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Master thesis

Exploring the effect of board interlocks on cross-listing valuation through the information environment

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Abstract

This thesis explores the moderating effects of board interlocks on the relation between the information environment and firm valuation for European companies cross-listing in the U.S. between 1997-2014. A sample is used of 42 cross-listing companies and 34 non cross-listing companies from 11 different countries and 18 industries. Evidence is found that board interlocks have a negative but insignificant association with the relation between both the information environment proxies, analyst following and forecast accuracy, and firm valuation, measured by Tobin's Q. This is determined by conducting random effects panel data regressions with a time window of 3 years around the cross-listing year. Other results suggests that cross-listing has a positive effect on the information environment through analyst following. Furthermore, evidence is found that the information environment positively affects firm valuation through forecast accuracy.

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Chapter 1 Introduction

Scholars have been interested in the widespread and enduring phenomenon of cross-listing ever since the late 1980s (Karolyi, 2012). Since the 2000s the phenomenon became increasingly scrutinized as the capital markets were characterized by an accelerating globalization process in which portfolio capital flows have increased dramatically (Gagnon & Karolyi, 2010). Therefore, access to foreign capital markets have become an increasingly important strategic issue for companies (Pagano, Röell, & Zechner, 2002; Chung, Cho and Kim, 2015).

The concept of cross-listing means the multiple listings of stock (Foucault & Frésard, 2012). Cross-listing is a choice made by firms to secondary list its equity shares, which are traded on the home market exchange, on a new overseas market (Gagnon & Karolyi, 2010; Karolyi, 2012). Cross-listing has been studied in light of the information environment of firms for the last two decades (Stulz, 1999; Coffee, 2002). The main point of related theories is that cross-listing can help overcome information asymmetries between the organization and investors (Roosenboom & Van Dijk, 2009; Karolyi, 2012). Hence, firms try to achieve higher firm valuation by reducing this information gap. Firms overcome the information asymmetry by cross-listing its stock on markets with higher disclosure requirements and legal obligations (Bris, Cantale, Hrnjić & Nishiotis, 2012). They are then forced to disclose more information to the public as well they signal their 'quality' as an organization.

These theories are exclusively addressed from an economic viewpoint incorporating agency theory as the main perspective to explain information asymmetries. A call for a greater stakeholder approach can be found in the literature related to corporate governance, which can be seen as an approach that attempts to contextualize corporate governance research (Kiel & Nicholson, 2003; Filatotchev & Boydm 2009). This thesis contextualizes the research on cross-listing by incorporating social theory. Social theory suggests that economic action is shaped by the structure of social relations (Roa, Davis, and Ward, 2000). This means at the firm level that the economic behavior of one firm can be affected by relations with other firms (Mizruchi, 1996). This perspective is mostly examined through the use of board interlocks. Board interlocks have been found to function as a communication network (Mizruchi, 1996) through which corporate practices are dispersed (Oxelheim & Randøy, 2003; Carpenter & Westphal, 2001; Cai, Dhaliwal, Kim, and Pan, 2014). This thesis argues that board interlocks might be used to actively influence the decision to cross-list and influence the potential gains of increased information environment through early adoption of corporate practices related to the information environment.

The object of this research is to examine whether cross-listing on a foreign exchange has a positive effect on firm valuation through the information environment and test for additional implications of

board interlocks. First of all, it is examined whether cross-listing has indeed a positive effect on the information environment on the firm level. In turn, it is examined whether changes in the information environment have significant influence on firm valuation. And as last, a social perspective is incorporated by examining whether firm networks, through board interlocks, moderate the relation between the information environment and firm valuation. To assess these relations panel data is collected. The collected panel data consists of yearly data about European firms cross-listing in the U.S. between the years 1997-2014. The U.S. is used as the country of cross-listing choice as the information environment of the U.S. is well-known to be of high quality due to stringent legal and disclosure requirements (Doidge, Karolyi, and Stulz, 2004; Dodd, 2013). The effects of cross-listing in the U.S. are thus likely to be more prominent for the information environment of cross-listing firms. Random effects panel data regressions are used to examine the relations between cross-listing and the information environment, and the information environment and firm value, moderated by board interlocks. The results of this research can only partially confirm the relations as described above. Cross-listing is found to be positive related to analyst following only, which is a proxy for the information environment. However, no evidence is found that analyst following in turn is positively correlated with firm value. In addition, another proxy of the information environment, forecast accuracy, is found to do have a significant positive influence on firm valuation. The moderating effect of board interlocks, however, is found to be insignificant. Therefore, it can be concluded that in this research there is only partial evidence for the relation between cross-listing and the information environment, and the information environment and firm value.

Academic literature suggests that cross-listing choices are frequently claimed to be based on information considerations since the emergence of cross-listing theories related to the information environment in the early 2000s (Leuz, 2003). However, little empirical evidence is found in the literature for the relation between cross-listing and the information environment (Lang, Lins, and Miller, 2003; Leuz, 2003). Studies that do explicitly study the relation between cross-listing and the information environment are Baker, Nofsinger, and Weaver (2002), Lang et al. (2003), Lang, Lins, and Miller (2004), Leuz, (2003), and Lee & Valero (2010). These studies have in common that they mainly base their findings on a cross-sectional analysis. Lang et al. (2003) also conduct an additional time series analysis with a time window of -3 to +3 years. This thesis adds to the current body of knowledge by explicitly examining the relation between cross-listing and the information with a longitudinal perspective, extending the time series regressions as proposed by Lang et al. (2003). This means that additional variables are included in the model, for which some are found to have significant effect. Data is collected to a larger extent, by collecting data up to 8 years prior to the cross-listing event for some variables and three years after. Also, data is collected in a more recent time period between 1997-2014. Lang et al. (2003) includes data about firms cross-listing in the year 1996 only and the most recent dataset relating to firms cross-listing between 1995-2005 (Lee & Valero,

2010). Another addition, is the incorporation of social theory. Board interlocks are examined to provide evidence whether or not board interlocks have an moderating effect on the relation between the information environment and firm value. Social theory, and in particular board interlocks, has not explicitly been studied yet in light of cross-listing. Theory suggests that board interlocks might have implications for the corporate governance practices which could affect the information environment of firms(Carpenter & Westphal, 2001; Oxelheim & Randøy, 2003; Cai et al., 2014). This thesis adds to the current body of knowledge by exploring board interlocks in light of cross-listing.

Results of this research can also have value for managers of domestic publicly listed firms in Europe. First of all, this research shows that cross-listing in the U.S. improves the visibility of the company through analyst following. An increase in the amount of analyst following is also related to a higher firm value of the company. Another implication of this research is that including board members of publicly listed companies in the U.S. does not necessarily influence the relation between the information environment and firm value. Thus, board interlocks are not of primary concern if cross-listing is considered to increase the information environment. However, they still might be of concern for other strategic considerations as mergers & acquisitions.

To provide an answer to the research question, the thesis is structured as follows. Chapter two provides an overview of the current relevant academic literature on cross-listing firms. Also, hypotheses are formulated on the basis of the literature described. In chapter three the research methodology used in this study, the variables of interest, and the research models used are described and elaborated on. In addition, the development of the dataset underlying the research models is described. Chapter four provides the results of the analyses performed. And as last, in chapter five the conclusion of the results are summarized, followed by a discussion and limitation of the research.

Chapter 2 Literature review

The aim of this chapter is to provide an overview of the current relevant academic literature on the topic of cross-listing. In addition, hypotheses are developed to support the research question based on the theory described. First of all, the concept of cross-listing is explained and motives to cross-list are elaborated on. Then, the information environment of firms is described in more detail. And as last, social theory, and in particular board interlocks, are described and linked to the information environment of firms.

2.1 Cross-listing

Cross-listing means in its core the multiple listings of stock by a company (Foucault & Frésard, 2012). Most literature explicitly or implicitly assumes that firms first publicly offer their stock in their home market before entering foreign markets. For example, Ferris, Kim, and Noronha (2009) describe cross-listing as '*the process by which a firm incorporated in one country elects to list its equity on the public stock exchange of another country*' (p. 338). However, some different forms of cross-listing can be identified. Examples are organizations which are listed on multiple foreign stock exchanges, and firms that list on a foreign exchange before their own domestic exchanges. Those firms are found to experience different effects of cross-listing than firms that cross-list on one foreign exchange after enlisting on their own domestic stock exchange (Busaba, Guo, Sun, and Yu, 2015). In this thesis cross-listing is examined in line with the description as provided by Ferris et al. (2009).

Cross-listing is a conscious strategic choice (Ganon & Karolyi, 2010; and Karolyi, 2012). Such choice involves a cost-benefit analysis, corporate policy, as well multiple stakeholders are involved (capital market participants, investment banks, depositary banks, custodial agents, accountants, lawyers and other strategic advisors). In the academic literature multiple motives have been theorized to be at the basis of such strategic choice. In these theorizations the motives to cross-list are often discussed in the light of potential benefits and costs. However, over time multiple cross-listing motives theorizations developed which are based on different perspectives (Appendix A). A widely used distinction on cross-listing motives is between traditional (or conventional) wisdom and alternative wisdom based on the information environment (Dodd, 2013). Until the mid-1990s the main motivation for cross-listing was considered to the fragmentation of capital markets (Sarkission & Schill, 2009; Dodd, 2013). This traditional wisdom argues that barriers exist between capital markets constraining capital to flow from one market to another. Cross-listing is then used as a means to overcome investments barriers which leads to better access to a larger deeper market for capital, greater diversification of the ownership base, and an increased liquid trading environment for shareholders (Karolyi, 2012). However, capital markets have been increasingly integrated over time (Dodd, 2013). Also, deregulation and significant technological advances in electronical equity trading have led to a detrimental effect on the relevance

of the traditional wisdom. In light of such developments, alternative motives for cross-listing were developed relating to the information environment (Roosenboom & Van Dijk, 2009; Karolyi, 2012).

2.2 The information environment

Early studies on cross-listing motives relied on capital asset pricing models (CAPM), which provide an explanation of the relationship between risk and asset return (Farma & French, 2004). However, early empirical research on the market segmentation theory and the liquidity theory led to mixed findings (Ganon & Karolyi, 2010; Karolyi, 2012). Remarkable trends found in the literature were that firms from countries that were substantially integrated in the world market still enjoyed abnormal market returns (Bris, Cantale, and Nishiotis, 2007). In other words, even firms that perceived relatively low investment barriers in their environment still received abnormal returns through cross-listing, while this was not hypothesized by early theory. Later on, alternative theories were developed which are described in this subparagraph. The new theories on cross-listing focused their attention on the information environment of firms. Classic asset pricing theory assumes that markets are efficient, and, in particular, information is costless and immediately available. In reality, markets are incomplete and incorporate incomplete information (Dodd, 2013). This is also reflected in firms as there exist agency conflicts between management and investors as theorized by the agency theory. The new theories focus on potential agency conflicts and posit that cross-listing can overcome the governance problems of firms (Karolyi, 2012). By overcoming information asymmetries between the organization and its investors firms can achieve a higher firm valuation and a lower cost of capital (Karolyi, 2012). The new theories consist of the legal bonding theory, the investor recognition theory and the information disclosure theory described in the following subparagraphs.

2.2.1 Legal bonding theory

Stulz (1999) is seen in the academic literature as the first to articulate critique of the market segmentation theory and provided groundwork for alternative explanations for international cross-listing. The groundwork of Stulz (1999) is based on information problems and agency conflicts (Coffee, 2002). Stulz (1999) describes that differences between management and investor assessments of valuations of a firm can exist of two reasons. First, management has more information about the company's profitability than investors do. Also, it is hard for companies to communicate such information credibly to investors. This problem is refers to information asymmetry between management and investors. Second, when investors have invested in a company, managers can make poor use of the capital provided. For example, to reach objectives which are not advantageous for the investors. This conflict refers to the agency theory. According to Stulz (1999) similar problems can arise when differences exist among investors. In this regard minority shareholders and block holders (controlling shareholders) are distinguished. Minority investors might judge from this perspective that management or controlling shareholders make poor use of the capital provided and try to reach

objectives which differ from common public shareholders (Coffee, 2002). The basic argument of Stulz (1999) is that a firm's cost of capital critically depends on its corporate governance system. This includes internal firm-specific controls, independent boards and effective compensation plans, and external and institutional controls such as legal protection for minority shareholders, monitoring from bankers, analysts, auditors, institutional investors, and legal and regulatory authorities (Stulz, 1999; Coffee, 2002). Firms in a national economy with more effective corporate governance can raise capital on better terms than firms in a weaker corporate governance environment (Stulz, 1999). Using this line of reasoning, the 'bonding theory' was developed. This theory posits firms can 'bond' themselves to a more stringent corporate governance environment by cross-listing on an exchange associated with a higher corporate governance quality. By bonding to tougher legal, regulatory, and capital market institutions of the new host country the costs of external financing can be reduced by reducing information and agency costs (Stulz, 1999; Coffee, 2002). Doidge et al. (2004) add to these statements that bonding to U.S. stock exchanges, known for stringent disclosure requirements and high levels of investor protection, is particularly beneficial for firms with significant growth opportunities. This reduces the extent to with shareholder blocks can engage in expropriation of assets and the firm also has increased ability to take advantage of growth opportunities.

Empirical evidence related to the bonding hypotheses is mixed. Doidge et al. (2004) show that firms that cross-list in the U.S. have higher valuations that other firms from their country that do not cross-list. Doidge (2004) examine cross-listing using firms that issued two classes of shares which only differ by their voting rights, differentiated in high- and low-voting shares. They used the voting premium, measured by the percentage of difference between the prices of high- and low voting shares, as a proxy for the private benefits of control. The results show that non-U.S. firms that cross-list on U.S. exchanges have significant lower voting premiums than firms that do not cross-list. Also, this difference is larger for firms from countries that provide poor protection to minority shareholders. This results thus support the bonding hypothesis. However, other studies find no significant effects of legal bonding. Bris et al. (2007) examine firms that cross-list in the U.S. and find that the significance of bonding benefits is relative small to market segmentation or liquidity benefits. Gozzi, Levine, and Schmukler (2008) find similar results in support of market segmentation over bonding benefits. Sarkissian and Schill (2009) examine whether foreign equity listings are associated with permanent valuation gains and find little evidence of permanent returns even for firm's listing in market that provide better legal protection, are more liquid or have a larger shareholder base. Also, a remarkable phenomenon happened after the introduction of the Sarbanes-Oxley act in 2002. The Sarbanes-Oxley act dramatically increased the strictness of the corporate governance environment in the U.S. after some major corporate scandals happened. The introduction of this act was thus hypothesized to further increase bonding benefits through cross-listing in the U.S. However, the adoption of Sarbanes-Oxley

act in 2002 led to a wave of de-listings from U.S. stock exchanges, which cannot be explained by the legal bonding theory (Dodd, 2013).

