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Is there a Cross Listing Premium for Non-Exchange Traded Depositary Receipts?

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Abstract

In this paper, I examine the valuation effects of trading in the U.S. as non-exchange issues i.e. Level 1 and 144 firms for non-U.S. firms. The study is motivated by two facts; first, while the number of new Level 2/3 issues has fallen 2001, Level 1 issues have remained an attractive listing option for non-U.S. firms. Second, while on theoretical grounds, firms from low-disclosure regimes have most to gain from exchange listing; these firms tend to list in the U.S. as non-exchange issues. Here, I examine whether the continuing attractiveness of, and the tendency of firms to choose a Level 1/144a listing is value enhancing. My results suggest that the tendency on the part of firms from low-disclosure regimes to choose non-exchange issues is justified. Relative to their high-disclosure peers, these firms tend to gain most from trading in the U.S. However, for Rule 144a issues, the valuation gains are short-lived.

Keywords: Cross listing, Level 1, Rule 144a, Tobin's q.
JEL Classification Codes: G15, G34, G35.

1. Introduction

During the 1990's, United States capital markets became the most attractive location for a secondary listing on International markets for non-U.S. firms. For example, at its peak, the number of depositary receipt programs numbered almost 2,200. At the same time, the share of foreign firms listed on European exchanges fell (See Pagano, Roell, Zechner (2002), and International Federation of Stock Exchanges (www.fibv.com)). For example, the share of foreign firms listed on the NYSE and the Nasdaq rose from 10.97% and 7.04% in 1995 to 19.95% and 10.44% in 2002, respectively. Foreign lists on the London Stock Exchange fell from 531 (21.22%) to 383 (16.81%) over the same period. Furthermore, non-U.S. firms have demonstrated a marked preference towards trading as Level 1 over-the-counter non-exchange issues (as opposed to Level 2/3 exchange issues) in the U.S. For example, in 2001 the number of Level 1 issues stood at 759, compared to 563 Level 2/3 exchange issues. In addition, the number of new Level 1 issues has outstripped new Level 2/3 issues in every year since 2001 (See Bank of New York (2006)).

Grounded in what is commonly referred to as the 'legal finance' literature, an exchange-cross-listing (as opposed to a Level 1/Rule 144a issue) in the U.S. provides a remedy for firms to overcome their financing constraints at home, and thus facilitate their hitherto stagnated growth. Financing constraints tend to be greatest for firms domiciled in countries where investors are poorly protected (See La Porta et al., 1998 and Demerguc-Kunt and Maksimovic, 1998 for the legal finance view, and Coffee, 1999, 2002 and Lins et al., 2005 for arguments specific to cross-listing). Consistent with this line of reasoning, Doidge, Karolyi, and Stulz (2004, DKS Hereafter) outline a theoretical model

whereby the valuation gains from exchange cross-listing, what they term a 'cross listing premium', is increasing in growth opportunities, and decreasing in domestic investor protection. This suggests that firms from low-disclosure regimes should demonstrate a marked preference for Level 2/3 exchange issues.

However, Hope, Kang, and Zang (2007, HKZ Hereafter), document evidence to the contrary. Using logit analysis, they show that while firms from low-disclosure regimes are more likely cross-list; they are less likely to exchange cross-list (i.e. Level 2/3 issue). In this paper, I examine whether the decision on the part of these firms to list as Level 1/144a issues is justified, at least on the grounds of value [1].

Using a panel of Level 1 and Rule 144a issues over the period from 1990 to 2003, I begin by estimating the cross listing premium for Level 1 and 144a firms in calendar time (1997) as DKS (2004) do. From here, I motivate the use of a longitudinal approach, which is then outlined. My results suggest that the tendency on the part of low-disclosure firms to trade in the U.S. as non-exchange issues is justified. Specifically, these firms tend to experience the greatest gains from trading, relative to their high-disclosure counterparts. However, unlike Level 1 issues, the valuation gains for 144a firms tend not to be long lasting.

The paper is organised as follows. In the next section I outline the data. Then I present estimates of the cross listing premium in calendar and event time. Section 4 concludes

2. Data

I begin by sourcing a full list of firms with a cross listing in the U.S. All information on cross-listed firms is sourced from the Bank of New York, and cross-referenced with information sourced from Deutsche Bank, JP Morgan, the New York Stock Exchange, and Nasdaq. The final sample, outlined in Appendix 1 is comprised of 4,310 firms from 36 different countries: 3,624 domestic firms, 471 Level 1 firms, and 215 Rule 144a firms. From my original cross-listed sample of firms, I classify firms according to their first depositary receipt level, and classify simultaneous Level 1/Portal 'listings' as Level 1 issues.

I outline in Appendix 1, the number of non-cross-listed firms, and the number of cross-listed firms listed in the United States. I exclude from my final sample firms domiciled in Russia, the Czech Republic and Indonesia because of a lack of data. I provide the percentage that each country contributes to each depositary receipt level and adopt an identical approach for my non-cross-listed sample. The majority of our non-cross-listed sample is domiciled in the U.K. There also exists a sizable difference across countries in their contribution to each depositary receipt level. For example, Hong Kong, Australia, U.K., and South Africa provide the majority of Level 1 issues, with 97 (20.59%), 61 (12.95%), 51 (10.83%), and 37 (7.86%) programs, respectively. Together, they supply 52.23% of the entire sample of Level 1 firms. In contrast, Argentina and Taiwan provide none. Similar trends are observed for private placement issues. The majority of these firms originate in India (50), Taiwan (42), and South Korea (21). Belgium, Denmark, Israel, Malaysia, and New Zealand provide no firm.

I follow DKS (2004), and HKZ (2007) and employ Tobin's q to measure firm value, where Tobin's q is defined $\left(\frac{\text{book value of debt + market capitalization}}{\text{book value of assets}}\right)$ where book value of debt is calculated as book value total assets less the book value of equity. All variables are expressed in local currency, sourced from Worldscope and are collected on the 31st of December in each year from 1990 to 2003.

[1] In a recent paper, like HKZ (2007), I find that the greatest valuation gains to exchange cross listing accrue to firms from high-disclosure regimes (See O'Connor (2007)). HKZ (2007) hypothesize that this result is primarily driven by the greater costs faced by low-disclosure firms in their efforts to comply with U.S. GAAP. This paper differs from HKZ (2007) in two respects. First, I pay special attention towards examining non-exchange firms (i.e. Level 1 and Rule 144a issues). In their analysis, HKZ (2007) do not examine the valuation effects for these firms separately. They create two dummy variables: 'XLIST' that takes the value of 1 if the firms cross-lists in the U.S., and 'ORG_EXC_XLIST' which is 1 if the firm exchange cross-lists. Second, I estimate both cross-sectional and panel regressions.

I employ the following firm-level control variables in my empirical specifications: I use the average sales growth over the last two years (geometric average) and Global Industry q to account for firm and industry growth, respectively. Based upon primary standard industry classifications, the (yearly) mean Global Industry q is calculated as the average q of all global firms within each classification. I employ over 15,000 international firms from the Worldscope database to calculate the mean Global Industry q for each year. To remove the influence of outliers, I remove the top 1% of observations for Tobin's q, two-year average sales growth, and total assets.

Finally, I include La Porta, Lopez-de-Silanes, Shleifler, and Vishny (1998) country-level governance variables in order to examine the valuation effects of listing across different governance regimes. I employ legal origin (English Common, French, Scandinavian and German Civil Law), and anti-director rights index, an equally weighted index of 6 different shareholder rights, which ranges from a low of 0 to a high of 5. The country-level governance variables are outlined by country in Appendix 2.

3. Empirical Results

This section presents the main results on cross listing and firm value. I begin by estimating the cross listing premium/discount for Level 1/Rule 144a firms in 1997 (as DKS (2004) do). In unreported results, I also estimate this cross-sectional relation in 2000 as HKZ (2007) do. The results are outlined in Table 1. I then proceed to analyse the relationship over time. To do so, I present univariate comparisons of cross-listed to non-cross-listed firms in calendar and event time. The results are presented in Table 2. Next, I estimate multivariate/panel data regressions that span the period from 1990 to 2003. Finally, in Table 4, I examine the dynamics of firm value around the time of listing.

Table 1: Cross-Sectional Estimates of the Cross-Listing Premium in 1997.

