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**A study of the impact of United States board
membership and cross-listing on United Kingdom
firms**

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Abstract

- Title:** A study of the impact of United States board membership and cross-listing on United Kingdom firms.
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- Key Words:** Financial integration, Segmented Markets, Cross-Listing, Independent Directors, United Kingdom, United States
- Purpose:** The purpose of this paper is to see if companies in a market that is not considered segmented can create value through the strategies of importing foreign outsider board members or cross-listing on other non-segmented markets. Additionally the study will analyze the degree of integration between the two markets in respect to corporate governance and financial systems
- Methodology:** The study is based on a quantitative methodology. We employ a multiple regression in an attempt to separate the effects between the U.S. listing and outsider U.S. board membership on firm value. The analysis is done with a multivariate OLS-regression model with firm value as the dependent variable. Various regression models are employed in an attempt to show the hypothesis' significance. The intention with the usage of more than one statistical technique is to obtain a higher degree of validity of the results. We also utilize eight theoretically grounded control variables in order to single out the real effect of the independent variables
- Conclusions:** We find that U.K firms cannot create value or lower their cost of capital by cross-listing on the U.S. market or by importing a U.S. board member. However, the results indicate that U.K. firms are able to create value by cross-listing on markets considered less well-integrated markets. We also find that the U.K. and U.S. market are well integrated both in regards to corporate governance and capital markets. Lastly, we conclude that the U.S. cost of capital is a poor proxy for the global cost of capital.

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Stockholm, June 10, 2004

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1. Introduction

The first chapter describes the background, motivation, problem and purpose of the paper. Additionally we present the limitations and disposition of the paper.

In pursuit of higher profits and wealth generated to the shareholders, companies continue to strive for lower cost of capital and thereby, higher firm valuations. Finance literature and research frequently discusses the desirability of attaining the global cost of capital which often in concrete studies uses the cost of capital on the U.S. financial market as a proxy.

Earlier studies covering capital costs and stock market valuations have analyzed the valuation effects of foreign company listings on U.S. exchanges¹, markets initial reactions to cross-listing², and the impact on value by importing an independent foreign board member.³ The findings (e.g. Forester and Karolyi, 1999, Hargis, 2000, Modén and Oxelheim, 1997) conclusively suggest that cross-listing has a positive effect on firm valuation and is further increased if it is combined with a simultaneous issuance of equity in the cross-listing market.⁴ Studies regarding independent foreign board members have also shown to have a positive effect on firm value.⁵

In this study, we focus on the two strategies suggested by Oxelheim and Randøy for achieving the global cost of capital, cross-listing and importing foreign board members from countries with more demanding corporate governance systems.⁶

1.1 Background

The global financial market has in the last three decades gone through dramatic transformations. Instead of consisting of several segmented national financial markets the global market has evolved to a more or less perfectly integrated and globalized system. This system of a global financial market has become noticeably more efficient than the traditional system with segmented national financial markets. Some of the major benefits with a globalized financial system are, efficiency gains due to specialization in the production of financial services, increased efficiency in national financial sectors as a result from stiffer international competition, more effective allocation of capital on a global scale and increasing opportunities of international diversification.⁷

In the absence of global financial institutions, like a world central bank, the global financial system consists of the interaction of all the national financial systems. The level of interaction and integration is determined in part by politicians controlling the level of deregulation of national financial systems and partly by the degree of cross-border capital flows mainly induced by large corporations seeking arbitrage transactions between less efficient and more efficient

¹ Sundaram and Louge (1996)

² Several studies have been conducted on this subject, among them Miller (1999), Modén and Oxelheim (1997), Howe and Kelm (1987) and Foerster and Karolyi (1999)

³ Oxelheim and Randøy (2003).

⁴ Modén and Oxelheim (1997)

⁵ Oxelheim and Randøy (2003)

⁶ Oxelheim and Randøy, p. 2371

⁷ Oxelheim (1996), p. 34

national markets.⁸ This development of deregulation will likely continue as financial and economic deregulation continues in numerous countries.

One recent example of continued integration is the induction of ten new members in the European Union on May 1, 2004. Although not yet financially integrated with the rest of Europe the entrance into the EU will likely lead to increased financial integration of these countries into the global system.

With increasing integration of world markets, the hampering segmentation effects are implicitly decreasing. The elimination of segmentation and increased cross-border financial investments offer firms more opportunity to achieve a lower cost of capital through reduced agency and information costs. It has already been established that companies in a segmented home market can create shareholder value by breaking away from the segmented market. In a segmented home market where the capital market is not well integrated with the international capital market, firms tend to face a higher cost of capital because of the increased risk mainly borne by investors in the home country. According to Doidge,⁹ the hypothesis of achieving a lower cost of capital through risk diversification with non-residents is known to face a few difficulties. Studies have shown that cross-listing firms from countries considered well integrated with the U.S. capital market also profit from cross-listing, furthermore cross-listings continue to increase and still shows increased positive signaling effects even as international capital markets are more integrated. In addition, studies have shown as the number of cross-listing firms from one country increases, the abnormal return on announcement of cross-listing does not decrease. This effect has been interpreted as evidence against the global risk diversification hypothesis¹⁰. Because of these difficulties other potential benefits from cross-listing that have been suggested are,¹¹

- Reduced risk premium- As the shareholder base increases risk sharing increases and the premium demanded for bearing risk is reduced.
- Access to more developed capital markets- The highly liquid and deep U.S. market tends to reduce firms barriers to credit.
- Information disclosure- U.S. markets have stringent information requirements.
- Bonding and Monitoring- A U.S. listing increases the protection of the firm's investors and lowers the agency costs of controlling the shareholders.

Cross-listing is the most commonly used alternative to break away from the domestic corporate governance system.¹² Another financial alternative is issuance of bonds on foreign markets. A different alternative is through appointing a foreign independent board member. This alternative enables companies to incorporate a different corporate governance system. In either case, companies achieve value through increased access to investors. The most beneficial choice of the two mentioned or a combination of both should be based on the company's initial global

⁸ Oxelheim (1996), p. 21-24

⁹ Doidge, et al. (2002)

¹⁰ Refers to risk sharing of non-residents with residents.

¹¹ Doidge, et al. p. 208-209

¹² Oxelheim and Randøy, p. 2370

recognition, costs associated with the alternative and what goals the company aims to achieve with the internationalization of the cost of capital.¹³

Jensen and Meckling¹⁴ define agency cost as “the sum of: 1. the monitoring expenditures by the principal, 2. the bonding expenditures by the agent, 3. the residual loss.” Agency costs arise when the agency relationship, defined by Jensen and Meckling as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent”¹⁵, is suboptimal and the agent does not act in the best interest of the principal. Agency costs arise at any time where there is a collaborative effort between two or more people. The shareholders and managers relationship fit the definition of a pure agency relationship and have been the subject of numerous studies¹⁶. Our interest lies in the contribution of agency costs to the overall cost of capital and if including an outsider foreign board member can indirectly lower the cost of agency and therefore the cost of capital. If this is the case shareholder value can be increased by including an outsider foreign board member and indirectly lower agency costs.

1.2 Problem Discussion

The motivation for this paper is to focus on companies in a non-segmented market and to determine if value can be created through the alternative cross-listing or by including a foreign independent board member on the board of directors. This is interesting not only for companies in already integrated markets but also for all companies considering the increasing financial integration of markets worldwide.

Our scope involves studying the valuation effects of firms from the non-segmented U.K. market cross-listing in the U.S. markets. The valuation effects of independent foreign board membership for firms are also investigated specifically in companies with board members from the United States, in companies based and listed in the United Kingdom. With the similar corporate governance traditions and disclosure requirements in both countries, we will control for firm-specific variables as well as other variables, to evaluate the impact on firm value.

Our contribution lies in the uniqueness of our study, if we find an effect in a set of U.K. based firms it is likely to be a small effect. This would still imply that there is value associated with further integration in markets already considered well integrated. After much research we have not encountered any previous studies analyzing this particular aspect of foreign board membership and between two countries considered non-segmented. Many earlier studies purely involve two very different countries in regards to their financial integration with no mention of board membership. By analyzing the effectiveness of importing an independent foreign board member or cross-listing, we provide additional insight into further understanding the means to achieving a global cost of capital. Furthermore, we provide additional evidence regarding the

¹³ Modén and Oxelheim, p. 224

¹⁴ Jensen and Meckling (1976), p. 310-311

¹⁵ Ibid.

¹⁶ For a survey of the literature on agency relationships, see Jensen and Meckling (1976). For a recent survey on agency cost literature, see Schleifer and Vishny (1997).

degree of how well integrated the U.S. and U.K. capital markets are both in terms of corporate governance and the financial integration.

Examples of studies covering cross-listing and foreign board membership on integrated and segmented markets are presented in the table below.

	Integrated markets	Segmented markets
Cross-listing	Ely and Salehizadeh (2001) Doidge, Karolyi and Stulz (2002) Leuz (2003) Einarsson and Nifelhalm (2004)	Sundaram and Louge (1996) Modén and Oxelheim (1997) Foerster and Karolyi (1999) Miller (1999) Ely and Salehizadeh (2001) Doidge, Karolyi and Stulz (2002) Leuz (2003)
Foreign board membership	Einarsson and Nifelhalm (2004)	Oxelheim and Randøy (2003)

This topic is of interest for companies in both segmented markets as well as integrated markets. With many different options for attaining lower cost of capital, it is important for small and medium firms to be aware of the options available. By importing a foreign board member, it is possible these firms can substantially lower their cost of capital at a relatively low cost when compared to cross-listing. However, by combining the strategies firms in segmented home markets can achieve the global cost of capital and continue to grow and create shareholder value because of the increasing access to capital.