2.2.2 Investor recognition theory

The first one to address the investor recognition theory was Merton (1987). His theory posits that investors are not aware of all stock options which limits their ability to diversify firm-specific risk (Dodd, 2013). For this reason a firm-specific risk premium is included in the cost of capital for firms that are lesser known (Sarkissian & Schill, 2009). Merton (1987) states that lesser known firms should '*expend resources of the firm to induce investors who are not currently shareholders to incur the necessary costs of becoming aware of the firm*' (p. 500). In other words, cross-listing can lead to a higher valuation through increased visibility and a broader (foreign) shareholder base (Dodd, 2013).

Empirical literature generally supports Merton's theory (Sarkissian & Schill, 2009), which is backed up by surveys of managers confirming that increasing their overall shareholder base is one of the reasons to cross-list (King & Segal, 2009). However, according to Sarkissian & Schill (2009) it is still not clear if cross-listing actually overcomes information barriers as mentioned by Merton (1987) or if cross-listing reflects already existing information flows. Some studies, for example, show that cross-listing decisions often follow export routes or product trade markets (Pagano et al., 2002). Also, other studies find that cross-listing does not lead to better access to foreign markets (Bris et al., 2007) or are sufficient to overcome cross-border information or familiarity barriers (Sarkissian & Schill, 2004). Although several studies provide critical notes to the use of the investor recognition theory, the theory is still supported in the academic literature in general. This theory is useful as it provides an incentive for firms that are neglected (in awareness) or have a low base of investors to cross-list in a foreign exchange (King & Segal, 2009).

2.2.3 Information disclosure theory

The information disclosure theory is closely related to the legal bonding theory. The legal bonding theory views that firms seek to list abroad in order to reduce investor expropriation risk and increased investor protection through bonding to a tougher legal environment. The information disclosure theory also states that firms seek out a tougher information environment, but now related to higher quality disclosure standards. Both theories might be seen as components of bonding to a stricter regulatory environment (Fuerst, 1998).

Saudagaran & Biddle (1992) studied financial disclosure requirements in relation to foreign listing decisions by firms. They found that firms are indeed influenced by financial disclosure levels in the choice of cross-listing on a certain stock exchange. Findings suggested that this effect operates only for firms which domestic disclosure levels are lower than those of the foreign stock exchange of choice. Fuerst (1998) also analyzed listing decision of foreign firms and demonstrated that managers

consciously cross-list on a market with high disclosure levels in order to credibly convey their private information regarding their firm' future prospects. He even states that it does not matter if the information disclosed in both foreign and domestic market is similar, differences in the regulatory environment are enough to communicate their private information more credibly. In other words, the notion of credibility is more important than the information itself. Using this line of thought the information disclosure theory predicts that firms cross-list in markets with high disclosure levels in order to signal their high quality (Bris et al., 2007). In the academic literature the information disclosure theory is also known as the signaling theory.

2.2.4. Summarizing the effect of cross-listing on the information environment

Several implications can be found in the academic literature for the information environment of cross-listing firms in the form of the legal bonding theory, the investor recognition theory and the information disclosure theory. According to the legal bonding theory firms do often cross-list on foreign stock exchanges in order to subject themselves to a tougher legal environment which in turn improves investor protection and thus the position of minority stakeholders (Stulz, 1999; Coffee, 2002). The investor recognition argues that firms can cross-list in order to improve their investor base (Merton, 1987) and increase their visibility (Dodd, 2013). It is debated, however, if getting access to foreign investors also improves the information flows related to the cross-listing firm (Pagano et al., 2002; Sarkissian & Schill, 2004). The information disclosure theory posits that disclosure requirements are an important factor in the decision for firms to cross-list. Cross-listing in a foreign country is then used to communicate more credible information about the firm future prospects. It is even argued that it does not matter if there is actually more information disclosed (Fuerst, 1998). Signaling the intention to disclose high quality information is enough for an improvement in the information environment to happen.

Key to these different theories is that firms can gain greater visibility, can bond themselves to higher quality corporate governance practices or increase disclosure requirements through cross-listing. In order to examine whether cross-listing does in indeed improve the information environment the following hypothesis is used:

Hypothesis 1: Cross-listing has a positive effect on the information environment

2.3 The information environment and firm valuation

The theories described in the previous paragraph were developed to explain the abnormal returns of cross-listing firms which experienced low investment barriers (Bris et al., 2007). The investor recognition theory states that firms are able to lower the firm-specific risk by attracting a broader base of (foreign) investors, which in turn has a positive influence on the valuation of the firm. The information disclosure theory suggests that firm value increases if the information asymmetry between

management and investor decreases through increased disclosure. And as last, the legal bonding theory predicts an improvement of firm value as the information asymmetry between management and investors is reduced through increased legal requirements and external monitoring.

It is extensively documented in the academic literature that cross-listing domestic stocks in foreign exchanges has significant valuation effects on the listed company's shares (Bris et al., 2007). Prior studies document that cross-listing has a positive effect on abnormal stock returns in a short time frame before and at the time of cross-listing (Foerster & Karolyi, 1999; Miller 1999; Doidge et al., 2004; Bailey, Karolyi, and Salva, 2006). Other studies incorporate a larger time-frame to assess the evolution of the cross-listing effects (Gozzi, Levine, and Schmukler, 2008) and whether cross-listing effects are permanent (Sarkissian & Schill, 2009). Results indicate that firm valuation does not rise after cross-listing (Gozzi, Levine, and Schmukler, 2008) and that cross-listing is not associated with permanent valuation gains (Sarkissian & Schill, 2009). However, some contradicting results can be found indicating positive long horizon returns (King & Segal, 2009; Foerster & Karolyi, 2010). However, these studies focus on the outcomes of cross-listing controlling for firm-specific factors rather than specifying how exactly these benefits are generated. Empirical evidence regarding how these effects are generated are less well-documented (Leuz, 2003).

This thesis focuses on how the information environment accounts for the effects of cross-listing on firm valuation. Several studies can be identified which examine the association between the information environment and firm valuation. Firm valuation being measured through either the cost of capital (Lang & Lundholm, 1996; Botosan, 1997; Baker et al., 2002; Hail & Leuz, 2009), stock return (Healy, Hutten, and Palepu, 1999), or Tobin's Q (Lang, Lins, and Miller, 2003; Leuz, 2003). Lang and Lundholm (1996) examine firms which increase their information disclosure policies and study whether increased disclosure affects the information environment which is studied through four proxies: analyst following, analyst earnings forecast accuracy, dispersion among analyst forecasts, and volatility in forecast revisions. Their study indicates that increased disclosure leads to a larger amount of analyst following, more accurate analyst earnings forecast, less dispersion among individual analyst forecasts, and less volatility in forecast revisions. All four have been shown in theoretical research to reduce a firm's cost of capital (Lang & Lundholm, 1996). A reduced cost of capital meaning that the firm experiences fewer costs in financing their business, which is positive for firm valuation as returns are than obtained with less costs involved. Botosan (1997) explicitly examines the association between the disclosure level and cost of equity capital. Disclosure is measured as the amount of voluntary disclosure in annual reports. The studies shows that the level of disclosure is positively associated with cost of equity capital for firms that have low analyst following and no association with firms that have high analyst following. An important implication of this study is that analysts seem to play a significant role in communicating information rather than voluntary disclosure. Healy et al. (1999) also examine the effect of increased voluntary disclosure on capital market factors and find that

increased disclosure is accompanied by increases stock returns, institutional ownership, analyst following, and stock liquidity. The previous mentioned studies, however, do not explicitly study the effects of the information environment from a cross-listing perspective. The study of Baker et al. (2002) examines international firms cross-listing their shares on the New York Stock Exchange (NYSE) and the London Stock Exchange (LSE). They find that firms enlisted on both exchanges experience a higher 'visibility', which consists of the proxies analyst following and media attention, than firms that do not in a time window of 52 weeks before and after the listing week. This increase in visibility is accompanied by a decrease in cost of equity capital, consistent with the investor recognition theory. Another important finding is that the effect of cross-listing is more prominent for firms cross-listing on the NYSE than firms cross-listing on the LSE. Lang et al. (2003) examine the relation between cross-listing in the U.S. and the information environment, which consists of the proxies analyst following and forecast accuracy. Their results indicate that cross-listing in the U.S. does indeed increase the information environment. In addition, they examine the influence of the information environment on firm valuation (measured by Tobin's Q) and find positive associations between the amount of analyst following, forecast accuracy and firm valuation. Leuz (2003) later replicates the study of Lang et al. (2003) using a sample of Canadian firms cross-listing in the U.S. Leuz (2003) tries to disentangle the effects of cross-listing by controlling for mandated disclosure requirements. Results show that there is no relation between forecast accuracy and firm valuation when controlling for mandated disclosure requirements. Analyst following, however, is still significant. These results show that the effects of cross-listing on the information environment are not obvious and that results are difficult to disentangle. Hail & Leuz (2009) estimate the effect of cross-listing using two different proxies: market prices and analyst forecast. When combined, the proxies account for growth expectations around cross-listing. Results show that cost of capital is reduced for firms listing on U.S. exchanges. Also, smaller reductions of cost of capital are found for firms which enlist on over-the-counter markets (not required to increase disclosure) and firms from countries with stronger legal institutions. Both results are in line with the legal bonding and information disclosure theory.

The investor recognition theory, the information disclosure theory, and the legal bonding theory all theorize that firm valuation can be improved through an improved information environment through cross-listing. Empirical studies show wide support for the positive effect of the information environment on firm valuation. Therefore, the following hypothesis is constructed:

Hypothesis 2: Quality of the information environment has a positive effect on firm valuation

2.4. Social theory

The cross-listing literature in general, and the theories related to the information environment in specific, exclusively address cross-listing from an economic viewpoint which incorporates global

capital asset pricing models and agency theory as main perspectives to argue about the contributions of cross-listing. However, these perspectives focus exclusively on investors and it can therefore be seen as narrow as it neglects other stakeholders who may have different interests (Filatotchev & Boyd, 2009). Therefore, a call for a greater stakeholder approach to corporate governance can be found in the corporate governance literature (Kiel & Nicholson, 2003). Economic globalization and developments in technologies for mass communication make stakeholder inclusion an essential component of corporate strategy (Wheeler & Sillanpa, 1998). A greater stakeholder approach can be seen as a more holistic approach in corporate governance research with studies attempting to 'contextualize' corporate governance research (Filatotchev & Boyd, 2009). In other words, the differences and dependencies in the organizational environment are more incorporated in such research. In this regard, social theory is incorporated in this research to 'contextualize' the information environment of firms that do adopt a cross-listing strategy.

In this thesis the social embeddedness theory takes a central role. This theory states that economic action is shaped by the structure of social relationships (Rao, Davis, and Ward, 2000). Suggesting that firm behavior can be affected by the firm's relations with other firms (Mizruchi, 1996). This assumption is widely used in social theory. Social theory focuses on more relational, contextual and systemic understandings in opposition of individualist, essentialist and atomistic explanations (Borgatti & Foster, 2003). Network research has seen an increase in number as these relational constructs are becoming more accepted over time. In relation to international corporate governance, these social networks are most often addressed through corporate boards. Corporate boards are argued to be of great importance as their responsibility is to assure that a particular company is well governed (Filatotchev & Boyd, 2009). Also, corporate boards are found to have the ability communicate and disperse innovate corporate governance practices (Mizruchi, 1996; Davis, 1996). Therefore, social networks are incorporated in this research as it might influence decisions and potential gains of a corporate strategy as cross-listing. This research examines social networks through the concept of board interlocks, which is the most widely employed measure of interfirm networks in the academic literature (Mizruchi, 1996).

2.4.1. Board interlocks

A board interlock occurs when '*a person affiliated with one organization sits on the board of directors of another organization*' (Muzruchi, 1996, p. 271). Academic literature has examined board interlocks within a variety of research topics. Early research studied board interlocks as means to manage organizational dependencies, and maintain power and control for social elites (Borgatti & Foster, 2003). More recent research examined interlocks as a means to reduce uncertainties and share information about acceptable and effective corporate practices (Borgatti & Foster, 2003). Board interlocks are thus increasingly seen as a communication mechanism as mentioned by Mizruchi

(1996). Also, an extensive part of the literature studies board interlocks in relation to executive compensation, strategies for mergers and acquisitions, and defending against takeovers, e.g. poison pills (Davis, 1996). Important to take from these studies is that board interlocks can thus be used to disperse innovations in the form of corporate practices and can be strategically used for example mergers and acquisitions, but maybe also in relation to cross-listing. An interesting empirical study is conducted by Oxelheim & Randøy (2003). They studied what the effects were of incorporating an Anglo-American board member in firms headquartered in Norway and Sweden. They found that through Anglo-American board members elements of the Anglo-American corporate governance system were adopted. In turn, they argue that the firm value increased as they were able to break free from the segmented domestic market. However, the increase in quality of corporate governance can also be related to the information environment, signaling a higher quality to investors. Martin, Gözübüyük, and Becerra (2015) studied board interlocks in relation to uncertainty. In their research they found that firms may create interlocks to enable adaptation and enhance performance when confronted by uncertainty, moderating the impact of uncertainty on the organization. Although cross-listing is not necessarily related to uncertainty, it is interesting to note that firms can thus actively use board interlocks to reach certain goals. For example, reduce uncertainty. The study of Carpenter & Westphal (2001) identify two roles of a companies' board. First of all, the board functions as an independent control mechanism. Second, another possible role for directors is providing ongoing advice to top managers on possible strategic changes or the implementation of existing strategies. The study then examines how external network ties determine a board's ability to contribute to the strategic decision making process. This study shows that external ties with relevant strategic knowledge and perspective do influence the ability to influence strategic decisions. It can thus be argued that external ties might have impact on the strategic decision to cross-list or not. Cai et al. (2014) examine whether board connections through shared directors influence firm disclosure policies. They study whether interlocked directors influence the decision to stop providing quarterly earnings guidance. Their results indicate that firms with interlocking directors who had previous experience with the cessation of guidance were more likely to stop providing guidance themselves. This effect was particularly strong for interlocked directors who experienced positive outcomes from this practice. Overall, their evidence indicates that interlocked directors can serve as conduits for the sharing of information that leads to the adaptation of certain policies related to corporate disclosure. This is of particular interest as interlocking directors could perform a similar role for increased disclosure policies. Increased disclosure policies could in turn affect the potential gains of cross-listing in an information environment of high quality like the U.S. Therefore, this thesis finds basis in the academic literature that board interlocks might have an significant effect in relation to a strategy as cross-listing.