	Level 1 & Rule 144a					**Level 1**		**Rule 144a**	
	OLS					**TE & 2SLS**			
	(1)	(2)	(3)	(4)	(5)	TE	2SLS	TE	2SLS
Constant	2.85 [5.81]***	2.60 [4.93]***	2.60 [4.88]***	2.58 [3.85]***	2.63 [4.92]***	0.02 [0.11]	0.07 [0.34]	0.20 [0.92]	0.15 [0.52]
Level 1	0.28 [3.16]***	0.23 [2.65]**	0.21 [1.85]*	-0.33 [3.85]***	-0.01 [0.11]	-1.28 [4.61]***	-2.91 [6.56]***		
Rule 144a	0.01 [0.09]	0.03 [0.14]	0.19 [0.75]	-0.43 [3.06]***	-0.26 [1.40]			-5.29 [6.17]***	-7.66 [5.41]***
Level 1 * Years			0.01 [0.15]						
Rule 144a * Years			-0.06 [1.08]						
Level 1 * High Rq				1.20 [6.69]***					
Rule 144a * High Rq				1.31 [7.92]***					
Level 1 * High Rq * Years					0.22 [4.87]***				
Rule144a * High Rq * Years					0.34 [4.91]***				
Global q	0.75 [5.44]***	0.70 [5.07]***	0.69 [5.04]***	0.65 [4.77]***	0.67 [4.91]***	0.72 [8.70]***	0.70 [6.96]***	0.71 [6.82]***	0.79 [5.66]***
Sales Growth	1.22 [3.67]***	1.24 [3.51]***	1.24 [3.51]***	1.24 [3.48]***	1.23 [3.47]***	1.48 [9.35]***	1.50 [7.87]***	1.39 [6.91]***	1.72 [6.38]***
Log (Total Assets)	-0.13 [6.56]***	-0.13 [6.61]***	-0.13 [6.46]***	-0.12 [6.37]***	-0.13 [6.52]***				
Anti-Director		0.11 [3.29]***	0.11 [3.34]***	0.12 [3.48]***	0.11 [3.42]***	0.12 [8.12]***	0.15 [7.93]***	0.11 [5.88]***	0.10 [3.61]***
Lambda						0.71 [5.18]***		2.34 [6.17]***	
#Obs (Firms) R-Squared Prob>F Prob>Chi	2,467 0.11 0.000 -	2,467 0.13 0.000 -	2,467 0.13 0.000 -	2,467 0.16 0.000 -	2,467 0.14 0.000 -	2,467 - - 0.000	2,467 - 0.000 -	2,467 - - 0.000	2,467 - 0.000 -

In this table, I report regression (cross-section) estimates of the impact of listing on firm value in 1997. In columns 1-5, I estimate ordinary least squares estimates with standard errors clustered at the country level. In the remaining columns I estimate treatment effects (two-stage) and two-stage least squares estimates. I proxy for value using Tobin's q. All variables are defined in the text.
***, **, and * denotes significance at the 10%, 5%, and 1% level, respectively.

3.1. Cross-Sectional Estimates of the Cross-Listing Premium

In Table 1, I present regression estimates of the impact of listing on the value of Level 1/Rule 144a firms. I present three sets of estimates: in columns (1-6), I present ordinary least squares estimates. In the remaining columns, I explicitly control for self-selection bias, and estimate treatment effects and two-stage least squares estimates, respectively. To conserve space, I have outlined the treatment effect methodology in greater detail in Appendix 3. In effect, I correct the ordinary least squares estimates for selection-bias, and estimate the following:

$$q_i = \alpha + X_i\beta + \delta CL + \delta_\lambda \lambda_i + \varepsilon_i \quad (1)$$

Where q is Tobin's q, X_i is a vector of firm and country level controls, CL is a standard 0/1 dummy, corresponding to either a Level 1 over-the-counter issue, or a privately placed Rule 144a issue (the treatment effects and two-stage least squares are estimated separately for each cross-listed sub-set of firms), λ_i is the inverse-mills ratio, generated from a first-stage probit model[2] (i.e. proxy for unobserved/private information), and ε_i is a standard error term.

The results from Table 1 suggest the following. First, the ordinary least squares estimates presented in columns (1-2) suggest that Level 1 firms, unlike Rule 144a firms are worth more than non-cross-listed firms. In both columns, the coefficient estimate on the Level 1 dummy is large, and

[2] The inverse-mills ratios i.e. for both Level 1 and Rule 144a firms are generated from a first-stage probit, whereby I model the decision to cross-list as a function of firm size (log of total assets (US$)), and legal origin. The results from the first-stage probit are available from the author upon request. To satisfy the exclusion restrictions, size is excluded from the second-stage selection-corrected valuation regression. The two-stage least squares estimates are generated using the same first-stage criteria.

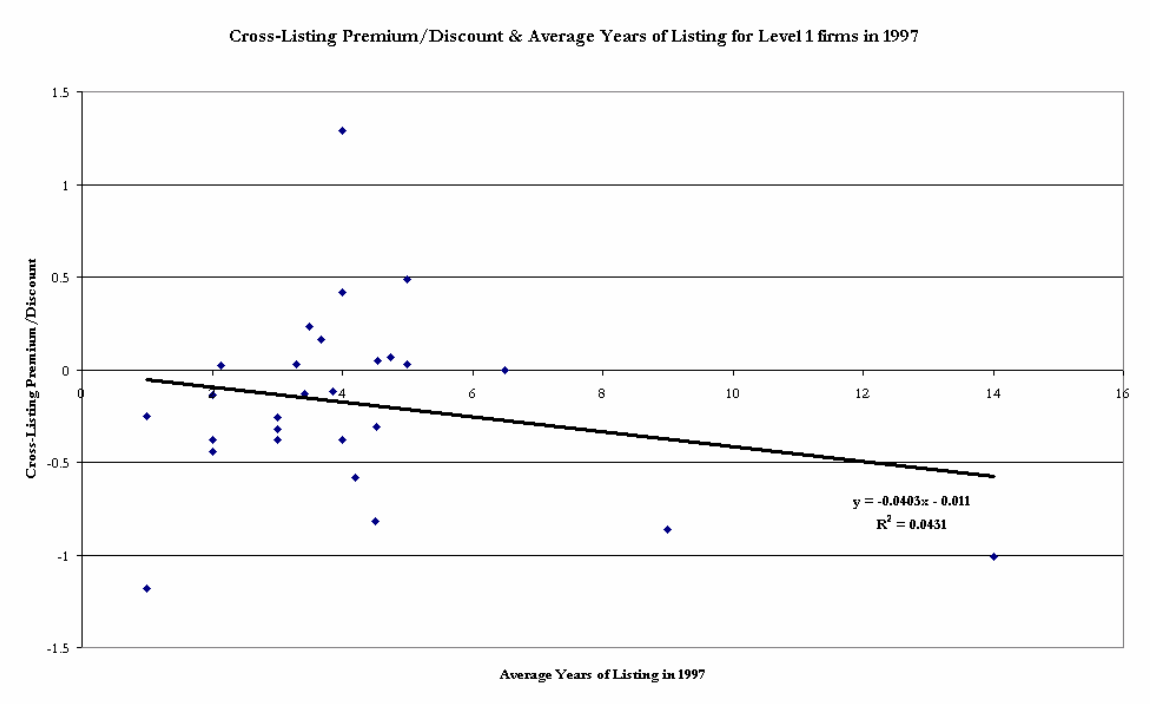
statistically different from zero. However, absent a self-selection correction, it is not clear whether this valuation premium is a cross-listing premium. I examine this issue in the remaining columns of Table 1. In contrast, the corresponding coefficient estimate for Rule 144a firms is small, and indifferent from zero. For Level 1 firms, the valuation premium is robust to the inclusion of firm, industry, and country-level control variables. In column 2, with all firm, industry, and control variables included, the coefficient on the Level 1 dummy is a statistically significant 0.23. The firm, industry, and control controls are all of the correct sign, and statistically different from zero. Firm value is increasing in firm and industry growth, and level of investor protection (anti-director rights). Larger firms tend to worth less.

However the ordinary least squares estimates are biased (See Appendix 3). In the remaining columns of Table 1, I control for the endogeneity of the cross-listing decision, and estimate treatment effects and two-stage least squares estimates. In the treatment effects regressions, I include, along with the firm (excluding size), industry, and country controls, a proxy for unobservable/private information i.e. the inverse mills ratio. The inclusion of the inverse-mills ratio dramatically affects the coefficient estimates on both cross-listing dummies. For both Level 1 and Rule 144a firms, the cross-listing dummy variables are both negative, and statistically different from zero. For Level 1 firms, the inclusion of the inverse mills ratio reverses the sign on the cross-listing dummy from positive to negative. In short, the positive sign seen in the ordinary least squares estimates are soaked up by the coefficient for the inverse mills ratio. However, of concern here is the flip in sign of the cross-listing dummy variables. For robustness sake, I also present two-stage least squares estimates. Consistent with the treatment effects estimates, when I control for the endogeneity of the listing decision, the coefficient estimates on both cross-listing dummies are now negative, and statistically so .[3] Interestingly, the coefficient estimate on the inverse mills ratio is positive and statistically different from zero for both sub-sets of firms. This implies that those unobservable factors that influence the decision to list, impact positively on firm value. However, once we account for this, there is no cross-listing premium. In fact, the results suggest the opposite, a cross listing discount.

Next, I examine whether the quality of firms that list abroad has any impact on post-listing value. For example, one might expect that higher quality firms would reap greater benefits from listing in the U.S. I classify cross-listed firms as high quality firms, if they are worth more than their corresponding (domestic) non-cross-listed firm on the year of listing. To dos o, I use Relative Tobin's q. Relative q is calculated as $\left(\frac{\text{q of cross-listed firm}}{\text{mean q of domestic firms}}\right)$, where a Relative q of greater than 1 suggests that the cross-listed firm is worth more than their average counterpart non-cross-listed domestic firm. A Relative q of less than 1 suggests the opposite. To shed some light on the relationship, I begin by outlining the unconditional relationship between Relative q on the list year, and post-listing Relative q. The data is calculated on a country-by-country basis, and is presented in a series of scatter plots (See Figure 2). The country-by-country data is outlined in Appendix 2. For both sets of firms, the relationship is positive: it appears that firms that are worth more on the list year continue to be worth more after listing. Next, I examine whether this relationship is robust to the inclusion of firm, industry, and country controls. To examine this, I create a simple dummy variable that is 1 if the firm is worth more than their counterpart domestic firms on the list year, and interact these with the cross-listing dummy variables. The results are presented in column 4 of Table 1. First, I find that the coefficient estimates on the interaction terms (i.e. Level 1 * High Rq, Rule 144a * High Rq) are positive and statistically significant form zero. However, with the inclusion of the interaction terms, the coefficient estimates on the Level 1 and Rule 144a dummies are now negative, and statistically different from zero. Taken together, the results suggest that it is only those firms that are more highly valued that gain from listing in the U.S.

