Cross-Listings and M&A Activity: Transatlantic Evidence

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We analyze whether European firms choose to list shares in the US to facilitate acquisitions. Evidence from a sample of 547 European companies shows that cross-listed firms are significantly more active in acquiring US companies than are their domestically listed peers. This pattern holds even after we account for self-selection in the cross-listing decision. Cross-listed firms are also more likely to use equity payment in large transactions, but after taking self-selection into account, transaction size becomes the key determinant of the use of equity. After cross-listing, the proportion of aggregate M&A volume financed with equity increases.

Practitioners have long advocated the idea that cross-listed stock provides a potentially useful form of payment for cross-border transactions. J.P. Morgan (2004), for example, argues that *"In fact, many foreign issuers who have reconciled their accounting to US GAAP and listed their ADRs on US exchanges have done so with the express intent of developing viable M&A currencies."* (J.P. Morgan, 2004). Cross-listing is needed because many target shareholders are likely to prefer payment in domestic equity, rather than foreign equity. There are a number of reasons for this preference, including better investor protection, better access to information, convenience in trading, and potential home bias.

Cross-listings have already spawned a sizable literature surveyed by Karolyi (1998). Subsequent papers have addressed issues such as valuation levels (Doidge, Karolyi, and Stulz, 2004), cross-listing motives for both non-US (Blass and Yafeh, 2000; Foerster and Karolyi, 2000; and Pagano, Röell, and Zechner, 2002) and US firms (Chaplinsky and Ramchand, 2000; Wu and Kwok, 2002), short-run stock price reactions (Miller, 1999), analyst coverage (Lang, Lins, and Miller, 2003) voting premiums (Doidge, 2004), changes in order flow (Domowitz, Glen, and Madhavan, 1998), shareholder protection (Coffee, 1999; Stulz, 1999; Reese and Weisbach, 2002), and cost of capital (Foerster and Karolyi, 1999). Most recently, Burns (2003) studies premiums paid by European cross-listed firms for US acquisitions, and finds that cross-listed firms that use equity pay an average of 10% less than non-cross-listed firms that pay with cash.

Many of these papers, such as Pagano et al. (2002), discuss acquisitions as a possible motive for cross-listing. With the exception of Burns (2003), where the analysis focuses on premiums in takeovers of public companies, prior studies do not empirically address our research question: Does cross-listing affect acquisition behavior?

We look at three outcome variables that relate to acquisition activity. First, we study the likelihood of US acquisitions by cross-listed European firms compared to their domestically listed peers. We find that even after we control for a number of variables affecting acquisition likelihood, cross-listed firms are significantly more likely to be acquirers of US firms. The acquirer's log market capitalization is another factor positively associated with acquisition likelihood. These results remain robust even after accounting for self-selection of cross-listed firms.

Second, we examine the payment method used by cross-listed firms and by their domestically listed peers. Cross-listed firms are more likely than domestically listed firms to use equity payment for larger transactions. However, this result appears to be driven by self-selection of cross-listed firms. In specifications in which we account for self-selection and/or additional control variables, transaction size becomes the key determinant of equity payment.

Third, we examine the effect of cross-listing on the premiums paid by the acquirer. After all, it could be that cross-listing affects the price paid, rather than the likelihood of an acquisition. However, we do not find a significant effect on premiums.

Finally, we perform additional experiments in which we examine cross-listed firms before and after cross-listing. The likelihood of US acquisitions does not change around a cross-listing: cross-listed firms are active acquirers in the US markets both before and after cross-listing. However, it is interesting to note that the average size of equity-financed transactions increases sharply after cross-listing, as does the proportion of transaction volume that is equity financed. Before cross-listing, firms finance 23% of their US acquisition volume with equity, but they finance 43% with equity in the first five years after cross-listing.

Overall, our findings support the proposition that, among other reasons, firms cross-list to facilitate acquisitions. The evidence suggests that companies that are already active acquirers in the US choose to cross-list to make larger transactions.

The article is organized as follows. Section I discusses cross-listed stock as a method of payment in acquisitions. Section II describes the data. In Section III we present our method. Section IV reviews the empirical results. Section V concludes.

I. Cross-Listed Stock as Acquisition Currency

One of the motives for European companies to cross-list in the US markets could be the need for a viable M&A currency. BenDaniel and Rosenbloom (1998) argue that non-US buyers have severe limitations in the use of stocks unless they list common stock or ADRs in the US One reason for this is convenience for new US shareholders. In a survey conducted by Citibank (1996), nearly 60% of portfolio managers cite "trading ease" as a source of preference for ADRs over common stock. In addition, a number of US funds have statutes that restrict their ownership of non-US listed securities. A further reason for sellers to prefer US listed stock is home bias. Lewis (1999) and Karolyi and Stulz (2003) survey the home bias literature in detail. Cross-listing reduces home bias by making the foreign firm more visible and in that respect more similar to US firms (Baker, Nofsinger, and Weaver, 2002).

It is also possible that the more extensive shareholder protection and disclosure standards of the US financial markets reduce information asymmetries between the acquiring insiders and the US target. Once a company is cross-listed, there should be less disagreement about the intrinsic value of the acquirer's equity. Lang et al. (2003) report that cross-listed firms have increased analyst coverage and increased forecast accuracy. Bailey et al. (2002), however, find that return and volume reactions to earnings announcements tend to increase after

cross-listing, despite the increased disclosure and consequent lower information asymmetry between investors.

Despite the potential convenience of using US stock to pay for US acquisitions, the causality between cross-listing and M&A activity may be more complex. A number of studies going back to Biddle and Saudagaran (1992) and Saudagaran (1988) find that cross-listed companies are likely to have certain distinctive characteristics in comparison to other similar firms. These characteristics should also make them more likely to enter into US acquisitions in the first place.

