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"Ownership, Foreign Listings, and Market Valuation"

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Abstract

We study changes in U.S. institutional ownership and its effects for 83 new listings of Canadian equities on U.S. exchanges. While institutional holdings increase starting four quarters before cross-listing, there is a pronounced spike in the listing quarter. This is consistent with foreign listing being essential to attract major foreign investors. Sorting stocks on the change in institutional ownership associated with cross-listing, we find that stocks with the largest increase in ownership experience (a) permanent increases in their prices; (b) the largest increase in comovement with the U.S. equity index; and (c) the largest increase in local liquidity. These results suggest that ownership plays a critical part in driving price and liquidity changes around cross-listings and in inducing comovement with local stocks.

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1.   Introduction

Finance theory has little to say about ownership of stocks. "Go forth and diversify" is a mantra given to MBAs in every introductory finance class; this suggests that ownership should have a diverse international flavor. In reality, investors appear to prefer investing in not just the familiar, but also the proximate, despite the availability of instant connectedness in today's world.[1] The flip side of this ownership conundrum is its impact on market quality and valuation. Why do firms solicit new owners, sometimes in distant markets? How are new shareholders brought into the fold? What role does familiarity and distance play in attracting new owners to a firm? What are the immediate and longer-term effects of ownership on the valuation and market quality of the stocks that are held by foreigners?

We address these myriad issues by studying changes in U.S. institutional ownership and its effects surrounding new listings of Canadian equities on U.S. exchanges. Our data allow us to deal with the chicken-and-egg problem inherent in any analysis of foreign listings and ownership; that is, do companies list abroad to service a growing class of foreign owners, or do owners gravitate to foreign stocks only after the issuing firms secure a local listing? Is a critical mass of foreign owners needed to swell their ranks further following a foreign listing? We examine the role of local liquidity in both the decision to cross-list by the firm and the decision

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[1] For evidence on the home-bias in domestic equity portfolios, see, among others, Coval and Moskowitz (JF 1999) and Huberman (RFS 2001), the latter with the aptly titled "*Familiarity breeds investment*". Both Cooper and Kaplanis (RFS 1994) and Lewis (JEL 1999) conclude that the equity home-bias phenomenon cannot be explained by either domestic inflation hedging motivations, or diversification costs. In fact, Lewis describes a related *consumption* home-bias that is equally hard to explain. Baxter and Jermann (AER 1997) offer the somewhat astonishing conclusion that due to the non-tradability of human capital, optimal portfolios should not only include foreign assets, but actually be *short* domestic equities. French and Poterba (AER 1991) conclude that investors must overwhelmingly (in fact, *simultaneously* across all countries) be optimistic about their own domestic equity returns vis-à-vis foreign equities to reconcile their low holdings of foreign stocks.   Overall, the picture that emerges from this literature is one of a distinct, persistent, and, by most rational yardsticks, inexplicable home-bias in the portfolio holdings of investors across the world, united only by a common disdain for Markowitz.

to purchase foreign stocks by investors. We also study the effect of new foreign ownership on the co-movement of the firm's stock returns with both the domestic and foreign indexes, on home market and foreign market liquidity, and on long-run stock price performance and valuation relative to domestic and foreign industry multiples.   To our knowledge, these ownership effects have not been examined in the literature.

While such effects can be examined for any group of assets, Canadian equities are of particular interest for two complementary sets of reasons. We mention these briefly here; Section 2 discusses these in detail. On the one hand, Canadian accounting standards are similar to U.S. standards, as are legal protections of minority shareholders. Canadian firms are at least somewhat familiar to large U.S. investors by virtue of their geographical proximity and the close trade relations between the two countries. Thus, the motivations for Canadian firms to list in the U.S. are not as obvious as for firms from other countries.

On the other hand, the Canadian and U.S. markets are highly integrated and have completely synchronous trading hours. Moreover, Canadian equities also trade as equities in the U.S., making them the closest things to perfect substitutes in international stock markets. These features make it especially easy for U.S. institutions to trade Canadian equities in Canada. Consequently, the effects of cross listing on ownership are expected to be weaker for Canadian stocks.

Our sample consists of 83 Toronto Stock Exchange-listed firms that list in the U.S. (63 on the NYSE/AMEX and 20 on NASDAQ) between January, 1978 and June 2003. We compile aggregate U.S. institutional ownership from the Shareworld 13F database. For most of our tests,

we divide our sample into three groups on the basis of the change in U.S. institutional ownership between two quarters after, relative to four quarters before, the cross-listing.

Our main results are as follows. There is a substantial increase in ownership in the cross-listing quarter, despite the fact that these stocks are easy and inexpensive to trade prior to cross-listing. Average liquidity increases following the cross-listing. On average, comovement with the U.S. index increases following cross-listing, while that with the TSX declines. The sample stocks experience price run-ups before their cross-listing dates, and much of this gain dissipates in the year following the listing. These results are similar to those documented for Canadian stocks and for other international cross-listings (see Karolyi, 1998, 2005, for a summary of the results).

Once we condition on U.S. institutional ownership, several striking results emerge. The increase in comovement and the improvement in liquidity are strongest for the stocks that experience the largest increase in U.S. ownership. The price increases show no signs of being reversed for the stocks with the largest increase in institutional ownership. One explanation for the last finding is that firms tend to cross-list when their stock is overvalued; however, institutions, as sophisticated investors, buy fairly valued shares and avoid the overvalued shares. A second is based on downward-sloping demand curves for stocks—as institutions buy stocks, prices increase permanently. For either reason, the pre-listing run-up is not reversed for stocks with large increases in institutional ownership. The increased interest from U.S. institutions is also consistent with the higher post-listing liquidity and comovement.

Our work is related to a burgeoning literature on cross-listing effects. The paper closest to ours is Ammer, Holland, Smith and Warnock (2005), which documents a significant "cross-

listing effect" using data from a survey of U.S. investor holdings of foreign equities in 1994 and 1997. Our paper differs from AHSW in that we use a much wider time period of cross-listings, albeit only from Canada, and are able to track ownership for six quarters before and after the cross-listing. Second, in addition to examining the cross-listing effect (as in AHSW) we also document an "**ownership effect**" on foreign market liquidity, price sensitivity to local indexes, and valuation of the cross-listed firms.

The rest of this paper is organized as follows. Section 2 describes our hypotheses and the relevant literature. Section 3 summarizes our data and methods. Section 4 contains our results. Section 5 concludes.

2.   Hypotheses and Related Literature

A large literature deals with international cross-listings.[2] Several strands of this literature are of relevance to our study and motivate our informal hypotheses. First, theoretical work (e.g. Errunza and Losq, 1985) has suggested that cross-listing allows firms to circumvent investment barriers and lowers expected returns. Empirical work shows that stocks listing in the U.S. typically experience price run-ups over the pre-listing period and declines in the post-listing period (e.g. see Foerster and Karolyi, 1999 and Miller, 1999).[3] Foerster and Karolyi document that the run-up (22%) and decline (-24%) are strong for Canadian stocks. The similarity of results for Canadian and non-Canadian stocks suggests that segmentation cannot be the complete

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[2] Karolyi (1998, 2005) provides excellent surveys.
[3] Miller (1999) examines the announcement abnormal return while F&K focus on the listing abnormal return. Most of the literature studies the listing return since announcement dates are hard to find and are unreliable. Moreover, the listing period returns are generally small (Miller is a notable exception).

story. Rather, the results are consistent with the timing hypotheses proposed by Dharan and Ikenberry (1995) in the context of domestic IPOs (new share issuance follows periods of high returns and overvalued share prices).[4]

Second, the effects of listings on risk are mixed (e.g. see Jayaraman, Shastri and Tandon, 193; Foerster and Karolyi, 1999). However, on balance, betas on the domestic index tend to decline while those on the foreign index rise (these changes are not insignificant in every study). Note that beta is a measure, not just of systematic risk, but also of comovement. The results of existing studies are, therefore, consistent with increases in return comovement with stocks in the country where a stock lists (Barberis, Shleifer and Wurgler, 2005). Several studies, most recently, Gagnon and Karolyi (2005) find that the difference between the U.S. and home country prices, which should be unrelated to anything, is significantly related to home and foreign country indices. This lends support to the hypothesis that prices are influenced by local 'sentiment', as in Barberis et al. (2005).

