ABSTRACT

Foreign stock listing in the US has increased dramatically over the past decade, significantly reducing barriers to foreign investment by domestic residents. These declining barriers have led some to claim that optimal international diversification can be achieved using domestically traded stocks. At the same time, global capital markets appear to be more highly correlated. In this paper, we use the available history of foreign stock returns of companies that list in the United States to analyze whether their asset pricing relationships change over time. For this purpose, we use extend the structural time series break methodology of Bai and Perron (1998, 2001) to estimate the cross-sectional breaks in the asset pricing relationships of foreign stocks that list in the US. We then compare these structural asset pricing break estimates with cross-listing dates. While the literature has largely assumed that changes in asset pricing relationships have occurred before or during foreign listings, we find that most occur before stock cross-listings. We also analyze the asset pricing implications of the after cross-listing market, finding an overall increase in betas with respect to the world index after cross-listing. (Also on the agenda, we will use these estimates to calculate the effects of structural changes on welfare gains.)
Global financial markets appear to have become more integrated over the past two decades and, if so, this integration should alter standard asset pricing relationships. Therefore, the effects of global market integration on asset prices are obviously important issues for both policy-makers and researchers. Are equity prices being priced more as an asset in a single world market or are they still priced according to benchmarks from their own domestic country? And if equity markets are evolving towards a common integrated market, what do the effects on asset prices imply about traditional assumptions about the diversification potential of foreign assets?

These general questions are the focus of a large literature spanning both macroeconomic and financial research (see Lewis (1999, 2000) for references.) It is commonly argued that domestic residents do not hold the optimal amount of foreign stocks because there are higher costs to doing so. These costs are usually argued to be one of two kinds: (1) direct transactions costs of going to foreign markets and paying possibly higher taxes and fees; or (2) informational costs of learning about a foreign firm and its growth potential (e.g., Gehrig (1993)).

In this paper, we examine a set of foreign stocks that have significantly lower costs along these two dimensions. In particular, we use a data set with information about foreign companies that cross-list their stocks in the New York stock market through so-called ADR (American Depositary Receipt) programs. Acquiring these foreign stocks is no more costly than acquiring domestic stocks. Moreover, foreign firms that list these stocks on the NYSE must go through the same disclosure requirements as a domestic US firm, including following the same accounting standards. Therefore, these foreign stocks provide at least some of the benefits of foreign diversification but are immune from the standard argument that acquiring stocks from foreign markets are more expensive and have significantly higher information costs. These stocks on domestic markets provide a unique opportunity to directly study the effects of global market integration on asset pricing and on the potentials for gains from international diversification.

For the purpose of this study, we have compiled a data set that includes the stock prices of 327 foreign stocks that are listed on the NYSE in the US and are matched with the available data on the prior history of the stock price in its home market. Our approach allows an examination of the potentially new asset pricing model itself. Based upon the estimated asset pricing model before
and after integration, we can also calculate the welfare gains for international equity markets before 
and after integration through cross-listing.

While our approach is unique, it bears on results from at least three different literatures concerning 
cross-listing of foreign stocks in the domestic US market. The first strand of research concerns 
capital market liberalization. Papers such as Henry (19xx, 200x) examine the impact on local 
stock markets when domestic investors and firms have access to foreign capital. In this 
framework, the stock prices of local firms increase and equity returns fall in response to the access 
to foreign markets. Moreover, its correlation with the foreign stock return increases.

The second strand of research examines the effects on the stock price from the “event” of the 
ADR stock listing in the US. (See the survey in Karolyi (1999)). In this corporate finance-based 
research, the issue of foreign stocks in the US market has been associated with a casual empirical 
observation: the stock price of the parent company tends to exhibit increased covariation with 
the US market after cross-listing.

The third literature takes an asset pricing approach to examining the effects of liberalization as well 
as timing. Bekaert and Harvey (19xx) and Bekaert, Harvey, and Lumbsdaine (200x) use aggregate 
stock returns to examine the liberalization effects in conjunction with macroeconomic variables.

Our study can be seen as combining an asset pricing approach to examining the potential price 
effects suggested in the liberalization literature approach by studying the cross-listing events as in 
the ADR corporate finance literature.

To examine the interaction between cross-listings and shifts in asset pricing relationships, we 
Using standard asset pricing models, we estimate the break dates with confidence bands for each 
foreign company stock providing a cross-section and time-series of break dates. We find that 
contrary to conventional wisdom, a significantly higher proportion of cross listing occur prior to 
the break dates in stocks.
The plan of the paper is as follows. Section 1 describes the basic asset pricing relationships. Section 2 details the data construction process. Section 3 reviews the Bai and Perron estimation method and describes the modifications used in this paper. Section 4 gives the results. Concluding results follow.