[3] Notice also that the constant is statistically different from zero in all of the ordinary least squares regression estimates, suggesting that missing variables may have an important influence on the results. However, when I include the IMR, the intercept terms are smaller, and no longer statistically different from zero.

Figure 1: Cross-Listing Premium/Discount and Average Years of Listing in 1997



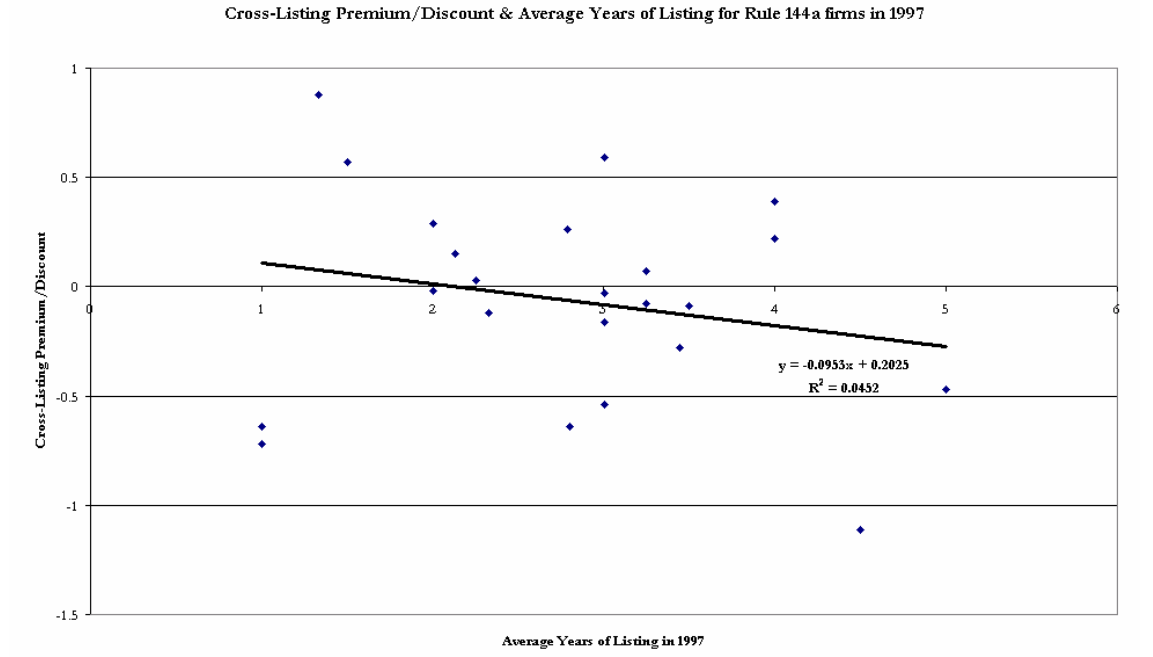
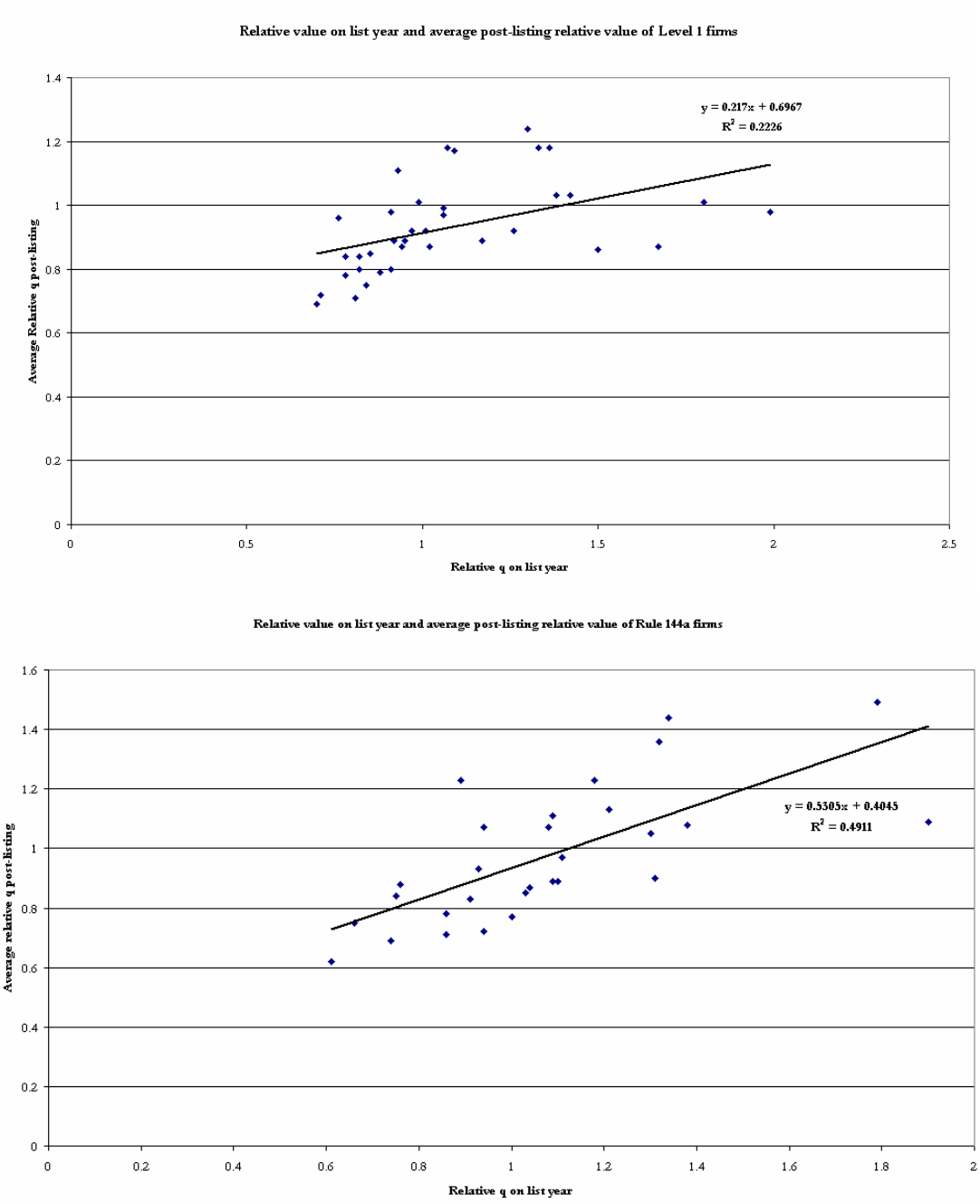


Figure 2: Relative q on List Year and Average Post-Listing Relative q



Finally, before I proceed to the longitudinal analysis, I use the cross-sectional estimates to make an initial attempt to examine the dynamics of corporate value, post-listing. In order to do so, I calculate for each firm, the number of years that each firm is listed in the U.S. in 1997. I denote this variable as 'Years'. To examine the behaviour of firm value in the post-listing period, I interact this variable with each cross-listing dummy variable creating, Level 1 * Years, and Rule 144a * Years, respectively. The results are presented in column 3 of Table 1, and suggest the following. First, the coefficient estimates suggest a slightly upward (downward) trend in value post-listing for Level 1 (Rule 144a) firms, although both sets of estimates are statistically different from zero. In contrast, I find that for firms that are worth more, the post-listing period is synonymous with an upward trend for both sets of firms. The coefficient estimates on the interaction terms 'Level 1 * High Rq * Years' and 'Rule 144a * High Rq * Years' are positive and different from zero.

The results thus far suggest the following. First, after controlling for self-selection bias, Level 1 and Rule 144a firms are worth less after trading in the U.S. Once we control for 'positive' unobservable/private information, the coefficient estimates on both the Level 1 and Rule 144a dummies, are negative, and statistically so. Next, I find that only those firms that are worth more on the list year gain from trading in the U.S. as non-exchange issues. Furthermore, their value continues to increase after trading in the U.S.

3.2. Year-By-Year and Event Time Valuation Comparisons

In Table 2 (Panel A) I compare the value of cross-listed firms to non-cross-listed firms in each year from 1990 to 2003. For each subset of cross-listed firms, I outline the value of the mean and median firm in each year. In the remaining columns, I outline the mean and median adjusted Relative q measure. The mean/median Relative q is calculated as $\left(\frac{\text{q of cross-listed firm}}{\text{mean or median q of domestic firms}}\right)$. The conclusions drawn from Panel A (and B) are largely dependent on how the Relative q measure is calculated. In general, when I compare cross-listed firms to the median non-cross-listed firms, cross-listed firms (both Level 1 and Rule 144a) are worth more than non-cross-listed firms. For example, using median-adjusted q, Level 1 firms are worth statistically more than domestic firms in every year, with the largest valuation difference originating in 1993. Rule 144a firms are worth more than the median domestic firm in all but one calendar year (1990).