Of equal importance is the more theoretical question of to which degree these two countries, not considered to be segmented, really are integrated in respect of both corporate governance and the financial systems. If it is the case that firms in non-segmented markets can create value by utilizing these strategies to achieve a lower cost of capital this leads us to conclude that these markets actually are not well integrated and do not enjoy the global cost of capital.

1.3 Purpose

The purpose of this paper is to see if companies in a market that is not considered segmented can create value through the strategies of importing foreign outsider board members or cross-listing on other non-segmented markets. Additionally the study will analyze the degree of integration between the two markets in respect to corporate governance and financial systems.

1.4 Limitations

Because of the limited scope of the master's thesis we are narrowing our analysis to the question whether U.K. based firms can achieve lower cost of capital and thereby create shareholder value by utilizing either cross-listing in the U.S. or importing an foreign outsider board member from the U.S. Additionally, with the limited timeframe involved we have chosen to evaluate 120 companies with three observation years each totaling to 360 observations.

1.5 Disposition

In chapter two we explain the underlying theory of our paper. Chapter three covers the methods used to conduct our study with our explanation of the data and variables used. In chapter four we

present the results from our group comparisons and regression models. Chapter five contains our analysis of the results and in chapter six we conclude and suggest further research routes and topics.

2. Theory and Literature Review

This chapter gives the theoretical background of the paper. We also cover earlier studies on the subject of agency theory, agency costs, corporate governance, outside board member and cross-listing.

The various aspects and impacts of agency theory, agency costs, corporate governance, outside board member and cross-listing on firm value has been covered in prior studies to great detail. In this chapter, we cover some of the underlying theories, significant findings of prior studies and we explain the four acknowledged corporate governance systems that exist. The chapter also contains a comparison of the financial systems of the U.S. and the U.K. This is done to aid the understanding of the two systems and why they are often considered similar. We also cover the advantages and disadvantages between the two systems from an agent theoretical perspective.

Jensen and Meckling (1976) established the initial work on agency theory but the problem of separation of ownership and control concerned scholars of corporations as early as Adam Smith.¹⁷ Managers have a fiduciary duty to the shareholders of a corporation to maximize the shareholders' wealth. However, the actual incentive of managers may be to maximize their own wealth, which is where agency costs and costs of agency control occur. Agency problems exist because contracts are not free to enter into or free to enforce.¹⁸ Agency costs arise when the cost of full enforcement of contractual obligations exceeds the benefits. Costs include cost of monitoring, structuring, and linking sets of contracts between agents with opposing interests.¹⁹ Research on agency theory has hypothesized a few strategies to control agency costs. The variables that have shown to limit agency costs are debt/equity (i.e. leverage), dividend policy, executive compensation, and institutional ownership.²⁰ Different variations of the executive compensation package have been suggested to further alleviate the principal-agent problem, such as holding the CEO's stock in a non-voting escrow account with a pre-set timeframe for withdrawal.²¹

With a recent surge in mergers and acquisitions (M&A), it is of utmost importance for shareholders to be aware of the principal-agent problem and agents' tendency for empire building. When the board of directors does not properly monitor management's actions and sufficient checks and balances are not in place owners can suffer large losses in value. There are unfortunately numerous examples of insufficient control by boards and failed M&As, for example see DaimlerChrysler, Tyco, AT&T, and WorldCom.²²

Our study indirectly addresses agency costs. The board of directors is one of the internal governance mechanisms in agency theory by which agency costs can be reduced.²³ Some of the assumptions involved in the justification for using an outsider foreign board member are that

¹⁷ Fama and Jensen, (1983) *Separation of Ownership and Control*, p. 301

¹⁸ Fama and Jensen, (1983) *Agency Problems and Residual Claims*, p. 327

¹⁹ Ibid.

²⁰ Crutchley, et al, p. 177

²¹ Bruhl, p. 402

²² Gaughan, p. 21

²³ Nowak and McCabe, p. 301

independent board members should reduce the agency costs and assert more control, i.e. increased control of management. In addition, it will increase alignment of the agent's goals with the principal's. This, we argue, will increase shareholder value and lower the cost of capital. Importing an outsider foreign board member can also reasonably be argued to reduce the old boy's network existing in many country's boardrooms.

There are many hypotheses on the sources of cross-listing effects. Cross-listing on a U.S. exchange is regarded to raise the visibility of foreign firms to American investors and institutions.²⁴ In addition, many American institutional investors are prohibited to invest in non U.S.-listed foreign firms.²⁵ One of the most important features of a foreign exchange listing is bridging of cross-border information gaps. By this, the firm gains access to new investors, which can create value for the existing shareholders. By cross-listing companies' ownership also becomes more dispersed, and imposed on them are harsher information requirements from foreign owners more likely to hold management and the board accountable.²⁶ The logic is if it is easier for foreign investors to invest, risk sharing and diversification are enhanced, leading to a lower cost of capital for the firm.

2.1 Corporate governance systems

Corporate governance mechanisms can be disassembled into economic and legal institutions that can be changed through the legislative process.²⁷ Four corporate governance systems are mentioned in the literature, Anglo-Saxon or Anglo-American, German, Japanese, and the Latin system.²⁸ Generally, the Anglo-American is regarded as the most demanding system with the Latin being the least demanding.²⁹ The Latin is regarded as being undeveloped to the point that it limits the external flow of capital to the companies adhering to this system.³⁰ The emerging markets of the world, Russia and other countries, lack recognized corporate governance mechanisms. This substantially hinders investments made in these economies.

As fore mentioned, it is generally regarded that the Anglo-American corporate governance system is the most stringent when it comes to information disclosures, and is most beneficial to the suppliers of financing.³¹ The Anglo-American corporate governance system consists of shareholder-centered corporate governance with weak financial intermediaries and well-developed capital markets. However, as recent events in the United States have shown, the system is far from perfect. (For examples see, WorldCom, Enron, Global Crossing, Kmart, Martha Stewart, etc)

In the field of corporate governance an issue currently encountered by managers, shareholders, and directors is the cultural, gender, and racial composition of the board of directors. The issue of the board's cultural composition has received much public attention with major institutional shareholders adopting investment policies to promote diversity. One example is TIAA-CREF (a

²⁴ Leuz, p. 359

²⁵ Ibid. p. 350

²⁶ Oxelheim and Randøy, p. 2374

²⁷ Schleifer and Vishny, p. 738

²⁸ Ibid.

²⁹ Oxelheim and Randøy, p. 2370

³⁰ Schleifer and Vishny, p. 738

³¹ Doidge, et al, p. 208-209

major U.S. based pension fund) and their investment criterion of diversity. TIAA-CREF believes that diversity on the board of directors will equal less indebtedness to management.³² Many corporations also realize the advantages of board diversity. As Sun Oil's CEO Robert Campbell wrote, "Often what a woman or minority person can bring to the board is some perspective a company has not had before—adding some modern-day reality to the deliberation process. Those perspectives are of great value, and often missing from an all-white, male gathering. They can also be an inspiration to the company's diverse workforce."³³ However, many companies reject the current trend of incorporating diverse, be it racial or gender, board members unless it actually enhances shareholder value. The argument is that board diversity for its own sake is pure tokenism.³⁴ This can be interpreted as an argument from the "old-boy's network" and its response to their cognitive dissonance³⁵. Meanwhile it is an additional argument for investigating the independent board member and its role in creating shareholder value.

2.2 Comparison of financial systems – U.S. and U.K.

The creation of the U.S.'s Securities and Exchange Commission, the SEC, came out of the stock market crash in New York 1929. At that time there was little regulation of the financial and securities markets in the United States. In popular fashion post crash hearings were held to determine what went amiss and what could be done to prevent any future crashes. Out of these hearings came the Securities Act of 1933 and the Securities Exchange Act of 1934. These laws were created to restore confidence in the financial and securities markets in the U.S. Monitoring the financial and securities industries demanded a coordinated effort and the SEC was created in 1934. Then President Franklin D. Roosevelt appointed Joseph Kennedy to serve as the first chair of the SEC.³⁶

Recent legislative developments in the United States have been enacted in response to the accounting scandals of Enron among others. President George W. Bush signed into law the Sarbanes-Oxley Act in 2002. It regulates the disclosure and corporate governance standards such as executive compensation, and the use of independent directors. The law was intended to have companies in compliance in the fall of 2003 but extensions were approved and compliance for large companies is now June 15, 2004 and small companies have until April 15, 2005.³⁷ The impact of the Act is yet unknown and the full scope of it will not be known until the Act has been vetted through the judicial system. However there are accounts of management questioning whether to remain a public company or not.³⁸ There are also concerns over the additional requirements imposed on foreign companies for listing in the United States.³⁹ The Act involves forcing foreign companies to adopt and accept U.S. accounting rules. In the past, the SEC has

³² Carter, et al, p.34

³³ Ibid.

³⁴ Ibid.

³⁵ The theory on cognitive dissonance was pioneered by Leon Festinger (1957) and is believed to occur in situations when an individual must choose between two incompatible actions or beliefs. In our case it would be the collective beliefs of the "old-boy's network" and its dissonant belief that the status quo of old boys on boards is fine with the changes demanded by investors to incorporate diversity. Their response is to reduce the importance of diversity to eliminate the dissonance they face.