Section 1: International Asset Pricing Relationships

To examine the international asset pricing relationships implied by cross-listings, we require an asset pricing model. For this purpose, we use a fairly general approach that fits into various theoretical frameworks. In particular, equity returns in excess of the risk-free rate for a given foreign company $i$ in country $\ell$ depend upon the following relationship:

$$r_{i\ell}^t = \alpha_{i\ell} + \beta_{i\ell} f_{\ell}^t + u_{it}$$

(1)

where $r_{i\ell}^t$ is the return to firm $i$ from country $\ell$ at time $t$, $f_{\ell}^t$ is a vector of factors affecting returns to all firms in country $\ell$ at time $t$, and $\beta_{i\ell}$ is a vector of parameters that value how the factors affect the return; i.e., the “factor sensitivities.” $\alpha_{i\ell}$ is a parameter that measures a constant predictable return in excess of the pricing model and therefore should theoretically equal zero if the factors measure all of the risk characteristics of the model.

Equation (1) can be motivated in several ways. First, in general equilibrium models with complete markets, the vector of factors is given by a single factor that is the marginal rate of substitution in consumption (Hansen and Singleton (1983)). As is well-known, however, this simple “single beta” model has been rejected in many different asset markets. Second, in the international framework when there are restrictions in goods markets so that purchasing power parity (PPP) does not hold, a common factor is the market model but there are additional risk factors arising from the deviations from PPP (Adler and Dumas (1983), Dumas and Solnik (1995)). This foreign exchange risk can be priced independently from the general market risk leading to multiple beta models. In partial equilibrium models where the market return is given, the factor is the benchmark market return. Gomez, et al (2000) have recently developed a general equilibrium model of cross-sectional returns that motivates this CAPM model from micro-foundations.

---

1 See, for example, Bekaert and Hodrick (1990) and Lewis (1991) across stock, bond, and currency returns.
In this paper, we consider the special case where there are two factors: a local factor given by the domestic stock return; and a foreign factor given by either the world market or else the US market. Thus, we take the special case of equation (1) where \( f_t = [r^f_t, r^W_t] \) for \( r^f_t \) defined as the return on the local market and \( r^W_t \) the return on the world market, all in US dollar terms. With these assumptions, equation (1) reduces to:

\[
r^i_t = \alpha^i + \beta^i f^i_t + u^i_t
\]

(2)

For the methodology described below, it will be useful to subsume the superscripts in equation (2), so that the relationship can be written in the more condensed form:

\[
r_t = \delta^i f^i_t + u_t
\]

(2')

where \( \delta \) is the combined parameter vector of alphas and betas for a given foreign company \( i \) from its home country \( \ell \).

Section 2: The Data

In this study, we use weekly stock returns in foreign markets for parent non-US companies that had stocks trading on the New York Stock Exchange in May of 2004. The time period is from January 1970 or the earliest date of availability to May 2004. All return series are measured in US dollars.

The data for this paper were collected in the following steps. Step (1) A data set of all foreign companies with stocks listed on the New York Stock Exchange in the US were obtained from the Bank of New York, the primary custodian bank for ADRs in this country. This set was cross-checked with listings from the NYSE itself and JP Morgan, another ADR custodian bank. All together there were 351 ADRs for 337 parent companies across 41 foreign countries. Step (2) For each of these companies, we collected the following data on Datastream: stock returns in the home market for full available history, market values, and stock return in the US market over the period since cross-listing. Step (3) For each of the countries, the Morgan Stanley market return series were obtained the composite stock market index for the next larger group of countries was used. Step (4) Issue dates for each of the ADRs were obtained from the Citibank data set. This data set provides both the initial date of cross-listing stocks in US markets as well as the initial date of

---

2 This local and world factor model has been commonly used in the international finance literature. See for instance, Campbell and Hamao (19xx) and Bekaert and Harvey (19xx, 19xx) among others assume there are two basic factors – a world and local factor.
capital raising. All parent companies in the sample have initial cross-listing dates, but not all parent companies have raised new capital in US markets. There are 227 foreign parent companies that are listed on the NYSE which have also raised capital in the US.

