



# Antecedents of the Decision to Cross-List on a Sophisticated Market: An Empirical Study of Foreign Cross-Listings on the New York Stock Exchange (NYSE)

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## Abstract

*This study examines the firm- and country-level antecedents of the decision to cross-list on a sophisticated stock exchange. The study focuses on the New York Stock Exchange (NYSE) listing decision of foreign firms that meet the NYSE's stringent listing criteria. The effects of firm and market level factors on the cross-listing decision are examined. The study finds that larger, high-tech, and more internationally oriented firms, and firms from countries geographically closer to the US are more likely to list their securities on the NYSE. Additionally, greater profitability is associated with an increased likelihood of cross-listing for the largest foreign firms.*

**Keywords:** International Cross-Listings, American Depositary Receipts (ADRs), International Financial Markets, Cross-Listing Decision

**JEL (Classification):** F30, G10, G15

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## 1. Introduction

The popularity of international cross-listings has attracted much interest from researchers. Starting in the 1990s, there has been a significant rise in the number of both firms and countries represented in such cross-listings, especially those occurring in the United States and Europe. Firms have increasingly had their shares listed on a stock market outside their country of incorporation, a practice commonly referred to as *cross-listing*. These occurred mainly via so-called American Depositary Receipt (ADR) programs for firms cross-listing in the US or Global Depositary Receipt (GDR) programs for cross-listings on multiple markets simultaneously. In addition, publicly traded Canadian firms have also been able to list their stock directly on US exchanges. The literature has examined the following aspects of the international cross-listing decision, among others: short- and long-term firm valuation effects; pricing dynamics between depositary receipts and their underlying stock; firm and country level antecedents; diversification benefits for foreign country residents; effects on domestic stock market liquidity, and competitive effects on domestic rival firms.

Pagano, Röell, and Zechner (2002) used a sample of European firms to examine several firm-level determinants of the international cross-listing choice and those of the destination stock market. In this paper, we examine the antecedents of a firm's decision to cross-list on a sophisticated stock market, namely, the New York Stock Exchange (NYSE) from 1992 to 1998. Unlike Pagano et al. (2002), a large number of foreign countries are used, and the sample of foreign firms are conditioned on their NYSE cross-listing eligibility.<sup>1</sup> Besides being the most popular global destination for cross-listings, the NYSE also has some of the strictest listing criteria in the world. Eligibility to list on the NYSE, either directly or via the issuance of ADRs (Level III), requires foreign firms to meet certain objective criteria and to be subject to US government (SEC) regulation. Hence, the consideration of a single cross-listing destination, such as the NYSE, allows the creation of a sample consisting of only cross-listing eligible firms, thus eliminating the potential bias in the results of other studies, such as Pagano et al. (2002), due to the presence of cross-listing ineligible firms in the data sample. Finally, focusing on the 1992 to 1998 period avoids the compounding effects of the Sarbanes-Oxley Act of 2002 on the listing criteria of the NYSE. Therefore, this paper investigates the reasons why international firms eligible to cross-list on a sophisticated stock exchange choose to do so, versus those that are eligible to cross-list but do not.

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<sup>1</sup> In their study, Pagano et al. (2002) use an unrestricted sample of European public firms, and do not exclude cross-listing ineligible firms.

The use of firms from a larger number of foreign countries and stock exchanges permits the control of country and market-specific effects in the cross-listing decision. Moreover, Pagano et al. (2002) treated the decision to cross-list separately from the choice of the cross-listing destination exchange. By using a representative sample of firms from both developed and emerging markets, this paper studies the decision to cross-list on a tightly regulated and sophisticated stock exchange, thus permitting the test of hypotheses not tested by the earlier study, namely those related to the effects of marginal costs of information disclosure, and to geographical proximity, etc.

The paper considers cross-listings on the NYSE in the form of non-capital raising ADR issues (Level II ADRs), capital raising ADRs (Level III ADRs) or direct cross-listings by Canadian firms that do and do not involve the raising of additional equity. To issue Level II and Level III ADRs, or to list directly on one of the three main US exchanges, the foreign firm must adhere to US GAAP, and must be registered fully with the SEC. Thus, the type of cross-listing programs undertaken by all foreign firms in our sample requires adherence to a similar level of SEC reporting and disclosure, except that capital-raising listings also furnish the SEC with extra information regarding the public float. The firms also must satisfy all listing requirements of the exchange where their shares will be listed.

Section 2 reviews the literature. Section 3 discusses existing hypotheses related to the international cross-listing decision. Section 4 discusses the data and sample selection issues. Section 5 presents descriptive statistics. Section 6 presents a model of cross-listing choice and outlines the linkages between the model's independent variables and the hypotheses being tested. Section 7 presents the results and discusses their implications for the hypotheses. Finally, Section 8 concludes.

## 2. Literature Review

Among the most important contributions to the theory of international capital market integration are Stapleton and Subrahmanyam (1977), and Alexander, Eun, and Janakiraman (1987). These authors demonstrate that listing the equity shares of a company across two segmented markets reduces the market required return for the shares and consequently increases the company's equilibrium share price. Errunza and Losq (1985) generalize Stapleton and Subrahmanyam (1977) to the case where only one of the two markets in their model is segmented. Thus, the investors in the first country are restricted to investing in securities listed only in that country, whereas investors in the second country can invest in securities listed in both countries. Alexander, Eun, and Janakiraman (1988) measure the change in the cost of capital of non-US companies after listing for the first time in the US and find a significant drop following a cross-listing, especially for non-Canadian firms.

Miller (1999) studies the market reaction to first time international cross-listings. He finds that firms from emerging markets experience a greater positive abnormal stock price reaction upon a new depositary receipt (DR) program announcement than do firms from developed markets. This provides support for Stapleton and Subrahmanyam's (1977) theoretical finding that circumventing market segmentation through international listings increases firm value, and thus lowers the firm's cost of capital. Furthermore, Miller (1999) studies abnormal price reactions to DR placement announcements, finding a positive effect for public placements but a negative one for private placements. He also finds that abnormal returns are most positive for firms listing on major US exchanges, rather than on OTC 'pink sheets' markets. This provides support for the hypotheses that greater liquidity and a larger investor base increase shareholder wealth.

Gande (1997) models the information asymmetries of ADR issuers in their home markets. The model implies that international cross-listings in the US, characterized by a commitment to the more stringent SEC information disclosure requirements, result in positive abnormal price reactions for the underlying stock, which the author also confirms empirically. Furthermore, Gande (1997) studies ADR underpricing, and finds that successive ADR issues from a particular country have less underpricing than previous ADR issues from the same country, which suggests that US investors are thus learning about country specific factors. Foerster and Karolyi (1999) examine abnormal price reactions surrounding ADR issues and find support both for the market segmentation hypothesis, and the investor recognition hypothesis of Merton (1987). Domowitz, Glen, and Madhavan (1997) find evidence of market segmentation induced by ownership restrictions in Mexico.

Lins, Strickland, and Zenner (2004) find that when publicly listed firms from emerging markets cross-list on US stock exchanges, the sensitivity of the firms' investment to cash flows decreases significantly, suggesting that by listing on US stock markets non-US firms can relax their capital constraints. Furthermore, non-US firms access international capital markets more frequently after a US stock market listing. This finding is also more pronounced for firms from emerging markets.