The current academic literature on cross-listing provides no suggestions related to the association between board interlocks and firm value. However, literature examining board interlocks in relation to

corporate governance argues that board interlocks are often used as a communication mechanism (Mizruchi, 1996) and network in which corporate practices are dispersed (Oxelheim & Randøy, 2003; Carpenter & Westphal, 2001; Cai et al., 2014). This thesis argues that firms are able to incorporate corporate practices or communicate commitment to corporate practices of higher quality information environments. Using board interlocks might thus be an alternative way to increase the information environment of a firm next to cross-listing. It could be fruitful to examine if board interlocks influence the information environment and if this in turn moderates the cross-listing benefits through the information environment. Therefore, we hypothesize that firms that have a higher number of board interlocks with firms from the foreign country they are cross-listing into experience smaller changes in the information environment and thus firm value. The hypothesis is structured as follows:

Hypothesis 3: Board interlocks negatively moderate the effect of the information environment on firm valuation

2.5 Summary

In this chapter an overview is provided of the current relevant academic literature on the topic of cross-listing. In addition, several hypotheses are developed which are based on the theory described. The following figure provides an overview of the hypotheses proposed:

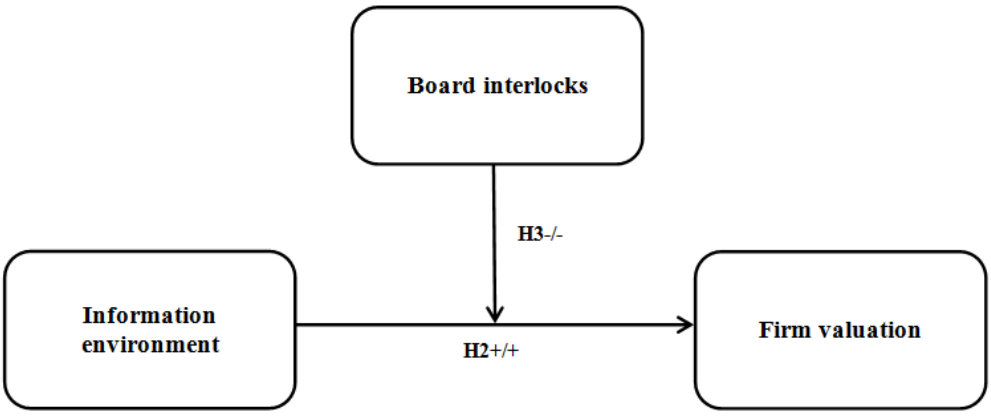

Figure 1: conceptual model

The first two paragraphs describe the concept of cross-listing and the relation with the information environment of firms. Based on the literature the first hypothesis is developed which states that cross-listing has a positive effect on the information environment of firms. Paragraph 2.3 then links the information environment of firms with firm valuation. The literature shows that cross-listing and the information environment are generally associated with higher firm valuations. Therefore, hypothesis 2 is developed which states that the information environment has a positive relation with firm valuation (see figure 1). In addition, social theory is described and related to cross-listing in paragraph 2.4.

Cross-listing is hypothesized to be negatively moderated by board interlocks, as board interlocks can be used to communicate and adopt corporate governance practices related to the information environment. Therefore, board interlocks is incorporated in the conceptual model as a moderator variable (figure 1).

Chapter 3 Methodology

This chapter will elaborate on the methodology used in this research to answer the research question. First, the research method used in this thesis is described. Second, the variables used to structure the research model are described and operationalized. As third, the research models are provided which are used to structure the analytical procedures. And as last, the development of the sample is discussed.

3.1 Research method

In order to provide a clear answer on the research question a quantitative approach is used. Such approach consists of testing empirical observations to find whether theory about certain states of the world can uphold (Field, 2013). To test theory about cross-listing firms several hypotheses, or predictions, were formulated in the literature review which are examined by quantifying and measuring the concepts of interest (Field, 2013).

However, in order to catch the effect of cross-listing on the information environment and the effect the information environment on firm valuation a stationary view in a specific moment in time might not reflect the true correlations. Literature suggests that abnormal returns can be detected years before and after major corporate events as cross-listing (Sarkissian & Schill, 2009). In line with the legal bonding theory and the signaling theory some examples might be envisioned in which changes in firm valuation and the information environment might occur around the cross-listing event instead of directly after. For example, Coffee (1999) and Leuz and Verrecchia (2000) argue in line with the signaling theory that the commitment to increased disclosure rather than increased disclosure itself can be an important aspect of cross-listing. Also, firms that are already transparent can use cross-listing to signal their commitment to continuing their policy (Fuerst, 1998; Moel, 1999). In these cases the information environment does not explicitly improve from cross-listing. It can thus be argued that the signaling can take effect even before the cross-listing actually happens, as cross-listing leads to no significant changes in the information environment. From another point of view it can be argued that even when cross-listing explicitly changes the information environment it is not clear when these changes take place (Lang et al., 2003). It is not expected that firms anticipating a cross-listing suddenly increase their disclosure following the cross-listing or that analysts suddenly increase their activity. It is rather expected that these changes take place more gradually in anticipation of the cross-listing event. Therefore, a larger time-window is used to estimate the change in the information environment of cross-listing firms. In line with Lang et al. (2003) a time-window of three years around the cross-listing date is considered. This time-window is still feasible as a larger time-window restricts the data availability too much, while it is likely that it captures a large part of the cross-listing effects. Therefore, panel data is collected for this research. Panel data consists of longitudinal data, which

means that data is collected about the research objects over a certain period of time (Vennix, 2010). In order to statistically test the hypotheses of this research panel regressions are used.

3.2 Variables description

3.2.1 The information environment

The information environment takes a central role in this research. However, directly measuring the information environment is not possible as there is no measure which covers the concept of the information environment as a whole (Lang et al., 2003). The information environment is therefore examined using indirect measurements. Examples of indirect measures used in the literature are price volatility and volume reaction to earnings announcements of cross-listing firms (Bailey et al., 2006), and measuring 'visibility' around cross-listing through analyst following and media coverage (Baker et al., 2002). Lang & Lundholm (1993, 1996) and Lang et al. (2003) measure the information environment through two proxy measures: analyst following and forecast accuracy. Forecast accuracy measures how well the market understands the economics of the firm in question. The accuracy of forecasts about the firm performance can improve through activity of analysts on the sell side, quality of firm disclosure or information gathering by other analysts and investors on the buy side. Analyst following is intended to measure the private information gathering by analysts and investors on the buy side. Both measurements are thus not mutually exclusive. For example, forecasts can be more accurately because more analysts are following the firm. However, forecasts can also be more accurate through improved disclosure. Therefore, both measures are examined simultaneously in this research. Analyst following is measured as the number of analysts that report estimates about the earnings per share of a firm. Forecast accuracy is defined as the negative of the absolute value of the analyst forecast error deflated by the stock price in line with Lang et al. (2003). This is done to ensure that the correct forecast error is measured as a perfect forecast has the value of zero. Using this formula every forecast deviation from the actual value thus leads to a worse forecast accuracy.

$$Analysts\ following(t) = \text{number of analysts reporting estimates for the following fiscal year end}$$

$$Forecast\ Accuracy\ (t) = -\left|\frac{Actual\ Earnings\ (t) - Estimated\ Earnings\ (t)}{Stock\ price\ (t)}\right|$$

3.2.2 Firm valuation

The dependent variable of the second and third hypothesis is firm valuation. Firm valuation is measured through Tobin's Q. This is a measure of firm value which is widely used in the academic literature (Lang et al., 2003; Doidge et al., 2004; Lang et al., 2004; Gozzi et al., 2008). Tobin's Q measures '*the capitalized value of the firm's future growth potential'* (Ben-Horim & Callen, 1989, p. 143) and is theoretically measured as the ratio of the market value of the firm to the replacement cost

of its assets. However, as it is difficult to measure the replacement cost of assets alternative measurements are often used in the academic literature (Chung & Pruitt, 1994). These measurements are often quite complex and limit the usefulness of Tobin's Q due to the limited availability of timely and accurate data. Therefore, Chung & Pruitt (1994) offer a more simple method based on basic financial and accounting information which can substitute for more complex measurements. In this research the model of Chung & Pruitt (1994) is followed in which Tobin's Q is measured as follows:

$$Tobin's\ Q = \frac{Market\ value\ equity + liquidity\ value\ preferred\ stock + DEBT}{Total\ assets}$$

$$DEBT = short\ term\ liabilities - short\ term\ assets + book\ value\ of\ long\ term\ debt$$

3.2.3 Board interlocks

Board interlocks are explored as a moderating variable influencing the relation between the information environment and firm valuation. A board interlock is formed when a board member of one board also sits on the board of another company at a particular moment in time. In this thesis the number of board interlocks is counted between the cross-listing companies and firms enlisted on the NYSE and the NASDAQ at the time of cross-listing. Therefore the following formula is used:

$Board\ interlocks =$ *Number of board interlocks between cross-listing firm and firms listed on the New York Stock Exchange (NYSE) and NASDAQ for both executive and non-executive board members.*

3.2.4 Control variables

In order to assess the relations between the variables as proposed by the hypotheses several control variables are used. The first hypothesis examines the relation between cross-listing and the information environment across firms. With regard to the information environment, and in particular firm disclosure behavior, firm size is argued to be of importance. First of all, firms experience preparation costs to disclose information about their company. However, larger firms are likely to have relatively lower disclosure costs than smaller firms due to fixed cost components in the adherence to disclosure requirements (Lang & Lundholm, 1993). Another reason to include firm size is that news and media, as well analysts, are more likely to follow larger firms than small firms (Lang & Lundholm, 1993; Lang et al., 2003). Lang & Lundholm (1993,1996) suggest that performance variability are also likely to be correlated to disclosure policies as well the amount of analysts collecting private information about the firm. Therefore, several earnings variables are included in the regressions. These earnings variables are included to control for the growth and volatility aspects of earnings, which might trigger analysts to follow to company or forecast to be less accurate. Earnings surprise is included in line with Lang et al. (2003) to control for the effects of stock volatility. Earnings surprise is calculated as the absolute difference in earnings between the current and previous

year deflated for the current stock price. One reason to include earnings surprise is that evidence suggests that cross-listing firms change their local reporting behavior to be more in line with U.S. GAAP, despite the fact that those firms are not required to change their local GAAP reporting when listed on the U.S. markets (Bailey et al., 2002; Lang, Ready, and Yetman 2003). Earnings surprise is thus taken into account as non-U.S. analysts might find it more difficult to predict earnings around cross-listing. In a similar line of reasoning the earnings standard deviation over the prior three years is included to control for earnings volatility over a larger time frame to control for firm specific stock volatility. Another control variable included is earnings growth. Earnings growth is calculated as the average growth of earnings over the prior three years. The reason to include earnings growth is that analysts might be more inclined to follow firms that are increasingly profitable. As last, the firm leverage, or debt/asset ratio, is included as a control in line with Lang et al. (2004). The debt/asset ratio gives an indication how a firm is financed, which is by a certain degree of equity as well debt. A higher debt/asset ratio then indicates that a firm is more financed by debt relative to equity. This research controls for debt as creditors might be able to lessen managerial agency problem (Lang et al., 2004).

To assess the relation between the information environment and firm valuation a regression is conducted to find whether cross-listing firms are generally more likely to have a higher Tobin's Q. However, it should be considered that firms that are performing well have in general a higher firm valuation. Therefore, controls are used for firm profit and prior year returns. Profit is calculated by operating income deflated by total assets. Prior year return is calculated by the total stock return over the prior year.

Both regressions conducted in this research control for firm size, industry and country effects. Industry is measured through I/B/E/S industry codes due to data availability. However, the I/B/E/S codes are broadly structured in the same manner as the U.S. two-digit SIC codes (Lang et al., 2003). It is important to control for industry effects as some industries are more capital intensive than others and cross-listing choices are likely to influenced by the industry the company operates in (Lang et al., 2003). Country effects are measured through the country of origin. Data is also acquired about the legal origin at the country level in line with La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998). However, the country of origin control and legal of origin control are correlated to such extent that only the country of origin is taken into account.

3.4 Research models

To empirically test the hypotheses formulated in the literature review section several research models are constructed. The first model tests whether cross-listing has a positive effect on the information environment as hypothesized in hypothesis 1. The second model tests whether the information

environment has a positive influence on firm valuation (hypothesis 2) and if board interlocks have a moderating effect (hypothesis 3). The first model looks as follows:

Research model 1

$$Information\ variables = \beta 0 + \beta 1\ ADR + \beta 2\ PostADR + \beta 3\ firm\ size\ (t) + \beta 4\ Earnings\ surprise(t) + \beta 5\ Earnings\ growth\ (t) + \beta 6\ Earnings\ volatility\ (t) + \beta 7 \frac{debt\ (t)}{asset\ (t)} + Industry\ controls + Country\ controls$$

where:

Information variables	number of analysts, forecast accuracy
ADR	measures whether a company is cross-listed or not. Cross-listing firms are appointed the value of 1, where non cross-listing firms are distinguished by the value of 0.
PostADR	indicates the years preceding and following the cross-listing year. Years preceding the cross-listing year are given the value of 0 and years following the cross-listing year the value of 1.
Firm size	is the log of the total assets.
Earnings surprise	is the value of difference between the current earnings per share and the prior year earnings per share, divided by the firm's current year stock price.
Earnings growth	is the average growth in annual earnings over the prior three years.
Earnings volatility	is the average earnings standard deviation of the annual earnings over the prior three years.
Debt/asset	or debt-to-asset ratio, is the ratio of total liabilities to total assets.
Industry controls	indicator variable for I/B/E/S industry classifications (broadly corresponds to the two-digit SIC codes).
Country controls	Indicator variable for the country of origin.

Research model 2

$$Tobin's\ Q = \beta 0 + \beta 1\ ADR + \beta 2\ PostADR + \beta 3\ Analysts\ coverage + \beta 4\ Forecast\ accuracy + \beta 5\ Firm\ size + \beta 6\ Profit + \beta 7\ Prior\ year\ return + \beta 8\ Board\ interlocks + \beta 9\ Board\ interlocks * Analyst\ coverage + \beta 10\ Board\ interlocks * Forecast\ accuracy + Industry\ controls + Country\ controls$$

where:

Tobin's Q	is defined as market value of equity plus the liquidity value of preferred stock plus short term liabilities minus short term assets plus book value of long term liabilities in the numerator and total assets in the denominator.
ADR	measures whether a company is cross-listed or not. Cross-listing firms are

	appointed the value of 1, where non cross-listing firms are distinguished by the value of 0.
PostADR	indicates the years preceding and following the cross-listing year. Years preceding the cross-listing year are given the value of 0 and years following the cross-listing year the value of 1.
Analyst coverage	is defined as the number of I/B/E/S analysts that report estimates about earnings per share for each firm.
Forecast accuracy	is defined as the negative of the absolute value of the analyst forecast error divided by stock price.
Firm size	is the log of the total assets.
Profit	is operating income deflated by total assets.
Prior year return	is the total stock return over the previous year.
Board interlocks	is the number of board interlocks between cross-listing firm and firms listed on the New York Stock Exchange (NYSE) and NASDAQ for both executive and non-executive board members.
Board interlocks*Analyst coverage	measures the interaction effect between board interlocks and analyst coverage.
Board interlocks*Forecast accuracy	measures the interaction effect between board interlocks and forecast accuracy.
Industry controls	indicator variable for I/B/E/S industry classifications (broadly corresponds to the two-digit SIC codes) .
Country controls	Indicator variable for the country of origin.

