Does Investor Base Influence Stock Comovement?

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ABSTRACT

Recent theory by Barberis and Shleifer (2003) suggests that stock comovement may be related to investor base. The implications of this view of comovement are tested in an international context by examining American Depositary Receipts (ADRs). ADRs are found to comove more with the U.S. market than their parent stocks. Parent stocks, in turn, have greater comovement with the U.S. market than similar foreign stocks traded solely at home. This increased relation with the U.S. market can be traced to the time of ADR listing. Competing explanations for these results are also examined. The country of origin of investor base appears to play an important role in international stock comovement. Further investigated are the implications of these findings for international diversification via ADRs as opposed to direct equity investment in foreign companies.

I. Introduction

This paper examines the role of investor base in explaining stock comovement using American Depositary Receipts (ADRs). I first compare ADRs with their parent stocks, both of which represent claims to exactly the same underlying cash flows with the difference being that they have different investor bases. Second, I compare parent stocks with foreign stocks having no ADRs. I further investigate when the differences occur by examining events accompanying changes of investor base. Economic implications of the results for international diversification are also explored.

This study contributes to two strands of the literature. First, it adds to the ongoing effort to understand the sources of stock comovement. The traditional paradigm argues that, since stock values are solely determined by economic fundamentals, stock comovement must be due to the high correlation of fundamentals. The accumulated evidence, however, indicates not only that some stocks with the same underlying cash flows diverge, but also that some securities' prices comove much more than can be justified by their economic fundamentals.

Such evidence includes the following. Froot and Dabora (1999) discover that “Siamese twin” companies, which split the same cash flow at an agreed proportion, deviate from each other, and they are more closely related to respective trading markets. Pindyck and Rotemberg (1990, 1993) report excessive comovement among mostly independent commodity prices and stock returns even after controlling for macro-economic and unobserved latent variables. Lee, Shleifer and Thaler (1991) show that individual investors, as major shareholders of closed-end funds, induce not only comovement across fund discounts, but correlation between fund shares and small stocks. Hardouvelis, La Porta and Wizman (1994) and Bodurtha, Kim and Lee (1995) demonstrate that, irrespective of net asset values determined overseas, share prices of closed-end

country funds are affected by the U.S. market. Additionally, Chan, Hameed and Lau (2003) find that, while the business location and operation of the Jardine group remain essentially the same, the change of its primary trading location from Hong Kong to Singapore significantly weakens its relation with the Hong Kong market and substantially strengthens its relation with the Singapore market.

This paper proposes a new explanation for international stock comovement based on the paradigm of Barberis and Shleifer (2003). They postulate that, if investors categorize stocks and make investment decisions on a group basis, and if the supply shock from selling a group of stocks drives down the prices of the whole group, then these stocks would comove more than can be justified by their economic fundamentals. Similarly, buying stocks in groups and the ensued demand shock move up the prices of the entire group. Hence, stocks in the same category are more highly correlated with each other than can be explained by their fundamentals.

I hypothesize that, since stocks traded in one country are perceived as one category and stocks in the same category comove more, non-U.S. stocks should commove less with the U.S. market than U.S. stocks, i.e., investor base should influence stock comovement. Since ADRs, their parent stocks and comparable foreign stocks without ADRs possess different investor bases, they are anticipated to demonstrate different degrees of comovement with the U.S. market. Indeed, using a large sample of 1,440 ADRs from 44 countries over the period from 1973 to 2002, I uncover that: (1) compared with their parent stocks, ADRs have significantly larger comovement with the U.S. market; (2) relative to foreign stocks having no ADRs, parent stocks comove significantly more with the U.S. market; (3) the large comovement between parent stocks and the U.S. market can be attributed to the change of investor base arising from ADR

listing; and (4) relative to ADRs, parent stocks provide larger diversification benefits for U.S. investors and home-matched stocks enhance even greater risk reduction than parent stocks.

The importance of investor base and the empirical findings distinguish this paper from closely related research. Barberis, Shleifer and Wurgler (2003) provide empirical support for Barberis and Shleifer (2003).[1] They find that, upon a stock's inclusion into the S&P 500 index, its beta increases significantly; for a stock being eliminated from the index, its beta drops substantially. My study differs from Barberis, Shleifer and Wurgler (2003) in an important way in that it demonstrates the significance of investor base in producing international stock comovement. This study also sheds light on the country and industry debate. Roll (1992) attributes the correlation of international stock returns to industrial composition. Both Heston and Rowenhorst (1994) and Griffin and Karolyi (1998) conclude that country effect dominates industry aspect. This paper uncovers a new element of investor base in producing international stock comovement.

This paper also adds to the ADR literature in several ways. First, to my knowledge, this is the first paper that measures, on a global basis, ADRs and parent stocks at the same time to preclude the influence of time zone and to facilitate circumventing the imprecision of beta estimation. This is accomplished through employing the intra-daily data for ADRs from the Trade and Quote (TAQ) database. Second, previous research documents the efficiency of the ADR market (e.g., Rosenthal (1983), Kato, Linn and Schallheim (1992) and Webb, Officer and Boyd (1995)), which implies that ADRs and their parent stocks should load similarly, if not identically, on the U.S. market. The comparison of ADRs and their parent stocks reveals, however, ADRs load significantly more on the U.S. market, and this challenges previous research.

[1] Greenwood and Sosner (2002) document similar phenomena for the Nikkei index.

Third, there is no consistent evidence on the relation between parent stocks and the U.S. market upon ADR listing. Foerster and Karolyi (1993) show that Canadian cross-listings exhibit an insignificant drop of the local beta. Jayaraman, Shastri and Tandon (1993) document an insignificant decrease (increase) of the local (U.S.) beta for a sample of non-Canadian cross-listings. Karolyi (1998) finds that home market betas unanimously decrease for all the regions examined, but the U.S. beta increases for Australian and continental European firms, and decreases for Canadian, Asian and the U.K. firms. Foerster and Karolyi (1999) report a significant decrease of the local beta and no significant change of the global beta.[2] Miller (1999) accounts for such beta changes while examining the valuation effect of ADR listing. I shed light on the contrasting evidence of beta changes by examining a unique data set. Fourth, previous research leaves out ADR de-listing events and this paper provides evidence in that regard and offers an explanation.

Lastly, it has been advocated that ADRs enhance portfolio returns and reduce risk. Among others, Officer and Hoffmeister (1987) demonstrate that ADRs provide diversification benefits for pure U.S. stocks. Wahab and Khandwala (1993) further show that, even relative to their parent stocks, ADRs enhance risk reduction without sacrificing return benefits. Bertolotti and Enyeart (1995) and Karolyi and Stulz (1996) find that a portfolio of ADRs follows the market index of their country of origin quite well. Errunza, Hogan and Hung (1999) conclude that a combination of multinational corporation stocks, country funds and ADRs is sufficient to mimic foreign indices and provides virtually the same benefit as investing abroad.[3] However, to

[2] Focusing on measuring the cost of capital in the long run, Errunza and Miller (2000) show an insignificant decrease (increase) of the local (world) beta. More generally, Bekaert and Harvey (1997) show that following market liberalization, countries are more affected by the world. Patro and Wald (2002) demonstrate that market liberalization induces decreased (increased) local (world) market beta at long horizons (-43 to -7 months pre-liberalization and 6 to 41 months post-liberalization).

[3] Bekaert and Urias (1996) show that, although U.K. closed-end country funds offer diversification benefits, U.S. country funds do not.

the extent that individual stocks can move quite differently from the market index and that it is more practical for individual investors to use ADRs, rather than all kinds of securities available, to diversify, it remains substantive to ascertain the relative benefits of diversifying via ADRs vs. foreign stocks purely traded at home. This paper fills that void.

The remainder of the paper proceeds in the following manner: Section II motivates the study; Section III describes the data; Section IV performs empirical analyses; Section V investigates competing explanations; Section VI explores the implications of the results for international diversification; and Section VII summarizes.

II: Motivation

Additional interesting evidence on stock comovement has recently emerged. Froot and Dabora (1999) examine three pairs of "Siamese twin" stocks, which represent proportional claims on the same cash flows. They find that the log deviations from price

parity range from approximately -40% to 20%. Although a stock's inclusion into the S&P 500 index reveals nothing not previously known to the market, Barberis, Shleifer and Wurgler (2003) present evidence that a stock's inclusion into (deletion from) the S&P 500 index induces a stronger (weaker) relation between the stock and other component stocks of the index. Greenwood and Sosner (2002) find similar results for the Nikkei index. Chan, Hameed and Lau (2003) observe that, with business operation unchanged, the change of trading location for the Jardine Group from Hong Kong to Singapore significantly decreases (increases) its relation with the Hong Kong (Singapore) market.

It is difficult to reconcile such evidence with the traditional paradigm of stock comovement. The traditional view argues that, since stock prices are completely determined by

their economic fundamentals, the comovement between stocks should be solely ascribed to their fundamentals. However, economic fundamentals for "Siamese twin" companies are proportional, and discount rates in different markets can only explain part of the large disparity between twin companies. Barberis, Shleifer, and Wurgler (2003) show that the excessive comovement between a stock and the rest of the S&P 500 index remains even after controlling for cash flow differences. In the case of the Jardine Group, cash flows remain unchanged.

Most recently, Barberis and Shleifer (2003) propose an explanation relying on the practice of investing on the basis of category: if investors categorize stocks and make investment decisions on a group basis, and if such trading moves prices, then stocks in the same category will be more highly correlated with each other than can be explained by their fundamentals.