## 3. Hypotheses to be Tested and the Related Literature

### 3.1. Reputation on the Product Market

Firms with globally recognizable products are also likely better to be known among international stock market investors. This should reduce adverse selection problems regarding firm quality, and lead to an increase in the firm's stock price after the cross-listing. Export-oriented firms should be more visible in global product markets and thus

have better reputations among foreign investors. Saudagaran (1988) uses a sample of 104 firms representing nine countries and finds that firms with foreign listings have a higher proportion of sales from international sources than control firms. Kang and Stulz (1997) find that foreign ownership of Japanese stocks is concentrated in firms that, controlling for size, have both greater levels of equity listed in the form of ADRs, and export more of their goods and services. Hence, if a firm's global product market reputation matters to foreign investors, it should also play a role in the firm's international cross-listing decisions.

### **3.2. Analyst Sophistication and the Reduction in Asymmetric Information**

Given the expertise and specialized knowledge required, the accurate valuation of high-tech firms depends on the presence of sophisticated analysts in the stock market. Indeed, a lack of qualified high-tech stock analysts in a market could give rise to severe information asymmetries, leading to a permanent undervaluation of such firms in that market. The US stock markets are typically followed by many sophisticated stock analysts who are well qualified to evaluate the performance of high-tech firms. Therefore, high-tech firms should in theory be more likely to benefit from a US cross-listing than firms of other types. In addition, disclosure regulations on a major US exchange like the NYSE are likely to enhance transparency and to reduce information asymmetries even further. This finding would be consistent with Blass and Yafeh (2000) who show for firms in Israel and the Netherlands that cross-listing on the NYSE is more common among high-tech firms than firms in other industries.

### **3.3. Serendipitous Information**

Subrahmanyam and Titman (1999) theorize that foreign firms about which US investors receive more serendipitous information, which they define as "costless information obtained by luck", are more likely to list their securities in the US. The authors analyze the choice between public and private financing and the evolution of capital markets in developing countries in a theoretical framework, and develop many empirically testable hypotheses. The major result of the paper is that serendipitous information is an important determinant of the going public decision, and that the size of an existing public market determines whether additional private firms find it optimal to go public. Thus, investors of an exchange prefer to invest in firms about which more serendipitous information is available to them, so that such firms may be more willing to list on that exchange. The authors interpret the role of serendipity in information acquisition as "... the extent to which stock market investors may, by chance, come across valuable information in their day-to-day activities." The authors provide the following as an example: "a store manager for a retailer such as J.C. Penney, in the course of managing the store's day-to-day operations, may obtain valuable information about the demand for the clothing line of a fledgling garment manufacturer". They state that although an individual piece of serendipitous information is likely to contain a great deal of noise, it may provide a useful signal when aggregated over many investors. Thus, serendipitous information is regarded as costless information about the aggregate demand for a firm's products and services, whereas, costly information is related to the efficiency of the firm's production process, such as information about the success of a recent merger or takeover, and the effectiveness of a new machine that automates a particular step of the production process for a manufacturer. The authors also propose that serendipitous information is more important for firms with a greater degree of product demand uncertainty, implying that younger firms, and firms in high-tech industries, are more likely to list their securities on a large international stock exchange. They also suggest that firms about which more information is available to international investors, such as firms that export more, would be more likely to issue on a large international market. Furthermore, the authors demonstrate that as the number of firms already listed on a stock exchange increases, the attractiveness of public equity financing increases, albeit non-linearly. The result stems from the fact that an increase in the number of firms in a market makes it more profitable to become an active investor and receive serendipitous information. This leads to a greater number of serendipitously informed investors in the market and thus greater market price efficiency, allowing the firm to make better decisions about its growth opportunities, thereby leading to a higher market valuation. All else equal, this relationship implies that firms are more likely to cross-list on a large international exchange if they originate from a smaller, as opposed to a larger, domestic stock market.

Hence, according to Subrahmanyam and Titman (1999) foreign firms that are larger, high-tech, in markets geographically closer to the US and that have an export orientation should be more likely to list their securities on the NYSE.

### **3.4. Liquidity**

According to Diamond and Verrecchia (1991), larger firms are more likely to disclose private information publicly because the reduction in information asymmetries will increase the liquidity of large firms' securities more than that of smaller firms. However, firm size can also affect the decision to cross-list on a large international exchange, due to the minimum information disclosure requirements of the exchange. Therefore, as larger firms are more likely already to have high levels of information disclosure in their domestic markets, the indirect costs of cross-listing, such as those involved in extra information gathering and extra auditing, would be lower for these firms. Additionally, firm size can also be important due to the direct costs of cross-listing, which for the largest US exchanges could be quite

substantial.<sup>2</sup> Therefore, due to the conflation of the information disclosure effect with the cost of cross-listing effect, a finding that larger firms are more likely to cross-list their securities in the US, would be consistent with both effects.

### 3.5. Market Segmentation

Miller (1999) finds that ADR listing announcements generate greater wealth for firms in free emerging markets than those in developed markets and interprets this as supporting the market segmentation hypothesis. The International Finance Corporation (IFC) defines a 'free' emerging market as one that places no restrictions on foreign investors regarding the repatriation of income and capital. On the other hand, a 'restricted' emerging market is defined as one having such restrictions. Because free emerging markets do not have any direct barriers to foreign investment, the market segmentation effect is due to indirect barriers to investment in these markets: i.e., emerging markets have lower liquidity, less investor recognition, and fewer disclosure requirements than developed markets.

However, cross-listing does not always integrate the market in a particular stock. Domowitz, Glen, and Madhavan (1998) show that if informational linkages between domestic and foreign markets are poor, then an international cross-listing may reduce the stock's liquidity in both markets. Hence, any liquidity benefits of listing abroad may be offset by poor inter-market information linkages.

### 3.6. Market Segmentation and Network Effects

Economides (1993) argues that network effects can be important for stock exchanges, so that as the number of participants in the stock market, i.e., firms and investors, increases, market liquidity is also enhanced. However, the author also points out that the equilibrium market price generated by a large stock exchange can create a negative externality that limits the large stock exchange's ability to grow while competing against smaller exchanges.<sup>3</sup>

Di Noia (1998) uses a network externality-based model of inter-stock market competition to show that network externalities can lock-in exchanges to inefficient outcomes even in perfect competition, and that implicit mergers in such cases can improve welfare, consumer surplus, and total profits.

Therefore, the positive network externality literature would generally predict that a firm listed on a small home stock exchange would be more likely to cross-list its shares on a large stock exchange than a firm listed on a large home stock exchange, ceteris paribus. An example of a small stock exchange is Fiji, with nine listed companies as of year-end 1998, whereas India is considered a large stock exchange with 5,860 listed companies listed as of the same period. However, as it also affects market liquidity, exchange size may not be the ideal proxy for the possible gains in informational efficiency of a firm's stock price after cross-listing. In other words, the desire of a firm from a small exchange to be listed on a large exchange is likely to reflect the benefits that would accrue from an increase in liquidity as well as any potential gains in the informational efficiency of its stock price.