3.4 Data

In this research the dataset is constructed using a sample of European firms cross-listing in the U.S. When enlisted in the U.S. firms fall under regulation of the securities and exchange commission (SEC) and have to report in the U.S. using the U.S. GAAP accounting standard. Due to stringent legal and disclosure requirements the U.S. it is widely accepted that U.S. cross-listing provide unique gains (Doidge et al., 2004). Therefore, it is expected that changes in the information environment will be most prominent when enlisting in the U.S.

Firms can enlist on U.S. exchanges through American depository receipts (ADR's). Several categories of ADR's exist, as described in the following figure:

American depository receipt programs	
Level 1 DR progam	Over the counter market (OTC)
Level 2 DR program	Listed on American stock exchange
Level 3 DR program	Listed on stock exchange & public offering
Rule 144A	Private placements for qualified institutional buyers

Figure 1. American depository receipt programs

In this research level 2 and 3 DR programs are considered. Level 2 and 3 programs require the company to be listed on the NYSE or the NASDAQ stock market and comply to the SEC and U.S. GAAP requirements. The over the counter market (OTC) and placements under rule 144A fall outside the scope of this research as they do not require to comply to U.S. regulation.

The first step in constructing the dataset was to collect data about European firms that cross-list in the U.S. Initially, all available data about cross-listing firms without time restrictions was collected through the Bank of New York, J.P. Morgan and Citibank as firms enlist ADR's on U.S. stock exchanges through banks. In addition, data sources as the NASDAQ and DataStream were used. And as last, the dataset of Sarkissian & Schill (1998) was collected as it is available on his personal website[1]. After merging the data sources around 2200 cross-listing firms were identified including OTC listings and around 700 excluding OTC listings. However, the data sources were not uniform in the identification of the cross-listing company and cross-listing date. One reason for this problem was that firms can enlist multiple types of shares on multiple markets. Also, firm identity often changes due to mergers and acquisitions. To mitigate these problems the CRSP database was used which is available through WRDS. The CRSP database covers stock data on the NYSE and NASDAQ stock market and is known to be most accurate. Using the search function it was possible to identify when the first enlisting date took place of the European firms in the U.S. However, as company identity changes over time it was a time-consuming process. This included looking up information in DataStream to find out whether a company was enlisted earlier under another name and if performance data was available. Later on, the WRDS database was used to lookup company identity and cross-listing date much faster. Also, the dataset became restricted to the years 1997-2016 due to data availability of the BoardEx database. After identifying the right identities and cross-listing dates through the WRDS general search function and the CRSP database, data was collected on the forecast accuracy and analyst following through the I/B/E/S database. The summary history database of I/B/E/S was used to determine the analyst following by collecting data about the number of estimates provided by analysts on the earnings per share (hereafter: EPS) for the following fiscal year end. To determine forecast accuracy data was collected about the mean of the e stimations made by analysts and actual values of EPS. After collecting data about the information environment the BoardEx database was used to determine the number of board interlocks of each company. Through looking up the historical characteristics of the board it was possible to determine the board members at the time of cross-listing. For each board member (executive member & supervisory member) information was available about their current and past board positions and most importantly the start and end-date of those positions. To determine whether a board interlock existed during the cross-listing year three steps were taken. First of all, board positions were only taken into account that started a minimum of 1 year before the year of cross-listing. Then, the companies related to those board positions were

[1] http://www.sergei-sarkissian.com/data.html

compared to the Standards and Poor (S&P) constituents list collected from WRDS. The S&P constituents list consists of firms which have been enlisted on the NYSE and NASDAQ over all time. As last, if there was a match, it was determined whether the company was enlisted on the NYSE and NASDAQ during the cross-listing year using the CRSP database. After determining the board interlocks, data was collected about the performance of the cross-listing companies through DataStream. Also, I/B/E/S was used to collect data about the industry as the identify codes used in the data collection were all matched with the I/B/E/S database.

Data	**Source**
Collect ADR listings (and OTC)	Bank of New York Citibank J.P. Morgan NASDAQ Sarkissian and Schill (1998) DataStream
Identify/check enlisting date	CRSP DataStream WRDS
Collect performance data	DataStream
Collect data information environment	DataStream I/B/E/S
Board interlocks	BoardEx CRSP

Figure 2: Overview data collection

After collecting data about cross-listing firms it was also necessary to collect data about non cross-listing firms. Using this benchmark it is possible to determine whether cross-listing has indeed a positive effect on the information environment in relation to non cross-listing firms. The I/B/E/S database was used to collect data about all European firms that had data available through 1997-2016. All firms were selected that are headquartered in similar countries and operate in the similar industries as the cross-listing sample. The previous data collection steps were then repeated. After collecting all the data the sample consists of 42 cross-listing companies and 34 non cross-listing companies divided over 11 countries, and 18 industries (Appendix B).

Chapter 4 Results

This chapter provides the results of the analyses conducted on the constructed panel data. First of all, the descriptive statistics of the dataset are elaborated on and assumptions are tested. Then the results of the cross-listing on the information environment are described. After that findings about the influence of the information environment on Tobin's Q and the moderating effect of board interlocks are described.

4.1 Descriptive statistics

The descriptive statistics provide an overview of the panel data before testing the underlying assumption and running the regressions models. The descriptive statistics look as follows:

Variables		Mean	Median	Std. Dev.	Min	Max	Obs.
Non-cross listing companies							
Dependent/independent variables	Analysts following	6.939698	5	6.813266	1	27	199
	Forecast Accuracy	-.1132965	-.0121981	.5754714	-5.722222	0	198
Dependent variable	Tobin's Q	1.201569	1.003989	1.201816	-.2881718	8.741638	204
Moderating variable	Board interlocks	.9565217	0	2.016643	0	7	138
Control variables	Earnings surprise	.3311521	.0057971	4.174124	-6.066667	56.40198	195
	Firm size	13.39859	12.174	2.762989	9.251098	19.60076	204
	Earnings growth	-.8797205	.1942415	10.60675	-149.2394	2.979285	201
	Earnings volatility	6.119095	.2782257	25.71545	.0018856	226.7779	167
	Debt/assets	.5605023	.5688233	.2496717	.0741272	1.462286	204
	Prior year return	.1489955	.116334	.5964285	-.9615385	3.056974	200
	Profit	.0140187	.0365836	.1960294	-1.132508	.4233819	204
Cross-listing companies							
Dependent/independent variables	Analysts following	19.2875	18	10.88494	1	46	240
	Forecast Accuracy	-.0385089	-.0051212	.2905898	-3.306944	0	276
Dependent variable	Tobin's Q	1.737296	1.151793	1.607149	.0453228	10.88452	287
Moderating variable	Board interlocks	3.5	2	5.068063	0	25	252
Control variables	Earnings surprise	-1.08827	.003706	13.77482	-206.879	.2790698	230
	Firm size	16.593	16.40829	2.215705	10.73195	20.72841	248
	Earnings growth	.4240987	.1719876	12.90797	-176.6446	60.75	241
	Earnings volatility	1.263414	.2166292	4.275576	.0021602	39.37524	201
	Debt/assets	.6288868	.6102983	.247995	.0494564	1.340434	247
	Prior year return	.1738704	.0790637	.9309455	-.9780544	12.53874	244
	Profit	.0442735	.0485206	.1024874	-.4073708	.3171304	247

Total panel data							
Dependent/independent variables	Analysts following	247	11	11.11335	1	46	439
	Forecast Accuracy	-.0727866	-.0072274	.4454329	-5.722222	0	432
Dependent variables	Tobin's Q	1.493892	1.071608	1.460329	-.2881718	10.88452	449
Moderating variable	Board interlocks	2.6	1	4.414745	0	25	390
Control variables	Earnings surprise	-.4370055	.0044726	10.53347	-206.879	56.40198	425
	Firm size	15.15127	15.48055	2.942346	9.251098	20.72841	452
	Earnings growth	-.1688146	.1857343	11.92139	-176.6446	60.75	442
	Earnings volatility	3.466943	.2474129	17.74631	.0018856	226.7779	368
	Debt/assets	.5979545	.5924304	.2508033	.0494564	1.462286	451
	Prior year return	.1626655	.0889317	.7970826	-.9780544	12.53874	444
	Profit	.0305884	.0453403	.1526576	-1.132508	.4233819	451

Table 1: Descriptive statistics panel data

The descriptive statistics show some important insights which should be elaborated on. First of all, it seems that cross listing companies tend to have more analysts following, a higher forecast accuracy (closer to 0) and a higher Tobin's Q when looking at both mean and median. These results are in line with prior evidence (Lang et al., 2003; Doidge, 2004; Doidge et al., 2004). Also, cross-listing firms are larger in firm size in general with a mean of 16.593 in comparison with non cross-listing firms (mean of ~13.40), which is in line with previous research (Leuz, 2003; Lang et al., 2003). Another remark is that cross listing companies have more board interlocks in general (mean 3.5) than non-cross listing companies (mean below 1). This can, however, not be compared with previous research. It also seems appropriate to test for outliers as some variables show extreme minimum and max values relative to their median and mean (earnings surprise, earnings growth, earnings volatility, and prior year returns).

It is also important to check whether and how much the variables used in the analysis are correlated. A correlation matrix displays the correlation between all of the variables. Correlation indicates an association between two variables and can have a value between -1 and +1. Minus 1 and plus 1 indicate a perfect correlation between two variables in either a negative of positive sense (Field, 2013). For example, a correlation of 0.5 would mean that one variable would increase by 1, the other would increase by 0.5. The correlation matrix is useful for getting a rough idea of the relationships between predictors and the outcome variables, and for a preliminary look for multicollinearity (Field, 2013). High correlations between two predictor variables could then indicate a breach of the multicollinearity assumption. Therefore, the correlation matrix is scrutinized to find variables with high correlation. Correlation values represent a small effect when values are ±0.1, medium when ±0.3 and large when ±0.5 in line with Field (2013). The following tables show the correlation matrix for the separate panel data regressions conducted:

	Analyst following	ADR	PostADR	Earnings surprise	Earnings growth	Earnings volatility	Firm size	Debt/ asset ratio	Industry	Country	Common/ code law	Legal origin
Analyst following	1.0000											
ADR	0.5818	1.0000										
PostADR	0.2214	0.4984	1.0000									
Earnings surprise	-0.0948	-0.0619	-0.1177	1.0000								
Earnings growth	0.0339	0.0067	0.0677	-0.0035	1.0000							
Earnings volatility	-0.0071	-0.1375	-0.0521	-0.0041	0.0064	1.0000						
Firm size	0.5275	0.5497	0.2929	-0.0249	0.0322	0.0949	1.0000					
Debt/asset ratio	0.0864	0.1495	0.0482	-0.0404	0.0093	0.1782	0.5174	1.0000				
Industry	0.0878	-0.0286	-0.0158	-0.0915	0.0953	-0.1454	-0.1665	-0.3386	1.0000			
Country	-0.0683	0.3073	0.1368	0.0309	-0.0054	-0.1255	0.2540	0.1289	0.0926	1.0000		
Common/ code law	-0.0269	0.4331	0.2153	0.0292	0.0144	-0.1019	0.2424	0.0911	0.0053	0.6791	1.0000	
Legal origin	-0.1030	-0.3150	-0.1693	0.0234	-0.0747	-0.0151	-0.2077	-0.1784	0.0936	-0.1382	-0.6895	1.0000

Table 2: Correlation matrix: dependent variable is analyst following

Table 2 shows several medium and large effects correlations. First of all, ADR, the indication for cross-listing firms, is highly correlated with the dependent variable analyst following (.5818). This indicates that cross-listing has a positive association with the number of analyst following. Firm size shows also a large positive association with analyst following (.5275). Both associations are in line with prior literature (Leuz, 2003; Lang, Lins, and Miller, 2003). PostADR (.4984), the indication for the years in the panel after the cross-listing event, and firm size (.5497) both have a strong correlation with ADR. PostADR is logically highly correlated with ADR as indication for years after cross-listing can only happen when firms are actually cross-listed as indicated by ADR. Also, the an increase in firm size is highly associated with the probability to cross-list. Country (.3073), common/code law (.4331), and legal origin (-.3150) are all moderately correlation with ADR. However, these variables are at the nominal level. Therefore, these correlations are hard to interpret. In addition, common/code law is highly associated with country (.6791) and legal origin is highly associated with common/code law (-.6895). This could indicate a multicollinearity problem and is further explored in paragraph 4.2 data preparation. Another notable correlation is between the debt/asset ratio and firm size (.5174). This association would indicate that when firms are more financed by debt than equity in relation to total assets the firm size is probable to be higher. However, as the association is quite large there could be a multicollinearity problem. The last notable correlation is between industry and firm size (-.3386). However, industry is a nominal variable and difficult to interpret in terms of correlation.

A similar correlation matrix is run with forecast accuracy as the dependent variable. This correlation matrix is similar to table 2. The only difference is that this correlation matrix includes the correlations between the independent variables and forecast accuracy. However, only small effects are found between ±0.1.