This paper contrasts the traditional view that fundamentals drive stock comovement with the view proposed by Barberis and Shleifer (2003) in the context of investor base. On one hand, the products of portfolio managers demonstrate that investors regard stocks traded in the U.S. as one category. Barberis and Shleifer (2003) suggest that stocks in the same category should exhibit larger comovement than stocks in different categories. Hence, I conjecture that ADRs, intrinsically foreign and traded in the U.S., should comove more with the U.S. market than stocks traded outside the U.S. should. In particular, ADRs' parent stocks are of interest, as they represent claims to the same cash flows as ADRs', but they trade in different countries and thus belong to different categories. As a result, ADRs and their parent stocks should demonstrate different degrees of comovement with the U.S. market. To put the above together, having an investor base in the U.S. should influence the stock's comovement with the U.S. market.

On the other hand, the traditional view of comovement indicates that ADRs and their parent stocks should have similar comovement with both the home and the U.S. markets,

because their fundamentals are identical. Although it is possible that different market mechanisms and settling procedures may result in different prices between ADRs and their parent stocks, one might expect that efficient arbitrage should realign one price with the other within some no-arbitrage band.

If investor base truly affects stock comovement, then when stocks experience changes of investor base in the U.S., their comovement with the U.S. market should change as well. ADR listing is an event when the parent stock switches from pure domestic investor ownership to partial foreign ownership in the U.S. This enlarged investor base should generate an increased relation between the parent stock and the U.S. market. The converse should hold for ADR de-listing.

One alternative argument is that, if foreign firms listed in the U.S. happen to have certain characteristics in common with U.S. stocks and those characteristics are associated with some cash flow factor, then the aforementioned increased comovement may also emerge. However, if it is investor base, rather than characteristics, that drives comovement, one would expect to see that, compared with parent stocks, foreign stocks exhibiting similar characteristics and having no ADRs should demonstrate significantly smaller comovement with the U.S. market.

Another possibility for increased comovement after ADR listing is that, after ADR listing, local market becomes integrated with the U.S. market, hence parent stocks comove more strongly with the U.S. market. If this argument holds, then one would also observe a stronger relation between parent stocks and non-local non-U.S. market. Subsequent sections perform empirical analyses to examine the role of investor base in explaining stock comovement and evaluate competing explanations.

III. Data

This paper utilizes a large set of ADRs compiled from Datastream. As a result of favorable disclosure and capital requirements, Canadian firms typically choose to list in the U.S. directly; Canadian cross-listings are hence procured separately from foreign equities listed in the U.S. For exposition convenience, ADRs and direct listings are collectively called ADRs henceforth. Daily and weekly stock return index, unadjusted price, market capitalization, volume, conversion ratio between an ADR and its parent stock, local and U.S. market return indices are extracted from Datastream. Part of the analyses uses price series for ADRs obtained from the Trade and Quote (TAQ) database. Following the convention of the literature, ADRs are required to be the first listing in the U.S. To identify parent stocks for ADRs, all equities in respective home countries are obtained, including both currently listed and de-listed firms. Two types of ADRs are eliminated from the sample: (1) ADRs whose parent stocks can not be identified; (2) ADRs whose parent stocks do not trade in home country - this is intended to better measure the relation between parent stocks and their local markets. For each ADR, its listing (de-listing) date is defined as the first day that Datastream starts (ceases) to carry it.

Table I describes the data. There are 1,440 ADRs from 44 countries over the period from 1973 to 2002.[4] Canada is the leading country having 342 cross-listings in the U.S., followed by 164 from the U.K., 143 from Japan and 105 from Australia. The sample has a broad coverage of continents as well as industries, 37 industries in all, where mining has the largest number of ADRs, 138, followed by 99 from oil and gas, and 96 from telecom services. The exchange distribution reveals that 721 ADRs, almost exactly half of the sample, trade over the counter. About a third, 421, trade on NYSE, followed by 257 on Nasdaq. More strikingly, the numbers of

[4] In subsequent analyses, certain number of return observations are required for regression analyses and, as a result, the number of ADRs decreases.

ADRs in three ten-year periods demonstrate a rapid growth trend over time: from 92 in 1970s, to 173 in 1980s, then to 1173 listings in the most recent decade.

IV. Empirical Analyses

This section analyzes the role of investor base in explaining stock comovement in three parts. The first part examines the comovement with the U.S. market for three types of stocks: ADRs, foreign stocks having ADRs and foreign stocks having no ADRs. The second part investigates if the change in investor base stemming from ADR listing influences the comovement between parent stocks and the U.S market. The third part performs similar analyses for ADR de-listing.

A. Investor Base and Comovement

If investor base influences stock comovement, then this effect should manifest itself among similar stocks that have different investor bases. I focus on three types of stocks exhibiting such features: ADRs, foreign stocks having ADRs and foreign stocks having no ADRs. While ADRs trade mainly among U.S. investors, their parent stocks, representing claims to exactly the same cash flows, are by and large held by investors overseas. Granting that assets having the same economic fundamentals should be related to each other to some extent, foreign stocks having ADRs differ from foreign stocks having no ADRs in that they are linked with the U.S. market.

A.1. ADRs vs. Parent Stocks

I first compare ADRs and their parent stocks at various horizons. The comparison at one-year horizon is carried out as follows: the common existing period for each ADR and its parent stock is determined first. To account for possible time zone effect, Wednesday-to-Wednesday

weekly stock returns, local and U.S. market returns are used from August 1, 2001 to July 31, 2002. For each ADR and its parent stock i, at least 20 weekly observations are required in three variants of the following regression:

$$R_{i,t} = \alpha_i + \beta_{i,Local} R_{Local,t} + \beta_{i,US} R_{US,t} + e_{i,t}, \quad (1)$$

where $R_{i,t}$ is the return on the ADR or its parent stock; $R_{Local,t}$ and $R_{US,t}$ are contemporaneous value-weighted local and U.S. market returns respectively.[5] The differences of $\beta_{i,Local}$, $\beta_{i,US}$ and adjusted R^2 between ADRs and their parent stocks are computed as ADRs' values minus parent stocks' counterparts. Country and regional averages are taken across all stocks applicable. Different degrees of comovement with the U.S. market should emerge as different coefficients on the U.S. market index. Similar analysis is also performed at longer horizons from two to five years.

Table II reports regional results for one-, three- and five-year regressions. Two- and four-year results are similar and are omitted to conserve space. As can be seen from the table, ADRs have significantly larger U.S. betas and substantially smaller local betas than their parent stocks, and as suggested by Barberis and Shleifer (2003), controlling for local market provides a cleaner measure of investor sentiment and produces stronger results. For instance, in the univariate setting at three-year horizon, ADRs overall have a local (U.S.) beta of 0.79 (0.56), which is significantly smaller (larger) than their parent stocks by 0.07 (0.05). After controlling for local markets, the difference increase to 0.16 (0.14). The reason that the numbers of ADRs and parent stocks are different is because, although they are uniquely matched with each other, they do not necessarily have the same number of return observations during regression periods. A stock is

[5] To account for the high correlations between the U.S. and some local market returns, I regress local market returns on U.S. market returns and use the residual as local market returns to conduct the analysis. I also use the residual from regressing U.S. market returns on local market returns to repeat the analysis. Neither qualitatively changes the results.

dropped if it fails to have the required number of observations (e.g., 60 weekly observations for three-year regressions). The same reason holds for all subsequent analyses. Overall, the results indicate that, despite the fact that ADRs and their parent stocks have the same economic fundamentals, the difference in investor base induces very different degrees of comovement with the U.S. market: ADRs are more (less) related to the U.S. (local) market than their parent stocks. The evidence is consistent with the theory of Barberis and Shleifer (2003) and the conjecture that investor base influences stock comovement.

Table III provides detailed bivariate results country-by-country for three-year regressions. To conserve space, the results reported and associated discussion hereafter will be on bivariate regressions. Relative to their parent stocks, ADRs exhibit a significantly smaller comovement with local markets by a significant 0.16 and this phenomenon exists in 32 out of 42 countries (76.2%). The relation between ADRs and the U.S. market is significantly stronger than between parent stocks and the U.S. market by a significant 0.14 and this is true in 35 out of 42 countries (83.3%). Such results indicate that different degrees of comovement are not driven by individual outliers and are indeed pervasive across countries.

A.2. ADRs vs. Parent Stocks: Further Investigation

Although weekly data is analyzed in order to circumvent time zone effect and to estimate beta as precisely as possible, it remains plausible that such control cannot comprehensively preclude the contamination of the results. This section further addresses this issue.

Ideally, the price and return series are measured at exactly the same time for both ADRs and their parent stocks, which will completely eliminate the influence of different time zones. Since prices and return series for parent stocks available from Datastream are measured at the end of trading day, measuring their ADRs' prices at the same time requires the foreign market

closes within U.S. trading hours. Such data is available through the Trade and Quote (TAQ) database. The other possibility is for foreign markets that close later than the U.S. market, obtain ADRs' prices at the end of U.S. trading day and compare them with contemporaneous parent stock prices. Unfortunately, the unavailability of such data renders the analysis impossible for now. I will solely focus on the intra-daily data for ADRs.

The data is compiled in the following procedure. Requiring overlapping trading hours excludes Asian, Australian, some European and African markets from the sample. Further requiring foreign markets closing no later than the U.S. market further eliminates parent stocks on Alberta exchange, resulting a sample covering Canada, Mexico, South Africa and nine European countries.

For ADRs with parent stocks in each included market, bid and ask price and quote condition are obtained from TAQ for a 15-minute window ending at the time corresponding to foreign market close. The latest price during that window are used to match with parent stock price. To filter data errors, bid price is required to be at least as high as ask price and both are required to be positive. Quote condition is required to be normal in order to eliminate confounding forces. Ask prices are used to form return series for ADRs. Similarly, closing prices are extracted from Datastream to produce returns for parent stocks. Such ensued daily return series should be immune from time zone effect. Subsequent analysis is analogous to the weekly analysis described in the previous section.