Third, the effects of cross-listing on liquidity appear to be beneficial. For instance, Foerster and Karolyi (1998) document an increase in average overall trading volume as well as average Toronto volume, and a reduction in the average bid-ask spread, for a sample of Canadian stocks listing in the U.S. However, improved liquidity is confined to the stocks for which Canadian volume increases.

Our research is motivated by these three sets of paper. Specifically, our interest lies in the relation between long-run returns, comovement and liquidity on the one hand and U.S.

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[4] Sundaram and Logue (1996) take a different tack to measuring the effects of cross-listing on valuation by studying the change in the stocks' price-earnings ratio. They find abnormal increases in the P/E ratio, consistent with a reduced expected return. As discussed below, we study convergence in P/E ratios conditional on ownership.

institutional ownership on the other. In the remainder of this section, we describe hypotheses regarding the relation between ownership and these variables.

First, to the extent that U.S. institutional owners are sophisticated investors, they should steer clear of overvalued stocks. Additionally, to the extent that demand curves for stocks slope down (e.g. Shleifer, 1986), any buying activity on the part of U.S. institutions will have a permanent effect on prices.[5] For both reasons, we expect that stocks with heaver institutional ownership will display superior post-listing performance. In other words, long-run abnormal returns will increase as U.S. institutional ownership increases.

A related hypothesis is whether valuation for cross-listed stocks is driven by local or foreign investors. The literature on governance suggests that U.S. listings are a means to lease superior governance for foreign firms (e.g. Stulz, 1999; Doidge, Karolyi and Stulz, 2001, 2004). If this is true, cross-listings should be associated with higher valuation multiples. Alternately, valuation can increase due to additional institutional buying. We propose to examine whether the price-earnings multiple for Canadian stocks converge to U.S. industry benchmark levels after these stocks cross-list, or whether these remain at the level of Canadian industry benchmarks. Moreover, we relate changes in the price-earnings multiple to both the number of institutions holding stocks in the cross-listed firms, and the total foreign ownership. This helps separate price pressure from governance related ownership effects on the valuation of cross-listed assets.

Our second hypothesis suggests that if U.S. institutions buy or sell dually-listed stocks in response to information originating in the U.S., ignoring or de-emphasizing Canadian information, U.S. information will become more relevant to the returns for these stocks.

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[5] By contrast, if institutional buying exerts price pressure (e.g. Harris and Gurel, 1986), the effects on prices should be fleeting, and long-run returns should be unaffected by such buying.

Additionally, post-listing, deviations between U.S. and Canadian prices will be related to the performance of the U.S. and Canadian markets. Thus, our hypothesis suggests that, as U.S. institutional ownership increases, (a) U.S. betas will increase (and possibly Canadian betas will decline), and (b) comovement of the U.S.-Canadian price differential with the U.S. and Canadian indexes will increase.

Our third hypothesis suggests that liquidity in the U.S. market and possibly the Canadian market will increase with U.S. institutional ownership. To the extent that U.S. institutions are regular, important buyers and sellers of the stock, trading volume will increase after cross-listing, and the increased volume is likely to depress trading costs. If U.S. institutions are active in the U.S. market alone, U.S. liquidity will improve and Canadian liquidity will not change. However, if U.S. institutions trade in Canada with increased frequency, Canadian liquidity will be enhanced as well.

Several factors can potentially militate against the above hypotheses. It is easy for U.S. institutions to buy Canadian stocks even before they list overseas because Canadian trading hours are the same as U.S. hours and the incremental costs of trading in Canada are low. The same factors make Canadian stocks easy to arbitrage. If U.S. institutions trade Canadian stocks on a regular basis before cross-listing, there might be no discernible effects on returns, comovement, or liquidity.

Our results do not directly address other strands of the cross-listing literature related to changes in the information environment and in corporate governance. Several papers show that cross-listing is accompanied by a large increase in number of analysts (e.g. Baker, Nofsinger and Weaver, 2002; Lang, Lins and Miller, 2003; and Bailey, Karolyi and Salva, 2005) and this leads

to improvements in analyst forecasts. In the corporate governance literature, Stulz (1999) and others argue that cross-listings allow firms to "rent" foreign governance and legal systems, for example, by listing in countries where minority protection rights are stronger. In the case of Canadian cross-listed stocks, minority shareholder rights are strongly protected under securities legislation in Ontario and Quebec, where most companies are based.

In closing this section, we note a recent working paper that incorporates ownership stakes in the analysis of cross-listings. Ammer, Holland, Smith and Warnock (2005, AHSW henceforth) document a significant "cross-listing effect" using data from a survey of U.S. investor holdings of foreign equities in 1997 and from a similar survey in 1994. AHSW recognize the endogeneity of ownership and the foreign listing decision by firms, and conclude that U.S. investors would have owned a higher fraction of the cross-listed firms relative to other foreign firms even in the absence of cross-listing, implying that firms cross list partly to serve an interested clientele. The cross-listing effect is defined as the incremental holdings of foreign firms by U.S. investors attributable to the listing decision, and is economically significant in their survey. AHSW also find that the cross-listing effect is stronger for firms that are less transparent, implying that U.S. scrutiny is most beneficial for such firms.

Our paper differs from AHSW in that we use a much wider time period of cross-listings and are able to track ownership for several years before and after the cross-listing. We use quarterly data on ownership, and can examine ownership changes immediately after as well as immediately before the cross-listing event. In addition to examining the cross-listing effect (as in AHSW) we also document an "ownership effect" on foreign market liquidity, price sensitivity to local indexes, and valuation of the cross-listed firms. We condition on ownership both by

examining firms that have zero and positive institutional holdings prior to the cross-listing and by classifying cross-listed firms into different U.S. ownership categories.

3.   Data

3.1   Cross Listed Sample

We use all Toronto Stock Exchange (TSE) traded stocks that also list their shares on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX) or NASDAQ with the following characteristics:

i. The stock must have listed on an American exchange after 1978, the first year in which institutional investor data becomes available from the Shareworld database.

ii. The stock must have been listed on the TSE for a minimum of six quarters prior to cross listing on the American exchange. This allows us to track U.S. institutional ownership before the cross-listing.

iii. The stock must have listed on an American market prior to June of 2003. This ensures that six quarters of post-listing data are available in the Shareworld dataset (which ends in the last quarter of 2004).

The spread of six quarters prior to and following the cross listing quarter is selected as Foerster and Karolyi (1996) and Miller (1999) find an abnormal price decline for Canadian stocks listing in the U.S. over the year following the listing. A total of 83 stocks meet the data requirements, 50 stocks trading on the NYSE, 13 stocks on AMEX and 20 stocks on NASDAQ.

3.2   *Institutional Holdings*

To study institutional investor behavior surrounding cross listing we use the Shareworld 13F Filing database as maintained by Thomson Financial. The Shareworld 13F database tracks, by quarter, the share holdings of institutional investors based on 13F filings made with the U.S. Securities and Exchange Commission. The institutions represented in Spectrum include mutual funds, banks, insurance firms, pension funds. Any manager with more than $100 million at their discretion is required to make a quarterly filing of a 13F for every security holding in excess of $200,000 or 10,000 shares. Additionally, the Shareworld 13F database tracks ownership profiles of non-US equities based on the Information Sheets and Shareholder Reports of both Domestic and Foreign Mutual Funds. Institutional ownership data is collected from the Shareworld 13F database for the six quarters prior to the cross listing, the cross listing quarter and the six quarters following the cross listing.

3.3   *Price, Shares and Volume*

The price of each stock and total shares outstanding at the end of each quarter is included in the Shareworld dataset. To allow a more detailed analysis of stock price behavior surrounding the stock cross listing date we collect the daily closing stock price from Datastream. In order to study trading activity and liquidity around cross-listing, we collect daily trading volume data from Datastream.

