examine whether the release of full portfolio disclosure is associated with an increase in the discount, a decrease in product demand, respectively. Consistent with the proprietary cost hypothesis, I find a negative association between releasing full portfolio holdings and demand for trusts exhibiting superior past performance. The

results are not sensitive to controlling for investor sentiment which is associated with movements in the discount (Lee et al. 1991). Furthermore, I substitute the indicator of full portfolio disclosure with another measure: the percentage of disclosed investments. I continue to find the negative association between full disclosure and proprietary information on product market demand. Furthermore, I use changes in the trusts' disclosure behavior to identify the change of expectations about the trust's future performance that occurs around the switching year. Using changes in the trust's disclosure behavior also helps to mitigate the influence of omitted variables. The results support my prior findings regarding the positive average association between full disclosure and product demand. Furthermore, I control for self-selection bias throughout my analyses. Overall, trusts with high proprietary information exhibit an incremental decrease in product demand. In summary, my results show a trade-off between the costs and benefits of fully disclosing portfolios for trusts with high proprietary information.

This paper contributes to prior literature on voluntary disclosure (see, e.g. Healy and Palepu 2001; Beyer et al. 2010) by providing evidence on how voluntary disclosure is associated with changes in product demand. Furthermore, measuring and quantifying proprietary cost is a challenge for researchers (Verrecchia and Weber 2006; Beyer et al. 2010; Bamber and Youngsoon 1998). By using the discount, I circumvent the noisy measure of the level of competition in an industry as a measure of proprietary costs. Moreover, information about the investment portfolio is competitively sensitive and proprietary in nature because it describes the whole business model of the trust. For example, stock picking ability and investment strategy are easily observable through the disclosure of full portfolio holdings by

competitors. Hence, my inferences only rely on one important part of disclosure in one industry and might be less noisy in comparison to multi-industry settings, which for example use regulatory changes regarding segment disclosure to infer whether firms try to hide profitable segments or segments in markets with low levels of competition (Berger and Hann 2007; Botosan and Harris 2000; Botosan and Stanford 2005; Leuz 2004).

It also adds to the debate on whether financial firms should disclose more information in the aftermath of the financial crisis (see e.g. Goldstein and Sapra (2013)). My results suggest that, despite the existing negative effects of releasing proprietary information, on average disclosing more information outweighs its costs. Furthermore, this paper adds to research concerning the ‘closed-end fund puzzle’ which is a widely studied anomaly in finance research (see e.g., the survey by Dimson and Minio-Paluello (2002) or more recently Cherkes (2012)). My evidence is consistent with liquidity-based theories of changes in the discount (Datar 2001; Cherkes et al. 2009) because it establishes a link between voluntary disclosure (a reduction of information asymmetry) and changes in the discount.

The paper proceeds as follows. Section 2 presents the related literature and introduces the institutional background. Section 3 describes the hypothesis development. Section 4 explains the research design. Section 5 presents the empirical results followed by a summary with concluding remarks in section 6.

3.2 Literature review and institutional setting

3.2.1 Literature review

Theoretical and empirical literature has shown that investors prefer liquid shares and that voluntary disclosure can increase liquidity by reducing

information asymmetry (Dye 1986; Amihud and Mendelson 2008, 1986; Diamond and Verrecchia 1991). This in turn lowers the discount investors require when purchasing the firm's shares, leading to lower cost of capital. However, these benefits of disclosure may come at the cost of revealing proprietary information. Proprietary costs represent the management's fear to lose the firm's competitive advantage or bargaining power to its competitors by revealing sensitive proprietary information (Hayes and Lundholm 1996; Lambert et al. 2007; Verrecchia 2001; Wagenhofer 1990). Dye (1986) uses an analytical model to study the tension arising from the disclosure of proprietary and non-proprietary information. The findings suggest that a value maximizing manager does not diverge from her disclosure behavior unless disclosure impacts firm value extremely positive (Dye 1986).

While theoretical evidence is well established regarding the proprietary cost hypothesis, empirical evidence is rare and mainly focuses on segment reporting (Beyer et al. 2010). For example, Hayes and Lundholms' (1996) findings suggest that the cost of finer segment reporting is that the firm's competitors will use the information to the disclosing firm's disadvantage (Hayes and Lundholm 1996). Harris (1998) investigates management discretion in segment reporting. She explores whether the number of reported segments matches the number of segments that could be reported according to standard industry classifications (SICs) defining the different industries the firm operates in. Her results suggest that managers try to hide abnormal profits and market share in less competitive industries in order to keep competitors from entry (Harris 1998). Berger and Hann (2007) use a change in US segment reporting rules to investigate why managers conceal segment profits: examining agency and proprietary cost. The results support the agency motive

(hiding segments with low abnormal profits) but gives mixed results regarding the proprietary cost motive which is the management's decision to hide segment disclosure for segments that exhibit high abnormal profits (Berger and Hann 2007).

Evidence from the mutual fund industry suggests that by releasing information about the fund's portfolio holdings to the public more frequently the fund loses its informational advantage to its competitors. Especially, top performing funds suffer from disclosing more information about their portfolio compared to top performing funds that disclose less which leads to a negative association between prior performance and actual returns (Parida and Teo 2011; Ge and Zheng 2006; Brown and Gregory-Allen 2012). Two recent studies from the hedge-fund industry also emphasize the proprietary nature of information content in the disclosure of portfolio holdings. Agarwal et al. (2013) findings suggest that funds requesting confidentiality of certain holdings have large risky portfolios or use unconventional investment strategies. The concealed positions, however, exhibit superior performance. They attribute their findings to private information within these holdings as one reason why funds want to hide those positions (Agarwal et al. 2013). This supports the notion that portfolio disclosure may increase proprietary costs. Similarly, Aragon et al. (2013) highlight the importance of reduced disclosure because they find that fund managers use the confidentiality option to protect proprietary information. They find that managers seek confidentiality for positions that have performed well in the past. Moreover, they find that the investors profit from the gains associated with the confidentiality treatment (Aragon et al. 2013).

Management style and expertise are important features of management ability. Prior studies find that actively managed funds outperform their benchmarks suggesting that active management adds value and leads to better performance (Amihud and Goyenko 2013; Daniel et al. 1997). However, there are also studies questioning whether managers add value by actively managing the trust (see, e.g., the widely cited Carhart (1997)). Recently, the evaluation of managers shifted from a return-based view to the security-level analysis or portfolio-based performance evaluation. These techniques allow researchers and investors to get insights into asset-allocation and security-selection talents. Furthermore, it allows decomposing the sources of value added by the management. Benchmarking is also more precise since every observation/investment laid out in the portfolio is one potential source of value added by the management (Wermers 2006). If the manager loses her informational advantage through disclosure, performance decreases due to copycats (Frank et al. 2004) or front-running activities by arbitrageurs (Wermers 2001). Frank et al. (2004) show that funds hypothetically mimicking a portfolio of an actively managed fund have subsequent returns that are undistinguishable from those of the active one after expenses (Frank et al. 2004). Consequently, investors perceive less managerial ability due to equal performance which ultimately translates into a decrease in demand for the investment trust's shares reflected by a change in the discount (Wei 2007; Berk and Stanton 2007).

3.2.2 Institutional setting

The UK investment trust industry displays some opportune features to investigate the effects of voluntary disclosure on product market demand. First,

investment trusts are similar to any other listed industrial firms.¹⁹ They are directly governed by an independent board of directors and indirectly by their shareholders possessing voting rights (Cheng et al. 1994). With regards to the shareholder base of investment trusts, institutional investors account for approximately two thirds of total ownership. Shareholders are predominantly long-term oriented and may differ in terms of return objectives, for instance, fixed income component vs. return generation through capital gains (Dimson and Minio-Kozerski 1999; Cherkes 2012). They predominantly invest in shares and securities of other companies, and other unquoted assets. Aiming at capital appreciation and investment income distributable to their shareholders investment trusts manage their stock holdings and strive for further investment opportunities. There is a vast variety in investment strategies ranging from large/small-cap investments in developed and emerging markets to sector specific investments in, for example communications, healthcare, or natural resources (Dimson and Minio-Kozerski 1999). Nevertheless, the trusts are relatively homogenous in terms of size and complexity (Cherkes 2012). The industry itself consists of 275 conventional investment trusts with a market capitalization of 79,245 £m.²⁰

Second, investment trusts are listed closed ended investment companies with a fixed number of shares. However, one important characteristic sets investment trusts apart from other collective investment schemes: the net asset value discount. The law of one price predicts that the same asset is priced the

¹⁹ Investment trusts are regulated by The Investment Trust Tax Regulations 2011 (ITR) and the Corporation Tax Act 2010 (CTA10). The CTA10 has recently been amended. In order to be recognized as an investment trust, firms apply to the HM Revenue & Customs (HMRC) and have to fulfill three distinct conditions which are stated in Section 1158 of the CTA10. Companies fulfilling these categories apply for the investment trust status and are subsequently approved companies exempted from corporation tax on capital gains. The tax exemption only applies to investment trusts located in the UK.

²⁰See <http://www.theaic.co.uk/aic/statistics/industry-overview>; last checked: 31.07.2013.

same. However, in contrast to open-ended investment trusts they do not always trade at net asset value, that is at the same value as their underlying assets (Pratt 1966; Boudreaux 1973). The discount measures the difference between the market value of the trust and the net asset value of its investments. Unlike their open-ended counterparts which can cancel and create units of shares based on investor demand the number of shares stays constant after the trust's Initial Public Offering (IPO) (Malkiel 1977; Wei 2007; Dimson and Minio-Kozerski 1999).²¹ The shares can only be traded on the secondary market. Consequently, any shift in the discount reflects a shift in demand for the trust's share.

Investment trusts are listed companies and therefore fall under the Disclosure and Transparency rules (DTR) (2013). They require listed firms to give fair view of its business and financial situation.²² This requirement is comparably loose and does not prescribe any exact obligation, which mandates disclosure of single holdings or portfolio weightings. As a consequence, investors, financial advisors, and other regulatory bodies such as the Retail Distribution Review (RDR), call for a coherent framework of full portfolio disclosure in order to achieve consistency and high quality disclosures. Because the demanded framework is not incorporated as of today, advisors and investors are still confronted with infrequent portfolio releases and stale data as a consequence. Monthly factsheets published on funds' websites barely compensate for such information asymmetry. Thus, published information is often insufficient to properly support investors in their asset allocation and

²¹ Share repurchases and new issues are possible, though, but come at transaction costs.

²²As of April 2013, see for more details on the requirements: Disclosure Rules and Transparency Rules (DTR), DTR 2: Disclosure and control of inside information by issuers, DTR 4: Periodic Financial Reporting.

portfolio optimization decisions because most of the trusts only provide information about their top ten holdings. Furthermore, inconsistencies in terms of financial reporting activities (e.g. frequency, timing, data provision, and quality) make a sound comparison across different funds difficult (Beard and Idzikowski 2012). In my sample, 32 percent of the trusts do not choose to disclose their full portfolio holdings. This closely matches statistics reported in a recent analyst review of the UK investment trust industry (Beard and Idzikowski 2012).

Since 2004 the United States Securities Exchange Commission (SEC) requires mutual funds to disclose full portfolio holdings quarterly in contrast to prior semi-annual disclosure. Parida and Teo (2011) compare semi-annually and quarterly disclosing US mutual funds in the periods 1990-2003 and 2005-2008. They find that before the change funds disclosing only semi-annually exhibit better performance than those funds disclosing quarterly. After the regulatory intervention this difference disappears. They attribute their findings to the increase in free-riding and copy-cat funds which use the available information to trade against previously successful funds (Parida and Teo 2011). My study is different since it focuses on the question whether a trust discloses full portfolios, at all. On the other hand, their research question focuses on whether more frequent disclosures influence future performance. Nonetheless, both studies put forward proprietary costs as one implication of more (frequent) disclosure which influences the trusts' future performance.

3.3 Hypothesis development

Economic theory proposes that increased disclosure reduces information asymmetry and thereby affects a firm's stock liquidity and cost of capital (Healy and Palepu 2001). Furthermore, it identifies increasing quantity

and/or quality of voluntary disclosure to be beneficial because it reduces information asymmetry between insiders and outsiders or buyers and sellers of a firm's shares (Leuz and Verrecchia 2000; Botosan 1997). In the investment trust industry the voluntary disclosure of full portfolio holdings allows investors and investment advisors to know exactly what they are invested in. It reduces the perceived risk and makes trusts more comparable within different investment categories. It also allows investors and advisors to monitor the trust and its investment activities more closely (Beard and Idzikowski 2012). Additionally, recent evidence suggests that on average individuals invest more into firms with higher disclosure quality (Lawrence 2013). Building on this and prior evidence, I expect voluntarily disclosing full portfolio holdings to affect the demand for the investment trust, consequently observable in a changing discount.

H1: *Disclosure of full portfolio holdings affects the demand for the trust's shares which ultimately maps into a reduction of the net asset value discount.*

A contrary perspective suggests that by voluntarily disclosing additional information firms disseminate sensitive information to the markets which weakens their competitive advantage (Hayes and Lundholm 1996; Lambert et al. 2007; Verrecchia 2001; Wagenhofer 1990).

Adding to this notion, evidence from the closely related mutual fund setting suggests that by releasing proprietary information about the fund's portfolio holdings to the public the fund loses its informational advantage. Prior mutual fund literature finds an asymmetric relationship between fund holdings' disclosure frequency and fund performance (Parida and Teo 2011; Ge and Zheng 2006; Brown and Gregory-Allen 2012). Prior "winners", which

are trusts that exhibit superior performance compared to their peers, suffer from more frequent disclosure of portfolio holdings by decreasing performance. Prior “losers” perform better after disclosing their portfolios. Moreover, exposing the portfolio to the public might attract copycats, free riders and front-runners which lead to diminishing trust returns (Ge and Zheng 2006; Parida and Teo 2011; Brown and Gregory-Allen 2012; Wermers 2001; Frank et al. 2004). Furthermore, Agarwal et al. (2013) show that hedge funds make use of a confidentiality option to hide risky portfolios or nonconventional investment strategies which exhibit superior performance. Hedge fund managers hide private information due to proprietary cost arising when disseminating portfolio holdings to the market and consequently decreasing the fund’s future performance. In the same vein, Aragon et al. (2013) find that managers who seek confidentiality to protect proprietary information earn abnormal returns with these positions, emphasizing benefits of reduced disclosure.

Berk and Stanton (2007) explain movements in the discount by investors’ perception of management ability (Berk and Stanton 2007). The basic notion behind their argument is that if the manager does not add value to the fund while charging fees the trust trades at a discount (Boudreaux 1973; Berk and Stanton 2007). Therefore, the perception of investment skill affects investors’ demand. Revealing the full portfolio of investments may negatively affect the trust’s performance. If the investors perceive diminishing returns as a sign of a lack of investment ability they retract from buying these shares. Consequently, successful funds have lower incentives to disclose full portfolio holdings.

To more directly examine the nature of proprietary costs of voluntary disclosure, I examine investment trusts which bear the highest proprietary costs. Since past returns are a measure of investment skills I expect proprietary cost to be highest for trusts with high past performance. I expect the demand for those investment trusts to decrease because they lose their proprietary advantage through releasing full portfolio holdings. Therefore, the second hypothesis is stated as follows:

H2: *Disclosure of full portfolio holdings decreases the demand for the trust's shares if investment skill (past returns) are highest.*

Active management of the investment portfolio entails costly research to find stocks with superior performance. Hence, Wermers (2000) finds that mutual funds with higher turnover rates hold investments that outperform funds with low turnover rates (Wermers 2000). Therefore, higher portfolio turnover rates may convey some evidence about the manager's superior private information. Thus, better (informed) managers' trade more to take advantage of their superior information. Grinblatt and Titman (1994) find portfolio turnover to be associated with finding underpriced stocks (Grinblatt and Titman 1994). In this case, full portfolio disclosure reveals, apart from the nature of the investment, also changes (on the single security-level) in the portfolio. Changes in the trust's different investments uncover private information about the fundamental value of the investment and convey this information to the market (Agarwal et al. 2013). By disclosing greater amounts of the portfolio holdings firms reveal their investment strategy and allow competitors to make inferences about trading strategies which severely reduce the impact of the managements' stock picking ability and market timing. Therefore, I expect more actively traded trust portfolios to contain more private information. Thus, other

investors may use this information to mimic investment strategies that reduce the trust's performance. Consequently, I expect the demand for the invest trust shares to decline. Subsequently, my third hypothesis is stated as follows:

H3: *Disclosure of full portfolio holdings decreases the demand for the trust if portfolio turnover is highest.*

3.4 Research design

3.4.1 Sample selection

I use all conventional UK investment trusts (SIC=6726) with available data on Worldscope. Currently, there are 398 investment companies members of the AIC (Association of Investment Companies) in the UK of which 275 are conventional investment trusts. The hand-collection of investment trusts covers 174 investment trusts for the period from 1993 to 2011. I collected the data on portfolio disclosures from the trust's annual reports and I use Worldscope as an additional data source for balance sheet and income statement items as well as for stock market data. The final sample used in the analysis covers 142 investment trusts with data available over the period 1993-2011, resulting in 1,534 firm-year observations.

I choose this sample period in order to obtain variation in annual full portfolio disclosure (*FULL*) and the percentage of disclosed investments (*%NAV*) variable. The cut-off in 2011 is most importantly attributed to the EU initiative and industry specific incentives beginning in 2012, mainly pushed by the AIC and Morningstar, which tend to make investment trusts, (1) to disclose full portfolio holdings, and (2) additionally to do this on a more frequent level than annually (Beard and Idzikowski 2012).

To circumvent data availability issues I start the sample period in 1993. To ensure the integrity of the data time-period I re-estimate the main tests with time spans varying between 5 and 10 consecutive years. My inferences stay unchanged.

3.4.2 Main test

I use the net asset value discount to establish a link between proprietary cost of voluntary disclosure and product market demand. I try to show that disclosing proprietary information in terms of full portfolio holdings outweighs the benefits of disclosure such as increase in liquidity and lower cost of capital (Leuz and Wysocki 2008; Beyer et al. 2010). In my setting, the actual costs of disseminating proprietary information are a reduction in product market demand which represents a widening of the net asset value discount.

I test my hypotheses by regressing investment trusts' net asset value discounts ($DISCOUNT_{i,t+1}$) on a binary variable indicating whether the investment trust fully discloses its investment portfolio ($FULL$). I model the relation between $DISCOUNT_{i,t+1}$ and $FULL$ as a lead-lag relation to acknowledge the fact that the market adjusts its priors after the release of the annual report (see e.g. Lawrence (2013), Covrig et al. (2007), or Bradshaw et al. (2004) for a similar research design). I expect investors to respond to the release of full portfolios by adjusting their demand for the respective trust, due to the lead-lag relationship between financial disclosure and individual shareholdings. Eventually, this relationship allows me to establish a notion of causality.

I use equation (1) to examine the association between full disclosure of investment portfolio and the discount in the following year. I expect voluntarily

disclosing information by the trusts to affect the demand for their shares in the following year.

$$\begin{aligned} DISCOUNT_{i,t+1} = & \alpha_0 + \beta_1 FULL_{it} + \beta_2 RETURN_{it} + \beta_3 EXPENSES_{it} \\ & + \beta_4 OWNERSHIP_{it} + \beta_5 YIELD_{it} + \beta_6 SIZE_{it} \\ & + \beta_7 LNAGE_{it} + \beta_8 IMR_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

I define the dependent variable, next period's discount $DISCOUNT_{i,t+1}$ in line with prior literature as net asset value less market value divided by net asset value (Gemmill and Thomas 2002; Hwang 2011). To illustrate, if the trust's net asset value is 10 and the market value is 9, the trust trades at a discount of 10%, and if the market value of the trust is 11 and the net asset value is 10 it trades at a premium of -10%. To calculate the discount I use data on common equity (WC03051) and market capitalization (WC08001) from Worldscope. My main test variable is $FULL$, which is an indicator variable that takes on the value one if the trust discloses 100% of its investment portfolio; and zero otherwise. I manually obtain the information on portfolio disclosure from the trusts' annual reports. I expect $FULL$ to increase the trust's liquidity and decrease the cost of capital which corresponds to an increase in the demand for the trust's shares. Therefore, the expected sign for $FULL$ is negative. Contrary to this notion, I expect $FULL$ to be positive if the proprietary cost of disclosing full portfolios outweighs the benefits of disclosure.