Table 2: Comparison of Cross-Listed to Non-Cross-Listed Firms

	Level 1				Rule 144a			
	Mean	**Median**	**Mean-Adj Relative q**	**Median-Adj Relative q**	**Mean**	**Median**	**Mean-Adj Relative q**	**Median-Adj Relative q**
Panel A	**Calendar Time**							
1990	1.62	1.53	0.96	1.08*	1.03	1.03	0.86*	0.87**
1991	1.66	1.49	0.96	1.06*	1.22	1.17	0.92*	1.00
1992	1.79	1.52	1.05	1.15***	1.72	1.50	0.96	1.10**
1993	1.98	1.82	1.04	1.19***	1.73	1.62	0.89	1.04*
1994	2.02	1.72	1.04	1.16***	2.52	2.21	1.01	1.21***
1995	1.85	1.62	1.02	1.15***	1.93	1.83	0.96	1.14***
1996	1.85	1.59	0.99	1.16***	1.76	1.53	0.94**	1.13***
1997	1.89	1.60	0.95*	1.14***	1.85	1.58	0.94*	1.14***
1998	1.60	1.36	0.96***	1.15***	1.56	1.30	0.88***	1.09**
1999	1.70	1.45	0.91***	1.14***	1.73	1.38	0.89***	1.17***
2000	1.68	1.40	0.89***	1.17***	1.76	1.32	0.96***	1.26***
2001	1.53	1.32	0.91**	1.15***	1.42	1.23	0.92***	1.12***
2002	1.53	1.36	0.92*	1.13***	1.46	1.27	0.91***	1.09**
2003	1.63	1.45	0.89*	1.12***	1.58	1.38	0.92***	1.11***
Panel B	**Event Time**							
	Mean	**Median**	**Mean-Adj Relative q**	**Median-Adj Relative q**	**Mean**	**Median**	**Mean-Adj Relative q**	**Median-Adj Relative q**
-5	2.17	1.71	1.15	1.33***	1.65	1.33	0.90	1.02
-4	2.09	1.67	1.06	1.30***	1.59	1.33	0.89	1.02
-3	1.99	1.61	1.07	1.26***	1.86	1.53	0.98	1.14***
-2	1.97	1.61	1.06	1.28***	2.17	1.72	1.09	1.25***
-1	1.98	1.60	1.05	1.27***	2.14	1.64	1.03	1.24***
0	1.89	1.58	1.03	1.23***	2.18	1.86	1.07	1.27***
1	1.78	1.53	0.98	1.16***	1.96	1.70	1.05	1.22***
2	1.78	1.53	0.95	1.14***	1.82	1.48	0.97	1.18***
3	1.73	1.46	0.95	1.14***	1.68	1.43	0.92	1.13***
4	1.70	1.45	0.96	1.15***	1.58	1.30	0.90	1.13***
5	1.62	1.38	0.92	1.11***	1.58	1.28	0.87	1.14***
Event Time (Before-After)								
	Mean	**Median**	**Mean-adj Relative q**	**Median-adj Relative q**	**Mean**	**Median**	**Mean-adj Relative q**	**Median-adj Relative q**
Before	1.94	1.62	1.06	1.25	1.86	1.37	0.98	1.13
After	1.70	1.47	0.94	1.14	1.67	1.37	0.93	1.14
Difference	(0.24)***	(0.15)***	(0.12)***	(0.11)***	(0.19)***	0.00	(0.05)**	0.01

In this table, I compare the value of cross-listed to non-cross-listed firms in calendar and event time. For cross-listed firms, I present the mean and median value. To compare cross-listed to non-cross-listed firms, I calculate the mean and median adjusted relative q measure. Both measures are calculated as the value of each cross-listed firm divided by the mean (median) value of non-cross-listed firms. I proxy for value using Tobin's q. In the remaining rows, I calculate value pre and post-listing.

***, **, and * denotes significance at the 10%, 5%, and 1% level, respectively.

I compare in Table 2 (Panel B), the value of cross-listed firms to non-cross-listed firms in event time. I denote the list year as '0', and compare cross-listed to non-cross-listed firms for the five years before to five years after listing. As before, I outline the mean and median adjusted Relative q measure. To complement these numbers, I present in Figures 3-4, the mean and median value of cross-listed firms, and the mean/median adjusted Relative q. As before, the conclusions drawn are largely contingent on the valuation adjustment employed. Using median-adjusted q, both sets of firms are worth more in every period around the list year. However, irrespective of the adjustment method employed, the trends in value around the time of listing remain the same. Prior to trading in the U.S., the value of Level 1 firms falls in almost every period leading up to the list year. Value continues to fall post-listing, although the magnitude of the decline is much smaller. On a median-adjusted basis, Level 1 firms, do, nevertheless continue to be worth more than domestic firms (although not on a mean-adjusted basis). Finally, the data presented in Table 2 (Panel B) suggest that Rule 144a firms 'time' their listing in the U.S. Rule 144a firms experience a sizable run-up in value prior to listing in the U.S. This is followed by a corresponding fall-off, post-listing. On a median-adjusted basis, around the time of listing, Rule 144a firms continue to be worth more than domestic firms, and the greatest valuation difference occurs on the year of listing.

Figure 3: Absolute and Relative Value of Level 1 Firms in Event Time

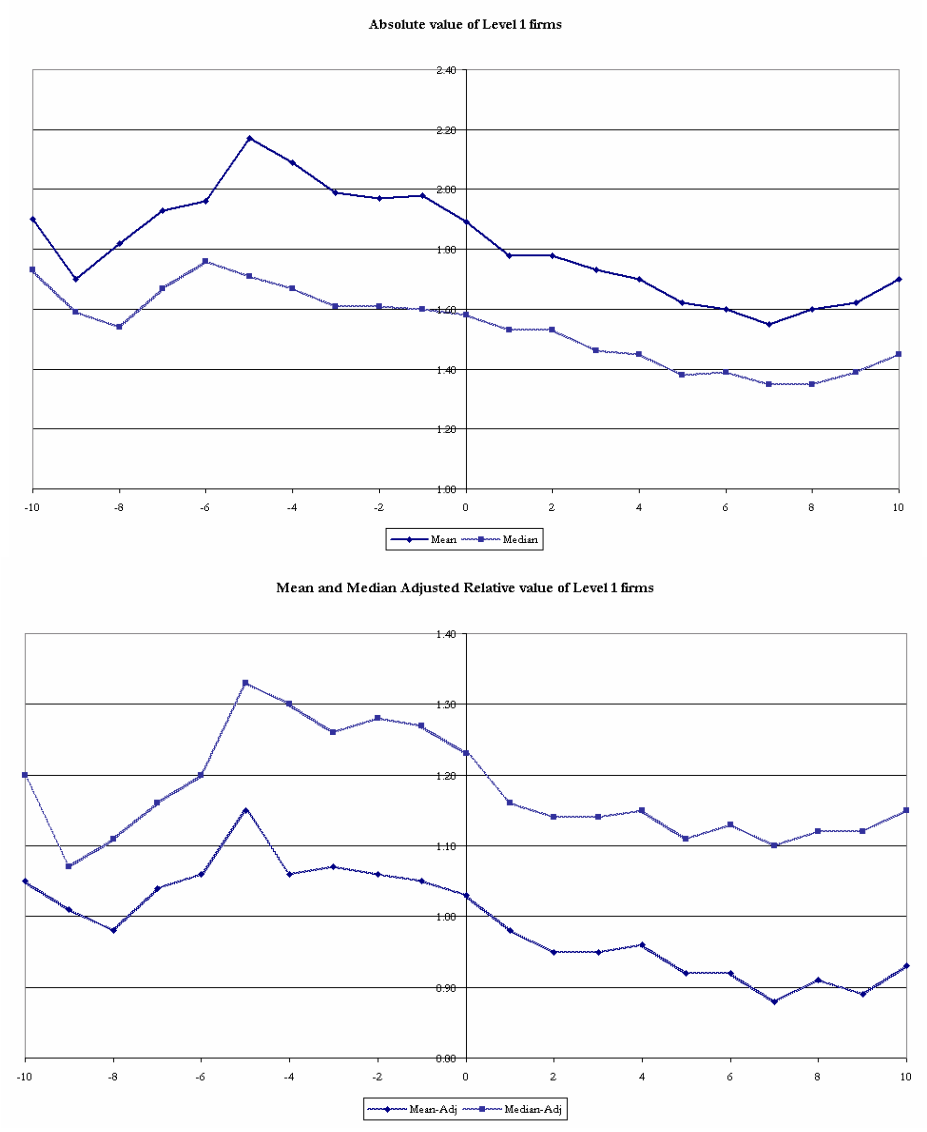
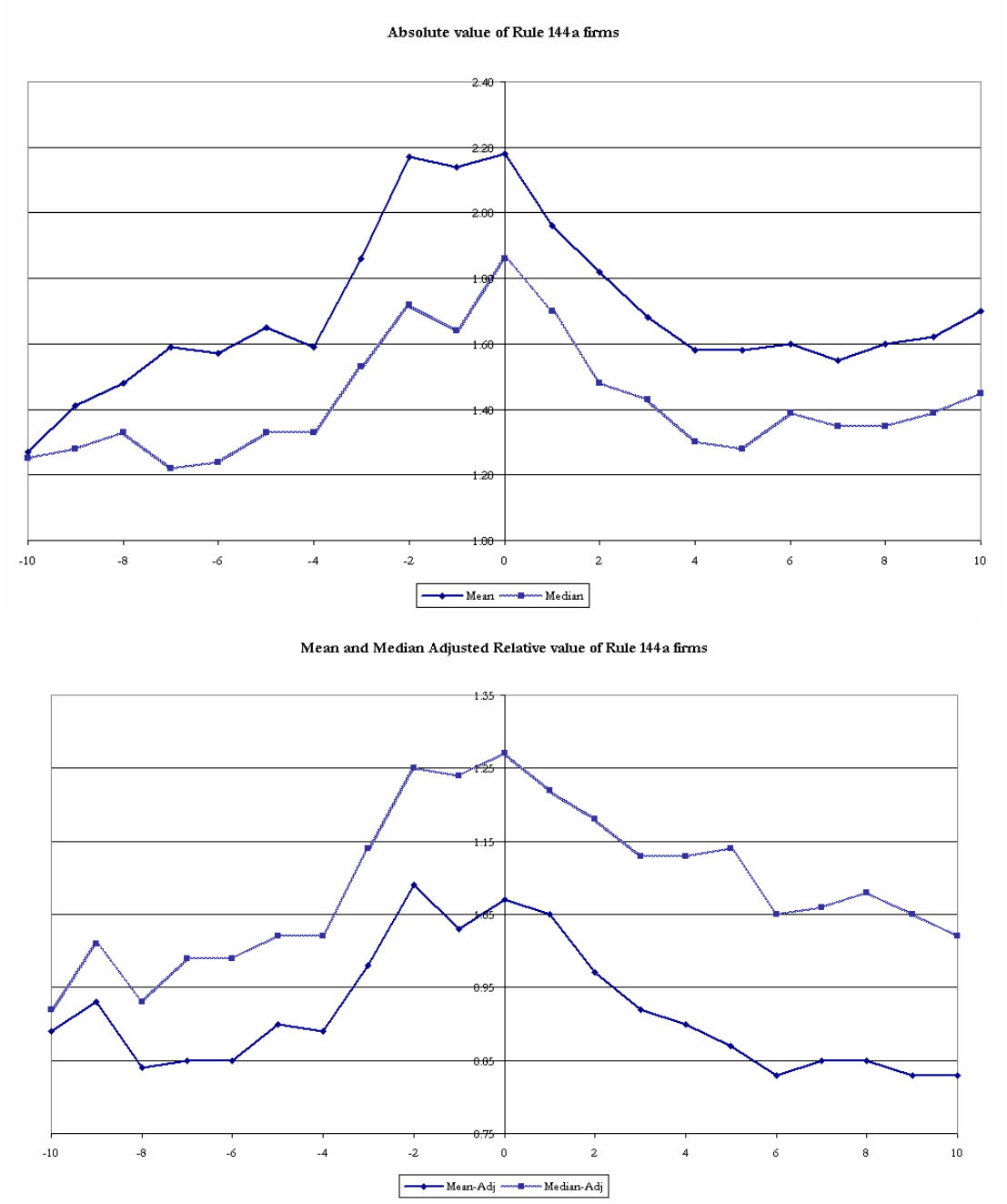