Table IV presents the results. Interestingly, even when the time zone effect is controlled for, relative to their parent stocks, Canada cross-listings still demonstrate a weaker relation with the Canadian market and a significantly stronger comovement with the U.S. market, by 0.05 and 0.12 respectively. For the other America country, Mexico, an analogous phenomenon exists. In

all nine European countries except Germany, ADRs systematically comove less with local markets; with the only exception of Norway, they all exhibit stronger relation with the U.S. market. On a global basis, compared with their parent stocks, ADRs significantly underperform in the strength of the relation with local markets and outperform when it comes to the U.S. market.

In sum, regional and country results at both low and high frequencies indicate that ADRs have bigger (smaller) comovement with the U.S. (home) market than their parent stocks. I next conduct an analogous comparison for parent stocks and comparable foreign stocks without ADRs.

A.3. Parent Stocks vs. Similar Foreign Stocks Without ADRs

Another way to examine the relation between investor base and comovement is to compare foreign stocks having ADRs to similar foreign stocks solely traded at home. This comparison is conducted by first matching each parent stock with a similar stock at home in the following way: find both the date when the size of the parent is first available
and the date closest and prior to January 1, 2000 when its size is available. On the later of these two dates, compare the parent stock with all stocks in the same industry and country based on size. The one that has the smallest magnitude of size difference with the parent stock is designated as the home-matched stock. The rest of the comparison is carried out in a manner analogous to that between ADRs and their parent stocks.

Table V displays the results. Compared with their peers, parent stocks have a significantly stronger relation with the U.S. market, and this holds in 28 out of 39 countries (71.8%). What appears puzzling is that parent stocks also have significantly larger local betas than their counterparts, by 0.12. Several possible reasons emerge. One could be that, as

previously shown, ADRs and parent stocks are not aligned very well, so the trading in the U.S. may not transmit to the local market perfectly, which hinders one from discovering the role of investor base in explaining comovement. To investigate this possibility, I use ADRs that are frequently traded, which should be better aligned with their parents. These ADRs are identified by requiring ADRs to have at least an average of 90% of their parent stocks' volume. The results in 24 markets worldwide show that although parents do not differ from their peers in terms of their relation with local market, they significantly comove more with the U.S. market. This result potentially debilitates the arbitrage argument for the difference, as these frequently stocks are conspicuous and if anything, arbitrage should be most effective in immediately eliminating the difference.[6]

Overall, analyzing the comovement for three types of stocks reveals that ADRs significantly comove more with the U.S. market than their parent stocks, which in turn have greater comovement with the U.S. market than similar foreign stocks having no ADRs, a finding consistent with both Barberis and Shleifer (2003) and the conjecture that investor base influences stock comovement.

B. Comovement Change Around ADR Listing

This section further evaluates the role of investor base from a time-series perspective. If as the previous section documents, greater investor base in the U.S. increases the comovement between parent stocks and the U.S. market, then the enlarged investor base in the U.S. arising from ADR listing should induce parent stocks to comove more with the U.S. market.

To investigate this notion, for each ADR listing i, I run the following regression for the parent stock before and after the listing event:

[6] Some ADRs are intended to raise capital in the U.S., and if the capital is used to develop the business in the local market, then it is reasonable to observe stronger relation between parent stocks and the local market.

$$R_{i,t} = \alpha_i + \beta_{i,Local}R_{Local,t} + \beta_{i,US}R_{US,t} + \beta_{i,D}D_t + \beta_{i,DLocal}D_tR_{Local,t} + \beta_{i,DUS}D_tR_{US,t} + \varepsilon_{i,t}, \quad (2)$$

where D_t is the dummy variable that takes the value of 1 if the day is in the post-listing period and zero otherwise. If investor base is influential, then the change of comovement measure $\beta_{i,DUS}$ should be significantly positive. Regression windows are 100 to 200 days prior to and after the listing. The reason that the regressions start 200 days pre-event is because, as explained in Foerster and Karolyi (1999), there is an average gap of 70 days between announcement and listing dates, and 20% of their sample (9 out of 45) has a difference that is more than 100 days. To be conservative, I skip 100 days immediately prior to listing. Starting from 100 days post-event allows U.S. investors some time to learn the newly-listed foreign companies and then trade on them. For this 200 days regression window, at least 120 observations are required and at least 40% of observations should be from post-listing. Country and regional averages are computed across all events applicable.

The results are reported in Table VI. During the post-listing period, parent stocks become more correlated with the U.S. market by a significant 0.06. Their relation with local market does not change much over 200 days horizon; together with the increase in Table V, it appears that parent stocks develop stronger liaison with local market over time, which is plausible as it involves business plans and implementation to enhance the company's financial position and market influence.

Overall, analyzing the change of investor base around ADR listing is supportive of the conjecture that investor base matters for stock comovement: foreign stocks experiencing enlarged investor base in the U.S. have greater comovement with the U.S. market.

C. Comovement Change Around ADR De-listing

In the spirit of examining ADR listing, I argue that, when an ADR is de-listed, naturally accompanied by a decreased investor base in the U.S., its parent stock ought to demonstrate decreased comovement with the U.S. market.

Table VII examines this notion by applying the methodology for ADR listing to all available de-listing events. Since some ADRs are de-listed because the underlying firms fail to satisfy regulatory requirements of either the Securities and Exchange Commission or the listing exchange, the relation between these ADRs and the U.S. market may have started to decrease even prior to de-listings. To reduce this bias, I measure the comovement 100 days prior to de-listings. The reason to start 100 days after de-listings is to account for the possibility that some parent stocks may de-list not long after their ADRs are de-listed, whereby their returns have already been insensitive to the U.S. and/or the local market. The results in Table VII demonstrate that, on average, parent stocks lose the exposure to the U.S. market and strengthen their relation with the local market.

One reason that neither of these changes is significant could be due to the delinkage of parent stocks from the U.S. market, which starts earlier than the regression period. As a matter of fact, for frequently traded ADRs that have 20% trading volume of their parents during 200 to 100 days before de-listing, their local beta increases by 0.38 with a significant t-statistics of 4.38.

In a nutshell, compared with their listing counterparts, de-listing results are not as strong, which stems from the inactivity of ADRs. However, the direction of the changes is evidence for the conjecture that investor base does affect stock comovement. These results extend the literature by revealing and explaining beta changes around ADR de-listing: the U.S. beta decreases, which can be attributed to the changes of investor base.

V. Competing Explanations

The results that have been established so far are that, after foreign stocks start to trade in the U.S. market, the increased investor base in the U.S. leads to more comovement with the U.S. market. The reasons are, as Barberis and Shleifer (2003) argue, some U.S. investors regard domestically traded securities as one style and stocks in one style comove more than stocks in different styles.

Two potential stories can also deliver the above results. One is that, upon ADR listing (de-listing), its parent stock becomes integrated with the U.S. market and that leads to the observed increase of the comovement with the U.S. market. The other is that foreign firms listed in the U.S. share some characteristics with U.S. stocks, and if those characteristics are associated with some cash flow factor, the commonality of such factors move the prices of parent and U.S. stocks simultaneously, which induces the increased comovement between parent stocks and the U.S. market in post-listing period. Industry and size are such characteristics. I will in turn examine these two alternatives.

A. Integration

To distinguish investor base from market integration, I include non-local non-U.S. market returns as an additional regressor. The idea is that with zero shareholder base in the non-local non-U.S. market both before and after ADR listing, investor base argument predicts no change of the relation between parent stocks with other non-local non-U.S. market. On the other hand, the integration argument holds that, if beta changes are from the integration of the local market with the U.S. market, then given the U.S. market integrates with some other markets, the relation between parent stocks and non-local non-U.S. market should increase as well. The converse applies to ADR de-listing.

As can be seen from Table VIII, upon ADR listing, parent stocks worldwide persistently demonstrate an increase of the U.S. beta even in the presence of other markets. More importantly, the relation between parent stocks and other non-local non-U.S. markets slightly decreases, rather than increases as predicted by the integration argument. Similarly, the results from de-listing in Table IX also demonstrate that the loss of the U.S. investor base does not materially change the relation between parent stocks and other non-local non-U.S. markets.

B. Characteristics

To examine the role of industry and size in comovement, the parent stock of each ADR is matched with a stock in the same country, industry and size group in the following way: find the size of the parent stock exactly one year prior to its listing date if available. Otherwise, go back in time until its size becomes available. On the same day, obtain the size of all firms in the same country and industry, and delegate the one with the smallest magnitude of size difference with the parent stock as the home-matched stock. The same procedure applies to de-listing events.

If it is investor base, rather than characteristics, that drives comovement, one would expect to see that beta changes before and after ADR listing should be bigger for stocks having ADRs than for stocks exhibiting similar characteristics but having no ADRs. Hence, previous analysis for parent stocks around listing is performed for each matched stock. Because certain number of return observations is required for regression analysis, some home-matched stocks drop out. The left-hand side of Table X reports comovement changes before and after ADR listing for parent stocks, which overall is -0.23 for the local beta and 0.34 for the U.S. beta. The differences of beta changes between parent stocks and their home-matched stocks are of interest and reported on the right-hand side of the table. As can be seen, the differences are -0.26 for the local beta and 0.42 for the U.S. beta.

As in earlier sections, the analysis for de-listing events reported in Table XI provides consistent evidence: upon ADR de-listing, parent stocks experience an overall decrease (increase) in the U.S. (local) beta of 0.26 (0.42). More importantly, these changes are substantially different from those for home-matched stocks: the change of U.S. (local) beta for parent stocks is lower (higher) than that of their matched stocks by a significant 0.29 (0.42). Both listing and de-listing analyses for parent and matched home stocks confirm that characteristics do not generate observed comovement.

To sum up, examining competing explanations illustrates that neither certain characteristics nor integration drives comovement. Rather, it is the change of stock ownership and investor base that is behind the phenomenon. Next, I turn to examine the economic and practical implications of the results for international diversification.