	Tobin's Q	ADR	PostADR	Analyst following	Forecast accuracy	Firm size	Profit	Prior year return	Industry	Country	Common/ code law	Legal origin
Tobin's Q	1.0000											
ADR	0.1857	1.0000										
PostADR	0.0237	0.5544	1.0000									
Analyst following	0.1629	0.5723	0.2843	1.0000								
Forecast accuracy	0.1230	0.0839	0.0054	0.1423	1.0000							
Firm size	-0.1036	0.5327	0.3530	0.5563	0.1154	1.0000						
Profit	0.0440	0.0945	0.0436	0.1087	0.0258	0.0762	1.0000					
Prior year return	0.1011	0.0190	-0.0759	0.0564	0.0259	0.0584	0.1977	1.0000				
Industry	-0.0776	-0.0438	-0.0155	0.0690	-0.1183	-0.1687	0.1486	0.0357	1.0000			
Country	0.0076	0.2873	0.1295	-0.0970	-0.0802	0.1959	-0.0658	0.0047	0.0838	1.0000		
Common/ code law	0.0091	0.4397	0.2159	-0.0618	-0.1035	0.2054	-0.0322	-0.0115	-0.0262	0.6734	1.0000	
Legal origin	0.0345	-0.3321	-0.1841	-0.0853	0.0570	-0.2099	-0.0311	0.0006	0.1356	-0.1217	-0.6909	1.0000

Table 3: Correlation matrix: dependent variable is Tobin's Q

Table 3 shows the correlation matrix for the panel regression concerning firm valuation. Important findings are that no independent variable seems associated with Tobin's Q to a medium or large extent. This could mean that some variables that drive Tobin's Q are not included in the correlation matrix. Another important note is that forecast accuracy and analyst following are only associated to a small extent (.1423). This could mean that both variables measure different aspects of the information environment in line with the argument of Lang et al. (2003). Furthermore, the correlations between independent variables with medium and large effect in table 3 show similar results as in table 2. Two new variables are included in table 3 in comparison with table 2, which are profit and prior year return. However, both variables show only small associations with Tobin's Q or the other independent variables. This indicates that there are no multicollinearity problems, however, profit and prior year return are also only associated with Tobin's Q to a small extent.

4.2 Dataset preparation

In order to run appropriate analyses for the regressions on the information environment and firm valuation it is important to check whether the underlying assumptions regarding the data are met. Violated assumptions can have serious implications for the outcomes of the analyses. The analyses might then not reflect the true relations which exist in reality (Field, 2013). Therefore, the panel data is first checked for missing data and outliers. Then, it is determined what type of panel data regression is appropriate in this research. After that, relevant assumptions are tested, which are autocorrelation and heteroscedasticity, multicollinearity, and linearity and normality.

Missing data

First of all, it is examined if the data available consists of valid values. This is addressed by looking into the issue of missing data. It is assessed what the extent of missing data is and if it is ignorable. As a rule of thumb under the 10 percent for an individual case or observation can generally be ignored

(Hair, Black, Babin, & Anderson, 2010). By tabulating all variables the variables board interlocks and earnings volatility exceeded the percentage with 14,47% and 19,30% respectively (Appendix C). However, when looking for patterns in the missing values (Appendix C), it does not seem that there are clear patterns between variables predicting missing values. Therefore, no further procedures were performed.

Outliers

Second, it is important to look out for outliers in the dataset. Outliers are '*observations with a unique combination of characteristics identifiable as distinctly different from the other observations'* (Hair et al., 2010, p. 64).Outliers are typically unusually high or low value observations for a variable which make it stand out from the others. These 'extreme' values can have a considerable impact on the analyses performed. In the descriptive statistics it can be already seen that earnings surprise, earnings growth, earnings volatility and prior year return might includes some outliers. Testing all variables on outliers shows that earnings surprise, earnings growth, earnings volatility and prior year return indeed incorporate several extreme values, which can greatly influence the coefficient in relation to the dependent variable (Appendix D). Therefore, all those variables are winsorized at the 95 percentile to account for these outliers. Appendix D shows the results from winsorizing the variables.

Fixed effects or random effects model

Panel data regressions can be conducted using a fixed effect or random effect model. In general, an effect is said to be fixed if all possible treatment conditions that a researcher is interested in are present in the experiment (Field, 2013). Panel data includes data over time. This means, in relation to fixed effects, that fixed effects are time-invariant characteristics. All possible treatment conditions are thus present in the analysis. Fixed effect models control for these time-invariant characteristics to assess the net effect of predictor variables. An effect is said to be random if the experiment (or in this case the panel data regression) only contains a sample of all possible treatments or conditions (Field, 2013).

When using an fixed effect model it would thus be assumed that there are some time-invariant characteristics which act identical for each individual (in this case each firm) and that they should not be correlated with other individual characteristics. For the panel data regressions performed in this research this would mean that time-invariant variables as cross-listing or not (ADR), industry, and country effects would be omitted from the regressions. However, as the regression models assume that these time-invariant individual effects are correlated with the dependent variable, it is not appropriate to use a fixed effects model.

In addition to this rationale, the hausman test and the 'Breusch and Pagan Langrangian multiplier test for random effects' are performed to test whether a fixed or random effects model is appropriate for this research (Appendix E). Both tests assess the error-terms and the constants of each entity included

in the regression. Fixed effect models assume that each individual is different, and therefore, the error terms and the constants should not correlate with the others. When the probability/chi2 of the Hausman test is below .05 the test indicates that a fixed effect is appropriate. When the probability/chi2 of the Breusch and Pagan test is below .05 it indicates that a random effects model is more appropriate. Both tests indicate that an random effects model is best suited for the regressions with analyst following and Tobin's Q as dependent variable. However, the tests also indicate that a fixed effects model is appropriate for the regression with forecast accuracy as dependent variable. However, as explained above, a random effects model is used for this regression as this research assumes the time-invariant variables are correlated with the dependent variable.

Autocorrelation and heteroscedasticity

Another tests performed are that of autocorrelation and heteroscedasticy. The assumption of autocorrelation test whether the standard errors are biased due to serial correlation which can cause the results to be less efficient (Drukker, 2003). The assumption of homoscedascity is related to the dependence relation between variables. It assumes that the dependent variable exhibits equal levels of variance across the range of predictor variables (Hair et al., 2010). If this dispersion is unequal the relationship is said to be heteroscedastic. As a result of heteroscedasticity predictions can be better at some levels of the independent variables than others. This can make the hypothesis tests either too stringent or too insensitive. In relation to autocorrelation and heteroscedasticity two tests are conducted (Appendix F). Both tests indicate no autocorrelation or heteroscedasticity for the regression between analyst following and the independent variables, but find autocorrelation and heteroscedasticity for the regressions with forecast accuracy as dependent variable and Tobin's Q as dependent variable. Therefore, the option vce(cluster 'firm identity') in stata is used in the latter two models. The vce() option specifies how to estimate the variance–covariance matrix (VCE) corresponding to the parameter estimates. The vce(cluster) variant produces an estimator of the VCE that is robust to cross-sectional heteroskedasticity and within-panel (serial correlation) (Hoechle, 2007).

Multicollinearity

Another important aspect is to assess whether the assumption of mulicollinearity is violated. Multicollinearity measures the correlation among the independent variables (Hair et al., 2010). Ideally, the independent are highly correlated with the dependent variable and not among themselves. Multicollinearity is measured through the variance inflation factor (VIF). A common cutoff threshold for VIF is 10, or 1/VIF is 0.10. If the VIF values become higher than 10 or 1/VIF lower than 0.10 the degree of collinearity becomes unacceptable. Appendix G provides an overview of the multicollinearity test among independent variables. It seems that firm size (1/VIF 0.077714) and the

debt/asset ratio (1/VIF 0.098174) are problematically correlated. Therefore, it might be better to leave either firm size or the debt/asset ratio out of the regression.

Normality

The assumption of normality is an important to assess in research using regression (Field, 2013). Linear models assume that errors in the model are normally distributed. Normal distribution refers then to the shape of the error distribution for individual metric variables in relation to the model (Hair et al., 2010; Field, 2013). It is assumed that the residuals in the model are random, normally distributed variables with a mean of 0 (Field, 2013). The violation of normality can have severe consequences for the statistical tests as normality is required to use the F and t statistics (Hair et al., 2010). However, larger sample sizes reduce the detrimental effects of non-normality by increasing statistical power through reduced sampling error (Hair et al., 2013). Normality is tested by examining the z-values of the kurtosis and skewness values for each research model conducted in this research (Appendix H). All three models show significant positive kurtosis values of the error terms. Additionally, the independent variables were examined separately for normality using probability-probability plots (P-P plots). P-Plots are graphical reproductions of the cumulative probability of a variable against the cumulative probability of a normal distribution (Field, 2013). The P-Plots indicate positive kurtosis (steepness) the variables earnings surprise, earnings growth, forecast accuracy and prior year return and negative kurtosis (flat distribution) for earnings volatility, analyst, and board interlocks (Appendix H). However, both Field (2013) and Hair et al. (2010) state that the effects may be neglectable if the sample size includes 200 or more observations. In this research the number observations per variable is at least 340. In addition, non normality could be of concern when it has impact on other assumptions as homoscedasticity. However, tests conducted in relation to homoscedasticity show no problematic results. Therefore, it is concluded that non normality is of less concern. Thus, no data transformations are performed related to non normality.

Linearity

The assumption of linearity assumes that the mean values of the outcome variable lie along a straight line for each additional value of the predictor variable (Field, 2013). This assumption is important for linear models as correlations represent only the linear associations of variables (Hair et al., 2010). This means that non-linear effects are not measured in the model. If non-linear relationships are included in a linear model, the results will be an underestimation of the actual strength of the relationship (Hair et al., 2010) and limit the generalizability of the findings (Field, 2013). To identify nonlinear relationships partial residual plots are examined. A partial residual plot is a graphical reproduction of the relationship between the residuals of the independent variable and a predictor variable. This graph shows a smoothed line for the residuals which can be compared to the ordinary regression line. This

method is conducted for all the predictor variables in the research models. No clear non-linear patterns are found. Therefore, it is concluded that the linearity assumption is met.

4.3 Panel data regression: information environment

In this paragraph the results of the panel data analyses on both analysts following and forecast accuracy are provided.

Table 4 Random effect panel regression: dependent variable = Analysts following

Research model 1	**Random effects panel regression: dependent variable = analyst following**			**Testing robustness due to multicollinearity**	
Model	**1**	**2**	**3**	**4**	**5**
Constant	6.828539*** (0.000)	-11.69768 (0.282)	-11.7385 (0.245)	-17.81872* (0.073)	21.95233*** (0.007)
ADR	13.01344*** (0.000)		10.16358*** (0.000)	9.938033*** (0.000)	15.02999*** (0.000)
Post ADR	-1.689454*** (0.009)		-3.093505*** (0.000)	-3.071429*** (0.000)	-2.260963*** (0.002)
Firm size		2.289608*** (0.000)	1.892801*** (0.000)	1.834898*** (0.000)	
Earnings surprise		6.564986 (0.242)	6.082939 (0.260)	5.467847 (0.318)	5.664652 (0.299)
Earnings growth		.5067157 (0.138)	.3569045 (0.277)	.4259155 (0.200)	.4503027 (0.177)
Earnings volatility		-.1171355 (0.477)	-.0210153 (0.892)	-.0295282 (0.851)	-.0261973 (0.872)
Debt/asset ratio		-7.103865*** (0.005)	-7.405702*** (0.002)		-7.261381*** (0.004)
Industry controls		Included	Included	Included	Included
Country controls		Included	Included	Included	Included
Overall R-squared	0.3084	0.6309	0.6965	0.6900	0.6343
N	439	343	343	343	343

*All models are panel data random effects (RE) regression models. Model 1 includes the variables of interest, namely whether the firms are cross-listed or not (ADR) and whether the years after cross-listing (PostADR) have any correlation with the information environment (in this case analyst following). Model 2 includes all control variables: firm size, earnings surprise, earnings growth, earnings volatility, debt/asset ratio, industry controls, an d country controls. Model 3 includes all variables used in this research model: ADR, PostADR and all control variables included in model 2. Model 4 & 5 leave either firm size or the debt/asset ratio out of the regression to test for robustness as assumption testing showed the both independent variables are highly correlated. Significance is indicated with stars, which indicate the following significance levels: *=10%, **=5%, and ***=1% significance. Both industry and country controls are included in model 2, 3, 4 and 5. However, as these variables take a lot of space in the table it is decided to not report them in the table to keep a clear overview.*

The panel data regressions conducted has an explanatory power of 69,65% in model 3 which includes all variables. This means that the independent variables explain 69,65% of the variation of the dependent variable analyst following. Both cross-listing (ADR) and the post cross-listing years (PostADR) show robust results over all models at a significant level of 1%. Cross-listing companies have on average 10.16 more analysts following the company when all control variables are included (model 3). If controlling for either firm size or debt/asset ratio the relation between cross-listing and analyst following changes to 9.94 or 15.03 respectively. This means that not only the decision to

cross-list or not influences the analyst following independently, but that the decision to cross-list also correlates with the firm size and how the firm is financed (debt/asset ratio). Firm size is indeed found to be highly significant at the 1% level and has a positive effect on analyst following of 1.89 in model 3. In short, larger firms have on average more analyst following. The debt/asset ratio negatively correlates with analyst following (-7.41, model 3) at the 1% level. This means that when firms are more financed by debt relative to equity firms are less likely to be followed by analysts. Another interesting finding is that the years after cross-listing (PostADR) are negatively correlated with analyst following with an amount of -3.09 at the 1% significance level (model 3). This means the amount of analyst following actually decreases after cross-listing. This is an important finding as it indicates that the effect of cross-listing on the amount of analysts following mainly precedes the cross-listing year rather than after. The control variables concerning earnings surprise, earnings growth, and earnings volatility are not found to be significant in either of the models. The hypothesis concerning analysts following is as follows:

Hypothesis 1a: Cross-listing has a positive effect on analysts following

As the results show a robust significant positive effect for cross listing (ADR), this hypothesis is not rejected. However, this effect seems primarily to take place the years before cross-listing.