Figure 4: Absolute and Relative Value of Rule 144a Firms in Event Time



The last three rows of Panel B summarize the value of firms subsequent to cross listing. Level 1 firms are worth less after listing in the U.S., both on an absolute and relative basis. The average Rule 144a firm is worth less, but shows no change on a median-adjusted basis.

In summary, the results from Table 2 suggest the following. First, on a median-adjusted basis, Level 1 and Rule 144a firms are worth more than domestic firms in almost every calendar period. Around the time of listing, both sets of firms continue to be worth more than domestic firms. The value of Level 1 firms falls around the time of listing, but the greatest fall in value is experienced pre-listing. Rule 144a firms 'time' their listing in the U.S. However, these univariate comparisons do not control for other factors that influence firm value. In the next section, I outline multivariate panel regressions.

3.3. Panel Regression Estimates of the Cross Listing Premium

In this section I examine the effect of cross listing on firm value. I begin with the following specification, whereby I model firm value as a function of firm characteristics:

$$q_{it} = \alpha + X_{it}\beta + \delta_1 \text{Level } 1_{it} + \delta_2 \text{Rule } 144a_{it} + u_{it} \quad (2)$$

Where X_{it} is a set of exogenous observable characteristics of the firm, $\text{Level } 1_{it}$, and $\text{Rule } 144a_{it}$ are standard dummy variables that take the value of 1 if the firm trades in the United States as a Level 1, or as a privately placed Rule 144a issue on Portal, respectively. u_{it} is a standard idiosyncratic disturbance term, and $\{\alpha, \beta, \delta_1, \delta_2\}$ is a vector of parameters to be estimated.

I explicitly acknowledge the non-randomness of the cross-listed sample, and model their decision to cross list as follows:

$$CL^*_{it} = \gamma Z_{it} + \eta_{it}, CL_{it} = 1 \text{ if } CL^*_{it} > 0, CL_{it} = 0 \text{ if } CL^*_{it} < 0 \quad (3)$$

Where CL^*_{it} $(\text{Level } 1_{it}, \text{Rule } 144a_{it} \in CL_{it})$ is an unobserved latent variable, Z_{it} is a set of observable firm-level characteristics that determine the decision to cross-list in the United States, and η_{it} is a disturbance term. Selection bias arises because of the correlation between $\text{Level } 1_{it}, \text{Rule } 144a_{it}$ and u_{it}. This correlation can arise in two instances i.e. (1) selection on observables which arises through correlation between Z_{it} and u_{it},or (2) through selection on unobservables i.e. correlation between η_{it} and u_{it}. Both instances render ordinary least squares estimates of the effect of cross listing on value, biased.

In my analysis, I estimate the effect of listing on firm value using two approaches. First, I estimate a variant of the standard firm-fixed effect regression. Specifically, I estimate a pooled ordinary least squares regression, with unobserved heterogeneity specified as Mundlak (1978) correction terms i.e. time averages of time-variant explanatory variables over time ($\alpha_i = \overline{X_i}\zeta + a_i$, where $\overline{X_i} = \frac{1}{T}\sum_{s=1}^{T} X_{it}$) [4].I do not estimate a firm-fixed effects model as I find that the assumption that strict exogeneity holds is violated .[5] Consequently, I estimate the following:

$$q_{it} = \alpha + X_{it}\beta + \delta_1 \text{Level } 1_{it} + \delta_2 \text{Level } 2/3_{it} + \delta_3 \text{Rule } 144a_{it} + \overline{X_i}\zeta + \mu_{it} \quad (4)$$

Next, I explicitly model for unobservables by proxying for them. To do so I estimate a treatment effects model, whereby I augment the second stage equation with a selection correction term namely the inverse mills ratio, from a first-stage probit model. The inverse mills ratios are generated on a year-by-year basis (using yearly probit models), thus resulting in a series of time-variant unobservables in the second stage equation. Consequently, I estimate:

$$q_{it} = \alpha + X_{it}\beta_1 + \delta_1 C_{it} + \lambda_1 \beta_2 + c_i + \upsilon_{it} \quad (5)$$

I outline this method in greater detail in Appendix 3. The coefficient estimates corresponding to Eqs (4-5) are presented in Table 3. In Table 3, I replicate much of the analysis that I originally examined in a cross-sectional setting in Table 1.

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[4] The Mundlak (1978) correction terms are included in all pooled ordinary least squares regressions, but to conserve space, they are not reported. They are available form the author upon request. However, I do report the p-value from a standard F-stat that tests whether they are jointly different from zero.

[5] Violations of strict exogeneity are likely in this case because of feedback effects i.e. from Tobin's q to future values of the cross-listing dummy variables. I formally test for this possibility, following Wooldridge (2002), by inserting the one-year forwarded cross-listing variables as independent variables and testing whether their coefficients are jointly equal to zero. The results suggest that the assumption of strict exogeneity holds is violated.

Table 3: Panel Regression Estimates of the Cross-Listing Premium.

	Level 1 & Rule 144a					**Treatment Effects**					
	POLS					**Level 1**			**Rule 144a**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
Level 1	0.16 [2.76]***	0.20 [2.89]***	0.01 [0.12]	0.09 [1.51]	0.51 [3.59]***	0.17 [2.97]***	0.22 [3.11]***	0.02 [0.28]	-0.06 [0.83]	0.10 [1.00]	-0.33 [6.46]***
Rule 144a	0.02 [0.24]	0.18[[1.90]*	-0.25 [4.76]***	-0.04] [0.65]	0.46 [2.42]***						
Level 1 * Years		-0.02 [1.08]					-0.02 [1.15]				
Level 1 * Rel q			0.42 [3.68]***					0.41 [3.70]***			
Level 1 * Relq * Years				0.04 [2.63]***							
Level 1 * ADR					-0.10 [2.54]***						
Rule 144a * Years		-0.05 [2.83]***								-0.04 [2.6]***	
Rule 144a * Rel q			0.51 [4.78]***								0.53 [5.01]***
Rule 144a * Relq * Years				0.04 [1.80]*							
Rule 144a * ADR					-0.14 [2.47]***						
Sales Growth	0.60 [7.36]***	0.59 [7.29]***	0.60 [7.43]***	0.54 [6.89]***	0.54 [6.86]***	0.74 [9.4]***	0.74 [9.3]***	0.74 [9.3]***	0.69 [8.2]***	0.68 [8.2]***	0.69 [8.25]***
Log (Total Assets)	-0.23 [10.4]***	-0.23 [10.4]***	-0.23 [10.26]***	-0.14 [9.81]***	-0.14 [9.84]***						
Global Industry q	0.73 [11.5]***	0.73 [11.4]***	0.72 [11.4]***	0.72 [11.37]***	0.72 [11.29]***	0.70 [11.0]***	0.70 [11.0]***	0.70 [11.0]***	0.75 [11.6]***	0.74 [11.6]***	0.74[11.6]***
Anti-Director Rights	0.11 [11.4]***	0.11 [11.5]***	0.11 [11.5]***	0.11 [11.47]***	0.12 [12.07]***	0.14 [13.3]***	0.14 [13.3]***	0.14 [13.3]***	0.10 [10.0]***	0.10 [10.1]***	0.10 [10.2]***
Lambda	-	-	-	-	-	0.27 [10.5]***	0.27 [10.5]***	0.27 [10.3]***	0.15 [8.7]***	0.15 [8.6]***	0.15 [8.61]***
Time Dummies	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time Ave (Mundlak)	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Prob>F (Mundlak)	0.000	0.000	0.000	0.000	0.000	-	-	-	-	-	-
# Obs (Firms)	4,310	4,310	4,310	4,310	4,310	4,310	4,310	4,310	4,310	4,310	4,310
R-Squared	0.12	0.12	0.12	0.12	0.12	0.111	0.111	0.114	0.102	0.103	0.105