VI: Economic Implications

To the extent that correlation determines the potential for diversification, the larger comovement with the U.S. market for ADRs than for both parent stocks and similar foreign stocks without ADRs casts doubt on the common practice of using ADRs to diversify. This section addresses this issue.

It has been advocated that ADRs enhance portfolio returns and reduce risk. Officer and Hoffmeister (1987) provide evidence that including as few as four ADRs with four U.S. stocks decreases portfolio risk exposure by 20% to 25% without losing any return benefits. Wahab and Khandwala (1993) refine and extend Officer and Hoffmeister (1987) by changing the number of ADRs included and the weight of U.S. securities. Comparing the benefits of using ADRs vs.

their respective parent stocks to diversify, they show that with similar portfolio returns, ADRs offer better risk reduction

than their parent stocks. Bertolotti and Enyeart (1995) use daily returns to analyze how closely a portfolio of ADRs can track an index of the domestic market stocks. Although ADRs and the composition of local market index are not destined to be similar, they find the tracking error is quite small. Karolyi and Stulz (1996) detect from intra-daily data that a portfolio of Japanese ADRs mimics the Nikkei 225 index fairly well.

Although the evidence on the benefits offered by ADRs for diversification amasses, to my knowledge, no paper so far has examined the relative advantage of diversifying using ADRs versus similar foreign stocks purely traded at home, which is particularly relevant in the light of the results documented in earlier sections. This is an important comparison for portfolio managers and individual investors.

In the mean time, researchers have been examining the relative importance of country and industrial composition in international diversification. Most notably, Roll (1992) present evidence that industrial structure is the driving force behind diversification. Similar to the findings in Heston and Rowenhorst (1994), Griffin and Karolyi (1998) demonstrate diversifying across countries is advantageous to across industries.

To carry out such a comparison, I rely on the observation that for a large portfolio, its variance is determined by average stock variance and average stock co-variance among those stocks, which can be approximated by the variance of an equal-weighted index. To estimate average stock variance, I first obtain daily returns for all U.S. stocks from CRSP over the period from January 1, 2000 to December 31, 2002. At least 120 days of returns are required to be available, resulting in 7096 stocks. Return variance is computed for each stock and then averaged

across stocks. This procedure is repeated for parent stocks and other foreign stocks. Average stock variance is the mean of variance across these three types of securities.

For market indices, I use CRSP equal-weight market returns for the U.S. and the global index and ADR index of Bank of New York available in Datastream. As there is no index for parent stocks readily available, I select representative parent stocks to construct equal-weighted index. The same applies to home-matched stocks. For each of these five series, returns and associated variances are computed from January 1, 2000 to December 31, 2002.

Figure 1 depicts the diversification results for various combinations of stocks. If the investor is able to purchase any type of stocks worldwide, the diversification limit of this strategy is 8.43% of average stock variance. With the constraint of investing in the U.S. and ADRs, one can only achieve 23.85% of average stock variance. Replacing ADRs with parent stocks reduces the limit to 17.03% of average stock variance and this is consistent with previous results that parent stocks move less with the U.S. market than their ADRs and hence possess greater diversification potential. Ultimately, combining U.S. stocks with foreign stocks solely trade at home produces greater benefit to the limit of 13.86% of average stock variance, a finding consistent with earlier conclusion that parent stocks have a higher correlation with the U.S. market than their home-matched peers.

Overall, this section complements previous research on international diversification in the light of stock comovement. Home-matched stocks appear to be more instrumental in international diversification than ADRs and their parent stocks. A warning is in order: as the analysis conducted here simplifies the reality by leaving out transaction cost, exchange rate considerations, etc., it provides an upper bound for the benefit of using home-matched stocks to diversify.

VII. Summary

This paper examines if investor base influences international stock comovement in the light of the theory by Barberis and Shleifer (2003). They propose that the simplicity and popularity of allocating investment across categorized stocks induces more return comovement than can be justified by the variation in cash flows. Since stocks traded in one country are regarded as one category, I conjecture that ADRs and their parent stocks should have different degrees of comovement with the U.S. market, i.e., investor base should influence stock comovement.

These relations are investigated using a large spectrum of ADRs from 44 countries over the period from 1973 to 2002. Consistent with the conjecture, I find that investor base does influence stock comovement as evidenced by the facts that: ADRs comove more with the U.S. market than their parent stocks; parent stocks in turn have larger comovement with the U.S. market than similar foreign stocks purely traded at home; and that, following the increase (decrease) of investor base in the U.S. upon ADR listing (de-listing), parent stocks show increased (decreased) comovement with the U.S. market, a finding robust to country, industry and size.

The economic magnitude of the correlation between ADRs and the U.S. market index has implications for portfolio diversification. To the extent that correlations between returns determine the potential for diversification, the larger comovement with the U.S. market for ADRs than for their home-matched stocks potentially reduces the benefit of the common practice of diversifying via ADRs. The analysis demonstrates that, parent stocks are indeed more instrumental in reducing risk than ADRs; foreign stocks with similar characteristics but not listed in the U.S. further surpass parent stocks in this respect. Such finding suggests that U.S. investors

intending to use ADRs and/or their parent stocks to diversify internationally should reconsider their strategy.

REFERENCES

Alexander, Gordon J., Cheol S. Eun, and S. Janakiramanan, 1987, Asset Pricing and Dual Listing on Foreign Capital Markets: A Note, *Journal of Finance* 42, 151-158.

Barberis, Nicholas, and Andrei Shleifer, 2003, Style Investing, *Journal of Financial Economics* 68, 161-199.

Barberis, Nicholas, Andrei Shleifer, and Jeffrey Wurgler, 2003, Comovement, Working paper, New York University.

Barberis, Nicholas, and Richard H. Thaler, 2003, A Survey of Behavioral Finance, Handbook of the Economics of Finance, North-Holland.

Bekaert, Geert, and Campbell R. Harvey, 1997, Emerging Equity Market Volatility, *Journal of Financial Economics* 43, 29-77.

Bekaert, Geert, and Michael S. Urias, 1996, Diversifcation, Integration and Emerging Market Closed-End Funds, *Journal of Finance* 51, 835-869.

Bodurtha, James N., Dong-Soon Kim, and Charles M. C. Lee, 1995, Closed-end Country Funds and U.S. Market Sentiment, *Review of Financial Studies* 8, 879-918.

Chan, Kalok, Allaudeen Hameed, and Sie Ting Lau, 2003, What If Trading Location is Different from Business Location? Evidence from the Jardine Group, *Journal of Finance* 58, 1221-1246.

De Long, J. Bradford, Andrei Shleifer, Lawrence H. Summers, and Robert J. Waldmann, 1990, Noise Trader Risk in Financial Markets, *Journal of Political Economy* 98, 703-738.

Errunza, Vihang R., Ked Hogan, and Mao-wei Hung, 1999, Can the Gains from International Diversification Be Achieved without Trading Abroad? *Journal of Finance* 54, 2075-2107.

Errunza, Vihang R., and E. Losq, 1985, International Asset Pricing under Mild Segmentation: Theory and Test, *Journal of Finance* 40, 105-124.

Errunza, Vihang R., and Darius P. Miller, 2000, Market Segmentation and the Cost of Capital in International Equity Markets, *Journal of Financial and Quantitative Analysis* 35, 577-600.

Eun, Cheol S., and Sanjiv Sabherwal, 2002, Cross-Border Listings and Price Discovery: Evidence from U.S. Listed Canadian Stocks, *Journal of Finance* 58, 549-576.

Fama, Eugene F. and Kenneth R. French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics* 43, 153-193.

Foerster, Stephen R., and G. Andrew Karolyi, 1993, International Listings of Stocks: the Case of Canada and the U.S., *Journal of International Business Studies* 24, 763-784.

Foerster, Stephen R., and G. Andrew Karolyi, 1999, The Effects of Market Segmentation and Investor Recognition on Asset Prices: Evidence from Foreign Stocks Listing in the U.S., *Journal of Finance* 54, 981-1014.

French, Kenneth R., and James M. Poterba, 1991, Investor Diversification and International Equity Markets, *American Economic Review* 81, 222-226.

Froot, Kenneth A., and Emil M. Dabora, 1999, How are Stock Prices Affected by the Location of Trade?, *Journal of Financial Economics* 53, 189-216.

Grammig, Joachim, Michael Melvin, and Christian Schlag, 2002, Internationally Cross-listed Stock Prices During Overlapping Trading Hours, Working paper, Arizona State University.

Greenwood, Robin M., and Nathan Sosner, 2002, Trade and the Comovement of Stock Returns: Evidence from Japan, Working paper, Harvard University.

Griffin, John M., and G. Andrew Karolyi, 1998, Another Look at the Role of the Industrial Structure of Markets for International Diversification Strategies, *Journal of Financial Economics* 50, 351-373.

Hardouvelis, Gikas A., Rafael La Porta, and Thierry A. Wizman, 1994, What Moves the Discount on Country Equity Funds, The Internationalization of Equity Markets, Chicago, The University of Chicago Press, 345-397.

Heston, Steven L., and K. Geert Rouwenhorst, 1994, Does Industrial Structure Explain the Benefits of International Diversification?, *Journal of Financial Economics* 36, 3-27.

Jayaraman, Narayaman, Kuldeep Shastri and Kishore Tandon, 1993, The Impact of International Cross Listings on Risk and Return: Evidence from American Depositary Receipts, *Journal of Banking and Finance* 17, 91-103.

Karolyi, G. Andrew, 1998, Why Do Companies List Their Shares Abroad? A Survey of the Evidence and its Managerial Implications, Volume 7, Number 1, Salomon Brothers Monograph Series, New York University.