³⁶ U.S. Securities and Exchange Commission, www.sec.gov

³⁷ Security and Sarbanes-Oxley,

http://searchsecurity.techtarget.com/originalContent/0,289142,sid14_gci929451,00.html

³⁸ Miller and Frankenthaler, p. 7

³⁹ Stevens, p. 36

made modifications to suit foreign companies listed on U.S. exchanges, but it seems unlikely that will happen this time around.⁴⁰

The Financial Services Authority, FSA, is coterminous to the SEC. However, with one major difference, the FSA is an independent non-governmental body that was given statutory powers through the Financial Services and Markets Act in 2000.⁴¹ The history of regulation in the U.K. is different from that in the U.S. Self-regulation has been a staple of the U.K. financial system. The system is still self-regulated with the FSA providing the statutory framework.⁴² In 1997, the Chancellor of the Exchequer announced the reforms of the financial services regulation and merged the banking supervision and investment services regulation into the Securities and Investments Board, SIB, which later in 1997 changed its name to FSA.⁴³

The U.K. response to corporate scandals differs significantly from how the issue was handled by the SEC in the U.S. The Secretary of State for Trade and Industry set up an independent review headed by Derek Higgs to evaluate the role and efficacy of independent directors. The outcome of the Higgs Review, which it is known as, was a number of recommendations on the structure of the board, the role and other commitments of the chair, the role of the non-executive director, the recruitment and appointment procedures to the board, the training and professional development of directors, the tenure and time commitment, remuneration, resignation procedures, audit and remuneration committees, liability and relationship with shareholders.⁴⁴ Some of the recommendations were controversial. One of these included the limitations on how many chairs one person could hold at one time.⁴⁵ In addition, Higgs recommended a stricter interpretation of independence that would rule out a CEO becoming the chair of the board. The U.K. government and the FSA supported the recommendations, which led to their adoption into the Combined Code in July of 2003.⁴⁶ The Combined Code consists of a range of corporate governance declarations over the years combined into one expression of best business practices.⁴⁷

The two different approaches to financial market regulation, with the U.S. more prone to legislate and the U.K. prone to issue recommendations and principles, have led to different strategies utilized by companies to comply or circumvent these regulations. More simply, U.S. companies try to find loopholes that do not contradict the letter intent of the regulations, while with the U.K. recommendations and principles companies can either adhere to them or not. There is little uncertainty about the interpretation involved.⁴⁸

⁴⁰ Greene, p. 15

⁴¹ The Financial Services Authority, www.fsa.gov.co.uk/history

⁴² Spalek, p. 75

⁴³ The Financial Services Authority, www.fsa.gov.co.uk/history

⁴⁴ Jones and Pollitt, p. 165

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Davies p. 250

⁴⁸ Keenan, p. 174

There are great similarities between the U.K. and U.S. financial systems. Some of the notable similarities are:

- Both are capital market dominated financial systems (U.S. capital system is the most developed in the world.)⁴⁹
- Both systems have a large proportion of widely held⁵⁰ corporations (U.K. has a slightly higher proportion)⁵¹
- Both have major financial centers, i.e. London/New York. Access to major markets.
- Both are considered to adhere to the Anglo-American corporate governance system, which is regarded as the most demanding system and superior in market performance (U.S. system in particular)^{52 53}

Some of the U.S. advantages/strengths compared to the U.K.:

- Strict information, disclosure requirements by the SEC^{54 55}
- “Sacking the boss”⁵⁶. The chief executive turnover in the U.S. has reached unprecedented levels in recent years. The similarity between the turnover in the world of sports, coaches changing teams almost weekly, and the corporate world, CEOs, is striking.
- In the U.S., usually only the Chief Executive Officer and Chief Financial Officer are on the board of directors, with the rest consisting of non-executive board members.⁵⁷
- Hostile takeovers were virtually invented by U.S. companies. The incentive for the board of directors to perform is that if they fail to perform the company could be subjected to a hostile takeover.⁵⁸ However, see disadvantages below for boards’ responses to this threat.

Some of the U.S. disadvantages/weaknesses compared to the U.K.:

- In the U.S. the chairman of the board and the CEO are the same person in 75 percent of the S&P500 companies. This is rare in the U.K.⁵⁹ It has been suggested that a separation of the executive chairman/CEO into a non-executive chairman and an executive CEO would help reduce the perceived omnipotent status and would open up the board to more dialogue.⁶⁰ With the non-executive chairman in charge of managing the board while the executive CEO manages the business.⁶¹
- Non-executives in the U.S. are often extremely limited in time commitment available for each company and often serve on many different company boards.⁶²

⁴⁹ Schmidt and Tyrell, p. 334

⁵⁰ Indicates that there is no one controlling shareholder. Widely dispersed ownership. See La Porta, et al, p.478.

⁵¹ La Porta, et al, p. 492

⁵² Oxelheim and Randøy, p 2371

⁵³ Oxelheim, (2000) p. 35-36

⁵⁴ Oxelheim and Randøy, p. 2371

⁵⁵ Oxelheim (2000), p. 32

⁵⁶ Ibid. p. 33

⁵⁷ Keenan, p. 173

⁵⁸ Oxelheim (2000), p. 32

⁵⁹ Keenan, p. 173

⁶⁰ Ibid.

⁶¹ Ibid.

⁶² Ibid.

- U.S. companies have increasingly opted to incorporate in the U.S. state of Delaware, known for its manager friendly rules of incorporation. This bundled with so-called “poison pills” have substantially limited the hostile takeovers⁶³ in recent years.

The two systems each have their strengths and weaknesses. Overall the U.S. financial system is, in our opinion, more efficient in regards to capital market efficiency than the U.K. system.

2.3 Previous studies- Literature Review

U.S. based research on the effects of outside independent board members, have reached inconclusive results. Studies show that independent board members can enhance firm performance⁶⁴, with other studies reaching contradictory results.⁶⁵ Lars Oxelheim and Trond Randøy conducted a similar study with the added angle of examining the effect of outside foreign board membership.⁶⁶ The study involved the effect of Anglo-American board membership on corporate performance measured in firm value using Tobin’s Q, on companies with headquarters in Norway or Sweden. The study found that in countries with partially integrated financial markets “importing” an outsider foreign board member adhering to the Anglo-American corporate governance system can create significant value. Additionally, the authors argue that recruiting an outsider Anglo-American board member can be seen as an alternative to reduce the cost of capital to the more common ways of achieving the global cost of capital. By importing a foreign board member, small and medium sized firms achieved a lower cost of capital rather inexpensively compared to the substantial expenses incurred with a cross- listing and issuance. A study by Nowak and McCabe⁶⁷ analyzed the perceptions of Australian independent corporate directors and their access to information in their role as directors. Their focus was on the information cost and information asymmetry involved. The central finding was that information asymmetry does exist and directors perceive that the CEO and executive have controlling power over information. This is an argument for further study of the effect of importing an outsider foreign board member.

Other studies have been conducted on varying corporate governance systems and the relation to ownership structures, see La Porta et al.⁶⁸ for a survey of the literature. The ownership structures that have been studied include the concentration of ownership around the globe, the role of large shareholders and voting rights involved in controlling the corporation.⁶⁹ In a study by Claessens⁷⁰ of the Czechoslovakian privatization reform of 1992, Claessens investigates the impact of corporate governance on two firms with two different shareholder structures *ceteris paribus* and if the firms would trade at different prices. The assumption was that the firm with a less dispersed ownership and implicitly better corporate governance would trade at a higher price.⁷¹ He found that firms with many small owners trade at lower prices and firms with majority ownership of one investor commands a higher price. A study of Swiss board conditions involving seat

⁶³ Keenan, p. 173

⁶⁴ Rosenstein and Wyatt (1990)

⁶⁵ Agrawal and Knoeber (1996)

⁶⁶ Oxelheim and Randøy (2003)

⁶⁷ Nowak and McCabe (2003)

⁶⁸ La Porta, et al. (1999)

⁶⁹ La Porta, et al. p. 471-472

⁷⁰ Claessens (1995)

⁷¹ Claessens, p. 2

accumulation, one director sitting on numerous boards, found a negative relationship between seat accumulation and firm value.⁷² This was largely attributed to the conflicts involved in holding multiple seats and the time constraint faced by the director.

The impact of diversity, racial and gender has been the topic of numerous studies. In a recent study conducted by Farrell and Hersch⁷³ on the effect of gender, they report that during the 90's women on corporate boards has significantly increased. They analyze the effect on boards already with female membership and the likelihood of hiring another woman when a board member departs. Their findings were that when a woman departs the likelihood of adding another woman increases. Additionally they report that women tend to serve on better performing firms' boards and there were no significant abnormal returns associated with the announcement of adding a woman to the board. Other studies have reported significant positive correlation between board diversity and firm value see, Carter et al.⁷⁴. The analogy can be argued that well performing firms more easily attract U.S. board members and firms that already have or have had U.S. board members are more likely to add another U.S. board member.

Early cross-listing studies have focused on market segmentation and the barriers to cross-border investments. The logic is that firms in a country considered to have a segmented national capital market face a higher cost of capital because of the risk is mainly borne by investors in that country.⁷⁵ Later studies have focused on the legal consequences of cross-listing in the U.S. A study by Fuerst⁷⁶ provides a signaling model allowing "good" firms to separate from "bad" firms based on the idea that cross-listing is costly because of the disclosure requirements and legal liability imposed on cross-listing firms. However, studies have failed to show that cross-listing in the U.S. has led to increased corporate transparency and stricter legal enforcement.⁷⁷ Other studies have shown that firms with a U.S. cross-listing have, positive abnormal returns before and at the time of the cross-listing announcement⁷⁸, have long-horizon returns⁷⁹, experience declines in the cost of capital after the cross-listing⁸⁰, ease successive equity issues⁸¹ and show evidence of higher firm valuations measured by Tobin's Q⁸².

2.4 Methods-Literature- Review

The two most commonly used methods to study the impact of board composition and cross-listing on firm value are quantitative and meta analysis.