The second measure of portfolio disclosures is the percentage of disclosed investments $\%NAV$ calculated by dividing the net asset value of disclosed investments by the trust's total net asset value ($\%NAV$). The reason for using $\%NAV$ is that it has more variation and is not as restrictive as $FULL$. Nonetheless, I expect $\%NAV$ to be consistent with my predictions for $FULL$.

Additionally, I employ several control variables from prior literature which explain the discount. I use raw buy and hold returns (*RETURN*), calculated as the change of the stock price over the fiscal year divided by last year's stock price, to capture the trust's performance over the year (Parida and Teo 2011; Brown and Gregory-Allen 2012). I expect *RETURN* to be positively associated with the discount ($DISCOUNT_{i,t+1}$), since ceteris paribus demand for well-performing (successful) trusts should be higher than for unsuccessful ones. To control for agency costs related explanations of the discount I control for excessive management fees by using the ratio of the sum of management fee, operating costs, and other costs incurred by the trust, divided by net assets (*EXPENSES*) (Malkiel 1977; Khorana et al. 2002). I expect *EXPENSES* to have a positive impact on the discount in line with Gemill and Thomas (2002). I use each trust's dividend yield (*YIELD*) to control for arbitrage costs. I expect *YIELD* to have a negative sign because the higher the dividend yield the more valuable is the trust (Pontiff 1996). Furthermore, I control for other trust-specific characteristics like size (*SIZE*) measured as the natural logarithm of the investment trust's total assets (Pontiff 1996) and institutional ownership, measured as the percentage of closely-held shares (*OWNERSHIP*) (Gemmill and Thomas 2006; Barclay et al. 1993). Larger investment trusts tend to trade on a smaller discount, on the other hand, investors seem to favor trusts with less institutional investors. Therefore, I expect *SIZE* to have a negative sign and *OWNERSHIP* to be positively associated with the $DISCOUNT_{i,t+1}$. To control for age specific fluctuations in the discount I use *LNAGE*, the natural logarithm of the timespan between the incorporation date and the respective firm-year observation. Older investment trusts are associated with higher discounts because trusts are often issued in hot periods trading at a premium. Over time,

however, they slide to trade at a discount (Gemmill and Thomas 2002; Lee et al. 1991).

I modify equation (1) to identify situations in which I find proprietary costs to be of high importance. More specifically, I use cross-sectional differences in each trusts' performance in terms of returns and portfolio turnover. I expect trusts located in the *HIGH_X* quintiles of both, returns and portfolio turnover, to have proprietary information suggesting that disclosing full portfolio holdings may be detrimental to the demand for their shares. Therefore, I expect the incremental effect of disclosure while being part of the top quintile of either returns or portfolio turnover, to be positively associated with the discount.

$$\begin{aligned}
 DISCOUNT_{i,t+1} = & \alpha_0 + \beta_1 FULL_{it} + \beta_2 HIGH_X_{it} \\
 & + \beta_3 FULL_{it} \times HIGH_X_{it} + \beta_4 EXPENSES_{it} \\
 & + \beta_5 OWNERSHIP_{it} + \beta_6 YIELD_{it} + \beta_7 SIZE_{it} \\
 & + \beta_8 LNAGE_{it} + \beta_9 IMR_{it} + \varepsilon_{it}
 \end{aligned} \tag{2}$$

HIGH_X in equation (2) represents the fifth quintile of the different experimental variables which I use to capture proprietary cost. The coefficient of main interest is β_3 from the interaction between *FULL* and *HIGH_X* which captures the incremental effect of disclosure conditional on having high proprietary cost. To test hypothesis 2, I use *RETURN* to examine the incremental effect of voluntary disclosure on the demand for the trust's shares. I expect firms in the fifth *RETURN* quintile to have high proprietary cost because higher stock picking ability and management skills are associated with high returns. I expect the sign of the coefficient on the interaction β_3 (*FULL* × *HIGH_RETURN*) term to be positive.

To further evaluate whether full portfolio disclosure bears proprietary costs which reduce product demand I use cross-sectional differences in the

trusts' portfolio turnovers (*PTURN*). I measure *PTURN* as the lower of purchases or sales of portfolio securities divided by net assets (Boudreaux 1973). I calculate quintiles according to each trust's yearly portfolio turnover. Disclosure of the portfolio reveals private information about the securities the manager purchases and sales. Active trust managers invest in research to find superior performing stocks. By revealing the identity and changes of the holdings they may incur decreasing returns due to free riding by other investors or trusts. Therefore, I expect firms in the fifth *PTURN* quintile to have high proprietary cost. Thus, I expect the sign of the coefficient β_3 (*FULL*×*HIGH_PTURN*) to be positive.

3.4.3 Endogeneity issues

Studies tackling the economic consequences of voluntary disclosure face endogeneity issues because the decision to voluntarily disclose is not exogenous to the firm (see e.g. (Leuz and Verrecchia 2000; Verrecchia and Weber 2006; Rogers 2008)). Thus, estimation procedures such as ordinary least squares (OLS) may yield biased coefficients (Maddala 1991; Lennox et al. 2011). Since my research design is primarily based on the inclusion of an endogenous indicator (*FULL*) as an independent variable, I estimate a treatment effect model to describe and incorporate the choice to disclose fully. More specifically, to control for the potential self-selection bias, I use the Heckman 2-stage approach (Heckman 1979).²³ In general, the choice to disclose fully and its relation to the discount is modelled as follows:

$$DISCOUNT_{i,t+1} = \beta'X + \theta FULL_{i,t} + u \quad (3)$$

²³ Tucker (2010) notes, that it is more efficient to use maximum likelihood estimation in Heckman models than the two step procedure. Nonetheless, I follow the advice in Lennox et al. (2011) and use the two step procedure since inferences from the maximum likelihood are less robust than the two step procedure.

X is a vector of controls which affect the $DISCOUNT_{i,t+1}$ and $FULL$ is an indicator variable that is one if the trust discloses its full portfolio; and zero otherwise.

$$FULL_{it} = \alpha_0'Z + \alpha_1'X + v \quad (4)$$

Equation (4) shows the binary choice (Probit) model. The intuition behind controlling for the choice of full disclosure by the fund is that it may be driven by unobservable variables that might be correlated with the discount. Since full disclosure is endogenous, the error terms (u and v) in equation (3) and (4) are correlated. That is why, without controlling for this issue, θ is biased. Therefore, I calculate the inverse mills ratio (IMR) in order to control for omitted correlated variables that affect both the choice to disclose fully and the discount and add it to equation (3), resulting in the following:

$$DISCOUNT_{i,t+1} = \beta'X + \theta FULL_{i,t} + \delta IMR + \varepsilon \quad (5)$$

Since the error term in equation (5) and $FULL$ are uncorrelated, θ is unbiased. The magnitude of the potential selection bias can be inferred from the direction and statistical significance of δ . It is also noteworthy that IMR , $FULL$, and the control variables are by definition correlated. Therefore, I calculate the variance inflation factors (VIFs) after the implementation of the inverse mills ratio to address potential issues regarding multicollinearity. Naturally, the VIFs are higher when I include the IMR in the different regression models but they are in general under the critical value of 10 and only show a level of 11.03 in one specification. Furthermore, my results in Tables (2) to (6) are robust to the inclusion of the inverse mills ratio and do not suffer from a selection bias.

Equation (6) operationalizes equation (4) and gives some insight on the determinants that drive the decision of full portfolio disclosure in the investment trust industry.

$$\begin{aligned} Prob(FULL_{it}) = & \alpha_0 + \beta_1 TURNOVER_{it} + \beta_2 PAGES_{it} + \beta_3 EXPENSES_{it} \\ & + \beta_4 RETURN_{it} + \beta_5 YIELD_{it} + \beta_6 GEAR_{it} \\ & + \beta_7 OWNERSHIP_{it} + \beta_8 EMERGING_{it} + \beta_9 SIZE + \varepsilon_{it} \end{aligned} \quad (6)$$

A critical step in the implementation of the Heckman-2-Stage approach is the identification of an exogenous independent variables which can be convincingly excluded from the second stage (Lennox et al. 2011). In this case, I exclude *TURNOVER*, calculated as the monthly share turnover three months after fiscal year-end, to capture the liquidity of the trust. *TURNOVER* is negatively correlated with the decision to fully disclose but not with next year's discount. This also reveals the notion that trusts which are traded more frequently have lower intentions to disclose their portfolio to their competitors. Ultimately, it seems as if the benefits of voluntary disclosure are not as important for trusts with high turnover rates. Nonetheless, I acknowledge the fact that selection models are fragile. To address the fragility issue, I report my main results with and without the inclusion of the inverse mills ratio. Without the inclusion of the inverse mills ratio, the results potentially suffer from the limitation of biased coefficients that over-/understate the association. Nonetheless, throughout almost all model specifications the *IMR* is insignificant, indicating that a selection bias is not present and the coefficients are not biased.

I employ several determinants in equation (6) which are associated with the likelihood to disclose full portfolio holdings. I use the trust's share turnover (*TURNOVER*), calculated as the monthly share turnover three months after fiscal year-end, to capture the liquidity of the trust. I expect *TURNOVER* to be

negatively associated with the likelihood of disclosure. I use the number of pages of the annual report (*PAGES*) to capture the disclosure quality of the trust. I expect trusts with higher numbers of pages to be more likely to disclose full portfolio holdings. To control for agency costs related explanations of the likelihood of disclosure I control for excessive management fees (Malkiel 1977) by using the ratio of the sum of management fee, operating costs, and other costs incurred by the trust, divided by net assets (*EXPENSES*). I expect *EXPENSES* to reduce the likelihood of full disclosure. Moreover, I calculate each trust's returns (*RETURN*) as the change of the stock price over the fiscal year divided by last year's stock price. I also expect *RETURN* to decrease the likelihood of disclosure since I expect well performing trusts to have fewer incentives to show their list of portfolio holdings. I use the trust's gearing ratio (*GEAR*) to capture the trust's debt exposure. I expect *GEAR*, calculated as the ratio of total debt divided by total assets, to decrease the likelihood of voluntary disclosure, since more gearing increases risk. I use the indicator variable *EMERGING* which captures whether the trust's investment strategy is focused on investing in emerging markets. I use investment strategies provided by Morningstar to identify trusts primarily investing in emerging markets. I expect *EMERGING* to positively influence the likelihood of disclosure to counteract perceived lower transparency of those investments. I use each trust's dividend yield (*YIELD*) to control for arbitrage costs. I expect *YIELD* to have a positive sign because the higher the dividend yield the more valuable is the trust (Pontiff 1996). I control for other trust-specific characteristics like size (*SIZE*) measured as the natural logarithm of the investment trust's total assets (Pontiff 1996) and institutional ownership, measured as the percentage of closely-held shares (*OWNERSHIP*).

3.5 Results

3.5.1 Descriptive statistics

Table 1 reports descriptive statistics and Pearson correlations for the main variables used in the regression analysis. In line with prior research the investment trusts trade on average at a discount around 12% of net asset value. The share of trusts that disclose full portfolios of their investment portfolio is 68%. Average *RETURNS* for the trusts equal 8%. The expense ratio is low with a value of 1% of net assets. The average *AGE* of the trusts is 44 years.

Table 1 panel B shows the Pearson correlation matrix. In line with the prediction there is a negative and significant ($p < 0.01$) correlation between *FULL* and the next year's *DISCOUNT*_{*i,t+1*}. This result gives some first support for the notion that voluntarily disclosing full portfolio holdings decreases the discount, which means it increases demand for the trusts' shares. Returns are also negatively correlated with the discount but are uncorrelated to full disclosure. Furthermore, *OWNERSHIP* is positive and significantly correlated with the discount, but negatively correlated to *FULL*. *EXPENSES* are significantly and positively related to the discount and show a negative correlation with *FULL*. The number of pages of the annual report is uncorrelated with the discount but shows a significant correlation with *FULL*. The control variables *SIZE*, *EXPENSES*, *AGE/LNAGE* are strongly correlated ($\rho = 0.4$; $p < 0.01$) which can cause multicollinearity in the regression analysis. Therefore, I re-estimate equation (1) and (2) with different combinations of those variables which lead to the same results.

Table 1: Descriptive statistics and correlation matrix

<i>Panel A: Descriptive statistics</i>						
	<i>Mean</i>	<i>SD</i>	<i>P25</i>	<i>Median</i>	<i>P75</i>	<i>N</i>
<i>DISCOUNT_{t,t+1}</i>	0.12	0.10	0.07	0.12	0.17	1534
<i>FULL</i>	0.68	0.47	0.00	1.00	1.00	1534
<i>RETURN</i>	0.08	0.35	-0.13	0.09	0.25	1534
<i>EXPENSES</i>	0.01	0.01	0.01	0.01	0.02	1534
<i>OWNERSHIP</i>	16.65	17.50	0.24	11.97	26.83	1534
<i>PTURN</i>	0.58	0.69	0.25	0.42	0.72	1534
<i>YIELD</i>	0.02	0.02	0.01	0.02	0.03	1534
<i>SIZE</i>	12.10	1.09	11.37	12.05	12.85	1534
<i>AGE</i>	44.35	40.85	11.00	21.00	78.00	1534
<i>LNAGE</i>	3.22	1.18	2.40	3.04	4.36	1534
<i>GEAR</i>	0.13	0.12	0.04	0.11	0.18	1534
<i>TURNOVER</i>	0.03	0.04	0.01	0.02	0.04	1534
<i>PAGES</i>	50.15	13.58	41.00	49.00	56.00	1534
<i>%NAV</i>	89.73	19.40	88	100.00	100.00	1491

Notes Panel A: This table presents the descriptive statistics for the variables used in the main analyses. *DISCOUNT_{t,t+1}* is the discount calculated as: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)). *FULL* is an indicator variable which equals 1 if the trust lists its full portfolio holdings annually; and 0 otherwise. *RETURN* is (stock price_t – stock price_{t-1}/ stock price_{t-1}). *EXPENSES* are the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets. *OWNERSHIP* is the percentage of closely held shares based on *WORLDSCOPE* item (wc08021). *PTURN* is portfolio turnover calculated based on the smaller value of sales or purchases of investments by the trust divided by net asset value. *YIELD* expresses dividend per share as a percentage of share price. *SIZE* is the natural logarithm of total assets, *AGE* is the age of the fund in years and *LNAGE* expresses the natural logarithm of *AGE*. *GEAR* is the trust's gearing ratio expressed as (total assets – *NAV*)/total assets at fiscal year-end. *TURNOVER* (*DATASTREAM* item: *UVO*) is the monthly share turnover measured three-month after fiscal year-end. *PAGES* expresses the number of pages in the trust's annual report; *%NAV* is calculated by dividing the net asset value of disclosed investments by the trust's total net asset value.

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Panel B: Pearson correlation table

	N=1,534	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) <i>DISCOUNT</i> _{<i>i,t+1</i>}	1													
(2) <i>FULL</i>	-0.098	1												
	0.000													
(3) <i>RETURN</i>	-0.182	-0.023	1											
	0.000	0.37												
(4) <i>EXPENSES</i>	0.136	-0.133	-0.083	1										
	0.000	0.000	0.001											
(5) <i>OWNERSHIP</i>	0.174	-0.045	0.001	0.202	1									
	0.000	0.077	0.967	0.000										
(6) <i>PTURN</i>	0.081	-0.004	0.141	0.120	0.044	1								
	0.001	0.881	0.000	0.000	0.087									
(7) <i>YIELD</i>	0.045	0.099	-0.219	0.156	0.123	-0.079	1							
	0.081	0.000	0.000	0.000	0.000	0.002								
(8) <i>SIZE</i>	-0.173	0.087	0.060	-0.367	-0.370	-0.100	-0.074	1						
	0.000	0.001	0.020	0.000	0.000	0.000	0.004							
(9) <i>AGE</i>	-0.052	0.132	-0.080	-0.285	-0.144	-0.155	0.219	0.486	1					
	0.042	0.000	0.002	0.000	0.000	0.000	0.000	0.000						
(10) <i>LNAGE</i>	-0.042	0.123	-0.071	-0.233	-0.086	-0.146	0.241	0.416	0.918	1				
	0.104	0.000	0.006	0.000	0.001	0.000	0.000	0.000	0.000					
(11) <i>GEAR</i>	0.073	-0.053	-0.103	0.313	0.047	0.134	0.326	-0.035	0.033	0.031	1			
	0.004	0.039	0.000	0.000	0.066	0.000	0.000	0.173	0.194	0.22				
(12) <i>TURNOVER</i>	0.014	-0.088	0.058	-0.044	-0.128	-0.002	-0.108	0.024	-0.075	-0.103	0.048	1		
	0.58	0.001	0.022	0.087	0.000	0.938	0.000	0.343	0.004	0.000	0.062			
(13) <i>PAGES</i>	-0.019	0.056	-0.043	0.119	-0.023	0.065	0.055	0.320	0.160	0.239	0.033	-0.119	1	
	0.462	0.029	0.090	0.000	0.364	0.011	0.031	0.000	0.000	0.000	0.200	0.000		

Notes Panel B: This table (Panel B) presents the Pearson correlations for the variables used in the main analyses. Significance levels are reported below the correlation coefficients. The number of observations used to calculate the correlations is 1,534 in all cases.

Table 2: Differences and determinants of full portfolio disclosure

Panel A: Univariate t -tests of differences between full portfolio disclosure and non-full portfolio disclosure trusts.

<i>N=1,534</i>	<i>Non-full portfolio disclosure</i> (1)	<i>Full portfolio Disclosure</i> (2)	<i>Difference</i> (1)–(2)
<i>TURNOVER</i>	3.59	2.87	0.71***
<i>PAGES</i>	49.04	50.66	– 1.62**
<i>EXPENSES</i>	1.75	1.35	0.40***
<i>RETURN</i>	0.09	0.07	0.02
<i>YIELD</i>	1.73	2.22	– 0.48***
<i>GEAR</i>	0.13	0.12	0.01**
<i>OWNERSHIP</i>	17.79	16.10	1.69**
<i>EMERGING</i>	0.11	0.19	– 0.08***
<i>SIZE</i>	11.96	12.16	– 0.20***
<i>DISCOUNT_{t+1}</i>	0.14	0.12	0.02***

Notes: This table presents a descriptive analysis of the differences of trusts' (non-) disclosing full portfolio holdings. *TURNOVER* (DATASTREAM item: UVO) is the monthly share turnover measured three-month after fiscal year-end. *PAGES* are the number of pages in the trust's annual report. *EXPENSES* are the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets. *OWNERSHIP* is the percentage of closely held shares based on WORLDSCOPE item (wc08021). *RETURN* is calculated (stock price_t – stock price_{t-1}/ stock price_{t-1}). *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end. *SIZE* is the natural logarithm of total assets. *GEAR* is the trust's gearing ratio expressed as (total assets - NAV)/total assets at fiscal year-end. *EMERGING* is an indicator variable which equals 1 if the trust invests in emerging markets; and 0 otherwise. *DISCOUNT_{t+1}* is calculated as: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)). *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed t -tests of means.

Tables 2 panel a, contrasts investment trusts which disclose full portfolio holdings and those that do not. Full disclosers are significantly different from non-disclosers in terms of *PAGES*, which indicates the overall disclosure quality of the trust. Furthermore, they exhibit lower share turnovers (*TURNOVER*) and have lower expense ratios. There is no significant difference in stock returns (*RETURN*). Non-disclosing trusts tend to have slightly more

gearing (*GEAR*) than disclosing ones. *OWNERSHIP* is slightly different between the two groups indicating that a higher percentage of closely-held shares decrease the likelihood of disclosure. Furthermore, disclosing trusts are larger (*SIZE*) and invest to a greater extent in emerging markets (*EMERGING*). I also observe a significantly higher discount for non-disclosing funds.

