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Are Cross-Listed Firms Subject to Less Information Asymmetries?

- A Study of the Reaction to a Change in Credit Rating

Cecilia Falck
20594@student.hhs.se

Sofia Gardefjord
20139@student.hhs.se

Abstract

Foreign firms that cross-list on major U.S. stock exchanges are subject to the stringent disclosure requirements in the United States. This should improve the transparency of these companies and provide their investors with better information. In this thesis we aim to investigate whether cross-listed firms are associated with less information asymmetry than firms that are not cross-listed, by studying the difference in share price reactions to a credit rating change by the major credit rating agencies Standard and Poor's and Moody's. We employ a multivariate regression analysis to measure the announcement returns of downgrades and reviews for downgrades for Brazilian firms cross-listed in the United States and compare them to the announcement returns of credit rating changes for domestically listed Brazilian firms during the period 1996-2009. At odds with our expectations, we find that cross-listed firms exhibit larger abnormal returns than non cross-listed firms. We suggest that differences in disclosure requirements, ownership structure and shareholder types could explain the larger announcement returns for cross-listed firms.

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Contents

1. Introduction

The efficient market hypothesis asserts that share prices in capital markets always fully incorporate and reflect all information and that any new information is immediately incorporated into the share price. According to the theory, the share price reflects the intrinsic value of an asset at any point in time, implying that it is impossible to persistently outperform the market by the use of information already known to the market. The theory is however widely debated in the finance literature and numerous studies have disputed its accuracy (see e.g., Grossman and Stiglitz, 1980; Rosenberg, Reid and Lanstein, 1985). Even though the empirical results have been ambiguous, a large number of imperfections have been identified in capital markets.

One imperfection recognized in contrast with the theory of efficient markets is the evidence of information asymmetry. Information asymmetry deals with the situation in which companies have better information about the value of the company than its investors. In situations of information asymmetry in capital markets so called principal-agent problems may arise between the parties. The principal-agent problem can occur because the two parties, the principal and the agent, may have different interests despite the fact that the latter performs actions on behalf of the former. In previous literature, corporate governance has been identified as one of the key determinants of the behaviour of managers and choices of company policies. Corporate governance can be defined as the set of processes, institutions, practices and rule of law that influence the way a company is managed and controlled. Corporate governance also includes the relation between companies and their stakeholders such as outside investors. When there are possible conflicts of interest between managers of companies and outside investors, corporate governance tools such as stringent disclosure requirements may reduce information asymmetry. Several studies have shown that corporate governance is improved for companies cross-listed[1] in the United States, as this enforces stricter disclosure requirements on foreign companies otherwise subject to less stringent requirements (see e.g., Khanna et al., 2004; Sami and Zhou, 2008).

This thesis addresses the question whether cross-listing companies in the United States improves the transparency of companies and provides investors with better information and thus reduces information asymmetry. This thesis rests on the assumption that investors demand a higher return premium for

[1] Our definition of cross-listed companies for this paper is companies with listed ADRs (American Depository Receipts, see section “American Depositary Receipts” on p.5).

stocks subject to higher information asymmetry.[2] As a proxy for improved information and better disclosure, we use the information content in changes in credit ratings. It has in several previous studies been shown that credit rating actions by the major credit rating agencies provide capital markets with previously unknown information (see e.g. Chan, Edwards and Walter, 2009; González et. al., 2004). To test the question addressed we will test the difference in impact of a change in credit rating between cross-listed companies and non cross-listed companies. As a measure of the impact of a change in credit rating we will study any existence and magnitude of any abnormal equity returns around the time of the announcement of the change. In particular, the purpose of this thesis is to answer the following question:

Is cross-listing in the United States an effective corporate governance mechanism to reduce the information asymmetry between a company and its outside investors?

To address this question, we will test the following hypotheses:

H1 (Information content of rating changes): The market does not fully anticipate all rating changes and is hence associated with abnormal share price returns around the announcement of such events.

H2 (Differences between cross-listed and non cross-listed firms): The abnormal returns caused by a rating event is smaller for cross-listed firms than for non cross-listed firms.

1.1. Scope of Thesis

This study focuses on Brazilian companies and the effect of being cross-listed in the United States. Due to the instability and uncertainty on their domestic market, many Latin American countries have a large share of firms cross-listed in the United States. Crises in the economic, political and legal systems in these countries have resulted in currency fluctuations and a legal and political climate that have hurt international investments, causing loans and other business transactions to be delayed or even cancelled. Brazil is the Latin American country with most firms cross-listed on foreign markets as well as the country with the largest number so called listed ADRs[3] on the U.S. stock exchanges. The Brazilian companies comprise 38 % of all listed Latin American ADRs on U.S. exchanges. As it is only the listed ADRs that have to comply with U.S. disclosure requirements we have decided to limit our study to this group of firms, making the Brazilian financial market the superior choice of country. To minimise the

[2] For further information on the influence of information asymmetry on return premiums, see e.g. Easley and O'Hara (2004) and Chan, Menkveld and Yang (2008).
[3] See section "American Depositary Receipts" on p.5.

differences in characteristics between the firms apart from our variable of interest, cross-listing, we choose to restrict our study to ADRs from only one country.

The corporate governance system in the United States is known to be one of the most stringent in the world. In a paper series by the European Central Bank (ECB), economists from various European central banks also highlight the great importance of ratings-based regulation in the United States. For this reason, we choose to specifically study the effect of the higher requirements of U.S. regulation on a foreign stock when cross-listed.

It is generally only the actions of the top credit rating agencies that have been shown to affect capital markets. Grossman and Stiglitz (1980) show that only rating agencies requiring a fee for the information provided to investors, give investors an information advantage. They conclude that credit rating agencies should be compensated for acquiring information as there would otherwise exist no incentive for such costly information gathering. Based on these findings, Chan, Edwards and Walter (2009) examine the effect of rating changes by agencies of different nature. They find evidence of positive excess returns after the announcement of credit upgrades by so called subscribing (fee-paying) rating agencies (such as Standard and Poor's and Moody's) but suggest that rating changes by non-subscribing rating agencies provide investors with very little information. Based on these findings, we have chosen to study the effect of rating changes by the two major credit rating agencies Standard and Poor's and Moody's.

In their reaction to credit rating changes, debt and equity markets have differing features. Even though credit ratings mainly refer to a specific issuance of a bond, ratings usually have an effect on the equity value of the firm. The relationship is perhaps not as direct as for bonds, but the information provided through a credit rating may contribute to reduce information asymmetries on equity markets as well. There are even indications that reactions to equity prices are *more* significant than to bond prices (Gonzales et. al., 2004). Wansley and Clauretie (1985) also find that the negative returns following additions to Standard and Poor's Credit Watch list (meaning that a rating may be lowered) prior to a downgrade remain for a longer period (up to seven months) for bond prices, and conclude that equity markets appear to function more efficiently than bond markets. We believe that these findings provide support for studying the reaction to rating changes not on bond prices but on equity prices.

Previous literature suggests that reactions to credit ratings are asymmetrical in terms of the magnitude of market reaction depending on the nature of the rating change. In general, market reactions to

downgrades have been found to be significantly larger than reactions to upgrades. Several studies show that downgrades are associated with negative abnormal returns, although most studies find no market reaction associated with upgrades. In a study of stock and bond market response to credit rating announcements from the three major rating agencies (Standard and Poor's, Moody's and Fitch) during the period 2000-2002, Norden and Weber (2004) find above average market reactions following downgrades and insignificant effects of upgrades. The implications of these findings is that testing the difference in reaction to rating changes for cross-listed and non cross-listed companies is more likely to give significant results for downgrades. Hence, we have decided to limit our study to only downgrades and reviews for possible downgrades.

1.2. Purpose and Contribution

The purpose of this thesis is to examine whether cross-listed firms are associated with less information asymmetry than non cross-listed firms by testing for a possible difference in impact of a credit rating change. Building on the existing literature on the information content of credit ratings, the implications of cross-listing in the United States and the role of disclosure as a means to protect outside investors, this thesis aims to shed light on the impact of being cross-listed on the information asymmetry surrounding the firm. To the best of our knowledge, no studies have previously tested this by looking at the difference in effect of a change in credit rating on cross-listed companies compared to non-cross listed companies. Previous studies have tested the impact of cross-listing on reducing the profitability of insider trading and have found evidence supporting that insider trading in cross-listed companies is significantly less profitable than in non cross-listed companies, implying that cross-listed firms bear less information asymmetries than non cross-listed firms (Korczak, 2005). Thus, we hope in this study to find evidence supporting these conclusions, i.e. that cross-listing in the United States reduces the information asymmetry between a company and its outside investors, but with a different approach – namely looking at the effect of credit rating changes.

1.3. Outline

The remainder of this paper is organized as follows: Section 2 presents an overview of international investing, why investors engage in it and why firms are attracted to markets outside the home market. The third section provides a background of the Brazilian legal and regulatory framework. Section 4 gives a description of the credit rating industry in order to provide a good interpretation of why it is a good measure when testing our hypotheses. The fifth section describes the theoretical framework and the sixth section states and explains our hypotheses. In section 7 we describe and motivate the

methodology of the thesis. The characteristics of the data used in the study and the modifications we have done are described in section 8. Our results are presented in section 9 and the analysis of the results is to be found in section 10. Finally section 11 concludes and section 12 elaborates on ideas for further research.

2. International Investing

International investing has increased in the past decades as globalization has lowered cross-border restrictions. Common reasons for investing abroad are diversification of risk and growth opportunities, especially in emerging markets. However, international investing is associated with certain risks. Some of the main risks are currency exchange rate risk, liquidity risk, political risk, legal risk and information asymmetry (SEC, 2009). Currency exchange rate risk is the risk associated with the conversion of cash from dividends and sales of a foreign investment. It is not uncommon that countries impose foreign currency controls with restrictions of how and under what conditions it is possible to move the currency out of the country. Some foreign markets are less developed than U.S. or western markets with fewer listed companies and lower trading volumes, and hence suffer from higher liquidity risks. These markets may also be influenced by political and social events to a larger extent than U.S. or western markets and it is thus important to understand the political risk associated with the investment. The legal risk involves potential difficulties to press charges on a foreign company from the home country as the legal frameworks and remedies may not only be different, but also weaker. The legal framework also affects the amount of information a company is required to provide to its shareholders. Another issue of information asymmetry is difficulties in finding information provided in English. Due to the risks associated with international investments, several solutions have been developed to facilitate foreign investing. Mutual funds, exchange-traded funds and American Depository Receipts (ADRs) are some of them.

2.1. American Depository Receipts

The concept of ADRs was first introduced by J.P. Morgan in 1927 for the British retailer Selfridges & Co. (J.P. Morgan, 2009). An ADR is a certificate of ownership in a non-U.S. company, issued by a U.S. depository bank. It can represent a fraction, a single share or multiple shares of the firm's stock. ADRs are traded on U.S. stock exchanges in the same way as U.S companies; denominated in U.S. dollars and pay dividends in U.S. dollars (SEC, 2009). The fact that the ADR is denominated in U.S. dollars makes it less vulnerable to exchange rate risk. The legal risk and information asymmetry is also reduced as the company is required to report under U.S. Generally Accepted Accounting Principles (GAAP) and to

provide shareholder meeting materials and corporate action notifications in English.[4] Due to these risk reductions, the ADRs are usually more liquid than its corresponding home share. Thus, ADRs facilitate for U.S. investors to invest abroad and for non-U.S. companies to get funding from U.S. investors. However, the downside of investing in ADRs instead of investing directly in the foreign market is that the time it takes to receive information from the company may be longer as it will have to pass through the depository bank before reaching the final investor. Even though some of the costs of cross-border and cross-currency transactions are reduced with the use of ADRs there may still be some extra fees charged from dividends etc, for the depository bank to cover their costs that would not be incurred if investing directly in the foreign market (SEC, 2009).

There are currently four major banks that act like depository banks and issue ADRs on the U.S. market: J.P. Morgan, Citibank, BNY Mellon and Deutsche Bank. ADRs can be of several different levels. Level l ADRs are the lowest level of ADRs. These ADRs can be either sponsored or unsponsored. Unsponsored ADRs are issued by one or several depository banks that do not have a formal agreement with the foreign company – it is the depository bank that solely controls the terms and operations of the ADR. This is in contrast to sponsored ADRs where the foreign company has an agreement with the depository bank and hence has some control rights over the terms of the ADR. Another difference between unsponsored and sponsored ADRs is that the unsponsored are not registered with the Securities and Exchange Commission (SEC) (SEC, 2008). Level l ADRs (both sponsored and unsponsored) are OTC-traded (traded over the counter) and are less regulated than other types of ADRs. These companies are not required to report under U.S. GAAP and, even if sponsored, they do not have to have full SEC registration (Oxford Metrica, 2005). With effect in October 2008, SEC issued a number of new rules for OTC-traded ADRs. These regulation changes aimed at facilitating for non-U.S. companies to have their stock traded in the U.S. OTC-market on a limited basis, conditional on the fulfilment of a number of requirements by the company (SEC, 2008). However, these changes made it possible for depository banks to freely register unsponsored ADRs without the company's knowledge or consent under the mere conditions that the company fulfils the specified requirements (to publish disclosure documents in English, for instance) (Jones, 2008). This means that a company that currently meets these requirements can be cross-listed by a depository bank and then forced to continue to meet these requirements.

Level ll and Level lll ADRs are called Listed ADRs. These are traded on one of the U.S. stock exchanges NYSE, NASDAQ or AMEX and hence are required to report under U.S. GAAP and complete full SEC

[4] This only applies to so called sponsored ADRs.

registration. These companies also have to comply with the listing requirements of the stock exchange and are hence considered to be safer investments than Level I ADRs (as the information asymmetry is lower). These shares are also more liquid and more covered by analysts than Level l shares. Level ll and Level lll ADRs are always so called sponsored ADRs. The difference between Level ll and Level lll is that Level lll ADRs (also) issue equity in the U.S. market and do not only deposit equity to be traded as ADRs (Oxford Metrica, 2005).

In addition to the restrictions of the different listing levels, companies can set up restricted ADR programs that restrict which investors are allowed to trade the stock. ADRs issued under Rule 144A may only be traded by Qualified Institutional Buyers in the PORTAL electronic trading system. These ADRs are privately placed and do not have to comply with U.S. reporting requirements or U.S. GAAP (Oxford Metrica, 2005).

2.2. Reasons for Cross-Listing

We have previously described why investors may prefer to invest in ADRs over a direct investment in the local market, but what are the benefits of issuing an ADR (i.e. to cross-list) from the firm's perspective? One of the main reasons for cross-listing is to access capital outside the local market. This might be for the aim of reaching more investors, or for the aim of reaching "better" investors – e.g. investors that have the capital to invest a larger stake or investors that have the right skills or contacts. Even if the company is well-known and should be able to attract international investors also on its local market, it may sometimes be the case that the government has imposed restrictions on investments by foreign investors on the home market. By issuing an ADR program, problems like this could be avoided.