The lion share of the research on the subject uses a quantitative method through utilizing various sample sets, descriptive statistics, and means and regression analysis. This is where most studies

⁷² Loderer and Peyer, p. 165

⁷³ Farrell and Hersch (2004)

⁷⁴ Carter, et al. (2003)

⁷⁵ Leuz, p. 350

⁷⁶ Fuerst (1998)

⁷⁷ Leuz, p. 350

⁷⁸ Foerster and Karolyi (1999) also Miller (1999)

⁷⁹ Foerster and Karolyi (2000)

⁸⁰ Errunza and Miller (2000)

⁸¹ Reese and Weisbach (2002)

⁸² Doidge, Karolyi and Stulz (2002)

on the subject of board composition and cross-listing's effect on firm value would be categorized. We have chosen to follow this path as is described in chapter three.

Meta-analysis is another method also used by researchers. Meta-analysis is commonly used to aggregate results across several studies on a related set of research questions and permits scholars to correct for statistical outcomes. This is done to find an estimate of the true relationship between two variables. However, it does not identify causality between the variables.⁸³ Most meta-analyses are based on the Hunter-Schmidt method developed by Hunter and Schmidt in 1990.⁸⁴ For an example see Dalton⁸⁵, they use the meta-analysis technique in their study of the number of directors and financial performance.⁸⁶

2.5 Variables used in previous studies

In the report, *The Impact of Foreign Board Membership on Firm Value* Oxelheim and Randøy used a variety of independent variables in order to minimize specification bias. They placed their control variables in the following groups: international corporate governance variables, general corporate governance variables and general control variables. The following control variables were used beside the independent variable *outsider U.S. board membership* and the dependent variable *Firm value*:⁸⁷

International corporate governance variables

- Foreign ownership
- Foreign listing
- Foreign subsidiary

General corporate governance variables

- Board size
- Board independence
- Block holder ownership

General control variables

- Firm size
- Firm age
- Industry effects

Foreign board members can in general have three different mandates. The first alternative is that the board member represents an owner with a major commercial interest in the firm such as a foreign direct investment or a subsidiary. A second alternative is that the board member represents a foreign owner with a big portfolio stake in the firm. The third alternative is that the board member is an independent outsider chosen specifically to signal the company's willingness to be monitored by the rules of a more demanding corporate governance system.⁸⁸

⁸³ Dalton, et al. (1999)

⁸⁴ Meta-Analysis, Lyons, p. 4

⁸⁵ Dalton, et al. (1999)

⁸⁶ Ibid.

⁸⁷ Oxelheim and Randøy, p. 2382

⁸⁸ Ibid. p. 2375

In order to isolate the effect of the third type of foreign board members Oxelheim and Randøy used *foreign ownership* as a proxy for foreign portfolio ownership in the absence of reliable data on the mandate of foreign board members. They also use a dummy variable for firms that are *foreign subsidiaries* to isolate the effects of outsider Anglo-American board members representing the owners of such companies.

Most of these control variables used by Oxelheim and Randøy have been acknowledged in other studies, examples are Firm Size^{89,90}, Board Independence or Composition⁹¹, Board Size⁹², Industry⁹³, Blockholder Ownership⁹⁴, Foreign Listings⁹⁵, Firm Age⁹⁶.

Other variables used in further studies to study corporate governance and its impact on firm performance and value include but are not limited to minority board membership, including female membership⁹⁷, average age of board members⁹⁸, number of annual board meetings⁹⁹, duality of the CEO and Chairman roles¹⁰⁰, ownership concentration¹⁰¹, national origin of incorporation¹⁰², return on assets¹⁰³, beta and alpha values¹⁰⁴.

⁸⁹ Dalton, et al. (1999)

⁹⁰ Thomsen and Pedersen (2000)

⁹¹ Dalton, et al. (1998)

⁹² Dalton, et al. (1999)

⁹³ Baysinger and Butler (1985)

⁹⁴ Thomsen and Pedersen (2000)

⁹⁵ Foerster and Karolyi (1999)

⁹⁶ Mishra (2001)

⁹⁷ Carter, et al. p.40

⁹⁸ Ibid.

⁹⁹ Ibid.

¹⁰⁰ Ibid.

¹⁰¹ Thomsen and Pedersen, p. 696

¹⁰² Ibid.

¹⁰³ Ibid.

¹⁰⁴ Ibid.

3. Methodology

This chapter presents the methods used in this paper. The method is intended to aid us in achieving our purpose.

This study is based on a quantitative methodology. Various statistical techniques are employed in an attempt to show the hypothesis' significance. The intention with the usage of more than one statistical technique is to obtain a higher degree of validity of the results. A variety of theoretically grounded control variables discussed earlier in this paper are also used in order to single out the real effect of the independent variables.

As we have established in the theory section, it is appropriate to choose the U.K. and the U.S. as test countries for this study. The reasons for this are the great similarities of the two countries' financial systems. Since the literature used in the theory section suggests that the U.S. financial- and corporate governance system are slightly more efficient is it natural to test if it is possible to show statistically that U.K. firms can enhance their value by using any of the two strategies of either cross-listing in the U.S. market or importing an independent board member from the U.S.

The hypotheses, with corresponding null hypotheses, that we will test in this study are presented below. The first hypothesis regarding U.S. listing focuses on the financial integration between U.K. and U.S. while the other hypothesis is related to the similarities of these two countries corporate governance systems.

H₀: The value of U.K. firms is independent of U.S. listing.

H₁: There is a positive relation between U.S. listing and value for U.K. firms.

H₀: The value of U.K. firms is independent of outsider U.S. board membership.

H₁: There is a positive relation between outsider U.S. board membership and value for U.K. firms.

3.1 Data

The data is taken from a random sample of 120 U.K.-based companies traded on the London Stock Exchange. U.K.-based are companies who have elected to incorporate in the U.K. and based the mainstay of their corporate activities there. Companies belonging to all industries except, finance, banking and insurance, are included in order to get results comparable to Oxelheim and Randøy's original study. All firms not listed before January 1, 2000 were also omitted since data from three full years from each firm is desirable to achieve a large enough sample set.

An alternative methodology would be to begin with dividing the population of all firms in categories depending on if they listed in the U.S. or have outsider U.S. board members and then take random samples from these sub samples. The advantage with this method is that we would be guaranteed to get enough firms from each category. After eliminating all firms listed before 2000 and the firms belonging to financing-, banking- and insurance industries, we had a population of 707 firms. Due to time constraints, we were unable to determine which of these firms is listed on U.S. stock exchanges or have outsider U.S. board members.

All the variables with the exception of share price were collected from annual reports and firm web sites. Share price data were collected from Yahoo Finance and in cases where the country of origin of board members were uncertain we employed other secondary sources on the internet such as Forbes.com and Google.com to further investigate board members nationality. In cases where the needed information could not be found in publicly available sources, questions were sent to the firms via e-mail. These enquiries have accounted for 35 additional firm-year observations.

The sample consists of 269 firm-year observations from 96 companies. That corresponds to information from 80 percent of the sampled firms and 75 percent of the total number of firm-year observations. The reason for the lower proportion of firm-year observations is that it was harder to obtain the older reports. In addition, some of the observations were excluded because of reporting periods longer or shorter than the normal 12 months. The number of observations for each year is 81, 92 and 96 for the years 2000, 2001 and 2002.

3.2 Definition of variables

We are basing this study on Oxelheim and Randøy's *The Impact of Foreign Board Membership on Firm Value*¹⁰⁵. Consequently, we will start out with the dependent variable *firm value*, the two independent variables *U.S. listing* and *outsider U.S. board membership* and the nine control variables listed in the beginning of section 2.5 in this thesis.

The dependent variable *firm value* is measured by the calendar year-end q-value in 2000, 2001 and 2002. The q-value used in this study and the original study by Oxelheim and Randøy¹⁰⁶ approximates Tobin's Q¹⁰⁷. The difference between the textbook definition of Tobin's Q and our approximation is that the replacement cost of total assets and the market value of total debt are approximated by the corresponding book values. Therefore, the q-value is defined as the ratio of the market value of the firm to the book value of total assets. In order to reduce heteroskedasticity the natural logarithm of the q-value is used as the dependent variable. The market value of the firm has been calculated as the number of shares outstanding on the reporting-year-end multiplied by the share price of the last close of the previous calendar year. Because of difficulties in acquiring the exact number of outstanding shares on the calendar year-end for firms with reporting years other than calendar year, we have approximated the number of outstanding shares on the calendar year by using the number of shares on the end of the firms reporting year.

U.S. listing is a dummy variable used to identify firms that are listed on one or more of the U.S. exchanges such as the New York Stock Exchange, NASDAQ or American Stock Exchange. The variable *foreign listings* measures how many foreign stock exchanges besides the U.S. exchanges the firm is listed on.

The explanatory dummy variable *outsider U.S. board membership* is measured as 1 if one or more outsider board member is a citizen of the U.S. and 0 if otherwise. A director in this study is considered an insider when he or she is, or has been, directly or indirectly employed by the firm.

¹⁰⁵ Oxelheim and Randøy (2003)

¹⁰⁶ Ibid.

¹⁰⁷ Gordon and Myers, p. 1

The share of outsider U.S. board members is not used since the signalling effect of adherence to the U.S. corporate governance system ought to be achieved by inclusion of only one U.S. board member.¹⁰⁸ Another reason for using a dummy variable instead of the number of board members fitting in to the definition or multiple dummies representing various numbers of outsider U.S. board members is that very few of the firms have more than one U.S. board member.

As described earlier Oxelheim and Randøy used the variable *foreign ownership* as a proxy for foreign portfolio ownership and a dummy variable for firms that are *foreign subsidiaries* to isolate the effects of outsider Anglo-American board members representing the owners of such companies. However, we will exclude these two control variables. *Foreign ownership* is excluded because of the difficulties of obtaining information about the share of a firm's equity in the hands of a specific foreign country. Oxelheim and Randøy used the total proportion of equity owned by foreign investors as a proxy of the proportion of equity owned by Anglo-American investors. Since U.S. or U.K. investors held two thirds of the Swedish and Norwegian shares held by foreigners at that time this motivated the simplification.¹⁰⁹ Since we only are interested in the proportion of U.K. firms' equity that are held by U.S. investors, this type of information is not publicly available, and no reasonable proxies can be found we are forced to exclude this variable from our analysis. *Foreign subsidiary* is excluded simply because none of the firms in our sample fits the definition of a foreign subsidiary¹¹⁰. That is none of the firms has a single U.S. industrial owner holding 20 percent or more of the firm's equity.