II. Data

We describe our data sources and how we construct our sample of European cross-listed and domestically listed acquirers. We also discuss the composition of the M&A sample.

A. Data Sources

We obtain our data from several sources. Data on foreign companies cross-listed in the US comes from the New York Stock Exchange, Nasdaq, and the American Stock Exchange. We obtain information on private placements from the Bank of New York website (http://www.adrbny.com/). We add companies that have been, but are no longer, cross listed by searching the Securities Data Corporation (SDC) databases for US new issues by European companies. We cross-check the cross-listing data against the web pages of the companies and the relevant European exchanges. We collect information on mergers and acquisitions from the SDC US Mergers & Acquisitions database. Information on financial statements and company Standard Industrial Classification (SIC) codes are from the Worldscope database, and currency exchange rates are from Datastream.

B. Company Sample

First, we identify all European issuers that have cross-listed in the United States, including those that are no longer cross-listed. We check their cross-listing status for information that includes the date, exchange, and type of listing. We obtain this information from various sources including exchange listings, company websites, and SDC. We exclude firms that cross-listed prior to 1980. The logic behind this decision is that these companies have been truly global for a long period of time. They represent a specific group that is different from both domestically listed and recently cross-listed firms. There are 25 such firms, including firms for which the year is unavailable.

Second, we need a broad sample of the European-listed firm population to act as a control. Thus, we first select all firms from a wide European stock market index. The index we use is the Dow Jones STOXX^{SM} Total Market Index for Europe, consisting of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the UK. This list excludes all tax havens such as the Netherlands Antilles. This selection of countries represents the 15 European Union members prior to the EU's enlargement on May 1st 2004, plus Norway and Switzerland. The index is constructed by taking all listed companies in these countries by market capitalization and adding the next largest company until the index covers 95% of total market capitalization for the sample. The index excludes stocks that have had more than ten non-

trading days in the prior three months. Further details on the composition of the index are available at www.stoxx.com.

After eliminating double-counting, combining the cross-listing sample and the European-listed-firms sample gives us a list of 614 companies. We then exclude financial institutions (42 companies) from the sample due to lack of comparability of accounting variables with other industries. We define financial institutions as companies with an SIC code beginning with a "6". After excluding 25 firms cross-listed before 1980, our final sample consists of 547 companies.

Table I shows the country and industry distribution of the sample. 326 of the companies are listed only domestically, and 221 are cross-listed. The largest countries in the sample are the UK with 185 companies, France with 71 companies, and Germany with 51 companies. The proportion of cross-listed companies in the sample is highest for Ireland (73%), followed by Finland (69%), and Norway (62%), excluding Austria, which has only one company in the sample.

Figure 1 shows the cross-listing year for both acquirers and non-acquirers. The number of cross listings increased sharply in the early 1990s and peaks in 1997 with 29 cross-listings. Since then, there has been a slight decrease, with 23 cross-listings in 2000.

C. M&A Sample

We base our M&A sample on US transactions by European sample companies between January 1996 and December 2000. Table II shows descriptive statistics of the sample, as well as some comparative statistics for transactions by US or rest-of-the-world acquirers. We disregard transactions below $1 million. We include only completed acquisitions of majority interests, but include all mergers, acquisitions of shares, and acquisitions of assets. Groups frequently use a locally incorporated subsidiary to complete the acquisition. For the purposes of this study, we attribute such acquisitions by a subsidiary to the ultimate listed parent. We determine the link between the subsidiary and parent from the SDC M&A database.

This procedure results in a sample of 1,692 acquisitions, of which 271 are by European firms cross-listed at the time of the acquisition and 1,421 are by European domestically listed companies. The method of payment required in some of the analysis is available in 1,474 cases. The mean value of the transactions is $907.9 million for cross-listed companies and $321.7 million for domestically listed companies.

III. Method

We discuss the dependent variables and specification and present our control variables. We also discuss the Heckman (1979) two-step estimation method used to correct for self-selection.

A. Model Specification

We examine the effect of cross-listing on three outcome variables: likelihood of acquisition, likelihood of equity payment, and premium paid over market. We estimate our models by using logit for the first two outcome variables and OLS for the third outcome variable. The equations take the forms:

$$ACQ_i = \alpha + \boldsymbol{\beta}'\mathbf{x}_i + \delta CL_i + \varepsilon_i, \tag{1}$$

$$EQ_i = \alpha + \boldsymbol{\beta}'\mathbf{y}_i + \delta CL_i + \varepsilon_i, \tag{2}$$