Karolyi, G. Andrew, and Ren'e M. Stulz, 1996, Why Do Markets Move Together? An Examination of U.S.-Japan Stock Return Comovements, *Journal of Finance* 51, 951-986.

Kato, Kiyoshi, Scott Linn and James Schallheim, 1992, Are There Arbitrage Opportunities in the Market for American Depositary Receipts?, *Journal of International Financial Markets*, Institutions and Money 1, 73-89.

Lee, Charles M. C., Andrei Shleifer, and Richard H. Thaler, 1991, Investor Sentiment and the Closed-end Fund Puzzle, *Journal of Finance* 46, 75-110.

Merton, Robert C., 1987, A Simple Model of Capital Market Equilibrium with Incomplete Information, *Journal of Finance* 42, 483-510.

Miller, Darius P., 1999, The Market Reaction to International Cross Listings: Evidence from Depositary Receipts, *Journal of Financial Economics* 51, 103-123.

Mittoo, Usha R., 1992, Additional Evidence on Integration in the Canadian Stock Market, *Journal of Finance* 47, 2036-2054.

Officer, Dennis T., and J. Ronrald Hoffmeister, 1987, ADRs: A Substitute for the Real Thing?, *Journal of Portfolio Management* 13, 61-65.

Patro, K. Dilip, and John K. Wald, 2002, Firm Characteristics and the Impact of Emerging Market Liberalizations, Working paper, Rutgers University.

Pindyck, Robert S. and Julio J. Rotemberg, 1990, The Excess Comovement of Commodity Prices, *Economic Journal* 100, 1173-1189.

Pindyck, Robert S. and Julio J. Rotemberg, 1993, The Comovement of Stock Prices, *Quarterly Journal of Economics*, 1073-1104.

Shleifer, Andrei and Robert W. Vishny, 1997, The Limits of Arbitrage, *Journal of Finance* 52, 35-55.

Roll, Richard, 1992, Industrial Structure and the Comparative Behavior of International Stock Market Indices, *Journal of Finance* 47, 3-42.

Rosenthal, Leonard, 1983, An Empirical Test of the Efficiency of the ADR Markets, *Journal of Banking and Finance* 7, 17-29.

Solnik, Bruno H., 1974, The International Pricing of Risk: An Empirical Investigation of the World Capital Market Structure, *Journal of Finance* 29, 365-378.

Stapleton, R. C., and M. G. Subrahmanyam, 1977, Market Imperfections, Capital Market Equilibrium and Corporate Finance, *Journal of Finance* 32, 307-319.

Stulz, René M., 1991, On the Effects of Barriers to International Asset Pricing, *Journal of Finance* 35, 783-794.

Stulz, René M., 1995, International Asset Pricing: An Integrative Survey, in Robert Jarrow.

Wahab, Mahmond, and Amit Khandwala, 1993, Why not Diversify Internationally with ADRs?, *Journal of Portfolio Management* 19, 75-82.

Webb, Shelly E., Dennis T. Officer, and Bryan E. Boyd, 1995, An Examination of International Equity Markets Using American Depositary Receipts, *Journal of Business Finance and Accounting* 22, 415-430.

Werner, Ingrid M., and Allan W. Kleidon, 1996, U.K. and U.S. Trading of British Cross-Listed Stocks: An Intraday Analysis of Market Integration, 1996, *Review of Financial Studies* 9, 619-664.

Table I
Sample Descriptive Statistics

This table describes the sample compiled from Datastream International. Three types of ADRs are eliminated: (1) ADRs whose parent stocks can not be identified; (2) ADRs whose parent stocks do not trade at home; and (3) ADRs that have the same parent stocks as some other ADRs. This results in 1,440 ADRs from 44 countries over the period from 1973 to 2002. Industry classification is based on the level-four scheme in Datastream. Also reported is the distribution of ADRs across exchanges and years.

Country	# of ADRs
Argentina	22
Australia	105
Austria	9
Belgium	5
Brazil	54
Canada	342
Chile	24
China	6
Colombia	5
Denmark	5
Finland	10
France	39
Germany	37
Hong Kong	83
Hungary	5
India	14
Indonesia	5
Ireland	18
Israel	10
Italy	23
Jamaica	1
Japan	143
Lithuania	1
Luxembourg	2
Malaysia	11
Mexico	52
Netherlands	27
New Zealand	7
Norway	22
Philippines	6
Poland	4
Portugal	4
Russian Federation	25
Singapore	17
South Africa	47
South Korea	9
Spain	8
Sweden	25
Switzerland	7
Taiwan	12
Thailand	8
Turkey	6
UK	164
Venezuela	11
Total	1440

Industry	# of ADRs
Missing	3
Aerospace & Defence	7
Automobiles & Parts	40
Banks	66
Beverages	20
Chemicals	38
Construction & Building Materials	58
Diversified Industrials	45
Electricity	31
Electronic & Electrical Equipment	76
Engineering & Machinery	58
Food & Drug & Retailers	10
Food Producers & Processors	42
Forestry & Paper	20
Gas Distribution	7
Household Goods & Textiles	39
Health	26
Information Technology Hardware	40
Insurance	12
Investment Companies	11
Leisure, Entertainment & Hotels	30
Life Assurance	7
Media & Photography	49
Mining	138
Oil & Gas	99
Personal Care & Household Products	6
Pharmaceuticals	41
Real Estate	38
Retailers	40
Software & Computer Services	51
Specialty & Other Finance	23
Steel & Other Metals	40
Support Services	30
Suspended Equities	41
Telecom Services	96
Tobacco	5
Transport	44
Unclasified	8
Unquoted Equities	2
Water	3
Total	1440

Exchange	# of ADRs
Missing	1
AMEX	40
Nasdaq	257
NYSE	421
OTC	721
Total	1440

Years	# of ADRs
Missing	2
1973 - 1982	92
1983 - 1992	173
1993 - 2002	1173
Total	1440

Table II
Comparing Comovement for ADRs and Their Parent Stocks

This table regresses Wednesday-to-Wednesday weekly ADR or parent stock returns on the U.S. and/or local market returns over one, three and five year(s), where at least 20, 60 and 100 observations are required respectively.

$$R_{i,t}=\alpha i + \beta_{i,Local}*R_{Local,t} + \beta_{i,US}*R_{US,t} + \varepsilon_{i,t}$$

The left and middle sections of the table report regression coefficients and adjusted R^2s for ADRs and their parent stocks respectively. The rightmost section compares ADRs with their parent stocks and the differences are reported as: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. All associated t-statistics are in parentheses. Averages are computed across all stocks applicable in 42 countries.

ADR				Parent				ADR Minus Parent						
N_ADR	β_{Local}	β_{US}	Adj. R^2	N_Parent	β_{Local}	β_{US}	Adj. R^2	N_Diff.	$\Delta\beta_{Local}$	t	$\Delta\beta_{US}$	t	Δ(Adj. R^2)	t
One-year Regression: August 1, 2001-July 31, 2002														
749	0.86		0.149	836	0.96		0.249	733	-0.14	(-4.26)			-0.100	(-18.30)
749		0.58	0.091	836		0.58	0.091	733			-0.03	(-0.89)	-0.006	(-2.05)
749	0.80	0.11	0.163	836	0.99	-0.03	0.253	733	-0.21	(-3.57)	0.14	(2.81)	-0.091	(-16.67)
Three-year Regression: August 1, 1999-July 31, 2002														
1037	0.79		0.115	1063	0.85		0.161	1003	-0.07	(-5.66)			-0.046	(-17.58)
1037		0.56	0.055	1063		0.51	0.055	1003			0.05	(3.13)	0.000	(0.03)
1037	0.64	0.21	0.123	1063	0.80	0.07	0.163	1003	-0.16	(-9.50)	0.14	(6.91)	-0.041	(-15.59)
Five-year Regression: August 1, 1997-July 31, 2002														
1024	0.85		0.144	1048	0.88		0.187	990	-0.04	(-4.20)			-0.043	(-17.13)
1024		0.60	0.057	1048		0.56	0.059	990			0.03	(2.68)	-0.002	(-2.00)
1024	0.76	0.13	0.150	1048	0.86	0.04	0.189	990	-0.09	(-6.73)	0.08	(5.46)	-0.039	(-15.75)

Table III
Country Results from Comparing Comovement for ADRs and Their Parent Stocks

This table regresses Wednesday-to-Wednesday weekly ADR or parent stock returns on the U.S. and local market returns from August 1, 1999 to July 31, 2002, where at least 60 weekly observations are required. The left and middle sections of each panel report regression coefficients and adjusted R^2s for ADRs and their parent stocks respectively. The rightmost section compares ADRs with their parent stocks and the differences are reported as: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