Consequently, we only include *foreign listing* as an international corporate governance variable in our study. As mentioned in the limitations to the purpose, U.S. listing will be one of the two independent variables used in an attempt to achieve the purpose of this master's thesis.

The three general corporate governance variables are *board size*, which is the number of directors on the board at the end of each year. *Board independence* is the percentage of independent outside directors and *blockholder ownership* is the percentage of all shares that are owned by the three largest shareholders.¹¹¹

The general control variables also taken from Oxelheim and Randøy's study consist of *firm size*, which is measured by taking the natural logarithm of total revenues for each sample year. The motivation for this is that the size alone is not normally distributed. *Firm age* is measured by the natural logarithm of the number of years between the observation year and the firms founding year. The *industry* effects will be controlled for by utilizing dummy variables representing following industry groups: *Retail and Property, Manufacturing, Information Technology and Telecom, Media and Publishing, Shipping and Transportation and Other Industries*.¹¹²

Besides measuring if a firm is listed on a U.S. stock exchange, we will also determine the total number of foreign (non-U.K. or U.S.) stock exchanges each firm is listed on. The motivation for using *foreign listings* as an additional control variable is that we argue that each additional market

¹⁰⁸ Oxelheim and Randøy, p 2384

¹⁰⁹ Ibid.

¹¹⁰ Ibid.

¹¹¹ Ibid. p. 2385

¹¹² Ibid.

a firm is listed on should add some value to the firm since each new market brings more potential investors to the firm.

Oxelheim and Randøy performed separate tests for each of the three sampled years in order to see if the results were stable. We will use a slightly different approach to the problem with market conditions changing over time. We will incorporate observation year dummy variables in our regression models with the purpose of reducing the variance depending on the difference in market conditions and large depreciation of stock market value between the years. Observation year dummies are commonly used for this purpose.¹¹³ The dummy variables will however only capture the variance in firm value due to changing market conditions. As a result, we will also carry out regressions of the full model separate for all three years in order to see if the result is stable over these years.

The list of the variables we are using in our study follows:

Dependent variable

Firm value

Independent variables

U.S. listing

Outsider U.S. Board Membership

Control variables

Foreign listings

Board size

Board independence

Block holder Ownership

Firm size

Firm age

Industry

Observation year

All variables have been measured at the end of the specific firms reporting year except firm market value, which is taken from the end of corresponding calendar year in order to eliminate influences from time-specific market effects. The reasoning is that large swings in the total market value could distort the results. For example, the exceptionally large fall in share values in the year 2000 could distort the results because of the high number of firms with reporting years other than calendar year. Meaning that firm values of firm reporting in, for example, February could be significantly higher or lower than firms reporting in April and this would skew the results.

3.3 Statistics of group difference

In order to see if there is any difference between firms listed on an U.S. stock exchange and firms not listed we will make a simple analysis of the two groups mean values on both the dependent variable and the control variables. An independent sample t-test for the equality of means is

¹¹³ For example, cf. Farrell and Hersch, (2004)

employed to test if there are any statistically significant differences between the groups. The corresponding analysis is then carried through for firms with and without outsider U.S. board members.

In order to employ the t-test in a theoretically correct way the following two conditions must be met. Both variables should be normally distributed and the variances ought to be equal in both populations. If both samples consists of 30 or more observations the central limit theorem is invoked and the t-test is thus in practice not sensitive to deviations from the two mentioned assumptions.¹¹⁴ The common way in using t-tests even in situations having small samples is just to assume that these two conditions are fulfilled. We will, nevertheless, try to assess how well our data material conforms to these criterions.

The normality of the variables will be checked with the Kolmogorov-Smirnov goodness-of-fit test that can be used to test the fit between any hypothesized distribution and empirical distributions.¹¹⁵ In order to test the assumption of equal variances we will use Levene's homogeneity-of-variance test. This test has been criticised for showing too high significances.¹¹⁶ However, we will use it since we lack a straightforward alternative.

3.4 Regression over U.S.-listing

In order to see if the firms listed on a U.S. stock exchange have higher value than other firms do, we perform a regression with firm value as the dependent variable and U.S. listing as an independent variable. This regression and all other regressions in this study are performed using ordinary least square regression technique, abbreviated as OLS-regression. This will be carried out with a simple regression model as well as with dummy variables representing the observation years. This is done to account for the large depreciation of the total the stock market value under the three years in question. The mean of the natural logarithm of Tobin's Q in our sample was 0.55 in 2000 and fell to 0.32 in 2001 and 0.20 in 2002.

3.5 Regression over Outsider U.S. Board Membership

While the U.S.-listing regression measured the effectiveness of the U.S. capital market in comparison to the U.K. capital market, the goal of the regression over outsider U.S. board membership is to measure the effectiveness of U.S. corporate governance in comparison to U.K. corporate governance. The analysis is done in the same way as the corresponding regression over a U.S. listing both with and without observation year dummies.

3.6 Multiple regression

Since it is reasonable to suspect that the variables, U.S. listing and outsider U.S. board membership may be correlated, we will also perform a multiple regression in an attempt to separate the effects of these two variables. The simple model with the two independent variables will also be extended with multiple control variables as discussed in section 2.4 and more closely defined in section 3.3. This analysis is based on the same methodology Oxelheim and Randøy used in their study of the impact of foreign board membership in Sweden and Norway¹¹⁷.

¹¹⁴ Miller and Miller, p 269-271

¹¹⁵ Hogg and Tanis, p 544-548

¹¹⁶ O'Neill and Mathews, p 81

¹¹⁷ Oxelheim and Randøy (2003)

The full model of the relation between U.S. listing, outsider U.S. Board Membership, firm value and the control variables are as follows:

$$\text{Firm value} = \alpha + \beta_1 * \text{U.S. Listing} + \beta_2 * \text{outsider U.S. Board Membership} + \beta_3 * \text{Foreign listings} + \beta_4 * \text{Board Size} + \beta_5 * \text{Board Independence} + \beta_6 * \text{Block holder Ownership} + \beta_7 * \text{Firm Size} + \beta_8 * \text{Firm Age} + \beta_i * \text{Industry Dummies} + \beta_j * \text{Observation year dummies}$$

3.7 Regression Diagnostics

The usage of the OLS regression techniques calls for testing if these techniques really are applicable to use on the specific data material. Some of the underlying assumptions for the multiple linear regression model to hold are:¹¹⁸

1. Linear relationship between dependent and independent variables.
2. *Homoscedasticity*. All the residuals are identically distributed with the same conditional variance.
3. The residuals are normality distributed for a given value of the independent variable.

If these assumptions are violated the result is that the regression model must be interpreted with some caution. The easiest way to confirm the first two assumptions are to plot the residuals from each independent variable against the dependent variable. If these diagrams do not reveal any patterns then these assumptions hold.

Assumption 3 is also easily checked by making a plot of both the observed residuals and the expected normal distribution of residuals or by making a histogram of the residuals accompanied by a normal function curve.

Another problem that must be controlled for is multicollinearity. This arises when explanatory variables have approximate linear relationships. When two independent variables are highly correlated, it is in practice impossible to simply hold one constant and change the other as the multiple regression model assumes.¹¹⁹ An often-used measure of collinearity is the variance inflation factor (VIF).¹²⁰ A rule of thumb for evaluating VIF is to be concerned with any value larger than 10.0.

¹¹⁸ Ramanathan, p. 76-121

¹¹⁹ Ibid. p. 210

¹²⁰ Kleinbaum, et al. p. 210.

4. Results

In this chapter we account for the results of our study. We present the statistics obtained from our regression models and the notable findings. For a more detailed presentation we refer to the appendices one through seven.

4.1 Statistics of group difference

In this first part of the chapter we describe how the companies in the sample compare to the variables used. In appendix 1, we account for the average values and the t-test used to find if any significant differences for the variables exist. First we look at the whole sample then we divide them into, U.S. listed or not, and U.S. board member or not. It could also have been interesting to further study the companies, which both are U.S. listed and have a U.S. board member, however, in our sample this included three companies and therefore would not have yielded any valid results.

Of the U.S. listed companies, 39 percent (of the firm-year observations) have a U.S. board member while 18 percent of the non-U.S. listed has a U.S. board member. Correspondingly, of companies with a U.S. board member 18 percent are listed in the U.S. compared with only 7 percent of the non-U.S. listed companies. This indicates that there is a positive correlation between the two independent variables, U.S. listing and U.S. board member. Evidence of this is that the two variables have a Pearson Correlation value of 0.157 with $p=0.010^{**}$. Overall, it is more common amongst U.K. firms to import a U.S. board member (19%) than to list on U.S. exchanges (9%).

Below are the significant characteristics for the firms analyzed.

Characteristics for U.S. listed firms:

- Younger. Average firm age is 16 years compared with 48 years for all others
- Firm size measured by turnover does not have an impact
- Larger boards. On average 1.5 more board members
- The proportion of independent board members is larger
- Ownership is more dispersed
- Listed on other foreign exchanges, 6.4 exchanges (U.S. exchanges accounted for) compared to 1.2 for other firms
- Firm value is significantly higher for the sample of U.S. listed firms and for the industry group, media and publishing industries

Characteristics for firms with outsider U.S. board members:

- Firm age is insignificant
- Firms have higher turnover, £416M compared with £185M
- On average two more board members
- Larger proportion of independent board members
- Ownership structure has no impact
- Firms are on average listed on 3.0 foreign exchanges (U.S. exchanges accounted for) compared to 1.4 for other firms

- Firm value is not affected by outsider U.S. board members except for the industry group shipping and transportation where firm value is significantly higher

4.2 Regression over U.S.-listing

The regression addressing U.S. listing is in appendix 2. First we disclose the result from the simple regression with only U.S. listing as explanatory variable. This is followed by the same regression with dummy variables added for each observation year to isolate the seasonality effects.