### 3.7. Increased Disclosure and Loss of Confidentiality

Fuerst (1998) presents a model where firms signal their quality by voluntarily cross-listing on strictly regulated exchanges. Stulz (1999) argues that firms in countries with poor regulatory standards can reduce their cost of equity by cross-listing in countries with stricter levels of exchange regulation. Reese and Weisbach (2002) document that firms from French Civil Law systems, known for their weak protection of minority shareholders, cross-list more often on the NYSE and the National Association of Securities Dealers Automated Quotations (NASDAQ) than firms from countries with greater minority shareholder rights. La Porta, Lopez-De-Silanes, Shleifer, and Vishny (1998) show using a sample of 49 countries that countries having weaker investor protection, as measured by both the nature of the legal rules as well as the quality of enforcement of those rules, also have smaller and narrower capital markets. However, one needs to be careful about using country of origin as a proxy for the level of investor protection and as a predictor for cross-listing, as the cultural, geographical and language dimensions associated with the country variable may also separately predict cross-listing. In fact, Sarkissian and Schill (1999) find that geographical proximity plays a role in the selection of foreign markets where cross-listing is to take place. Thus, categorizing firms into groups based on their country of origin, i.e., French Law, German Law, and English Law origin countries, representing the different levels of investor protection, as used by La Porta et al. (1997), may also segment the countries along cultural, linguistic, and geographical lines.

The disclosure rules of stock exchanges also require firms to report information whose concealment may be important to maintaining competitive advantage, such as information about ongoing R&D projects or future

<sup>2</sup> Miller (1999) documents that the direct cost of a Level II ADR issue is between 200 and 500 thousand dollars, whereas for a Level III ADR listing, the direct costs rise to somewhere between 500 thousand and 2 million dollars, depending on the size of the public offering.

<sup>3</sup> This is because smaller exchanges can use the market price generated by the large exchange to avoid undertaking the cost of price discovery themselves. Their ability to pass these cost savings on to customers can also help them attract customers from the large stock exchange. Hence, as the large exchange shrinks it produces less efficient prices, making it less attractive for other exchanges to use these prices. Consequently, a larger stock exchange cannot maintain its size in the face of competition from smaller exchanges.

marketing strategies. Campbell (1979) points out confidentiality as a deterrent to public financing for private companies. Similarly, it can be hypothesized that when foreign public firms consider listing on a large US stock exchange with stricter disclosure rules than their home market, they also must consider the adverse competitive effects of greater disclosure.

Yosha (1995) develops a model of voluntary information disclosure for entrepreneurial firms, which suggests that such firms are more likely to prefer bilateral financing arrangements to multilateral ones, as the latter would involve the disclosure of information that may benefit competitors. Thus, firms that stand to lose more by conveying confidential information, such as those in high-tech industries, or firms with large R&D expenditures, may be less likely to cross-list abroad. So, contrary to Subrahmanyam and Titman's (1999) hypothesis that high-tech firms would be more likely to list abroad, this hypothesis suggests that such firms would be less likely to do so.

Nevertheless, Biddle and Saudagaran (1989) find that firms from emerging markets, which generally have weak disclosure requirements, experience greater positive abnormal stock returns upon the announcement of a cross-listing on a sophisticated exchange than do firms from developed countries. This implies that revealing confidential information may be more beneficial than harmful for cross-listing firms, especially for those originating from emerging markets. Hence emerging market firms should be more likely to cross-list than firms from developed markets.

### 3.8. Stock Overvaluation

As noted in section 3.4, firm size can be an important determinant of the cross-listing decision due to the costs associated with cross-listing, which for the largest US exchanges could be quite substantial. Additionally, however, a firm's profitability may also impact its probability of cross-listing due to the direct costs involved. Pagano, Panetta, and Zingales (1998) use a sample of Italian firms to investigate the determinants of the IPO. Although the authors restrict their sample to firms that satisfy the listing requirements for a given year, and thus control for the sample selection problem, they realize that profitability can still affect a firm's equity issuance decision in other ways. For example, a more profitable company, needing less external equity, would be less likely to want to raise capital through an IPO. On the other hand, a private firm that has experienced a temporary increase in profits may wish to cross-list in order to convince investors that its increase in profitability is permanent, leading investors to then overvalue the firm's shares.

A similar problem can exist for capital-raising international cross-listings. Thus, as it has a reduced need for external capital, a more profitable company would be less likely to consider a cross-listing for the purpose of raising capital, either at the time of cross-listing or thereafter. Nevertheless, a firm experiencing an unexpected boost in profit (and in stock price) may still wish to cross-list in order to benefit from the overvaluation of its shares. This is consistent with the theory that the insiders of a firm, having access to private information, are more likely to issue equity when the firm's stock is overvalued (Myers and Majluf, 1984).

However, the effect of a firm's profitability on its decision to cross-list on a major stock exchange, like the NYSE may also be due to the significant direct and indirect costs involved in listing on such an exchange. Therefore, if greater profitability increases the likelihood of a cross-listing on the NYSE, this finding will preclude the separation of the effects related to the overvaluation of the firm's shares, and the costs of cross-listing.

## 4. Data

The initial sample of firms was drawn from Global Access' Worldscope, a database containing financial and accounting data for selected international public firms.<sup>4</sup> Banks, insurance companies, and other financial firms were discarded due to the differences in these firms' operations, and their accounting data. From the December 1999 edition of the database, 10,738 non-financial firms were identified as having been incorporated outside the US. The sample period is from 1992 to 1998, inclusive. Worldscope provided about 10 years of data on most firms in the initial sample, and mainly from 1989 to 1998. The first three years of this time-series were used to determine whether or not a firm met the listing requirements of an exchange and was therefore eligible for listing on that exchange.

All firms having cross-listings prior to January 1, 1992, were excluded from this sample, as these firms if they reissued, did not necessarily do so for the same reasons as firms that issued for the first time. From the Center for Research in Security Prices (CRSP) database, 303 non-financial international firms were identified as having already cross-listed on one of the three main exchanges in the US as of the last day of 1991. The assumption is that a firm has already cross-listed in the US, i.e., NYSE, AMEX or NASDAQ, if the firm has a CRSP security identified either as an ADR or as belonging to a firm incorporated outside the US, and if a history exists for any security of the firm either on or before December 31, 1991. A pre-sample period history was assumed to exist for the firm if the first name structure for the firm was added to the CRSP data files before January 1, 1992. The name structure of a firm contains information about any changes to the name of the firm as well as the exchange on which the firm was

<sup>4</sup> All data used in this paper was collected in 2000 when the author was a graduate student at the Kelley School of Business, Indiana University, Bloomington.

trading when added to the CRSP files. A comparison of these dates, with actual listing dates obtained from the exchanges, revealed that the firms' market price data became available on CRSP either on, or within a few days of, the official listing day. Given this level of accuracy, the CRSP daily stock file was deemed suitable for the purpose of identifying the stock listing dates used in this paper. Of these firms, 115 were appeared in the initial data sample and were therefore removed. Next, CRSP was again used to identify all firms having their first US cross-listing after January 1, 1992. The identification of first-time international listings was made using CRSP instead of the three main US exchanges. This is because the exchanges only identify the currently listed foreign firms and the dates of their most recent listings. As the exchanges do not keep data about delisted firms for longer than one year, this would introduce a survivorship bias in the sample of cross-listed firms provided by the exchanges. On the other hand, the list of CRSP firms did not suffer from a survivorship bias as CRSP maintains cross-listed firms' data on its files indefinitely, even after delistings.