	ADR				Parent				ADR Minus Parent						
Country/Region	N_ADR	β_{Local}	β_{US}	Adj. R^2	N_Parent	β_{Local}	β_{US}	Adj. R^2	N_Diff.	$\Delta\beta_{Local}$	t	$\Delta\beta_{US}$	t	Δ(Adj. R^2)	t
Argentina	18	0.49	0.27	0.114	16	0.98	0.10	0.340	16	-0.46	(-4.68)	0.22	(4.28)	-0.215	(-6.40)
Australia	65	0.57	0.24	0.035	71	0.82	0.06	0.043	63	-0.21	(-1.72)	0.21	(2.76)	-0.008	(-1.86)
Austria	9	1.12	-0.22	0.050	9	0.69	-0.08	0.110	9	0.43	(1.06)	-0.14	(-1.39)	-0.060	(-2.01)
Belgium	2	0.59	0.24	0.044	2	0.66	-0.03	0.151	2	-0.07	(-0.27)	0.27	(0.89)	-0.107	(-0.86)
Brazil	41	1.02	0.18	0.233	38	0.94	0.07	0.211	36	0.13	(2.91)	0.12	(2.47)	0.034	(2.52)
Canada	204	0.57	0.26	0.064	202	0.54	0.20	0.053	194	0.02	(0.47)	0.03	(0.78)	0.010	(5.49)
Chile	22	1.19	0.10	0.268	22	1.12	0.01	0.256	22	0.07	(2.21)	0.09	(3.38)	0.012	(0.82)
China	6	0.94	0.25	0.141	6	0.99	0.14	0.202	6	-0.05	(-0.40)	0.11	(3.09)	-0.061	(-1.76)
Colombia	3	0.66	0.40	0.024	2	0.59	0.02	0.056	2	-0.05	(-0.67)	-0.11	(-4.50)	-0.017	(-5.65)
Denmark	3	0.76	0.04	0.160	3	1.13	-0.08	0.309	3	-0.37	(-4.58)	0.12	(4.20)	-0.149	(-6.35)
Finland	8	0.23	0.41	0.200	7	0.43	0.26	0.286	7	-0.12	(-4.88)	0.17	(1.99)	-0.060	(-2.06)
France	34	0.59	0.51	0.126	34	1.09	0.02	0.228	34	-0.50	(-7.70)	0.49	(5.22)	-0.101	(-6.27)
Germany	30	0.64	0.29	0.127	31	0.93	0.03	0.177	30	-0.31	(-4.42)	0.26	(2.89)	-0.049	(-3.66)
Hong Kong	61	0.65	0.03	0.118	70	0.78	0.00	0.185	61	-0.14	(-5.07)	0.04	(0.96)	-0.066	(-6.35)
Hungary	3	0.98	0.13	0.348	3	1.13	0.08	0.456	3	-0.15	(-1.52)	0.06	(0.46)	-0.108	(-2.27)
India	13	0.94	0.20	0.249	13	0.96	0.02	0.269	13	-0.02	(-0.52)	0.18	(1.98)	-0.020	(-1.74)
Indonesia	2	1.12	0.28	0.431	2	0.91	0.06	0.363	2	0.21	(12.98)	0.22	(3.35)	0.069	(1.23)
Ireland	14	0.27	0.29	0.082	17	0.61	0.08	0.128	14	-0.36	(-2.72)	0.21	(2.62)	-0.061	(-2.26)
Israel	9	1.03	0.32	0.325	9	1.11	0.14	0.382	9	-0.08	(-2.05)	0.17	(5.17)	-0.058	(-3.02)
Italy	19	0.46	0.19	0.111	20	0.73	0.04	0.200	19	-0.30	(-4.94)	0.14	(3.58)	-0.100	(-5.17)
Japan	139	0.51	0.13	0.094	141	0.69	0.06	0.155	139	-0.18	(-8.25)	0.06	(3.55)	-0.061	(-9.64)
Luxembourg	1	0.15	0.14	0.091	1	0.15	-0.03	0.007	1	-0.01	(0.00)	0.16	(0.00)	0.084	(0.00)
Malaysia	10	0.51	1.31	0.318	10	1.06	0.19	0.407	10	-0.55	(-0.85)	1.12	(0.88)	-0.089	(-3.55)
Mexico	28	0.88	0.01	0.234	26	0.75	0.02	0.223	25	0.09	(2.50)	0.03	(0.77)	0.006	(0.50)
Netherlands	23	0.53	0.20	0.106	24	1.01	-0.05	0.184	23	-0.49	(-8.37)	0.27	(5.60)	-0.077	(-7.00)
New Zealand	5	0.62	0.29	0.136	6	0.89	0.11	0.191	5	-0.24	(-2.25)	0.21	(2.57)	-0.043	(-1.60)
Norway	14	0.79	0.13	0.148	15	1.04	-0.04	0.215	14	-0.27	(-4.70)	0.17	(2.66)	-0.076	(-6.06)
Philippines	5	0.94	-0.75	0.233	5	0.98	0.08	0.307	5	-0.05	(-0.16)	-0.83	(-1.16)	-0.074	(-1.40)
Poland	1	2.51	0.40	0.213	2	1.19	0.63	0.278	1	0.62	(0.00)	-0.13	(0.00)	-0.068	(0.00)
Portugal	3	0.84	0.15	0.272	3	1.20	0.01	0.454	3	-0.36	(-4.75)	0.14	(2.96)	-0.181	(-14.99)
Russian Federation	15	0.96	0.08	0.348	13	0.91	0.15	0.393	11	0.00	(0.06)	-0.05	(-0.47)	-0.045	(-1.06)
Singapore	13	0.98	0.17	0.234	14	0.98	0.05	0.277	13	-0.03	(-0.60)	0.14	(1.43)	-0.050	(-1.81)
South Africa	26	0.47	0.09	0.092	32	0.58	-0.11	0.118	25	-0.13	(-1.66)	0.31	(1.01)	-0.043	(-2.46)
South Korea	8	0.90	0.13	0.278	9	1.00	-0.07	0.331	8	-0.10	(-1.53)	0.21	(1.61)	-0.058	(-3.06)
Spain	6	0.55	0.07	0.136	6	0.78	0.00	0.242	6	-0.23	(-2.59)	0.07	(1.97)	-0.105	(-3.42)
Sweden	17	0.40	0.21	0.111	19	0.60	0.11	0.206	16	-0.08	(-0.84)	0.00	(0.03)	-0.060	(-2.16)
Switzerland	4	0.72	-0.17	0.059	3	0.59	0.59	0.182	3	0.23	(0.48)	-0.72	(-0.87)	-0.098	(-1.50)
Taiwan	8	1.11	0.43	0.479	8	1.16	0.00	0.548	8	-0.05	(-1.64)	0.43	(3.29)	-0.069	(-2.02)
Thailand	6	0.84	0.05	0.223	7	0.97	0.19	0.403	6	-0.11	(-0.60)	-0.17	(-0.36)	-0.179	(-1.78)
Turkey	3	0.85	0.42	0.378	5	1.00	0.24	0.487	3	-0.11	(-4.19)	0.21	(4.43)	-0.182	(-1.84)
UK	125	0.61	0.32	0.090	128	1.05	0.04	0.134	124	-0.43	(-10.55)	0.27	(7.00)	-0.044	(-9.66)
Venezuela	11	0.57	-0.24	0.082	9	0.55	-0.18	0.155	9	0.04	(0.30)	0.10	(0.89)	-0.066	(-1.72)
World	1037	0.64	0.21	0.123	1063	0.80	0.07	0.163	1003	-0.16	(-9.50)	0.14	(6.91)	-0.041	(-15.59)

Table IV
Controlling for Time Zone Difference to Compare Comovement for ADRs and Their Parent Stocks

Parent stock returns are derived from price series available in Datastream International. ADR returns are based on prices in TAQ database measured at the same time as the corresponding parent stock.This table regresses daily ADR or parent stock returns on the U.S. and local market returns from January 1, 2000 to December 31, 2002, where at least 120 observations are required. The left and middle sections of the table report regression coefficients and adjusted R^2s for ADRs and their parent stocks respectively. The rightmost section compares ADRs with their parent stocks and the differences are reported as: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

	ADR				Parent				ADR Minus Parent						
Country/Region	**N_ADR**	**β_{Local}**	**β_{US}**	**Adj. R^2**	**N_Parent**	**β_{Local}**	**β_{US}**	**Adj. R^2**	**N_Diff.**	**$\Delta\beta_{Local}$**	**t**	**$\Delta\beta_{US}$**	**t**	**Δ(Adj. R^2)**	**t**
Belgium	1	-0.49	0.63	0.012	1	0.48	-0.07	0.008	1	-0.96		0.70		0.004	
Canada	153	0.37	0.30	0.056	153	0.42	0.18	0.051	153	-0.05	(-1.57)	0.12	(3.10)	0.005	(2.85)
Finland	1	0.96	0.20	0.773	1	1.17	0.01	0.972	1	-0.22		0.20		-0.199	
France	17	1.16	0.15	0.159	17	1.22	0.00	0.207	17	-0.06	(-0.61)	0.15	(1.52)	-0.048	(-2.85)
Germany	6	1.48	0.27	0.172	6	1.25	0.02	0.211	6	0.23	(0.72)	0.25	(1.61)	-0.039	(-0.54)
Ireland	2	1.29	0.45	0.138	2	1.49	0.13	0.234	2	-0.20	(-1.44)	0.32	(0.92)	-0.096	(-0.95)
Mexico	10	0.45	0.18	0.118	10	0.46	0.08	0.109	10	0.00	(-0.05)	0.11	(1.52)	0.009	(0.71)
Netherlands	11	0.86	0.34	0.097	11	1.14	0.09	0.170	11	-0.29	(-6.70)	0.25	(2.69)	-0.073	(-3.90)
Norway	2	0.80	-0.74	0.010	2	0.83	0.07	0.214	2	-0.04	(-0.20)	-0.81	(-2.13)	-0.204	(-1.90)
South Africa	4	0.88	0.77	0.068	4	0.40	-0.08	0.098	4	0.49	(0.87)	0.85	(1.33)	-0.030	(-1.32)
Sweden	3	0.69	0.07	0.282	3	0.73	0.04	0.327	3	-0.04	(-1.36)	0.04	(0.45)	-0.045	(-1.76)
UK	37	0.97	0.08	0.089	37	1.11	0.04	0.132	37	-0.14	(-1.71)	0.04	(0.81)	-0.043	(-3.56)
World	247	0.59	0.25	0.081	247	0.65	0.13	0.096	247	-0.06	(-2.26)	0.12	(4.25)	-0.014	(-3.76)