Section 3: Empirical Methodology

International equity markets are often caricatured as two scenarios. One, global markets are integrated so that global risk factors are priced into domestic stock prices. Two, equity markets are “segmented” into isolated domestic markets. This is the typical approach taken in the welfare gain of diversification literature. See, for example, Obstfeld (1994b) and Cole and Obstfeld (1991). This approach is also taken in the international cost of capital literature as surveyed in Stulz (1999). Some models of international capital market liberalization also condition alternatively on the domestic market and the international market (e.g., Bekaert and Harvey (1995)).

Our approach to quantifying these relationships in the context of individual foreign stocks is to ask take the standard pricing model described above and test for the presence of structural breaks. That is, we consider the possibility that the covariation between the individual stock return and the market factors can change, perhaps as a result of market integration. Rewriting equation (2’) to allow for an arbitrary number of shifts, m, in parameters across regimes, we have:

\[ r_t = \delta_j' f_t + u_t \]  

where \( \delta_j \) is a fixed parameter vector for period j, j = 1, …, m+1 and where the breakpoints, \( T_1, T_2, \ldots, T_m \) are unknowns. Bai and Perron (1998) (hereafter BP) show that the breakpoints can be estimated consistently by minimizing over the sum of squared residuals for all the possible partitions of the number of observations into m+1 different intervals. In other words, \( T_1, T_2, \ldots, T_m \) can be consistently estimated by solving the following minimization:

\[
(T_1, T_2, \ldots, T_m) = \text{argmin}_{T_1, T_2, \ldots, T_m} \sum_{i=1}^{m+1} \sum_{t=T_{i-1}}^{T_i} [r_t - \delta_j' f_t]^2
\]

BP also derive the limiting distribution of these break point estimates along with confidence intervals. We follow BP in using this estimate of the break points. However, instead of estimating the breaks for a single series, we estimate these break points individually across all 327 parent companies in
the sample. To determine the number of break points in each series, we first test for the number of
breaks, m, using a sequential F test of $\tau + 1$ versus $\tau$ breaks for every $\tau = 1$ to 4.\(^3\) None of our series
showed evidence of more than 3 breaks so allowing a maximum number of breaks to be 4 seemed
relatively conservative.

**Section 4: Empirical Evidence of Regime Shifts in Covariation**

*(4.1) The World Market Model Relationships*

We begin our investigation in the spirit of the macroeconomic asset pricing liberalization
literature by focusing on the relationship between each of the foreign country aggregate stock
market returns, $l$, and the world market:

$$r_{lt} = \alpha^l + \beta^l r^w_t + \epsilon_{l,t}, \quad l = 1, \ldots, L \quad (5)$$

To test for the number of breaks, we first conduct sequential F-tests for the number of breaks as
described above. Table 1, Panel A details the results from these tests, broken down by marginal
significance level. For example, the first row reports the results for a 10% marginal significance
level. At this level, 83.3% of the countries rejected the hypothesis of no breaks --- clearly
significantly higher than the 10% that might be expected in a purely random sample.

The box in Panel A reports the proportion of countries rejecting the hypothesis of more than 1
break, 2 breaks, and 3 breaks, respectively. All of the countries rejected the hypothesis of more
than 4 breaks. Going back to the first row, then, at a 10% marginal significance level, 56.7% of
the countries that rejected the hypothesis of no break also rejected the hypothesis of more than 1
break. Thus for an MSL of 10%, the table reports that 56.7% of the countries have evidence of 1
Break, 30% of the countries have evidence of 2 breaks, and 13.3% of the countries have
evidence of 3 breaks. For lower marginal significance levels, the proportion of rejections decline
slightly.

\(^3\) The results were qualitatively similar using other tests for number of breaks such as the Double Maximum Test
described in BP.
TABLE 1: Foreign Country Market Breaks and Initial Cross-Listings

\[ r^l_t = \alpha^l + \beta^l r^w_t + e^l_{t,t}, t = 1, \ldots, L \]

Panel A: Distribution of Break Categories across Marginal Significance Levels

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion of Total 36 Countries Rejecting Ho: No Breaks</th>
<th>Proportional # of Breaks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.833</td>
<td>0.567</td>
</tr>
<tr>
<td>5%</td>
<td>0.806</td>
<td>0.586</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.750</td>
<td>0.667</td>
</tr>
</tbody>
</table>

Panel B: Distribution of Listing Dates to Break Dates for 1 Break Countries

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion of Single Break Countries</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.567</td>
<td>0.706</td>
</tr>
<tr>
<td>5%</td>
<td>0.586</td>
<td>0.706</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.667</td>
<td>0.722</td>
</tr>
</tbody>
</table>