Both these regression models are strongly significant with p-values 0.001*** and 0.000***. The independent variable U.S.-listing is also significant with a p-value of 0.001*** in both models. The coefficient is positive with a value between 0.42-0.44, which means that firms listed on U.S. markets on average are valued more highly than other firms. The R^2 value for the simple regression is 0.039 which indicates that 3.9 percent of the variation in the firms value, as calculated as the natural log of Tobin's Q, is explained by if the firms are listed in the U.S. or not.

4.3 Regression over Outsider U.S. Board Membership

In appendix 3, similarly we address the regressions covering U.S. board membership with and without observation year dummy variables. The first simple regression shows no significance for either the model or the independent variable U.S. board member. When the model is expanded to include observation year dummies, it achieves significance. However, the independent variable of U.S. board member does still not obtain any significant results. This indicates that we cannot conclude if U.K. firms with a U.S. board member are valued differently than other firms.

4.4 Multiple regression

In appendices 4-6 we present the complete results from the multiple regression models and in the table below we highlight the noteworthy findings.

	basic model		+ obs. year dummies		+ foreign listings	
R^2	,197		,248		,294	
R^2_{adj}	,160		,206		,252	
	B	p-value	β	p-value	β	p-value
U.S. listing	,222	,114	,250	,068	-,022	,881
Outsider U.S. Board Member	-,056	,573	-,075	,434	-,087	,351
Board size	,078	,000***	,077	,000***	,054	,001***
Board independence	-,004	,122	-,004	,178	-,005	,052
Blockholder ownership	-,004	,094	-,004	,128	-,003	,205
Firm size	-,017	,476	-,013	,570	-,025	,262
Firm age	-,043	,340	-,041	,355	-,062	,149
Foreign listings	-	-	-	-	,079	,000***

The table shows that neither U.S.-listing nor outsider U.S. board member present significant results when the control variables are accounted for. Most notably the significance is lower for U.S. listing and the β -value is negative when the variable foreign listing is introduced in the last regression model.

The reason for the higher significance for U.S. listing before introducing the foreign listing variable is that these two variables are highly correlated; A Pearson Correlation value of 0.506, $p=0.000***$ and that foreign listings influences the firms value.

Of the control variables, it is only board size, foreign listings, observation year dummies, as well as some of the industry dummies that show significance. The control variables have strongly contributed to the model's explanatory value, which is indicated by the increase of R^2 and R^2_{adj} to 0.294 and 0.252 in the final model from 0.097 and 0.087 in the simple regression model on U.S. listing with observation year dummies.

In Appendix 7 we have a summary of the regressions carried out on the complete model for each observation year. The results are similar to the outcome of the regression on all three years with observation year dummies but with a bit lower significances due to the reduced number of observations.

4.5 Diagnostics

The results from the Kolmogorov-Smirnov test of normality and Levene's test for equality of variances are presented in Appendix 8. The normality test was performed on the complete variables as well as the variables grouped according to the variables U.S. listing and outsider U.S. board member. The equality of variances test is also presented for the variables grouped according to U.S. listing and outsider U.S. board member.

The Kolmogorov-Smirnov test demonstrates that all variables are normally distributed when looking at the complete sample of observations. Some of the variables do however not show significance of normality when they are grouped according to U.S. listing and outsider U.S. board member. Since all the occurrences of this problem but one is localized in the smaller groups, $n=23$ and $n=51$, we conclude that the prerequisite of normally distributed variables is satisfyingly fulfilled.

The test for equality of variances is naturally also affected by the problem with small number of observations in one of the groups. In spite of this, half of the tests show significance for equal variances. Five of the seven (grouped) variables not showing significance are also grouped by outsider U.S. board member and have thereby $n=218$ and 51 which invokes the central limit theorem so that the variables do not need to fulfil the equality of variances condition.

The regression diagnostics also confirm that the methods used are applicable on this data material. The residual plots presented in Appendix 9 do not show any patterns that could lead us to the conclusion that the relationship between the dependent and the independent variables could be non-linear. The plots also confirm the homocedasticity criterion. The VIF values measuring collinearity are reported directly in connection to the regressions in Appendices 2-6. The highest VIF-value 2,011 confirms that there is no multicollinearity problem either. The last diagram in Appendix 9 presents a histogram showing that the residuals are fairly well normally distributed.

4.4 Summary of the results

The results show that it is more common among U.K. firms to import an outsider U.S. board member than to list on a U.S. exchange. There is also a positive correlation between outsider U.S. board membership and U.S. listing. Common to the groups with outsider U.S. board members and U.S. listing is that they have significantly larger boards with a higher degree of independence and are listed on more foreign exchanges than other firms are. The differences we observe between these two groups are that a firm that is listed in the U.S. is significantly younger than other firms are and have a more dispersed ownership structure. Firms with outsider U.S. board members are also significantly larger than other firms.

The most interesting difference is that firms listed in the U.S. have a higher value than the other firms do, while outsider U.S. board membership does not affect firm value. This result is confirmed by high significances for the simple regression with U.S. listing as sole independent variable. Maybe more important for our conclusions is the fact that the effect disappears when the control variables, and especially the variable foreign listings, are introduced in the regression model.

In the end, we failed to show significance for both our hypotheses. Either U.S. listing or outsider U.S. board membership does not affect U.K. firms' value.

5. Analysis

This chapter contains our analysis of the results obtained in chapter four. We elaborate on underlying reasons for our findings.

U.K. firms might to a higher degree choose to approach the U.S. market by having a U.S. board member because of the lower cost incurred compared to a U.S. listing. It could also be argued that U.K. firms believe that the U.K. capital market is well integrated with the U.S. capital market and therefore they conclude that a listing on the U.S. market is superfluous. If this is the case a reason for importing a U.S. board member could be that the board member's personal network is a means to approach the U.S. market for the firm's products. Another reason could be that the firm thinks there are significant differences between the corporate governance systems in U.S. and would like to signal adherence to what they consider a superior system.

The explanation why younger firms tend to be U.S. listed could be that these firms could have had an increased need for capital and faced difficulties raising capital in the home market compared with the older, more established firms. The U.S. listed firms have a larger proportion of independent board members, which is a mirror image of the conditions on the U.S. market where it is common that only the CEO and CFO are the non-independent board members.¹²¹ Block holder ownership is lower amongst the U.S. listed firms, which is one of the effects of a foreign listing, it leads to an increased opportunity for a larger pool of investors to purchase shares. This distinction could also depend on the fact that owners of firms with concentrated ownership and therefore large block holders are less willing to give up control to gain additional foreign owners.

The fact that U.S. listed companies have further foreign listings appears natural when we consider the fact that the firms prefer easy access to capital. The mean firm value for U.S. listed firms is higher for all industry groups. The Media and Publishing industries was the only industry group with a statistically significant result, which can be explained by the few observations in some of the industry groups.

Firms with higher turnover are more likely to have a U.S. board member. We attribute this to the internationalization of these firms and therefore these firms are better equipped to realize the benefits of incorporating a U.S. board member. However, the reverse could also be true, that firms that are more internationalized attracts foreign board members. Unfortunately in our study, we are unable to determine the causality between the variables, however we are able to measure the correlation.

The fact that boards with a U.S. board member tend to be larger could be an indication that the foreign independent board member is simply an addition to the existing board. Board independence is also higher for these firms, which we argue, can be attributed to the added independent U.S. board member although it could also be the intention of the firm to replicate the independence prevalent in U.S. firms.

¹²¹ Keenan, p. 175.

The lack of correlation between block holder ownership and U.S. board member is further evidence that firms with concentrated ownership also incorporate a U.S. board member. This is indicative of that firms with concentrated ownership can approach the U.S. market via including a U.S. board member without having to list on a U.S. exchange, which over time could lead to undesired changes in ownership structure. If firms with a U.S. board member are more internationalized it also seems natural for these firms to be listed on additional foreign markets than other firms. In chapter four we reported just that. However, these firms are on average only listed on 2.8 foreign exchanges compared with U.S. listed firms that were listed on 5.4 foreign exchanges (plus the U.S. exchange). The rationale could be the differing motivations for approaching the U.S. market. U.S. listed firms approach the U.S. market to achieve increased access to lower cost of capital while firms with a U.S. board member approach the U.S. market to utilize the U.S. board member's network, experiences and know how from the U.S. product market.

The two simpler regression models, as was mentioned earlier, displayed significance for U.S. listing and its positive impact on firm value. The complete model including all control variables did not display any evidence for this result. This is an indication that it is not U.S. listing by itself that effects firm value, instead firm value is affected by one or some of the control variables that are correlated with U.S. listing. The most notable difference in significance arose when the variable foreign listing was included in the model. This is of course not surprising since we have already shown the correlation between these two variables and that foreign listing has a strong significant effect on firm value.

These results are even more interesting since the U.S. markets are not included in foreign listings. If it is the case that listing in the U.S. increases firm value as does all other foreign listings, U.S. listing should display a significant positive coefficient. However, this is not the case, the coefficient is far from significant with a p-value of 0.881 and is slightly negative. This indicates that a U.S. listing does not have any effect on firm value while other foreign listings do increase firm value. We interpret this as the U.S. capital market being well integrated with the U.K. market and more so than with other markets, mainly European markets, on which the firms in our sample are often listed on. Since all U.S. listed firms in our sample are listed on at least four other foreign exchanges we unfortunately do not have any opportunity to investigate the effect of U.S. listing on firms that do not have any additional foreign listings.