Table V
Comparing Comovement for Parent Stocks and Their Home-matched Stocks

For each parent stock, a home-matched stock is found in the following manner: find both the date when the size of the parent is first available and the date that is closest and prior to January 1, 2000 when the size of the parent is first available. On the later of these two dates, compare the parent stock with all stocks in the same industry and home country based on size. The home stock that has the smallest magnitude of size difference with the parent stock is designated as the home-matched stock. Their daily returns are derived from price series in Datastream. This table regresses such daily returns of parent stocks and their home-matched stocks on the U.S. and local market returns from January 1, 2000 to December 31, 2002, where at least 120 daily observations are required. The left and middle sections of each panel report regression coefficients and adjusted R^2s for parent stocks and their home-matched stocks respectively. The rightmost section compares parent stocks with their home-matched stocks and the differences are reported as: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

	Parent				Home-matched Stock				Parent Minus Home-matched Stock						
Country/Region	N_Parent	β_{Local}	β_{US}	Adj. R^2	N_Home	β_{Local}	β_{US}	Adj. R^2	N_Diff.	$\Delta\beta_{Local}$	t	$\Delta\beta_{US}$	t	Δ(Adj. R^2)	t
Argentina	11	1.03	0.06	0.300	11	0.94	0.00	0.194	11	0.09	(0.64)	0.07	(0.66)	0.106	(1.73)
Australia	69	0.90	0.00	0.066	69	0.89	-0.01	0.036	69	0.01	(0.10)	0.02	(0.40)	0.029	(2.83)
Austria	3	1.19	0.00	0.141	3	0.18	-0.13	0.018	3	1.01	(9.55)	0.13	(1.41)	0.123	(3.61)
Belgium	3	0.94	-0.17	0.239	3	0.45	-0.10	0.089	3	0.49	(6.11)	-0.06	(-0.45)	0.150	(2.75)
Brazil	30	0.94	0.06	0.201	30	0.78	-0.04	0.142	30	0.16	(1.18)	0.10	(1.84)	0.059	(2.19)
Canada	229	0.49	0.12	0.051	229	0.48	0.07	0.030	229	0.00	(0.05)	0.04	(0.93)	0.021	(5.41)
Chile	18	1.10	0.03	0.197	18	0.67	-0.03	0.088	18	0.44	(5.43)	0.07	(2.04)	0.109	(4.19)
China	6	0.45	-0.07	0.105	6	0.48	-0.12	0.083	6	-0.03	(-0.56)	0.05	(0.79)	0.022	(1.83)
Colombia	1	0.50	0.18	0.000	1	1.71	0.23	0.271	1	-1.21		-0.05		-0.271	.
Denmark	3	0.90	0.06	0.083	3	0.67	0.00	0.058	3	0.24	(1.16)	0.05	(0.46)	0.025	(2.74)
Finland	8	0.43	0.08	0.185	8	0.32	0.08	0.087	8	0.11	(1.58)	0.00	(-0.17)	0.098	(1.46)
France	48	1.05	0.01	0.221	48	0.53	0.01	0.076	48	0.51	(6.85)	0.00	(0.18)	0.145	(7.30)
Germany	22	0.96	-0.01	0.226	22	0.60	0.00	0.060	22	0.35	(1.75)	-0.01	(-0.40)	0.165	(3.58)
Greece	2	1.05	0.04	0.524	2	1.13	-0.05	0.686	2	-0.08	(-4.94)	0.09	(2.05)	-0.162	(-6.17)
Hong Kong	68	0.78	0.05	0.188	68	0.90	0.03	0.147	68	-0.13	(-2.20)	0.02	(1.01)	0.041	(2.46)
India	17	0.97	0.01	0.232	17	0.88	0.01	0.211	17	0.08	(0.87)	0.00	(0.01)	0.020	(0.76)
Ireland	8	0.92	0.06	0.175	8	0.44	-0.02	0.030	8	0.47	(2.10)	0.08	(0.96)	0.146	(2.85)
Israel	14	1.04	0.03	0.282	14	1.05	0.02	0.291	14	-0.02	(-0.17)	0.01	(0.29)	-0.009	(-0.16)
Italy	21	0.72	-0.01	0.194	21	0.63	0.02	0.157	21	0.09	(1.17)	-0.03	(-0.71)	0.037	(2.21)
Japan	150	0.80	0.02	0.176	150	0.79	0.02	0.143	150	0.01	(0.29)	0.00	(0.27)	0.033	(3.59)
Luxembourg	1	0.28	0.04	0.023	1	0.01	0.01	-0.006	1	0.27		0.03		0.029	.
Malaysia	11	1.03	0.03	0.257	11	0.96	0.05	0.180	11	0.07	(0.50)	-0.02	(-0.71)	0.077	(1.84)
Mexico	17	0.78	0.07	0.208	17	0.58	-0.02	0.076	17	0.20	(1.68)	0.09	(2.50)	0.132	(2.79)
Netherlands	27	0.86	0.04	0.220	27	0.41	0.04	0.050	27	0.46	(4.03)	0.00	(0.08)	0.170	(4.66)
New Zealand	1	0.70	-0.04	0.085	1	0.81	0.03	0.081	1	-0.10		-0.07		0.004	.
Norway	16	1.03	0.02	0.214	16	0.65	-0.07	0.095	16	0.38	(2.56)	0.09	(2.25)	0.119	(3.29)
Philippines	4	1.23	-0.10	0.298	4	1.50	0.01	0.248	4	-0.26	(-0.97)	-0.11	(-6.29)	0.050	(0.59)
Portugal	3	0.67	-0.01	0.124	3	0.29	0.02	0.056	3	0.38	(1.24)	-0.02	(-0.37)	0.067	(0.63)
Russian Federation	7	1.25	0.05	0.619	7	0.95	-0.30	0.281	7	0.30	(1.84)	0.35	(1.68)	0.338	(5.96)
Singapore	13	1.02	0.01	0.236	13	1.03	0.02	0.172	13	0.00	(-0.01)	-0.01	(-0.22)	0.064	(1.51)
South Africa	21	0.71	0.00	0.131	21	0.64	-0.06	0.059	21	0.07	(0.50)	0.06	(0.86)	0.073	(3.83)
South Korea	12	0.91	-0.05	0.343	12	0.83	-0.04	0.252	12	0.08	(1.24)	-0.01	(-0.19)	0.091	(3.82)
Spain	9	0.72	0.05	0.273	9	0.37	-0.01	0.058	9	0.36	(2.27)	0.06	(1.33)	0.215	(2.53)
Sweden	23	0.67	0.08	0.180	23	0.59	0.04	0.138	23	0.08	(1.05)	0.04	(0.95)	0.042	(1.47)
Switzerland	3	0.90	0.22	0.088	3	0.60	0.02	0.044	3	0.30	(0.93)	0.20	(1.05)	0.044	(1.31)
Taiwan	10	1.15	0.00	0.473	10	1.05	0.03	0.385	10	0.10	(2.09)	-0.03	(-0.88)	0.088	(3.18)
Thailand	6	1.28	0.01	0.323	6	1.05	0.00	0.239	6	0.23	(0.82)	0.01	(0.11)	0.084	(0.70)
Turkey	5	1.09	0.11	0.562	5	0.93	0.05	0.380	5	0.16	(1.97)	0.06	(0.68)	0.183	(3.66)
United Kingdom	143	0.85	0.02	0.128	143	0.58	0.01	0.068	143	0.27	(7.24)	0.00	(0.25)	0.060	(7.79)
World	1063	0.79	0.04	0.158	1063	0.67	0.02	0.099	1063	0.12	(5.65)	0.03	(2.20)	0.059	(15.13)

Table VI
Comovement Change Around ADR Listing

The listing date for each ADR is determined as the starting date documented in Datastream International. This table regresses daily returns of the underlying stocks on contemporaneous U.S., local market returns, and their interactions with the dummy variable for ADR listing. Regression windows are (-200, -101) and (101, 200) for pre- and post-listing respectively, where 0 is the listing date.

$$R_{i,t}=\alpha_i + \beta_{i,Local}*R_{Local,t} + \beta_{i,US}*R_{US,t} + \beta_{i,D}*D_t + \beta_{i,DLocal}*D_t*R_{Local,t} + \beta_{i,DUS}*D_t*R_{US,t} + \varepsilon_{i,t}$$

At least 120 daily observations, of which at least 40% should be from post-listing, are required for the regressions. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