One of the advantages of cross-listing a company is the positive impact on the equity value. The increase in firm value is generally regarded as a result of that funding is expected to become cheaper and shareholder wealth more likely to increase. Studies done on Latin American companies show that at the end of the first year after cross-listing, the share price has increased by approximately 30 % for firms choosing to issue Listed (Level ll and Level lll) ADRs. Brazilian firms stand out with an average increase of 70 % in share prices for the first year. The explanation for these value effects are thought to be the greater information disclosure following full SEC registration and reconciliation with U.S. GAAP that are requirements for Listed ADRs. However, the same study shows that the share prices of firms issuing Level l ADRs increase by 40 % on average. (Oxford Metrica, 2005) Hence, a more consistent explanation might be that the cross-listing in itself creates increased analyst coverage (regardless of level status) of the firm and in that sense reduces the information asymmetry.

A common misperception among cross-listed firms (and a commonly mentioned reason for terminating an ADR program) is that the stock in the domestic market becomes less liquid when the stock is traded also on a second, alternative, exchange (Oxford Metrica, 2005). However, it has been shown that the liquidity in the stock on the home market is increased thanks to cross-listing as the firm becomes more visible by receiving greater coverage from analysts (Oxford Metrica, 2005) and increased media attention (Baker, Nofsinger, and Weaver, 1999).

3. Corporate Governance in Brazil

In this section we will provide an overview of Brazil's disclosure requirements, level of investor protection and efficiency of the judicial system in Brazil. The aim of this is to give the reader a better understanding of the legal framework in Brazil.

3.1. Listing Requirements on the Brazilian Stock Exchange

In May 2008 the São Paulo Stock Exchange (Bovespa) merged with the Brazilian Mercantile and Futures Exchange (BM&F) and created a common exchange, BM&FBovespa. BM&FBovespa has four different listing levels with increasing degrees of governance standards: Bovespa's original listing requirements, Level 1, Level 2 and Novo Mercado ("New market"). Under Brazilian securities regulations public companies are required to disclose any important development related to their business to the Comissão de Valores Mobiliários (CVM) and BM&FBovespa (CFA, 2009). Listing on any of the additional levels (Level 1, Level 2 or Novo Mercado) is voluntary and all impose a responsibility to improve the information provided to the market. Level 1 listed companies are required to provide an annual corporate agenda and financial statements under local accounting standards. Level 2 and Novo Mercado listings impose the strictest transparency requirements. Companies listed at this level have additional obligations and must for instance provide annual balance sheets according to the standards of U.S. GAAP or International Financial Reporting Standards (IFRS). They are also required to appoint a board of directors of which a minimum of 20 % of the members should be independent. (BM&FBovespa, 2009) Brazilian corporate law does not impose on companies to have an audit committee, nominating committee or corporate governance committee. Standing board committees are rare in Brazilian companies. If they exist, they normally consist of inside board members and often have little ability to make decisions (CFA, 2009). The consequences of a Novo Mercado listing can be summarised as a number of rules that "increase shareholder's rights and enhance the quality of information commonly disclosed by companies" (BM&FBovespa, 2009).

3.2. Efficiency of Corporate Regulation

The BM&FBovespa stock exchange is primarily regulated under the Comissão de Valores Mobiliários (CVM) and through self-regulation by voluntary adherence to governance practices. The legal and procedural regulation on public Brazilian companies and stock exchanges is primarily provided by the Brazilian Corporations Law. The Corporations Law has been reformed twice since enacted in 1976, in 1997 and 2001. The 1997 reform abolished several minority protection mechanisms and may even have led to an increase in private benefits enjoyed by controlling shareholders (Prado and Salama, 2008). In 2001 the Brazilian Corporate Law was reformed to provide stronger protection of investors and increase the efficiency of the capital markets. However, the process has been delayed under the influence of controlling actors in the market. Instead, it is self-regulation rather than legal regulation that has successfully enhanced minority rights and corporate governance mechanisms in the market (Prado and Salama, 2008).

Prado and Salama (2008) argue that Brazil's corporate law today is relatively typical to that of developing countries – a relatively old-fashioned legislation poorly enforced in practice with slow court processes and unpredictable outcomes:

> *"Brazilian Law provides minority shareholders with a fairly broad set of rights […], but the enforcement of such rights is seriously impaired by the sluggishness of the courts. […] The CVM (Securities and Exchange Commission) has a limited staff and budget and suffers from the political problems that typically affect regulatory agencies."*

The authors conclude that the Brazilian capital markets have evolved considerably but find that the extent to which the Brazilian legal framework enhances or hampers the development of local capital markets remains an issue. The United States on the other hand is known to have among the most developed and effective corporate governance systems. Hence, there is reason to believe that the Brazilian and U.S. corporate law still differ in critical aspects.

4. The Credit Rating Industry

As financial markets are growing more and more complex, with funding shifting from traditional bank lending to issuance of debt in the capital market, the importance of credit rating agencies has in the last decades increased. The role of credit rating agencies is to reduce part of the information asymmetry that exists in the market place and thereby helping both issuers and investors. Reduced information asymmetry lowers the costs for the issuer to find and obtain funding, while it at the same time helps the investor to better understand the risks and returns associated with investments in the company.

The two main credit rating agencies in the market are Standard and Poor's Division of the McGraw-Hill Companies Inc. (Standard and Poor's) and Moody's Investors Service (Moody's). A credit rating is the agency's opinion of the relative creditworthiness of an issuer or of an issuer's specific issue. It is not to be mistaken as a buy, sell or hold recommendation of a specific security (White, Sondhi and Fried, 2003). A credit rating is a measure of potential credit losses that may arise due to failures of honouring the terms of a financial contract, where credit loss is defined as the difference between what the party was contracted to pay and what the party actually is paying (Moody's, 2003). The aim is thus to give a good measure of a company's long term default risk rather than short term fluctuations driven by cyclical economic factors.

The rating scales for Standard and Poor's and Moody's are shown in Table I in the Appendix. Standard and Poor's uses a rating scale ranging from AAA (highest credit rating) to D (lowest credit rating), whereas Moody's uses a rating scale from Aaa to D. For Standard and Poor's the ratings from AA to CCC may be modified by the addition of a plus (+) or minus (-) sign, while the Moody's ratings from Aa to Caa can be modified by the addition of the numbers 1, 2 or 3 to show the relative standing within the major rating categories. The modifier + and 1 indicate that the bond ranks in the higher end of its rating category (S&P 2009b and Moody's, 2003). Bonds with ratings lower than BBB- or Baa3 are referred to as having speculative grade status or non investment grade status. These bonds are expected to bear substantial credit risk and being exposed to speculative element (White, Sondhi and Fried, 2003).

In addition to the credit rating, credit rating agencies can also assign a bond with credit rating outlooks, which states the likely direction of future rating changes over the medium term. When a bond is under review for possible change in the short term, it is sometimes put on the so called "Watchlist". In most cases the direction of the possible rating change is stated in the announcement when a bond is put on the Watchlist (Moody's, 2003). When referring to a review for a possible downgrade, we henceforth use the term "possible downgrade".

4.1. The Role of Credit Ratings for the Bond and Equity Market

Credit rating agencies can be thought of as having both a signalling role and a certification role in the financial market. When a firm issues bonds it is crucial that the information asymmetry between the issuer and the investors is minimized. Here credit rating agencies play an important role, as they gather and interpret information and may provide the market with indirect access to non-public information (White, Sondhi and Fried, 2003). Hence, they reduce the information asymmetry and may in this way facilitate the access to debt markets and thereby improve the ability to receive funding. By interpreting

and providing the market with new information, credit rating agencies *signal* the relative creditworthiness of a company by assigning the bond a credit rating. The economies of scale in gathering the information enable credit rating agencies to process the information which would otherwise be too costly for individual investors to gather and interpret. Without credit rating agencies, there would be situations where the costs of reducing information asymmetries would be so high that potential issuers would find it more profitable to finance themselves with ordinary bank debt, rather than absorbing the costs of communicating directly to the market. Moreover, it is common that investors and regulators demand credit rating coverage in order to give their confidence or approval of an issuer (White, Sondhi and Fried, 2003). Here credit rating agencies play a certification role when assigning a professional credit opinion to an issuer. Hence, credit rating agencies play a crucial part in making the financial market more efficient.

As mentioned above, credit ratings mainly refer to bond issues but have also proved to affect the share price of a firm (see e.g. Goh and Ederington, 1993; Norden and Weber, 2004; and Hand, Holthausen and Leftwich, 1992) as the participants on equity markets also are concerned with the information linked with the credit rating. However, it is important to remember the distinction of to what information bonds versus equity prices react. As each single rating symbol contains a large amount of information (White, Sondhi and Fried, 2003), issuers with the same rating symbol may differ with respect to specific characteristics. Hence, a change in credit rating may have different impacts depending on the triggering factor. A rating downgrade caused by a decrease in coverage ratio may have less impact on equity return than a rating downgrade caused by decreased profitability or cash flow generation and hence the share price is expected to change less. It is also important to have in mind that different factors have different weights at each rating level and thus reactions to credit rating changes caused by the same triggering factors are likely to differ depending on the issuer's current credit quality.

4.2. The Impact of Market Anticipation

The magnitude and direction of the announcement effect can also depend on the degree of market anticipation of the rating action. An actual downgrade not preceded by an announcement of a possible downgrade is likely to cause greater announcement effects than one that is. Holthausen and Leftwich (1986) examine the effect of credit ratings preceded by an addition to Standard and Poor's Watchlist. They find reduced effects for announcement of such rating changes, implying that rating changes following a credit watch procedure provide the market with less information and are to larger extent anticipated. Hence, we have controlled our data for such events by excluding all downgrades preceded

by an addition to the watchlist less than 21 days prior to the actual downgrade. The actual watchlistings are still included in the sample (see the Methodology section). Longer time between the addition to the watchlist and the actual downgrade should mean that the degree of market anticipation is lower than otherwise. Hence, this type of market anticipation should not have a considerable effect on the announcement returns of our sample.

4.3. The Reliability and Objective of Credit Ratings

Trustworthiness and reputation are key determinants for the efficiency and function of credit rating agencies. Since the outbreak of the financial crisis in 2007, the reliability of the ratings of credit rating agencies has been questioned. As the potential risk of collateralized debt obligations (CDOs) became clear(er) to the investors, investors blamed the credit rating agencies for assigning too optimistic credit ratings. The trust in credit ratings fell, and investors feared that issuers were riskier than implied by their credit rating, leading to a situation of market illiquidity and scarcity of capital for previously solvent companies. Similar critique of credit rating agencies was put forward in the aftermath of the ENRON collapse. This critique may be a reflection of the increased influence of and dependence on credit ratings and thus it is becoming increasingly important for the rating agencies to communicate their objectives.

It is of great importance that the participants of the financial market are familiar with the objectives of credit rating agencies. As previously explained, the objectives of credit rating industries is to give an opinion of the relative creditworthiness of an issuer or of an issuer's specific issue – and not to give buy, sell or hold recommendations (Standard & Poor's, 2008). It is crucial for the credit rating institutions to clearly communicate these objectives to the financial market. In cases where the credit ratings are used and interpreted by the market in a wrongly manner, it may end with a situation where the credit ratings are questioned and the market's confidence in the agencies is weakened.

Credit rating agencies only assign companies a credit rating on the issuer's own initiative. As mentioned above, one of the motivations for being rated by a credit rating agency is that it can provide the necessary coverage to enable financing or regulatory approvals otherwise more difficult to obtain. However, as it is the issuer and not the investor that pays for the rating, the question of conflicts of interests arises. When the credit rating agency assigns the issuer a rating, the issuer has the choice of whether to publish the rating or not[5] (Standard & Poor's, 2008). Hence, it is possible that the ratings published are in fact biased towards positive information and that credit rating agencies see advantages of assigning a client a good rating. However, the ability of the market to continuously evaluate the credit

[5] For most markets outside the United States.

rating provides the credit rating agencies with a strong incentive to provide systematic and reliable credit ratings. By looking at the historical performance of credit ratings (e.g. comparing the consistency of credit ratings with the pricing or credit risk in financial markets) the market participants can monitor and assess the consistency and objectivity of credit ratings. If the rating agencies fail to provide fair opinions, the relevance of the information revealed by a credit rating will be questioned by the market participants. Thus, despite the existence of a potential conflict of interest, credit rating agencies have clear incentives to remain objective in the ratings assigned.

4.4. The Wealth Redistribution Effect

The fact that a downgrade appears to cause negative abnormal returns on share prices is however not necessarily true for all downgrades. Equity holders of a firm are said to have the payoff pattern similar to a call on the firm's asset, where the strike price is equal to the value of the firm's debt. Hence, equity holders gain from increased volatility in the firm's cash flow patterns. If a downgrade is motivated by higher volatility in cash flow patterns, but not necessarily lower expected returns, shareholders will be better off (as long as the firm does not need to raise new capital) as they do not have to bear the higher cost of capital that comes with the higher risk level. The value is said to be transferred from bondholders to equity holders. (Goh and Ederington, 1993) Hence this implies a reaction in share prices opposite to the reaction of bond prices, i.e. an increase in share price for a negative rating change. This phenomenon is referred to as the wealth redistribution hypothesis. However, considering the findings of previous studies done on the effect of credit rating changes, we do not expect this effect to have any considerable impact on the results of our study.

5. Theoretical Framework

In this section we provide an overview of the theoretical framework for analyzing the information content of credit ratings and how it may differ between cross-listed companies and non cross-listed companies. In line with previous studies on the information content of credit ratings (see e.g. Holthausen and Leftwich, 1986; Norden and Weber, 2004) we will base our analysis on capital market theory. This framework relies on the assumptions that all investors are efficient investors, implying that abnormal returns related to credit rating events are driven by the information content of the credit rating change and hence does not take into account any irrational investor behaviour (i.e. investor reactions that do not correspond to the information released by the credit rating change). As a basis for the analysis of differences in information asymmetry between cross-listed and non cross-listed firms we

will use the concept of “the bonding hypothesis”, which suggests that cross-listing improves corporate governance mechanisms.

5.1. The Efficient Market Hypothesis

In 1970, Eugene Fama introduced in his publication “Efficient capital markets” the idea of random walks in the changes in share prices. Fama defined how the share price of an asset will, in an efficient market, always wander randomly around its intrinsic value, even though uncertainty around the value remains. Should this not be the case, and share prices moved in a systematic way around the intrinsic value, individual investors taking advantage of the information would drive the actual price of the asset against its intrinsic value (Fama, 1965). The efficient market hypothesis received in the early 1970s widespread acceptance and has long been a cornerstone of financial theory. However, the theory has also been hugely criticized and numerous studies have identified the existence of information asymmetries. In 1980, Sanford Grossman and Joseph Stiglitz studied the efficiency of capital markets, and concluded that if the market was in fact informationally efficient, no investor would have incentive to acquire the information upon which share prices are based (the so called Grossman-Stiglitz paradox).