Table 5 Random effect panel regression: dependent variable = forecast accuracy

Research model 1	**Random effects panel regression: dependent variable = forecast accuracy**			**Testing robustness due to multicollinearity**	
Model	**1**	**2**	**3**	**4**	**5**
Constant	-.112513*** (0.054)	-.2728952 (0.360)	-.2351599 (0.475)	-.5769556 (0.126)	.5020486** (0.030)
ADR	.1035424* (0.077)		.0746561 (0.296)	.0760998 (0.185)	.1857838** (0.040)
Post ADR	-.0627334 (0.137)		-.0615378 (0.179)	-.0520588 (0.288)	-.0439454 (0.308)
Firm size		.0486699** (0.031)	.0444543* (0.056)	.0306441* (0.082)	
Earnings surprise		.3290709 (0.584)	.3198749 (0.589)	.2822003 (0.673)	.272784 (0.654)
Earnings growth		.064594 (0.261)	.0621745 (0.280)	.0612165 (0.286)	.0637895 (0.274)
Earnings volatility		-.0071324 (0.480)	-.0059836 (0.556)	-.0090476 (0.400)	-.0064145 (0.532)
Debt/asset ratio		-.6207636** (0.014)	-.6232717** (0.013)		-.5573186** (0.015)
Industry controls		Included	Included	Included	Included
Country controls		Included	Included	Included	Included
Overall R-squared	0.0094	0.3368	0.3403	0.3058	0.3279
N	432	343	343	343	343

All models are panel data random effects (RE) regression models corrected for autocorrelation and heteroscedasticy using the option vce(cluster) in stata. Model 1 includes the variables of interest, namely whether the firms are cross-listed or not (ADR) and whether the

*years after cross-listing (PostADR) have any correlation with the information environment (in this case forecast accuracy). Model 2 includes all control variables: firm size, earnings surprise, earnings growth, earnings volatility, debt/asset ratio, industry controls, an d country controls. Model 3 includes all variables used in this research model: ADR, PostADR and all control variables included in model 2. Model 4 & 5 leave either firm size or the debt/asset ratio out of the regression to test for robustness as assumption testing showed the both independent variables are highly correlated. Significance is indicated with stars, which indicate the following significance levels: *=10%, **=5%, and ***=1% significance. Both industry and country controls are included in model 2, 3, 4 and 5. However, as these variables take a lot of space in the table it is decided to not report them in the table to keep a clear overview.*

Table 2 provides the results of the panel data regression with forecast accuracy as dependent variable. Both independent variables of interest (ADR and PostADR) have an insignificant relation with forecast accuracy. Meaning that the decision to cross-list (and the years after cross-listing) have no significant impact on forecast accuracy. The variable ADR (which identifies cross-listing firms) is significant at the 10% confidence level in model 1 and significant at the 5% confidence level in model 5. However, model 2 and 3 show insignificant results. Therefore, the effect of cross-listing is not robust. A reason for the differences between the models might be found in the correlation with the control variable firm size. The correlation matrix (table 2) showed that firm size is highly correlated with ADR (0.5497). Firm size is found to be significantly correlated with forecast accuracy at the 5% confidence level in model 2, and at the 10% confidence level in model 3 and 4. When firm size is included in the regression (model 2, 3, and 4), the significance level of ADR drops. When firm size is excluded (model 1 and 5) ADR is found to be significant. Therefore, it is probable that firm size substitutes at least partial the effect of cross-listing on forecast accuracy. The debt/asset ratio shows robust results at the 5% significant level in model 2, 3 and 5. The debt/asset ratio is negatively correlated with forecast accuracy with an amount of -.6232717 in model 3 including all variables of the research model. This means that when a firm is more financed by debt in relation to equity the forecast accuracy drops to quite a large extent. No significant results are found for earnings surprise, earnings growth, and earnings volatility The hypothesis related to forecast accuracy is as follows:

Hypothesis 1b: Cross-listing has a positive effect on forecast accuracy

As the results show a no robust significant results for cross listing (ADR) this hypothesis is rejected. Cross listing is thus not found to have an significant positive effect on forecast accuracy.

4.4 Panel data regression: firm performance & board interlocks

In this paragraph the relation between the information environment and firm performance, measured by Tobin's Q, is assessed. Board interlocks is included as moderating variable, hypothesized to have a negative effect on Tobin's Q.

Table 6 Random effect panel regression: dependent variable = Tobin's Q

Research model 2	**Random effects panel regression: dependent variable = Tobin's Q**						
Model	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Constant	1.077562*** (0.000)	1.227144*** (0.000)	1.101459*** (0.000)	4.255137** (0.049)	4.597863* (0.063)	4.473326* (0.063)	4.617164** (0.064)
ADR	.4616416 (0.123)	.6913096** (0.015)	.461679 (0.121)	1.3102*** (0.005)	1.181773*** (0.008)	1.211897*** (0.009)	1.17319*** (0.009)
Post ADR	-.344322* (0.055)	-.3466627* (0.053)	-.3216549* (0.078)	-.1174675 (0.522)	-.1337346 (0.493)	-.1394821 (0.470)	-.1374538 (0.482)
Analyst following	.0191092 (0.130)		.0178086 (0.164)	.0274277** (0.045)	.025454 (0.180)	.0207276 (0.128)	.0256132 (0.180)
Forecast accuracy		.1669525*** (0.000)	.1368156*** (0.000)	.1430146*** (0.000)	.1503943*** (0.000)	.1839995*** (0.000)	.1796614*** (0.000)
Firm size				-.2584431** (0.026)	-.3057286* (0.053)	-.2968491* (0.051)	-.3071231* (0.054)
Profit				.1880668 (0.676)	-.0367568 (0.927)	-.0431304 (0.913)	-.0348388 (0.931)
Prior year return				.489916*** (0.000)	.3092576*** (0.007)	.3108854*** (0.007)	.3139345*** (0.007)
Board interlocks					.0023519 (0.966)	-.0308401 (0.421)	.0008796 (0.989)
Board interlock * analyst following					-.0013843 (0.413)		-.0013325 (0.426)
Board interlock * forecast accuracy						-.0396059 (0.119)	-.0367753 (0.122)
Industry controls				Included	Included	Included	Included
Country controls				Included	Included	Included	Included
Overall R-squared	0.0450	0.0483	0.0504	0.3106	0.3706	0.3650	0.3706
N	437	431	431	422	362	370	362

*All models are panel data random effects (RE) regression model corrected for autocorrelation and heteroscedasticy using the option vce(cluster) in stata. Model 1-3 include the independent variables of interest ADR (cross-listing or not), PostADR (indication of the years after cross-listing), analyst following, and forecast accuracy. Model 1 and 2 separately include analyst following and forecast accuracy as analyst following and forecast accuracy both proxy the information environment. Then in model 3 both independent variables are included to see if one substitutes for the other. Model 4 incorporates all variables of the research model excluding the moderator variable board interlocks and the interaction effects. Model 5 additionally includes the board interlocks and the interaction effect with analyst following. Both interaction effects are first modeled separately before putting them together in the model to check for robustness. Model 6 then includes the interaction effect of board interlocks and forecast accuracy instead of board interlocks and analyst following. Model 7 includes all variables of the research model including the interaction effects. Significance is indicated with stars, which indicate the following significance levels: *=10%, **=5%, and ***=1% significance. Both industry and country controls are included in model 4, 5, 6, and 7. However, as these variables take a lot of space in the table it is decided to not report them in the table to keep a clear overview. Note: a model including the control variables only is excluded from table 6 as the table would then not fit on the page. The control variables together have an R-square of .156, furthermore the coefficients and significance levels are similar to model 4.*

Table 6 shows a highly significant positive association between ADR and Tobin's Q in model 4-7 which include the control variables. This means that cross-listing firms have a higher firm valuation than non cross-listing firms. The variable PostADR suggests that the positive firm valuations are more

pronounced at the period before cross-listing than after. However, this association is not significant in model 4-7 including the control variables. These results are thus not robust. Also, a positive effect of analyst following on Tobin's Q is found. However, this association is only significant at the 5% level in model 4 which excludes board interlocks and the interaction effects. Also, in model 1 and 2 no significant results are found, which exclude the control variables. The association between analyst following and Tobin's Q is therefore not robust. These results are not in line with prior evidence (Lang et al., 2003, 2004) which suggest a significant positive effect of analyst coverage on Tobin's Q using a cross-sectional analysis. Forecast accuracy shows a robust and highly significant positive effect on Tobin's Q. This means that an increased forecast accuracy leads to a higher firm valuation. Control variables firm size and prior year return both show robust significant correlations with Tobin's Q. Firm size has a negative relation of -.307 (model 7), which means that larger firms have on average a lower Tobin's Q than smaller firms. Prior year return shows a positive relation of .313 (model 7) with Tobin's Q, which means that a higher return in the preceding year leads to a higher Tobin's Q in the current year. Profit does not show any significant correlations with Tobin's Q in either model. Another important finding is that board interlocks show no significant correlation with either Tobin's Q or interaction effects with the information environment (forecast accuracy and analyst following). Therefore, the following conclusions can be drawn about the following hypotheses:

Hypothesis 2: Quality of the information environment has a positive effect on firm valuation

Which is answered by addressing the following two hypotheses:

Hypothesis 2a: Analyst following has a positive effect on firm valuation

Analyst following shows positive correlations with Tobin's Q. However, hypothesis 2a must be rejected as these results are insignificant.

Hypothesis 2b Forecast accuracy has a positive effect on firm valuation

Forecast accuracy shows significant positive correlations with Tobin's Q. Therefore hypothesis 2b is confirmed.

Hypothesis 3: Board interlocks negatively moderate the effect of the information environment on firm valuation

Which is answered by the following two hypotheses:

Hypothesis 3a: Board interlocks negatively moderates the effect of analyst following on firm valuation

The interaction effect of board interlocks with analyst following shows indeed a negative effect. However, this effect is not significant and also not robust. Therefore, hypothesis 3a is rejected. Hypothesis 3a is thus not confirmed.

Hypothesis 3b: Board interlocks negatively moderates the effect of forecast accuracy on firm valuation

The interaction effect of board interlocks with forecast accuracy is used to determined the moderating effect of board interlocks of the relation between forecast accuracy and firm valuation. The interaction effect shows indeed a negative relation. However, these results are insignificant and not robust. Therefore, hypothesis 3b is rejected. Hypothesis 3b is not confirmed.

Chapter 5 Conclusion

5.1 Conclusion

This thesis studies the phenomenon of cross-listing. Meaning the listing of stock on multiple exchanges. The effects of cross-listing are examined in relation to the information environment and firm valuation for a sample of European firms cross-listing in the U.S. between 1997-2014. In addition, the relation between the information environment and firm valuation is examined in light of board interlocks, which finds its theoretical ground in social theory.

First of all, the relation between cross-listing and the information environment is examined. The information environment is measured by two proxy variables: analyst following and forecast accuracy. Therefore, two regressions are conducted with each of the proxies as dependent variable. Results show that cross-listing companies have on average 10.16 more analyst following the company than companies that do not cross-list. However, the amount of analyst following decreases over the three years following cross-listing by -3.09 on average. The cross-listing effect on analyst following thus primarily takes place in the three years preceding cross-listing. The results for the regression with forecast accuracy as dependent variable show a positive association between cross-listing and forecast accuracy. However, the results are not robust for the various models included in the regression. Therefore, it cannot be concluded that cross-listing has a significant correlation with forecast accuracy. Overall, the results show that cross-listing only partially improves the information environment through analyst following.

Second, the relation between the information environment and firm value is examined. Firm value is measured using Tobin's Q, which measures the market value of the company relative to the replacement value of its assets. Cross-listing is included in the model to distinguish between cross-listing and non cross-listing firms and show a significant positive association with firm value. Cross-listing therefore positively affects firm value. Analyst following is found to positively affect Tobin's Q, however this effect is not significant. For forecast accuracy significant positive results are found. The information environment is thus found to partially positively affect firm valuation as hypothesized through forecast accuracy.

Board interlocks were hypothesized to negatively influence the effect of the information environment on firm valuation. The results show indeed a negative association with the information proxies. However, the results are not significant. Therefore, the hypothesis is not confirmed.

Overall, the hypothesized relations could only be partially confirmed. This thesis finds evidence for the positive effect of cross-listing on analyst following and a positive effect on firm valuation of forecast accuracy. No significant results are found for the hypothesized moderating effect of board interlocks.

5.2 Discussion

The results of the analyses conducted confirm some of the expected relations. However, the results also show several deviations from the hypothesized relations formulated based on existing literature. First of all, cross-listing is found to have a positive association with both analyst following and forecast accuracy. The positive associating between cross-listing and analyst following is in line with the investor recognition theory, which states that cross-listing increases the visibility of the company. The positive association between cross-listing and forecast accuracy is predicted by the legal bonding and information disclosure theory which state that the information asymmetry between management and investor (or analyst) is reduced, which would lead to better earnings forecasts. However, the results relating to forecast accuracy or not significant or robust. This is not in line with previous empirical evidence which suggests that there are significant positive relations between cross-listing and forecast accuracy (Lang et al. 2003). A reason for these results might be found in the high correlation in the research model between the control variable firm size and cross-listing. When firm size is included in the model, the effect of cross-listing on forecast accuracy becomes insignificant. Firm size was not included in the model by Lang et al. (2003). This could indicate that cross-listing does improve the forecast accuracy, but that this effect is less pronounced for larger firms. This might be caused by the increased complexity of forecasting earnings as firms are larger in size (and business). Another reason could related to the years included in the sample. This research includes data about cross-listing firms between 1997-2014, where Lang et al. (2003) only includes firms cross-listing in the year 1996. Various developments have taken place after 1996 as an increased digitalization, an increase in the globalization of accounting standards (IFRS), and the Sarbanes-Oxley Act which might influence the information environment as a whole. For example, the information environment of European firms might have increased in quality relative to the U.S. which makes the increase in forecast accuracy less pronounced. Another finding is that both proxies of the information environment show a positive association with Tobin's Q. This is also in line with theory which suggests that an increase in the quality of the information environment improves the firm valuation. However, only forecast accuracy is found to be significant. This is not in line with previous empirical evidence as Baker et al. (2002), Lang et al. (2003, 2004), and Leuz (2003) suggest that analyst following has a significant effect on firm valuation. A link might be found in the previous results between cross-listing and forecast accuracy. Cross-listing does significantly improve the amount of analyst that follow the company, but this doesn't mean that it involves a reduced information asymmetry between managers and investors or better earnings forecasts. This research showed that no significant relation was found between cross-listing and forecast accuracy. Therefore, an increased amount of analysts is not found to significantly translate to better information about the firm. The relation between board interlocks and the firm environment is found to be negative which is in line with hypothesized relation. However, the moderated effect of board interlocks was not found to be significant. This suggests that board interlocks do negatively affect the value gains of the information

environment through cross-listing, however this effect is minimal. Reasons might be that board members are not as effective conduits for dispersing corporate governance practices as suggested in the academic literature or that the amount of analyst following and forecast accuracy is only limited dependent on the corporate governance practices prior to cross-listing. Another reason could be that the differences in corporate governance between firms from the developed European markets and the U.S. are not that great for board interlocks to be of significant effect.

5.3 Limitations & future research

The research conducted in this thesis knows several limitations which should be addressed. First of all, the information environment is a central concept for the theory and research models used in this thesis. However, the information environment is not directly measurable, and therefore the proxy variables analyst following and forecast accuracy are used. This research shows that both proxies show different effects. It can thus be argued that both proxies measure a different element of the information environment. Future research could adopt alternative proxies for the information environment to explore the effects of cross-listing on the information environment and the information environment on firm valuation. The interaction effect of board interlocks on the information environment greatly depends how the information environment is measured. Future research might therefore also incorporate board interlocks in their model when addressing different proxies for the information environment. Another limitation is that a relative small sample is used in this research. Therefore, different results might be found when examining a larger sample. The sample is also limited to firms from European countries which have developed markets and a relative high quality information environment. The effects of board interlocks might be more pronounced for firms from emerging markets with less developed information environments. Thus, future research could examine the effect of board interlocks on the relation between the information environment and firm value for firms from emerging markets. And as last, it could also be the case that board interlocks determine the decision to cross-list to a great extent. Cross-listing could than follow already existing information flows (through board interlocks) or other strategic considerations rather than a strategy to increase the quality of the information environment or firm valuation. Future research could therefore also examine whether board interlocks has a significant influence on the choice of cross-listing rather than the outcomes.