$$PREM_i = \alpha + \boldsymbol{\beta}'\mathbf{z}_i + \delta CL_i + \varepsilon_i, \tag{3}$$
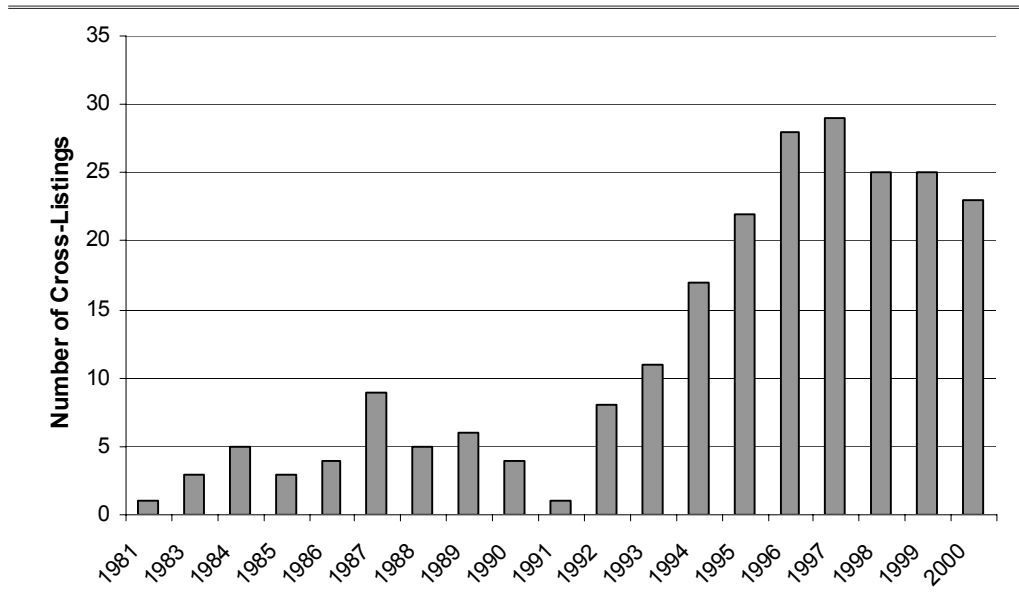
Table I. European Acquirer Sample

Table I shows the country of origin and industry for the European acquirer sample. The sample of 547 firms includes cross-listed firms and European firms in the Dow Jones Stoxx[SM] Total Market Index for Europe. We exclude companies in the financial sector.

		Only Domestically Listed	Cross-Listed	Total
Country of Origin				
	Austria	0	1	1
	Belgium	7	2	9
	Denmark	10	3	13
	Finland	4	9	13
	France	45	26	71
	Germany	33	18	51
	Greece	4	5	9
	Ireland	4	11	15
	Italy	15	16	31
	Luxembourg	2	2	4
	Netherlands	20	19	39
	Norway	5	8	13
	Portugal	4	4	8
	Spain	21	6	27
	Sweden	16	13	29
	Switzerland	18	11	29
	United Kingdom	118	67	185
Region				
	Central Europe	71	49	120
	Northern Europe	35	33	68
	Western Europe	54	30	84
	Southern Europe	44	31	75
	UK and Ireland	122	78	200
Industry				
SIC 1	Mining and construction	25	12	37
SIC 2	Manufacturing: foods, textiles etc.	64	56	120
SIC 3	Manufacturing: plastics, metals etc.	84	56	140
SIC 4	Transportation and communications	63	46	109
SIC 5	Wholesale and retail trade	46	8	54
SIC 6	Finance, insurance, and real estate	excl.	excl.	excl.
SIC 7	Personal and business services	35	33	68
SIC 8	Health, legal, educational services	8	10	18
SIC 9	Public administration	1	0	1
Total		326	221	547

Figure 1. Development of Cross-Listings over Time

Figure 1 shows the number of US cross-listing transactions made by European firms in 1980-2000. The figure includes all European cross-listed companies, whether or not they acquired US companies.

where:

ACQ_i These observations are firm-years. The variable takes a value of one in firm-years where the company makes an acquisition.

EQ_i These observations are acquisitions. The variable takes a value of one if over 50% of the acquisition price is paid in equity.

$PREM_i$ is the percentage difference between the offer price per share and the stock price at the close of the day before the announcement.

x_i, y_i, z_i are control variables that vary depending on the specification.

CL_i This variable takes a value of one if the company is cross-listed in the firm-year (for outcome variable ACQ_i) or cross-listed at the time of the acquisition (for outcome variables EQ_i and $PREM_i$).

B. Control Variables

For models of acquisition likelihood (Equation 1), the control variables are log market capitalization, cash ratio, leverage, return on equity, relative exchange rate, a 144A private placement dummy, and an interaction term CL_i * US trading volume as well as year, industry, and region controls.

We measure size as the natural logarithm of market capitalization in millions of dollars at the beginning of the firm-year. Company size is a significant determinant of acquisition likelihood (e.g., Harford, 1999): Larger firms tend to make more acquisitions. We define the cash ratio as the ratio of cash and equivalents to total assets at the beginning of the firm-year. Following Jensen (1986), we expect that the more cash rich companies will be more

Table II. M&A Activity with US Targets

Table II shows descriptive statistics for overall acquisition activity with US targets 1996-2000 in terms of number of acquisitions and total volume. We present the statistics in four categories: European cross-listed acquirers, European domestically listed acquirers, US acquirers, and other acquirers not from Europe or the US We obtain our data from the SDC M&A database, except for the division of European acquirers into cross-listed and domestically listed, which is based on our own analysis.

	European Cross-Listed Acquirers		European Domestically Listed Acquirers		US Acquirers		Acquirers not from Europe or US		Total	
	N	$m	N	$m	N	$m	N	$m	N	$m
1996	24	9,456	187	24,007	3287	324,356	210	14,175	3708	371,993
1997	30	9,085	246	40,958	4406	637,075	321	32,850	5003	719,968
1998	53	109,066	255	53,383	4574	1,125,304	289	49,355	5171	1,337,108
1999	66	18,378	346	183,195	3718	1,032,493	275	54,426	4405	1,288,491
2000	98	100,058	387	155,661	3371	1,391,970	382	67,403	4238	1,715,092
Total	271	246,042	1421	457,204	19356	4,511,197	1477	218,208	22525	5,432,652

acquisitive. We measure leverage as the three-year average of the ratio of book value of debt to book value of assets at the beginning of the firm-year. Since debt financing is still feasible, lower leverage may be associated with a higher likelihood of acquisitions. We define return on equity as the three-year average of earnings per share divided by book equity per share at the beginning of the firm-year. Return on equity relates to the potential for efficiency improvements from combining firms of unequal managerial talent. We expect efficient companies to acquire less efficient ones.