3.5.2 Empirical results

I use equation (1) to establish an association between full disclosure of portfolio holdings and the demand for the trust's shares. Anchored on evidence from prior literature, I expect trusts' voluntarily disclosing full portfolio holdings to benefit from disclosure. Hence, they exhibit a positive effect on the demand for their shares. Table 3 provides empirical evidence for hypothesis 1 regarding the average effect of the association between full portfolio disclosure and the discount. The main variable of interest is *FULL*. The results show that on average full disclosure increases demand for the trusts' shares. The coefficient β_3 (coeff. -0.079 , z-stat.: 1.98) in column (2) is negative and statistically significantly different from zero ($p < 0.05$) after controlling for selection bias by including the inverse mills ratio (*IMR*). The negative association between *FULL* and *DISCOUNT*_{*t+1*} in column (2) supports hypothesis 1. Moreover, the statistically significant inverse mills ratio suggests that it is necessary to adjust for selection bias.

Focusing on economic significance, a one standard deviation change corresponds to a 37 percentage point change in the discount, on average.²⁴

RETURN is also negative and significantly smaller than zero which supports

²⁴ The calculation is as follows: (standard deviation independent variable \times coefficient independent variable)/standard deviation dependent variable.

the notion that demand increases when the trust is performing well. *OWNERSHIP* is positively associated with the $DISCOUNT_{t+1}$. In line with prior findings there is higher demand for larger trusts which explains the negative association between *SIZE* and $DISCOUNT_{t+1}$.

Table 3: The association between full portfolio disclosure and demand

Panel A: This table shows the results of an OLS regression of the trusts discount ($DISCOUNT_{i,t+1}$) on an indicator of full portfolio disclosure. Column (2) includes the inverse mills ratio from the determinants model presented in Table 2, *panel B*.

	<i>Expected sign</i>	$DISCOUNT_{t+1}$ (1)	$DISCOUNT_{t+1}$ (2)
<i>FULL</i>	–	–0.014 (1.60)	–0.079** (1.98)
<i>RETURN</i>	–	–0.038*** (2.66)	–0.039*** (2.88)
<i>EXPENSES</i>	+	0.465 (0.65)	0.133 (0.18)
<i>OWNERSHIP</i>	+	0.001** (2.54)	0.001** (2.42)
<i>YIELD</i>	–	–0.108 (0.48)	0.037 (0.18)
<i>SIZE</i>	–	–0.011** (2.06)	–0.010* (1.75)
<i>LNAGE</i>	+	0.004 (0.95)	0.004 (0.78)
<i>IMR</i>	?		0.040* (1.75)
<i>INTERCEPT</i>	?	0.195*** (3.05)	0.219*** (3.33)
<i>Year fixed effects?</i>		<i>Yes</i>	<i>Yes</i>
<i>Adjusted R²</i>		0.14	0.14
<i>N</i>		1,534	1,534

Notes: $DISCOUNT_{t+1}$, is calculated in the following way: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)) at fiscal year. *FULL* is an indicator variable which equals 1 if the trust discloses its full portfolio annually; and 0 otherwise; *RETURN* is calculated (stock price_t – stock price_{t-1}/ stock price_{t-1}) at fiscal year-end; *EXPENSES* are the of the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets; *OWNERSHIP* is the percentage of closely held shares based on *WORLDSCOPE* item (wc08021); *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end; *SIZE* is the natural logarithm of total assets, *AGE* is the age of the fund in years and *LNAGE* expresses the natural logarithm of *AGE*. *IMR* is the inverse mills ratio calculated from the first stage Probit regression presented in table 2, panel B. *, **, *** Indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. *Z*-statistics are shown in parentheses below the coefficients and are calculated using clustered standard errors, clustered by investment trust (143 individual trusts) and by year (18 years). All regressions include year fixed-effects; however, for brevity, these separate intercepts are not reported

To control for endogeneity of the decision to fully disclose portfolios I use equation (6) as a first-stage in a two-stage Heckman approach to control for self-selection (Heckman 1979). Panel B in Table 2 presents the results of the probit estimation of the determinants of full portfolio disclosure. *TURNOVER* is significant and negative which is in line with my expectations that already liquid trusts have less incentives to increase disclosure to enhance demand. The marginal effect at the means for *TURNOVER* is -0.86 ($p < 0.1$). A one percentage point increase in *TURNOVER* thus, decreases the likelihood of full portfolio disclosure by -0.0086 . The coefficient on *PAGES* is negative but insignificant showing that having higher disclosure volume in terms of pages in the annual report does not ultimately lead to the disclosure of full portfolio holdings. This result does not confirm results from the univariate tests; however, it highlights the expectation of proprietary information hidden in full portfolio disclosures. *EXPENSES* are also negative and significant indicating that higher expenses in the current year reduce the likelihood of disclosing full portfolio holdings. The corresponding marginal effect at means is -4.37 ($p < 0.05$). Therefore if *EXPENSES* increase by one percentage point for an average investment trust, the likelihood of full portfolio disclosure decreases by 0.0437. *YIELD* on the other hand is positive and statistically significant. A one unit change in *YIELD* increases the probability of full portfolio disclosure by 2.76 ($p < 0.1$), which is in line with my prediction. *EMERGING* is positive and significantly different from zero indicating a higher probability for firms investing in emerging markets to disclose their holdings. The marginal effect at the means for *EMERGING* is 0.20 ($p < 0.05$). Therefore, compared to an average investment trust, investing in emerging markets increases the likelihood of full portfolio disclosure by 0.20. This is not surprising because

investing in emerging markets is associated with more risk and higher information asymmetry. Based on this first-stage binary choice model I calculate the inverse mills ratio which I employ in equation (1) and all further analyses to control for self-selection.

Table 2: Differences and determinants of full portfolio disclosure

Panel B: This table shows the determinants of full portfolio disclosure which is also the first stage in a two stage Heckman Model. The dependent variable is *FULL* which is 1 if the trust discloses its full portfolio annually; and 0 otherwise.

	<i>Expected sign</i>	<i>FULL</i>	<i>Marginal effects at means</i>
<i>TURNOVER</i>	–	–2.438* (1.68)	–0.856* (1.67)
<i>PAGES</i>	+	–0.011 (1.50)	–0.004 (1.49)
<i>EXPENSES</i>	–	–12.471** (2.08)	–4.379** (2.10)
<i>RETURN</i>	–	–0.059 (0.62)	–0.020 (0.62)
<i>YIELD</i>	+	7.868* (1.91)	2.762* (1.90)
<i>GEAR</i>	–	–0.059 (0.08)	–0.020 (0.08)
<i>OWNERSHIP</i>	–	–0.001 (0.26)	–0.000 (0.26)
<i>EMERGING</i>	+	0.578** (2.15)	0.203** (2.14)
<i>SIZE</i>	+	0.140 (1.60)	0.049 (1.61)
<i>INTERCEPT</i>	?	–0.005 (0.00)	
<i>Year fixed-effects</i>		Yes	
<i>McFadden's R²</i>		0.08	
<i>N</i>		1,534	

Notes: This table presents an analysis of the determinants of disclosing full portfolio holdings. *TURNOVER* (DATASTREAM item: UVO) is the monthly share turnover measured three-month after fiscal year-end. *PAGES* are the number of pages in the trust's annual report. *EXPENSES* are the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets. *RETURN* is calculated $(\text{stock price}_t - \text{stock price}_{t-1}) / \text{stock price}_{t-1}$. *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end. *GEAR* is the trust's gearing ratio expressed as $(\text{total assets} - \text{NAV}) / \text{total assets}$ at fiscal year-end. *OWNERSHIP* is the percentage of closely held shares based on WORLDSCOPE item (wc08021). *EMERGING* is an indicator variable which equals 1 if the trust invests in emerging markets; and 0 otherwise. *SIZE* is the natural logarithm of total assets. *, **, *** Indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Z-statistics are shown in parentheses below the coefficients and are calculated using clustered standard errors, clustered by investment trust (143 individual trusts) and by year (18 years).

Table 4 provides regression evidence for hypothesis 2. I use *RETURN* quintiles as a proxy for cross-sectional differences in performance to examine whether proprietary cost arising through disclosure of full portfolios affect the demand for skilled managed trusts. The coefficient of main interest is β_3 which shows the incremental effect of full disclosure for the top performing trusts in terms of *RETURN*. The coefficient is positive and significant ($p < 0.01$) in all specifications ($p < 0.01$). This is in line with my prediction that proprietary costs are highest for top performing trusts (H2). The release of private information is associated with a decrease in demand reflected by a positive association between $DISCOUNT_{t+1}$ and the interaction term $FULL \times HIGH_RETURN$. This result is robust to the inclusion of *RETURN* as an additional control variable in column (3). The control variables which are the same as in equation (1) do not switch signs or significance with respect to $DISCOUNT_{t+1}$. A joint test of the main and interaction effects reveals that it is still beneficial for high performing trusts to disclose although the positive net effect for *HIGH_RETURN* trusts on product demand decreases (combined coefficient: -0.007 ; z-stat = -0.96). A one standard deviation change corresponds to a 14 percent point change in the discount on average, which is substantially less than the average effect.²⁵ This adds to the notion that proprietary costs for well performing trusts reduce the positive effect of voluntary disclosure.

In order to check the robustness of the results I employ a different way of measuring disclosure. I use the percentage of disclosed investments calculated by dividing the net asset value of disclosed investments by the

²⁵ Summary statistics for high return indicator: Mean: 0.1923; Standard deviation: 0.3942; N=1,534.

trust's total net asset value (*%NAV*). I replace the indicator variable to use variation in the level of portfolio disclosure over time and to be less restrictive in my measure of disclosure. Since my predictions do not only expect an association between portfolio disclosures and demand if the full portfolio is revealed. Moreover, I also predict an association for cross-sectional differences in the level of portfolio disclosures. The last column (4) in Table 4 shows the results for this alternative specification. The coefficient for *%NAV*×*HIGH_RETRUN* is also significant and positive (coeff. 0.045; z-stat: 2.71). Due to missing information to calculate *%NAV* the number of observations in this regression decreases compared to the number of observations used in the prior analysis.²⁶ Nonetheless, the incremental value of disclosing a higher percentage of the net asset value by showing individual holdings decreases the demand for the trust shares. A joint test of the main and interaction effect in this specification reveals a negative and statistical significant association (combined coeff. −.0147; z-stat: 2.10).

Overall, my results indicate that in the presence of proprietary information disclosing full portfolio holdings is associated with a reduction of demand for the trust.

²⁶Some trusts describe their portfolio of investments in detail but give either no evidence whether these top or main investments do or do not represent their whole portfolio nor they do not give current fair values or percentages of NAV which can be used to calculate *%NAV*.

Table 4: Cross-sectional differences in performance and demand

This table shows the results of the test of hypothesis 2. I use cross-sectional variation in the trusts' stock returns to identify trusts with high (low) proprietary information. Then I test how the association between high proprietary information is associated with product demand.

	<i>Expected sign</i>	<i>DISCOUNT</i> _{t+1} (1)	<i>DISCOUNT</i> _{t+1} (2)	<i>DISCOUNT</i> _{t+1} (3)	<i>DISCOUNT</i> _{t+1} (4)
<i>FULL</i>	–	–0.021** (2.23)	–0.080* (1.86)	–0.087** (2.14)	
<i>HIGH_RETURN</i>	–	–0.041*** (5.27)	–0.042*** (5.31)	–0.024*** (2.70)	–0.059*** (3.35)
<i>FULL</i> × <i>HIGH_RETURN</i>	+	0.034*** (4.37)	0.035*** (4.30)	0.036*** (3.95)	
<i>%NAV</i>	–				0.022 (0.70)
<i>%NAV</i> × <i>HIGH_RETURN</i>	+				0.045*** (2.71)
<i>RETURN</i>	–			–0.039** (2.11)	
<i>EXPENSES</i>	+	0.530 (0.72)	0.229 (0.29)	0.121 (0.16)	1.288* (1.88)
<i>OWNERSHIP</i>	+	0.001** (2.42)	0.001** (2.31)	0.001** (2.40)	0.001** (2.48)
<i>YIELD</i>	–	–0.060 (0.26)	0.077 (0.36)	0.050 (0.24)	–0.204 (0.70)
<i>SIZE</i>	–	–0.011** (2.14)	–0.010* (1.84)	–0.009* (1.71)	–0.010* (1.71)
<i>LNAGE</i>	+	0.005 (1.02)	0.004 (0.86)	0.004 (0.81)	0.007 (1.39)
<i>IMR</i>	?		0.036 (1.50)	0.039* (2.11)	–0.013 (1.45)
<i>INTERCEPT</i>	?	0.193*** (3.02)	0.215*** (3.27)	0.221*** (3.37)	0.128* (1.81)
<i>Year fixed-effects?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Adjusted R</i> ²		0.14	0.14	0.15	0.15
<i>N</i>		1,534	1,534	1,534	1,491

Notes: The *DISCOUNT*_{t+1} is calculated in the following way: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)) at fiscal year-end. *FULL* is an indicator variable which equals 1 if the trust discloses its full portfolio annually; and 0 otherwise. *%NAV* is calculated by dividing the net asset value of disclosed investments by the trust's total net asset value. *RETURN* is calculated (stock price_t – stock price_{t-1}/ stock price_{t-1}) at fiscal year-end. *HIGH_RETURN* is an indicator variable that takes on the value 1 if the trust performance belongs to the highest quintile in a given year; and 0 otherwise. *EXPENSES* are the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets; *OWNERSHIP* is the percentage of closely held shares based on *WORLDSCOPE* item (wc08021). *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end; *SIZE* is the natural logarithm of total assets, *AGE* is the age of the fund in years and *LNAGE* expresses the natural logarithm of *AGE*. *IMR* is the inverse mills ratio calculated from the first stage Probit regression presented in table 2, panel B.*; **, *** Indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. *Z*-statistics are shown in parentheses below the coefficients and are calculated using clustered standard errors, clustered by investment trust (143 individual trusts) and by year (18 years).

Table 5 provides regression evidence for hypothesis 3 using cross-sectional differences in the trusts' portfolio turnover. Therefore, I calculate

portfolio turnover (*PTURN*) quintiles to examine whether proprietary cost arising through disclosure of full portfolios affect the demand for actively managed investment trusts. Comparable to the prior results, the coefficient for *FULL*×*HIGH_PTURNS* is positive and significantly different from zero ($p < 0.05$) indicating a reduction of demand for high turnover trusts when they release full portfolio holdings. I use *%NAV* to substitute for the *FULL* indicator as an alternative measure of portfolio disclosure. I find a positive coefficient albeit it is insignificant. To summarize, the findings suggest that in the presence of high portfolio turnover releasing full portfolios to the public decreases in the demand for the trust.

Table 5: Cross-sectional differences in portfolio turnover

This table shows the results of the test of hypothesis 2. I use cross-sectional variation in the trusts' portfolio turnover to identify trusts with high (low) proprietary information. Then I test how the association between high proprietary information is associated with product demand.

	<i>Expected sign</i>	<i>DISCOUNT</i> _{<i>t</i>+1} (1)	<i>DISCOUNT</i> _{<i>t</i>+1} (2)	<i>DISCOUNT</i> _{<i>t</i>+1} (3)	<i>DISCOUNT</i> _{<i>t</i>+1} (4)
<i>FULL</i>	–	–0.021** (2.21)	–0.080* (1.93)	–0.077* (1.85)	
<i>HIGH</i>	–	–0.019* (1.73)	–0.020* (1.70)	–0.032** (2.55)	–0.019 (0.70)
<i>FULL</i> × <i>HIGH_PTURN</i>	+	0.029** (2.05)	0.030** (2.18)	0.026** (1.97)	
<i>%NAV</i>	–				0.026 (0.71)
<i>%NAV</i> × <i>HIGH_PTURN</i>	+				0.017 (0.56)
<i>PTURN</i>	–			0.015*** (3.90)	
<i>EXPENSES</i>	+	0.505 (0.68)	0.200 (0.26)	0.170 (0.22)	1.290* (1.87)
<i>OWNERSHIP</i>	+	0.001** (2.50)	0.001** (2.38)	0.001** (2.36)	0.001** (2.48)
<i>YIELD</i>	–	–0.015 (0.06)	0.124 (0.57)	0.120 (0.54)	–0.171 (0.60)
<i>SIZE</i>	–	–0.011** (2.01)	–0.009* (1.72)	–0.009* (1.68)	–0.009* (1.66)
<i>LNAGE</i>	+	0.005 (1.02)	0.004 (0.87)	0.004 (0.88)	0.007 (1.41)
<i>IMR</i>	?		0.037 (1.51)	0.034 (1.42)	–0.013 (1.42)
<i>INTERCEPT</i>	?	0.181*** (2.80)	0.203*** (3.04)	0.193*** (2.91)	0.117 (1.61)
<i>Year fixed-effects?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Adjusted R</i> ²		0.13	0.13	0.14	0.14
<i>N</i>		1,534	1,534	1,534	1,491

Notes: *DISCOUNT*_{*t*+1}, is calculated in the following way: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)) at fiscal year. *FULL* is an indicator variable which equals 1 if the trust discloses its full portfolio annually; and 0 otherwise. *RETURN* is calculated (stock price_{*t*} – stock price_{*t*–1}) / stock price_{*t*–1}) at fiscal year-end. *HIGH_TURN* is an indicator variable that takes on the value one if the trust's portfolio turnover (*PTURN*) belongs to the highest quintile in a given year; and zero otherwise. *EXPENSES* are the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets. *OWNERSHIP* is the percentage of closely held shares based on *WORLDSCOPE* item (wc08021). *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end. *SIZE* is the natural logarithm of total assets. *AGE* is the age of the fund in years and *LNAGE* expresses the natural logarithm of *AGE*. *IMR* is the inverse mills ratio calculated from the first stage Probit regression presented in table 2, panel B. *, **, *** Indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. *Z*-statistics are shown in parentheses below the coefficients and are calculated using clustered standard errors, clustered by investment trust (143 individual trusts) and by year (18 years).

Next, I further investigate the consequences of full portfolio disclosures on product demand. From the econometric standpoint, using changes in the indicator variable helps me to identify the change of expectations about the trust's future performance that occurs around the switching year. Furthermore, using the change helps to mitigate the possibility that any other unobserved variable is responsible for the cross-sectional change in the demand for the trusts' shares. I substitute *FULL* for the indicator variable *SWITCHUP* (*SWITCHDOWN*) in equation (6) which identifies the firm-year of the upward (downward) switch in disclosure policy and turns one in the year the trust switches its disclosure policy; and zero otherwise. Thus, I use the indicator variables *SWITCHUP* (*SWITCHDOWN*) to investigate the association between the discount and trusts increasing (decreasing) their level of portfolio disclosure. In contrast to *FULL* it indicates only the specific year of the switch. I expect increases (decreases) in full portfolio disclosure to be associated with an increase (decrease) on demand.

Table 6: Analysis of switches in portfolio disclosure and demand

This table presents the results of the OLS regression of $DISCOUNT_{i,t+1}$ on indicator variables that indicate either the time of an upward or a downward switch in the trust's disclosure behavior. Moreover, the table shows the interaction between an upward (downward) switch in the trust's disclosure behavior with either $RETURN$ (col. (1)-(3)), $HIGH_RETURN$ (col. (4)-(6)), and LOW_RETURN (col. (7)-(9)).