3.4   *Descriptive Statistics*

In **table 1** we describe the market and accounting statistics of the cross-listed firms prior to listing in the U.S. The mean and median price, in U.S. dollars, is $15.04 and $11.29, and the

firms have a mean and median market cap of $1.6 billion and $360 million. Daily trading volume in Toronto prior to the cross-listing averages about 250,000 shares, but is likely influenced by a few very actively traded stocks, as the third quartile of volume is 176,225 shares per day. On average, these stocks trade about 1.12 times their outstanding shares per year, although half the stocks trade about 0.54 times shares outstanding or less.

The Amihud Illiquidity Ratio is defined as the price impact of dollar volume, and the mean statistic is influenced by a few very large observations. The median statistic is less than 0.0001, implying that for more than half the stocks, the price impact of trades is small (that is, it would take a $10,000 trade to move prices by 1 percent).

In terms of size, the cross-listed firms are from among the larger firms listed on the Toronto Stocks Exchange, with a mean value of total assets of $12 billion and a median value of $418 million (all numbers in Canadian funds). The median cross-listed firm does not pay dividends, and reports an EPS of $0.55. In many respects, cross-listed Canadian firms resemble mid-sized U.S. companies, and the Toronto Stock Exchange provides a trading venue that is cost competitive relative to the NYSE and other U.S. exchanges.

In order to examine the effects of ownership, we divide the sample into three groups (tertiles) on the basis of the change in U.S. institutional ownership between two quarters after cross-listing and four quarters before cross-listing. In order to maximize the number of firms in each tertile, we pool stocks across markets. We have repeated our main analysis separately for NASDAQ and find that the results are very similar to the combined sample results. Hence, we only report the latter.

4.   Results

We start by describing the evolution of U.S. institutional ownership of the cross-listed stocks from six quarters before the cross-listing through six quarters after the cross-listing.

4.1   *Ownership Changes Surrounding the Cross Listing Date*

In **figures 1-3**, we plot the ownership by quarter, where Q_CL is the cross-listing quarter. We plot separate columns for NYSE/AMEX listings, and NASDAQ listings.   Institutional ownership is measured at the end of each quarter, beginning six quarters before and ending six quarters after the cross-listing. We start first by describing U.S. ownership, and then provide a similar description of Canadian institutional ownership.

U.S. institutional ownership for NYSE/AMEX and NASDAQ is very similar. In the six quarters prior to the cross-listing, all firms show a generally increasing ownership by U.S. institutions, albeit the increase is more dramatic for NASDAQ stocks. There is a sharp increase in the quarter of cross-listing, bringing mean aggregate U.S. institutional holdings to more than 10% of outstanding shares. This is more than twice the level in the quarter prior to the cross-listing for both NYSE/AMEX and NASDAQ stocks. The increase in the listing quarter is sustained over the next six quarters for both NYSE/AMEX and NASDAQ listings. These results are broadly in line with those reported in AHSW.

Five stocks listed on the NYSE and one stock listed on the AMEX (Agnico Eagle Mines, Agrium, Inco, Magna, Rogers Wireless and MDC) have significantly higher U.S. institutional ownership prior to the cross listing date than other stocks. Removing the six outlier stocks from the sample makes the mean ownership numbers very similar to the medians.

For NASDAQ stocks, mean Canadian institutional holdings remain small in the six quarters prior to the cross-listing. For NYSE/AMEX stocks, Canadian ownership appears to increase from 1% six quarters before the listing, to 2% following the cross-listing. There is a significant increase in Canadian institutional ownership at the time of cross-listing, with the increase being more dramatic for NASDAQ listings than for NYSE/AMEX listings.

Contrasting U.S. and Canadian investor percent ownership surrounding the cross listing date, and focusing on the sample with the outliers removed, markedly different trends emerge. In the six quarters prior to the cross listing date, both Canadian and U.S. percent institutional ownership increases, from 0.8% to 2.7% for U.S. investors and from 3.57% to 6.09% for Canadian investors. In the cross listing quarter, U.S. institutional ownership increases to 9% from 2.7% while Canadian percent institutional ownership drops to 3.62% from 6.09%. Following cross listing, again, both U.S. and Canadian percent institutional ownership increases, from 9% to 12.7% for American investors and from 3.62% to 6.43% for Canadian investors.

The drop in Canadian institutional investor ownership of stocks during the cross listing quarter can be explained by the possibility that, for many stocks, a share issue coincides with cross listing. In other words, Canadian investors are not decreasing their holdings of stocks in the cross listing quarter, but instead are not participating in the purchase of a new share issue. To investigate this possibility, we provide statistics on overall shares outstanding following the cross-listing, and note an increase in both mean and median numbers of outstanding shares.

In figure 3A we see that there is a sharp increase in the number of shares outstanding in the quarter of cross-listing. Overall shares outstanding increase for 55 stocks, decrease for 16 stocks and remain constant for 18 stocks during the cross listing quarter. In figure 3B, we measure the

change in Canadian ownership conditioning on whether the number of shares outstanding decreases, stays the same, or increases in the cross listing quarter. We find that Canadian ownership declines the most in cases where there is an increase in the number of outstanding shares, consistent with our earlier conjecture that new share issues usually accompany cross-listing and are generally bought by U.S. investors more aggressively than by Canadian investors.

4.1.3   Number of U.S. Institutions owning equity in cross-listed shares

The increase in U.S. holdings can come about either due to additional buying by incumbent owners, or by new investors attracted to the cross-listed stocks. To investigate this issue, we also examine the number of institutional owners. In figure 4, we plot the number of U.S. institutional owners of cross-listed Canadian equities. We do this to understand the role of familiarity in fostering foreign ownership. For instance, if overall U.S. ownership is increasing, but the number of institutional investors in the U.S. remains unchanged, it would be inconsistent with the argument that the additional familiarity or governance protection brings in more investors. Rather, the increase in incumbent holdings and the absence of new shareholders following the cross-listing would support a version of the local liquidity hypothesis; that is, the availability of a local trading venue encourages U.S. investors to increase their holdings of cross-listed stocks, perhaps because local trading is perceived to provide a deeper market. We investigate this issue in more detail when we examine liquidity ratios and volume turnover.

We find that the number of institutions owning Canadian equity increases sharply following cross-listing. On average, there are 18 additional U.S. institutions holding Canadian cross-listing stock in the five quarters following cross-listing than in the five quarters preceding

cross-listing (the mean number of U.S. institutions owning Canadian equity is six before the cross-listing).

We repeat this analysis conditioning on the extent of pre-listing ownership. The increase in the number of new institutions depends on pre-listing institutional ownership. Cross-listed firms with low and medium pre-listing U.S. ownership experience a large increase in new investors, while firms that had high level of pre-listing ownership attract fewer new owners. These results support the familiarity/local liquidity hypotheses; that is, new owners are attracted to Canadian stocks after these are cross-listed in the U.S.

4.2 Price Behavior Surrounding the Cross Listing Date

Foerster and Karolyi (1999) do an event study of ADR listings. Their main finding is that ADRs follow on the heels of abnormally positive stock price performance in the year leading up to the listing. There are reversals over the year following the listing that wipe out most of these gains. Similar evidence is reported for Canadian listings and ADRs in Alexander, Eun and Janakiramanan (1988). Foerster and Karolyi (1999) do not find any stock price effect associated with the announcement of the cross-listing, inconsistent with the argument that cross-listings signal improved corporate governance for the firm. The actual listing month is associated with a positive price change, although it too is not significant at conventional levels.

Our pre-listing findings from an updated sample mirror these earlier results. However, we do not find evidence of a stock price decline in the post-listing period. Panel A of Figure 5 provides the cumulative abnormal return (defined as market-adjusted returns) following the cross-listing, and shows that the post listing return continues to be positive for Canadian cross-

listed stocks as long as one year after the cross-listing. This is in contrast to earlier finding of price declines following cross-listings of Canadian stocks.