There are three main categories within the definition of market efficiency related to the different degrees of information asymmetry, each with different implications for the function of capital markets. The concept of strong efficient markets describes a market where all public and private information is impounded into share prices. Even though this might be viewed as the perfect state of the capital market, it becomes sort of a puzzle. If prices do reflect all information, there will be a free-rider’s problem where no incentive to bear the cost of producing information exists. Hence, for strong efficient markets to exist there must be no costs of acquiring information. The weakest form of market efficiency as defined by Fama states that no investor can earn excess returns based on historical share prices. However, an investor is assumed to gain from performing research on financial statements and other public information. In the so called semi-strong efficient market, asset prices reflect all past prices and all public information available, but not the private information available. Whereas the market reacts instantaneously to new public information, private information may have a value in this setting. The existence of profitable insider trading would provide support for the semi-strong efficient market hypothesis, which states that only information not publicly available can earn abnormal returns for investors. In the same way, an abnormal reaction to the share price following a change in credit rating suggests that the credit rating agencies provide the market with previously unknown information.

5.2. The Bonding Hypothesis

When cross-listing in the United States, either by listing foreign shares on a major U.S. exchange or indirectly through an ADR, foreign companies must comply with U.S. regulation and listing requirements. Cross-listing in the United States is associated with more stringent disclosure requirements and stricter investor protection and can signal reliability to capital markets – information that can otherwise be difficult to convey to investors under the poor corporate governance functions of the home country. This phenomenon is referred to as the bonding hypothesis, suggesting that companies with weak domestic investor protection can voluntarily incur stricter corporate governance functions by cross-listing in the United States, enabling the company to reduce agency costs and lower cost of capital (see e.g. Miller, 1999).

The term bonding hypothesis was originally used to describe the agency costs imposed on an agent or entrepreneur to signal to investors that he will behave as agreed. Today the bonding hypothesis refers to the effects of corporate governance mechanisms such as stricter disclosure requirements and stronger shareholder minority protection enforced upon companies that choose to cross-list on a foreign market. (Coffee, 2002) This is as a way for companies to attract funding from investors that are otherwise less inclined to invest.

Various reasons for the decision of a foreign company to cross-list on a U.S. stock exchange have been suggested and the bonding mechanisms referred to by the bonding hypothesis are several. One often tested motivation is that the U.S. governance system can be said to be “rented” by the cross-listed firm. The United States is generally known to have among the most developed and effective corporate governance systems and several studies conclude that cross-listing by registering an ADR in the United States improves disclosure (see e.g. La Porta, Lopez de Silanes, Shleifer and Vishny, 2000).

Most observers agree that there are two main types of bonding; legal (liability-based) bonding and reputational bonding (see e.g. Coffee, 2002; King and Segal, 2009; and Siegel, 2004). The former refers to bonding through the actions of courts and the latter to the monitoring through U.S. coverage of the company performed by agents such as equity analysts, credit rating agencies or underwriters (King and Segal, 2009; Coffee, 2002). Recent research has indicated that reputational bonding works more efficiently than legal bonding. Reputational bonding is by definition not observable and has been investigated in previous studies with the help of proxies. In the following section we present the most commonly studied bonding mechanisms of cross-listing.

5.2.1. Reduced Information Asymmetries

As covered in previous sections the choice to cross-list entails a commitment to increase disclosure. The higher disclosure requirements in the United States are generally regarded as one of the main difficulties of cross-listing as firms that cross-list on one of the U.S. stock exchanges must register with the U.S. SEC and report under U.S. GAAP. The increased disclosure following cross-listing implies reduced information asymmetries. The wish to reduce the lack of information about foreign companies due to for instance slack disclosure requirements in the home country is suggested as a reason for cross-listing also in previous literature (Karolyi, 1998). Sami and Zhou (2008) also provide evidence in favour of this view. They examine the impact of cross-listing on Chinese firms in their domestic market and find that cross-listed firms face lower information asymmetry risk compared to non cross-listed firms. Lang, Lins and Miller (2003) examine the impact on the information environment and disclosure improvements of foreign firms that are cross-listed on U.S. exchanges. They find that analyst coverage and accuracy in analyst forecasts are higher for cross-listed firms compared to firms that are not. They also conclude that these improvements in the information environment are associated also with higher valuations by the market.

6. Hypotheses

As previously stated, the main goal of this thesis is to test if cross-listed firms are more transparent (i.e. suffer from less information asymmetry) than non cross-listed firms. Based on the previous research referred to, our analysis of the credit rating industry, the identified characteristics of cross-listed firms and the theoretical framework developed we will test two hypotheses. In order to credibly address the question of the potential differences in information asymmetry between cross-listed and non cross-listed firms by looking at their relative reaction to credit rating changes, it is important to ensure the existence of a systematic link between credit ratings and the return patterns on equity markets. I.e. that the information revealed by credit rating changes is of such magnitude that it affects equity prices. Hence, our first hypothesis is:

H1 (Information content of rating changes): The market does not fully anticipate all rating changes and is hence associated with abnormal share price returns around the announcement of such events.

With support in the existing body of literature, we expect to find evidence in favour of this hypothesis. From here we continue to our main hypothesis, which aims to investigate the differences in reactions between cross-listed and non cross-listed firms:

H2 (Differences between cross-listed and non cross-listed firms): The abnormal returns caused by a rating event are smaller for cross-listed firms than for non cross-listed firms.

Based on our theoretical framework and analysis of common characteristics of cross-listed firms we expect to find evidence in favour of this hypothesis.

7. Methodology

7.1. Event Study

To investigate the impact of rating actions on share prices we perform an event study over nine different event windows. We define the date when a rating change takes place as the event date. First we look at the combined effect of abnormal returns both before and after the event date. The smallest event window of this kind is one day before and one day after the event date (event window [-1, 1]). We also look at the event windows of three days before and three days after ([-3, 3]) and ten days before and ten days after ([-10, 10]). We then separate the effects of the rating events from before and after and study only the event date plus one day, minus one day, plus three days, minus three days, plus ten days and minus ten days respectively. We expect the days after the rating event to exhibit the highest abnormal returns. However, the choice of looking also at days before the event date is motivated by the fact that the share price in the period prior to a rating event in general is characterized by an downward (upward) trend for downgrades (upgrades), maybe due to a leak of information.

Based on the common rating scale we have checked for differences in the average level (quality) of rating and for the magnitude of the rating change (measured as the difference in the number of grades the rating changes) between cross-listed and non cross-listed firms. T-tests for differences in means show no significant statistical differences between the two groups of firms (see Table II in the Appendix). Hence, we conclude that our results should not be distorted by discrepancies in these characteristics of the ratings.

We note that individual event dates may be contaminated by other rating events, by either the same rating agency or by another. It is not uncommon that both Standard and Poor's and Moody's adjust their credit rating of a company at approximately the same time. Hence, in order to control for other rating changes that may affect the observation of interest, we exclude a number of observations. As the event windows never reaches further than ten days before and ten days after the event date we only exclude events overlapping each other within 21 days, i.e. when a rating change occurs twice within a 21-day period. For example, Aracruz Celulose SA is put on the watchlist for a possible upgrade by Standard and

Poor's on 3 October 2008 and is then given an actual downgrade by Standard and Poor's on 10 October 2008. For such situations we only keep the first event, as we believe it is likely that the market reaction is larger for the first event than for the second event.

After eliminating contemporary events, overlapping events and events with missing values for any of the control variables, we have a sample of 50 different rating actions, 34 by Standard and Poor's and 16 by Moody's. 28 of these rating actions correspond to cross-listed firms and 22 correspond to non cross-listed firms. Table III and IV in the Appendix show the distribution between the different rating actions. The resulting number of actual downgrades and possible downgrades is 24 and 26 respectively. The final sample of rating actions corresponds to 21 issuers listed on the Brazilian stock exchange BM&F Bovespa and covers the period April 1996 to September 2009.

After deciding on our final data set we collect price data from DataStream for the number of days prior and number of days after the event date, depending on which event window we look at, for all 50 observations and calculate daily abnormal stock returns as:

$$AR_{it} = R_{it} - RI_t \quad (1)$$

where is the return of stock at date and the return on the index at date . Cumulative abnormal returns are also calculated by summing daily abnormal returns for each rating event.

7.2. Cross-Sectional Regression Analysis

To capture potential cross-sectional variations in the impact of rating actions on share prices we perform a multivariate regression analysis of the results from our event study. We use our cumulative abnormal returns from the event study, calculated for each specific event window, as the dependent variable.

7.2.1. Control Variables

Apart from being cross-listed, there are several firm characteristics that may cause differences in the market reaction to a rating change. To avoid jumping to the wrong conclusions, it is important to control for characteristics that generally differ between the two groups of firms.

Size

Previous studies have shown that cross-listed firms tend to be larger in size (Korczak, 2005). It can be shown that large companies in general get more analyst coverage and hence the information asymmetry for larger companies is assumed to be lower than for small companies (Greenstein and Sami,

1994; Chiang and Venkatesh, 1988). To control for such differences, we create a variable for size using the logarithm of market capitalisation as a proxy.

Leverage

The leverage of a firm generally differs between cross-listed firms and non cross-listed firms. Cross-listed firms have been shown to have higher leverage than non cross-listed firms (Korczak, 2005). For this reason, we introduce a control variable to control for effects caused by differences in the firms' leverage. As a proxy for leverage, we use the ratio of total debt over total assets.

Profitability

The profitability level of a firm generally also differs between cross-listed firms and non cross-listed firms. Cross-listed firms tend to be more profitable than non cross-listed firms. (De Medeiros and Tiberio, 2005) In order to control for this, we have created a variable using yearly return on assets (ROA) as a proxy for profitability.

There are a number of possible characteristics of cross-listed firms that ideally should be controlled for, such as for instance the growth rate of a firm. However, we lack sufficient data on these factors.

7.2.2. Regression

Including the control variables defined and motivated above, our multivariate regression model is constructed as follows:

$$\begin{aligned} Cumulative\ Abnormal\ Returns_i &= \alpha + \beta_1 * crosslisted_i + \beta_2 * logsize_i + \beta_3 * (crosslisted * logsize)_i \\ &+ \beta_4 * leverage_i + \beta_5 * (crosslisted * leverage)_i + \beta_6 * profitability_i \\ &+ \beta_7 (crosslisted * profitability)_i + \varepsilon_i \end{aligned} \quad (2)$$

Where crosslisted*logsize, crosslisted*leverage and crosslisted*profitability are the interaction variables for size, leverage and profitability respectively.

Relevance of sample period

We are also concerned with the impact of the sample period in our data. The sample includes observations from the recent financial crisis that began to unravel in late 2007. During this time period, the credit rating agencies began to downgrade also the highest grade investments in the United States. In the epilogue of this story of rapid rating changes the credit rating agencies have been criticized for understating the risk related to the new, complex securities that played an important role for the outbreak of the financial crisis, such as mortgage backed securities (MBS) and collateralized debt

obligations (CDO). As previously described, the credibility of the rating agencies has been severely damaged following this period. It is possible that the crisis has impacted the timing and accuracy of the ratings in our sample (as perceived by the market) for the rating actions in 2008 and 2009. To control for the importance of this time period for our results, we have included year specific variables in our regression. Interestingly, the results remain in all relevant aspects unchanged. To check the validity of these year variables, we have also run our regressions excluding the years of the crisis, rendering in essence the same results as for the entire sample. From this, it seems that the financial crisis has not had any considerable effect on our study.

8. Data

The data set consists of 66 different rating actions by the major rating agencies Standard and Poor's and Moody's for 25 issuers listed on the Brazilian stock exchange BM&F Bovespa. The sample contains both actual downgrades (19 from Standard and Poor's, 13 from Moody's) and possible downgrades (23 from Standard and Poor's, 11 from Moody's), so called watch-listings.

To find appropriate cross-listed companies for our study we manually gathered data on companies cross-listed in the United States. As the more stringent requirements are implemented only for the companies listed on the major exchanges NYSE, NASDAQ and AMEX, we exclude all companies that are merely OTC-listed. For companies that were rated prior to their U.S. cross-listings, we treat the rating events prior to the listing as observations for non cross-listed firms.

Our sample of non cross-listed companies has been designed to correspond to the sample of cross-listed companies to the greatest extent possible. As cross-listed firms have been shown to be larger in size, we have as an initial control matched the cross-listed companies in size by selecting the largest non cross-listed firms listed on the BM&F Bovespa. We have also ensured there is a reasonable diversification of industries in both groups of companies. The sample covers companies from industries like food and beverage, banks, telecommunication services and utilities.

All bond issues made by the same company may not all accurately affect the creditworthiness of the entire entity. To choose the most appropriate type of ratings for our study we have collected the *issuer rating* for long term bonds, which is an opinion on a company's overall financial capacity to pay its financial obligations (Standard & Poor's, 2009b). For companies where this rating type was not available we have used the rating of the most comparable bond. For financial institutions, we have used the ratings designed specifically to assess the creditworthiness of banks (*Bank Fundamental Strength* for

Standard and Poor's and *Bank Financial Strength* for Moody's). These ratings do not evaluate the probability of the ability to repay debt but rather the possibility that the bank will require outside financial support from its owners, regulators or government.

Price data was retrieved from DataStream. The daily common stock closing prices, adjusted for dividends, stock splits and right and bonus issues, were merged with the rating data. As a proxy for market return we use the Brazil Bovespa index, which is the most appropriate Brazilian index as it covers over 60 listed Brazilian companies (Bloomberg, 2009).

8.1. Discussion of Data

8.1.1. Unrelated Events

A common problem with event studies is the existence of contaminating events unrelated to the rating events examined, such as firm specific and industry specific shocks. Such events may have a distorting impact on the results of the study. As explained in the Methodology section, we have controlled for unrelated events by excluding contemporary and overlapping events. However, controlling for all unrelated events is difficult and we bear in mind that our sample may be affected by this kind of noise.

8.1.2. Sample Size

A limitation of our data is the limited number of observations. After all necessary eliminations, due to for instance the elimination of contemporary and overlapping events or observations with missing values for any of the control variables, the final data set consists of 50 observations. The robustness tests of the regression results however show that important underlying assumptions of the OLS methodology are met (see section Robustness Tests of Regression Results in Appendix). The sample is well distributed across different industry groups as well as over the time period studied (1996-2009). However, a larger sample would have enabled us to put more confidence into the assumption that the sample is representative for the entire population.

9. Results

In this section we start by presenting our results from the event study. Moreover we present the results of our cross-sectional regression analysis, which is based on our event study results.