Panel C: Distribution of Listing Dates Relative to Break Dates for 2 Break Stocks

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion of Double Break Countries</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Breaks</td>
</tr>
<tr>
<td>10%</td>
<td>0.300</td>
<td>0.778</td>
</tr>
<tr>
<td>5%</td>
<td>0.276</td>
<td>0.750</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.185</td>
<td>0.600</td>
</tr>
</tbody>
</table>
Two basic patterns are evident from Table 1, Panel A. First, for the sample as a whole there is strong evidence of breaks. The proportion of countries rejecting no breaks is always significantly higher than the MSL. Second, more than half of the countries, ranging from 57% to 67% exhibit evidence of only one break.

Conditional on the number of breaks, the estimator in equation (4) can be used to estimate the date of the breaks together with confidence intervals. Figure 1 depicts these dates as 90% confidence intervals based upon the 5% marginal significance level results above. The vertical axis in Figure 1 gives the date in years. The horizontal axis gives the countries in the order of earliest foreign stock listing to latest.

The confidence intervals for the break dates are given by the crossed error bands. The earliest error band by country (in blue) gives the confidence interval for the first break. For example, the UK appears to have only one break, but it has a very wide confidence interval spanning about 8 years between 1987 and 1995. If the country showed evidence of a second break, the confidence

---

4 We examined the sensitivity of the results to different assumptions about the MSL for the break tests and the confidence intervals. An MSL of 5% together with the 90% confidence intervals appeared to give the most robust results across countries as well as stocks below. Therefore, all of the results in the figures below are based upon these criteria.
interval for this break is given next (in green). If there is a third break, this interval is given as the latest band depicted (in purple). For example, the Netherlands appears to have three breaks: the first around 1979, the second around 1987, and the third around 1997.

All of these results are based upon simply estimating the model without any information about foreign stock cross-listings. In the liberalization literature, the approach has often been to use the earliest date of cross-listing as the point in time when liberalization occurred and the pricing relationship changed. To examine this possibility, we depict the earliest ADR listing date in the US as a red diamond in Figure 1. The earliest cross-listing date in the sample was in 1957 by a UK company, Shell Transport and Trading. The latest country to have a company cross-list was Portugal with a listing by Portugal Telecom in 1995.

Figure 1 shows little evidence that structural breaks occur close to an initial cross-listing dates. Only a few countries have standard error bands that include the listing dates. Also, most of the structural breaks appear to occur significantly after the cross-listing.

Table 1 examines the distribution of listing dates relative to break dates more carefully in Panels B and C. Consider first the case of countries with evidence of a single break in Panel B. For marginal significance levels ranging from 10% to 2.5%, the boxed area shows the proportion of the single break countries with “Listing before Break,” “Listing during Break,” and “Listing after Break.” For all three MSLs, the proportion of those listing significantly before the break was over 70% and of those listing after the break was around 22-23%. Those listing during a 90% confidence interval break only comprised 6%.

A similar break-down for the double break countries is given in Panel C. Here, the evidence shows that a significant majority of the countries have initial listings before any break and the remainder of the breaks occur between the first and second breaks. There are no occurrences of listings during either break interval.

Overall, therefore, it appears that the occurrence of listing either has no effect upon structural breaks in the correlation patterns across markets or else that the breaks are significantly after the cross-listings. However, this evidence corresponds to aggregate stock market behavior. As noted earlier, the corporate finance event study literature has focused upon individual stock returns. Therefore, in the next subsection, we examine the behavior of individual companies.
(4.2) The Two-Factor Parent Stock Return Model and Cross-Listing Dates

We now return to the two-factor model described above. If there are no breaks, the returns depend upon the local stock market return and the world market return as given in:

\[ r_{i\ell}^t = \alpha_i^i + \beta_i^{\ell} r_{\ell}^t + \beta_i^{w} r_{w}^t + e_{i\ell}^t, \quad \text{for } i = 1, \ldots, N; \quad \ell = 1, \ldots, L \]  

(6)

where \( i \) is the index of the parent company and \( \ell \) is the index of the foreign country. Thus, these equations will be estimated for each parent company using local stock market and the world stock market as the factors.