First, in both the pooled ordinary least squares and treatment effect regressions (See Columns 1 and 6), the coefficient estimate on the Level 1 dummy is positive and statistically different from zero. In contrast, Rule 144a firms are not worth more. Like before, I find that the coefficient estimate (Lambda) on the IMR is positive, and statistically different for both sets of firms. Next, I examine the dynamics of firm value in the post-listing period. As in Table 1, I interact each cross-listing dummy variable with 'Years', which denotes the number of years each firm is listed in the U.S., in each cross-sectional period. The coefficient estimates are outlined in Columns 2, 7, and 10. Unlike the results presented in Table 1, the results now suggest that a Level 1 issue is associated with a fall in value, post-listing, albeit insignificantly so. Rule 144a firms experience an even greater downward trend in value, which is statistically different to zero. In Table 4, I return to this issue, and examine the short and long-term valuation gains from listing.

Table 4: Evolution of Tobin's q by legal characteristics.

	Level 1						
	All	**All: Relative q**		**Anti-Director Rights**		**Legal Origin**	
		Mean-Adj	**Median-Adj**	**Above Median**	**Below Median**	**English Common**	**Civil Law**
List year	0.27 [3.01]***	0.16 [3.61]***	0.19 [3.37]***	0.21 [1.94]*	0.30 [1.98]**	0.11 [1.01]	0.33 [2.31]**
1 year after list	0.19 [2.19]**	0.13 [3.36]***	0.12 [2.51]**	0.24 [1.97]**	0.05 [0.48]	0.26 [1.91]*	-0.03 [0.42]
2 years after list	0.20 [2.19]**	0.12 [2.90]***	0.13 [2.61]***	0.11 [0.94]	0.27 [1.78]*	0.15 [1.13]	0.14 [1.38]
3 years after list	0.08 [0.96]	0.08 [1.77]*	0.08 [1.42]	0.00 [0.01]	0.16 [1.19]	0.00 [0.00]	0.09 [0.80]
4 years after list	0.14 [1.53]	0.11 [2.47]**	0.12 [2.13]**	0.08 [0.67]	0.17 [1.42]	0.07 [0.53]	0.11 [0.85]
5 years after list	0.07 [0.79]	0.07 [1.70]*	0.07 [1.25]	0.03 [0.26]	0.06 [0.63]	0.00 [0.06]	0.08 [0.71]
> 5 years after list	0.18 [2.15]**	0.10 [2.00]**	0.13 [2.04]**	0.08 [0.78]	0.31 [2.44]**	0.05 [0.41]	0.28 [2.25]**
Global Industry q	0.77 [11.80]***	0.34 [11.15]***	0.45 [10.97]***	0.77 [8.46]***	0.68 [7.65]***	0.71 [5.23]***	0.79 [10.82]***
Sales growth	0.49 [6.18]***	0.28 [6.67]***	0.30 [5.86]***	0.39 [3.32]***	0.79 [7.34]***	0.35 [2.55]**	0.48 [4.91]***
Total Assets	-0.13 [8.86]***	-0.15 [14.61]***	-0.14 [11.05]***	-0.19 [8.24]***	-0.12 [6.97]***	-0.18 [5.80]***	-0.10 [6.26]***
Time Dummies	No	No	No	No	No	No	No
# Obs (Firms)	4,310	4,310	4,310	2,172	2,138	1,490	2,820
R^2	0.09	0.07	0.08	0.09	0.11	0.08	0.10
$Pr > F$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$Pr > F(Mundlak)$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Rule 144a						
	All	**All: Relative q**		**Anti-Director Rights**		**Legal Origin**	
		Mean-Adj	**Median-Adj**	**Above Median**	**Below Median**	**English Common**	**Civil Law**
List year	0.18 [1.42]	0.04 [0.84]	0.01 [0.12]	0.47 [1.36]	0.20 [1.80]*	0.54 [1.49]	0.07 [0.64]
1 year after list	0.13 [1.22]	0.11 [1.87]*	0.09 [1.28]	-0.27 [1.48]	0.37 [2.91]***	-0.07 [0.32]	0.20 [1.60]
2 years after list	0.10 [0.94]	0.05 [1.00]	0.06 [1.00]	-0.34 [2.52]***	0.35 [2.75]***	-0.29 [1.94]*	0.21 [1.68]*
3 years after list	-0.04 [0.53]	0.02 [0.42]	0.02 [0.48]	-0.39 [3.76]***	0.21 [2.31]**	-0.37 [3.13]***	0.08 [0.86]
4 years after list	0.00 [0.01]	0.04 [0.68]	0.03 [0.53]	-0.21 [1.46]	0.17 [1.33]	-0.14 [0.85]	0.04 [0.33]
5 years after list	0.07 [0.47]	0.02 [0.35]	0.11 [1.01]	0.04 [0.11]	0.13 [1.02]	0.16 [0.47]	0.00 [0.04]
> 5 years after list	-0.16 [2.31]**	-0.07 [2.08]**	-0.05 [1.05]	-0.25 [1.95]*	-0.07 [1.02]	-0.14 [1.03]	-0.19 [2.91]***
Global Industry q	0.76 [11.75]***	0.34 [11.10]***	0.44 [10.94]***	0.76 [8.34]***	0.67 [7.58]***	0.70 [5.20]***	0.78 [10.75]***
Sales growth	0.49 [6.19]***	0.28 [6.66]***	0.30 [5.85]***	0.40 [3.44]***	0.76 [7.10]***	0.34 [2.51]***	0.47 [4.82]***
Total Assets	-0.13 [8.61]***	-0.15 [14.71]***	-0.14 [10.95]***	-0.19 [8.00]***	-0.13 [7.16]***	-0.18 [5.55]***	-0.10 [6.23]***
Time Dummies	No	No	No	No	No	No	No
# Obs (Firms)	4,310	4,310	4,310	2,172	2,138	1,490	2,820
R^2	0.09	0.07	0.08	0.10	0.11	0.08	0.09
$Pr > F$	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$Pr > F(Mundlak)$	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Next, I examine whether better quality firms perform better. As before, I classify better firms, as those that are worth more than their counterpart domestic firms on the year of listing. The results are outlined in Columns 3, 8, and 11. In line with the coefficient estimates presented in Table 1, I find that better quality Level 1 and Rule 144a firms gain the most from trading in the U.S. As before, the inclusion of the interaction terms dramatically reduces the coefficient estimates on the Level 1 and Rule 144a dummy variables. The coefficient estimate on the Level 1 dummy is smaller (0.01), and no longer statistically different from zero. The corresponding coefficient estimate on the Rule 144a dummy is negative, and statistically different from zero. Using the interaction terms 'Level 1 * Rel q * Years, Rule 144a * Rel q * Years', I find that the value of these firms continues to increase post-listing. However, the gains are greatest for Level 1 firms.

Finally, I examine the valuation gains to listing by the level of domestic investor protection. HKZ (2007) find in a series of Logit models that while firms from low-disclosure regimes are more likely to cross-list, they are less likely to exchange cross-list i.e. a Level 2/3 issue as opposed to a Level 1/Rule 144a issue. While the decision on the part of these firms not to list as a Level 2/3 issue is undoubtedly related to the costs associated with the initial and ongoing costs associated with exchange-traded issues, it may also be the case that these firms from low-disclosure regimes experience the greatest gains from non-exchange trading in the U.S. I examine this issue in Column 5 of Table 3. Here, I create an interaction dummy variable, whereby I interact each cross-listing dummy with LLSV (2000) anti-director rights measure. The anti-director rights measure for each country is outlined in Appendix 1. The coefficient estimates are consistent across both sub-sets of cross-listed firms. Level 1 and Rule 144a firms from low-disclosure regimes experience the greatest gains from listing in the U.S. With the inclusion of the interaction terms, the coefficient estimates on the Level 1 and Rule 144a dummies are positive and statistically different from zero. The corresponding coefficient estimates on the interaction terms is negative, and statistically different from zero. In all specifications, the control variables are of the correct sign and statistically different from zero. Firm value increases with investor rights, and firm and industry growth. As expected, larger firms are worth less.

In summary, the results from Table 3 highlight the following. First, I find that Level 1 firms experience a cross listing premium. Upon further investigation, it appears that this premium manifests for, first high quality firms i.e. firms worth more than domestic firms, and second, Level 1 issues from low-disclosure regimes. These results manifest also for privately placed Rule 144a issues. The results for low-disclosure regime firms suggests that their decision not to trade as a Level 2/3 issue is justified, especially given the findings of HKZ (2007). Their analysis suggests that high-disclosure regime firms gain the most from trading as Level 2/3 issues. The authors hypothesis that given the costs of listing for low-disclosure regime firms (which are considerably greater on a relative basis), the benefits to listing may not be sufficient to meet these costs. In the next section, I examine the post-listing valuation gains to listing for these firms. Specifically, I want to examine the dynamics of value post-listing. For example, are the gains immediate, or do they materialize later? And if so, are the gains permanent? Rather than just interact the 'Level 1 * ADR, Rule 144a * ADR' dummies with the 'Years' variable, I undertake a more informative test.