We are interested in conditioning long-term stock price performance on U.S. ownership. When we divide the sample into low, medium, and high pre-cross-listing ownership tertiles, we find that the post cross-listing price increase is limited to the top ownership tertile (see panel C). For the lowest U.S. ownership group, the post cross-listing abnormal returns are negative, and for the mid-tertile, the post event cumulative return is close to zero. We interpret these findings as initial support for the hypothesis that ownership effects are important for cross-listings. There are at least two reasons for this. First, downward sloping demand curves imply that ownership will manifest itself in permanently higher stock prices. The second explanation hinges on market timing. Firms presumably take advantage of periods when their stock is overvalued to cross-list. As sophisticated investors, U.S. institutions are expected to buy stocks for fundamental reasons. Under this view, corrections are less likely for stocks that are bought more heavily by U.S. institutions.

Note that it is possible that the post cross-listing returns for the highest ownership tertile are driven by price pressure if the pre-listing ownership is positively correlated to post cross-listing buying by U.S. institutions. To investigate this issue, we also provide the post cross-listing returns based on the change in ownership from before to after cross-listing, and obtain similar results. More compelling is the fact that the long-term abnormal return is positive, as it is reasonable to expect that price pressure driven effects will dissipate within a year of cross-listing.

4.3   Liquidity Changes Surrounding Cross Listing

4.3.1   Illiquidity Ratio

We start by describing the Illiquidity Ratio (IR) before and after the cross-listing event. The IR is calculated as the absolute return based on daily closing stock price divided by the Canadian dollar value of the daily trading volume: $IR_d = \dfrac{|r_d|}{Volume_d}$, where r_d is the close-close return and $Volume_d$ is the daily volume, both on day d. For each stock we calculate IR_d daily for the year preceding, through the year following, the cross-listing and then report the cross-sectional averages for the full period or periods of interest.

There is a sharp decline in IR in the two days around the cross-listing. More interestingly, when we compare the IR in the year prior to the cross-listing (month –14 through month –3) to that prevailing in the same time period following the cross-listing, we find that the IR declines significantly from more than 0.80 before the cross-listing to a mean (median) value of 0.42 (0.17). These numbers indicate that cross-listing is associated with a large increase in the liquidity of the cross-listed stocks.

We turn our attention to ownership effects on liquidity. In figure 7 we plot the IR for low, moderate, and large changes in U.S. ownership following the cross-listing event. Our results show that while liquidity as measured by IR improves for all three categories of stocks, the improvements are strongest for the group experiencing the largest increase in ownership. We believe that the ownership effect on liquidity of cross-listed firms is important, and has not been documented in earlier literature. We also investigate turnover changes surrounding the cross-listing date.

4.3.2   Turnover around the cross-listing date

We define turnover as the ratio of daily trading volume to the number of shares outstanding. Figure 8 plots the mean Canadian as well as the aggregate (i.e. U.S. plus Canadian) turnover before and after the cross-listing. As expected, there is heightened turnover on the cross-listing date. In the long run, turnover in Canada is materially unchanged following the cross-listing. This is inconsistent with the story that some U.S. investors, who likely trade in Canada prior to the cross-listing, migrate to the U.S. However, aggregate turnover shows a significant increase in the year following the cross-listing, implying that investors trade more aggressively after the cross-listing. Overall, the turnover results support the strong association of local liquidity and ownership. At this stage, we do not draw any causal links between the two.

4.4   Co-movement of Stock Price with Canadian and US Indexes Pre and Post Cross Listing

In this section we examine how ownership affects co-movement of the cross-listed stock returns with both local and foreign market indexes. The regression we run is similar to that run by Froot and Dabora (1999) and Gagnon and Karolyi (2005):

$$R_{US,t} - R_{TSE,t}^{USD} = \alpha + \rho_1(R_{US,t-1} - R_{TSE,t-1}^{USD}) + \sum_{j=-1}^{+1} \beta_j^{US} M_{t+j}^{US} + \sum_{j=-1}^{+1} \beta_j^{TSX} M_{t+j}^{TSE} + \sum_{j=-1}^{+1} \beta_j^{FX} FX_{t+j} + \varepsilon_t$$

(1)

where

$R_{US,t} = Ln(P_{US,t} / P_{US,t-1})$ is the return to a Canadian cross-listed stock in the US on day t;

$R_{TSE,t}^{USD} = Ln\{[P_{TSE,t}S(USD/\$)_t]/[P_{TSE,t-1}S(USD/\$)_{t-1}]\}$ is the TSE return to the stock on day t,

expressed in US dollars;

M_{t+j}^{US} is the US market return on day $t+j$;

M_{t+j}^{TSE} is the TSE market return on day $t+j$; and

$FX_{t+j} = Ln[S(USD/\$)_t / S(USD/\$)_{t-1}]$ is the return to holding Canadian dollars on day $t+j$.

One lead and one lag of market and FX returns is included to capture possible non-synchroneities in prices, induced by thin trading or differential recording times of stock and foreign currency prices. In this framework, the measured beta on each factor (market return or FX returns) is the sum of the contemporaneous, lead and lag regression coefficients.

Interpretation. Under the law of one price, $P_{US,t} = P_{TSE,t}S(USD/\$)_t$.

Taking natural logs of both sides, this implies: $R_{US,t} = R_{TSE,t}^{USD}$ or $R_{US,t} - R_{TSE,t}^{USD} = \varepsilon_t$. Thus, the null hypothesis is that the common currency return differential will be unrelated to any instrument.

On the other hand, suppose US traders trade all US-based stocks as a basket, while Canadian traders trade Canadian stocks as a basket. This suggests that the US return will be related to the US market return, while the Canadian return will be related to the Canadian market return. Under this hypothesis, equation (1) is essentially broken into two market models, one to describe the evolution of US prices and the other to describe that of Canadian prices (converted into US dollars).

The inclusion of the return to the Canadian dollar allows us to examine whether currency changes exert systematic influences on either return.

The inclusion of the lagged dependent variable examines whether the differential displays mean reversion.

Estimates. The regression specification (1) is estimated over the period [-301 , -51] and [+ 51 , +301] surrounding the cross-listing date in the US, and the estimates are summarized in **Table 2**. As before, we present the mean coefficients for each tertile and supplement the mean with the median coefficients. The main coefficient of interest is the coefficient on the US market return, β_{US}.

The mean β_{US} is positive, indicating that positive (negative) US market returns lead to US returns for a dually-listed stock that are more positive (negative) than its Canadian returns. The mean increases monotonically across the ownership tertiles, from 0.23 to 0.37 to 1.09. In other words, holding all else constant a 1% return on the US index leads to a US-TSE (common currency) return discrepancy of 23 bps for the stocks with the smallest US ownership, 37 bps for stocks with intermediate US ownership and 109 bps for stocks with the largest US ownership. The increase from the first to the second tertile is not statistically significant, but that from the second to the top tertile is significant at the 1% level of significance. The median coefficients yield similar inferences. This result suggests that US institutional ownership drives a wedge between US and Canadian returns. One possibility is that US institutional investors trade US-listed stocks as a basket, as suggested by Barberis et al.

The mean (median) coefficients on TSE market returns are negative. Thus, positive (negative) TSE market returns lead to TSE returns for a dually-listed stock that are more positive

(negative) than its US returns. However, the coefficients do not display the same monotonic pattern, being largest for the intermediate ownership tertile. Tests of significance on the mean or median show that these coefficients do not differ across tertiles. Note, also, that the spread in the TSE market coefficients is smaller than in the coefficients on US market returns. Since we are conditioning on US ownership, this result makes sense. That is, for stocks sorted by US ownership, the difference in the economic impact of the Canadian market in driving prices apart are smaller than that of the US market.

Finally, the point estimates capturing the effects of FX returns are remarkably similar across the tertiles. The coefficients are negative, indicating that an appreciation of the Canadian dollar leads to larger TSE returns than US returns for a typical dually-listed stock. This suggests that exchange rate changes are not immediately matched by changes in relative stock prices to maintain the law of one price. However, these deviations do not appear to differ across stocks with different levels of U S ownership. It is of interest to explore whether the induced deviations afford arbitrage opportunities.