If there are breaks, however, there will be a different parameter vector over each subperiod. In particular, if there are \( m \) breaks, there will be \( m+1 \) sets of parameters so that in our results below, the model to be estimated will be:

\[ r_{i\ell}^t = \sum_{j=1}^{m+1} I(T_i) [\alpha_j^i + \beta_j^{\ell} r_{\ell}^t + \beta_j^{w} r_{w}^t + e_{i\ell}^t] \quad \text{for } i = 1, \ldots, N; \quad \ell = 1, \ldots, L \]  

(7)

where \( j = 1, \ldots, m+1 \) and where the breakpoints, \( T_1, T_2, \ldots, T_m \) are unknowns but are estimated as in equation (4). We will examine the parameters in the next section below. However, here we proceed as with the aggregate stock return model and analyze the number of breaks relative to listing dates.

Table 2, Panel A shows a similar pattern of breaks as in the aggregate data. For the 337 parent companies, the proportion of companies that reject the hypothesis of no breaks is significantly greater than the marginal significance levels. In addition, the boxed area demonstrates that most of the companies show evidence of only one break at between 64% and 75%. Somewhat fewer parent companies have two breaks and very few have three breaks. All of the parent companies reject the hypothesis of more than three breaks.
TABLE 2: Foreign Company Stock Breaks and Initial Cross-Listings

\[ r_{i\ell}^{it} = \alpha_i + \beta_i r_{i\ell}^{\ell} + \beta_{iw} r_{i\ell}^{w} + \epsilon_{i\ell t}, \text{ for } i = 1, \ldots, N; \ell = 1, \ldots, L \]  

Panel A: Distribution of Break Categories across Marginal Significance Levels

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion of Total Rejecting Ho: No Breaks</th>
<th>Proportional # of Breaks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.707</td>
<td>0.641</td>
</tr>
<tr>
<td>5%</td>
<td>0.637</td>
<td>0.712</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.543</td>
<td>0.751</td>
</tr>
</tbody>
</table>

Panel B: Distribution of Listing Dates Relative to Break Dates for 1 Break Stocks

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion Rejecting: Ho - No Breaks and H1 - Breaks &gt; 1</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Break</td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td>0.546</td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td>0.539</td>
</tr>
<tr>
<td>2.5%</td>
<td></td>
<td>0.528</td>
</tr>
</tbody>
</table>

Panel C: Distribution of Listing Dates Relative to Break Dates for 2 Break Stocks

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion Rejecting: Ho - No Breaks and H1 - Breaks &gt; 2</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Breaks</td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td>0.476</td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td>0.447</td>
</tr>
<tr>
<td>2.5%</td>
<td></td>
<td>0.524</td>
</tr>
</tbody>
</table>
Figure 2 illustrates the pattern of asset pricing relationship breaks and the incidence of cross-listings. The vertical axis gives the year while the horizontal axis now gives the foreign parent companies arrayed by the earliest cross-listed company to the latest. Specifically, the earliest listed company was Shell, a UK company in January 1957, and the latest listed company was Stora Enso Oyj, a Finnish company that first listed in the US on January 2004.

While there are more data points in this picture, a similar pattern to the stock market relationships can be seen. Most of the first or single break intervals occur after the first listing date of the company in the United States. To see this a little more clearly, Figures 2a to 2e break this picture down into groups by geographical region. In particular, Figure 2a shows the UK foreign companies. The UK has the largest group of foreign companies trading in the US as well as the longest history of a presence in US markets.
Figure 2b shows the same picture for parent companies in the continental Europe, while Figure 2c shows the results for Asia. Among the Asian companies, the tendency for structural breaks around the time of the Asian crisis in 1998 is pronounced. Figure 2d depicts the results for the companies from Latin America. As the figure makes clear, the first Latin American ADRs were not issued until the early 1990s. Yet again, the structural instability tends to come after this cross-listing. Finally, Figure 2e combines the companies of Australia, New Zealand, and Africa (primarily South Africa and the Middle East).
Figure 2b: European Stock Breaks and Cross-Listing Dates

Figure 2c: Asian Stock Breaks and Cross-Listing Dates
Figure 2d: Latin American Stock Breaks and Cross-Listings

Figure 2e: Australia, NZ and African Stock Breaks and Cross-Listing Dates
Table 2 summarizes the results from the break point distributions relative to the listing dates. Panel B shows distribution for single break stocks. More than 50% of the parent companies listed their stocks in US market significantly before the first structural asset pricing break. Approximately 30% of the companies listed after the break. Only about 15% of the companies listed during the 90% confidence interval estimated as corresponding to the structural break. Panel C shows that the distribution for initial listings in the double break stocks tends to be concentrated before the first break and then pretty evenly scattered thereafter.