	<i>Expected sign</i>	<i>DISCOUNT</i> (1)	<i>DISCOUNT</i> (2)	<i>DISCOUNT</i> (3)	<i>DISCOUNT</i> (4)	<i>DISCOUNT</i> (5)	<i>DISCOUNT</i> (6)	<i>DISCOUNT</i> (7)	<i>DISCOUNT</i> (8)	<i>DISCOUNT</i> (9)
<i>SWITCHUP</i>	-	0.029 (1.37)		0.029 (1.34)	0.008 (0.52)		0.008 (0.52)	0.032 (1.03)		0.032 (1.03)
<i>SWITCHDOWN</i>	+		-0.027 (1.23)	-0.027 (1.21)		-0.023 (0.84)	-0.023 (0.86)		-0.006 (0.34)	-0.006 (0.33)
<i>RETURN</i>	-	-0.036** (2.52)	-0.043*** (2.91)	-0.041*** (2.80)						
<i>HIGH_RETURN</i>	-				-0.021*** (2.95)	-0.019*** (2.68)	-0.021*** (2.90)			
<i>LOW_RETURN</i>	+							0.028** (2.35)	0.029** (2.36)	0.029** (2.40)
<i>SWITCHUP</i> × <i>RETURN</i>	-	-0.065* (1.72)		-0.062 (1.61)						
<i>SWITCHDOWN</i> × <i>RETURN</i>	+		0.038*** (2.66)	0.037** (2.56)						
<i>SWITCHUP</i> × <i>HIGH_RETURN</i>	+				0.124 (1.42)		0.125 (1.42)			
<i>SWITCHDOWN</i> × <i>HIGH_RETURN</i>	-					0.007 (0.24)	0.010 (0.32)			
<i>SWITCHUP</i> × <i>LOW_RETURN</i>	+							-0.017 (0.48)		-0.018 (0.50)
<i>SWITCHDOWN</i> × <i>LOW_RETURN</i>	-								-0.122*** (4.05)	-0.122*** (4.05)
<i>IMR</i>		-0.008 (1.41)	-0.008 (1.40)	-0.008 (1.46)	-0.008 (1.43)	-0.008 (1.43)	-0.008 (1.48)	-0.008 (1.45)	-0.008 (1.48)	-0.009 (1.51)
<i>INTERCEPT</i>		0.186*** (2.94)	0.189*** (2.99)	0.186*** (2.93)	0.185*** (2.87)	0.186*** (2.89)	0.184*** (2.84)	0.159** (2.49)	0.162** (2.56)	0.161** (2.52)
<i>Controls?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>

3 Proprietary costs of full portfolio disclosure for UK investment trusts

<i>[continued]</i>									
<i>Year fixed-effects?</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Adjusted R ²	0.14	0.14	0.14	0.14	0.13	0.14	0.14	0.14	0.14
N	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534	1,534

Notes: $DISCOUNT_{t+1}$, is calculated in the following way: (net asset value (wc03501) less market value (wc08001)/net asset value (wc03501)) at fiscal year. *SWITCH* is an indicator variable which equals 1 if the trust switches its disclosure policy either upwards or downwards; and 0 otherwise. *SWITCHUP* is an indicator variable which equals 1 if the trust switches its disclosure policy to full portfolio disclosure; and 0 otherwise. *SWITCHDOWN* is an indicator variable which equals 1 if the trust switches its disclosure policy from full portfolio disclosure to non-full portfolio disclosure; and 0 otherwise. *RETURN* is calculated (stock price_t – stock price_{t-1}/ stock price_{t-1}) at fiscal year-end. *HIGH_RETURN* is an indicator variable that takes on the value one if the trust's portfolio turnover (*RETURN*) belongs to the highest quintile in a given year; and zero otherwise; *Controls* include: *EXPENSES* are the of the sum of management fees, operating costs, and other costs incurred by the trust, divided by net assets, *OWNERSHIP* is the percentage of closely held shares based on *WORLDSCOPE* item (wc08021), *YIELD* expresses dividend per share as a percentage of share price at fiscal year-end, *SIZE* is the natural logarithm of total assets, and *AGE* is the age of the fund in years and *LNAGE* expresses the natural logarithm of *AGE*. *IMR* is the inverse mills ratio calculated from the first stage Probit regression presented in table 2, panel B. *,**,*** Indicate significance at the 0.10, 0.05, and 0.01 levels, respectively, using two-tailed tests. Z-statistics are calculated using clustered standard errors, clustered by investment trust (143 individual trusts) and year (18 years).

The sample comprises 53 switching trusts of which 37 increase disclosures and 16 trusts decrease disclosures. Table 6 shows the results for the analysis of the switching trusts. Columns (1) to (3) show that there is an incremental positive (negative) association between switching upwards (downwards) and the demand for the trust. The negative and significant coefficient of $SWITCHUP \times RETURN$ in column (1) suggests that there is an incrementally positive association between increasing portfolio disclosure and the demand for trust (coeff. -0.065 , z-stat.: 1.72). On the other hand, the coefficient of $SWITCHDOWN \times RETURN$ in column (2) shows that decreasing portfolio disclosure is associated with a decrease in demand (coeff. 0.038 , z-stat.: 2.67). In column (3) employ upwards as well as downwards changes simultaneously to further dissect the association between switching disclosure behavior and product demand. Although the predicted direction of the coefficients remains the same, only $SWITCHDOWN \times RETURN$ remains statistically significant (coeff. 0.037 , z-stat.: 2.56).

Next, in columns (4) to (6), I substitute $RETURN$ with $HIGH_RETURN$ to investigate how upwards or downwards changes in the disclosure policy affect well performing trusts. For instance, the joint coefficient of $HIGH_RETURN$ and $SWITCHUP \times HIGH_RETURN$ in column (4), is positive which is in line with my predictions (coeff. 0.12 , z-stat.: 1.42) but not significant at the conventional level. At the time of the switch, there seems to be no statistical significant incremental effect for well performing trusts which increase disclosure. This might be due to the fact that the general level of disclosure is high in the investment trust industry and that although proprietary cost are present the benefits of higher product market demand, outweigh the costs of releasing proprietary information to competitors.

Then, in columns (7) to (9), I substitute *HIGH_RETURN* with *LOW_RETURN* to investigate how upwards or downwards changes in the disclosure policy affect weak performing trusts. Throughout columns (7) to (9) the coefficients of *LOW_RETURN* are positive and statistically significant ($p < 0.05$) which is in line with my prediction that low performance is associated with lower demand for the trusts' shares. Moreover, the coefficient of the interaction term *SWITCHDOWN* × *LOW_RETURN* in columns (8) and (9) is – 0.122 (z-stat.: 4.05) suggesting that downwards switching trusts that are in the low return quintile exhibit an increase in demand.

3.6 Summary and conclusion

This study examines voluntary disclosures of full portfolio holdings by UK investment trusts to explain disclosures in the financial industry. In the light of the strong theoretical evidence about proprietary costs, I expect the disclosure of sensitive information about the business strategy to have negative implications for the disclosing firms. I place the study in the UK investment trust industry because the disclosure of the portfolio is sensitive and important information. It may be used by competitors to infer trading and stock picking strategies. In turn, this may impair the profitability of the trust which decreases the demand for the trust's shares. I expect this association to be strongest for the most successful trusts, where I expect the magnitude of proprietary information in the disclosures to be highest.

My measure of demand is the net asset discount ($DISCOUNT_{i,t+1}$). Changes in the discount correspond to changes in demand for the trust's share. My findings consistently show a positive association between disclosures on

demand, on average. Nonetheless, full portfolio disclosure comes at a price for successful investment trusts, which is a reduction in demand.

Overall, my results are in line with prior research on disclosure (Beyer et al. 2010; Leuz and Verrecchia 2000) but also highlight the proprietary costs aspect of disclosure that has to be taken into account. I show evidence that the release of proprietary information even in a very transparent industry leads to decrease in product demand. This adds to the general debate on disclosures in the financial industry (Goldstein and Sapra 2013), and specifically, to the UK debate on the transparency of investment management products. My results address the potential costs that successful investment trusts endure if they become more transparent due to portfolio disclosure. Nonetheless, this study partly supports the Association of Investment Companies' (AIC) view that UK investment trust should disclose full portfolio holdings²⁷ and it also speaks to policy makers that support greater transparency on financial markets in the aftermath of the financial crisis.

²⁷See <http://www.theaic.co.uk/aic/news/citywire-news/three-fold-rise-in-trusts-rising-to-transparency-challenge>, last checked 31.7.2013

4 Private firms' investment efficiency and local news media coverage²⁸

4.1 Introduction

In this paper I investigate how the quality of private firms' external information environment affects corporate investment efficiency²⁹. Bushman and Smith (2001) suggest that a more transparent information environment can reduce agency conflicts by enhancing monitoring and that it can help the firm to identify and exploit investment opportunities. Adding to this notion, Bushman et al. (2004) argue that underdeveloped communication infrastructures can hinder the flow of firm-specific information resulting in limited availability of decision relevant information to economic agents. Since private firms operate in an opaque environment (Minnis 2011) compared to publicly listed firms due to the absence of analyst coverage, the quality of the external information environment is even more critical. Furthermore, private firms make up a large proportion of a country's investment and therefore, it is necessary to understand the factors that drive the efficient resource allocation of private firms (Claessens 2006; Francis et al. 2009). Although, there is previous literature on how the quality of the information environment affects business decisions of public firms and efficient resource allocation within an economy (Frankel and Li 2004; Francis et al. 2009; Shroff et al. 2014; Beyer et al. 2010; Bushman et al. 2004; Horton et al. 2013; Armstrong et al. 2012; Lau et al. 2; Bhat et al. 2006), little is known about whether and how it affects private firms (Badertscher et al. 2013).

²⁸ This chapter is based on Peter, C.D. (2014a), Private firms' investment efficiency and local news media coverage, Working paper: WHU – Otto Beisheim School of Management.

²⁹ I use the term private firms to refer to unlisted large, small and medium sized entities (SMEs).

I try to fill this gap by examining whether greater local news media coverage increases the responsiveness of firms' investments to their investment opportunities by reducing uncertainty about the local economic environment the firms operate in. The intuition is that via a greater number of local news media, managers have access to a greater range of timely information, which allows them to make better informed investment decisions. Hence, the reduction of uncertainty about the economic environment subsequently translates into more efficient investments.

My analysis is based on theoretical predictions of investment under uncertainty by Dixit and Pindyck (1994), which has been recently applied to the private firm setting by Badertscher et al. (2013) and Asker et al. (2014). Within this theoretical framework, investments can be seen as options. Additionally, investments are at least partly irreversible, which means that once executed the investment cannot be taken back without incurring any costs, since at least some of the investment expenses are sunk. That is why, firms facing uncertainty about the future outcome of the investment tend to hold back investments instead of exercising the "option" (Bloom et al. 2007). Therefore, if greater local news media coverage decreases uncertainty, I expect firms to be more responsive to investment opportunities which can be interpreted as more efficient investments (Badertscher et al. 2013; Asker et al. 2014).

Prior literature on the differences in responsiveness of investment opportunities between public and private firms finds that private firms are more responsive to investment opportunities than public firms (Asker et al. 2014). Solely focusing on private firms, Badertscher et al. (2013) find positive externalities of public firms' industry presence to affect private firms' responsiveness to investment opportunities. They attribute their findings to

enhancements in the (industry wide) information environment of private firms due to information readily accessible via the public firms' annual financial statements. I follow this line of research and exploit cross-sectional as well as time series variation in the number of local news media at the city-level, to examine whether news media is beneficial to private firms' information environment.

To test my prediction, I exploit Italian panel data that provides me with cross-sectional and time series information about the number local newspaper in Italian cities. I merge data on Italian private firms from Bureau van Dijk (BvD) with information on local (city-level) data on news media coverage by Drago et al. (2014). Private firms make up 99.9% of the Italian landscape of firms and are an important contributor to the country's economy.³⁰ Although, European regulation mandates private firms to disclose financial statements, their abbreviated financial accounts do not include the level of information. Furthermore, they are less timely and widely distributed compared to financial records of publicly listed firms (Feng et al. 2011; Ball and Shivakumar 2005). Finally, the quantity of disclosure depends on the size category the firm is part of and is adjusted to the needs of users.³¹ The reports are publicly (online) accessible via an internet platform (Registro imprese)³². Overall, prior literature identifies private firms' disclosure environment to be weaker than that of public firms (see e.g. Burgstahler et al. (2006) or Feng et al. (2011)). Thus, in the absence of financial analysts as an important information dissemination mechanism, and low informativeness of abbreviated reports,

³⁰ See e.g. http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/files/countries-sheets/2013/italy_en.pdf. In the landscape of all firms in Italy 99.9% are categorized as small and medium sized entities (SME).

³¹ European Union 2011: Study on Accounting Requirements for SMEs. Report Published Online:<http://ec.europa.eu/enterprise/policies/sme/business-environment/accounting/#h2-2>.

³² See: <http://www.registroimprese.it/en/web/guest/home>.

local news media may play an important role in the dissemination of information. Notably, news media and financial analysts have found to be substitutes if earnings informativeness of financial statements is low (Frankel and Li 2004). Especially with regard to Italian municipalities, local newspapers play an important part in the dissemination of information (Drago et al. 2014). Furthermore, unlike the national newspaper market which is highly concentrated, the local newspaper market provides a wide range of newspaper competition across and within municipalities and cities (Drago et al. 2014).

Extant literature in financial economics examines how local news media is associated with affects business decisions. For example, Fang and Peress (2009) find that stocks with no mass media coverage, such as newspapers, exhibit significantly higher returns than stocks with low coverage. Their findings are amplified if the stock is small, has low analyst coverage, and if individual ownership is high. More broadly speaking, they find that the breadth of information dissemination affects stock prices (Fang and Peress 2009). Engelberg and Parson (2011) establish a causal link between local news coverage and trading behavior. When local news coverage is disrupted due to extreme weather conditions they do not find the same media coverage trading pattern as before. Consequently, media coverage improves the efficiency of stock markets by disseminating information among investors (Engelberg and Parsons 2011). Both studies highlight the effect of news media as an important disseminator of information for publicly listed firms that reduces informational frictions.

Based on the argumentation above, I predict and find that a higher quality external information environment increases the responsiveness of firms' investments to investment opportunities. Furthermore, I find that

investment efficiency increases and that underinvestment, as well, as overinvestment decreases. To alleviate concerns that my results are driven by omitted variables I employ city, industry, and year fixed effects in the regression analysis to eliminate time invariant omitted variables. Furthermore, the proportion of publicly listed firms has been shown to positively affect private firms' responsiveness to investment opportunities (Badertscher et al. 2013). I show that my results are further robust to the inclusion of firm fixed effects and to the inclusion of the proportion of public listed firms in an industry. Including this variable further emphasizes that news media is a distinct and relevant channel of information dissemination.

This study makes several contributions. Investment decisions are one of the most fundamental decisions a firm makes (Hubbard 1998). Furthermore, investment is an important driver of efficient resource allocation in an economy. First, I add to the prior literature on efficient resource allocation and corporate transparency (Bushman et al. 2004; Bushman and Smith 2001; Francis et al. 2009; Lang and Maffett 2011), by investigating how private firms' information environment is associated with corporate investment efficiency. I especially add to prior literature, investigating the management's investment decision process and how managers obtain decision-relevant information (Badertscher et al. 2013; Shroff 2014; Shroff et al. 2014), by showing that regional news media coverage is an important channel that nourishes private firms' information environment.

Secondly, I add to the literature on spillover effects by showing that higher regional news media coverage is associated with more efficient investment decisions by private firms. This adds to existing evidence of firms using information in peer firm restatements to alter their investment decisions

(Durnev and Mangen 2009; Beatty et al. 2013; Gleason et al. 2008) by introducing a broader setting unrelated to restatements that displays an alternative channel through which firms obtain decision relevant information.

Third, I add to literature investigating the role of news media in financial economics (Engelberg and Parsons 2011; Fang and Peress 2009; Peress 2014; Robert et al. 1987). Whereas prior literature focuses on capital market oriented (listed) firms, I use private firms to explore the role of news media in the firm's external information environment. In the absence of financial analysts as one important information dissemination mechanism, the private firm setting allows me to investigate the impact of news media in a straight-forward way. I also add to prior research that investigates the effect of news media on citizens' welfare (Drago et al. 2014; Gentzkow et al. 2011). My results suggest that news media coverage is associated with a more efficient resource allocation which highlights another benefit of news media next to, for example, the selection of politicians and their performance. Regarding policy implication, my results emphasize the importance of communication infra-structures in ensuring efficient resource allocation in an economy by securing the flow and availability of decision relevant firm-specific information to economic agents.

The rest of the paper proceeds as follows. Section 2 gives an outlay about the theoretical background of this study. Section 3 develops the hypotheses. Section 4 describes the research design, the sample selection, and variable measurement. Section 5 presents the empirical results. Section 6 describes the potential limitations of this study and section 7 concludes.

4.2 Background

4.2.1 *The firm's external information environment and investment*

A key element to effective resource allocation in an economy is the availability of firm-specific information that is available to outsiders of *publicly* traded firms (Bushman et al. 2004). For instance, Francis et al. (2009) find that corporate transparency facilitates resource allocation across industry sectors.³³ One of the most important management decisions regarding resource allocation in an economy is investment. Bushman and Smith (2001) argue that managers can identify new investment opportunities on the basis of information reported by other firms. Since managers use this information and evaluate investments based on forecasted and discounted cash flows (Graham and Harvey 2001), (changes to) the firm's external information environment may affect their information set and the following investment decision. Theories of costly information acquisition and processing suggest that managers have limited information processing capacities and are not aware of all decision relevant information (DellaVigna 2009). Thus, a higher quality external information environment may provide the manager with new information about the economic environment the firm is situated in.

The external information environment is critical for private firms since they operate in an opaque environment compared to publicly listed firms (Minnis 2011) due to weaker disclosure restrictions (Burgstahler et al. 2006). For instance, Badertscher et al. (2013) predict and find that US private firms operating in industries with more public firm presence are more responsive to

³³ Moreover, prior literature has shown several benefits of transparent information environments. Thus, more transparent firms exhibit increases in liquidity (Lang and Maffett 2011), higher analyst forecast accuracy (Bhat et al. 2006), less earnings management (Hunton et al. 2006), and enjoy lower cost of capital (Barth et al. 2013).

investment opportunities. They attribute their findings to managements' ability to make better informed investment decisions while facing less economic uncertainty due to the industry-wide dissemination of decision relevant information in public firm disclosures (Badertscher et al. 2013). Similarly, Asker et al. (2014) document differences between the investment behavior of public and private firms. They find that public firms invest less and are less responsive to investment opportunities. They attribute their findings to managerial myopia.

A related stream of literature suggests that managers learn from industry wide information transfer. For instance, Beatty et al. (2013) study such information spillovers and find that firms in industries that exhibit fraudulent behavior by their peers increase their investment during the fraud period. Their results suggest that peers use the disseminated information and base in their own investment decisions. The disseminated "good news", despite untrue, result in overinvestment by industry peers. This adds to prior evidence by Durnev and Mangen (2009), who find firms alter their investment decisions after restatements of peer firms. They show that restatements convey information about the investment projects of restating firms' competitors (Durnev and Mangen 2009). Moreover, Shroff et al. (2014) find that multinational companies are more responsive to local growth opportunities in country-industries that have more transparent information environments. They attribute their findings to a reduction in agency cost that arise when firms operate in different countries. Essentially, a more transparent information environment helps to decrease information asymmetry within the multinational firm. One of their proxies for the quality of the external information environment is press coverage (Shroff et al. 2014).

Prior literature identifies news media as an important source of information and monitoring device. Miller (2006) finds that the press fulfills this role as a “watchdog” for fraudulent behavior of firms by re-disseminating information from other information intermediaries and by undertaking original investigation and analysis. But news media is also an important player in financial markets. Peress (2014) explores the impact of news media on trading and price formation. He establishes a causal relationship between trading volume and news media coverage by using newspaper strikes in several countries as an exogenous event. He finds a reduction in trading, dispersion of stock returns, and intraday volatility suggesting that media contributes to the efficiency of the stock market by improving the dissemination of information among investors (Peress 2014). With respect to local news media coverage, Engelberg and Parson (2011) also establish a causal link between differences in local reporting of S&P 500 index firms' earnings reports coverage and local trading behavior. When local news coverage is disrupted due to extreme weather conditions they do not find the same media coverage trading pattern as before (Engelberg and Parsons 2011). This study relates to aforementioned one, by additionally providing insights on the importance of local news media coverage on trading behavior.

The discussion above highlights the importance of the firm's information environment in forming educated investment decisions. Furthermore, the importance of news media as one part of the external information environment becomes obvious. Especially, in the private firm setting where in most cases the manager is the owner or at least one of the few owners, agency problems due to the dispersion of ownership seem not to play an important role compared to public firms (Badertscher et al. 2013; Ang et al.

2000). Since managers of private firms have unconstrained access to information within their firms they arguably have demand for timely information about the industry, and especially information about the region they operate in. Hence, local news media coverage may enable the manager to grasp a wider range of decision-relevant information in a more timely fashion that enables her to make better investment decisions or be more precise in the calculation of the net present value (NPV) of future investments.