As the purpose of this paper is to study the determinants of the decision to cross-list, the sample is restricted to firms that have at least a theoretical chance of cross-listing each year. Therefore, a yearly observation exists for a firm only if the firm meets the exchange listing criteria during that particular year. Other information required to judge a foreign firm's cross-listing eligibility, such as its ability to meet SEC information disclosure rules and to adhere to US GAAP, cannot be gleaned from public sources. In fact, the use of exchange listing requirements remains the only feasible method of determining a foreign firm's ex-ante ability to cross-list. To cross-list on a major US exchange an international firm must first satisfy complex exchange listing criteria, such as minimum financial, distribution of ownership, and size requirements.

There are several reasons why this paper studies only foreign cross-listings that occurred on the NYSE. AMEX cross-listings were unsuitable due to weak financial and distribution of ownership criteria and a low incidence of cross-listings during the sample period. NASDAQ, on the other hand, had complicated non-financial requirements, and too few cross-listings overall, including both the NASDAQ Small-Cap and National Markets. Furthermore, and like AMEX, NASDAQ's Small-Cap market had weak foreign cross-listing requirements.

Nevertheless, the NYSE was selected for this study not only because of the aforementioned elimination process. The NYSE also had the least complicated set of non-financial requirements among the three exchanges, as well as the largest number of foreign cross-listings of any US exchange during the sample period. Between January 1992 and December 1998, 222 first-time non-financial cross-listings occurred on the NYSE, while only 46, and 108 did so on AMEX and NASDAQ, respectively. The NYSE also had listing requirements on the fewest number of non-financial variables. For example, the NYSE had no requirement on the minimum size of the offering as did NASDAQ and AMEX. Most non-financial variables used in the official listing criteria of these exchanges were either unavailable or had too many missing observations for the sample of firms obtained from Worldscope.

The costs associated with cross-listing on a US stock exchange could be significant. Some examples are the costs of implementing new accounting standards, i.e., US GAAP; marginal costs of information gathering, such as the purchase of a new accounting information system; marginal auditing costs; and also, the initial and annual fees to be paid for an exchange listing. Hence, only the largest foreign firms would typically be able to afford such costs. Because of the NYSE's minimum listing criteria regarding firm size, most small firms that could not afford the costs of a US cross-listing would automatically be excluded from the sample. This would minimize the incidence of any potential sample selection bias.

The NYSE had two sets of listing standards for international firms. The first, NYSE's US standard, is for firms that already have a minimum level of distribution of ownership for their shares within the US. However, due to a lack of available data on foreign firms' private US share distributions and public share distributions on exchanges other than the NYSE, AMEX, and NASDAQ, only the second, i.e., non-US or alternative listing standard, is used, as shown in Table 1, below. Therefore, to be considered eligible to cross-list on the NYSE, a foreign firm had to satisfy one of the three sets of financial criteria shown in Table 1, Panel A. The firm also had to satisfy all the distribution and size criteria in Table 1, Panel B. The asterisks denote the criteria used in the paper to determine a firm's eligibility to be included in the final sample in a particular year.

Almost all actual NYSE cross-listings satisfied the alternative listing criteria during the sample period. Hence, very few cross-listing firms did so by meeting only the standard listing criteria of the NYSE. Thus, using the alternative listing criteria to determine cross-listing eligibility did not introduce a significant bias by incorrectly excluding some firms from the list of those eligible to cross-list. Additionally, firms meeting all the Table 1 criteria, except for the ones related to market size, were still considered eligible to cross-list by the NYSE if they meet some other, and slightly looser, minimum market size criteria. Such firms were nevertheless excluded from the study due to the unavailability of data required to ascertain compliance with these criteria. However, most actual cross-listings fully satisfied the listing requirements in Table 1. This implies that very few firms met the cross-listing eligibility requirements under the looser market size criteria. Hence, the exclusion of these firms was not expected to affect materially the analyses performed in this paper.

Panel A: Criteria Related to Minimum Share Distribution and Firm Size		
	Number of shares (worldwide)	2,500,000*
	Number of worldwide shareholders with at least 1 round lot (100 shares)	5,000
	Worldwide market value (US \$)	100,000,000*
	AND	
1.	Aggregate pretax income for last 3 years (US \$)	100,000,000*
	Pretax income for each of the last 3 years (US \$)	25,000,000*
OR 2.	Worldwide market capitalization (US \$)	500,000,000*
	Revenues (US \$)	200,000,000*
	Aggregate cash flow for last 3 years (US \$)	100,000,000*
	Cash flow in each of last 2 years (US \$)	25,000,000*
OR 3.	Worldwide market capitalization (US \$)	1,000,000,000*
	Revenues (US \$)	250,000,000*

**Table 1: Non-US (Alternative) Listing Criteria of the NYSE During 1991-1998**

\* These criteria were used to determine a firm's eligibility for inclusion in the final sample for a given year.

A firm was considered eligible to cross-list in a given year if it satisfied NYSE's listing standards as of the end of the previous fiscal year. For example, a foreign firm had to meet the listing requirements for fiscal year-end 1991 to be considered eligible to cross-list in 1992. If the data required for determining a firm's cross-listing eligibility in a particular year were missing, then that firm-year observation was dropped from the sample. In the next section, the summary statistics for these data-missing firms are compared against those of firms from the initial sample. The presence of any selection bias is thus analyzed. As mentioned before, this study considers only first-time US cross-listings occurring on the NYSE. Therefore, a firm that cross-listed on any US exchange during the sample period, including the NYSE, was removed from the sample for subsequent years. After these exclusions, the sample contained 11,053 firm-year observations, representing 2,446 firms from 46 countries. The IFC Factbooks, published annually by the International Finance Corporation, are used to determine a country's level of economic development. Thus, countries are classified as either *developed* or *emerging* market.

Out of a sample of 2,446 firms, 51 first-time US cross-listings occurred on the NYSE. The final sample contained 11,002 firm-years belonging to firms that met the listing eligibility requirements in a given year but chose not to cross-list in that year.

The country specific data, such as the annual number of firms listed on national exchanges, the annual total dollar trading volumes per country, and the annual total dollar market capitalization per country, were also collected from IFC Factbooks. Month-end exchange rate data were obtained from Worldscope, and all financial variables quoted in units of domestic currency were converted into dollars as of each firm's fiscal year-end. The determination of high-tech firms was made using their SIC code descriptions.

## 5. Summary Statistics

Table 2, Panels A through D, below, present summary statistics on the initial sample, and subsamples, of firms obtained from Worldscope. Panel A contains summary statistics for all available firm-years in the 1992 to 1998 sample period, namely, the initial sample. Panel B shows the summary statistics only for firms that met the listing requirements in a given year and contain only firm-years where the necessary data was available to determine a firm's eligibility to cross-list in a given year. Panel B therefore comprises eligible cross-listing firm-years, and eligible non-listing firm-years. Panel B also excludes firms that cross-listed in the US prior to 1992, and firm-year observations for the years following a cross-listing. Panel C shows the statistics of cross-listing firms in the year of their cross-listing, i.e., the firm-years that correspond to cross-listings. In other words, Panel C shows the summary data for firm-years where a firm has been found eligible to cross-list in a given year and has actually chosen to cross-list in that year. All data shown in Table 2 are for the end of the fiscal year prior to the year in question. *ROA* is the return on total assets. '*Domestic / US Turnover*' is the average in the last three years of the ratio of 'Total value traded in domestic equity markets/Total market cap in US equity markets' to 'Total value traded in US equity markets/Total market cap in US equity markets'. It is therefore a relative measure of the recent average liquidity in the two markets. It is worth noting that the 'number of firms listed' variables are also three-year averages and consist of all publicly traded firms in either the domestic country or the US, respectively. Finally, Panel D shows the statistics for firms that were eliminated from the initial sample, prior to the determination of cross-listing eligibility, due to the unavailability of all data required to determine eligibility.