(4.3) The Two-Factor Parent Stock Return Model and Capital Raising Events

Some have claimed that capital raising events are different than simple cross-listings. In particular, cross-listings can simply imply that local market stock returns are listed in the US without any new equity being issued. On the other hand, a new issue of equity would generally tend to lower the stock price and increase the firm’s cost of capital, while the event study literature has generally found the opposite.

To consider the possibility of capital raising events, we next exclude foreign companies that have cross-listed in the US, but never raised new equity in the US market. This leaves us with 227 foreign companies currently trading on the NYSE. Table 3 and Figure 3 show the results for this investigation. The results are strikingly similar to the results including cross-listing. In particular, most of the stocks appear to have a single break and cross-listings appear to occur before the first structural asset pricing break.
TABLE 3: Foreign Company Stock Breaks and Initial Capital Raising Events

Panel A: Distribution of Break Categories across Marginal Significance Levels

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion of Total Rejecting Ho: No Breaks</th>
<th>Proportional # of Breaks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.715</td>
<td>0.617</td>
</tr>
<tr>
<td>5%</td>
<td>0.648</td>
<td>0.690</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.525</td>
<td>0.713</td>
</tr>
</tbody>
</table>

Panel B: Distribution of Capital Raising Dates to Break Dates for 1 Break Stocks

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion Rejecting: Ho - No Breaks and $H_1$ - Breaks &gt; 1</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.617</td>
<td>0.620</td>
</tr>
<tr>
<td>5%</td>
<td>0.690</td>
<td>0.613</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.713</td>
<td>0.597</td>
</tr>
</tbody>
</table>

Panel C: Distribution of Capital Raising Dates to Break Dates for 2 Break Stocks

<table>
<thead>
<tr>
<th>MSL</th>
<th>Proportion Rejecting: Ho - No Breaks and $H_1$ - Breaks &gt; 2</th>
<th>Proportion of Initial Listing Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Listing before Break</td>
</tr>
<tr>
<td>10%</td>
<td>0.313</td>
<td>0.500</td>
</tr>
<tr>
<td>5%</td>
<td>0.276</td>
<td>0.500</td>
</tr>
<tr>
<td>2.5%</td>
<td>0.266</td>
<td>0.440</td>
</tr>
</tbody>
</table>
(4.4) The Two-Factor Parent Stock Return Model and Cross-Listing Dates

The behavior of local market returns and the world stock market in Table 1 leads to obvious questions about the individual parent company asset pricing behavior. Are the breaks found in the company stocks simply a by-product of the breaks from the aggregate market return and the world?

To consider this possibility, Table 4 shows evidence of a standard CAPM model in local markets.

\[ r_{it} = \alpha + \beta r_{it} + e_{it}, \quad i = 1, \ldots, N; \quad \ell = 1, \ldots, L \]  

< Discussion of Results here>
TABLE 4: Foreign Company Stock Breaks, Cross-Listings, and Capital Raisings

\[ r^{it} = \alpha^i + \beta^i r^{it} + \epsilon_{it}, \ i = 1, \ldots, N; \ \ell = 1, \ldots, L \]

Panel A: Distribution of Break Categories across Events

<table>
<thead>
<tr>
<th>Events</th>
<th>Proportion of Total Rejecting Ho: No Breaks</th>
<th>Proportional # of Breaks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Break</td>
<td>2 Breaks</td>
</tr>
<tr>
<td>Cross-Listing</td>
<td>0.632</td>
<td>0.644</td>
</tr>
<tr>
<td>Capital Raisings</td>
<td>0.648</td>
<td>0.690</td>
</tr>
</tbody>
</table>

Correlation Results here
Section 5: Asset Pricing Relationships – Is the World More Integrated?

(5.1) The World Model

As we saw above, international cross-listings have tended to occur before the break-dates estimated independently from standard asset pricing models. Moreover, this tendency is relatively robust across models, measures of cross-listings, and degree of aggregation in foreign country returns.

In this section, we examine the underlying estimates from these models to see if they correspond to greater international integration. That is, the presumption in many macroeconomic studies as well as financial market research is that international financial markets have become more highly correlated.

Figure 4 depicts the betas for the world market model. The estimates of beta with respect to the world before the first break are given in the blue columns while the estimates of world betas after the break are given in red. With only a few exceptions, most of the betas are in fact increasing after the break.

<To be continued>
References