4.2.2 Investment under uncertainty

Most corporate investment decisions share three distinct characteristics: (1) they are partially or completely irreversible, (2) there is uncertainty over the future benefit (return) from the investment, and (3) the investor has some slack regarding the timing of the investment, for example to gather additional information while she postpones the investment in the meantime (Dixit and Pindyck 1994). The focus of this study lies on (2) and (3) of the above mentioned characteristics. Thus, I base my analysis on theory about investment under uncertainty (see e.g. Dixit and Pindyck (1994)).

Essentially corporate finance theory predicts that in the presence of uncertainty firms hold back investments if the investments are partially irreversible. A key element in these models is that uncertainty increases the separation between the marginal product of capital of investment and disinvestment. Due to this increase, firms tend to “wait and see” instead of investing because the decision to invest bears cost due to its uncertain outcome. Thus, higher uncertainty reduces the responsiveness to investment opportunities (Bloom et al. 2007). Stated differently, corporate investment is viewed as an option which bears some irreversibility. By not exercising the

option and waiting for additional information to arrive, firms lower the risk of making an ex post suboptimal decision at the cost of missing a valuable investment opportunity. On the other hand, if they exercise the option without further information, they lower the risk of missing a profitable investment opportunity, at the cost of making an ex post suboptimal decision. Consequently, the value of waiting for new information about the designated investment project to arrive is greater when uncertainty is high (Dixit and Pindyck 1994; Asker et al. 2014; Badertscher et al. 2013). Therefore, if a more transparent information environment allows firms to reduce uncertainty in their investment decision process, firms are more likely to be more responsive to investment opportunities. Consistent with Hubbard (1998) and prior literature on private firms' investment efficiency (Asker et al. 2014; Badertscher et al. 2013; Shroff et al. 2014), I infer investment efficiency from the firm's responsiveness to its investment opportunities.

Applied to the private firm setting of this study, I argue that the number of news media in a city is a proxy for the quality of the informational environment for firms headquartered in that particular city. Since news media disseminates information about the local economic environment I expect firms in cities with a higher amount of news media to face less uncertainty regarding their investment decisions compared to firms located in cities with a lower number of local news media.

4.2.3 *The Italian media landscape*

The availability of information is a key ingredient to investors', voters', and consumers' decision making. A key player in collecting information are news media, such as newspapers, television, and radio (Simeon Djankov et al. 2003). The focus of this study is on the Italian newspaper market. In 2011, 52.1 percent of the Italian population aged 6 and over is said to read a newspapers at least once a week, and 36.7 percent of those read a newspaper at least five days out of seven. The number of copies distributed every day per one thousand inhabits is 161.9, which ranks Italy in the lower third within EU comparisons. For instance, Sweden ranked among the top three EU countries, has 468.6 copies of distributed newspapers per thousand inhabitants.³⁴ The national newspaper market is highly concentrated and dominated by only few newspapers that are owned by financial trusts (Durante and Knight 2012). For example, the Hdp-RCS group³⁵, owns the biggest-circulation national newspaper, the *Corriere della Sera*, and the most read sport daily, the *Gazzetta dello Sport* (Kelly et al. 2004). Whereas, the national newspapers make up only a small fraction of the number of all circulating newspapers, 90 percent of the circulating newspapers are regional and local newspapers. Furthermore, newspapers are an important source of information on the local level.

Therefore, Italian municipalities present a suitable setting to investigate whether local news media coverage is associated with firms' business decisions, since they are an important source of information on the local level. Moreover, the market for local news exhibits a wide range of competition

³⁴ Source: [http://noiitalia2013en.istat.it/index.php?id=55&no_cache=1&user_100ind_pi1\[id_pagina\]=744&cHash=473a8918df169b6252b8fcc8ca1a653a](http://noiitalia2013en.istat.it/index.php?id=55&no_cache=1&user_100ind_pi1[id_pagina]=744&cHash=473a8918df169b6252b8fcc8ca1a653a).

³⁵ Source: <http://www.rcsmediagroup.it/en/pages/business/#newspapers>.

between newspapers within and across Italian municipalities (Drago et al. 2014).

4.2.4 The Italian reporting environment

In line with the 4th EU directive, listed firms in Italy report their financial accounts according to the International Financial Reporting Standards (IFRS). Micro, small and medium sized firms, that are unlisted, are not permitted to use IFRS for financial reporting purposes. They report under Italian GAAP. Article 2435-bis of the Italian Civil Code regulate financial reporting requirements. It allows, especially, small and medium sized firms to report abbreviated financial statements depending on their legal form and size criteria. Hence, the information conveyed in these reports is limited. Nonetheless, every Italian company is required to report its financial statements not later than four months after the accounting year has ended to the Registrar of Companies (Registro delle Imprese). On the Registrar of Companies' homepage you can get access to the financial statements, however, it is not free of charge. Furthermore, Italian firms that are not eligible to file abbreviated accounts, are part of a group, or have to file consolidated financial statements have to appoint an internal auditor.

Most of the firms in my sample fall into the category of small firms that have total assets smaller than € 4.4 million, turnover that is lower than € 8.8 million, and less than 50 employees. The most prominent legal form in my sample is Limited Liability Company (SRL). Reporting requirements for these firms allow for abbreviated financial statements if they meet the aforementioned criteria for two consecutive years. Hence, financial reports of

these firms are rather opaque and are not comparable to the informativeness and transparency of listed firms' financial reports.

4.3 Hypothesis development

Bushman and Smith (2001) argue that a more transparent information environment can reduce agency conflicts by enhancing monitoring and that it can help the firm to identify and exploit investment opportunities. Furthermore, communication infra-structures are important since they assure the flow and availability of decision relevant firm-specific information to economic agents (Bushman et al. 2004). Theories of costly information acquisition and processing suggest that managers have limited information processing capacities and are not aware of the entire range of decision relevant information (DellaVigna 2009). Thus, a higher quality of the firm's external information environment provides the manager with new or additional useful information about the economic environment. For instance, this information is useful to form expectations about NPV estimates which are a crucial determinant in successful investment decisions (Goodman et al. 2013). Specifically, I assume that a more transparent external information environment enables the manager to make more precise estimates of the investment's net present value (NPV).

Prior evidence suggests that managers use information about their peers' economic activities in the process of forming their investment decisions (Francis et al. 2009). A downside of using information about peers is that, if that information does not display true nature of the firm's underlying economics (e.g. investment or performance) it leads to inefficient resource allocation. For example, prior literature identifies overinvestment as a downside of managers using (fraudulent) information in peer firms' financial

accounts (Beatty et al. 2013; Durnev and Mangen 2009). On the other hand, recent evidence suggests that a more transparent information environment, for example, more information about economic developments in an industry or in a country, is incrementally important to firms and positively affects their investment due to a reduction in uncertainty related to the outcome of investments (Badertscher et al. 2013; Shroff 2014).

Private firms constitute 99.9% of the registered firms in the Italian economy. EU regulation requires them to disclose financial information but these disclosures contain less information than annual reports of public firms. Most importantly, size thresholds allow small firms to disclose abbreviated financial statements that most likely contain only a fracture of the information content available in financial statements of publicly listed firms. Therefore, vital information for the strategic decision making process of the managers in terms of firm-specific and more importantly industry and regional economic information is missing. Nonetheless, prior evidence suggests that news media and analyst coverage substitute for missing financial statement informativeness (Frankel and Li 2004). Furthermore, due to the absence of analyst coverage, an important group of information intermediaries, information dissemination is likely to be less efficient in regions and industries dominated by small firms. Therefore, one of few remaining source of information dissemination is news media.

Based on the argumentation above, I expect a more transparent information environment to enrich the manager's information set. Since I cannot determine the nature of the information I do not predict how a more transparent information environment affects the level of investment. There is the possibility that more information reduces uncertainty and positively affects

the level of investment since the manager withdraws from the “wait and see” premise. On the other hand, more information about the outcome of the future investment may lead to a reduction in the level of investment if that increase in decision relevant information leads the manager to stop the potential investment since her updated information set suggests that it is not profitable (negative expected net present value) anymore. Both scenarios correspond to the notion of a reduction in uncertainty. Therefore, I do not predict a direction of how the firm’s information environment is associated with the level of investment and state hypothesis 1 in the following manner:

H1: *The quality of the firm’s information environment is associated with its level of investment.*

A more transparent information environment may also affect the efficiency of investments. In contrast to the level of investments, prior evidence suggests that a more transparent information environment is associated with an increase in firms’ investment efficiency (Shroff 2014; Shroff et al. 2014; Badertscher et al. 2013). Focusing on evidence of public and private firms’ responsiveness to investment opportunities, Asker et al. (2014) find private firms to be more responsive to investment opportunities than public firms. They (among others) interpret the responsiveness to investment opportunities as investment efficiency. Prior literature focusing on investment decisions suggests that improved financial transparency can reduce over-/underinvestment for public firms (Hope et al. 2013).

With respect to the relative opaqueness of private firms’ operations (Minnis 2011), I expect the firm’s informational environment to have a positive effect on investment efficiency. Therefore, I state hypothesis two in the following way:

H2: *The quality of the firm's information environment is positively associated with investment efficiency.*

4.4 Research design

4.4.1 Sample selection

The starting point of the sampling process are all Italian firm-years with non-missing unconsolidated financial accounts and non-missing information on the location of the firm's headquarter available on the 2014 version of Amadeus from Bureau van Dijk (BvD).³⁶ Then, I match firms' location with data on newspaper and online press market entry and exit on the municipality-level provided by Dargo et al. (2014) using the ISTAT indicator.³⁷ Moreover, I drop firms from financial (NAICS: 52) and regulated industries (NAICS: 22) since they are not suited for investment models (Badertscher et al. 2013). Finally, I drop observations with missing data for the main analyses and only keep firms if firm age is greater than zero. I winsorize all variables at the 1st and 99th percentile in every year to control for outliers.³⁸ The final sample comprises a maximum of 333,638 individual firms covering the years 2005 to 2010, resulting in a maximum of 1,007,482 firm-year observations.³⁹ The average number of observations per firm is 4, with a minimum of 1 year and a maximum of 6 years coverage. Table 1 presents descriptive statistics and the Pearson correlation matrix of the variables used in the tests.

³⁶ Due to my institutions BvD subscription only the last ten years of data are available, so far.

³⁷ ISTAT indicators can be obtained here: <http://www.istat.it/it/archivio/6789>.

³⁸ See Mortal and Reisel (2013) for a similar filtering procedure.

³⁹ The number of observations decreases in some tests due to the unavailability of lagged values, for example in the investment efficiency tests (obs.: 1,007,482).

4.4.2 Data on news media in Italy

In the following tests I use a dataset originally compiled by Drago et al. (2014). Specifically, I use the data item: *News_TOT* from this dataset which provides me with the total number of local print and online news by newspaper in a given year per Italian municipality or city. The dataset covers the presence of local news provided by different national and local newspapers for all Italian municipalities above 15,000 inhabitants in the period spanning from 1993 to 2010.⁴⁰ The dataset excludes foreign newspapers and non-news including real estate listings, all-sport newspapers, and financial newspapers (Drago et al. 2014). Excluding purely financial newspapers from the dataset does not alter my theoretical underpinnings, since these newspapers most likely do not cover micro, small and medium sized companies. I stress the fact that, local newspapers disseminate local news about the industry and the economic situation in the city or region which is of greater importance to managers (owners) of private firms than news about capital markets. The benefit of the dataset set is that it allows me to study news media coverage across Italian cities and over time.

4.4.3 Empirical strategy

To investigate the relation between changes in the external information environment of the firm and investment, I specify the following model:

$$y_{i,c,t} = \alpha_t + \varphi_c + \delta_n + \beta_I NEWS_{c,t-1} + \beta' X_{i,c,t-1} + \varepsilon_{i,c,t} \quad (1)$$

⁴⁰ I am deeply grateful to Francesco Drago, Tommaso Nannicini, and Francesco Sobbrino for making their dataset publicly available. See <http://www.aeaweb.org/articles.php?doi=10.1257/app.6.3> as the data source (last checked 23.01.2015).

The dependent variable is a firm-level outcome variable y for firm i , located in city c , in year t . The variable y entails measures of the firm's investment activities (INV or INV_NET), calculated as the difference in gross (or net) fixed assets divided by lagged total assets. The variable $NEWS$ captures the number of newspapers on the city-level lagged by one year.

The vector of firm level controls (X) includes the following variables from the standard investment model which have been used in prior literature measured at $t-1$ (Badertscher et al. 2013; Asker et al. 2014; Shroff 2014): I measure the firm's investment opportunities as the one year change of sales divided by sales at the beginning of the year. This way of measuring investment opportunities is widely used in studies investigating corporate investment (Shin and Stulz 1998; Lehn and Poulsen 1989; Whited and Wu 2006; Whited 2006; Bloom et al. 2007; Badertscher et al. 2013; Asker et al. 2014). I expect investment opportunities to be positively associated with the level of investments. I use the firm's return on assets (ROA), measured as the ratio of earnings before interest and tax (EBIT) to total assets, to control for profitability. I expect ROA to be positively associated with the level of investments. Next, I use the firm's level of cash and cash equivalents ($MONEY$), measured as ratio of cash and cash equivalents to total assets. I expect the firm's cash holdings to be positively associated with the level of investments. I use the firm's leverage (LEV) measured as the ratio of the sum of non-current and current liabilities divided by total assets, to proxy for firm risk. Since firms with higher leverage are more risky and more reluctant to investment due to financial constraints, I expect LEV to be negatively associated with the level of investment. I measure industry concentration as the Herfindahl-Hirshman index (HHI) at the four-digit NAICS code level. I expect

industry concentration to be negatively associated with the level of investments since more competitive industries are less profitable. Finally, I use the firm's size (*SIZE*), measured as the natural logarithm of total assets and firm age (*AGE*) as control variables. I expect both variables to be positively associated with the level of investments. I also include year- (α_t), city- (φ_c), and industry-fixed effects (δ_n) in the tests. The fixed effects ensure that the coefficient of interest (β_I) is not affected by time invariant year-, city-, and industry factors. The year fixed-effects remove year-specific shocks across all cities that may influence firm-level investments. Finally, I calculate the dependent and control variables at fiscal-year end and cluster standard errors at the firm-level⁴¹.

4.5 Results

4.5.1 Univariate analysis

Table 1 shows descriptive statistics of all variables used in the following tests. My primary proxies of investment are the gross change in fixed investments (*INV*) and the net change in fixed assets (*INV_NET*). Both variables have a mean of 2.7% of total assets during the sample period. This is lower compared to US based studies which find investments to be around 5% of total assets (Badertscher et al. 2013; Asker et al. 2014). This may be due to the large fraction of very small firms in my sample. Furthermore, the average presence of local news media (*NEWS*) is 6.569 local newspapers per city. Profitability (*ROA*) of the firms during the sample period is low and on average 0.9%, cash holdings (*MONEY*) are on average 10% of total assets, and leverage (*LEV*) is relatively high with 75% of total assets. The high level of leverage is likely a function of low access to equity markets (Berger and Udell 1998).

⁴¹ Clustering at the city-level does not change my inferences.

Table 1: Summary statistics of dependent and independent variables

	<i>Mean</i>	<i>SD</i>	<i>P25</i>	<i>P50</i>	<i>P75</i>	<i>Obs.</i>
<i>Dependent variables (t₀)</i>						
<i>INV</i>	0.027	0.188	-0.027	-0.005	0.022	999,624
<i>INV_NET</i>	0.027	0.183	-0.024	-0.004	0.018	1,038,183
<i>INV_EFF</i>	0.085	0.162	0.018	0.040	0.083	999,624
<i>INV_NET_EFF</i>	0.080	0.159	0.017	0.037	0.077	1,007,482
<i>INV_EFF_CF</i>	0.085	0.161	0.018	0.040	0.083	999,624
<i>INV_NET_EFF_CF</i>	0.080	0.159	0.017	0.037	0.078	1,007,482
<i>Experimental variables (t-1)</i>						
<i>NEWS</i>	6.569	3.624	4.000	5.000	10.000	1,038,183
Δ <i>NEWS</i>	0.179	0.447	0.000	0.000	0.000	1,038,183
<i>Control variables (t-1)</i>						
<i>INV_OP</i>	0.093	0.161	0.005	0.088	0.145	1,038,183
<i>ROA</i>	0.009	0.100	-0.006	0.007	0.035	1,038,183
<i>MONEY</i>	0.104	0.145	0.008	0.042	0.141	1,038,183
<i>LEV</i>	0.759	0.252	0.627	0.825	0.933	1,038,183
<i>SIZE</i>	13.770	1.549	12.671	13.670	14.749	1,038,183
<i>HHI</i>	0.025	0.036	0.006	0.012	0.026	1,038,183
<i>AGE</i>	2.391	0.823	1.792	2.398	3.045	1,038,183

Notes: The dependent variables investment (*INV*) and net investment (*INV_NET*) are measured in the following ways: ((Fixed assets + Depreciation)_t - (Fixed assets + Depreciation)_{t-1}) / Total assets_{t-1} and (Fixed assets - Fixed assets_{t-1}) / Total assets_{t-1}. *INV_EFF_CF* and *INV_NET_EFF_CF*, are the absolute values of the residuals obtained from a regression of investments on investment opportunities (and cash flow from operations). See section 4.5.3.2 for a detailed description of the estimation. *NEWS* is equals the number of newspapers in the province over the year measure at t-1. Δ *NEWS* is the change of *NEWS* over the last year measured at t-1. Investment opportunities (*INV_OP*) is measured as (Sales_t - Sales_{t-1}) / Sales_{t-1} at t-1. Return on assets (*ROA*) is measured as EBIT / Total assets at t-1. Cash and cash equivalents (*MONEY*) are measured as Cash / Total assets at t-1. The firm's leverage (*LEV*) is measured as (non-current + current liabilities) / Total assets at t-1. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at t-1. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at t-1. I measure *AGE* as the natural logarithm of the firm's age at t-1. All variables are winsorized at the 1st and 99th percentiles.

Table 2 shows the Pearson correlation matrix. Notably, *NEWS* is negatively correlated with the level of investments (*INV* and *INV_NET*) ($p < 0.05$) but positively correlated ($p < 0.01$) with the measure of investment (in-) efficiency. The first correlation gives some insights on how *NEWS* may influence the level of investment. The second correlation between investment efficiency and *NEWS* is opposite to my predictions since a positive correlation

implies that higher news media presence positively correlates with the absolute value of deviations from the predicted investment. Furthermore, I find strong positive correlations ($p < 0.01$) between investment opportunities (*INV_OP*), past performance (*ROA*), the firms' level of cash holdings, firm size (*SIZE*), and age (*AGE*). These results correspond to the predicted signs.