Changes in relative exchange rates may cause variations in cross-border M&A activity. The stronger the acquirer's home currency against the target's currency, the more likely the acquisition. The measure we use here, as in Harris and Ravenscraft (1991), is based on relative exchange rates against the US dollar. We define the measure as:

$$RER_{it} = \frac{\overline{ER}_i - ER_{it}}{\overline{ER}_i} \tag{4}$$

where RER_{it} is the relative exchange rate of currency i against the US dollar at the end of year t, $\overline{ER}_i$ is the average exchange rate of currency i against the US dollar calculated from values of at the end of years 1996-2000, and ER_{it} is the exchange rate against the US dollar of currency i at the end of year t. We note that we use the period 1996-2000 as a basis for relative exchange rate calculations because we are interested in controlling for variation only within the sample period.

We express exchange rates as US$1 equals the number of foreign currency units. Consequently, positive (negative) values of RER_{it} indicate the currency is strong (weak) relative to the US dollar. We expect the effect of this variable for acquisition likelihood to be positive.

Not all cross-listings are equal: some cross-listed shares may present more attractive acquisition currencies than others. Although we include S.E.C. Rule 144A private placements (i.e., privately placed depositary receipts sold to qualified institutional buyers) in our cross-listing sample, private placement equity may be less attractive than publicly listed equity because of the limited secondary market for these issues. We expect the private placement dummy to be negatively

related to acquisition likelihood. Liquidity may also be an issue. We include an interaction term of the cross-listing dummy and US-based trading volume (1996-2000 average annual volume, or if the firm cross-listed later than 1996, average volume from cross-listing to 2000). We expect this measure to positively affect the likelihood of a US acquisition.

Countries that share common economic ties are more likely to see cross-border acquisitions. Sarkissian and Schill (2004) note similar cross-cultural factors in the patterns of international cross-listings. We group countries into five regions according to geopolitical and linguistic proximity. *Northern* comprises Finland, Sweden, Norway, and Denmark; *Central* is Germany, Austria, Switzerland, and the Netherlands; *Western* is France, Belgium and Luxembourg; *Southern* is Spain, Portugal, Italy, and Greece. The fifth group comprises the *UK and Ireland*. We expect to find a positive effect on acquisition likelihood for *UK and Ireland* because of strong economic and cultural/linguistic ties with the US.

We also include industry and year dummies as control variables. We base industry dummies on the first digit of the SIC code.

For models of method of payment (Equation 2), control variables are log transaction value, its interaction term with CL_i, cash ratio, leverage, a 144A private placement dummy, and the interaction term $CL_i *$ US trading volume as well as year, industry, and region controls.

Due to a lack of sufficient cash resources, firms often finance larger acquisitions by using stock. To control for size, we include the log transaction value, a cross-listing dummy, and their interaction term. Log transaction value is the natural logarithm of the value of the transaction in millions of dollars. We expect all three to have a positive influence on the likelihood of equity payment. Other control variables used in this model are defined similarly as before.

For models of premiums paid (Equation 3), following Burns (2003), our control variables are a dummy for equity financed deals, its interaction term with CL_i, log acquirer market value, log transaction value, toehold, a multibidder dummy, relative exchange rate, a 144A private placement dummy, and the interaction term $CL_i *$ US trading volume. Because of the limited number of observations available, we omit other control variables.

We define an equity-financed deal as one that has over 50% of its payment made in equity. We measure acquirer market value as the natural logarithm of market capitalization in millions of dollars at the beginning of the acquisition year. We define toehold as the percentage of equity in the target held by the acquirer before the transaction. The multibidder dummy takes a value of one if there are multiple bidders.

C. Self-Selection Model

An important consideration in modeling the effects of cross-listing is that cross-listed firms are not random draws from the population, but rather self-select. Therefore, using a cross-listing dummy might lead to biased results. Since firms that cross-list self-select and since that decision relates to ACQ_i, CL_i and ε_i are correlated and a simple OLS estimate of δ will be biased. To correct for this bias, we use a Heckman (1979) two-step estimation method. The first step is to estimate the selection mechanism model, which in this case is a probit model of cross-listing likelihood:

$$CL_i^* = \gamma' \mathbf{c_i} + \eta_i$$
$$CL_i = 1 \; if \; CL_i^* > 0$$
$$CL_i = 0 \; if \; CL_i^* \leq 0$$

(5)

where CL_i^* is an unobserved latent variable of the decision to cross-list, c_i is a set of variables that affect the decision to cross-list, and η_i is an error term.

In constructing the probit model, we follow Doidge et al. (2004) and Lang et al. (2003) in using both company and country level variables. We note that changing the probit specification by using fewer independent variables or different combinations of them has no material impact on results concerning acquisition likelihood or acquisition premiums. For the results on the likelihood of equity payment, changing the probit specification affects the significance of the cross-term CL_i* log transaction value, but not its sign.

As company-level variables we use the natural logarithm of book assets at the beginning of the firm-year; three-year annualized sales growth; price-to-earnings; market-to-book; and industry dummies based on the first digit of the SIC code. Price-to-earnings is stock price divided by earnings per share and market-to-book is market value of equity divided by book value of equity at the beginning of the firm-year, both averaged over three years. The correlation between price-to-earnings and market-to-book is only 0.3 in this sample, low enough to avoid a multicollinearity problem.

As country level variables in the probit, we use dummies for legal origin as well as measures of anti-director rights, accounting standards, and judicial efficiency as defined by La Porta et al. (1998). We add market liquidity, which we measure as the dollar value of shares traded divided by the average market capitalization in 1997, and the natural logarithm of the country's 1997 GNP in billions of dollars. We obtain both variables from Doidge et al. (2004).