Specifically, I create a series of individual event-year post-listing dummy variables. I create 7 individual event-year dummies; one for each post-listing year (including the List year) up to five years post-listing, and a final dummy (> 5 years after listing), which is designed to measure, any potential long-term valuation gains to listing. These single year event-year specific dummies are 1 on the referred year and zero otherwise. The reference year is the pre-listing period. I present results for the full sample of firms (All), using mean and median-adjusted q, by level of investor protection (using anti-director rights measure), and finally, by legal origin (See Appendix 1 for the legal origin of each country). Table 4 contains the results.

The results for Level 1 firms suggest the following. For the full sample of firms, it appears that there are immediate valuation gains to listing, which disappear after the second year of listing, but manifest later into a permanent cross-listing premium. The 'List year', '1 Year after list' and '2 years after list' dummy variables are 0.27, 0.19, and 0.20, respectively, and are all significantly different

from zero. In contrast, for the next three event years i.e. '1 Year after list', '2 years after list', and '3 years after list' are smaller, and statistically insignificant from zero. However, I find that a long-term permanent cross-listing premium manifests. The coefficient estimate on the '> 5 years after list' dummy is 0.18, and is statistically different from zero at a conventional level. The mean and median-adjusted q measures are broadly in line with the absolute q measure. Next, and consistent with the findings documented in Table 3, the valuation gains are concentrated amongst firms from low-disclosure regimes. For example, when I classify firms in accordance with their level of domestic investor protection, firms from high-disclosure regimes (i.e. above-median anti-director rights), the valuation gains to listing are short-lived. After the first year of listing, the cross listing premium disappears for these firms. In contrast, for low-disclosure domiciled Level 1 firms, the results are in line with those documented for the entire sample; immediate valuation gains, which dissipate after 2 years of listing, but manifest again into a permanent cross listing premium. The coefficient estimate on the'> 5 years after list' dummy is a statistically significant 0.31. I reach almost identical conclusions, when I characterize firms as either English common or civil law domiciled.

Finally, the results for Rule 144a firms are outlined in the bottom panel of Table 4. For the full sample of firms, I find that there are no gains to listing in any of the 5 years after listing. In each event period, the coefficient estimates are statistically no different to zero. However, there is a long-term cross listing discount: the coefficient estimate on the '> 5 years after list' dummy is –0.16 and statistically different to zero. The mean-adjusted relative q figures support this view. The results by level of investor protection/legal origin are outlined in the remaining columns. Interestingly, and unlike Level 1 issues, I find no long-term cross-listing premium. While the valuation gains do accrue to firms from low-disclosure regimes, they are immediate, but not long lasting. For example, for below-median anti-director rights firms, the valuation gains disappear after three years of listing (Interestingly, when I employ legal origin, civil law firms actually experience a long-term cross listing discount). Above-median firms are never worth more (from a statistical view point) and they experience a cross-listing discount i.e. the coefficient estimate on the '> 5 years after list' is a statistically significant –0.25. Finally, in all specifications, the controls are of the expected sign, and are different to zero.

4. Concluding Remarks

In recent years, the number of non-U.S. firms that have sought a Level 2/3 exchange cross listing in the U.S. has fallen. Coupled with this, the number of firms that have delisted from U.S. exchanges has also intensified (See Marosi and Massoud (2006), and Witmer (2006)). In contrast, over the same period, a non-exchange listing has become a more attractive option for non-U.S. firms, as opposed to a Level 2/3 list. Furthermore, HKZ (2007) show that firms from low-disclosure regimes tend to prefer a non-exchange listing in the U.S., despite the fact that, on theoretical grounds, it is these firms that have most to gain from an exchange listing. In this paper, I examine the valuation effects of such listing choices.

Using a panel of Level 1 and Rule 144a firms, I show that relative to firms from high-disclosure regimes, non-exchange listings for firms from low-disclosure regimes tend to be value enhancing. For example, in the case of Level 1 firms from low-disclosure regimes, the valuation gains from listing tend to be immediate, and long lasting. In contrast, the valuation gains that accrue to Level 1 firms from high-disclosure regimes tend to be short-lived. Finally, I find that the valuation gains from listing as a private placement i.e. Rule 144a issue accrue only to those firms from low-disclosure regimes. However, these gains tend to be transitory.

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Appendix

Appendix 1: Sample Description

		Sample								Country Variables	
	Country	**Domestic**	**%**	**Level 1**	**%**	**144a**	**%**	**Sample**	**%**	**Anti- DR**	**Legal Origin**
1	Argentina	20	0.55	0	0.00	5	1.06	25	0.58	4	FCL
2	Australia	72	1.99	61	12.95	4	0.85	137	3.18	4	ECL
3	Austria	31	0.86	10	2.12	2	0.42	43	1.00	2	FCL
4	China	58	1.60	8	1.70	4	0.85	70	1.62	N/A	-
5	Colombia	14	0.39	1	0.21	4	0.85	19	0.44	3	FCL
6	Denmark	39	1.08	4	0.85	0	0.00	43	1.00	2	SCL
7	Finland	42	1.16	2	0.42	2	0.42	46	1.07	3	SCL
8	France	210	5.79	16	3.40	5	1.06	231	5.36	3	FCL
9	Germany	238	6.57	21	4.46	3	0.64	262	6.08	1	GCL
10	Greece	3	0.08	1	0.21	2	0.42	6	0.14	2	FCL
11	Hong Kong	196	5.41	97	20.59	1	0.21	294	6.82	5	ECL
12	Hungary	5	0.14	2	0.42	8	1.70	15	0.35	N/A	-
13	India	83	2.29	5	1.06	50	10.6	138	3.20	5	ECL
14	Ireland	1	0.03	1	0.21	1	0.21	3	0.07	4	ECL
15	Israel	36	0.99	1	0.21	0	0.00	37	0.86	3	ECL
16	Italy	107	2.95	5	1.06	7	1.49	119	2.76	1	FCL
17	Japan	635	17.52	23	4.88	0	0.00	658	15.27	4	GCL
18	Korea	287	7.92	4	0.85	21	4.46	312	7.24	2	GCL
19	Malaysia	178	4.91	12	2.55	0	0.00	190	4.41	4	ECL
20	Mexico	31	0.86	18	3.82	11	2.34	60	1.39	1	FCL
21	Netherlands	57	1.57	15	3.18	2	0.42	74	1.72	2	FCL
22	Norway	47	1.30	8	1.70	3	0.64	58	1.35	4	SCL
23	New Zealand	22	0.61	4	0.85	0	0.00	26	0.60	4	ECL
24	Peru	11	0.30	3	0.64	1	0.21	15	0.35	3	FCL
25	Phillipines	34	0.94	5	1.06	6	1.27	45	1.04	3	FCL
26	Poland	17	0.47	1	0.21	11	2.34	29	0.67	N/A	-
27	Portugal	17	0.47	2	0.42	3	0.64	22	0.51	3	FCL
28	Singapore	111	3.06	19	4.03	1	0.21	131	3.04	4	ECL
29	South Africa	89	2.46	37	7.86	3	0.64	129	2.99	5	ECL
30	Spain	71	1.96	4	0.85	2	0.42	77	1.79	4	FCL
31	Sweden	78	2.15	6	1.27	1	0.21	85	1.97	3	SCL
32	Switzerland	114	3.15	5	1.06	1	0.21	120	2.78	2	GCL
33	Taiwan	243	6.71	0	0.00	42	8.92	285	6.61	3	GCL
34	Thailand	82	2.26	14	2.97	1	0.21	97	2.25	2	ECL
35	Turkey	34	0.94	5	1.06	7	1.49	46	1.07	2	FCL
36	U.K	311	8.58	51	10.83	1	0.21	363	8.42	5	ECL
	Total	**3,624**	**100%**	**471**	**100%**	**215**	**100%**	**4,310**	**100%**	-	-

In this table I report by country the number of domestic (non-cross-listed), Level 1 and Rule 144a firms. I report by country, the number of domestic, Level 1, and Rule 144a firms. For each category of firms, I also calculate the percentage (%) contribution of each country to the overall sample. All firms are obtained from the Worldscope Country Lists. All information on firms cross-listed in the U.S. are obtained from the Bank of New York, and cross-referenced with data provided by Deutsche-Bank, JP Morgan and Citibank. Rule 144a ADRs trade on Portal and Level 1 ADRs trade over-the-counter as pink sheet issues. In the remaining columns, I outline La Porta, Lopez-de-Silanes, Shleifler, and Vishny (1998) country level governance variables; anti-director rights and legal origin. ECL, FCL, GCL, and SCL denote English Common Law, French Civil Law, German Civil Law, and Scandinavian Civil Law, respectively.