Table 2: Pearson correlation matrix of dependent and independent variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) <i>INV</i>	1														
(2) <i>INV_NET</i>	0.991	1													
(3) <i>INV_EFF</i>	0.815	0.826	1												
(4) <i>INV_NET_EFF</i>	0.823	0.832	0.990	1											
(5) <i>INV_EFF_CF</i>	0.814	0.826	0.999	0.989	1										
(6) <i>INV_NET_EFF_CF</i>	0.822	0.832	0.989	0.999	0.990	1									
(7) <i>NEWS_{t-1}</i>	-0.002	-0.001	0.013	0.012	0.013	0.012	1								
(8) $\Delta NEWS_{t-1}$	0.008	0.008	0.009	0.009	0.009	0.009	0.216	1							
(9) <i>INV_OP_{t-1}</i>	0.023	0.020	0.019	0.019	0.019	0.019	0.010	-0.009	1						
(10) <i>ROA_{t-1}</i>	0.061	0.053	-0.018	-0.010	-0.017	-0.011	-0.002	0.010	0.069	1					
(11) <i>MONEY_{t-1}</i>	0.000	0.004	-0.005	-0.011	-0.005	-0.011	0.062	-0.009	0.001	0.179	1				
(12) <i>LEV_{t-1}</i>	-0.051	-0.052	-0.043	-0.047	-0.043	-0.046	-0.021	-0.023	0.039	-0.399	-0.201	1			
(13) <i>SIZE_{t-1}</i>	0.041	0.036	-0.043	-0.032	-0.043	-0.032	-0.018	0.046	0.044	0.046	-0.289	-0.034	1		
(14) <i>HHI_{t-1}</i>	-0.004	-0.005	0.001	-0.001	0.001	-0.001	0.019	0.010	-0.020	0.002	0.030	-0.025	0.036	1	
(15) <i>AGE_{t-1}</i>	0.034	0.039	-0.005	0.000	-0.006	0.000	-0.005	0.041	-0.088	0.018	-0.066	-0.217	0.336	0.038	1

Notes: The dependent variables investment (*INV*) and net investment (*INV_NET*) are measured in the following ways: $((\text{Fixed assets} + \text{Depreciation})_t - (\text{Fixed assets} + \text{Depreciation})_{t-1}) / \text{Total assets}_{t-1}$ and $(\text{Fixed assets} - \text{Fixed assets}_{t-1}) / \text{Total assets}_{t-1}$. *INV_EFF* (*CF*) and *INV_NET_EFF* (*CF*), are the absolute values of the residuals obtained from a regression of investments on investment opportunities (and cash flow from operations). See section 5 for a detailed description of the estimation. *NEWS* is equals the number of newspapers in the province over the year measure at *t-1*. $\Delta NEWS$ is the change of *NEWS* over the last year measured at *t-1*. Investment opportunities (*INV_OP*) is measured as $(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$ at *t-1*. Return on assets (*ROA*) is measured as $\text{EBIT} / \text{Total assets}$ at *t-1*. Cash and cash equivalents (*MONEY*) are measured as $\text{Cash} / \text{Total assets}$ at *t-1*. The firm's leverage (*LEV*) is measured as $(\text{non-current} + \text{current liabilities}) / \text{Total assets}$ at *t-1*. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at *t-1*. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at *t-1*. I measure *AGE* as the natural logarithm of the firm's age at *t-1*. All variables are winsorized at the 1st and 99th percentiles. Bold numbers indicate significance levels at $p < 0.01$.

4.5.2 Test of hypothesis 1

To test whether the external information environment of private firms is associated with the level of corporate investments, I run a regression of the level of investments on the number of news media (print and online) at the city-level. Table 3 shows the OLS estimates. Column (1) uses the firm's change in gross fixed assets investments (*INV*) and column (2) presents the results for using net fixed assets investments as the dependent variable. Turning to the control variables, the firm's investment opportunities (*INV_OP*) are positively associated with the level of investments (coeff. 0.0031, t-stat. 15.44). The firm's return on asset is also positively associated with investment (coeff. 0.0852, t-stat. 33.73). Moreover, cash holdings (*MONEY*) are positively associated with the investments (coeff. 0.0072, t-stat. 5.08), whereas the firm's leverage is negatively associated with investment (coeff. -0.0124, t-stat. 11.74). The firm's size (*SIZE*) and age (*AGE*) are both positive and statistically significant associated with investments. Industry concentration (*HHI*) shows the predicted sign but is not statistically significant at the conventional level in column (1) and is weakly significant in column (2) (coeff. -0.0206, t-stat. 1.37 and coeff. -0.0265, t-stat. 1.87). Overall, the control variables show the predicted signs and are significantly associated with the level of investment.

Turning to the experimental variable, *NEWS* which is the number of local news media presence at the city-level, I find a negative and statistically significant association with private firms' investments in column (1) (coeff. -0.0015, t-stat.4.05) and column (2) (coeff. -0.0018, 5.07). The negative association suggests that a more transparent information environment is associated with a reduction in the level of investment. This may be due to the

fact, that a more transparent local economic environment reveals information that reduces the net present value of the investment. For example, the economic development in Italy, as of today, is still in recovery from the financial crisis.⁴² Applied to local investment decisions by private firms, this may suggest that higher transparency reveals suboptimal investment opportunities which subsequently lead to lower levels of investment.

Table 3: Investment levels and the external information environment

This table presents the association between private firms' investment levels and their information environment.			
	<i>Predicted sign</i>	<i>INV (1)</i>	<i>INV_NET (2)</i>
<i>NEWS</i>	+/-	-0.0015*** (4.05)	-0.0018*** (5.07)
<i>INV_OP</i>	+	0.0031*** (15.44)	0.0025*** (13.64)
<i>ROA</i>	+	0.0852*** (33.73)	0.0631*** (27.46)
<i>MONEY</i>	+	0.0072*** (5.08)	0.0119*** (8.95)
<i>LEV</i>	-	-0.0124*** (11.74)	-0.0136*** (13.74)
<i>SIZE</i>	+	0.0015*** (9.95)	0.0007*** (5.15)
<i>HHI</i>	-	-0.0206 (1.37)	-0.0265* (1.87)
<i>AGE</i>	+	0.0037*** (13.38)	0.0051*** (19.29)
<i>Year FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>City FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>Industry FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>Adj. R²</i>		4%	4%
<i>N</i>		999,624	1,038,183

Notes: The dependent variables investment (*INV*) and net investment (*INV_NET*) are measured in the following ways: $((\text{Fixed assets} + \text{Depreciation})_t - (\text{Fixed assets} + \text{Depreciation})_{t-1}) / \text{Total assets}_{t-1}$ and $(\text{Fixed assets} - \text{Fixed assets}_{t-1}) / \text{Total assets}_{t-1}$. *NEWS* is equals the number of newspapers in the province over the year measure at t-1. Investment opportunities (*INV_OP*) is measured as $(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$ at t-1. Return on assets (*ROA*) is

⁴² See for example the OECD's economic survey report for Italy, available here: <http://www.oecd.org/eco/surveys/economic-survey-italy.htm>.

[continued]

measured as EBIT/Total assets at t-1. Cash and cash equivalents (*MONEY*) are measured as Cash/Total assets at t-1. The firm's leverage (*LEV*) is measured as (non-current + current liabilities)/Total assets at t-1. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at t-1. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at t-1. I measure *AGE* as the natural logarithm of the firm's age at t-1. All variables are winsorized at the 1st and 99th percentiles. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are clustered at the firm-level.

4.5.3 Test of hypothesis 2

To further illuminate the association between the external information environment and private firms' investment behavior, I turn to the test of hypothesis two. Hypothesis two suggests that a more transparent information environment is associated with higher investment efficiency.

4.5.3.1 Firms' responsiveness to investment opportunities

In a first approach to test this association, I include an interaction term between the number of local news media and the firm's investment opportunities (*NEWS* × *INV_OP*) in equation (1), resulting in the following equation:

$$y_{i,c,t} = \alpha_t + \varphi_c + \delta_n + \beta_1 NEWS_{c,t-1} + \beta_2 NEWS_{c,t-1} \times INV_OP + \beta' X_{i,c,t-1} + \varepsilon_{i,c,t} \quad (1a)$$

Following prior literature, a positive interaction term (β_2) suggests more efficient investment (Asker et al. 2014; Badertscher et al. 2013). Table 4 shows the results of the modified equation (1). The coefficient of interest is the interaction term *NEWS* × *INV_OP*. The coefficient of *NEWS* × *INV_OP* is positive and statistically significant in column (1) (coeff. 0.0002, t-stat. 3.01) and column (2) (coeff. 0.0001, t-stat. 2.58). This result suggests that private firm investment is more responsive to investment opportunities in cities with higher news media coverage. In economic terms, I find a 1 one unit increase in

local newspaper coverage increases investment sensitivity by 0.06% from the mean level.⁴³ The control variables have the predicted signs and remain statistically significant.

Table 4: Investment sensitivity and the external information environment

This table presents the results of sensitivity of private firms' investments to their investment opportunities.

	<i>Predicted sign</i>	<i>INV (1)</i>	<i>INV_NET (2)</i>
<i>NEWS</i>	+/-	-0.0015*** (4.09)	-0.0018*** (5.11)
<i>INV_OP</i>	+	0.0020*** (4.91)	0.0016*** (4.41)
<i>NEWS</i> × <i>INV_OP</i>	+/-	0.0002*** (3.01)	0.0001*** (2.58)
<i>ROA</i>	+	0.0852*** (33.74)	0.0631*** (27.46)
<i>MONEY</i>	+	0.0072*** (5.08)	0.0119*** (8.94)
<i>LEV</i>	-	-0.0124*** (11.73)	-0.0136*** (13.73)
<i>SIZE</i>	+	0.0015*** (9.93)	0.0007*** (5.14)
<i>HHI</i>	-	-0.0207 (1.37)	-0.0266* (1.87)
<i>AGE</i>	+	0.0037*** (13.38)	0.0051*** (19.29)
<i>Year FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>City FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>Industry FE?</i>		<i>Yes</i>	<i>Yes</i>
<i>Adj. R²</i>		4%	4%
<i>N</i>		999,624	1,038,183

Notes: The dependent variables investment (*INV*) and net investment (*INV_NET*) are measured in the following ways: $((\text{Fixed assets} + \text{Depreciation}) - (\text{Fixed assets} + \text{Depreciation})_{t-1}) / \text{Total assets}_{t-1}$ and $(\text{Fixed assets} - \text{Fixed assets}_{t-1}) / \text{Total assets}_{t-1}$. *NEWS* is equals the number of newspapers in the province over the year measure at t-1. Investment opportunities (*INV_OP*) is measured as $(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$ at t-1. Return on assets (*ROA*) is measured as $\text{EBIT} / \text{Total assets}$ at t-1. Cash and cash equivalents (*MONEY*) are measured as $\text{Cash} / \text{Total assets}$ at t-1. The firm's leverage (*LEV*) is measured as $(\text{non-current} + \text{current liabilities}) / \text{Total assets}$ at t-1. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at t-1. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at t-1. I measure *AGE* as the natural logarithm of the firm's age at t-1. All variables are winsorized at the 1st and 99th percentiles. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are clustered at the firm-level.

⁴³ Average responsiveness of investment to investment opportunities: $0.002 + 0.0002 * 6.569 = 0.0033138$. An increase of local news media by 1 is accordingly: $1 * 0.0002$.

4.5.3.2 Firms' investment efficiency

In a second approach to test the association between investment efficiency and the information environment, I follow prior literature on investment efficiency (Goodman et al. 2013; McNichols and Stubben 2008; Shroff 2014; Biddle et al. 2009; Richardson 2006), and calculate investment efficiency in the following way.

$$Y_{i,t} = \beta_0 + \beta_1 INV_OP_{i,t} + \varepsilon_{i,t} \quad (1a)$$

$$Y_{i,t} = \beta_0 + \beta_1 INV_OP_{i,t} + \beta_2 CFO_{i,t} + \varepsilon_{i,t} \quad (1b)$$

where the dependent variable Y_{it} is either INV or INV_NET , and INV_OP is the firm's lagged sales growth as defined earlier. I add the firm's operating cash flow divided by total assets at the beginning of the year (CFO) in equation (3) to capture the firm's financial position which may hamper firm's investment (Fazzari et al. 1988; Mortal and Reisel 2013). I run the regression for each industry (four digit NAICS code) year combination. Then I use the absolute value of the residual as my measure of investment inefficiency. The residual captures the magnitude of the firm's deviation from the expected level on investment according to its investment opportunities (Biddle et al. 2009).

According to hypothesis two, I expect a negative association between $NEWS$ and investment inefficiency measured as the absolute value of the residual from equation (2) and (3). The intuition behind this test is that, a more transparent local information environment increases the manager's ability to adapt her information set to changing economic developments. Thereby, the newly gained information enables her to decrease the likelihood of overinvestment and underinvestment, based on a less transparent/incorrect

picture of the local economic situation. Specifically, I assume that a more transparent external information environment enables the manager to make more precise estimates of the investment's NPV, which is a crucial determinant in successful investment decisions (Goodman et al. 2013). Hence, I expect a more transparent local information environment to be associated with a decrease in investment inefficiency which equals an increase in investment efficiency.

Table 5 columns (1) to (4) show the results of the regression of investment efficiency on the number of local news media. Throughout the different ways of calculating investment efficiency in columns (1) to (4) the coefficient of *NEWS* is negative and significant at the one percent level (p-value < 0.01). These results suggest that a more transparent local information environment increases investment efficiency.

Table 5: Investment efficiency and the external information environment

This table shows the results from a regression of investment on the firm's external information environment. Columns (1) to (4) indicate which investment efficiency variable ((1):*INV_EFF*, (2): *INV_EFF_NET*, (3): *INV_EFF_CF*, (4):*INV_EFF_NET_CF*), has been used as the dependent variable.

	<i>Predicted sign</i>	<i>INV_EFF</i> (1)	<i>INV_NET_EFF</i> (2)	<i>INV_EFF_CF</i> (3)	<i>INV_NET_EFF_CF</i> (4)
<i>NEWS</i>	–	–0.0023*** (7.56)	–0.0023*** (7.64)	–0.0023*** (7.53)	–0.0022*** (7.60)
<i>ROA</i>	–	–0.0548*** (26.49)	–0.0408*** (20.60)	–0.0534*** (25.80)	–0.0428*** (21.62)
<i>MONEY</i>	–	–0.0163*** (13.41)	–0.0203*** (17.21)	–0.0161*** (13.26)	–0.0202*** (17.12)
<i>LEV</i>	–	–0.0258*** (29.44)	–0.0258*** (30.17)	–0.0255*** (29.19)	–0.0254*** (29.76)
<i>SIZE</i>	–	–0.0068*** (52.33)	–0.0059*** (46.85)	–0.0067*** (52.02)	–0.0058*** (46.43)
<i>HHI</i>	–	–0.0250** (1.97)	–0.0255** (2.09)	–0.0268** (2.12)	–0.0277** (2.27)
<i>AGE</i>	–	–0.0006** (2.34)	–0.0002 (0.96)	–0.0007*** (3.03)	–0.0004 (1.58)
<i>Year FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>City FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Adj. R2</i>		10%	10%	10%	10%
<i>N</i>		999,624	1,007,482	999,624	1,007,482

Notes: The dependent variables *INV_EFF(CF)* and *INV_NET_EFF(CF)*, are the absolute values of the residuals obtained from a regression of investments on investment opportunities (and cash flow from operations). See section 4.5.3.2 for a detailed description of the estimation. *NEWS* is equals the number of newspapers in the province over the year measure at t-1. Return on assets (*ROA*) is measured as EBIT/Total assets at t-1. Cash and cash equivalents (*MONEY*) are measured as Cash/Total assets at t-1. The firm's leverage (*LEV*) is measured as (non-current + current liabilities)/Total assets at t-1. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at t-1. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at t-1. I measure *AGE* as the natural logarithm of the firm's age at t-1. All variables are winsorized at the 1st and 99th percentiles. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are clustered at the firm-level.

To further investigate the relation between the external information environment and investment efficiency, I partition the sample into firms that overinvest and firms that underinvest.⁴⁴ I do so, by using the signed residual from equations (2) and (3) and define overinvestment as a positive deviation from the predicted investment and underinvestment as a negative deviation from the predicted investment level, accordingly. Then I use this definition to split the sample accordingly. The dependent variable, however, remains the one from the previous analysis: the absolute value of the residual from equation (2) or (3). Table 6 shows the results for the two groups. The results suggest that a more transparent information environment is negatively associated with overinvestment and underinvestment. The coefficient of *NEWS* is negative throughout every specification and statistically significant ($p < 0.01$)

⁴⁴ See e.g. Feng et al. (2011) who use a comparable research design.

Table 6: Over- and underinvestment and the firm's information environment

This table shows the results from a regression of over- (under) investment on the firm's external information environment. Columns (1) to (4) indicate which investment variable ((1): *INV_EFF*, (2): *INV_EFF_NET*, (3): *INV_EFF_CF*, (4): *INV_EFF_NET_CF*), has been used to partition the sample into overinvestment and underinvestment buckets, respectively.

	<i>Predicted sign</i>	<i>Overinvestment</i>				<i>Underinvestment</i>			
		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>NEWS</i>	–	–0.0033*** (3.39)	–0.0031*** (3.23)	–0.0033*** (3.48)	–0.0031*** (3.23)	–0.0014*** (9.87)	–0.0013*** (10.16)	–0.0014*** (9.86)	–0.0013*** (10.10)
<i>ROA</i>	–	–0.0746*** (10.08)	–0.0715*** (9.73)	–0.0512*** (7.46)	–0.0580*** (8.55)	–0.0738*** (67.10)	–0.0540*** (58.32)	–0.0740*** (65.92)	–0.0584*** (61.31)
<i>MONEY</i>	–	–0.0334*** (8.47)	–0.0374*** (9.47)	–0.0346*** (8.89)	–0.0384*** (9.85)	–0.0135*** (26.66)	–0.0189*** (42.86)	–0.0127*** (24.86)	–0.0184*** (41.54)
<i>LEV</i>	–	–0.0777*** (25.73)	–0.0802*** (26.32)	–0.0755*** (25.78)	–0.0777*** (26.25)	–0.0078*** (20.10)	–0.0075*** (21.52)	–0.0075*** (19.15)	–0.0069*** (19.64)
<i>SIZE</i>	–	–0.0219*** (53.88)	–0.0210*** (50.92)	–0.0210*** (52.56)	–0.0202*** (49.79)	–0.0042*** (65.46)	–0.0033*** (57.73)	–0.0042*** (65.37)	–0.0033*** (56.77)
<i>HHI</i>	–	0.0050 (0.13)	–0.0037 (0.10)	–0.0053 (0.14)	–0.0072 (0.19)	–0.0130** (2.13)	–0.0110** (1.99)	–0.0160*** (2.59)	–0.0149*** (2.68)
<i>AGE</i>	–	0.0056*** (7.67)	0.0065*** (8.75)	0.0050*** (7.05)	0.0062*** (8.46)	–0.0031*** (30.05)	–0.0035*** (37.82)	–0.0033*** (31.78)	–0.0037*** (39.50)
<i>Year FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>City FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry FE?</i>		<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Adj. R²</i>		17%	18%	17%	18%	25%	27%	25%	27%
<i>N</i>		267,187	259,086	271,187	262,782	732,437	748,396	728,437	744,700

Notes: The dependent variables *INV_EFF(CF)* and *INV_NET_EFF(CF)*, are the absolute values of the residuals obtained from a regression of investments on investment opportunities (and cash flow from operations). See section 4.5.3.2 for a detailed description of the estimation. *NEWS* is equals the number of newspapers in the province over the year measure at t-1. Return on assets (*ROA*) is measured as EBIT/Total assets at t-1. Cash and cash equivalents (*MONEY*) are measured as Cash/Total assets at t-1. The firm's leverage (*LEV*) is measured as (non-current + current liabilities)/Total assets at t-1. The firm's size (*SIZE*) is measured as the natural logarithm of total assets at t-1. I measure industry concentration as the Herfindahl-Hirshman index (*HHI*) at the four-digit NAICS code level at t-1. I measure *AGE* as the natural logarithm of the firm's age at t-1. All variables are winsorized at the 1st and 99th percentiles. *, **, *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Robust standard errors are clustered at the firm-level.

Overall, my results suggest that a more transparent information environment decreases the level of investments, but increases the firm's responsiveness to investment opportunities and its investment efficiency by reducing the firms' under- as well as overinvestment.

4.6 Sensitivity checks and limitations

One limitation of the study is that I do not show a causal link between news media presence in the firms' information environment and private firms' investment efficiency. Furthermore, one might argue that the association that I find is driven by omitted variables. In order to alleviate concerns about time invariant variables driving my results I exploit the panel characteristics of the sample and use fixed effects to control for endogeneity. Additional to the presented results which include city, industry, and year fixed effects, I use firm and year fixed effects in an untabulated sensitivity analysis. Using firm-fixed effects assures that my coefficient of interest is not driven by location and firm specific time invariant omitted variables. My inferences remain unchanged, however, I acknowledge the potential loss of efficiency due to the fixed effects specification (Roberts and Whited 2013).

Another concern in the investment literature is that investment opportunities are measured with bias (see e.g. Kaplan and Zingales (1997)). So far, I have not used another measure apart from lagged firm-level sales growth. Therefore, I caution the reader to interpret the results with care.