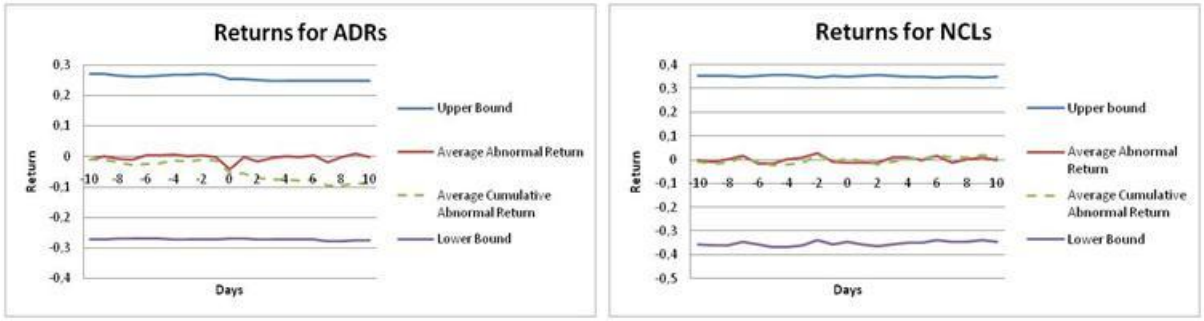
9.1. Results of Event Study

This section reports the results from the event study in terms of development of abnormal returns and the significance of abnormal returns for cross-listed firms and non cross-listed firms respectively.

9.1.1. Development of Abnormal Returns

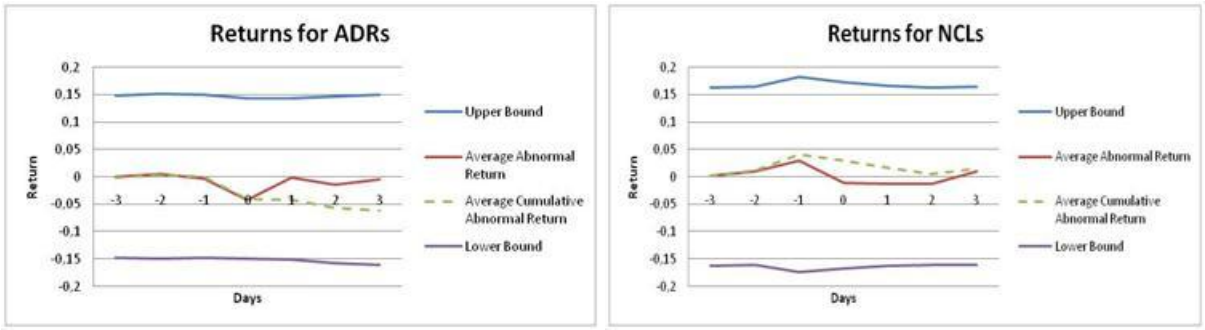
Graph 1 and 2 below show the development of abnormal returns for cross-listed firms (ADRs) and non cross-listed firms (NCLs) respectively for the 21 days surrounding a negative credit rating event (i.e. ten days before and ten days after a credit rating event). The return patterns imply that there are average abnormal returns for both firm types. However, the trend is not as negative as expected. Based on a mere visual evaluation, there are obvious differences, at least when looking at the days after the credit rating change. The average cumulative abnormal returns for cross-listed firms have a clear negative drift, while it is difficult to say anything about the cumulative returns for non cross-listed firms.

Graph 1 and 2 – Returns for both firm types for event window [-10, 10].



Looking at the average abnormal returns during the event window [-3, 3], there are clear differences between the two firm types (see Graph 3 and 4). For cross-listed firms, the negative share price reactions seem to begin two days prior to the event day, while the negative abnormal returns for non cross-listed firms begin only one day before the event. In other words, even though both firm types exhibit negative abnormal returns on day -1, it appears as if the share price returns for cross-listed firms are anticipated earlier, as there is negative abnormal return already two days before the event date.

Graph 3 and 4 – Returns for both firm types for event window [-3, 3].



The development of abnormal returns for all event windows is presented in Graph 1-18 in the Appendix.

9.1.2. The Significance of Abnormal Returns

Table V below reports the results from our calculations of cumulative abnormal returns based on the entire sample of downgrades and possible downgrades for cross-listed and non cross-listed firms respectively. Independent of which event window we look at, the cumulative abnormal returns for cross-listed firms are all negative and significant on a 1% significance level, while all the cumulative abnormal returns for non cross-listed firms are insignificant.

Table V - Cumulative abnormal returns for both firm types and all event windows.

	Cross-listed firms				Non cross-listed firms			
Event window	**Coef.**	**Std.Err.**	**t**	**P>|t|**	**Coef.**	**Std.Err.**	**t**	**P>|t|**
-1 to 0	-0.0442	0.0105	-4.19	0.000	0.01783	0.01910	0.93	0.356
-3 to 0	-0.0400	0.0098	-4.08	0.000	0.02978	0.01717	1.73	0.086
-10 to 0	-0.0543	0.0089	-6.11	0.000	0.00599	0.01517	0.4	0.693
-1 to 1	-0.0458	0.0087	-5.26	0.000	0.00234	0.01456	0.16	0.873
-3 to 3	-0.0617	0.0089	-6.90	0.000	0.01653	0.01128	1.47	0.145
-10 to 10	-0.0912	0.0086	-10.57	0.000	0.02189	0.01407	1.56	0.12
0 to 1	-0.0427	0.0139	-3.07	0.003	-0.02384	0.01924	-1.24	0.222
0 to 3	-0.0628	0.0133	-4.72	0.000	-0.02619	0.01638	-1.6	0.114
0 to 10	-0.0780	0.0126	-6.17	0.000	0.00051	0.01343	0.04	0.97

9.2. Results of Cross-Sectional Regression Analysis

The results of the cross-sectional regression analysis can be found in Table VI-XIV in the Appendix. The presentation of the results is divided by the event windows “before and after”, “before” and “after”. We have also included a section where we check the effect of each control variable by adding them sequentially. To check the robustness of our obtained results, we have performed a series of tests on the assumptions underlying the OLS regression methodology. These tests are reported and explained in the Appendix.

9.2.1. Before and After

The result for the event window [-1, 1] shows significant values for our hypothesis that the different firm types react differently to a rating change. However, the result is in opposite direction of what we expected. The sign of the coefficient for our dummy variable for being cross-listed is negative with a coefficient of -0.6566, implying that a cross-listed firm reacts more negatively to a downgrade or a possible downgrade than a non cross-listed firm, all else equal. This result is significant on a 5 % significance level (see Table VI in the Appendix). For the event window [-3, 3] we find the same negative relation to be significant on a 10 % significance level (see Table VII in the Appendix). For the widest

event window, [-10, 10], the sign of the coefficient is negative but insignificant (see Table VIII in the Appendix).

Our variable controlling for size is negative and significant on a 1 % significance level for the most narrow event window [-1, 1] and on a 5 % significance level for the event window [-3, 3]. The sign of the coefficient is negative, implying that larger firms react more negatively to a rating change than small firms. For the event window [-10, 10] size does not have any significant explanatory power. None of the other control variables are significant on a 5 % or a 10 % level for these event windows.

9.2.2. Before

Table IX-XI in the Appendix present the result of the regression testing for trends in periods prior to a rating change. For the most narrow event window [-1, 0] we find significant results for the dummy variable for being cross-listed (with a p-value of 1.6 %). As for the previous event windows the sign of the coefficient is negative, i.e. the opposite of what we expected. The same holds for the result for the event window [-3, 0], with a coefficient of -0.8094 and a p-value of 2.8 %.

Looking at the explanatory power of our control variables, the tables show that besides from the dummy for being cross-listed or not, size is the only variable that is significant on a 5 % significance level. However, for the event window [-10, 0], none of the control variables are significant.

9.2.3. After

We expect to find the most significant share price reaction shortly after the rating change announcement. For the event window [0, 1] the difference between the two firm types as represented by the dummy for being cross-listed, is negative and significant on a 10 % significance level (see Table XII in the Appendix). For the event window [0, 3] the coefficient is insignificant, while it for the event window [0, 10] is negative and significant on a 1 % significance level (see Table XIII and XIV in the Appendix).

Regarding the control variables, size is the only variable with explanatory power. It is significant on a 1 % significance level for all three event windows examining cumulative abnormal returns after a rating change. The sign is negative with coefficients of -0.1486, -0.1595 and -0.2542 for the event windows [0, 1], [0, 3] and [0, 10] respectively (see Table XII-XIV in the Appendix).

9.2.4. Adding Each Control Variable Sequentially

For the event window [-1, 1] we show the impact of each control variable. This shows that when excluding control variables for size, leverage and profitability, the r-square is notably lower (see Table XV

in the Appendix). This implies that the model lacks control variables. By adding size as a control variable r-square rises to 49.91 % and by additionally including profitability we reach an r-square of 56.35 %. All results are significant on a 5 % significance level and all show a negative coefficient for the dummy of being cross-listed. The results can be found in Table XV-XVII in the Appendix.

10. Analysis

In this section we analyse the results presented in the previous section and consider the results with regard to our hypotheses. For the first hypothesis, we find mixed evidence. We find significant negative share price reactions only for cross-listed companies and insignificant reactions for non cross-listed firms. For the second hypothesis, we find evidence of a relation opposite of that we expected. In this section we also outline the possible explanations to these findings.

First, we conclude that our results provide mixed evidence for our first hypothesis, that the market does not fully anticipate all rating changes and is hence associated with abnormal share price returns around the announcement of such events. For cross-listed firms, we find negative and significant announcement returns for all event windows (see Table V in the Appendix). Hence, we conclude that the relation holds for this group of firms. This finding is supportive of previous evidence from similar studies on the effects of rating changes. For non cross-listed firms on the other hand, the results are not significant. Hence, we conclude that our first hypothesis only holds true for cross-listed firms.

Second, we relate the results to our second hypothesis, that the negative abnormal returns caused by a rating event are smaller for cross-listed firms than for non cross-listed firms. Here, we observe effects opposite of those we expected. We find that the difference between the two groups of firms (the dummy for being cross-listed) is statistically significant at the 5 % significance level for the event windows [-1, 1], [-1, 0], [-3, 0] and [0, 10]. The negative coefficient implies that cross-listed firms on average show more negative share price reactions to a rating change than non cross-listed firms.

These results are robust to differences in size, leverage and profitability between the two groups of firms. The impact of leverage and profitability are shown to have only insignificant explanatory power for the differences in reactions to rating changes. Size, on the other hand, is shown to be an important explanation factor for the share price reaction. For the event windows [-1, 1], [-3, 3], [-1, 0], [-3, 0], [0, 1] and [0, 10] the effect of size is significant at the 5 % significance level. For non-cross listed firms, the direction of the effect of size is uniform across all event windows: that larger firms on average exhibit more negative share price returns than smaller firms. The result for cross-listed firms indicates that the

relationship is the opposite (i.e. that smaller firms on average exhibit more negative share price returns than larger firms), as the sum of the coefficient of the interaction variable of being cross-listed and size and the coefficient of size is consistently positive. These results are significant for the event windows [-1, 1], [-3, 3], [-1, 0], [-3, 0], [0, 1] and [0, 10].

To seek explanations for the observed pattern of announcement returns, we first analyse how and to what extent our results are caused by the effects related to the phenomenon of being cross-listed or not, examining both disclosure related and investor related aspects. Second we elaborate on possible explanations related to the indications of positive announcement effects observed for the non cross-listed firms in our study.

10.1. Impact of Differences in Corporate Regulation

The legal and regulatory framework is known to be tougher in the United States compared to Brazil. The bonding hypothesis suggests that cross-listed firms rent the stricter regulatory framework in the United States and thus that the amount and relevance of information supplied by these firms are larger than for non cross-listed firms. This should imply that investors of cross-listed companies are less affected by a downgrade than investors of non cross-listed companies, when the actual rating event occurs, as the investors of cross-listed firms have already incorporated this information into the share price. At odds with our expectations, we find evidence of the reverse relation, that cross-listed firms exhibit a more negative share price reaction than non cross-listed firms.

A possible explanation to this could be that these firms release less additional information (i.e. information not required by law or regulation) compared to non cross-listed firms. It is possible that non cross-listed firms compensate for the lower disclosure levels by revealing more forecasts of financial statements and financial prospects. Some evidence in favour of this view is provided by Frost (1996) in a study of whether the strict disclosure requirements in the United States deter companies from releasing relevant forward-looking information compared to companies in countries with less stringent legal and regulatory requirements. Frost compares the frequency, specificity, and conservativeness of managers' timely forward-looking disclosures and demonstrates that U.S. firms in general release fewer disclosure forecasts and have lower forecast frequency than companies in countries such as France and Japan where the requirements are less rigorous. This result may be applicable also for Brazilian non cross-listed firms. In absence of higher disclosure requirements, it may be the case that non cross-listed firms aim to compensate for the higher information asymmetry by releasing more information.

Another possible reason for why our results in general do not support previous evidence that cross-listed firms have lower information asymmetries than non cross-listed firms, may be that the differences between the Brazilian and U.S. regulations are not as significant as suggested. As discussed, the regulation of companies in Brazil has become to a large part self-regulated. It is possible that the voluntary self-governance practices (through for instance the additional listing levels on the BM&FBovespa) have been adopted to such a considerable degree that the Brazilian companies enjoy stronger confidence among investors than previously believed.

Further, a potential explanation for the increased impact of a downgrade for cross-listed firms could be the ownership structure. Firms in countries with low disclosure requirements tend to have more concentrated ownership structures than firms in other countries. Previous studies have shown that highly concentrated ownership structures can be used as a method to decrease information asymmetry (La Porta et. al., 1998). Hence, a possible explanation to our results could be that Brazilian firms tend to have ownership structures with fewer and larger shareholders than average firms have.

10.2. Impact of Differences in Shareholder Types

The *type* of shareholder could also affect the degree of reaction to credit rating changes. A company that has owners sensitive to fluctuations in credit rate levels, should experience stronger share price reactions than companies with non-sensitive owners. Hedge funds, pension funds or mutual funds with specific investment requirements for instance, could be very sensitive to the characteristics of their investments, such as level of rating (or category of market capitalization, for instance) and could be forced to take drastic actions and sell off shares if the outlook of a firm is changed. For instance, some funds may be restricted to investments in investment grade bonds only. A rating of a company causing a migration from investment grade to non investment grade would in that case call for an immediate disposal of the asset. In contrast, small private shareholders are less likely to be sensitive to these types of changes (it is possible that they would not even notice an event like this).

10.3. Impact of the Wealth Redistribution Effect

As explained above, it is not necessarily the case that equity prices should exhibit a negative reaction to the announcement of a downgrade or a possible downgrade. The wealth redistribution theory suggests that positive share price reactions to credit rating changes can be explained by a transfer of value from bondholders to equity holders in cases where the credit rating change is motivated by increased volatility in the firm's cash flow patterns. Hence, if many of the ratings for non cross-listed firms in our sample are downgrades with a rationale that in fact has positive implications for shareholders, a likely

explanation for the observed overall positive (but insignificant) announcement effect is that these observations cancel the negative effects out and cause the average reaction to be insignificant. As we lack information on the rationale for the individual rating actions we are unable to examine to what extent this type of downgrades influence the direction of the announcement effects in our data sample.