Estimating Equation (5) as step one of the Heckman (1979) model gives us an estimate of γ. For each observation, we next compute:

$$\hat{\lambda}_i = \frac{\phi(\hat{\gamma}'\mathbf{c_i})}{\Phi(\hat{\gamma}'\mathbf{c_i})}, \qquad\qquad (6)$$

where $\hat{\lambda}_i$ is known as the inverse Mills ratio, and ϕ and Φ are the standard normal density and cumulative distribution functions, respectively.

As the second stage of the Heckman (1979) procedure, we estimate Models (1), (2), and (3) with an additional variable, namely the inverse Mills ratio. Model (1), for example, becomes:

$$ACQ_i = \alpha + \boldsymbol{\beta}'\mathbf{x_i} + \delta CL_i + \delta_\lambda \lambda_i + v_i, \qquad\qquad (7)$$

which we estimate using OLS.

IV. Results

We begin with a logit analysis of the effects of cross-listing on acquisition likelihood, then analyze effects on the choice of method of payment and premiums paid. We also discuss a number of further experiments.

A. Determinants of Acquisition Likelihood

Table III shows the results of a logit analysis of acquisition likelihood for cross-listed firms compared to their domestically listed peers. All logit results are maximum likelihood estimates. We calculate the pseudo-R^2 reported as:

Table III. Determinants of US Acquisition Likelihood for European Companies

In the logit specifications (1) through (4), the observations are firm-years from the sample of European acquirers 1996-2000. The dependent variable receives a value of one if a US acquisition by the European company takes place in the firm-year. In the probit model, the dependent variable receives a value of one if the company is cross-listed, zero otherwise, and the observations are firm-years in 1996. Lambda is the inverse Mills ratio as in Heckman (1979), which we calculate by using the probit results. When an acquisition takes place in the year of the cross-listing, the cross-listing dummy takes a value of one only if the cross-listing takes place before the acquisition. Log market capitalization is the natural logarithm of the market value in millions of dollars. We calculate cash ratio as cash/assets. We calculate both the log market capitalization and cash ratio as of the beginning of the firm-year. Sales growth is annualized three-year growth. Leverage is total debt/total assets, return on equity earnings per share/book equity per share, P/E price per share/earnings per share, and market-to-book market value of equity/book value of equity, all defined as three-year averages at the beginning of the firm-year. Relative exchange rate measures the deviation from the 1996-2000 average exchange rate of local currency against US dollar as in Harris and Ravenscraft (1991). We calculate US trading volume for cross-listed firms as 1996-2000 average annual volume, or if the firm cross-listed later than 1996, as average from cross-listing to 2000. Country-level variables in the probit model are from La Porta et al. (1998) and Doidge et al. (2004). All significance tests are two-sided. *t*-statistics are in parentheses below the coefficients. LogL is the value of the log likelihood function and Pseudo R^2 a goodness-of-fit measure based on the difference between unrestricted and restricted likelihood functions as in McFadden (1974).

Dependent Variable: Dummy for Acquisition in the Firm-Year (1/0)

			Treatment Effects		
	Logit (1)	**Logit (2)**	**Probit**	**Logit (3)**	**Logit (4)**
Constant	-2.19***	-8.12***	-0.35	-1.70***	-7.59***
	(-10.18)	*(-9.85)*	*(-0.41)*	*(-3.41)*	*(-7.92)*
Cross-Listing Dummy	0.38***	0.33**		0.33**	0.32**
	(3.09)	*(2.43)*		*(2.55)*	*(2.26)*
Log Market Capitalization		0.39***			0.39***
		(8.08)			*(7.80)*
Cash Ratio		0.09			0.23
		(0.15)			*(0.35)*
Leverage		0.003			0.004
		(0.96)			*(1.11)*
Return on Equity		0.002*			0.002*
		(1.67)			*(1.93)*
Relative Exchange Rate		-0.22			-0.13
		(-0.11)			*(-0.07)*
144A Private Placement Dummy		-0.94**			-0.78*
		(-2.23)			*(-1.83)*
Cross-Listing Dummy * US Trading Volume		0.0001			0.0001
		(0.87)			*(1.04)*
Lambda (Heckman)				-0.24	-0.42
				(-0.69)	*(-1.08)*
Log Assets			0.001***		
			(3.49)		
Sales Growth			-0.0001		
			(-0.31)		

Note: Additional variables shown on the following page.

Table III. Determinants of US Acquisition Likelihood for European Companies
(*Continued*)

| | Logit (1) | Logit (2) | Treatment Effects | | |
			Probit	Logit (3)	Logit (4)
P/E Ratio			-0.002		
			(-0.99)		
Market to Book			0.003		
			(1.25)		
French Law			0.03		
			(0.21)		
German Law			-0.42		
			(-1.22)		
Scandinavian Law			0.35*		
			(1.73)		
Accounting Standards			-0.01		
			(-0.60)		
Judicial Efficiency			0.07		
			(0.77)		
Liquidity Ratio			0.04		
			(0.11)		
Log GNP			-0.05		
			(-0.61)		
Year Dummies	√	√		√	√
Industry Dummies	√	√	√	√	√
Region Dummies	√	√		√	√
LogL	-987.3	-871.9	-269.6	-893.0	-830.0
Pseudo-R^2	0.09	0.13	0.08	0.08	0.12
N	2735	2302	547	2247	2136

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level**.

$$\rho^2 = 1 - \frac{L(\hat{\beta})}{L(\hat{\beta}^H)} \tag{8}$$

where $L(\hat{\beta})$ is the log likelihood of the unconstrained model and $L(\hat{\beta}^H)$ is the log likelihood of the model defined by the null hypothesis (McFadden, 1974).