5.   Conclusion

This paper attempts to understand the antecedents as well as the effects of foreign equity ownership. Almost forty years after Markowitz pioneering work on diversification, equity portfolios the world over remain domestically skewed. We show that when foreign firms cross-list their shares in a new market, local investors take notice and generally increase their holdings of the x-listed shares, confirming earlier evidence on such a x-listing effect. We also show that ownership changes following x-listings are not uniform, and in particular, that they depend on

local liquidity. This is puzzling in that our sample of x-listed firms are domiciled on the Toronto Stock Exchange, where liquidity for the cross-listed stocks is comparable to that on the NYSE. Overall, we find that stocks with the largest increase in ownership experience (a) permanent increases in their prices; (b) the largest increase in their U.S. betas; and (c) the largest increase in local liquidity. These results suggest that ownership plays a critical part in driving price and liquidity changes around cross-listings and in inducing comovement with local stocks.

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Table 1
Descriptive statistics for cross-listed stocks.

Price, shares outstanding, and market capitalization are measured 262 trading days before cross-listing. Volume is the mean number of shares traded per day measured in the quarter ending 262 trading days before cross-listing. Turnover is annualized volume scaled by the total number of outstanding shares. Amihud liquidity ratio is defined as the absolute value of the mean daily return scaled by the mean dollar value of trading per day. Earnings per share excluding extraordinary items, total assets, and dividends per share are measured at the end of the fiscal year preceding the cross-listing.

Variable	Mean	1st Quartile	Median	3rd Quartile
Price ($)	15.04	2.20	11.29	14.43
Shares Outstanding ($MM)	76	9	31	53
Market Capitalization ($MM)	1,618	33	360	629
Volume	249,569	9,249	91,493	176,225
Turnover Annualized	1.12	0.15	0.54	0.71
Amihud Illiquidity Ratio x 10^{-3}	1.2810	0.0019	0.0985	0.4272
Earning per Share($)	0.55	-1.69	0.69	0.97
Total Assets ($MM)	12,928	50	418	1,320
Dividends per share ($)	0.31	0.00	0.00	0.11

Table 2

Coefficient estimates of the effect of cross-listing on co-movement of returns.

The following regression is estimated for each stock in the period surrounding cross-listing.

$$R_{US,t} - R_{TSE,t}^{USD} = \alpha + \rho_1(R_{US,t-1} - R_{TSE,t-1}^{USD}) + \sum_{j=-1}^{+1} \beta_j^{US} M_{t+j}^{US} + \sum_{j=-1}^{+1} \beta_j^{TSX} M_{t+j}^{TSE} + \sum_{j=-1}^{+1} \beta_j^{FX} FX_{t+j} + \varepsilon_t$$

(equation 1 in the text) and the coefficients aggregated within ownership groups. Ownership groups were formed based on the percent change in stock ownership by U.S. institutional investors from before to after cross-listing. Values reported are the average betas of all the stocks within each group. The low, moderate, and high groups contain 27, 28, and 28 stocks.

Ownership Group	β_{TSE}	β_{US}	β_{FX}
Mean Coefficients			
Low	-0.3467	0.2282	-1.8793
Moderate	-0.2674	0.3724	-1.7880
High	-0.3831	1.0856	-1.8828
Median Coefficients			
Low	-0.3230	0.2016	-1.8045
Moderate	-0.5340	0.3645	-1.9519
High	-0.3503	1.1713	-1.7911

Figure 1
Mean and median institutional ownership by U.S. investors of Canadian cross-listed stocks.
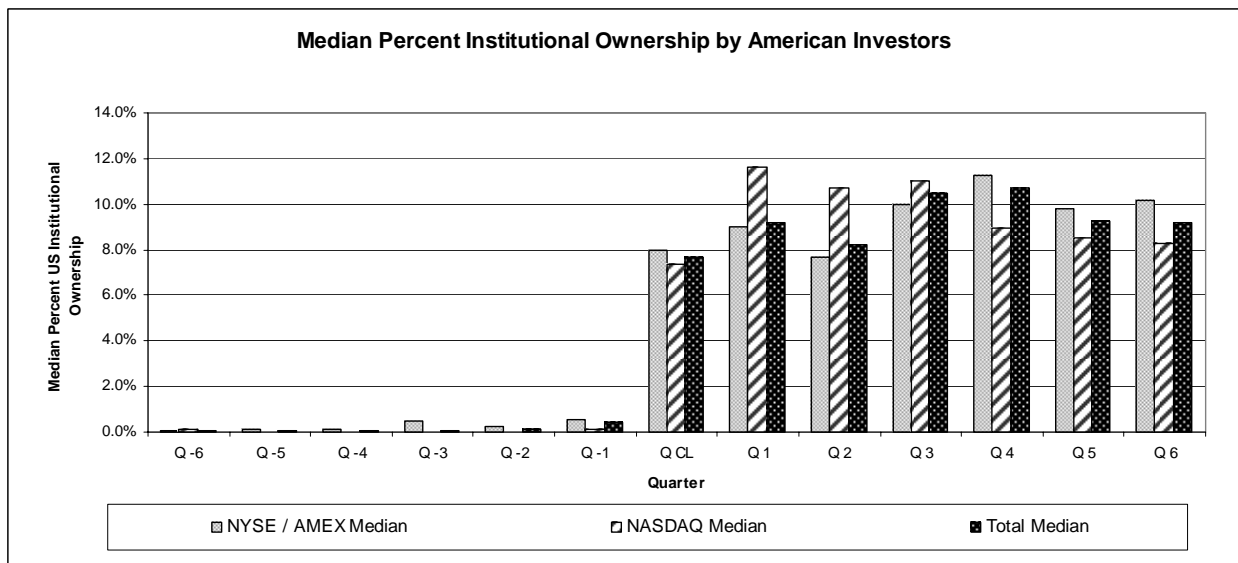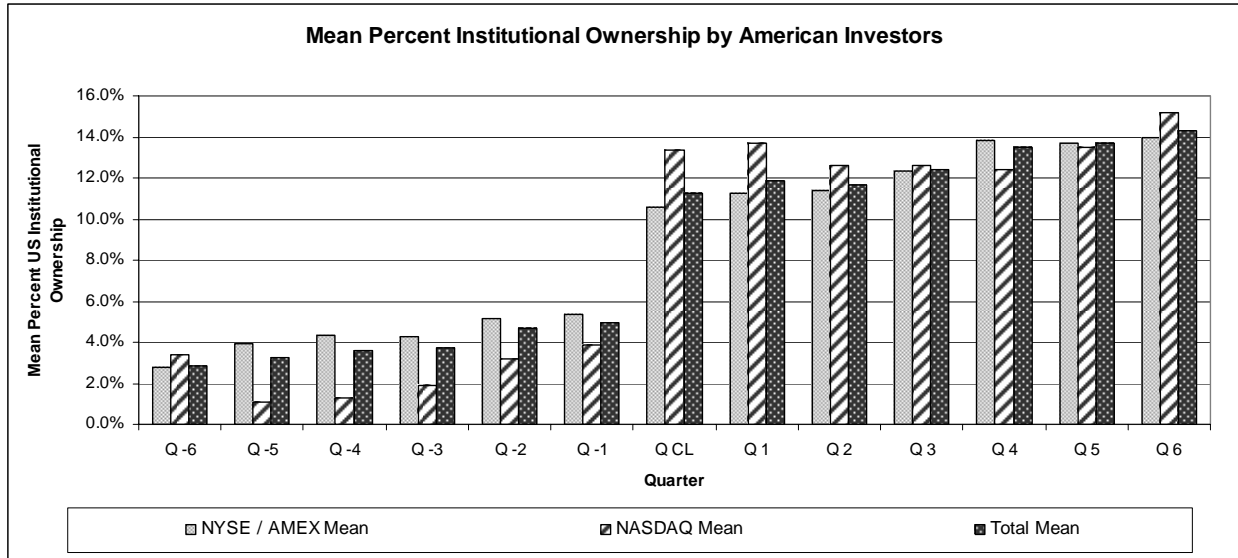Q_CL is the quarter in which cross listing occurs.