As shown in Panel A, the initial sample contained many very small firms, a median of only 162 million dollars in market capitalization, but the presence of a few very large companies raised this figure significantly, to around 800 million dollars. The same was true of cross-listing eligible firms (Panel B), which had a median market cap of around 1.1 billion dollars, and a mean market cap of 2.2 billion. Also, it is apparent that cross-listing eligible firms are much larger in both mean and median market capitalization than those in the initial sample. The total sales

figure is also greater for the sample of cross-listing eligible firms. These firms also have a higher mean ratio of foreign to total sales than the initial sample. Not surprisingly, as they are also bigger in market capitalization, cross-listing eligible firms have a greater number of outstanding shares. Although the mean R&D to sales ratio is much lower for the cross-listing eligible sample than for the initial sample, the median of this ratio is larger in the eligible sample. Also, the eligible firms have larger home markets, in terms of the number of companies listed, than do firms in the initial sample. Furthermore, the eligible firms are slightly less profitable in terms of both the mean and median *ROA*, than the initial sample, and this does not seem to be due to a possible sample selection bias created by removing unclassifiable firm-years, because in Panel D, the mean and median *ROA* of firm-years are actually lower than in the initial sample. It is apparent that actual cross-listing firms (Table 2, Panel C) are greater in both mean and median market cap as well as in mean and median total sales than the sample of eligible firms. Therefore, firm size appears to be a good predictor of cross-listings. Also, the mean and median foreign to total sales ratios in the cross-listing sample are almost twice as large as their counterparts in the eligible sample. Consequently, the size of a firm's exports may be a determinant of the decision to cross-list, as suggested by Saudagaran (1988), Kang and Stulz (1997), and Subrahmanyam and Titman (1999). Cross-listing firms are also more profitable in terms of average and median *ROAs*, than firms in the eligible sample. Also, a greater proportion of firms in the cross-listing sample are high-tech than in the eligible sample, as consistent with the literature.

Panel D shows the statistics for firm-years dropped from the initial sample due to a lack of all necessary data for determining cross-listing eligibility, as outlined in Table 1. It is evident that a great majority of these firm-years were missing market-cap data, as there were only 26 observations with lagged market cap data in a sample of 22,282 firm-years. Based on some firm specific variables, such as shares outstanding, market cap and total sales, the firms in this sample are slightly smaller than those in the initial sample. Arguably, most of these firm-years would not have met the listing requirements employed in the paper, and therefore would not have been included in the final sample of cross-listing eligible firms. Thus, the necessity of excluding the firm-years in Panel D from the initial sample before determining cross-listing eligibility is unlikely to create a significant selection bias in the sample of eligible firms.

**Panel A: Initial Sample of All Firm-Years**

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Market Cap (millions US \$)	801	162	2,950	0	117,454	48,933
Total Sales (millions US \$)	1,277	210	5,778	-51	201,740	53,577
Foreign Sales / Total Sales (%)	18.98	0	28.76	0	902.15	38,911
High-Tech Firm (Dummy)	0.3	0	0.46	0	1	71,397
<i>ROA</i> (%)	8.46	4.5	692	-7,414	151,942	48,412
Shares Outstanding (millions)	584	31	9,669	0	966,800	52,561
Domestic / US Turnover	0.83	0.64	0.81	0.01	8.38	67,799
Developed Market (Dummy)	0.75	0.43	1	0	1	71,397
R&D / Total Sales (%)	51.64	0.81	5,131	0	653,935	16,398
No. of firms listed on home markets	1,117	642	941	16	5,747	70,282
No. of firms listed on US markets	7,289	7,212	573	6,680	8,334	71,397

**Panel B: Subsample of Firms Eligible to Cross-list**

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Market Cap (millions US \$)	2,261	1,143	4,212	15	117,454	11,053
Total Sales (millions US \$)	3,592	1,491	9,044	0	201,740	11,042
Foreign Sales / Total Sales (%)	25.86	14.53	31.63	0	902.15	8,588
High-Tech Firm (Dummy)	0.32	0	0.47	0	1	11,053
<i>ROA</i> (%)	6.52	4.55	11.7	-36.9	334.06	10,959
Shares Outstanding (millions)	1,182	147	13,885	3	538,000	11,053
Domestic / US Turnover	0.71	0.56	0.56	0.01	8.38	10,750
Developed Market (Dummy)	0.85	1	0.36	0	1	11,053
R&D / Total Sales (%)	4.71	1.34	136.76	0	9304.9	4,643
No. of firms listed on home markets	1,412	1,863	912	27	5,747	11,032
No. of firms listed on US markets	7,377	7,212	586	6,680	8,334	11,053



Panel C: Subsample of Cross-listing Firms

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Market Cap (millions US \$)	4,699	2,026	6,427	542	28,538	51
Total Sales (millions US \$)	5,898	1,596	11,724	0	60,871	51
Foreign Sales / Total Sales (%)	43.41	54.41	29.41	0	91.75	36
High-Tech Firm (Dummy)	0.41	0	0.5	0	1	51
ROA (%)	9.98	7.22	9.87	-12.1	40.82	48
Shares Outstanding (millions)	3,523	334	14,130	14	75,250	51
Domestic / US Turnover	0.77	0.68	0.53	0.1	2.9	44
Developed Market (Dummy)	0.71	0.46	1	0	1	51
R&D / Total Sales (%)	2.89	1.52	3.89	0	16.16	24
No. of firms listed on home markets	842	582	680	65	2,194	50
No. of firms listed on US markets	7,467	7,536	531	6,680	8,334	51

Panel D: Subsample of Unclassifiable Firm-Years

Variable	Mean	Median	Std. Dev.	Min	Max	Obs.
Market Cap (millions US \$)	307	40	587	1	2,520	26
Total Sales (millions US \$)	1,264	115	5,332	0	128,620	4,701
Foreign Sales / Total Sales (%)	20.28	0	30.12	0	174.96	2,228
High-Tech Firm (Dummy)	0.34	0	0.47	0	1	22,282
ROA (%)	5.78	5.17	36	-1,426	660	2,696
Shares Outstanding (millions)	192	9	2,138	0	67,650	4,365
Domestic / US Turnover	1.02	0.68	1.18	0.02	8.38	20,462
Developed Market (Dummy)	78.9	0.92	2,021	0	57,133	801
R&D / Total Sales (%)	780	503	746	16	5,747	21,490
No. of firms listed on home markets	7,052	6,896	460	6,680	8,334	22,282
No. of firms listed on US markets	307	40	587	1	2,520	26