We conduct estimations in two ways, first as a one-step logit in Specifications 1 and 2 and second with a Heckman (1979) two-step model in Specifications 3 and 4. The observations we use to estimate the probit model shown in Table III are firm-years from 1996 (alternatively, using all firm-years from 1996-2000 leads to a smaller pseudo-R^2 in the probit).

The sample in Specification 1, Table III, consists of 2,735 firm-years in the period 1996-2000. The dependent variable takes a value of one in firm-years in which a European firm acquires a majority interest in a US firm, and zero otherwise. Cross-listed firms are significantly more likely to conduct US acquisitions than are non-cross-listed firms. The specification

shows that the cross-listing dummy takes a positive value and is significant at the 1% level. This result is robust to the addition of a self-selection mechanism (Specifications 3 and 4), although its significance diminishes slightly.

Specification 2 in Table III adds several firm-specific control variables. These variables relate to financial characteristics, year dummies, industry dummies, and geographic region dummies. The results show that the cross-listing dummy remains positive and significant at the 5% level. Most of the financial control variables are not significant at conventional levels. The major exception is log market capitalization, which is positive and highly significant. As expected, larger firms are more likely to be acquirers. Return on equity and the 144A dummy also show significant values.

We also include year, industry, and region dummies. Using the UK and Ireland region as benchmark, all four other European region dummies take negative and significant values. This pattern is as expected. Because of their closer economic and cultural ties, UK and Irish firms are more likely acquirers of US companies.

B. Determinants of the Use of Equity

Table IV shows the results of our logit analysis of the determinants of using equity as payment in US acquisitions. The sample consists of 1,474 US acquisitions with known methods of payment by cross-listed companies and their domestically listed peers in 1996-2000. For all three specifications, we report both a simple logit (Specifications 1 and 2) and a self-selection model (Specifications 3 and 4). We calculate lambdas for the Heckman (1979) model as in Table III, but in Table IV we use a sample of acquisitions instead of firm-years. Company-specific variables refer to the acquirer.

The dependent variable receives a value of one if the acquisition was equity-financed, zero otherwise. We define an acquisition as equity financed if over 50% of the payment is made with equity. When an acquisition takes place in the year of the cross-listing, the cross-listing dummy takes a value of one only if the cross-listing takes place before the acquisition.

Specification 1 in Table IV shows the results of a parsimonious model in which the independent variables are the cross-listing dummy, log transaction value, and their interaction term. As expected, the interaction term CL_i* log transaction value comes out positive and significant at the 1% level.

We interpret the interaction term as follows: when the US acquisition is large and the European company is cross-listed, the likelihood of equity payment increases significantly. Meanwhile, the cross-listing dummy takes an unexpected negative value. In a model in which the only independent variable is the cross-listing dummy (with a constant), the dummy is also negative but not significant at conventional levels.

However, Specification 1 is not robust to self-selection. The interaction term remains positive, but is no longer significant once we add lambda in Specification 3. Instead, the log transaction value alone picks up the size-related effects and becomes significant at the 1% level. This change may be due to a smaller number of observations: The use of firm-specific accounting variables reduces usable observations by more than half.

Specification 2 in Table IV adds more control variables. Similarly as with the self-selection model, the significance of the interaction term transfers to the log transaction value variable, which becomes positive and significant. Again, the decline in significance may be partly due to the smaller size of the sample.

We conduct two unreported robustness checks related to the definition of equity payment, the results of which are available from the authors on request. The first one is a multinomial

Table IV. Determinants of Use of Equity in US Acquisitions by European Companies

In the logit specifications (1) through (4), the observations are US acquisitions in 1996-2000 made by our sample of European acquirers. The dependent variable receives a value of one if the acquisition is equity-financed. We define an acquisition as equity-financed if over 50% of the payment is made using equity. In the probit model, the dependent variable receives a value of one if the acquirer is cross-listed, zero otherwise. Lambda is the inverse Mills ratio as in Heckman (1979), which we calculate by using the probit results. When an acquisition takes place in the year of the cross-listing, the cross-listing dummy takes a value of one only if the cross-listing takes place before the acquisition. The log transaction value is the natural logarithm of the value of the transaction in millions of dollars. Other variables are defined as in Table III. All significance tests are two-sided. LogL is the value of the log likelihood function and Pseudo-R^2 a goodness-of-fit measure based on the difference between unrestricted and restricted likelihood functions as in McFadden (1974).

Dependent Variable: Dummy for Equity Financed Acquisition

				Treatment Effects	
	Logit (1)	Logit (2)	Probit	Logit (3)	Logit (4)
Constant	-2.29***	-2.89***	0.11	-6.89***	-6.41***
	(-6.76)	(-3.74)	(0.04)	(-4.78)	(-4.14)
Cross-Listing Dummy	-1.06**	-0.09		0.26	0.13
	(-2.10)	(-0.11)		(0.22)	(0.11)
Log Transaction Value	0.07	0.25**		0.40***	0.15***
	(1.34)	(2.28)		(2.74)	(2.76)
Cross-Listing Dummy * Log Transaction Value	0.27***	0.12		0.03	0.21
	(2.79)	(0.81)		(0.13)	(0.20)
Cash Ratio		1.07			-0.06
		(0.59)			(-0.02)
Leverage		-0.02			-0.02
		(-1.62)			(-1.02)
144A Private Placement Dummy		-0.73			0.47
		(-0.66)			(0.36)
Cross-Listing Dummy * US Trading Volume		0.0001			0.00004
		(0.96)			(0.38)
Lambda (Heckman)				0.49	0.76
				(1.48)	(1.44)
Log Assets			0.29***		
			(5.57)		
Sales Growth			0.22		
			(1.24)		
P/E Ratio			0.001		
			(0.22)		
Market to Book			0.02***		
			(2.94)		

Note: Additional variables shown on the following page.