10.4. Impact of Market Anticipation

As mentioned previously, the magnitude and direction of the announcement effect depend on the degree of market anticipation. By excluding all downgrades overlapping another within a 21-day period we control to some extent for anticipated events. However, there are some effects of market anticipation that we have not been able to control for that could explain the positive announcement effects in our sample. For instance, should the market anticipate a downgrade of a company by two notches, and then the company is only downgraded by one notch, the announcement effect is likely to be smaller, or even positive. By the same logic, anticipation can also have distorting effects when a rating is less timely. If a rating change is perceived as less timely by the market, i.e. that the information provided is already known and incorporated into the share price, there should be no market reaction associated with the event.

11. Conclusions

This thesis aims to investigate whether foreign firms cross-listed in the United States are associated with less information asymmetry than firms that are not cross-listed. Based on the characteristics of cross-listed firms, e.g. that cross-listed firms are subject to the stricter U.S. disclosure requirements, we expected this group of firms to exhibit smaller abnormal returns associated with a credit rating change as an indication of less information asymmetry. To test these implications, we have performed a multivariate regression analysis to compare the announcement returns of negative credit rating changes for Brazilian firms cross-listed in the United States compared to domestically listed Brazilian firms during the period 1996-2009. Opposite to our expectations, we find that the cross-listed firms in our study on average exhibit *larger* abnormal returns than the non cross-listed firms, implying that they experience more information asymmetry and hence are less transparent than non cross-listed firms. We can thus not conclude that cross-listing in the United States is an effective corporate governance mechanism to reduce the information asymmetry between a company and its outside investors. We have identified several possible explanations for this observed relation. For instance, we suggest that differences in disclosure requirements, ownership structure and shareholder types could explain the larger announcement returns for cross-listed firms.

12. Suggestions for Further Research

The concepts of cross-listing and announcement effects associated with rating changes are both extensively investigated in previous research. This thesis makes an attempt to investigate what impact cross-listing has on the transparency of a firm by examining the reactions in share price to credit rating changes. This area is to our knowledge previously unexplored and several questions remain interesting for areas for future research.

First, it would be of interest to investigate our hypotheses on a larger set of data, covering a larger number of rating events over a longer time period. With access to a larger set of credit rating data than available for this thesis one could further mitigate the problems of sample specific noise. In addition, more detailed information on the rationale behind the individual rating actions could allow for a more thorough analysis of the existence of positive announcement returns to downgrades.

Second, it would be interesting to repeat our study on other countries or geographical regions to test if our results show tendencies common for all cross-listed firms or if they illustrate trends specific for Brazilian firms. It could also be interesting to take into consideration the ownership structure and the shareholder types to examine to what extent these characteristics can explain any differences. However, we were unable to find sufficient data on ownership structures.

Finally, an analysis of the transparency of cross-listed firms compared to non cross-listed firms using other measures of level of transparency, such as share price reactions to earnings forecasts for instance, could be an interesting complement to this study.

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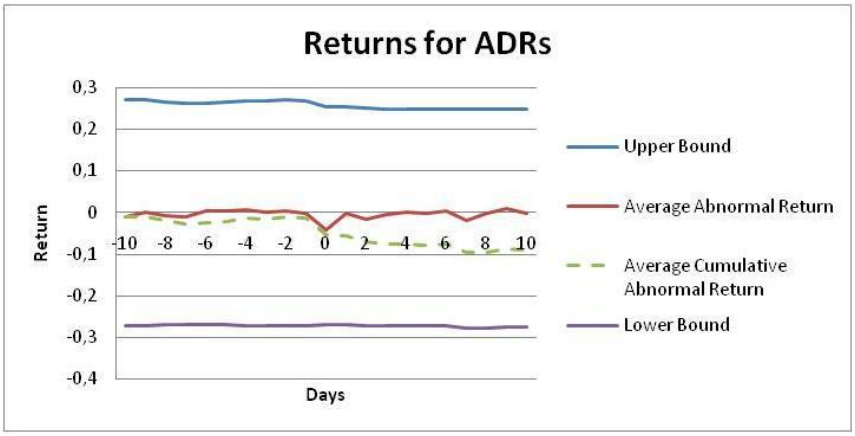
14. Appendix

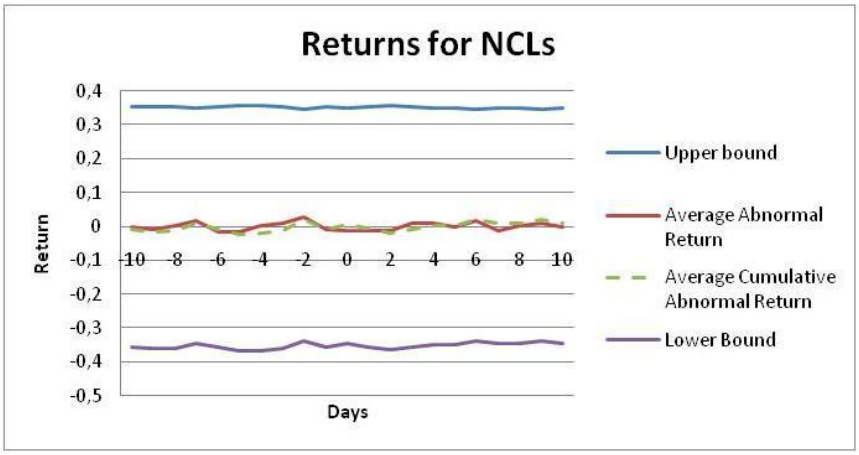
14.1. Graphs

14.1.1. Event Study

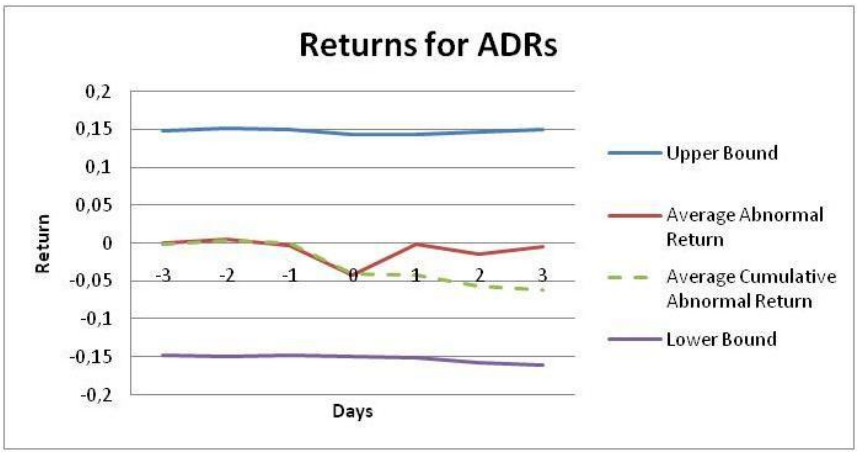
Graph 1. Returns for cross-listed firms, event window [-10, 10].



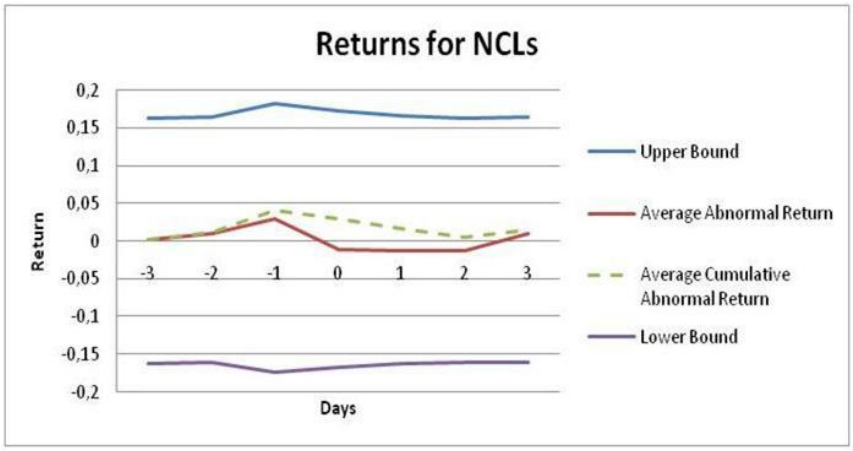
Graph 2. Returns for non cross-listed firms, event window [-10, 10].



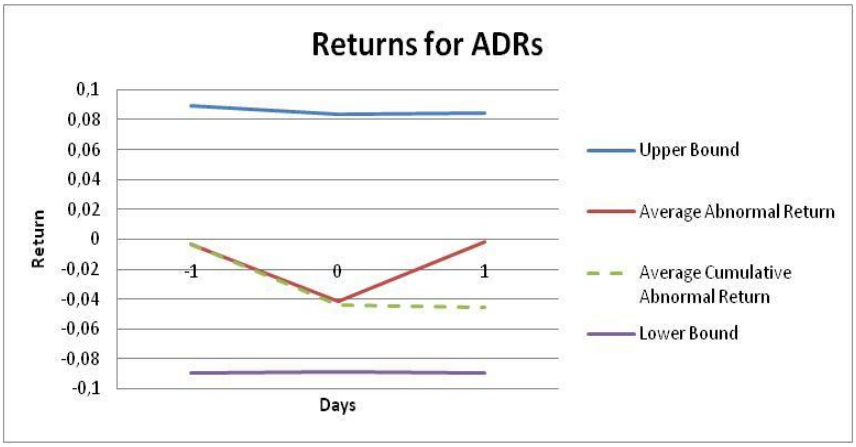
Graph 3. Returns for cross-listed firms, event window [-3, 3].



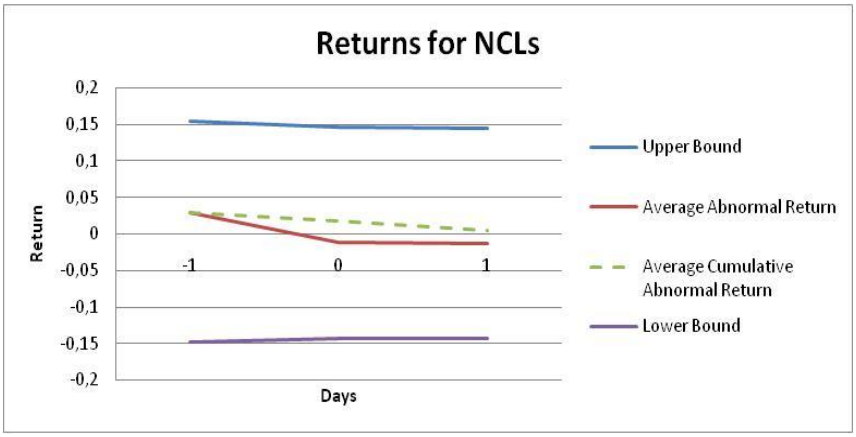
Graph 4. Returns for non cross-listed firms, event window [-3, 3].



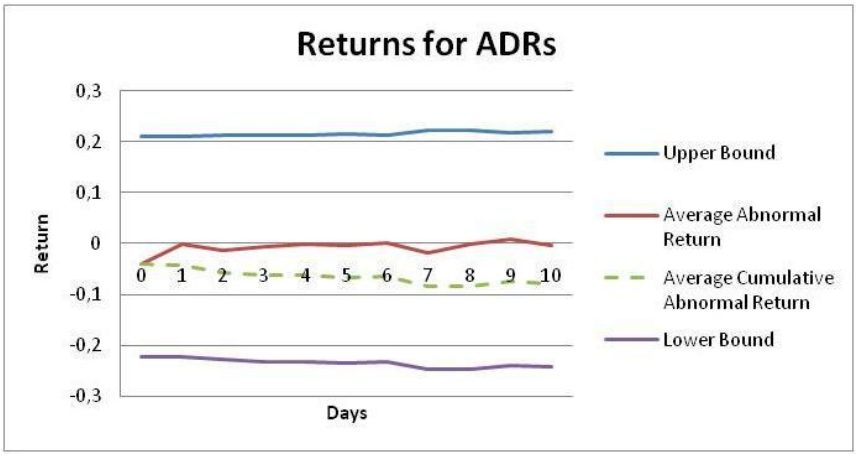
Graph 5. Returns for cross-listed firms, event window [-1, 1].



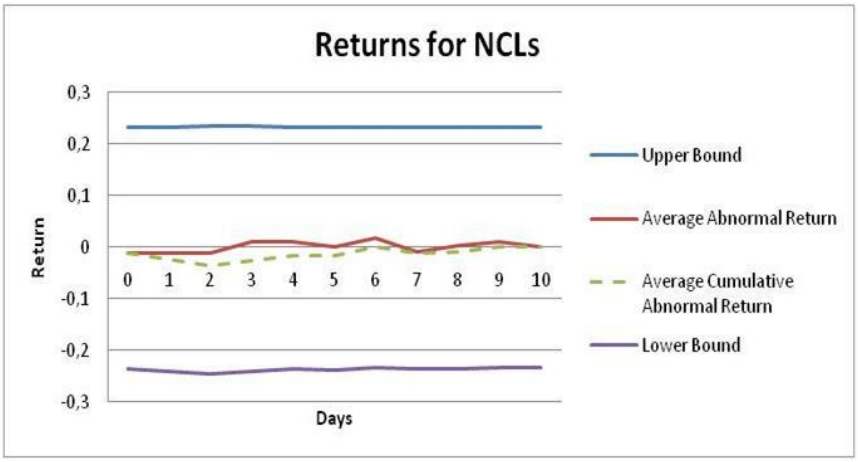
Graph 6. Returns for non cross-listed firms, event window [-1, 1].



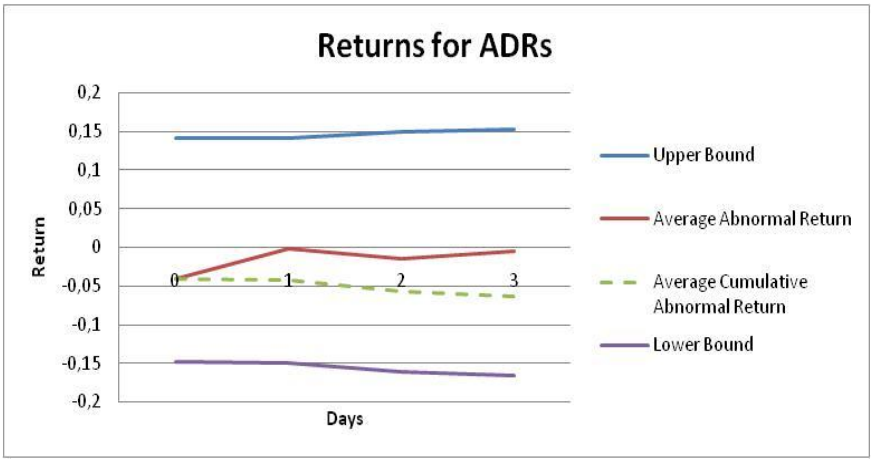
Graph 7. Returns for cross-listed firms, event window [0, 10].