Mean Percent Institutional Ownership by American Investors

Median Percent Institutional Ownership by American Investors

Figure 2

Mean and median institutional ownership by Canadian investors of Canadian cross-listed stocks.
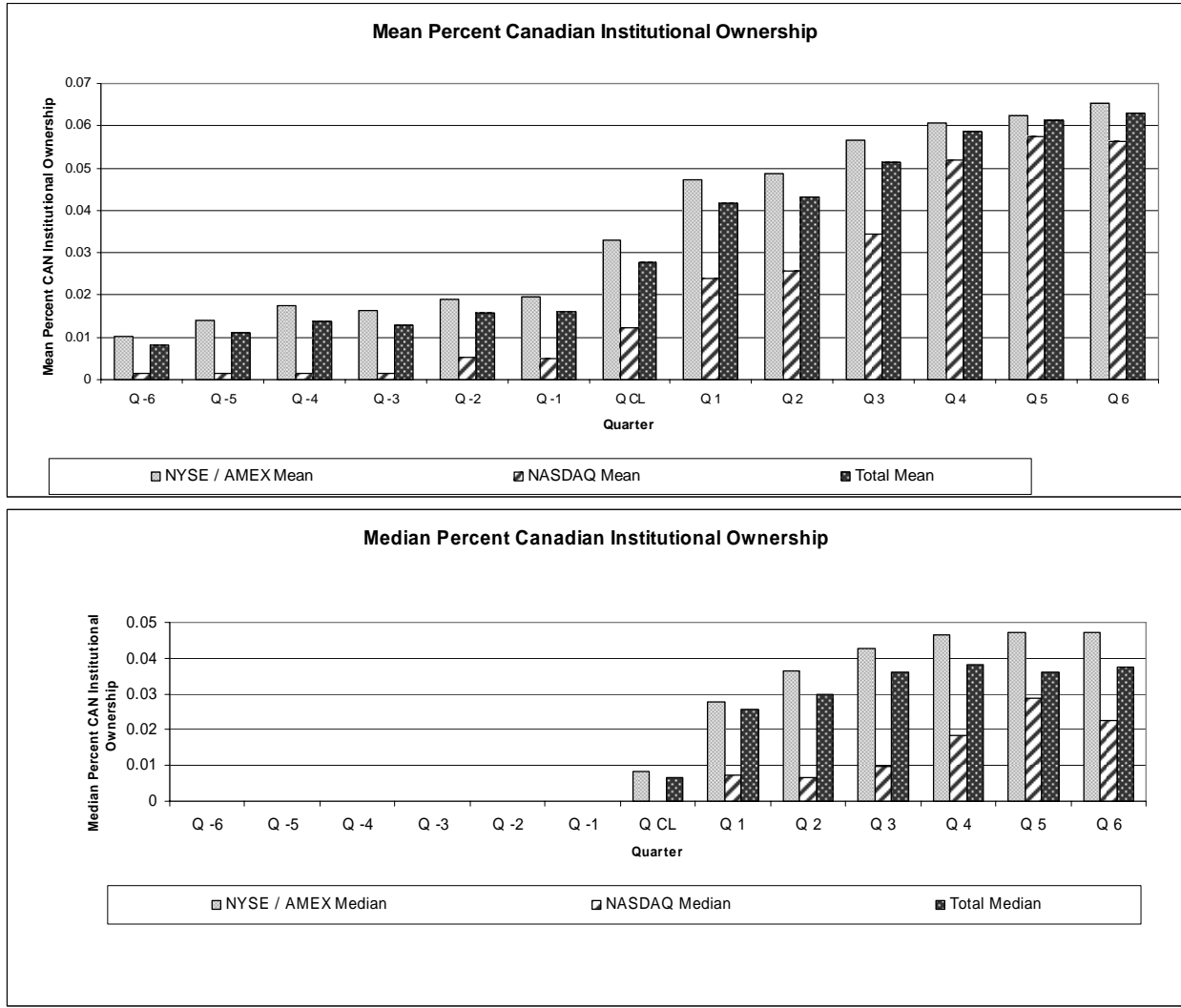Q_CL is the quarter in which cross listing occurs.

Figure 3

Mean and median American and Canadian institutional ownership surrounding the stock cross listing date. Ownership is the percent ownership of each individual stock in the 87 stock sample held by institutional investors. The American sample with outlier stocks removed was used. Q_CL is the quarter in which cross listing occurs.
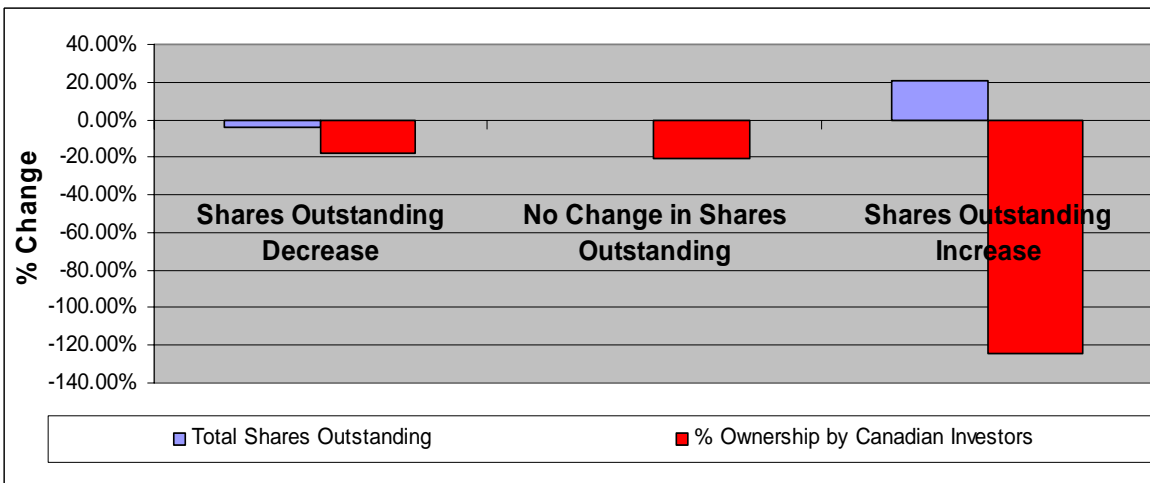

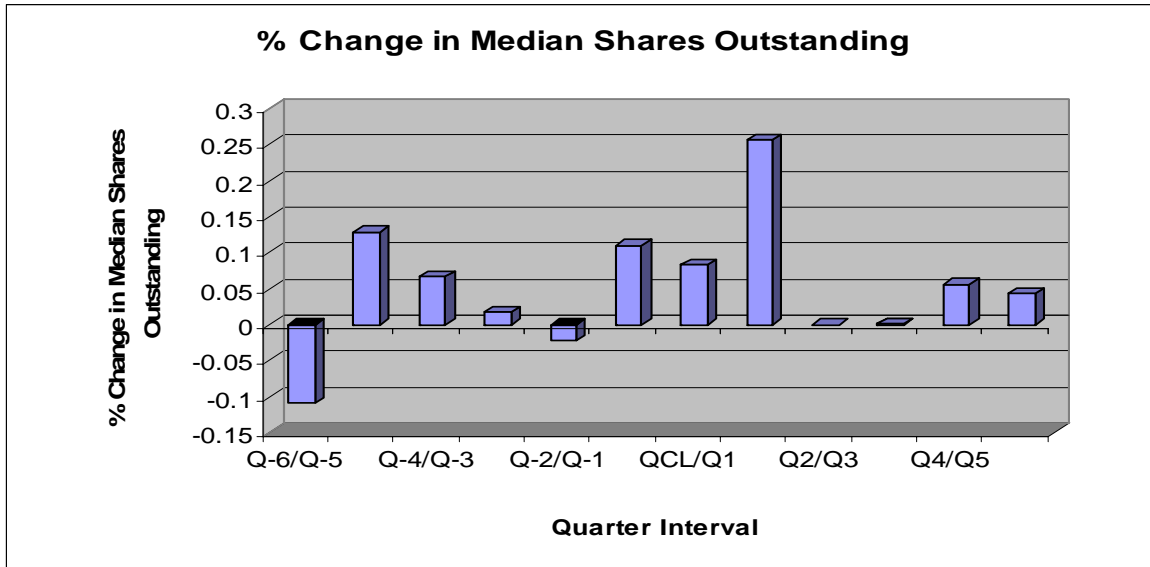**% Change in Median Shares Outstanding**

Figure 4

Mean and median American and Canadian institutional ownership surrounding the stock cross listing date. Ownership is the percent ownership of each individual stock in the 83 stock sample held by institutional investors. The American sample with outlier stocks removed was used. Q_CL is the quarter in which cross listing occurs.