Table 2: Summary Statistics of Firm-Years in the Initial Sample and Subsamples

## 6. A Model of the Cross-Listing Decision

This section presents the estimation model for the analysis of the ex-ante determinants of the international cross-listing decision, and describes the independent variables used to test the hypotheses presented in Section 3. The probability of cross-listing is estimated as a univariate probit model with the following general form:

$$(1) \quad Pr(\text{Crosslist}_{it} \text{ is } 1) = \alpha_1 \text{Size}_{it} + \alpha_2 \text{TSales}_{it} + \alpha_3 \text{FSRatio}_{it} + \alpha_4 \text{Hitech}_{it} \\ + \alpha_5 \text{ROA}_{it} + \alpha_6 \text{MktTurn}_{it} + \alpha_7 \text{Develop}_{it} + \alpha_8 \text{R\&D}_{it} \\ + \alpha_9 \text{DMktSize}_{it} + \alpha_{10} \text{USMktSize}_{it} + \beta_i \text{Geogr}_i + \gamma_t \text{Year}_t + \varepsilon_{it}$$

where  $\text{Crosslist}_{it}$  is an indicator variable that equals one if company  $i$  cross-lists in period  $t$ , and zero otherwise;  $F(\cdot)$  is the cumulative standard normal distribution function; and  $\text{Year}$  and  $\text{Geogr}$  are the dummies for the year and the geographic region, respectively. The independent variables are defined as follows:  $\text{Size}$ , the log of the lagged dollar market capitalization, proxies for firm size;  $\text{TSales}$ , the natural log of lagged total sales, which after controlling for market capitalization, measures the firm's future growth opportunities, as firms with greater sales for a given market cap should be less likely to list abroad. This is because after controlling for market cap, a firm with a greater level of sales would have a smaller share of its market value composed of future growth opportunities, and the demand for the firm's products would thus be more certain.  $\text{FSRatio}$  is the lagged ratio of a firm's foreign to total sales and captures foreign investors' level of familiarity with the firm. Because this ratio is provided as an aggregate measure of the proportion of exports, it is not possible to determine a breakdown by country, or even to determine the largest export market for the firm. Therefore, although firms with a higher foreign to total sales ratio may not necessarily have a greater product market reputation within the US, it is nevertheless reasonable to expect US investors to be more familiar with foreign firms that are export-oriented than with those that are not. Thus, the variable  $\text{FSRatio}$  is used to proxy for US investors' level of familiarity with the foreign firm.

The dummy variable,  $\text{Develop}$ , takes on the value 1 for a developed market firm, and 0 for an emerging market one. The dummy variable,  $\text{Hitech}$ , equals 1 for firms classified as high-tech, and 0 for those that are not. The variable  $\text{ROA}$  is the lagged return on total assets and is measured as of the fiscal year-end prior to the year in question. The variable  $\text{R\&D}$  is the lagged ratio of research and development costs to sales. It is used to represent the level of proprietary information that a firm may need to disclose if it lists in the US. However, similar to the  $\text{Hitech}$  dummy,  $\text{R\&D}$  may also represent the future demand uncertainty for a firm's 'as yet undeveloped' products. These two measures are in fact somewhat correlated. In the final sample, the average high-tech firm has an  $\text{R\&D}$  value of 8.2%, whereas for an average low-tech firm, this figure is 1.1%.

The variable *MktTurn* is used to measure the effect of liquidity improvement associated with cross-listing in the US. *MktTurn* is the three-year lagged average turnover ratio of a firm's home market for a given year divided by the three-year lagged average US stock market turnover ratio, i.e., for all US exchanges combined. The turnover ratio is defined as the total value traded on a stock market for a given year divided by the capitalization of that stock market for the same year. Hence, *MktTurn* is used as a measure of the expected liquidity gain (or loss) an average foreign firm's stock would experience if it were traded on a US exchange in a particular year within the sample period. This study does not distinguish between the motivations for cross-listings that raise capital and those that do not. Temte (1995) finds similar listing-day underpricing regardless of whether or not new capital is raised, suggesting that the motivations for these cross-listings may be similar.

The model also uses the variables *DMktSize* and *USMktSize*, namely the average number of firms listed in the last three years on the domestic stock market of a given firm, and on the NYSE, respectively, to control for the effects of stock market size.

The study also employs geography dummies, as defined in Table 3, to control for country effects. The *FSRatio* variable is used to test the hypothesis that foreign firms better known by US investors are more likely to cross-list in the US. Geography dummies should therefore also capture any residual *investor recognition* biases related to a particular country. Hence, firms from geographically distant countries should also be less likely to cross-list in the US, *ceteris paribus*. The study also uses year dummies to capture the time clustering of cross-listings. Table 4 presents the empirical predictions of the main theories, and shows the links between the hypotheses, based on the theories or implications of prior literature, and the explanatory variables used in the model.

Geography Dummy	Country					
Africa	S. Africa					
Asia	China	Hong Kong	India	Indonesia	Japan	S. Korea
	Malaysia	Pakistan	Philippines	Singapore	Taiwan	Thailand
Australia & N. Zealand	Australia		N. Zealand			
	Austria	Belgium	Denmark	Finland	France	Germany
Europe & Middle East	Greece	Hungary	Ireland	Israel	Italy	Luxembourg
	Netherlands	Norway	Poland	Portugal	Russia	Spain
	Sweden	Switzerland	Turkey	U.K.		
North America	Canada	Mexico				
South America	Argentina	Brazil	Chile	Colombia	Peru	Venezuela

Table 3: Geography Dummies

Hypotheses Implied by Theory or Empirical Findings	Explanatory Variables and Predicted Sign of Effect on Cross-listing Probability
Product Market Reputation: <i>Saudagaran (1988); Kang and Stulz (1997)</i>	<i>FSRatio</i> (+)
Analyst Sophistication: <i>Blass and Yafeh (2000)</i>	<i>Hitech</i> (+)
Serendipitous Information: <i>Subrahmanyam and Titman (1999)</i>	<i>Hitech</i> (+); <i>FSRatio</i> (+); <i>TSales</i> (-); <i>DMktSize</i> (-); <i>Geogr, i.e., nearby markets</i> (+)
Liquidity: <i>Diamond and Verrecchia (1991)</i>	<i>Size</i> (+)
Market Segmentation: <i>Stapleton and Subrahmanyam (1977)</i>	<i>Develop</i> (-)
Network Effects: <i>Economides (1993); Di Noia (1998)</i>	<i>DMktSize</i> (-)
Loss of Confidentiality: <i>Campbell (1979); Yosha (1995)</i>	<i>Hitech</i> (-); <i>R&amp;D</i> (-)
Stock Overvaluation: <i>Myers and Majluf (1984)</i>	<i>ROA</i> (+)

Table 4: Hypotheses to be Tested and Explanatory Variables

## 7. Results and Discussion

### 7.1. Whole Sample

The maximum likelihood estimates (MLE) for eleven subsets of the probit model using all eligible firm-years are as shown in Table 5, Panel A, with the standard errors in parentheses below each estimate. Logit estimations, also conducted, yielded results similar to those of the probit model. Furthermore, the significance of the coefficient estimates of all logit models with finite MLE solutions were identical to their probit counterparts. Further, only statistically significant year dummies are shown. Also shown, are the Akaike Information Criterion, the Schwarz Information Criterion, and the Likelihood Ratio (LR) test statistic. The reported p-value is for the LR test of the null hypothesis that the estimates of all coefficients of a model, not including the intercept, are equal to zero.