4.7 Conclusion

This study examines whether private firms external information environment is associated with investments. I use the number of local news media in Italy to link the quality of the firm's information environment with its

investment behavior. I conjecture that a higher quality of the information environment reduces uncertainty about investments which is associated with a greater responsiveness of firms to their investment opportunities. Furthermore, I expect the information environment to provide the manager with useful information to make more precise estimates of NPVs, which in turn enables her to make more efficient investments. To test my predictions I explore cross-sectional as well as variation over time in the number of local news media in Italian cities. I use the panel structure of the dataset to control for time invariant omitted variables that may bias my results. In line with my predictions, I find firms to be more responsive to investment opportunities in cities which have a better information environment. Furthermore, I find a positive association between investment efficiency and the information environment. Additionally, I find higher quality information environment to reduce over as well as underinvestment.

My results have policy implication since they show that the communication infra-structures is an important channel ensuring efficient resource allocation in an economy by securing the flow and availability of decision relevant firm-specific information to economic agents.

5 Summary and conclusion

This dissertation investigates the economic consequences of reporting transparency and presents evidence on real effects of firms' reporting and disclosure activities. It adds to firm-specific and market-wide studies corroborating the economic consequences of reporting transparency. However, although policy makers are in favor of increasing reporting transparency, this study also highlights costs of corporate disclosure activities.

The concept of reporting transparency comprises the availability of firm-specific information to stakeholders. The availability of firm-specific and market-wide information plays a central role in efficient resource-allocation and decision making activities by economic agents. Mainly, information asymmetries and agency costs deter efficient resource allocation. Since reporting transparency decreases information asymmetries and agency costs, it provides a better picture of the firm's underlying economics. Nonetheless, reporting transparency can also be costly due to the disclosure of proprietary information.

Chapter two of this thesis examines how financial reporting transparency of firms in different countries affects product markets by using the cartel setting. The cartel setting is especially interesting since economic theory predicts that transparency prolongs cartels by reducing contracting costs or it decreases cartel duration by earlier detection of deviating members. This study utilizes heterogeneity in reporting transparency between international and local accounting standards. The results suggest that leaving a cartel is more likely for firms with transparent reporting. This finding can be explained by the enhanced ability of cartel members to detect cheating by their fellow members when their reports are more transparent. Consistent with this argument, the

results further show that transparency lowers cartel duration when the opportunity costs of cooperation and the likelihood of cheating are high.

This chapter adds to prior studies on the relationship between firms' competitive environment and the level of reporting transparency by showing evidence consistent with theoretical predictions that reporting transparency can affect industry coordination and competition. It emphasizes the role of reporting transparency in implicit contracts and the monitoring of implicit product market contracts. Furthermore, it adds to research on cartel duration which has important welfare and policy implications. It explicitly considers transparency as one determinant of cartel duration which speaks to competition authorities by pointing out its consumer welfare implications, since it fosters competition by reducing cartel sustainability.

Chapter three examines the economic consequences arising from proprietary costs of voluntary disclosures. It exploits the UK investment trust industry to show how the voluntary disclosure of full portfolio holdings affects the demand for the trust's shares. The discount represents the difference between the market value of the investment trust's investments under management and the investment trust's own share price. Due to the inelastic supply curve of the investment trust's shares, changes in demand translate into changes in the discount. A decrease in demand in this setting, therefore, represents the proprietary costs of disclosure. The findings suggest that additional disclosure increases the demand for shares, on average. However, exploring cross-sectional variation within the investment trust industry, negative effects of voluntary disclosure for the demand of trusts with higher proprietary information occur. This chapter adds to prior research on the cost, as well as, the benefits of voluntary disclosure. Apart from the benefits of

transparency promoted by prior research and policy makers, this study highlights detrimental effects of enhanced disclosure behavior. This study utilizes the fact that investment trusts trade at a discount as a new approach in quantifying proprietary costs. This feature distinguishes it from prior studies in the field of research firms' voluntary disclosure behavior. It further speaks to policy makers and regulators of financial markets by showing evidence of detrimental effects of reporting transparency.

These findings add to the rather long-lasting debate on more transparency promoted by politicians in the aftermath of the recent financial crisis. It further adds to reforms introduced by the European Union by showing that there may not be a "one-size-fits-all" solution in increasing transparency in financial markets, and that more transparency may not always be equally desirable for all market participants.⁴⁵

Chapter four examines whether the external information environment is associated with private firms' investment behavior. It uses an Italian setting which allows exploiting regional newspaper coverage to link the quality of the private firm's information environment to investment behavior. The findings show that a higher quality of the information environment reduces uncertainty about investments which leads to greater responsiveness of firms to their investment opportunities and higher investment efficiency. These results shed some light on the importance of news media as an additional source of transparency which provides managers with decision relevant information. Moreover, the results bear policy implications, since they emphasize the

⁴⁵ See <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013L0050&from=EN>.

importance of communication infra-structures in ensuring efficient resource allocation in an economy.

Overall, these studies provide insights into macro-level as well as firm-level consequences of reporting transparency. They highlight positive effects of transparency on efficient resource allocation that can be beneficial to the welfare of an economy. Nonetheless, especially chapter four presents evidence on the potential drawbacks of reporting transparency that have to be taken into account by regulators and policy makers.

Future research may further concentrate on implications of financial as well as non-financial reporting transparency on market outcomes different from these investigated in this study. It could be worthwhile to consider labor market implications of firms reporting transparency. Moreover, the rise of new technologies in providing and disseminating accounting information is a field of research that needs to be taken into account to present a more complete picture of the economic consequences of transparency. Lastly, it is also of great interest whether fostering transparency leads to desirable long-term effects.

References

- Abreu, D., D. Pearce, and E. Stacchetti. 1986. Optimal cartel equilibria with imperfect monitoring. *Journal of Economic Theory* 39 (1):251-269.
- Agarwal, V., W. E. I. Jiang, Y. Tang, and B. Yang. 2013. Uncovering hedge fund skill from the portfolio holdings they hide. *Journal of Finance* 68 (2):739-783.
- Akerlof, G. A. 1970. The market for "Lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics* 84 (3):488-500.
- Amihud, Y., and R. Goyenko. 2013. Mutual fund's R2 as predictor of performance. *Review of Financial Studies* 26 (3):667-694.
- Amihud, Y., and H. Mendelson. 1986. Asset pricing and the bid-ask spread. *Journal of Financial Economics* 17 (2):223-249.
- . 2008. Liquidity, the value of the firm, and corporate finance. *Journal of Applied Corporate Finance* 20 (2):32-45.
- Ang, J. S., R. A. Cole, and J. W. Lin. 2000. Agency costs and ownership structure. *The Journal of Finance* 55 (1):81-106.
- Aragon, G., M. Hertzel, and Z. Shi. 2013. Why do hedge funds avoid disclosure? Evidence from confidential 13F filings. *Journal of Financial & Quantitative Analysis* 48 (5):1499-1518.
- Armstrong, C. S., K. Balakrishnan, and D. Cohen. 2012. Corporate governance and the information environment: Evidence from state antitakeover laws. *Journal of Accounting and Economics* 53 (1-2):185-204.
- Asch, P., and J. J. Seneca. 1976. Is collusion profitable? *Review of Economics and Statistics* 58 (1):1.
- Asker, J., J. Farre-Mensa, and A. Ljungqvist. 2014. Corporate Investment and Stock Market Listing: A Puzzle? *Review of Financial Studies*.
- Badertscher, B., N. Shroff, and H. D. White. 2013. Externalities of public firm presence: Evidence from private firms' investment decisions. *Journal of Financial Economics* 109 (3):682-706.
- Bagnoli, M., and S. G. Watts. 2010. Oligopoly, disclosure, and earnings management. *The Accounting Review* 85 (4):1191-1214.
- Balakrishnan, K., M. B. Billings, B. Kelly, and A. Ljungqvist. 2014. Shaping liquidity: On the causal effects of voluntary disclosure. *The Journal of Finance* 69 (5):2237-2278.
- Ball, R., R. M. Bushman, and F. P. Vasvari. 2008. The debt-contracting value of accounting information and loan syndicate structure. *Journal of Accounting Research* 46 (2):247-287.
- Ball, R., A. Robin, and J. S. Wu. 2003. Incentives versus standards: Properties of accounting income in four East Asian countries. *Journal of Accounting and Economics* 36 (1-3):235-270.
- Ball, R., and L. Shivakumar. 2005. Earnings quality in U.K. private firms: comparative loss recognition timeliness. *Journal of Accounting and Economics* 39 (1):83-128.
- Bamber, L. S., and S. C. Youngsoon. 1998. Discretionary management earnings forecast disclosures: Antecedents and outcomes associated with forecast venue and forecast specificity choices. *Journal of Accounting Research* 36 (2):167-190.
- Barclay, M. J., C. G. Holderness, and J. Pontiff. 1993. Private benefits from block ownership and discounts on closed-end funds. *Journal of Financial Economics* 33 (3):263-291.
- Barth, M. E., Y. Konchitchki, and W. R. Landsman. 2013. Cost of capital and earnings transparency. *Journal of Accounting and Economics* 55 (2-3):206-224.
- Barth, M. E., W. R. Landsman, and M. H. Lang. 2008. International accounting standards and accounting quality. *Journal of Accounting Research* 46 (3):467-498.

- Beard, J., and S. Idzikowski. 2012. Investment trusts: Why transparency matters. *Morningstar Research Paper* May, 2012:1-17.
- Beatty, A., S. Liao, and J. J. Yu. 2013. The spillover effect of fraudulent financial reporting on peer firms' investments. *Journal of Accounting and Economics* 55 (2-3):183-205.
- Berger, A. N., and G. F. Udell. 1998. The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance* 22 (6-8):613-673.
- Berger, P. G., and R. N. Hann. 2007. Segment profitability and the proprietary and agency costs of disclosure. *The Accounting Review* 82 (4):869-906.
- Berk, J. B., and R. Stanton. 2007. Managerial ability, compensation, and the closed-end fund discount. *The Journal of Finance* 62 (2):529-556.
- Beyer, A., D. A. Cohen, T. Z. Lys, and B. R. Walther. 2010. The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics* 50 (2-3):296-343.
- Bhat, G., O.-K. Hope, and T. Kang. 2006. Does corporate governance transparency affect the accuracy of analyst forecasts? *Accounting & Finance* 46 (5):715-732.
- Bhattacharya, U., and H. Daouk. 2002. The world price of insider trading. *Journal of Finance* 57 (1):75-108.
- Bhattacharya, U., H. Daouk, and M. Welker. 2003. The world price of earnings opacity. *The Accounting Review* 78 (3):641-678.
- Biddle, G. C., G. Hilary, and R. S. Verdi. 2009. How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics* 48 (2-3):112-131.
- Bloom, N., S. Bond, and J. Van Reenen. 2007. Uncertainty and investment dynamics. *The Review of Economic Studies* 74 (2):391-415.
- Botosan, C. A. 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72 (3):323-349.
- Botosan, C. A., and M. S. Harris. 2000. Motivations for a change in disclosure frequency and its consequences: An examination of voluntary quarterly segment disclosures. *Journal of Accounting Research* 38 (2):329-353.
- Botosan, C. A., and M. Stanford. 2005. Managers' motives to withhold segment disclosures and the effect of SFAS No. 131 on analysts' information environment. *The Accounting Review* 80 (3):751-771.
- Boudreaux, K. J. 1973. Discounts and premiums on closed-end mutual funds: A study in valuation. *The Journal of Finance* 28 (2):515-522.
- Bradshaw, M. T., B. J. Bushee, and G. S. Miller. 2004. Accounting choice, home bias, and U.S. investment in non-U.S. firms. *Journal of Accounting Research* 42 (5):795-841.
- Brenner, S. 2009. An empirical study of the European corporate leniency program. *International Journal of Industrial Organization* 27 (6):639-645.
- Brochet, F., A. D. Jagolinzer, and E. J. Riedl. 2013. Mandatory IFRS adoption and financial statement comparability. *Contemporary Accounting Research* 30 (4):1373-1400.
- Brown, K., and R. Gregory-Allen. 2012. The potential effects of mandatory portfolio holdings disclosure in Australia and New Zealand. *Working paper: Massey University*:1-40.
- Bundeskartellamt. 2011. Fuel sector inquiry.
- Burgstahler, D., C. Leuz, and L. Hail. 2006. The importance of reporting incentives: earnings management in European private and public firms. *The Accounting Review* 81 (5):983-1016.
- Bushman, R. M., J. D. Piotroski, and A. J. Smith. 2004. What determines corporate transparency? *Journal of Accounting Research* 42 (2):207-252.
- Bushman, R. M., J. D. Piotroski, and A. J. Smith. 2005. Insider trading restrictions and analysts' incentives to follow firms. *The Journal of Finance* 60 (1):35-66.

- . 2011. Capital allocation and timely accounting recognition of economic losses. *Journal of Business Finance and Accounting* 38 (1-2):1-33.
- Bushman, R. M., and A. J. Smith. 2001. Financial accounting information and corporate governance. *Journal of Accounting and Economics* 32 (1-3):237-333.
- Busse, M. 2002. Firm financial condition and airline price wars. *RAND Journal of Economics* 33 (1):298-318.
- Byard, D., Y. Li, and Y. Yu. 2011. The effect of mandatory IFRS adoption on financial analysts' information environment. *Journal of Accounting Research* 49 (1):69-96.
- Carhart, M. M. 1997. On persistence in mutual fund performance. *The Journal of Finance* 52 (1):57-82.
- Chay, J. B., and C. A. Trzcinka. 1999. Managerial performance and the cross-sectional pricing of closed-end funds. *Journal of Financial Economics* 52 (3):379-408.
- Cheng, A., L. Copeland, and J. O'Hanlon. 1994. Investment trust discounts and abnormal returns: UK evidence. *Journal of Business Finance & Accounting* 21 (6):813-831.
- Cherkes, M. 2012. The 2012 survey of closed-end funds' literature. *Annual Review of Financial Economics* 4.
- Cherkes, M., J. Sagi, and R. Stanton. 2009. A liquidity-based theory of closed-end funds. *Review of Financial Studies* 22 (1):257-297.
- Christensen, H. B., E. Lee, and M. Walker. 2009. Do IFRS reconciliations convey information? The effect of debt contracting. *Journal of Accounting Research* 47 (5):1167-1199.
- Claessens, S. 2006. Corporate governance and development. *The World Bank Research Observer* 21 (1):91-122.
- Cleves, M. A., W. Gould, and R. Gutierrez. 2008. *An introduction to survival analysis using Stata*. Texas: Stata Press.
- Connor, J. M. 2001. *Global price fixing: Our customers are the enemy*: Kluwer Academic Publishers.
- Connor, J. M. 2004. Global antitrust prosecutions of modern international cartels. *Journal of Industry, Competition and Trade* 4 (3):239-267.
- Connor, J. M., and Y. Bolotova. 2006. Cartel overcharges: Survey and meta-analysis. *International Journal of Industrial Organization* 24 (6):1109-1137.
- Covrig, V. M., M. L. Defond, and M. Hung. 2007. Home bias, foreign mutual fund holdings, and the voluntary adoption of international accounting standards. *Journal of Accounting Research* 45 (1):41-70.
- Cox, D. R. 1972. Regression models and life-tables. *Journal of the Royal Statistical Society. Series B (Methodological)* 34 (2):187-220.
- Cuijpers, R., and W. Buijink. 2005. Voluntary adoption of non-local GAAP in the European Union: a study of determinants and consequences. *European Accounting Review* 14 (3):487-524.
- Cuthbertson, K., D. Nitzsche, and N. O'Sullivan. 2008. UK mutual fund performance: Skill or luck? *Journal of Empirical Finance* 15 (4):613-634.
- Daniel, K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks. *The Journal of Finance* 52 (3):1035-1058.
- Darrough, M. N., and N. M. Stoughton. 1990. Financial disclosure policy in an entry game. *Journal of Accounting and Economics* 12 (1-3):219-243.
- Daske, H., and G. Gebhardt. 2006. International financial reporting standards and experts' perceptions of disclosure quality. *Abacus* 42 (3/4):461-498.
- Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS reporting around the world: early evidence on the economic consequences. *Journal of Accounting Research* 46 (5):1085-1142.

- . 2013. Adopting a label: Heterogeneity in the economic consequences around IAS/IFRS adoptions. *Journal of Accounting Research* 51 (3):495-547.
- Datar, V. 2001. Impact of liquidity on premia/discounts in closed-end funds. *The Quarterly Review of Economics and Finance* 41 (1):119-135.
- Datta, S., M. Iskandar-Datta, and V. Singh. 2013. Product market power, industry structure, and corporate earnings management. *Journal of Banking and Finance* 37 (8):3273-3285.
- De, O. 2010. Analysis of cartel duration: Evidence from EC prosecuted cartels. *International Journal of the Economics of Business* 17 (1):33-65.
- DeFond, M. L., J. R. Francis, and X. Hu. 2011. The geography of SEC enforcement and auditor reporting for financially distressed clients: University of Southern California.
- DellaVigna, S. 2009. Psychology and economics: Evidence from the field. *Journal of Economic Literature* 47 (2):315-372.
- Diamond, D. W. 1985. Optimal release of information by firms. *Journal of Finance* 40 (4):1071-1094.
- Diamond, D. W., and R. E. Verrecchia. 1991. Disclosure, liquidity, and the cost of capital. *Journal of Finance* 46 (4):1325-1359.
- Dick, A. R. 1996. When are cartels stable contracts? *Journal of Law and Economics* 39 (1):241-283.
- Dimson, E., and C. Minio-Kozerski. 1999. Closed-end funds: A survey. *Financial Markets, Institutions & Instruments* 8 (2):1-41.
- Dixit, A., and R. Pindyck. 1994. *Investment under uncertainty*. Princeton, NJ (1994): Princeton university press.
- Drago, F., T. Nannicini, and F. Sobbrío. 2014. Meet the press: How voters and politicians respond to newspaper entry and exit. *American Economic Journal: Applied Economics* 6 (3):159-188.
- Durante, R., and B. Knight. 2012. Partisan control, media bias, and viewer responses: Evidence from Berlusconi's Italy. *Journal of the European Economic Association* 10 (3):451-481.
- Durnev, A. R. T., and C. Mangen. 2009. Corporate investments: Learning from restatements. *Journal of Accounting Research* 47 (3):679-720.
- Dye, R. A. 1986. Proprietary and nonproprietary disclosures. *The Journal of Business* 59 (2):331-366.
- Engelberg, J. E., and C. A. Parsons. 2011. The causal impact of media in financial markets. *The Journal of Finance* 66 (1):67-97.
- Fang, L., and J. Peress. 2009. Media coverage and the cross-section of stock returns. *The Journal of Finance* 64 (5):2023-2052.
- Farvaque, E., C. Refait-Alexandre, and D. Saïdane. 2011. Corporate disclosure: a review of its (direct and indirect) benefits and costs. *International Economics* 128 (0):5-31.
- Fazzari, S., R. G. Hubbard, and B. C. Petersen. 1988. Financing constraints and corporate investment: National Bureau of Economic Research Cambridge, Mass., USA.
- Feng, C., H. Ole-Kristian, L. Qingyuan, and W. Xin. 2011. Financial reporting quality and investment efficiency of private firms in emerging markets. *The Accounting Review* 86 (4):1255-1288.
- Fernandes, N., and M. A. Ferreira. 2009. Insider trading laws and stock price informativeness. *Review of Financial Studies* 22 (5):1845-1887.
- Francis, J. R., S. Huang, I. K. Khurana, and R. Pereira. 2009. Does corporate transparency contribute to efficient resource allocation? *Journal of Accounting Research* 47 (4):943-989.
- Frank, Mary M., James M. Poterba, Douglas A. Shackelford, and John B. Shoven. 2004. Copycat funds: Information disclosure regulation and the returns to active

- management in the mutual fund industry. *Journal of Law and Economics* 47 (2):515-541.
- Frankel, R., and X. Li. 2004. Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics* 37 (2):229-259.
- Friedman, J. W. 1971. A Non-cooperative Equilibrium for Supergames. *The Review of Economic Studies* 38 (1):1-12.
- Gassen, J. 2014. Causal inference in empirical archival financial accounting research. *Accounting, Organizations and Society* forthcoming.
- Ge, W., and L. Zheng. 2006. The frequency of mutual fund portfolio disclosures. *Working paper: School of Business Administration, University of Michigan*:1-36.
- Gemmill, G., and D. C. Thomas. 2002. Noise trading, costly arbitrage, and asset prices: Evidence from closed-end funds. *The Journal of Finance* 57 (6):2571-2594.
- . 2006. The Impact of corporate governance on closed-end funds. *European Financial Management* 12 (5):725-746.
- Gentzkow, M., J. M. Shapiro, and M. Sinkinson. 2011. The effect of newspaper entry and exit on electoral politics. *American Economic Review* 101 (7):2980-3018.
- Gleason, C. A., N. T. Jenkins, and W. B. Johnson. 2008. The contagion effects of accounting restatements. *The Accounting Review* 83 (1):83-110.
- Goldstein, I., and H. Sapra. 2013. Should banks' stress test results be disclosed? An analysis of the costs and benefits. *Foundations and Trends in Finance* 8 (1):1-54.
- Goncharov, I., and C. D. Peter. 2014. Does reporting transparency affect industry coordination? Evidence from the duration of international cartels. *Working paper: Lancaster University - Management School, WHU – Otto Beisheim School of Management*.
- Goncharov, I., and J. Zimmermann. 2007. Do accounting standards influence the level of earnings management? Evidence from Germany. *Die Unternehmung* 61 (5):371-388.
- González, T. A., M. Schmid, and D. Yermack. 2013. Smokescreen: How managers behave when they have something to hide. *Working paper: University of St. Gallen, University of St. Gallen, and New York University*:1-38.
- Goodman, T. H., M. Neamtiu, N. Shroff, and H. D. White. 2013. Management forecast quality and capital investment decisions. *The Accounting Review* 89 (1):331-365.
- Gordon, L. A., M. P. Loeb, and W. Zhu. 2012. The impact of IFRS adoption on foreign direct investment. *Journal of Accounting and Public Policy* 31 (4):374-398.
- Graham, J. R., and C. R. Harvey. 2001. The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics* 60 (2-3):187-243.
- Green, E. J., and R. H. Porter. 1984. Noncooperative collusion under imperfect price information. *Econometrica* 52 (1):87-100.
- Grinblatt, M., and S. Titman. 1994. A Study of monthly mutual fund returns and performance evaluation techniques. *Journal of Financial & Quantitative Analysis* 29 (3):419-444.
- Grossman, S. J., and O. D. Hart. 1980. Disclosure Laws and Takeover Bids. *The Journal of Finance* 35 (2):323-334.
- Guercio, D. D., and P. A. Tkac. 2002. The determinants of the flow of funds of managed portfolios: Mutual funds vs. pension funds. *Journal of Financial and Quantitative Analysis* 37 (04):523-557.
- Hail, L. 2007. Discussion of investor protection and analysts' cash flow forecasts around the world. *Review of Accounting Studies* 12 (2-3):421-441.
- Hail, L., and C. Leuz. 2006. International differences in the cost of equity capital: Do legal institutions and securities regulation matter? *Journal of Accounting Research* 44 (3):485-531.