Mean Number of Institutional Owners

Number of US Institutional Investor Ownership

Group 1 cotains firms that have the lowest U.S. ownership in qaurter Q-2, while
Group 3 contains firms with the highest U.S. ownership in quarter Q-2.
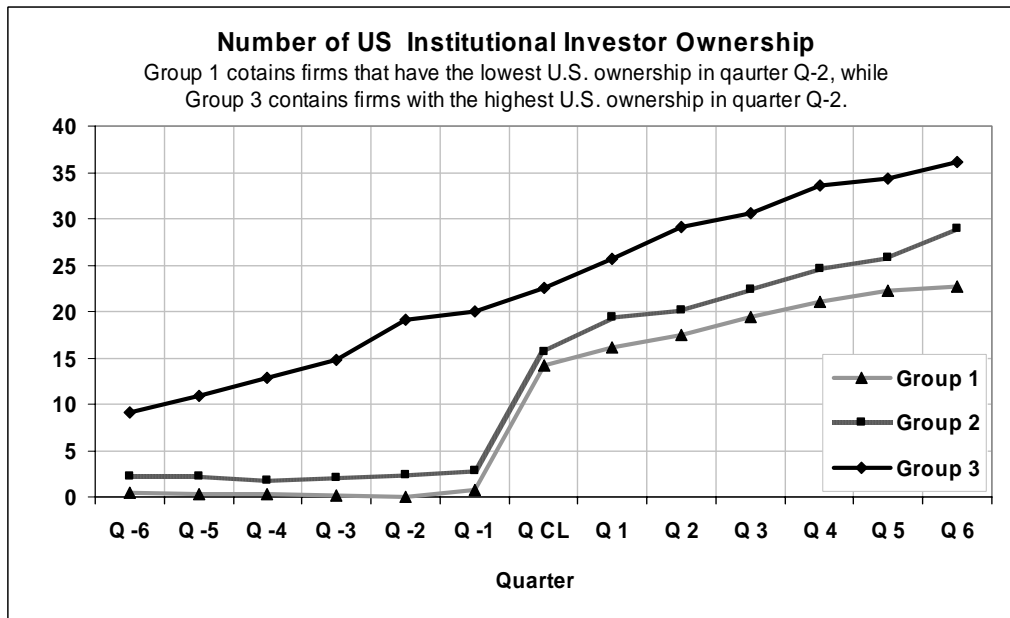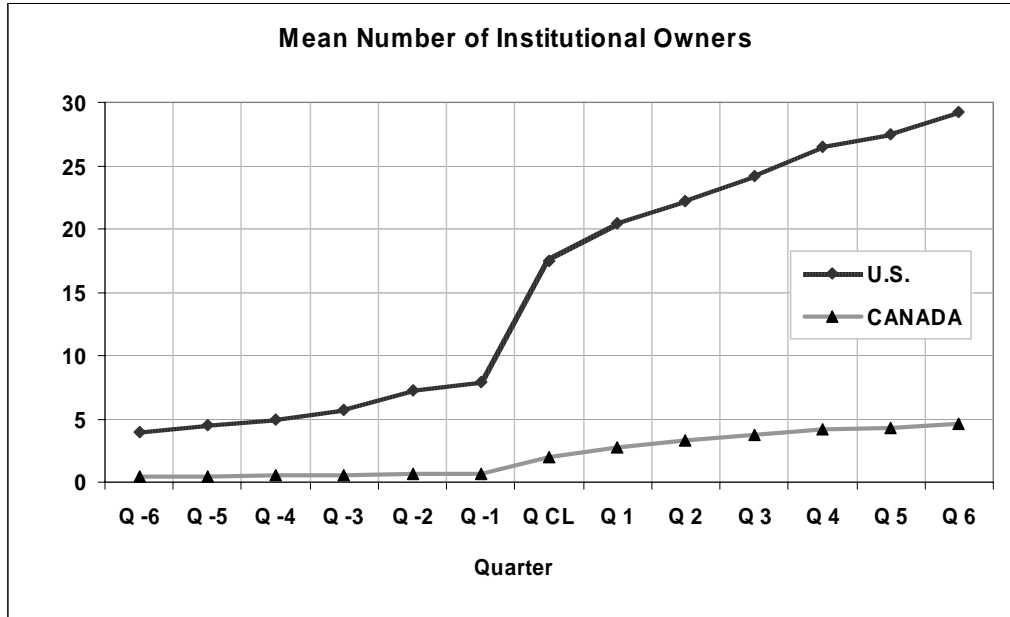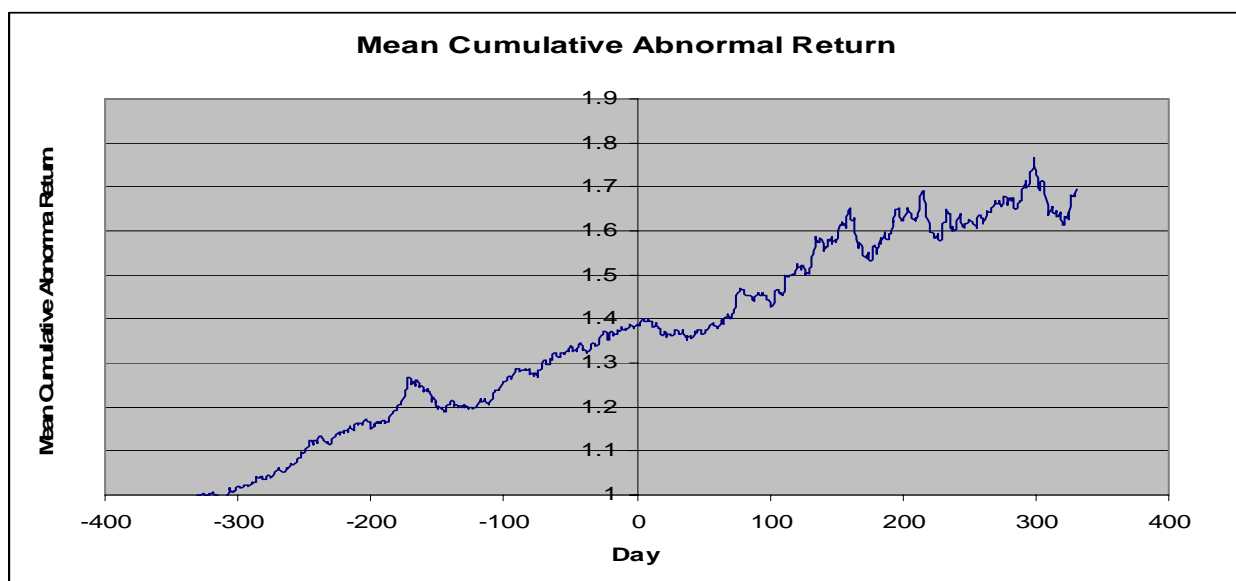
Figure 5

Cumulative Abnormal Return is the mean of the daily return for each stock summed over each time span less the return of the TSX Composite Index, and is calculated by using a daily buy and sell routine, each day investing $1 plus the return from the previous day on an original investment of $1 on day -330. Day zero is the cross listing date. Returns are calculated using the daily closing price from Datastream.