In Table 5, the firm size variable, *Size*, is highly significant, with point estimates that are stable across all model specifications. However, the coefficients for *Size* seem to rise by an appreciable amount with the inclusion of the *R&D* variable. This is to be expected as the models with *R&D* are estimated using a sample containing a greater proportion of cross-listings. Thus, the probability of cross-listing seems to be more sensitive to changes in the log of

market cap in these models. In the first model, a one standard deviation increase in the log of market capitalization leads to about one-quarter of a percentage point increase in the probability of cross-listing, corresponding to a 123% increase in the sample average probability of cross-listing. Thus, firm size appears to be an important determinant of the cross-listing decision. We further note that, although the coefficient for *TSales* is significant in only the first model, the signs of the coefficients are negative for all eleven specifications, as predicted. *FSRatio*, the foreign sales to total sales ratio, is positive, and statistically highly significant in most models where it is used, but becomes insignificant in model 8, with the addition of variables *DMktSize*, and *USMktSize*. Furthermore, the point estimates for *FSRatio* are similar in all of the models. The addition of *DMktSize* and *USMktSize* also leads to a rise in the adjusted R-squared, and a drop in the Akaike Information Criterion (AIC).

The coefficients of *ROA* are significant only when *FSRatio* is in the model, and the geography dummies are not, but the positive sign of the coefficients in models 6, 7 and 8, is consistent with the hypothesis that more profitable firms cross-list to raise capital when their shares are overvalued. However, the significant and positive coefficient estimate for *ROA* can also be due to more profitable firms finding it easier to fund the costs of cross-listing. It is evident in comparing the models 8 and 9, which are based on the same sample, that the geography dummies make the *Hitech* variable statistically significant and positive. *DMktSize* and *USMktSize* are also significant in models 8 and 9 but lose their significance with the addition of the geography variables. Therefore, the dummy for Asia is significant and negative, whereas for North America, it is significant and positive. Finally, the statistically significant geography effects indicate that firms traded on far away markets, namely those in Asia, are less likely to cross-list on the NYSE, whereas firms from Canada and Mexico are more likely to do so. Firms in other distant geographical locations do not appear any more or less likely to cross-list in the US. Thus, our findings support the hypothesis that geography is an important determinant of the cross-listing decision. Out of all models estimated with the *R&D* variable, only model 3 gave a convergent solution, and is the only model with *R&D* shown in Table 5. Nevertheless, the coefficient of *R&D* was insignificant in this model.

The probability of cross-listing falls as the number of firms listed in the domestic market increases. This result is likely driven by the high number of Japanese firms that are eligible to cross-list but don't. However, the low incidence of Japanese cross-listings can also be related to the sample period, because prior to 1992 only eight non-financial Japanese firms cross-listed on the NYSE, and 15 on the NASDAQ.

Panel A: Unrestricted Sample of Firm-Years

Variable	Model Specification				
	1	2	3	4	5
Constant	-5.7916 *** -0.714	-6.0431 *** -0.82	-7.304 *** -1.096	-5.9709 *** -0.824	-5.8964 *** -0.823
Size	0.2905 *** -0.065	0.3138 *** -0.079	0.3774 *** -0.117	0.3096 *** -0.079	0.2957 *** -0.08
TSales	-0.074 -0.051	-0.088 -0.066	-0.08 -0.097	-0.0788 -0.067	-0.0726 -0.068
FSRatio		0.0031 *** ( <i>&lt;0.001</i> )		0.0032 *** ( <i>&lt;0.001</i> )	0.0032 *** ( <i>&lt;0.001</i> )
Develop				-0.1753 -0.201	-0.1816 -0.202
Hitech					0.1224 -0.122
R&D			-0.016 -0.023		
D96	0.2476 -0.172	0.3293 * -0.191	0.6916 ** -0.34	0.3368 * -0.192	0.3323 * -0.191
Total Obs.	11,033	8,588	4,643	8,588	8,588
Cross-Listings	49	36	24	36	36
Akaike IC	614.05	447.65	289.73	448.93	449.94
Adj. R-Square	0.0022	0.0035	0.0047	0.0033	0.0034
Schwarz IC	679.82	518.23	354.16	526.57	534.64
Likelihood Ratio	596.05	427.65	269.73	426.93	425.94
P-value	<0.0001	<0.0001	0.0003	<0.0001	<0.0001

\*, \*\*, \*\*\* Significant at the 0.1, 0.05, and 0.01 levels, respectively. Standard errors are given in parentheses below each estimate.

**Table 5**  
**Panel A – Continued**

Variable	Model Specification									
	6		7		8		9		10	
Constant	-5.7916	***	-6.0431	***	-7.304	***	-5.9709	***	-5.8964	***
	-0.714		-0.82		-1.096		-0.824		-0.823	
Size	0.2905	***	0.3138	***	0.3774	***	0.3096	***	0.2957	***
	-0.065		-0.079		-0.117		-0.079		-0.08	
TSales	-0.074		-0.088		-0.08		-0.0788		-0.0726	
	-0.051		-0.066		-0.097		-0.067		-0.068	
FSRatio			0.0031	***			0.0032	***	0.0032	***
			(<0.001)				(<0.001)		(<0.001)	
Develop							-0.1753		-0.1816	
							-0.201		-0.202	
Hitech									0.1224	
									-0.122	
ROA					-0.016					
					-0.023					
D96	0.2476		0.3293	*	0.6916	**	0.3368	*	0.3323	*
	-0.172		-0.191		-0.34		-0.192		-0.191	
Total Obs.	11,033		8,588		4,643		8,588		8,588	
Cross-Listings	49		36		24		36		36	
Akaike IC	614.05		447.65		289.73		448.93		449.94	
Adj. R-Square	0.0022		0.0035		0.0047		0.0033		0.0034	
Schwarz IC	679.82		518.23		354.16		526.57		534.64	
Likelihood Ratio	596.05		427.65		269.73		426.93		425.94	
P-value	<0.0001		<0.0001		0.0003		<0.0001		<0.0001	

\*, \*\*, \*\*\* Significant at the 0.1, 0.05, and 0.01 levels, respectively. Standard errors are given in parentheses below each estimate.

**Table 5: Determinants of the Cross-Listing Decision Using Probit Model Estimation**

## 7.2. Sub-samples

The final sample of firm-years contained a high proportion of Japanese firms, as well as other Asian firms, that were much less likely to cross-list within the sample period. In order to ensure the robustness of the results, the analysis was repeated after excluding these overrepresented firms from the final sample. The results are tabulated in Table 5, Panel B, for the subset of model specifications giving convergent solutions. The log of market cap is highly significant, just as it is for the estimations based on the full sample. Further, the point estimates for the restricted sample are similar to their full sample counterparts. However, *FSRatio* becomes insignificant in the non-Asian sample, whereas *Hitech* is significant for all estimated models. The significance of *Hitech* could be explained by the fact that removing the Asian firms, also removed the disproportionately high number of Japanese high-tech firms that were unlikely to cross-list. Hence, foreign high-tech firms were found to be more likely to cross-list than their non-high-tech counterparts. The dummy for the year 1996 was highly significant and had similar point estimates for all models in Table 5, Panel B, indicating an apparent time clustering of non-Asian cross-listings in that year.