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Appendix A

Cross-listing motives	**Implications**
Traditional wisdom	
Market segmentation theory	Markets are segmented due to investment barriers. Cross-listing in a foreign market reduces investment barriers through an increased shareholder base and risk sharing and thus reduces the cost of capital.
Liquidity theory	Cross-listing improves stock liquidity. Improved stock liquidity translates into lower cost of equity capital and higher stock valuation.
Information environment	
Investor recognition theory	Cross-listing increases the (foreign) investor base which results in higher valuation of the firm through lower firm specific risk, and increased benefits in relation to firms which are less known by investors.
Information disclosure theory	Cross-listing in a country which is associated with additional mandatory disclosure requirements (in the financial statements) signals to investors that the organization is of high quality and a reduced information asymmetry between managers and investors can be expected, which leads to improved firm value.
Legal bonding theory	Cross-listing in a country which has a tougher legal, regulatory and capital market environment improves the corporate governance system of the firm in question. This reduces the cost of capital as the information asymmetry between management and investors reduces and external monitoring increases.
Information flows	
Proximity preference theory	Geographical, cultural, economic, and industrial proximity between the home and host countries are important determinants for cross-listing destination choices.
Business strategy theory	The decision to cross-list is based on firm-specific factors. Hence, the valuation effects of cross-listing are determined by firm-specific factors. Important indicators are growth of the firm, type of industry and export-orientation.

Appendix B

Cross-listing companies

Country of Origin	N	Industry	N	Industry	N	Cross-listing year	N
Belgium	2	Energy Sources	2	Chemicals	1	1997	3
France	3	Utilities	3	Broadcast & publication	4	1998	5
Germany	4	Telecommunications	4	Insurance	3	1999	3
Greece	1	Business and public services	2	Hea Multi-industry	1	2000	11
Italy	2	Banking	5	Merchandising	1	2001	8
Netherlands	3	Health Care	7	BAS Multi-industry	1	2002	2
Norway	2	Electronic Component Distributors	1	Machinery & Engineering	1	2003	2
Spain	3	Food & Household	3	Beverages & Tobacco	1	2005	1
Sweden	1	Electrical and Electronic engineering	1	Energy Equipment	1	2009	2
Switzerland	4					2010	1
U.K.	17					2011	2
						2014	2
	42				**42**		**42**

Non cross-listing companies

Country of origin	N	Industry	N	Industry	N	Base year	N
Belgium	1	Energy Sources	2	Chemicals	2	1998	2
France	4	Telecommunications	1	Broadcast & publication	2	2001	3
Germany	6	Business and public services	4	Insurance	2	2003	4
Greece	5	Banking	3	Merchandising	1	2004	2
Italy	3	Health Care	4	BAS Multi-industry	2	2005	9
Netherlands	2	Electronic Component Distributors	2	Machinery & Engineering	1	2009	4
Norway	1	Food & Household	3	Energy Equipment	4	2010	2
Spain	2	Electrical and Electronic engineering	1			2011	3
Sweden	6					2012	5
Switzerland	3						
U.K.	1						
	34				**34**		**34**

Appendix C

Variable	Missing	Total	Percent Missing
tobq	7	456	1.54
analyst	17	456	3.73
forecast	24	456	5.26
size	4	456	0.88
earnsur	31	456	6.80
earngrowth	14	456	3.07
earnstd	88	456	19.30
profit	5	456	1.10
pyreturn	12	456	2.63
boardlock	66	456	14.47

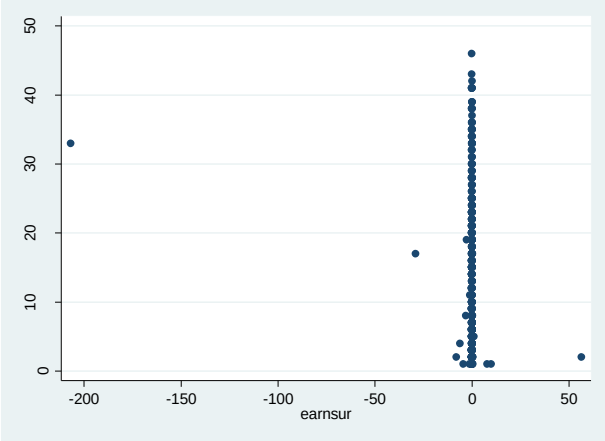
Figure 1: Overview variables with missing values

Missing for which variables?	Freq.	Percent	Cum.
12345 _789_	2	0.44	0.44
12345 __8__	1	0.22	0.66
123_5 67_9_	2	0.44	1.10
1_345 _7___	1	0.22	1.32
1____ 6____	1	0.22	1.54
_23_5 6____	1	0.22	1.75
_23_5 _7__0	1	0.22	1.97
_23_5 _7___	3	0.66	2.63
_23_5 ____0	4	0.88	3.51
_23_5 _____	3	0.66	4.17
__3_5 67___	1	0.22	4.39
__3_5 _7___	2	0.44	4.82
__3_5 _____	3	0.66	5.48
____5 67_9_	1	0.22	5.70
____5 __89_	1	0.22	5.92
____5 ____0	3	0.66	6.58
____5 _____	2	0.44	7.02
_____ 67___	2	0.44	7.46
_____ 6__90	1	0.22	7.68
_____ 6____	5	1.10	8.77
_____ _78__	1	0.22	8.99
_____ _7__0	11	2.41	11.40
_____ _7___	61	13.38	24.78
_____ ___9_	5	1.10	25.88
_____ ____0	46	10.09	35.96
_____ _____	292	64.04	100.00
Total	456	100.00	

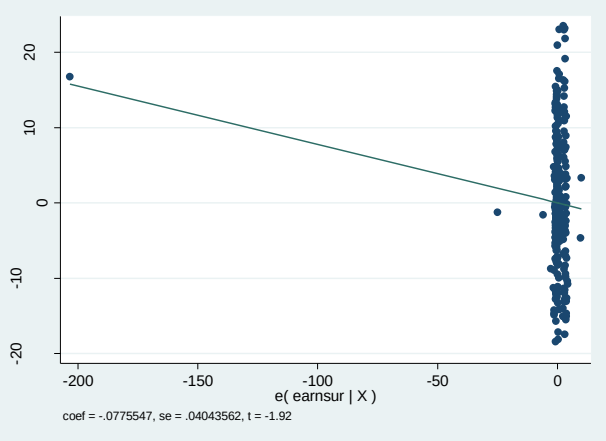
Figure 2: Missing patterns

Appendix D

Scatterplots earnings surprise

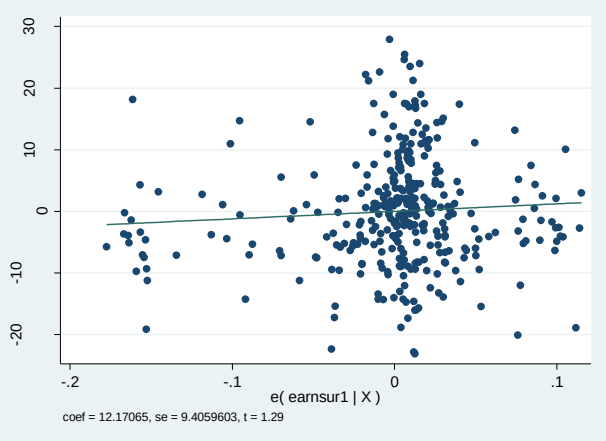


Scatterplot analyst following - earnings surprise



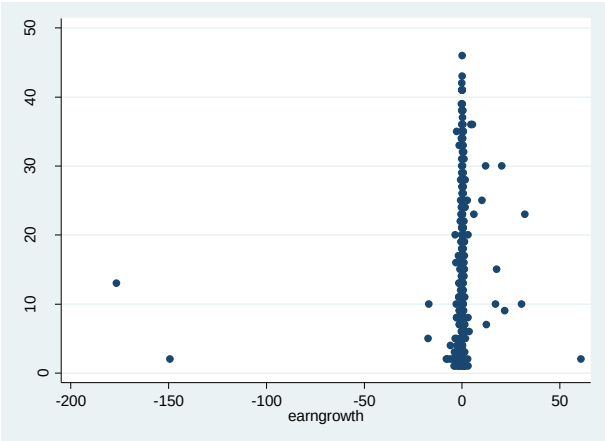
Avplot analyst following – earnings surprise

Scatterplot after winsorizing - earning surprise

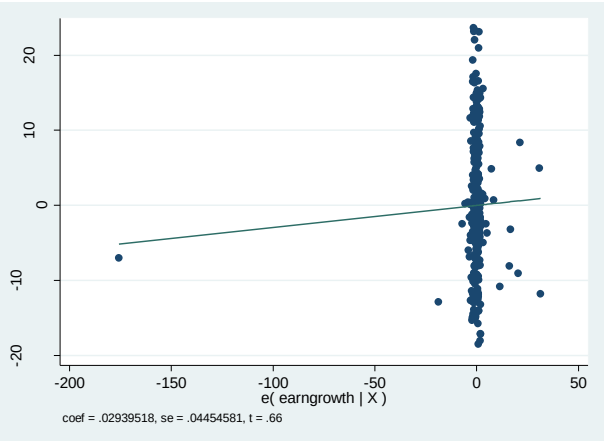


Avplot after winsorizing - earnings surprise

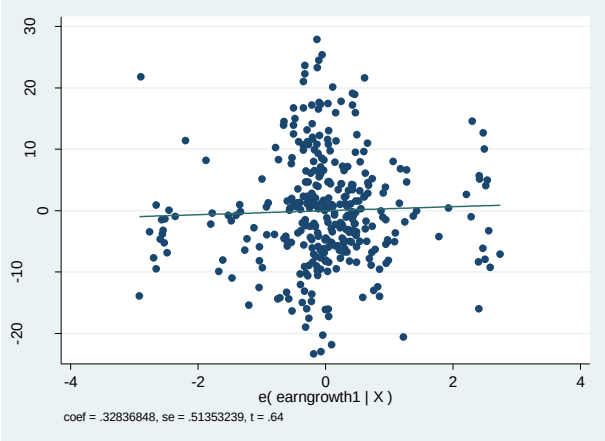
Scatterplots earnings growth



Scatterplot analyst following – earnings growth

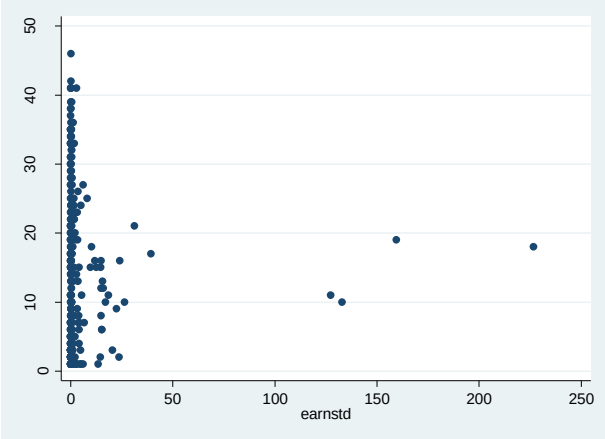


Avplot analyst following – earnings growth

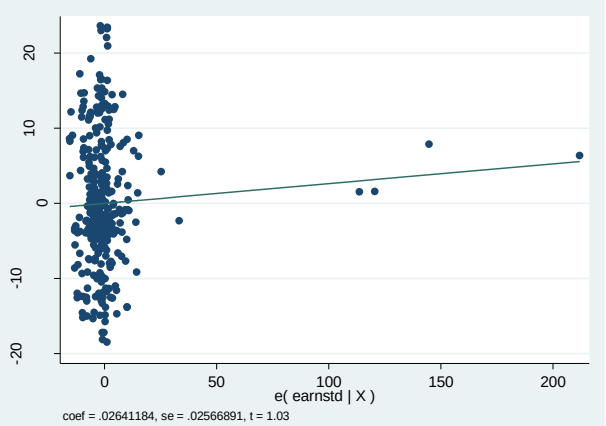


Avplot after winsorizing - earnings growth

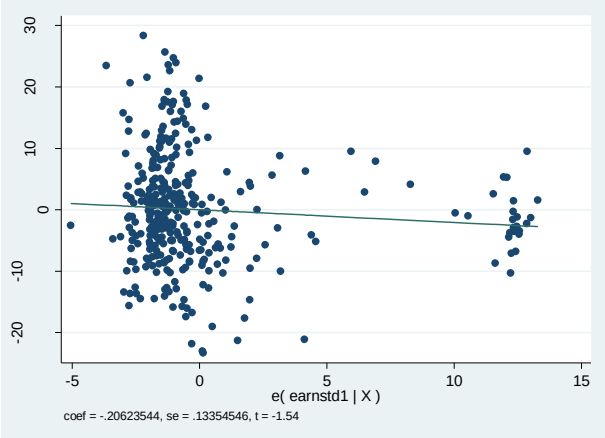
Scatterplots earnings volatility



Scatterplot analyst following – earnings volatility

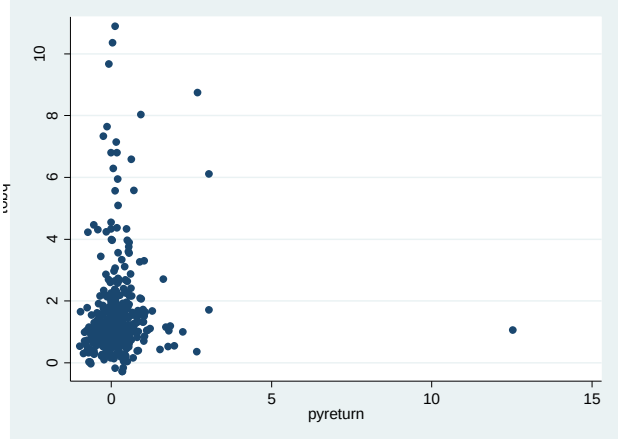


Avplot analyst following – earnings volatility

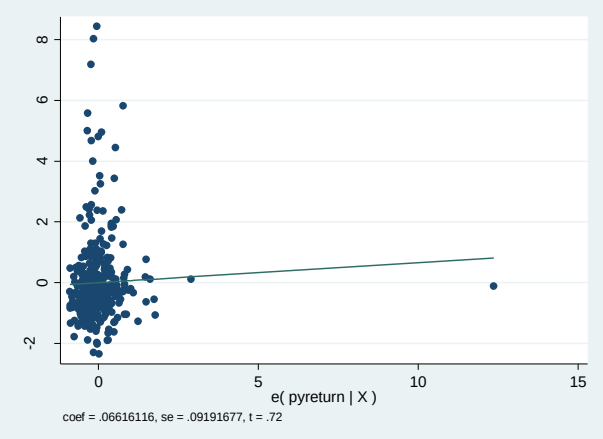


Avplot after winsorizing - earnings volatility

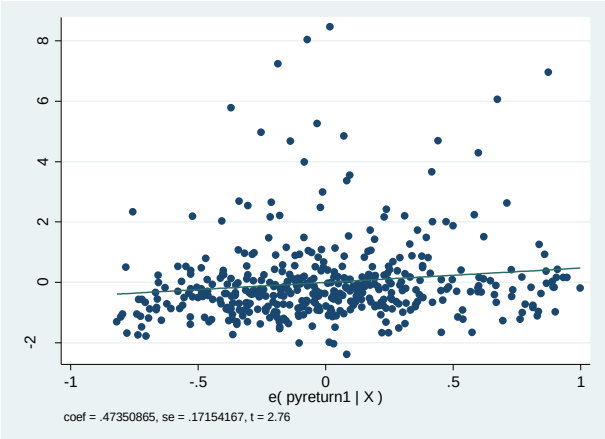
Scatterplot Prior year returns



Scatterplot Tobin's Q – prior year return



Avplot Tobin's Q – prior year return



Avplot after winsorizing – prior year return

Appendix E

```
. hausman fe re, sigmamore
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
postadr	-2.909023	-3.093505	.1844824	.2657869
size	1.537804	1.892801	-.3549971	.541961
earnsur1	5.110005	6.082939	-.9729347	.8855432
earngrowth1	.3795336	.3569045	.0226291	.0978157
earnstd1	-.0146258	-.0210153	.0063894	.098635
debtasset	-8.307117	-7.405702	-.9014151	1.397417