- Hail, L., A. Tahoun, and C. Wang. 2014. Dividend payouts and information shocks. *Journal of Accounting Research* 52 (2):403-456.
- Harrington, J. E., and A. Skrzypacz. 2007. Collusion under monitoring of sales. *The RAND Journal of Economics* 38 (2):314-331.
- . 2011. Private monitoring and communication in cartels: Explaining recent collusive practices. *American Economic Review* 101 (6):2425-2449.
- Harrington Jr, J. E., and M. H. Chang. 2009. Modelling the birth and death of cartels with an application to evaluating antitrust policy. *Journal of the European Economic Association* 7 (6):1400-1435.
- Harrington Jr., J. E. 2006. How do cartels operate? In *Foundations and trends in microeconomics*. Hanover, MA: Now Publishers Inc., 1-105.
- Harris, M. S. 1998. The association between competition and managers' business segment reporting decisions. *Journal of Accounting Research* 36 (1):111-128.
- Hayes, R. M., and R. Lundholm. 1996. Segment reporting to the capital market in the presence of a competitor. *Journal of Accounting Research* 34 (2):261-279.
- Healy, P. M., and K. G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31:405-440.
- Heckman, J. J. 1979. Sample selection bias as a specification error. *Econometrica* 47 (1):153-161.
- Hölmstrom, B. 1979. Moral hazard and observability. *The Bell Journal of Economics* 10 (1):74-91.
- Hope, O.-K., W. B. Thomas, and D. Vyas. 2013. Financial reporting quality of U.S. private and public firms. *The Accounting Review* 88 (5):1715-1742.
- Horton, J., G. Serafeim, and I. Serafeim. 2013. Does mandatory IFRS adoption improve the information environment? *Contemporary Accounting Research* 30 (1):388-423.
- Hubbard, R. G. 1998. Capital-market imperfections and investment. *Journal of Economic Literature* 36 (1):193-225.
- Huddart, S., J. S. Hughes, and C. B. Levine. 2001. Public disclosure and dissimulation of insider trades. *Econometrica* 69 (3):665-681.
- Hunton, J. E., R. Libby, and C. L. Mazza. 2006. Financial reporting transparency and earnings management. *The Accounting Review* 81 (1):135-157.
- Hwang, B.-H. 2011. Country-specific sentiment and security prices. *Journal of Financial Economics* 100 (2):382-401.
- Jayaraman, S. 2012. The effect of enforcement on timely loss recognition: Evidence from insider trading laws. *Journal of Accounting and Economics* 53 (1-2):77-97.
- Jenkins, S. P. 2004. Survival analysis. *Unpublished manuscript, Institute for Social and Economic Research, University of Essex*:1-133.
- Jensen, M. C., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3 (4):305-360.
- Kaplan, S. N., and L. Zingales. 1997. Do investment-cash-flow sensitivities provide useful measures of financing constraints? . *Quarterly Journal of Economics* 112 (1):169-215.
- Kedia, S., and S. Rajgopal. 2011. Do the SEC's enforcement preferences affect corporate misconduct? *Journal of Accounting and Economics* 51 (3):259-278.
- Kelly, M., G. Mazzoleni, and D. McQuail. 2004. *The media in Europe: The euromedia research group*. SAGE Publications Ltd. London: SAGE Publications Ltd.
- Khorana, A., S. Wahal, and M. Zenner. 2002. Agency conflicts in closed-end funds: The case of rights offerings. *Journal of Financial and Quantitative Analysis* 37 (02):177-200.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny. 1998. Law and finance. *Journal of Political Economy* 106 (6):1113-1155.

- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny. 2000. Investor protection and corporate governance. *Journal of Financial Economics* 58:3-27.
- Lambert, P. C. 2007. Modeling of the cure fraction in survival studies. *Stata Journal* 7 (3):351-375.
- Lambert, R., C. Leuz, and R. E. Verrecchia. 2007. Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research* 45 (2):385-420.
- Lambert, R. A. 2001. Contracting theory and accounting. *Journal of Accounting and Economics* 32 (1-3):3-87.
- Lang, M., K. V. Lins, and M. Maffett. 2012. Transparency, liquidity, and valuation: International evidence on when transparency matters most. *Journal of Accounting Research* 50 (3):729-774.
- Lang, M., and M. Maffett. 2011. Economic effects of transparency in international equity markets: A review and suggestions for future research. *Foundations and trends in accounting* 5 (3):175-241.
- Lanning, S. G. 1987. Costs of maintaining a cartel. *The Journal of Industrial Economics* 36 (2):157-174.
- Lau, S. T., L. K. Ng, and B. Zhang. 2007. Information environment and equity risk premium volatility around the world. *Management Science* 53 (7):1322-1340.
- Lawrence, A. 2013. Individual investors and financial disclosure. *Journal of Accounting and Economics* 56 (1):130-147.
- Lee, C. M. C., A. Shleifer, and R. H. Thaler. 1991. Investor sentiment and the closed-end fund puzzle. *The Journal of Finance* 46 (1):75-109.
- Lehn, K., and A. Poulsen. 1989. Free cash flow and stockholder gains in going private transactions. *The Journal of Finance* 44 (3):771-787.
- Lennox, C., J. R. Francis, and Z. Wang. 2011. Selection models in accounting research. *The Accounting Review* 87 (2):589-616.
- Leslie, C. R. 2004. Trust, distrust, and antitrust. *Texas Law Review* 82 (3):62.
- Leuz, C. 2003. IAS versus U.S. GAAP: Information asymmetry-based evidence from Germany's new market. *Journal of Accounting Research* 41 (3):445-472.
- . 2004. Proprietary versus non-proprietary disclosures: Evidence from Germany. In *The Economics and Politics of Accounting*, edited by C. Leuz, D. Pfaff and A. Hopwood. Oxford, U.K.: Oxford University Press.
- Leuz, C., and R. Verrecchia. 2000. The economic consequences of increased disclosure. *Journal of Accounting Research* 38 (Supplement):91-124.
- Leuz, C., and P. Wysocki. 2008. Economic consequences of financial reporting and disclosure regulation: A review and suggestions for future research. *Working paper: University of Chicago - Booth School of Business; University of Miami - School of Business Administration*.
- Levenstein, M. 1997. Price wars and the sustainability of collusion: A study of the pre-world war I bromine industry. *The Journal of Industrial Economics* 45 (2):117-137.
- Levenstein, M., and V. Suslow. 2006. What determines cartel success? *Journal of Economic Literature* 44 (1):43-95.
- Levenstein, M., and V. Y. Suslow. 2011. Breaking up is hard to do: Determinants of cartel duration. *Journal of Law and Economics* 54 (2):455-492.
- Lipczynski, J., J. Wilson, and J. Goddard. 2005. *Industrial organization*. 2nd ed. New York: Prentice Hall.
- Machlup, F., ed. 1952. *The economics of seller's competition*. Baltimore, MD: John Hopkins University Press.
- Maddala, G. S. 1991. A Perspective on the use of limited-dependent and qualitative variables models in accounting research. *The Accounting Review* 66 (4):788-807.
- Mahoney, J. T. 2005. *Economic foundations of strategy*. California: SAGE Publications

- Malkiel, B. G. 1977. The valuation of closed-end investment-company shares. *The Journal of Finance* 32 (3):847-859.
- McNichols, M. F., and S. R. Stubben. 2008. Does earnings management affect firms' investment decisions? *The Accounting Review* 83 (6):1571-1603.
- Miller, G. 2013. Promoting trust and transparency in the UK investment trust industry. London: SCM Private LLP.
- Miller, G. S. 2006. The press as a watchdog for accounting fraud. *Journal of Accounting Research* 44 (5):1001-1033.
- Minnis, M. 2011. The value of financial statement verification in debt financing: Evidence from private U.S. firms. *Journal of Accounting Research* 49 (2):457-506.
- Mortal, S., and N. Reisel. 2013. Capital allocation by public and private firms. *Journal of Financial and Quantitative Analysis* 48 (01):77-103.
- O'Brien, P. C., M. F. McNichols, and L. Hsiou-Wei. 2005. Analyst impartiality and investment banking relationships. *Journal of Accounting Research* 43 (4):623-650.
- OECD. 2007. Glossary of statistical terms In *Glossary of statistical terms* Paris: Organisation for Economic Co-operation and Development.
- Orr, D., and P. W. MacAvoy. 1965. Price strategies to promote cartel stability. *Economica* 32 (126):186-197.
- Parida, S., and T. Teo. 2011. The impact of more frequent portfolio disclosure on mutual fund performance. *Working paper: London School of Economics & Political Science (LSE) - Department of Finance*.
- Pepall, L., D. J. Richards, G. Norman, and P. Debashis. 2005. *Industrial organization: Contemporary theory and practice*. New York: Thomson/South-Western.
- Peress, J. 2014. The Media and the diffusion of information in financial markets: evidence from newspaper strikes. *The Journal of Finance*:2007-2043.
- Peter, C. D. 2014a. Private firms' investment efficiency and local news media coverage. *Working Paper: WHU – Otto Beisheim School of Management*.
- . 2014b. Proprietary cost of full portfolio disclosure for UK investment trusts. *Working Paper: WHU – Otto Beisheim School of Management*.
- Pontiff, J. 1996. Costly arbitrage: Evidence from closed-end funds. *The Quarterly Journal of Economics* 111 (4):1135-1151.
- Porter, R. 2005. Detecting collusion. *Review of Industrial Organization* 26 (2):147-167.
- Posner, R. A. 1970. A statistical study of antitrust enforcement. *Journal of Law and Economics* 13 (2):365-419.
- Pratt, E. J. 1966. Myths associated with closed-end investment company discounts. *Financial Analysts Journal* 22 (4):79-82.
- Richardson, S. 2006. Over-investment of free cash flow. *Review of Accounting Studies* 11 (2-3):159-189.
- Rivers, D., and Q. H. Vuong. 1988. Limited information estimators and exogeneity tests for simultaneous probit models. *Journal of Econometrics* 39 (3):347-366.
- Robert, B. T., II, C. Olsen, and J. R. Dietrich. 1987. Attributes of news about firms: An analysis of firm-specific news reported in the wall street journal index. *Journal of Accounting Research* 25 (2):245-274.
- Roberts, K. 1985. Cartel behaviour and adverse selection. *The Journal of Industrial Economics* 33 (4):401-413.
- Roberts, M. R., and T. M. Whited. 2013. Chapter 7 - Endogeneity in Empirical Corporate Finance. In *Handbook of the Economics of Finance*, edited by M. H. George M. Constantinides and M. S. Rene: Elsevier, 493-572.
- Rogers, J. L. 2008. Disclosure quality and management trading incentives. *Journal of Accounting Research* 46 (5):1265-1296.

- Seale, D. A., R. J. Arend, and S. Phelan. 2006. Modeling alliance activity: Opportunity cost effects and manipulations in an iterated prisoner's dilemma with exit option. *Organizational Behavior and Human Decision Processes* 100 (1):60-75.
- Shin, H.-H., and R. M. Stulz. 1998. Are internal capital markets efficient? *The Quarterly Journal of Economics* 113 (2):531-552.
- Shroff, N. 2014. Corporate investment and changes in GAAP. *Working paper: Massachusetts Institute of Technology*.
- Shroff, N., R. S. Verdi, and G. Yu. 2014. Information environment and the investment decisions of multinational corporations. *The Accounting Review* 89 (2):759-790.
- Simeon Djankov, Caralee McLiesh, Tatiana Nenova, and Andrei Shleifer. 2003. Who Owns the Media? *Journal of Law and Economics* 46 (2):341-382.
- Spagnolo, G. 2005. Managerial incentives and collusive behavior. *European Economic Review* 49 (6):1501-1523.
- Spar, D. L. 1994. *The cooperative edge: The internal politics of international cartels*. Ithaca: Cornell University Press.
- Stigler, G. J. 1964. A theory of oligopoly. *The Journal of Political Economy* 72 (1):44-61.
- Suslow, V. Y. 2005. Cartel contract duration: empirical evidence from inter-war international cartels. *Industrial and Corporate Change* 14 (5):705-744.
- Telser, L. G. 1980. A theory of self-enforcing agreements. *The Journal of Business* 53 (1):27-44.
- Tirole, J. 1988. *The theory of industrial organization*. Massachusetts Institute of Technology, Cambridge, Massachusetts.
- Tucker, J. W. 2010. Accounting and finance research. *Journal of Accounting Literature* 29:31-57.
- Verrecchia, R. E. 2001. Essays on disclosure. *Journal of Accounting and Economics* 32 (1-3):97-180.
- Verrecchia, R. E., and J. Weber. 2006. Redacted disclosure. *Journal of Accounting Research* 44 (4):791-814.
- von Blanckenburg, K., and A. Geist. 2011. Detecting illegal activities: The case of cartels. *European Journal of Law and Economics* 32 (1):15-33.
- Wagenhofer, A. 1990. Voluntary disclosure with a strategic opponent. *Journal of Accounting and Economics* 12 (4):341-363.
- Watts, R. L., and J. L. Zimmerman. 1979. The demand for and supply of accounting theories: The market for excuses. *The Accounting Review* 54 (2):273-305.
- . 1986. *Positive accounting theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Wei, B. 2007. Managerial ability, open-end fund flows, and closed-end fund discounts. *Working paper: Duke University*.
- Wermers, R. 2000. Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. *The Journal of Finance* 55 (4):1655-1703.
- Wermers, R. 2001. The potential effects of more frequent portfolio disclosure on mutual fund performance. *Perspective, The Investment Company Institute* 7 (3):1-11.
- Wermers, R. 2006. Performance evaluation with portfolio holdings information. *The North American Journal of Economics and Finance* 17 (2):207-230.
- Whited, T. M. 2006. External finance constraints and the intertemporal pattern of intermittent investment. *Journal of Financial Economics* 81 (3):467-502.
- Whited, T. M., and G. Wu. 2006. Financial constraints risk. *Review of Financial Studies* 19 (2):531-559.
- Williamson, O. E. 1973. Markets and hierarchies: Some elementary considerations. *The American Economic Review* 63 (2):316-325.

- . 1974. The economics of antitrust: Transaction cost considerations. *University of Pennsylvania Law Review* 122 (6):1439-1496.
- Yang, T. 2012. Essays on closed-end funds, Faculty of Humanities, Manchester Business School, Manchester.
- Zimmerman, J. E., and J. M. Connor. 2005. Determinants of cartel duration: A cross-sectional study of modern private international cartels. *Working paper: Purdue University*.

Affirmation – Statutory Declaration

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Affirmation – Statutory Declaration
According to § 10 part 1 no. 6 of the Doctoral Studies' Guide Lines
(dated 5th March 2008 as amended on the 8th September 2009)

I hereby declare, that the

Dissertation

submitted to the Wissenschaftliche Hochschule für Unternehmensführung (WHU) – Otto-Beisheim – Hochschule was produced independently and without the aid of sources other than those which have been indicated. All ideas and thoughts coming both directly and indirectly from outside sources have been noted as such.

This work has previously not been presented in any similar form to any other board of examiners.

Sentences or text phrases, taken out of other sources either literally or as regards contents, have been marked accordingly. Without notion of its origin, including sources which are available via internet, those phrases or sentences are to be considered as plagiarisms. It is the WHU's right to check submitted dissertations with the aid of software that is able to identify plagiarisms in order to make sure that those dissertations have been rightfully composed. I agree to that kind of checking, and I will upload an electronic version of my dissertation on the according website to enable the automatic identification of plagiarisms.

The following persons helped me gratuitous / non-gratuitous in the indicated way in selecting and evaluating the used materials:

Last Name	First Name	Kind of Support	gratuitous / non-gratuitous
Mirontschenko	Nelli	Data collection	gratuitous
Beckerman	Marius	Data collection	gratuitous
Ehlig	Pia	Data collection	gratuitous

Further persons have not been involved in the preparation of the presented dissertation as regards contents or in substance. In particular, I have not drawn on the non-gratuitous help of placement or advisory services (doctoral counsels / PhD advisors or other persons). Nobody has received direct or indirect monetary benefits for services that are in connection with the contents of the presented dissertation.

The dissertation does not contain texts or (parts of) chapters that are subject of current or completed dissertation projects.

Place and date of issue: Vallendar, 31.03.2015

Signature _____

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Education

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Working Papers

“Proprietary Costs of Full Portfolio Disclosure for UK Investment Trusts”

“Private firms’ investment efficiency and news media coverage”

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Conference Presentations

- 2014: AAA Annual Conference, Atlanta (August)
Presenter and Discussant
The European Accounting Association 37th Annual Congress, Tallin (May)
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Presenter and Discussant
- 2013: GGS Conference - Communication in Capital Markets, Giessen (October)
- 2012: Doctoral Seminar at Justus-Liebig University, Giessen (May)
The European Accounting Association 35th Annual Congress, Ljubljana (May)
The European Economic Association 27th Annual Congress, Malaga (August)

Doctoral Seminars with Application Procedure

- 2013: 29th Doctoral Colloquium in Accounting, EAA Paris (May)
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- 2011: Capital Market Research, Tilburg (October - November)
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Doctoral Workshops

- 2013: Text Analysis in Financial Markets, Justus - Liebig University (October)
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Teaching

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