**Table 5**  
**Panel B: Subsample of Non-Asian Firms**

Variable	Model Specification									
	1		2		3		4		5	
Constant	-5.414	***	-5.5874	***	-5.27	***	-5.4291	***	-5.6694	***
	-0.762		-0.87		-0.875		-0.916		-0.96	
Size	0.2807	***	0.3011	***	0.2622	***	0.2633	***	0.2745	***
	-0.07		-0.086		-0.087		-0.089		-0.092	
TSales	-0.078		-0.0879		-0.0801		-0.0788		-0.0726	
	-0.055		-0.072		-0.097		-0.067		-0.068	
FSRatio			0.0006		0.0004		0.0002		-5E-05	
			-0.002		-0.002		-0.002		-0.002	
Develop					-0.1827		-0.0344		-0.1816	
					-0.251		-0.293		-0.202	
Hitech					0.2848	**	0.2512	*	0.3074	**
					-0.14		-0.142		-0.148	
ROA							0.0007		-0.0009	
							-0.007		-0.009	

<i>MktTurn</i>									-0.2057
									-0.208
<i>D96</i>	0.3947 **	0.4541 **	0.4513 **	0.5157 **	0.4833 **				
	(-0.186)	(-0.204)	(-0.206)	(-0.216)	(-0.219)				
Total Obs.	5,086	3,922	3,922	3,906	3,821				
Cross-Listings	46	34	34	33	31				
Akaike IC	515.3	382.18	381.74	375.34	355.41				
Adj. R-Square	0.0037	0.0049	0.0055	0.0049	0.0052				
Schwarz IC	574.11	444.92	457.04	456.85	442.89				
Likelihood Ratio	497.3	362.18	357.74	349.34	327.41				
P-value	0.0007	0.0008	0.0006	0.0017	0.0018				

\*, \*\*, \*\*\* Significant at the 0.1, 0.05, and 0.01 levels, respectively. Standard errors are given in parentheses below each estimate.

Next, in order to reduce potential biases caused by the inclusion of smaller firms unable to cross-list due to their inability to afford the direct and indirect costs of cross-listing on the NYSE even while meeting its listing criteria, the analysis is repeated once more using a subset of the largest firms in the eligible sample. Thus, the subsample of firm-years is restricted to the largest market-cap quintile, and the results are given in Table 5, Panel C. The most striking feature of this set of results is that the market size coefficient estimate is no longer statistically significant. Also, the point estimates are slightly lower than in the earlier panels of Table 5. Moreover, *ROA* is now positive and significant in all models containing it. However, the results in Table 5, Panel C do not seem to be too significant, as the p-value for the LR test is rather high. Nevertheless, the results that market cap is not an important determinant of the decision to cross-list if the firm is large enough, and that profitability determines whether or not a very large firm cross-lists, are still noteworthy and make intuitive sense.

**Table 5**  
**Panel C: Subsample of the Largest Firms (Top Market Cap Quintile)**

Variable	Model Specification					
	1	2	3	4	5	6
Constant	-4.658 **	-4.346 **	-3.8966 *	-5.784 ***	-6.432 ***	9.6683
	(-1.969)	(-2.057)	(-2.077)	(-2.228)	(-2.305)	(-8.62)
<i>Size</i>	0.2015	0.1793	0.1312	0.1072	0.1443	0.1368
	(-0.144)	(-0.157)	(-0.162)	(-0.169)	(-0.172)	(-0.171)
<i>TSales</i>	-0.065	-0.072	-0.0399	0.0295	0.0124	0.0085
	(-0.085)	(-0.102)	(-0.106)	(-0.115)	(-0.119)	(-0.118)
<i>FSRatio</i>		0.0047	0.0056 *	0.0362	0.0023	0.00056
		(-0.003)	(-0.003)	(-0.003)	(-0.004)	(-0.004)
<i>Develop</i>			-0.4048	0.3791	0.6385	0.6494
			(-0.351)	(-0.615)	(-0.794)	(-0.777)
<i>Hitech</i>			0.2348	0.2032	0.2188	0.2405
			(-0.188)	(-0.197)	(-0.207)	(-0.21)
<i>ROA</i>				0.0239 **	0.0228 **	0.0219 **
				(-0.01)	(-0.011)	(-0.011)
<i>MktTurn</i>					0.2412	0.1485
					(-0.208)	(-0.234)
<i>DMktSize</i>						-0.0001
						(-0.0002)
<i>USMktSize</i>						-0.0019 *
						(-0.001)
<i>D96</i>	0.2298	0.2741	0.2847	0.6562	0.6288	-0.8696
	(-0.313)	(-0.325)	(-0.331)	(-0.438)	(-0.423)	(-0.572)
<i>D97</i>	0.4344	0.4088	0.4202	0.7963 *	0.7482 *	
	(-0.293)	(-0.306)	(-0.312)	(-0.424)	(-0.41)	
Total Obs.	2,193	1,729	1,729	1,714	1,687	1,687
Cross-Listings	21	18	18	17	16	16
Akaike IC	249.03	211.48	212.5	200.33	191.12	192.37
Adj. R-Square	-0.001	-2E-04	0.0003	0.0025	0.0028	0.0026
Schwarz IC	300.27	266.03	277.97	271.14	267.15	273.83
Likelihood Ratio	231.03	191.48	188.5	174.33	163.12	162.37
P-value	0.6465	0.4682	0.3908	0.1756	0.1656	0.1833

\*, \*\*, \*\*\* Significant at the 0.1, 0.05, and 0.01 levels, respectively. Standard errors are given in parentheses below each estimate.

## 8. Conclusion

This study finds that firms with larger market capitalization are more likely to cross-list on the NYSE, which while consistent with the liquidity hypothesis of Diamond and Verrecchia (1991), may also in part be explained by the cost of cross-listing on the NYSE. Firms from nearby foreign markets, i.e., Canada and Mexico, are more likely to cross-list, consistent with Subrahmanyam and Titman's (1999) serendipitous information hypothesis, as well as with Sarkissian and Schill (1999).

There is also some evidence that high-tech firms are more likely cross-list, and this supports both the analyst sophistication argument of Blass and Yafeh (2000), as well as the serendipitous information hypothesis of Subrahmanyam and Titman (1999) but does not support the loss of confidentiality argument of Campbell (1979) and Yosha (1995). The latter may also be due to the gains in stock price efficiency from trading on a market with sophisticated analysts, as well as serendipitous information outweighing potential loss of confidentiality concerns.

Firms that export a greater proportion of exports are found more likely to cross-list. This lends support to the argument that cross-listing disproportionately benefits firms with a greater product market reputation by reducing potential undervaluation of their stock (Saudagaran, 1988; Kang and Stulz, 1997), and is also consistent with the serendipitous information hypothesis (Subrahmanyam and Titman, 1999).

Also, for very large firms, greater profitability increases the likelihood of cross-listing. This is consistent with Myers and Majluf (1984) and implies that firms cross-list abroad in order to raise capital when their shares are overvalued. While it may also be attributable to the costs of cross-listing, the propensity of the largest firms, which should be able to afford the costs of cross-listing on the NYSE, to cross-list when they experience high earnings provides more unambiguous support for the overvaluation hypothesis.

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