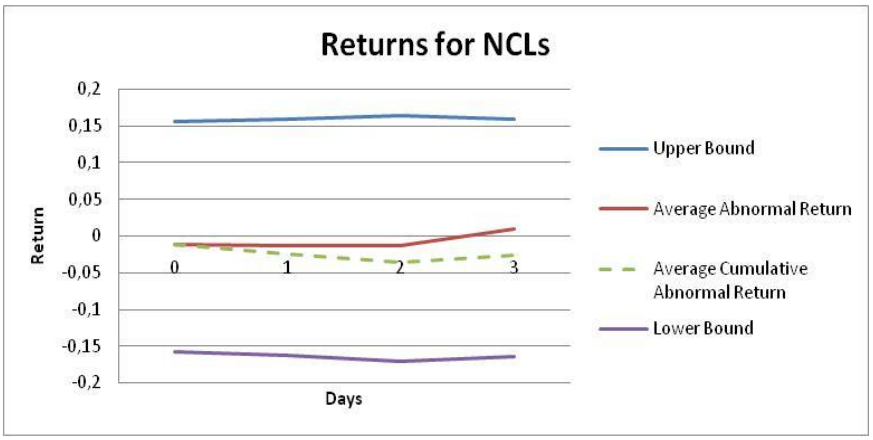
Graph 8. Returns for non cross-listed firms, event window [0, 10].



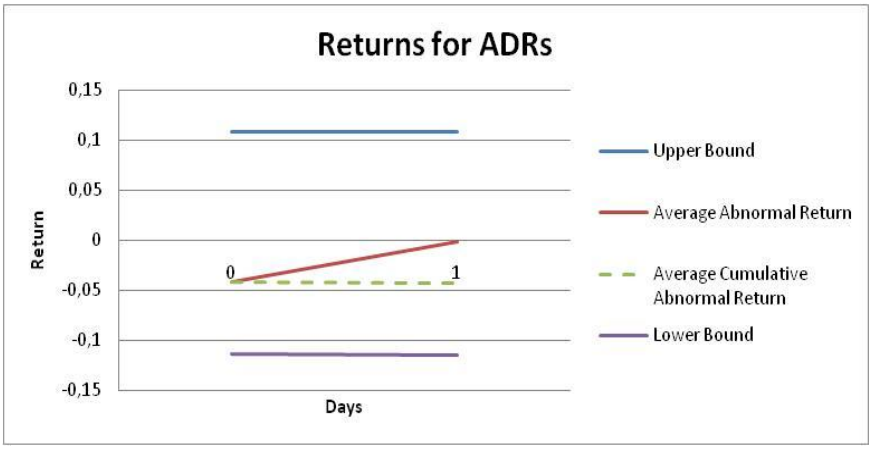
Graph 9. Returns for cross-listed firms, event window [0, 3].



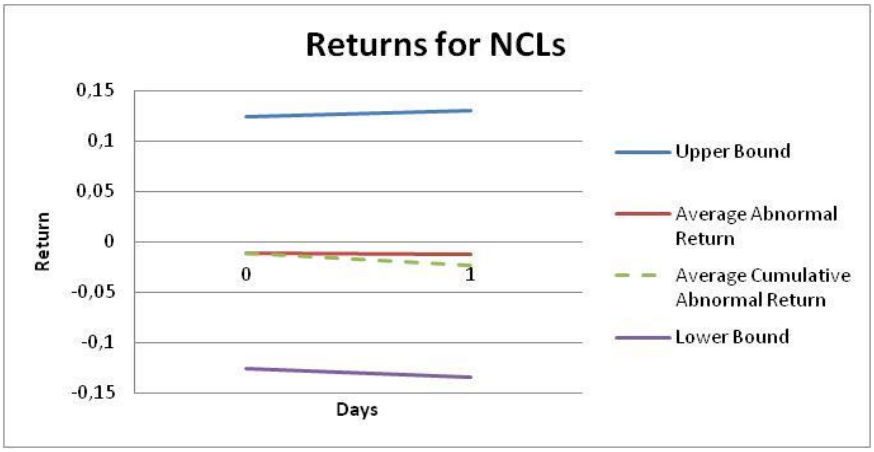
Graph 10. Returns for non cross-listed firms, event window [0, 3].



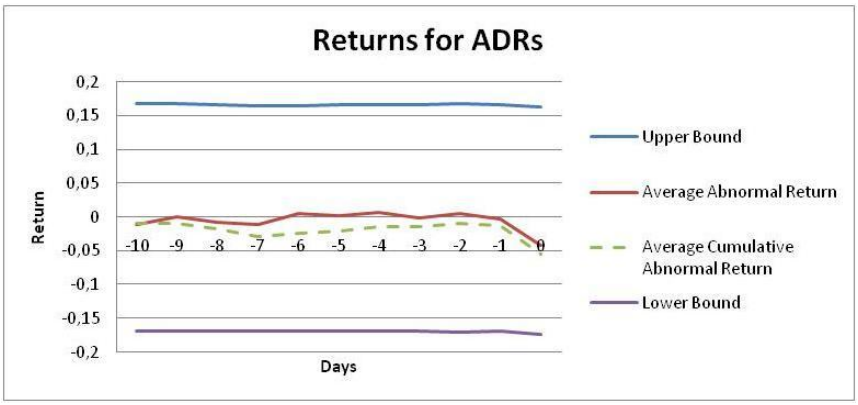
Graph 11. Returns for cross-listed firms, event window [0, 1].



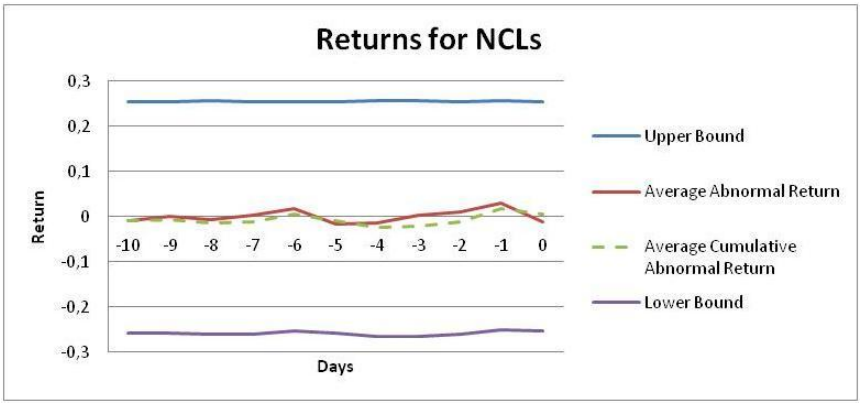
Graph 12. Returns for non cross-listed firms, event window [0, 1].



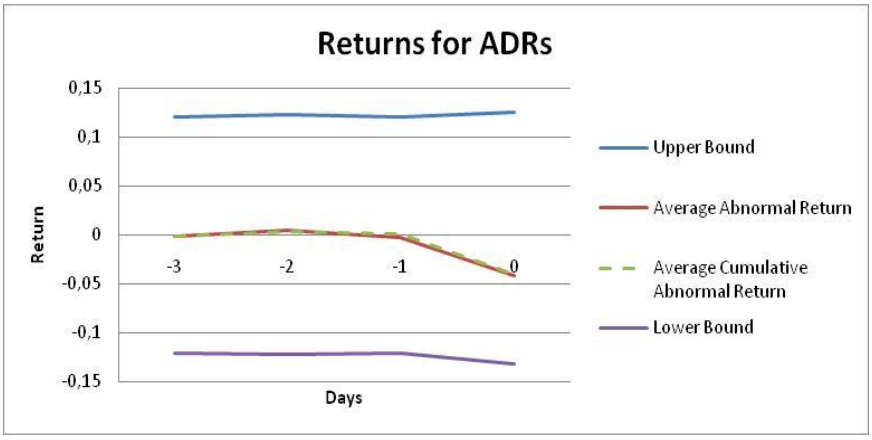
Graph 13. Returns for cross-listed firms, event window [-10, 0].



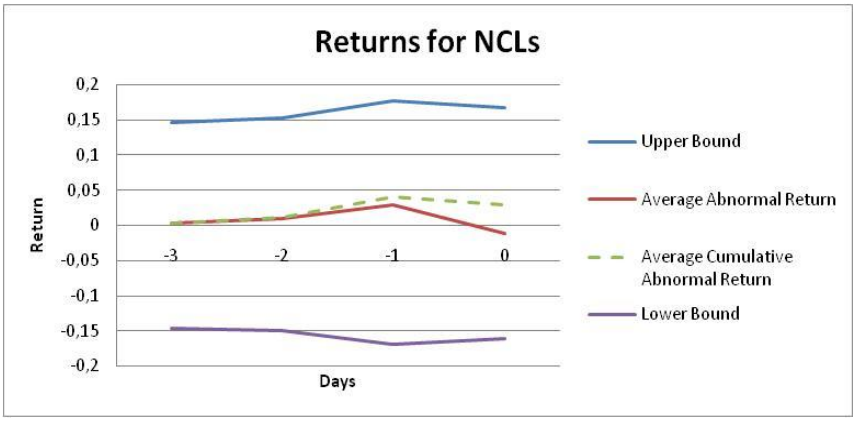
Graph 14. Returns for non cross-listed firms, event window [-10, 0].



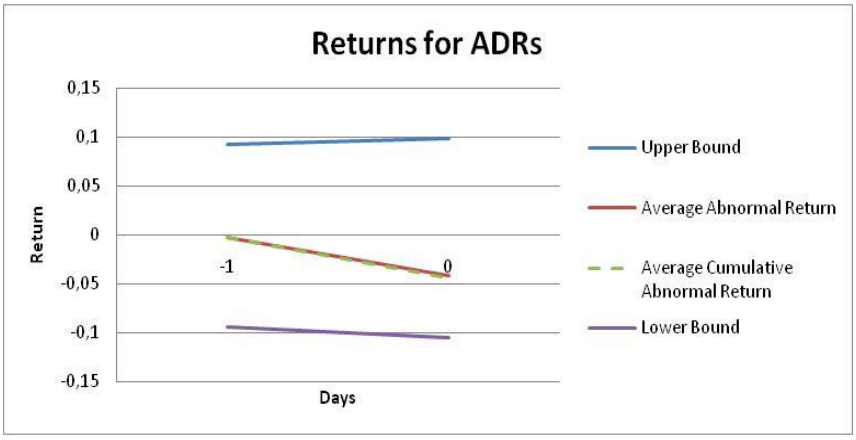
Graph 15. Returns for cross-listed firms, event window [-3, 0].



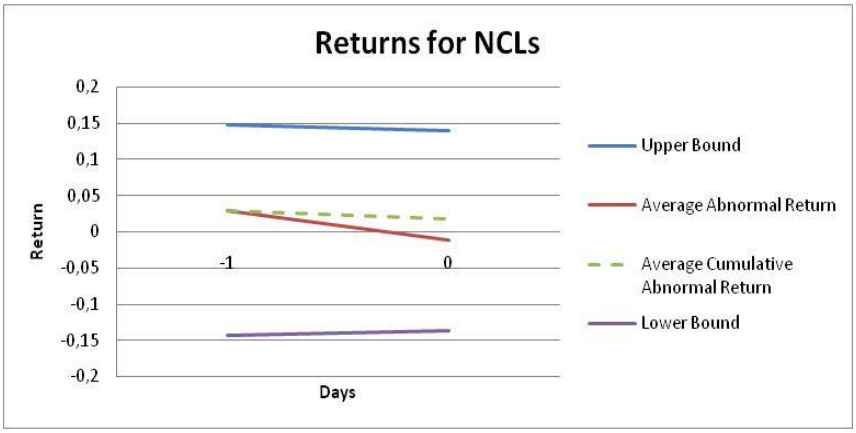
Graph 16. Returns for non cross-listed firms, event window [-3, 0].



Graph 17. Returns for cross-listed firms, event window [-1, 0].



Graph 18. Returns for non cross-listed firms, event window [-1, 0].



14.2. Tables

14.2.1. Data

Table I. Actual rating scales of Standard and Poor's (S&P) and Moody's and the common rating scales assigned.

Common rating definitions

S&P	Moody's	Gradation	Grade number
AAA	Aaa	1	1
AA+	Aa1	2	1
AA	Aa2	3	1
AA-	Aa3	4	1
A+	A1	5	1
A	A2	6	2
A-	A3	7	2
BBB+	Baa1	8	2
BBB	Baa2	9	2
BBB-	Baa3	10	2
BB+	Ba1	11	3
BB	Ba2	12	3
BB-	Ba3	13	3
B+	B1	14	3
B	B2	15	3
B-	B3	16	3
CCC+	Caa1	17	4
CCC	Caa2	18	4
CCC-	Caa3	19	4
CC	Ca	20	4
R/SD	C	21	5
D	D	22	5

For the ratings between Aa (AA) and Caa (CCC) a rating grade 1-3 (+ or -) is assigned to show the relative strength within the rating classifications.

14.2.2. Event Study

Table II. Student's t-test for differences in means for cross-listed and non cross-listed firms.

T-tests	p-value
Magnitude of rating (number of grades changed)	0.2784
Level of rating	0.3813

Table III. Distribution of possible downgrades (PD) and downgrades (D) for Standard and Poor's and Moody's respectively for non cross-listed firms.

	S&P	Moody's	Total
PD	6	6	12
D	5	5	10
Total	11	11	22

Table IV. Distribution of possible downgrades (PD) and downgrades (D) for Standard and Poor's and Moody's respectively for cross-listed firms.

	S&P	Moody's	Total
PD	12	2	14
D	11	3	14
Total	23	5	28

Table V. Cumulative abnormal returns for both firm types and all event windows.