Another issue that becomes known with these results is the, if it is appropriate, use the U.S. cost of capital as a proxy for the global cost of capital. Our results could indicate that U.S.-U.K. have similar cost of capital by the non-effect of a U.S. listing on U.K. firms. However, it is also evident by the results that U.K. companies can lower their cost of capital by listing on other non-U.S. markets that are less integrated with the U.K. capital market. These results could be an indication that it is not the capital cost in the country of listing that directly effects firm value but simply the increased supply of investors available drives the firm value at a foreign cross-listing. This indication would be in line with the enlargement of the set of potential investors available to cross-listing firm as found in prior studies. This leads to the conclusion that the U.S. cost of capital is higher than the global cost of capital and therefore may not be suitable as a proxy for it. Nevertheless, it is still the best proxy available concerning the difficulties associated with measuring the global cost of capital.

Since none of our hypotheses are supported by the data we must accept the null hypotheses that U.S. listing or outsider U.S. board membership does not affect U.K. firm value. This shows that the U.K. and U.S. markets are well integrated both in regards to the financial markets and corporate governance. The stable result for the three years of observation is a strong indication of the validity of the results.

6. Conclusions

In this chapter we draw conclusions from the results obtained in our quantitative study. We also give recommendations to firms trying to achieve a global cost of capital. Lastly, we suggest future avenues of research.

As previous studies have suggested cross-listing on a foreign market considered more integrated compared to the home market, can create substantial value and lower the cost of capital for firms. Oxelheim and Randøy found that firms, in markets only partially integrated, can create value by importing an Anglo-American board member.

By using the approach suggested by Oxelheim and Randøy¹²², incorporating a foreign board member, with our twist of adding a board member from a similar corporate governance system, we found that this did not increase firm value. Therefore it did not have the desired effect suggested by Oxelheim and Randøy in respect to two markets considered well integrated.

We argued that while importing a U.S. independent board member does not create firm value firms do this to tap into the board member's know how, and market specific network. Firms cross list to have increased and easier access to investors and capital.

Our study found that U.K. firms could not create value or lower cost of capital by cross-listing on the U.S. market, considered a well-integrated foreign market. However, the results indicate that firm value can be created by cross-listing on less well-integrated foreign markets. We found that the U.S. and U.K. markets are well integrated and in regards to both financial and corporate governance systems. We also conclude that the U.S. cost of capital is a poor proxy for the global cost of capital.

Further research is needed to analyze two or more similar corporate governance systems and see if the effects of cross-listing or importing a foreign board member hold across markets and corporate governance systems. Another avenue for further research is to find and accurately measure the global cost of capital.

¹²² Oxelheim and Randøy (2003)

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Appendix 1. Statistics of group differences

Variables	Full Sample	U.S. listing	Non U.S. listing	t-test for equality of Means p-value	U.S. Board Membership	Non-U.S. Board Membership	t-test for equality of Means p-value
	n=269	n=23	n=240		n=56	n=218	
	Mean	Mean	Mean		Mean	Mean	
U.S. Listing	9%				18%	7%	,012*
Outsider U.S. Board Membership	19%	39%	18%	,012*			
Firm age (ln)	3,78	2,74	3,87	,000***	3,73	3,78	,702
Firm size (ln turnover)	5,36	5,48	5,37	,773	6,03	5,22	,005**
Board size	8,22	9,52	8,15	,007**	9,82	7,9	,000***
Board independence	47,19%	57,55%	45,88%	,000***	53,20%	45,38%	,000***
Blockholder ownership	28,30%	16,81%	28,38%	,000***	27,47%	27,34%	,954
Foreign listings	1,55	5,39	1,22	,000***	2,82	1,29	,000***
Firm Value (log q-value)							
All Industries (n=269)	0,32	0,71	0,3	,002**	0,38	0,33	,545
Retail and Property Industries (n=70)	0,11	0,36	0,1	,296	0,27	0,07	,132
Manufacturing Industry (n=62)	0,35	0,74	0,33	,234	0,24	0,38	,430
Information Technology and Telecom Industries (n=14)	0,41	-	0,41	-	0,41	0,41	,995
Media and Publishing Industries (n=23)	0,59	1,81	0,54	,034*	-	0,59	-
Shipping and Transportation Industries (n=26)	0,19	-	0,19	-	0,55	0,09	,000***
Other Industries (n=74)	0,45	0,7	0,38	,149	0,55	0,43	,621

Appendix 2. Regression over U.S.-listing

Model 1 – minimal model

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,197	,039	,035

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3,770	1	3,770	10,729	,001***
Residual	93,814	267	,351		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,288	,038	7,618	,000***		
U.S. listing	,423	,129	3,276	,001***	1,000	1,000

Model 2 – including observation year dummies

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,312	,097	,087

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9,503	3	3,168	9,530	,000***
Residual	88,081	265	,332		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,492	,065	7,602	,000***		
U.S. listing	,438	,126	3,485	,001***	,999	1,001
2002 dummy	-,360	,087	-4,133	,000***	,711	1,406
2001 dummy	-,225	,088	-2,566	,011*	,711	1,406

Appendix 3. Regression over Outsider U.S. Board Membership

Model 1 – minimal model

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,047	,002	-,001

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	,219	1	,219	,600	,439
Residual	97,365	267	,365		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,310	,041	7,587	,000		
Outsider U.S. Board Membership	,073	,094	,775	,439	1,000	1,000

Model 2 – including observation year dummies

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,240	,058	,047

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5,615	3	1,872	5,393	,001***
Residual	91,969	265	,347		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,512	,068	7,503	,000***		
Outsider U.S. Board Membership	,060	,092	,658	,511	,999	1,001
2002 dummy	-,349	,089	-3,925	,000***	,711	1,407
2001 dummy	-,218	,090	-2,431	,016*	,711	1,406

Appendix 4. Multiple regression – basic model

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,444	,197	,160

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	19,247	12	1,604	5,241	,000***
Residual	78,337	256	,306		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,310	,261	1,188	,236		
U.S. listing	,222	,140	1,586	,114	,744	1,343
Outsider U.S. Board Membership	-,056	,099	-,565	,573	,761	1,314
Board size	,078	,017	4,678	,000***	,748	1,336
Board independence	-,004	,003	-1,553	,122	,849	1,178
Blockholder ownership	-,004	,003	-1,681	,094	,776	1,289
Firm size (ln turnover)	-,017	,023	-,714	,476	,635	1,574
Firm age (ln)	-,043	,045	-,955	,340	,615	1,625
Retail and Property dummy	-,271	,102	-2,649	,009**	,563	1,776
Manufacturing Industry dummy	,016	,108	,149	,882	,555	1,803
Information Technology and Telecom dummy	,104	,168	,619	,537	,820	1,219
Media and Publishing dummy	,177	,138	1,283	,201	,761	1,315
Shipping and Transportation Industry dummy	-,249	,145	-1,720	,087	,622	1,608

Appendix 5. Multiple regression – including observation year dummies

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,498	,248	,206

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	24,191	14	1,728	5,980	,000***
Residual	73,392	254	,289		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,436	,257	1,693	,092		
U.S. listing	,250	,136	1,835	,068	,742	1,347
Outsider U.S. Board Membership	-,075	,096	-,784	,434	,759	1,318
Board size	,077	,016	4,721	,000***	,748	1,337
Board independence	-,004	,003	-1,352	,178	,842	1,188
Blockholder ownership	-,004	,002	-1,529	,128	,771	1,296
Firm size (ln turnover)	-,013	,023	-,569	,570	,634	1,578
Firm age (ln)	-,041	,044	-,926	,355	,615	1,627
Retail and Property dummy	-,260	,100	-2,613	,010**	,563	1,777
Manufacturing Industry dummy	,024	,105	,232	,816	,554	1,804
Information Technology and Telecom dummy	,122	,163	,751	,453	,820	1,220
Media and Publishing dummy	,194	,134	1,446	,149	,760	1,316
Shipping and Transportation Industry dummy	-,233	,141	-1,653	,099	,621	1,610
2002 dummy	-,335	,082	-4,105	,000***	,702	1,425
2001 dummy	-,216	,082	-2,627	,009**	,708	1,413

Appendix 6. Multiple regression – full model including Foreign Listings

Dependent Variable: Tobins Q (ln)

Model Summary

R	R Square	Adjusted R Square
,542	,294	,252

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	28,649	15	1,910	7,010	,000***
Residual	68,934	253	,272		
Total	97,583	268			

Coefficients

	Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	,663	,256	2,589	,010**		
U.S. listing	-,022	,148	-,150	,881	,590	1,695
Outsider U.S. Board Membership	-,087	,093	-,935	,351	,758	1,319
Board size	,054	,017	3,239	,001***	,665	1,504
Board independence	-,005	,003	-1,951	,052	,825	1,212
Blockholder ownership	-,003	,002	-1,271	,205	,767	1,303
Firm size (ln turnover)	-,025	,022	-1,125	,262	,622	1,607
Firm age (ln)	-,062	,043	-1,446	,149	,605	1,652
Retail and Property dummy	-,175	,099	-1,765	,079	,537	1,862
Manufacturing Industry dummy	,120	,104	1,153	,250	,526	1,902
Information Technology and Telecom dummy	-,003	,161	-,021	,983	,789	1,267
Media and Publishing dummy	,289	,133	2,178	,030*	,736	1,358
Shipping and Transportation Industry dummy	-,197	,137	-1,438	,152	,619	1,617
2002 dummy	-,329	,079	-4,144	,000***	,702	1,425
2001 dummy	-,206	,080	-2,576	,011*	,707	1,415
Foreign listing	,079	,020	4,045	,000***	,497	2,011