Table IV. Determinants of Use of Equity in US Acquisitions by European Companies (*Continued*)

			Treatment Effects		
	Logit (1)	Logit (2)	Probit	Logit (3)	Logit (4)
French Law			-0.13		
			(-0.40)		
German Law			0.33		
			(0.75)		
Scandinavian Law			-0.25		
			(-0.85)		
Accounting Standards			0.03		
			(1.31)		
Judicial Efficiency			-0.36***		
			(-3.11)		
Liquidity Ratio			-0.30		
			(-0.63)		
Log GNP			-0.62***		
			(-6.46)		
Year Dummies	√	√		√	√
Industry Dummies	√	√	√	√	√
Region Dummies	√	√		√	√
LogL	-519.9	-169.1	-287.4	-106.7	-106.0
Pseudo-R^2	0.09	0.15	0.17	0.18	0.19
N	1474	654	560	560	560

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

logit analysis of the likelihood of equity payment in which the dependent variable takes a value of two for full stock payment, one for hybrid payments, and zero for full cash payment. The interaction term CL_i* log transaction value is positive and significant at the 1% level.

The second robustness test is a tobit regression in which the dependent variable is the percentage of stock used from zero to 100%, with truncation at both limits. The interaction term CL_i* log transaction value remains positive but is not significant at conventional levels.

C. Determinants of Acquisition Premiums

We also conduct an analysis in which we focus on whether cross-listed firms pay smaller premiums after cross-listing or relative to domestically listed peers. We report our results in Table V.

We construct a subsample of our data set when the acquisition target is listed and premium data is available. Doing so leaves us with 285 observations. The dependent variable is the percentage difference between the offer price per share and the stock price at the close of the day before offer announcement. The *t*-statistics are heteroskedasticity-consistent, as in White (1980). We exclude outliers where the premium is less than -10% or more than 100%.

Table V. Determinants of Premium in US Acquisitions by European Companies

In the OLS specifications (1) through (4), the observations are US acquisitions in 1996-2000 made by our sample of European acquirers. We calculate the dependent variable "Percentage premium over market" as the percentage difference between the offer price per share and the stock price one day before offer announcement. We exclude outliers where the premium is less than –10% or more than 100%. An additional subsample in specification (5) includes only cross-listed firms before and after cross-listing. In the probit model, the dependent variable receives a value of one if the acquirer is cross-listed, zero otherwise. Lambda is the inverse Mills ratio as in Heckman (1979), which we calculate by using the probit results. When an acquisition takes place in the year of the cross-listing, the cross-listing dummy takes a value of one only if the cross-listing takes place before the acquisition. We measure log acquirer market capitalization as the natural logarithm of market value in millions of dollars at the beginning of the acquisition year. Toehold is the percentage of equity in the target held by the acquirer before the transaction. The multibidder dummy takes a value of one if there are multiple bidders. Other variables are defined as in Tables III and IV. All significance tests are two-sided. t-statistics are in parentheses below the coefficients. t-statistics are heteroskedasticity-consistent as in White (1980).

Dependent Variable: Percentage Premium Paid Over Market

	OLS (1)	OLS (2)	Treatment Effects			Cross-Listed Subsample
			Probit	OLS (3)	OLS (4)	OLS (5)
Constant	0.27***	0.42***	-12.71*	0.24***	0.11	0.21***
	(17.30)	(5.23)	(-1.90)	(3.03)	(0.38)	(3.41)
Cross-Listing Dummy	-0.003	-0.02		-0.06	-0.04	
	(-0.08)	(-0.59)		(-1.18)	(-0.77)	
Equity Financed Deal Dummy	0.05	0.07		-0.06	-0.03	0.03
	(0.70)	(1.03)		(-0.26)	(-0.52)	(0.44)
Cross-Listing Dummy * Equity Financed Deal Dummy	0.09	0.09		0.27	0.25	
	(0.98)	(0.92)		(1.04)	(1.58)	
Log Acquirer Market Value		-0.01			0.01	
		(-1.40)			(0.53)	
Log Transaction Value		-0.01			-0.001	
		(-1.01)			(-0.07)	
Toehold		-0.001			0.0002	
		(-0.68)			(0.19)	
Multibidder Dummy		0.15*			0.21	
		(1.81)			(1.61)	
Relative Exchange Rate		-0.74***			-0.30	
		(-4.06)			(-1.08)	
144A Private Placement Dummy		-0.003			-0.13	
		(-0.04)			(-1.51)	
Cross-Listing Dummy * US Trading Volume		-0.000001			-0.000005	
		(-0.05)			(-0.51)	

Note: Additional variables shown on the following page.

**Table V. Determinants of Premium in US Acquisitions by European Companies
(*Continued*)**

| | OLS (1) | OLS (2) | Treatment Effects | | | Cross-Listed Subsample |
			Probit	OLS (3)	OLS (4)	OLS (5)
Deal before Cross-Listing Year Dummy						-0.07
						(-0.75)
Deal after Cross-Listing Year Dummy						0.08
						(1.19)
Lambda (Heckman)				0.06	0.08	
				(1.08)	*(1.12)*	
Log Assets			0.16			
			(1.16)			
Sales Growth			1.09			
			(1.03)			
P/E Ratio			-0.01			
			(-1.40)			
Market to Book			0.04			
			(1.51)			
French Law			1.54			
			(1.59)			
German Law			1.32			
			(0.82)			
Scandinavian Law			-0.20			
			(-0.15)			
Accounting Standards			0.09			
			(1.54)			
Judicial Efficiency			0.25			
			(0.80)			
Liquidity Ratio			0.21			
			(0.11)			
Log GNP			-0.02			
			(-0.06)			
N	285	204	99	99	99	96
Adjusted R^2	0.009	0.087		0.017	0.016	0.029
Pseudo-R^2			0.12			

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

However, doing so does not affect the results.