	Cross-listed firms				Non cross-listed firms			
Event window	**Coef.**	**Std.Err.**	**t**	**P>|t|**	**Coef.**	**Std.Err.**	**t**	**P>|t|**
-1 to 0	-0.0442	0.0105	-4.19	0.000	0.01783	0.01910	0.93	0.356
-3 to 0	-0.0400	0.0098	-4.08	0.000	0.02978	0.01717	1.73	0.086
-10 to 0	-0.0543	0.0089	-6.11	0.000	0.00599	0.01517	0.4	0.693
-1 to 1	-0.0458	0.0087	-5.26	0.000	0.00234	0.01456	0.16	0.873
-3 to 3	-0.0617	0.0089	-6.90	0.000	0.01653	0.01128	1.47	0.145
-10 to 10	-0.0912	0.0086	-10.57	0.000	0.02189	0.01407	1.56	0.12
0 to 1	-0.0427	0.0139	-3.07	0.003	-0.02384	0.01924	-1.24	0.222
0 to 3	-0.0628	0.0133	-4.72	0.000	-0.02619	0.01638	-1.6	0.114
0 to 10	-0.0780	0.0126	-6.17	0.000	0.00051	0.01343	0.04	0.97

14.2.3. Cross-Sectional Regressions

Table VI. Cross-sectional regression result for event window [-1, 1].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.5730
Root MSE	0.0832

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.6566	0.2862	-2.2900	0.0280	-1.2389	-0.0744
logsize	-0.1588	0.0448	-3.5400	0.0010	-0.2500	-0.0675
ADR_logsize	0.2104	0.0749	2.8100	0.0080	0.0580	0.3627
profitabil~y	0.0074	0.0052	1.4300	0.1610	-0.0031	0.0179
ADR_profit~y	-0.0080	0.0047	-1.6800	0.1020	-0.0176	0.0017
leverage	-0.0161	0.2618	-0.0600	0.9510	-0.5488	0.5165
ADR_leverage	-0.1490	0.2854	-0.5200	0.6050	-0.7297	0.4316
_It_1998	-0.0779	0.0859	-0.9100	0.3710	-0.2527	0.0970
_It_1999	-0.1844	0.0758	-2.4300	0.0210	-0.3386	-0.0302
_It_2001	-0.0271	0.0605	-0.4500	0.6580	-0.1502	0.0961
_It_2002	-0.0540	0.0602	-0.9000	0.3760	-0.1765	0.0684
_It_2003	-0.0775	0.0930	-0.8300	0.4110	-0.2668	0.1118
_It_2006	-0.1222	0.0548	-2.2300	0.0330	-0.2337	-0.0108
_It_2007	-0.1035	0.0602	-1.7200	0.0950	-0.2260	0.0191
_It_2008	-0.1155	0.0599	-1.9300	0.0630	-0.2374	0.0065
_It_2009	-0.0929	0.0559	-1.6600	0.1060	-0.2066	0.0207
_cons	0.5974	0.1607	3.7200	0.0010	0.2706	0.9243

Table VII. Cross-sectional regression result for event window [-3, 3].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.4885
Root MSE	0.1230

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.7949	0.4403	-1.8100	0.0800	-1.6908	0.1009
logsize	-0.1694	0.0639	-2.6500	0.0120	-0.2994	-0.0393
ADR_logsize	0.2700	0.1070	2.5200	0.0170	0.0523	0.4878
profitabil~y	0.0091	0.0073	1.2400	0.2230	-0.0058	0.0241
ADR_profit~y	-0.0098	0.0071	-1.3800	0.1770	-0.0244	0.0047
leverage	-0.1518	0.3087	-0.4900	0.6260	-0.7797	0.4762
ADR_leverage	-0.2101	0.3741	-0.5600	0.5780	-0.9713	0.5511
_It_1998	-0.1592	0.1018	-1.5600	0.1270	-0.3663	0.0479
_It_1999	-0.1015	0.1188	-0.8500	0.3990	-0.3432	0.1402
_It_2001	-0.0769	0.0797	-0.9700	0.3410	-0.2390	0.0852
_It_2002	-0.1145	0.0995	-1.1500	0.2580	-0.3169	0.0879
_It_2003	-0.1430	0.1502	-0.9500	0.3480	-0.4486	0.1626
_It_2006	-0.2270	0.0810	-2.8000	0.0080	-0.3919	-0.0621
_It_2007	-0.2026	0.0967	-2.1000	0.0440	-0.3994	-0.0059
_It_2008	-0.1032	0.0771	-1.3400	0.1900	-0.2601	0.0536
_It_2009	-0.1664	0.0868	-1.9200	0.0640	-0.3430	0.0102
_cons	0.6987	0.2384	2.9300	0.0060	0.2136	1.1837

Table VIII. Cross-sectional regression result for event window [-10, 10].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.3676
Root MSE	0.2611

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-1.2624	0.7760	-1.6300	0.1130	-2.8413	0.3164
logsize	-0.2055	0.1580	-1.3000	0.2020	-0.5269	0.1159
ADR_logsize	0.4033	0.2047	1.9700	0.0570	-0.0131	0.8198
profitabil~y	0.0160	0.0214	0.7500	0.4590	-0.0275	0.0596
ADR_profit~y	-0.0203	0.0203	-1.0000	0.3240	-0.0617	0.0210
leverage	-0.0906	0.6159	-0.1500	0.8840	-1.3437	1.1626
ADR_leverage	-0.3443	0.7386	-0.4700	0.6440	-1.8469	1.1584
_It_1998	-0.2939	0.2114	-1.3900	0.1740	-0.7239	0.1361
_It_1999	-0.0747	0.4503	-0.1700	0.8690	-0.9909	0.8414
_It_2001	-0.1032	0.2185	-0.4700	0.6400	-0.5476	0.3413
_It_2002	-0.0654	0.2364	-0.2800	0.7840	-0.5463	0.4156
_It_2003	-0.0999	0.2795	-0.3600	0.7230	-0.6685	0.4687
_It_2006	-0.3056	0.2130	-1.4300	0.1610	-0.7391	0.1278
_It_2007	-0.1929	0.2378	-0.8100	0.4230	-0.6767	0.2909
_It_2008	-0.3320	0.2019	-1.6400	0.1100	-0.7427	0.0787
_It_2009	-0.2639	0.2284	-1.1600	0.2560	-0.7285	0.2008
_cons	0.8693	0.6873	1.2600	0.2150	-0.5291	2.2678

Table IX. Cross-sectional regression result for event window [-1, 0].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.5452
Root MSE	0.0881

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.6864	0.2707	-2.5400	0.0160	-1.2371	-0.1358
logsize	-0.1292	0.0469	-2.7500	0.0100	-0.2247	-0.0337
ADR_logsize	0.2195	0.0749	2.9300	0.0060	0.0671	0.3719
profitabil~y	0.0081	0.0058	1.4100	0.1680	-0.0036	0.0198
ADR_profit~y	-0.0085	0.0053	-1.5900	0.1210	-0.0193	0.0023
leverage	0.1087	0.3273	0.3300	0.7420	-0.5572	0.7746
ADR_leverage	-0.1885	0.3407	-0.5500	0.5840	-0.8817	0.5048
_It_1998	-0.0687	0.1106	-0.6200	0.5390	-0.2938	0.1564
_It_1999	-0.1397	0.0832	-1.6800	0.1030	-0.3088	0.0295
_It_2001	-0.0610	0.0695	-0.8800	0.3860	-0.2023	0.0803
_It_2002	-0.1029	0.0680	-1.5100	0.1400	-0.2414	0.0355
_It_2003	-0.0369	0.0945	-0.3900	0.6990	-0.2292	0.1554
_It_2006	-0.1803	0.0624	-2.8900	0.0070	-0.3074	-0.0533
_It_2007	-0.1266	0.0660	-1.9200	0.0640	-0.2609	0.0077
_It_2008	-0.1382	0.0643	-2.1500	0.0390	-0.2689	-0.0074
_It_2009	-0.1367	0.0636	-2.1500	0.0390	-0.2662	-0.0073
_cons	0.4869	0.1592	3.0600	0.0040	0.1631	0.8108

Table X. Cross-sectional regression result for event window [-3, 0].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.5159
Root MSE	0.1163

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.8094	0.3524	-2.3000	0.0280	-1.5264	-0.0924
logsize	-0.1289	0.0536	-2.4100	0.0220	-0.2380	-0.0199
ADR_logsize	0.2826	0.0954	2.9600	0.0060	0.0884	0.4768
profitabil~y	0.0074	0.0074	1.0000	0.3250	-0.0076	0.0224
ADR_profit~y	-0.0093	0.0068	-1.3700	0.1810	-0.0231	0.0046
leverage	0.2502	0.4005	0.6200	0.5370	-0.5648	1.0651
ADR_leverage	-0.4035	0.4376	-0.9200	0.3630	-1.2939	0.4869
_It_1998	-0.0139	0.1269	-0.1100	0.9140	-0.2721	0.2443
_It_1999	0.0535	0.1126	0.4700	0.6380	-0.1757	0.2826
_It_2001	-0.0740	0.0812	-0.9100	0.3690	-0.2392	0.0912
_It_2002	-0.1336	0.0917	-1.4600	0.1540	-0.3202	0.0529
_It_2003	-0.0374	0.1282	-0.2900	0.7720	-0.2981	0.2234
_It_2006	-0.2360	0.0866	-2.7300	0.0100	-0.4121	-0.0598
_It_2007	-0.1872	0.0857	-2.1800	0.0360	-0.3616	-0.0127
_It_2008	-0.1412	0.0741	-1.9100	0.0650	-0.2920	0.0095
_It_2009	-0.1868	0.0799	-2.3400	0.0260	-0.3494	-0.0243
_cons	0.4455	0.2009	2.2200	0.0340	0.0367	0.8544

Table XI. Cross-sectional regression result for event window [-10, 0].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.4291
Root MSE	0.1834

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.3794	0.5368	-0.7100	0.4850	-1.4714	0.7127
logsize	-0.0703	0.0972	-0.7200	0.4740	-0.2680	0.1274
ADR_logsize	0.2188	0.1403	1.5600	0.1280	-0.0666	0.5042
profitabil~y	0.0090	0.0126	0.7200	0.4770	-0.0165	0.0346
ADR_profit~y	-0.0113	0.0123	-0.9100	0.3670	-0.0363	0.0138
leverage	0.5942	0.4077	1.4600	0.1540	-0.2354	1.4238
ADR_leverage	-0.9280	0.4760	-1.9500	0.0600	-1.8964	0.0404
_It_1998	-0.0492	0.1426	-0.3400	0.7320	-0.3392	0.2409
_It_1999	-0.0456	0.2590	-0.1800	0.8610	-0.5724	0.4813
_It_2001	-0.1880	0.1413	-1.3300	0.1920	-0.4756	0.0995
_It_2002	-0.2591	0.1563	-1.6600	0.1070	-0.5770	0.0589
_It_2003	-0.2853	0.1928	-1.4800	0.1480	-0.6774	0.1069
_It_2006	-0.3722	0.1395	-2.6700	0.0120	-0.6560	-0.0884
_It_2007	-0.2956	0.1519	-1.9500	0.0600	-0.6046	0.0134
_It_2008	-0.3794	0.1367	-2.7800	0.0090	-0.6576	-0.1013
_It_2009	-0.3684	0.1407	-2.6200	0.0130	-0.6548	-0.0821
_cons	0.2537	0.4139	0.6100	0.5440	-0.5885	1.0959

Table XII. Cross-sectional regression result for event window [0, 1].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.6079
Root MSE	0.0881

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.5033	0.2880	-1.7500	0.0900	-1.0894	0.0827
logsize	-0.1486	0.0444	-3.3400	0.0020	-0.2390	-0.0582
ADR_logsize	0.1783	0.0746	2.3900	0.0230	0.0265	0.3301
profitabil~y	0.0047	0.0047	1.0000	0.3240	-0.0049	0.0142
ADR_profit~y	-0.0061	0.0044	-1.4000	0.1720	-0.0151	0.0028
leverage	-0.0071	0.2592	-0.0300	0.9780	-0.5344	0.5202
ADR_leverage	-0.2642	0.2914	-0.9100	0.3710	-0.8570	0.3286
_It_1998	-0.1915	0.0961	-1.9900	0.0550	-0.3870	0.0040
_It_1999	-0.2796	0.0672	-4.1600	0.0000	-0.4163	-0.1429
_It_2001	-0.0240	0.0519	-0.4600	0.6470	-0.1295	0.0816
_It_2002	-0.0433	0.0567	-0.7600	0.4500	-0.1587	0.0720
_It_2003	-0.1236	0.0904	-1.3700	0.1810	-0.3075	0.0604
_It_2006	-0.0732	0.0530	-1.3800	0.1760	-0.1810	0.0345
_It_2007	-0.0696	0.0564	-1.2400	0.2250	-0.1843	0.0450
_It_2008	-0.0992	0.0566	-1.7500	0.0890	-0.2143	0.0160
_It_2009	-0.0466	0.0514	-0.9100	0.3710	-0.1511	0.0580
_cons	0.5578	0.1572	3.5500	0.0010	0.2379	0.8777

Table XIII. Cross-sectional regression result for event window [0, 3].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.6574
Root MSE	0.1059

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.5186	0.3609	-1.4400	0.1600	-1.2528	0.2155
logsize	-0.1595	0.0540	-2.9500	0.0060	-0.2694	-0.0496
ADR_logsize	0.1749	0.0869	2.0100	0.0520	-0.0019	0.3516
profitabil~y	0.0072	0.0054	1.3200	0.1950	-0.0039	0.0183
ADR_profit~y	-0.0072	0.0052	-1.3700	0.1800	-0.0179	0.0035
leverage	-0.2842	0.2900	-0.9800	0.3340	-0.8742	0.3059
ADR_leverage	-0.1102	0.3541	-0.3100	0.7580	-0.8307	0.6102
_It_1998	-0.3277	0.1080	-3.0300	0.0050	-0.5474	-0.1080
_It_1999	-0.3898	0.0805	-4.8400	0.0000	-0.5537	-0.2259
_It_2001	-0.0608	0.0602	-1.0100	0.3200	-0.1833	0.0617
_It_2002	-0.0731	0.0750	-0.9700	0.3370	-0.2256	0.0795
_It_2003	-0.1886	0.1138	-1.6600	0.1070	-0.4200	0.0429
_It_2006	-0.1223	0.0634	-1.9300	0.0620	-0.2513	0.0067
_It_2007	-0.1082	0.0739	-1.4600	0.1530	-0.2586	0.0422
_It_2008	-0.0839	0.0643	-1.3000	0.2010	-0.2148	0.0470
_It_2009	-0.0699	0.0656	-1.0700	0.2940	-0.2035	0.0636
_cons	0.7005	0.1938	3.6100	0.0010	0.3061	1.0948

Table XIV. Cross-sectional regression result for event window [0, 10].

Number of obs	50
F(14, 33)	.
Prob > F	.
R-squared	0.6160
Root MSE	0.1672

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-1.4162	0.5002	-2.8300	0.0080	-2.4338	-0.3986
logsize	-0.2542	0.0800	-3.1800	0.0030	-0.4169	-0.0915
ADR_logsize	0.3720	0.1340	2.7800	0.0090	0.0994	0.6445
profitabil~y	0.0124	0.0124	1.0000	0.3230	-0.0128	0.0377
ADR_profit~y	-0.0157	0.0116	-1.3600	0.1840	-0.0393	0.0078
leverage	-0.5670	0.4410	-1.2900	0.2070	-1.4643	0.3302
ADR_leverage	0.2801	0.5314	0.5300	0.6020	-0.8010	1.3613
_It_1998	-0.4270	0.1514	-2.8200	0.0080	-0.7351	-0.1190
_It_1999	-0.2640	0.2406	-1.1000	0.2800	-0.7535	0.2255
_It_2001	0.0270	0.1347	0.2000	0.8420	-0.2470	0.3009
_It_2002	0.1015	0.1359	0.7500	0.4610	-0.1751	0.3780
_It_2003	0.1025	0.1785	0.5700	0.5700	-0.2608	0.4657
_It_2006	-0.0647	0.1292	-0.5000	0.6200	-0.3276	0.1982
_It_2007	0.0100	0.1478	0.0700	0.9470	-0.2908	0.3107
_It_2008	-0.0744	0.1165	-0.6400	0.5270	-0.3114	0.1625
_It_2009	0.0142	0.1392	0.1000	0.9190	-0.2690	0.2975
_cons	1.0629	0.3332	3.1900	0.0030	0.3850	1.7409

Table XV. Cross-sectional regression result for event window [-1, 1] with control variable only for cross-listing.