Appendix 7. Multiple regression – full model year by year

Year	R	R Square	Adjusted R Square
2000	,557	,310	,176
2001	,561	,314	,200
2002	,524	,274	,159

Year		Sum of Squares	df	Mean Square	F	Sig.
2000	Regression	14,003	13	1,077	2,317	,013*
	Residual	31,143	67	0,465		
	Total	45,147	80			
2001	Regression	7,357	13	0,566	2,749	,003**
	Residual	16,054	78	0,206		
	Total	23,411	91			
2002	Regression	6,462	13	0,497	2,384	,009**
	Residual	17,099	82	0,209		
	Total	23,561	95			

Year		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
2000	(Constant)	1,249	,580	2,155	,035*
	U.S. listing	-,495	,360	-1,374	,174
	Outsider U.S. Board Membership	-,049	,211	-0,233	,817
	Board size	,049	,043	1,145	,256
	Board independence	-,007	,006	-1,141	,258
	Blockholder ownership	-,002	,006	-0,421	,675
	Firm size (ln turnover)	-,054	,049	-1,096	,277
	Firm age (ln)	-,146	,099	-1,480	,144
	Foreign listing	,118	,047	2,513	,014*
2001	(Constant)	,134	,396	0,337	,737
	U.S. listing	,192	,237	0,809	,421
	Outsider U.S. Board Membership	-,080	,142	-0,563	,575
	Board size	,055	,027	2,054	,043*
	Board independence	-,003	,004	-0,907	,367
	Blockholder ownership	-,004	,004	-1,058	,293
	Firm size (ln turnover)	-,006	,034	-0,173	,863
	Firm age (ln)	-,021	,068	-0,310	,758
	Foreign listing	,063	,031	2,038	,045*
2002	(Constant)	-,001	,390	-0,002	,999
	U.S. listing	,214	,209	1,025	,308
	Outsider U.S. Board Membership	-,170	,144	-1,179	,242
	Board size	,050	,024	2,135	,036*
	Board independence	-,004	,004	-1,128	,262
	Blockholder ownership	-,002	,003	-0,601	,550
	Firm size (ln turnover)	-,008	,035	-0,240	,811
	Firm age (ln)	-,005	,064	-0,082	,935
	Foreign listing	,054	,029	1,875	,064

Appendix 8. Diagnostics

Kolmogorov-Smirnov test of Normality

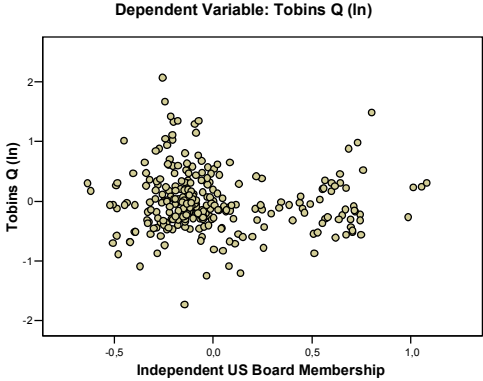
Complete variables	n	p-value		n	p-value
Firm age (ln)	269	,004			
Tobins Q (ln)	269	,000			
Firm size (ln turnover)	269	,026			
Board size	269	,000			
Board independence	269	,000			
Outsider U.S. Board Membership	269	,000			
U.S. listing	269	,000			
Blockholder ownership	269	,000			
Foreign listings	269	,000			
Not listed in the U.S.			Listed in the U.S.		
Firm age (ln)	246	,002	Firm age (ln)	23	>,200
Tobins Q (ln)	246	,000	Tobins Q (ln)	23	,018
Firm size (ln turnover)	246	,093	Firm size (ln turnover)	23	,000
Board size	246	,000	Board size	23	,082
Board independence	246	,000	Board independence	23	,060
Outsider U.S. Board Membership	246	,000	Outsider U.S. Board Membership	23	,000
Blockholder ownership	246	,000	Blockholder ownership	23	>,200
Foreign listings	246	,000	Foreign listings	23	,031
No Outsider U.S. Board Membership			Outsider U.S. Board Membership		
Firm age (ln)	218	,001	Firm age (ln)	51	>,200
Tobins Q (ln)	218	,000	Tobins Q (ln)	51	,092
Firm size (ln turnover)	218	,000	Firm size (ln turnover)	51	,000
Board size	218	,000	Board size	51	,000
Board independence	218	,001	Board independence	51	,115
U.S. listing	218	,000	U.S. listing	51	,060
Blockholder ownership	218	,000	Blockholder ownership	51	,000
Foreign listings	218	,000	Foreign listings	51	,000

Levene's Test for Equality of Variances

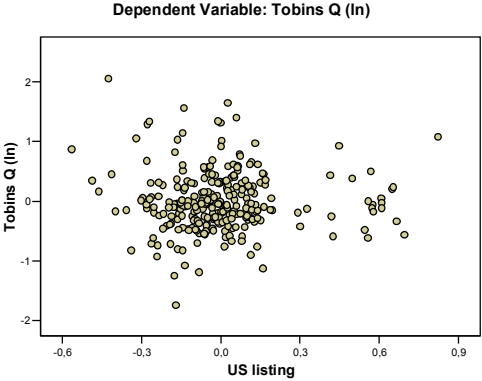
Not listed in the U.S. vs. Listed in the U.S.	p-value	No Outsider U.S. Board Membership vs. Outsider U.S. Board Membership	p-value
Variable		Variable	
Firm age (ln)	,444	Firm age (ln)	,013
Firm size (ln turnover)	,000	Firm size (ln turnover)	,210
Board size	,233	Board size	,843
Board independence	,028	Board independence	,457
Blockholder ownership	,002	Blockholder ownership	,506
Foreign listings	,009	Foreign listings	,151
Outsider U.S. Board Membership	,000	U.S. listing	,000

Appendix 9. Diagnostics - diagrams

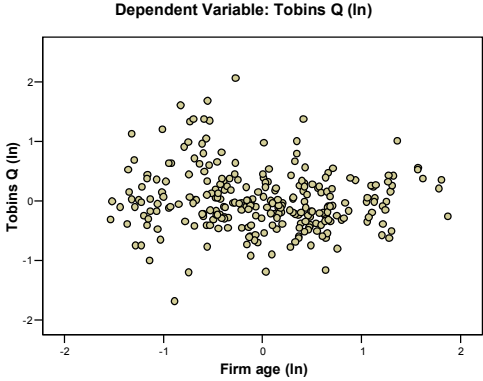
Partial Regression Plot



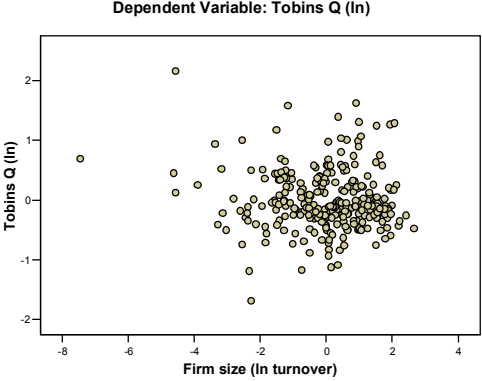
Partial Regression Plot



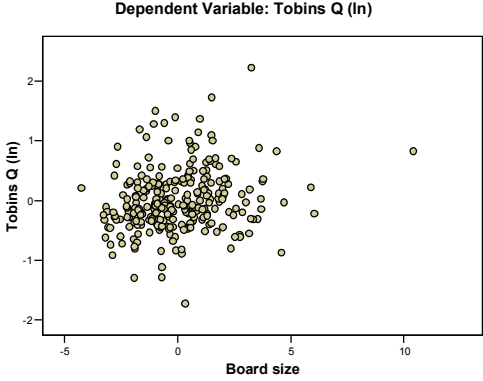
Partial Regression Plot



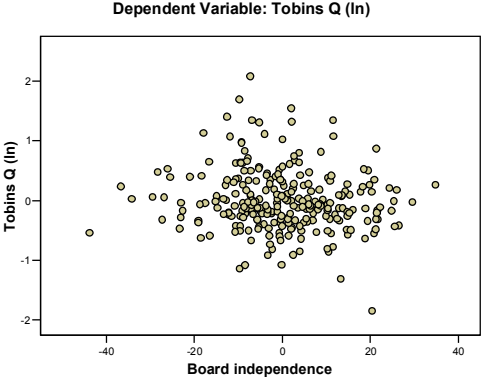
Partial Regression Plot



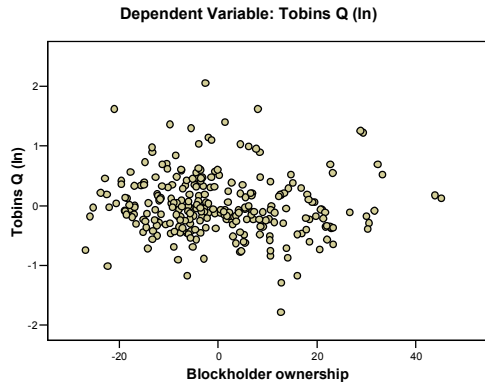
Partial Regression Plot



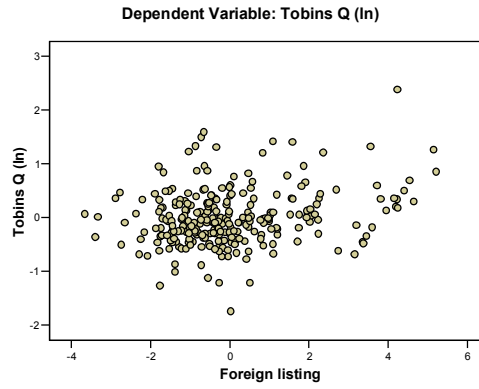
Partial Regression Plot



Partial Regression Plot



Partial Regression Plot



Histogram