Specification 1 in Table V shows the results of a parsimonious model in which we explain the percentage premium by using dummies for cross-listing and equity finance and their interaction term. The results show no effects significant at conventional levels.

Specification 2 adds deal-specific variables such as log acquirer market value, log transaction value, toehold defined as the percentage owned by the acquirer prior to transaction, and a multibidder dummy. However, the results are weak. The only variables that comes out as significant is the measure of relative exchange rates as in Harris and Ravenscraft (1991) and the multibidder dummy. A positive relative exchange rate measure, indicating that the currency is relatively strong against the dollar, is associated with a lower premium paid. This result is significant at the 1% level. Specifications 3 and 4 include lambda, which lowers the significance level of the exchange rate variable.

Finally, an additional subsample experiment shown as Specification 5 in Table V reports results for cross-listed firms only, before and after cross-listing. However, the results come out as not significant at conventional levels. This may be due to the relatively small sample size: for the premium analysis, both firms need to be listed, which severely restricts our sample size.

D. Additional Experiments

We perform two further, unreported, experiments as to whether the act of cross-listing in itself changes the behavior of companies. These experiments focus on acquisition likelihood and use of equity before and after cross-listing. Results are available from the authors on request.

First, we study acquisition likelihood by constructing a sample of 834 firm-years before and after cross-listing. Evidence from a logit model does not support the idea that cross-listing is followed by a surge in acquisitions. The coefficient for cross-listing is positive but not significant at conventional levels.

Second, we study methods of payment using a sample of 238 acquisitions by cross-listed firms, both before and after their cross-listing. A logit model shows that the likelihood of equity payment is not higher after cross-listing, except perhaps for some weak evidence of a positive association in the year of cross-listing.

Does cross-listing, then, change the behavior of a company in other significant ways? It does appear that after cross-listing, companies start to make larger acquisitions. At the same time, the total proportion of M&A volume that is equity financed increases dramatically. Figure 2 shows how the average size of transactions goes up almost threefold after cross-listing. Prior to cross-listing, 23% of total M&A volume is financed with equity. In years 1-5 after cross-listing 43%, and in years 6 or more after cross-listing 58%, of M&A volume is equity financed.
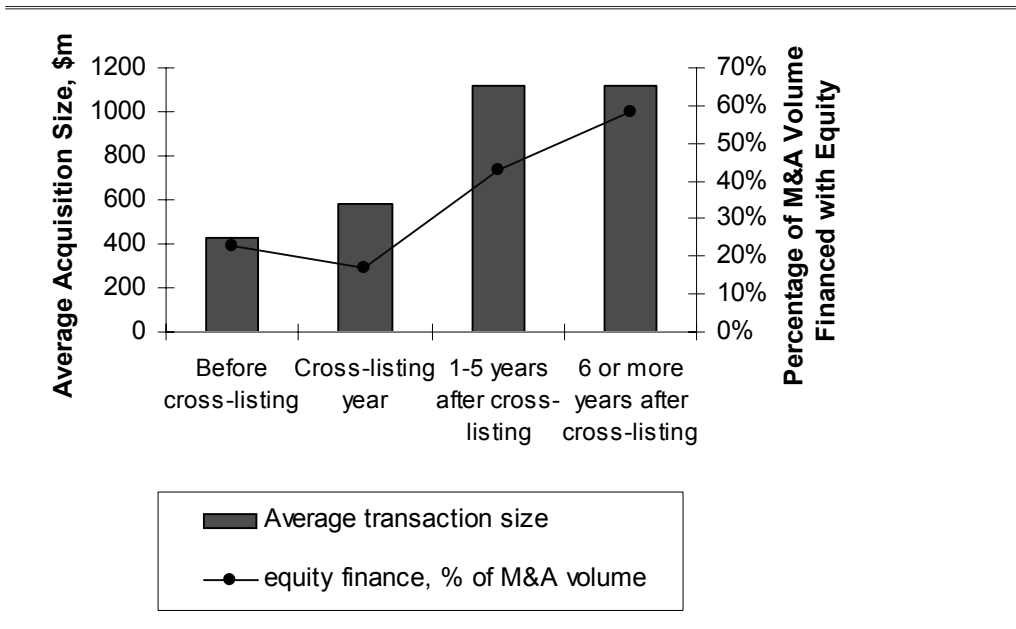
V. Conclusion

We investigate the idea that European companies cross-list partly to obtain a currency for US acquisitions. We find that European firms that cross-list in the US are significantly more likely to acquire US firms than are their domestically listed peers. Once the company is cross-listed, it continues its US acquisitions, but it can now initiate larger transactions. The mean transaction size increases from $427 million before cross-listing to $1,118 million in the first five years after cross-listing.

We interpret these results as evidence that companies that are already active acquirers in the US markets are the ones that choose to cross-list. In the words of Pagano et al. (2002), "When it comes to cross-listing, the most dynamic and outward-oriented European companies self-select in US exchanges." Cross-listings do not cause acquisitions. Rather, increased

Figure 2. Acquisition Size and M&A Volume Financed with Equity

Figure 2 examines changes in acquisition size and M&A volume financed with equity relative to the cross-listing year. The sample consists of US acquisitions made by European cross-listed companies in 1996-2000.

acquisitiveness by European companies in the US markets is likely to be part of that company's wider internationalization process. Local acquisitions and access to the local capital markets through cross-listing are logical steps in this process.∎

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