Number of obs	50
F(9, 39)	.
Prob > F	.
R-squared	0.1451
Root MSE	0.1084

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.0696	0.0343	-2.0300	0.050	-0.1391	-0.0001
_It_1998	0.0229	0.1031	0.2200	0.825	-0.1857	0.2316
_It_1999	-0.0672	0.1190	-0.5700	0.575	-0.3078	0.1734
_It_2001	0.0650	0.0205	3.1700	0.003	0.0235	0.1065
_It_2002	0.0561	0.0279	2.0100	0.051	-0.0003	0.1124
_It_2003	0.0652	0.0343	1.9000	0.065	-0.0042	0.1347
_It_2006	0.0377	0.0354	1.0600	0.293	-0.0339	0.1094
_It_2007	0.0570	0.0384	1.4800	0.146	-0.0208	0.1348
_It_2008	0.0184	0.0407	0.4500	0.654	-0.0640	0.1008
_It_2009	0.0478	0.0414	1.1500	0.256	-0.0360	0.1315
_cons	-0.0182	0.0000	.	0.000	-0.0182	-0.0182

Table XVI. Cross-sectional regression result for event window [-1, 1] with control variables only for cross-listing and size.

Number of obs	50
F(10, 37)	.
Prob > F	.
R-squared	0.4991
Root MSE	0.0852

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.8733	0.2159	-4.0500	0.000	-1.3107	-0.4359
logsize	-0.1717	0.0548	-3.1300	0.003	-0.2828	-0.0607
ADR_logsize	0.2369	0.0596	3.9700	0.000	0.1161	0.3577
_It_1998	-0.0039	0.0667	-0.0600	0.954	-0.1391	0.1314
_It_1999	-0.0704	0.0777	-0.9100	0.37	-0.2278	0.0869
_It_2001	0.0640	0.0292	2.2000	0.035	0.0049	0.1231
_It_2002	0.0506	0.0285	1.7700	0.084	-0.0072	0.1085
_It_2003	0.0579	0.0331	1.7500	0.089	-0.0093	0.1250
_It_2006	-0.0407	0.0215	-1.8900	0.067	-0.0843	0.0029
_It_2007	-0.0080	0.0315	-0.2500	0.801	-0.0718	0.0558
_It_2008	-0.0484	0.0365	-1.3300	0.193	-0.1224	0.0256
_It_2009	0.0010	0.0323	0.0300	0.976	-0.0644	0.0664
_cons	0.5983	0.1968	3.0400	0.004	0.1996	0.9970

Table XVII. Cross-sectional regression result for event window [-1, 1] with control variables only for cross-listing, size and profitability.

Number of obs	50
F(12, 35)	.
Prob > F	.
R-squared	0.5635
Root MSE	0.0817

Variable	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
dummy_cros~d	-0.7399	0.2545	-2.9100	0.006	-1.2565	-0.2232
logsize	-0.1609	0.0454	-3.5500	0.001	-0.2531	-0.0688
ADR_logsize	0.2128	0.0709	3.0000	0.005	0.0689	0.3567
profitabil~y	0.0072	0.0042	1.7200	0.095	-0.0013	0.0157
ADR_profit~y	-0.0066	0.0046	-1.4300	0.162	-0.0161	0.0028
_It_1998	-0.0784	0.0812	-0.9700	0.34	-0.2432	0.0863
_It_1999	-0.1935	0.0735	-2.6300	0.012	-0.3427	-0.0444
_It_2001	-0.0235	0.0590	-0.4000	0.692	-0.1433	0.0962
_It_2002	-0.0444	0.0545	-0.8200	0.42	-0.1550	0.0661
_It_2003	-0.0412	0.0679	-0.6100	0.548	-0.1791	0.0967
_It_2006	-0.1251	0.0533	-2.3500	0.025	-0.2333	-0.0169
_It_2007	-0.0992	0.0571	-1.7400	0.091	-0.2150	0.0167
_It_2008	-0.1191	0.0544	-2.1900	0.035	-0.2295	-0.0088
_It_2009	-0.0877	0.0552	-1.5900	0.121	-0.1998	0.0243
_cons	0.6015	0.1633	3.6800	0.001	0.2699	0.9331

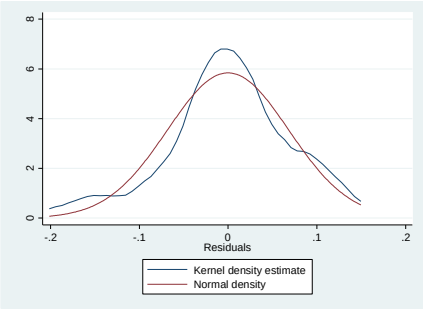
14.3. Robustness Tests of Regression Results

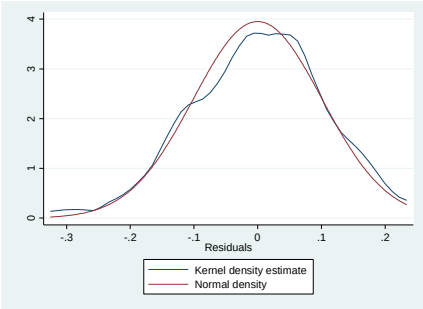
We have performed the analysis of our data with OLS (Ordinary Least Squares) regressions including interaction terms. To obtain reliable results from this methodology we have performed a series of test on underlying assumptions of the model. We have chosen to closer address the issues of normality (normal distribution of the residuals), heteroskedasticity (inconstant variance of the error terms), multicollinearity (high correlation among the explanatory variables) and serial correlation of the error terms.

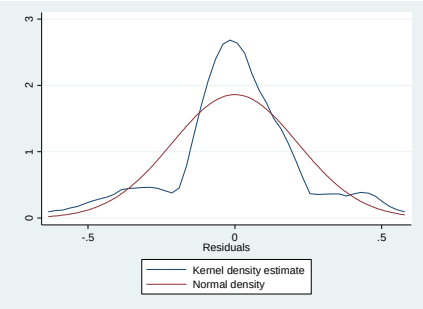
14.3.1. Testing for Normality of Residuals

The OLS methodology requires that the residuals (standard errors) are equally and independently distributed. This is not required to obtain correct estimations of the coefficients, but assures that the significance levels are valid. To test for normality we conduct a Kernel density test on the residuals. This method allows us to graphically evaluate the normality of the residuals. A visual evaluation of the distribution of the residuals indicates that the distribution is not entirely normal. The following graphs illustrate the distribution of the residuals in our regressions together with a normal distribution for comparison.

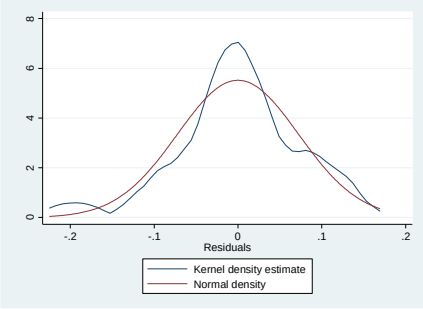
Graphs 19-21. Kernel density tests for normality for event windows [-1, 1], [-3, 3] and [-10, 10].

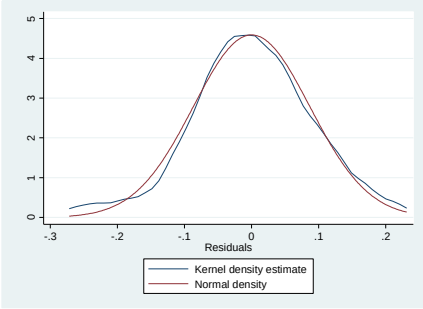


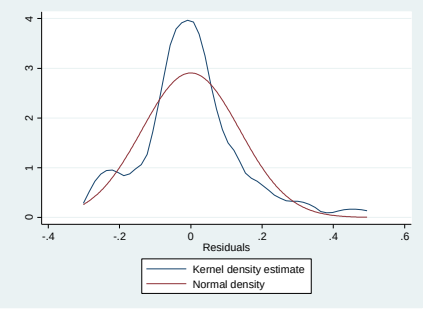




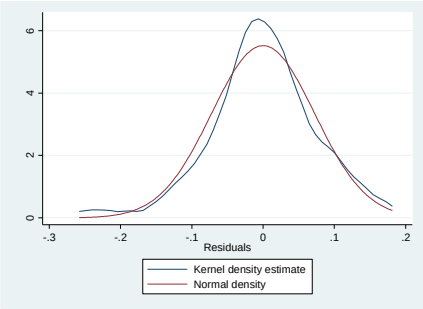
Graphs 22-24. Kernel density tests for normality for event windows [0, 1], [0, 3] and [0, 10].

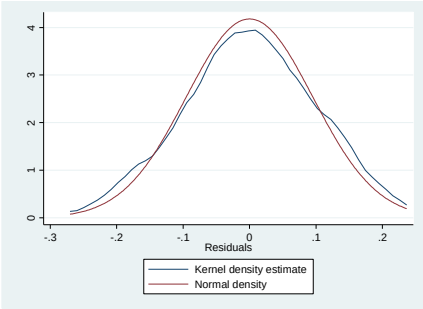


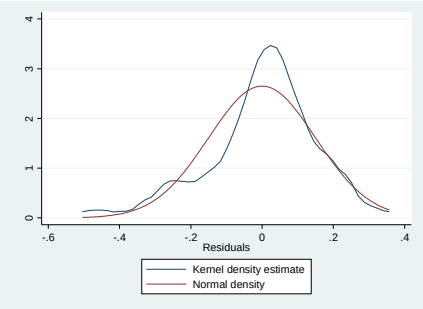




Graphs 25-27. Kernel density tests for normality for event windows [-1, 0], [-3, 0] and [-10, 0].







To further assess the normality of the tests we perform skewness and kurtosis test for normality. The skewness measures the degree of asymmetry of the distribution and kurtosis measures the degree of "peakedness". Low significance levels indicate that the null hypothesis of normality must be rejected. The results do not support the presence of either skewness or kurtosis (see Table XVIII below).

Table XVIII – Skewness and kurtosis test for normality for all event windows.

Event window	Source	chi2	df	p-value
-1 to 0	**Skewness**	20.93	16	0.1814
	Kurtosis	1.11	1	0.2914
-3 to 0	**Skewness**	18.05	16	0.3209
	Kurtosis	0.58	1	0.4457
-10 to 0	**Skewness**	15.91	16	0.4590
	Kurtosis	0.90	1	0.3428
-1 to 1	**Skewness**	26.26	16	0.0505
	Kurtosis	0.46	1	0.4957
-3 to 3	**Skewness**	21.74	16	0.1517
	Kurtosis	0.01	1	0.9413
-10 to 10	**Skewness**	10.20	16	0.8559
	Kurtosis	2.74	1	0.0979
0 to 1	**Skewness**	25.18	16	0.0668
	Kurtosis	1.17	1	0.2802
0 to 3	**Skewness**	18.67	16	0.2862
	Kurtosis	0.90	1	0.3423
0 to 10	**Skewness**	9.80	16	0.8771
	Kurtosis	1.47	1	0.2246

14.3.2. Testing for Multicollinearity of the Residuals

Multicollinearity is the phenomenon in which explanatory variables in the regression model are highly correlated. This may result in measurement errors of the estimates of their individual regression coefficients while controlling for the others. Table XIX below displays the pair-wise correlation among the independent variables. Any correlation exceeding 0.75 for a pair of variables is generally regarded as an indication of problems with multicollinearity. All values are well below this critical value and we can interpret this result as an indication that our initial control variables do not suffer from multicollinearity.

Table XIX – Pair-wise correlation between the independent variables.

Variable	profitability	levarage	logsize	d_crosslisted
profitability	1			
levarage	-0.5874	1		
logsize	0.4249	-0.2946	1	
d_crosslisted	-0.3483	0.5083	0.0561	1

14.3.3. Testing for Heteroskedasticity

To further test the robustness of our model we must check for the presence of heteroskedasticity, meaning that the variances of the residuals are not constant across observations. Under heteroskedasticity, the estimators of the regression coefficients are still unbiased. However, as the OLS methodology relies on the assumption of homogeneous variance, heteroskedasticity causes the estimators of the residuals (standard errors) to be biased.

To assess this issue, we use White's general test for heteroskedasticity (developed from the "Breusch-Pagan test"), which tests the null hypothesis that the variance is equal across the residuals. The results of the tests are displayed in Table XX below. The high p-values imply that we cannot reject the null hypothesis of equal variance.

Table XX – White's general test for heteroskedasticity for all event windows.

Event window	chi2	df	p-value
-1 to 0	49.89	48	0.3980
-3 to 0	49.80	48	0.4014
-10 to 0	35.39	48	0.9116
-1 to 1	49.76	48	0.4030
-3 to 3	48.79	48	0.4409
-10 to 10	49.99	48	0.3942
0 to 1	48.80	48	0.4407
0 to 3	49.14	48	0.4271
0 to 10	46.46	48	0.5361

This test is sensitive to the assumption of normality in the model. As previously described, our tests of normality however indicate that this assumption is not violated. To control for the existence of any heteroskedasticity we have used the *robust* command in STATA. With this we get standard errors and t-statistics robust to heteroskedasticity while the unbiased regression coefficients are still maintained.

14.3.4. Testing for Serial Correlation

The OLS methodology relies also on the assumption of no serial correlation of the error terms. Serial correlation is defined as correlation of the error term of a variable over consecutive time periods. This would violate the assumption of the error terms being uncorrelated. Due to the characteristics of our data we are unable to perform any tests for serial correlation, since it is not possible to perform such tests on unbalanced panel data. Hence, we cannot exclude that our model suffers from serial correlation and we bear in mind that this could affect our results.

14.3.5. Conclusions

The robustness tests show that our data sample is reasonably robust to the underlying assumptions of the OLS methodology. It should be noted that our tests of normality show some indications of a not entirely normal distribution of the residuals, which could affect the validity of the significance levels. However, this is does not affect the correctness of the obtained estimations of the coefficients. We have found no support for skewness, kurtosis or multicollinearity in our data sample. Furthermore, our regressions are robust to any heteroskedasticity in the sample. In conclusion, we believe the results of our regression analysis should be reliable.