Appendix 2: Mean value of Level 1 & Rule 144a firms in 1997

		Level 1					Rule 144a				
	Country	**Level 1**	**D (q)**	**Ave # Years List in 1997**	**Rel. q on List Year**	**Rel q post-listing**	**Rule 144a**	**D (q)**	**Ave # Years List in 1997**	**Rel. q on List Year**	**Rel q post-listing**
1	Argentina	-	-	-	-	-	1.65	(0.09)	3.50	1.10	0.89
2	Australia	2.21	0.03	5.00	0.99	1.01	2.10	(0.08)	3.25	0.76	0.88
3	Austria	1.95	0.28	2.33	1.38	1.03	1.65	(0.02)	2.00	1.00	0.77
4	China	1.16	(0.14)	2.00	0.92	0.89	1.37	0.07	3.25	-	0.93
5	Colombia	-	-	-	0.78	0.78	1.41	(0.03)	3.00	1.38	1.08
6	Denmark	1.07	(1.01)	14.00*	1.99	0.98	-	-	-	-	-
7	Finland	1.57	(0.38)	4.00	0.85	0.85	1.48	(0.47)	5.00	0.86	0.78
8	France	2.07	0.03	3.29	1.36	1.18	2.07	0.03	2.25	0.61	0.62
9	Germany	1.41	(0.38)	2.00	0.91	0.80	2.08	0.29	2.00	1.31	0.90
10	Greece	-	-	-	-	0.75	-	-	-	1.09	1.11
11	Hong Kong	1.94	(0.13)	3.42	1.01	0.92	-	-	-	0.89	1.23
12	Hungary	2.47	0.49	5.00	1.80	1.01	2.86	0.88	1.33	1.18	1.23
13	India	3.49	1.29	4.00	1.33	1.18	1.56	(0.64)	2.80	0.94	0.72
14	Ireland	1.34	(0.44)	2.00	0.84	0.75	-	-	-	-	1.08
15	Israel	-	-	-	0.71	0.72	-	-	-	-	-
16	Italy	1.35	(0.26)	-	1.02	0.87	2.59	0.98	1.25	1.32	1.36
17	Japan	1.81	0.05	4.55	1.06	0.99	-	-	-	-	-
18	Korea	-	-	-	0.91	0.98	1.11	(0.28)	3.44	0.93	0.93
19	Malaysia	1.53	(0.58)	4.20	1.17	0.89	-	-	-	-	-
20	Mexico	1.98	0.42	4.00	1.09	1.17	1.71	0.15	2.13	1.11	0.97
21	Netherlands	2.56	0.00	6.50	1.07	1.18	2.02	(0.54)	3.00	1.09	0.89
22	Norway	2.75	0.23	3.50	0.76	0.96	1.41	(1.11)	4.50	0.86	0.71
23	NZ	1.12	(1.18)	1.00	1.50	0.86	-	-	-	-	-
24	Peru	1.25	(0.32)	3.00	0.97	0.92	-	-	-	-	1.59
25	Phillipines	1.32	(0.26)	3.00	0.78	0.84	1.80	0.22	4.00	1.08	1.07
26	Poland	1.83	(0.25)	List Yr.	0.88	0.79	1.36	(0.72)	List Yr.	0.94	1.07
27	Portugal	-	-	-	1.42	1.03	2.15	0.57	1.50	1.34	1.44
28	Singapore	1.92	(0.12)	3.86	1.26	0.92	-	-	-	0.74	0.69
29	Spain	1.28	(0.86)	9.00*	1.67	0.87	-	-	-	0.91	0.83
30	Sth Africa	2.05	0.02	2.13	1.06	0.97	1.39	(0.64)	1.00	0.75	0.84
31	Sweden	1.58	(0.82)	4.50	0.82	0.80	1.58	(0.82)	2.00	1.04	0.87
32	Switzerland	1.84	0.16	3.67	0.93	1.11	2.70	1.02	2.00	1.79	1.49
33	Taiwan	-	-	-	-	-	2.76	0.26	2.79	1.30	1.05
34	Thailand	1.50	0.07	4.75	1.30	1.24	1.27	(0.16)	3.00	1.90	1.09
35	Turkey	1.96	(0.60)	1.00	0.82	0.84	3.15	0.59	3.00	1.03	0.85
36	U.K	2.21	(0.31)	4.53	0.94	0.87	-	-	-	-	0.82
	Total	**1.89**	**(0.12)**	**3.54**	**1.04**	**0.75**	**1.85**	**(0.16)**	**2.79**	**1.08**	**0.93**

List Yr. Denotes "List Year"

* Denotes a single firm.

In this table I report the mean value of cross-listed (Level 1 & Rule 144a) firms in 1997. The mean difference is reported in the column labeled **D (q) 1997**. In the remaining columns, I report by country, and for each subset of cross-listed firms, the average number of years listed in the U.S. in 1997 **[Ave # Years List in 1997**], and the relative value of cross-listed firms in the year the firm listed in the U.S. **[Rel. q on List Year],** and post-listing **[Rel q post-listing].** Relative value is calculated as the value of each cross-listed firms divided by the average value of non-cross-listed firms in each year.

Appendix 3: Treatment Effects Models

In this section, I outline cross-section and panel treatment effect models. I begin with the cross-sectional approach. Lets begin with the following standard valuation equation:

$$q_i = \alpha + X_i\beta + \delta CL + \varepsilon_i \quad (A.1)$$

Where X_i is a set of exogenous observable characteristics of the firm, CL_i is a standard dummy variable that take the value of 1 if the firm trades in the United States and ε_i is a standard idiosyncratic disturbance term

And a cross-listing decision equation as:

$$CL_i^* = \gamma Z_i + u_i, CL_i = 1 \text{ if } CL_i^* > 0, CL_i = 0 \text{ if } CL_i^* < 0 \quad (A.2)$$

Where CL_i^* is an unobserved latent variable, Z_i is a set of observable firm-level characteristics that determine the decision to cross-list in the United States, and u_i is a disturbance term. Selection bias arises because of the correlation between CL_i and ε_i. This correlation can arise in two instances i.e. (1) selection on observables which arises through correlation between Z_i and ε_i, or (2) through selection on unobservables i.e. correlation between ε_i and u_i. Both instances render ordinary least squares estimates of the effect of cross listing on value, biased.

Given Eq. (A.2), and lets assume that the error terms from both equations are jointly normally distributed, with means zero, and standard deviations $\sigma_\varepsilon, \sigma_u$ (normalized to one) and correlation ρ, the expected value of the cross-listed firm is given by:

$$\begin{aligned} E[q_i \mid CL_i = 1] &= \beta X_i + \delta + E[\varepsilon_i \mid CL_i = 1] \\ E[q_i \mid CL_i = 1] &= \beta X_i + \delta + \rho\sigma_\varepsilon \lambda_{i1}(\gamma Z_i) \end{aligned} \tag{A.3}$$

Where $\lambda_{i1}(\gamma Z_i)$ is the 'inverse mills ratio', and is computed as $\left(\phi(\gamma Z_i) \Big/ \Phi(\gamma Z_i)\right)$, where $\phi(.), \Phi(.)$ are the density and cumulative density functions for the standard normal, respectively. Given Eq. (A.3), the value of a firm that chooses not to cross-list is:

$$E[q_i \mid CL_i = 0] = \beta X_i + \rho\sigma_\varepsilon \lambda_{i2}(\gamma Z_i) \tag{A.4}$$

Where $\lambda_{i2}(\gamma Z_i)$ is computed as $\left(-\phi(\gamma Z_i) \Big/ [1 - \Phi(\gamma Z_i)]\right)$. Thus, the difference in value for the cross and non-cross-listed firms is given by:

$$E[q_i \mid CL_i = 1] - E[q_i \mid CL_i = 0] = \delta + \left[\rho\sigma_\varepsilon \phi(\gamma Z_i) \Big/ [\Phi(\gamma Z_i)(1 - \Phi(\gamma Z_i))]\right] \tag{A.5}$$

Thus, ordinary least squares estimates of the effects of cross listing on firm value will be biased upwards, if $\rho > 0$, which is expected for cross listed firms. Two-step treatment effects models correct for this. The first-step (probit/logit) obtains estimates of γ in Eq. (A.2), which are used to compute $\lambda_{i1}, \lambda_{i2}$. Next, Eq. (A.1) is estimated using ordinary least squares, but with an additional right hand side variable, λ_i, computed as $\lambda_{i1}(\gamma Z_i)CL_i + \lambda_{i2}(\gamma Z_i)(1 - CL_i)$. The selection-corrected valuation equation is:

$$q_i = \alpha + X_i\beta + \delta CL + \delta_\lambda \lambda_i + \varepsilon_i \tag{A.6}$$

The panel version of the treatment effects model is as follows. First, the valuation equation is given by:

$$q_{it} = \alpha + X_{it}\beta_1 + \delta CL_{it} + \alpha_t + \upsilon_{it} \tag{A.7}$$

And the selection equation:

$$CL^*_{it} = \gamma Z_{it} + \eta_{it}, CL_{it} = 1 \text{ if } CL^*_{it} > 0, CL_{it} = 0 \text{ if } CL^*_{it} < 0 \tag{A.8}$$

Under the assumption that the error terms are bivariate normal, the generalized residual from the first-stage probit is:

$$E(q_{it} \mid C_{it} = 1) = \rho\sigma_\upsilon \lambda_1(\beta Z_{it}) \tag{A.9}$$

Where $\lambda_1(\beta Z_{it})$ is computed as $\varphi(\beta Z_{it}) \Big/ \phi(\beta Z_{it})$, which is a series of <u>time-specific</u> 'inverse mills ratios'. Substituting into Eq. (A.7) yields:

$$q_{it} = \alpha + X_{it}\beta_1 + \delta CL_{it} + \lambda_1\beta_2 + c_i + \upsilon_{it} \tag{A.10}$$