Panel A: Cumulative abnormal returns

Mean Cumulative Abnormal Return

Panel B: Cumulative returns by ownership tertiles

Mean Cumulative Abnormal Return Sorted by Q -2 US Institutional Ownership

— Average Lowest % Ownership Q -2 — Average Mid % Percent Ownership Q -2 — Average Highest Percent Ownership Q -2
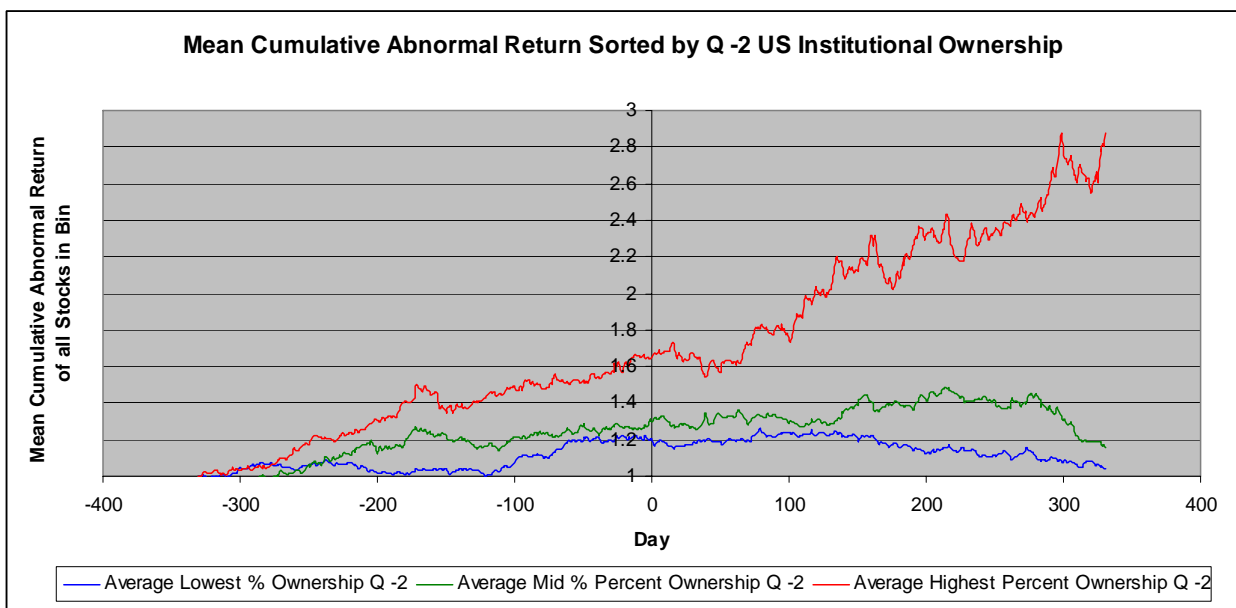
Figure 6

Amihud Illiquidity Ratio before and after cross-listing of Canadian stocks on NYSE/AMEX/NASDAQ
The Amihud Illiquidity Ratio is calculated as the absolute daily return based on the daily closing stock price divided by the Canadian dollar value of the daily trading volume. Lower values imply more liquidity.

Mean Amihud Illiquidity Measure by Time Span

Day Span

Median Amihud Illiquidity Measure by Time Span

Day Span

Figure 7

Amihud Illiquidity Ratio before and after cross-listing of Canadian stocks in the U.S. Based on Change in Ownership

The Amihud Illiquidity Ratio is calculated as the absolute daily return based on the daily closing stock price divided by the Canadian dollar value of the daily trading volume. Lower values imply more liquidity.
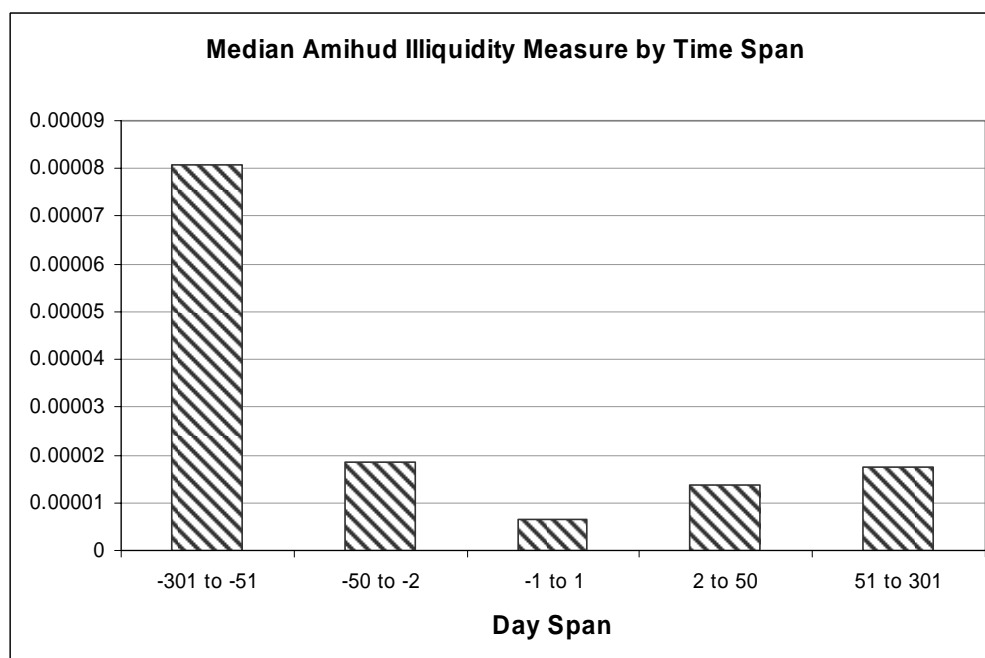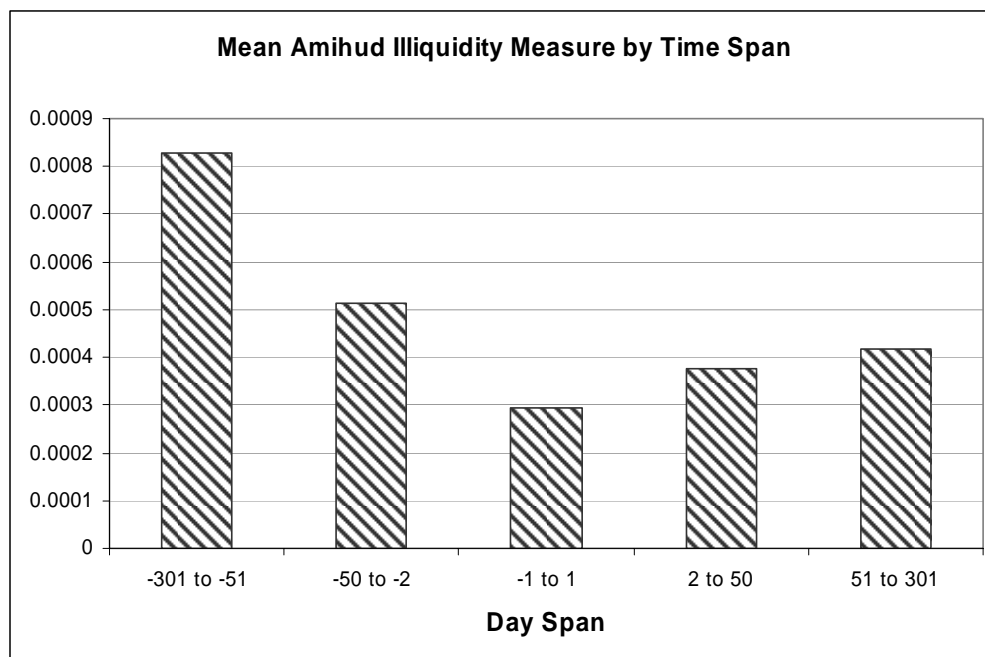

Mean Amihud Illiquidity Ratio Sorted by Q+2 minus Q-4 Percent U.S. Institutional Ownership

Legend:
- Low Ownership Tertile
- Moderate Ownership Tertile
- High Ownership Tertile

X-axis (DAYS): -301 to -51, -50 to -2, -1 to 1, 2 to 50, 51 to 301

Improvement in Liquidity
Based on percent improvement one year before cross-listing to on eyear after cross-listing

X-axis: Low Ownership Tertile, Moderate Ownership Tertile, High Ownership Tertile