```
                b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

              chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        3.63
            Prob>chi2 =      0.7268
```

```
Breusch and Pagan Lagrangian multiplier test for random effects

        analyst[Issuer1,t] = Xb + u[Issuer1] + e[Issuer1,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                 analyst |    123.4307        11.10993
                       e |     23.0196        4.797875
                       u |    28.85007        5.371226

        Test:   Var(u) = 0
                                chibar2(01) =     88.62
                            Prob > chibar2 =     0.0000
```

Figure 1: hausman test: dependent variable analyst following

```
. hausman fe re, sigmamore
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
postadr	-.1033568	-.0615378	-.041819	.0275159
size	.1901853	.0444543	.145731	.0531279
earnsur1	.2895676	.3198749	-.0303073	.1377027
earngrowth1	.0582569	.0621745	-.0039176	.0141311
earnstd1	-.0208041	-.0059836	-.0148206	.0124945
debtasset	-1.297973	-.6232717	-.6747017	.1791986

```
                b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho:  difference in coefficients not systematic

              chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       28.53
            Prob>chi2 =      0.0001
```

```
Breusch and Pagan Lagrangian multiplier test for random effects

        forecast[Issuer1,t] = Xb + u[Issuer1] + e[Issuer1,t]

        Estimated results:
                             |       Var      sd = sqrt(Var)
                             |---------------------------------
                    forecast |    .2210147         .470122
                           e |     .142711        .3777711
                           u |    .0089131        .0944091

        Test:   Var(u) = 0
                                    chibar2(01) =      0.92
                                Prob > chibar2 =    0.1692
```

Figure 2: hausman test: dependent variable forecast accuracy

```
. hausman fe re, sigmamore

                 ---- Coefficients ----
                 |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                 |       fe           re         Difference          S.E.
-----------------+------------------------------------------------------------
        analyst  |     .02056    .0343569       -.0137969        .0046433
       forecast  |  .1954765    .1867435        .0087331        .0188159
           size  | -.3986572   -.3028991       -.0957581        .0490349
         profit  | -.0305937    .0688823        -.099476        .1090654
      pyreturn1  |  .3037008    .3271484       -.0234476        .0112327
c.boardloc~t     | -.0007002   -.0018301        .0011299        .0005861
c.boardloc~t     | -.0286086   -.0426102        .0140016         .011952
------------------------------------------------------------------------------
                 b = consistent under Ho and Ha; obtained from xtreg
  B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       13.25
                Prob>chi2 =      0.0663


Breusch and Pagan Lagrangian multiplier test for random effects

        tobq[Issuer1,t] = Xb + u[Issuer1] + e[Issuer1,t]

        Estimated results:
                             |       Var      sd = sqrt(Var)
                             |---------------------------------
                        tobq |    2.175045        1.474803
                           e |    .6698944        .8184707
                           u |    1.338189        1.156801

        Test:   Var(u) = 0
                                    chibar2(01) =    183.94
                                Prob > chibar2 =    0.0000
```

Figure 3: Hausman test: dependent variable Tobin's Q

Appendix F

```
. xtserial analyst ADR postadr earnsur1 size earngrowth1 earnstd1 debtasset

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      62) =      3.962
           Prob > F =      0.0509

. xtserial forecast ADR postadr earnsur1 size earngrowth1 earnstd1 debtasset

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      62) =     67.209
           Prob > F =      0.0000

. xtserial tobq ADR postadr analyst forecast size pyreturn1 profit

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      71) =     19.788
           Prob > F =      0.0000
```

Figure 1: testing for autocorrelation

Appendix G

```
. vif, uncentered
```

Variable	VIF	1/VIF
size	12.87	0.077714
debtasset	10.19	0.098174
ADR	3.62	0.276088
postadr	1.74	0.575814
earnstd1	1.33	0.754443
earngrowth1	1.07	0.936131
earnsur1	1.02	0.981581
Mean VIF	4.55	

```
. vif, uncentered
```

Variable	VIF	1/VIF
size	4.21	0.237379
analyst	3.67	0.272436
boardlock	1.47	0.680729
pyreturn1	1.21	0.828702
profit	1.18	0.847353
forecast	1.05	0.956178
Mean VIF	2.13	

Appendix H

Tests for skewness and kurtosis — Number of obs = 343; Replications = 50

(Replications based on 76 clusters in Issuer1)

	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
Skewness_e	-4.330967	14.01668	-0.31	0.757	-31.80315	23.14121
Kurtosis_e	1816.48	423.1253	4.29	0.000	987.1694	2645.79
Skewness_u	184.9612	94.5792	1.96	0.051	-.4105949	370.3331
Kurtosis_u	545.7542	1018.001	0.54	0.592	-1449.491	2541

Joint test for Normality on e: chi2(2) = 18.53 Prob > chi2 = 0.0001
Joint test for Normality on u: chi2(2) = 4.11 Prob > chi2 = 0.1280

Figure 1: testing for linearity and normality analyst following

Tests for skewness and kurtosis — Number of obs = 343; Replications = 50

(Replications based on 76 clusters in Issuer1)

	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
Skewness_e	-.1352234	.1017935	-1.33	0.184	-.334735	.0642882
Kurtosis_e	1.864664	.5755542	3.24	0.001	.7365981	2.992729
Skewness_u	-.1176041	.083524	-1.41	0.159	-.2813081	.0461
Kurtosis_u	.2131198	.1334409	1.60	0.110	-.0484195	.4746591

Joint test for Normality on e: chi2(2) = 12.26 Prob > chi2 = 0.0022
Joint test for Normality on u: chi2(2) = 4.53 Prob > chi2 = 0.1037

Figure 2: testing for linearity and normality forecast accuracy

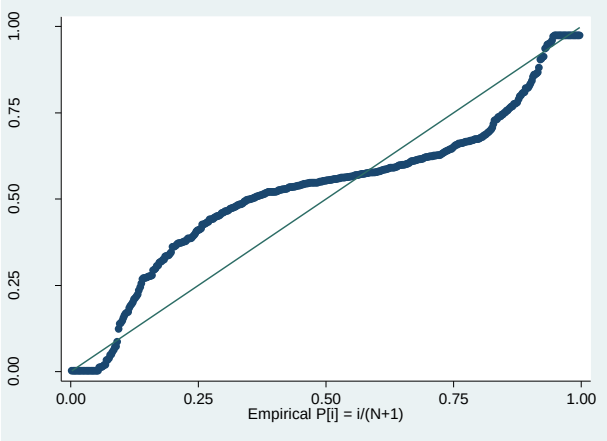
Tests for skewness and kurtosis — Number of obs = 362; Replications = 50

(Replications based on 65 clusters in Issuer1)

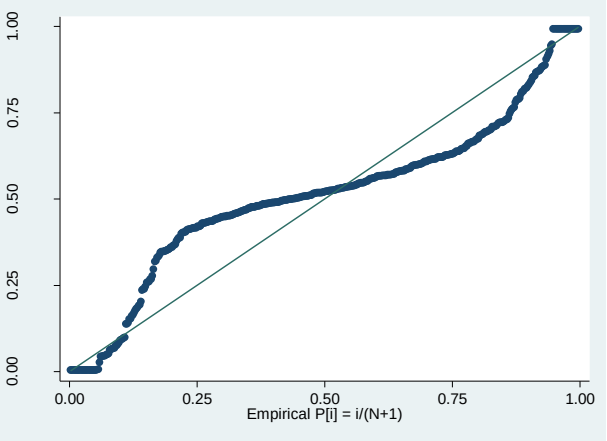
	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
Skewness_e	.3901512	.5359771	0.73	0.467	-.6603445	1.440647
Kurtosis_e	7.721918	3.045429	2.54	0.011	1.752986	13.69085
Skewness_u	4.216179	2.258334	1.87	0.062	-.2100739	8.642431
Kurtosis_u	20.50212	11.1564	1.84	0.066	-1.36403	42.36826

Joint test for Normality on e: chi2(2) = 6.96 Prob > chi2 = 0.0308
Joint test for Normality on u: chi2(2) = 6.86 Prob > chi2 = 0.0323

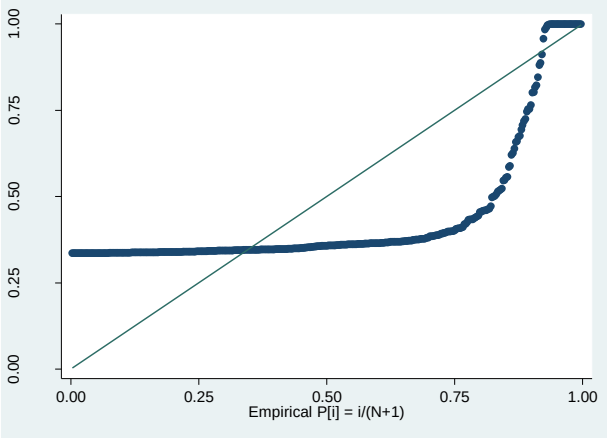
Figure 3: testing for linearity and normality Tobin's Q



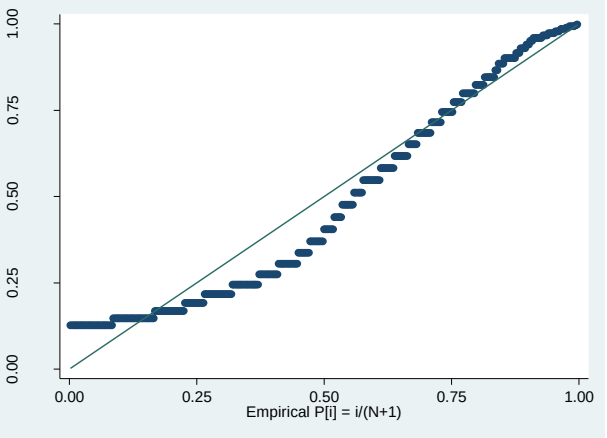
P-Plot earnings surprise



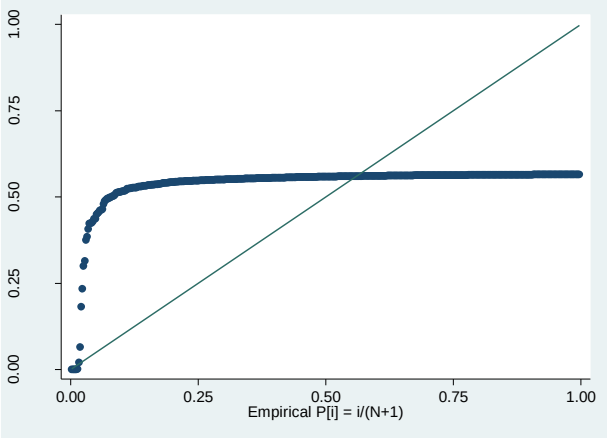
P-Plot earnings growth



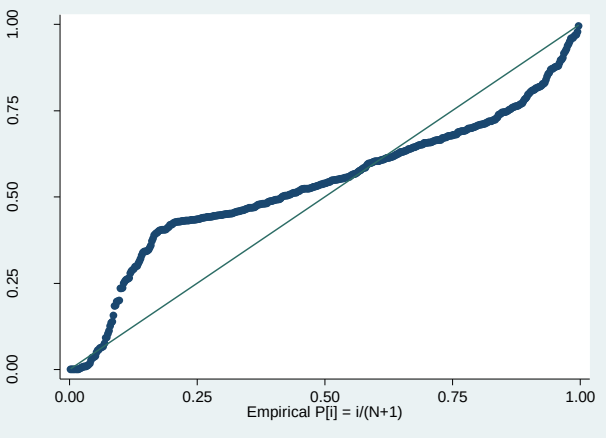
P-Plot earnings volatility



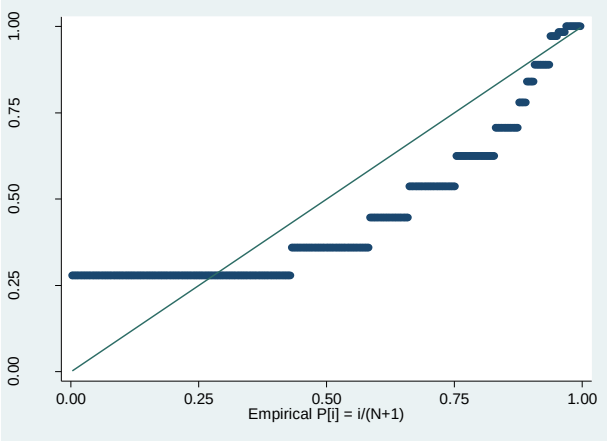
P-Plot analyst folowing



P-Plot forecast accuracy



P-Plot profit



P-Plot board interlocks

Figure 4: P-Plots