Country/Region	Start	End	N	β_{DLocal}	t	β_{DUS}	t	Adj. R^2
Argentina	19940308	20010518	9	0.15	(1.66)	0.01	(0.01)	0.434
Australia	19750106	20010606	67	-0.32	(-2.82)	0.12	(1.21)	0.156
Austria	19941227	19980629	9	-0.06	(-0.50)	-0.05	(-0.49)	0.334
Belgium	19941227	20010924	5	0.09	(0.39)	-0.16	(-1.09)	0.262
Brazil	19941227	20011119	25	0.12	(1.69)	0.31	(1.27)	0.315
Canada	19780626	20011008	158	0.13	(0.71)	0.10	(0.76)	0.047
Chile	19900720	19990408	17	0.14	(1.40)	-0.12	(-0.84)	0.307
China	19950116	19990906	4	0.01	(0.02)	0.24	(0.80)	0.108
Colombia	19941115	19950726	3	-0.20	(-0.33)	0.70	(7.56)	0.170
Denmark	19810430	19941227	3	0.45	(1.24)	0.14	(1.22)	0.360
Finland	19930802	20000901	9	-0.05	(-0.39)	0.05	(0.26)	0.246
France	19860723	20011005	32	0.09	(1.39)	0.02	(0.32)	0.267
Germany	19930802	20010123	32	-0.14	(-1.07)	0.09	(0.95)	0.272
Greece	19960718	19991018	3	-0.02	(-0.10)	-0.01	(-0.03)	0.302
Hong Kong	19881209	20000822	68	-0.04	(-0.80)	0.07	(1.02)	0.298
Hungary	19941227	19980312	2	0.68	(1.68)	-0.62	(-2.46)	0.324
India	19930802	20010720	18	0.09	(0.65)	-0.15	(-1.26)	0.330
Indonesia	19941227	19941227	1	1.10		1.13		0.122
Ireland	19870129	19990826	8	-0.19	(-2.27)	-0.25	(-2.05)	0.283
Israel	19951114	19990831	6	0.15	(0.75)	0.23	(1.71)	0.332
Italy	19870716	19981102	16	-0.05	(-0.73)	0.15	(1.17)	0.381
Japan	19741119	20010927	135	0.09	(2.22)	-0.02	(-0.52)	0.306
Luxembourg	19930630	19941227	2	1.00	(7.63)	-0.29	(-1.09)	0.116
Malaysia	19930802	19950118	13	-0.15	(-0.85)	-0.10	(-0.50)	0.273
Mexico	19911120	19971117	21	0.10	(0.84)	-0.11	(-0.47)	0.394
Netherlands	19841101	20011018	22	-0.13	(-1.44)	0.04	(0.49)	0.275
New Zealand	19960621	19960621	1	-0.44		-0.02		-0.028
Norway	19860625	19990831	14	-0.25	(-0.64)	0.60	(1.34)	0.264
Peru	19960515	19970618	2	-0.01	(-0.03)	-0.14	(-0.33)	0.088
Philippines	19930802	19950130	4	0.18	(0.47)	0.26	(0.91)	0.196
Portugal	19920612	19970114	3	0.35	(1.04)	0.05	(0.34)	0.206
Russia	19970214	20010824	8	0.32	(1.86)	0.25	(0.82)	0.313
Singapore	19930802	19990513	17	-0.14	(-1.19)	0.03	(0.25)	0.235
South Africa	19800930	19990928	26	0.08	(0.61)	-0.11	(-0.85)	0.202
South Korea	19930802	20011102	12	0.00	(0.01)	0.02	(0.13)	0.383
Spain	19880601	19991130	7	-0.20	(-1.48)	0.08	(0.47)	0.273
Sweden	19830815	20001003	18	-0.06	(-0.53)	0.13	(0.93)	0.193
Switzerland	19930802	19970610	3	-0.23	(-1.04)	0.09	(1.58)	0.294
Taiwan	19941018	20001002	11	0.10	(0.72)	0.08	(0.55)	0.450
Thailand	19930802	20000601	7	0.18	(0.53)	0.17	(0.78)	0.363
Turkey	19931116	19991222	7	-0.11	(-1.27)	0.27	(0.59)	0.293
UK	19780515	20010611	126	0.09	(2.21)	0.05	(1.02)	0.166
Venezuela	19930323	19990113	6	-0.13	(-0.47)	0.16	(0.45)	0.402
World	19741119	20011119	960	0.03	(0.73)	0.06	(2.05)	0.228

Table VII
Comovement Change Around ADR De-listing

The de-listing date for each ADR is determined as the ending date documented in Datastream International. This table regresses daily returns of the underlying stocks on contemporaneous U.S., local market returns, and their interactions with the dummy variable for ADR de-listing. Regression windows are (-200, -101) and (101, 200) for pre- and post-listing respectively, where 0 is the de-listing date.

$$R_{i,t}=\alpha_i + \beta_{i,Local}*R_{Local,t} + \beta_{i,US}*R_{US,t} + \beta_{i,D}*D_t + \beta_{i,DLocal}*D_t*R_{Local,t} + \beta_{i,DUS}*D_t*R_{US,t} + \varepsilon_{i,t}.$$

At least 120 daily observations, of which at least 40% should be from post-listing, are required for the regressions. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

Country/Region	Start	End	N	β_{DLocal}	t	β_{DUS}	t	Adj. R^2
Argentina	20001207	20001207	1	0.17		0.07		0.101
Australia	19970317	20020306	15	0.27	(0.31)	-0.31	(-1.36)	0.042
Austria	20010910	20010910	1	0.06		-0.03		-0.007
Belgium	19971001	19990609	2	-0.17	(-2.04)	0.23	(1.06)	0.119
Brazil	20001207	20020110	4	0.03	(0.06)	0.04	(0.21)	0.203
Canada	19890329	20020305	12	-0.72	(-1.62)	0.44	(0.75)	0.004
Chile	20010319	20010319	1	-0.25		-0.05		0.085
China	20010910	20010910	5	0.7	(3.68)	-0.04	(-0.64)	0.190
Finland	20010910	20010910	1	-0.01		-0.04		0.024
France	19970702	20000901	2	0.01	(0.88)	-0.04	(-0.49)	0.054
Germany	19990325	20010910	8	0.21	(1.26)	-0.15	(-1.05)	0.069
Greece	20010910	20010910	1	0.23		-0.02		0.567
Hong Kong	19980716	20010910	20	0.03	(0.28)	-0.27	(-2.13)	0.156
Hungary	19980318	20010910	3	0.11	(0.60)	-0.2	(-3.09)	0.394
India	20001207	20020429	9	0.01	(0.04)	-0.03	(-0.55)	0.209
Ireland	20010910	20010910	2	-0.42	(-2.39)	0	(0.02)	0.017
Israel	20010611	20010910	2	0.33	(1.12)	-0.06	(-0.34)	0.381
Italy	19970228	20010910	9	0.01	(0.04)	0.01	(0.07)	0.221
Japan	19980331	20020423	38	0.27	(3.43)	0.05	(0.77)	0.193
Luxembourg	20010830	20010830	1	-0.82		0.26		0.017
Malaysia	19991216	20011221	10	0.18	(0.82)	-0.11	(-1.00)	0.246
Mexico	19970228	20010910	5	-0.32	(-2.58)	0.22	(0.70)	0.257
Netherlands	19980701	19980701	1	-0.12		0.36		0.210
Norway	20001016	20010910	5	-0.03	(-0.10)	-0.14	(-1.14)	0.111
Peru	20010824	20010824	1	-0.98		-0.04		0.018
Philippines	20010910	20010910	2	0.18	(0.65)	0.4	(3.76)	0.410
Portugal	20010524	20010910	2	-0.81	(-3.27)	0.01	(0.14)	0.012
Russia	20010910	20010910	1	0.28		0.12		0.357
Singapore	19970516	20010910	3	0.3	(1.48)	0.27	(0.89)	0.122
South Africa	20001207	20020410	5	0.05	(0.25)	-0.1	(-0.54)	0.132
South Korea	20010905	20011227	5	0.13	(1.59)	0.19	(1.32)	0.269
Spain	20010910	20010910	2	-0.28	(-19.27)	0.01	(0.14)	0.074
Sweden	20001207	20020131	4	0.18	(1.67)	0	(-0.01)	0.059
Taiwan	19980318	20010910	3	0.11	(3.31)	0	(-0.04)	0.308
Thailand	20010313	20011221	3	-0.49	(-4.16)	0.49	(1.60)	0.487
Turkey	19980610	20011204	4	0.02	(0.08)	0.06	(0.66)	0.403
UK	19970429	20020318	9	0.4	(2.24)	-0.19	(-1.21)	0.057
World	19890329	20020429	202	0.07	(0.86)	-0.01	(-0.28)	0.165

Table VIII
Comovement Change Around ADR Listing: Segmentation v. Investor Base

The listing date for each ADR is determined as the starting date documented in Datastream International. This table regresses daily returns of the underlying stocks on contemporaneous U.S., local market returns, non-US and non-local market returns, and their interactions with the dummy variable for ADR listing. Regression windows are (-200, -101) and (101, 200) for pre- and post-listing respectively, where 0 is the listing date.

$R_{i,t}=\alpha_i + \beta_{i,L}*R_{Local,t} + \beta_{i,US}*R_{US,t} + \beta_{i,DNLUS}*R_{DNLUS,t} + \beta_{i,D}*D_t + \beta_{i,DLocal}*D_t*R_{Local,t} + \beta_{i,DUS}*D_t*R_{US,t} + \beta_{i,DNLUS}*D_t*R_{NLUS,t} + \varepsilon_{i,t}$.

At least 120 daily observations, of which at least 40% should be from post-listing, are required for the regressions. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

Country/Region	Start	End	N	β_{DLocal}	t	β_{DUS}	t	β_{DNLUS}	t	Adj. R^2
Argentina	19940308	20010518	9	0.19	(2.36)	-0.04	(-0.10)	-0.52	(-0.74)	0.439
Australia	19780306	20010606	66	-0.39	(-3.11)	0.12	(1.21)	0.09	(1.03)	0.16
Austria	19941227	19980629	9	-0.11	(-0.98)	-0.08	(-0.84)	0.10	(0.59)	0.334
Belgium	19941227	20010924	5	0.07	(0.31)	-0.15	(-0.89)	0.05	(0.32)	0.259
Brazil	19941227	20011119	25	0.13	(1.83)	0.43	(1.86)	-0.48	(-2.12)	0.321
Canada	19780626	20011008	158	0.14	(0.69)	0.09	(0.62)	0.09	(0.93)	0.051
Chile	19900720	19990408	17	0.13	(1.29)	-0.12	(-0.82)	0.03	(0.28)	0.307
China	19950116	19990906	4	0.09	(0.18)	0.37	(1.41)	-0.74	(-1.31)	0.11
Colombia	19941115	19950726	3	-0.26	(-0.38)	0.87	(7.73)	-0.77	(-7.47)	0.179
Denmark	19810430	19941227	3	0.37	(1.29)	0.1	(0.74)	0.21	(0.91)	0.369
Finland	19930802	20000901	9	0.07	(0.57)	0.02	(0.10)	-0.23	(-0.53)	0.248
France	19860723	20011005	32	0.06	(0.86)	0.01	(0.19)	0.03	(0.39)	0.271
Germany	19930802	20010123	32	-0.11	(-0.79)	0.1	(1.07)	-0.11	(-0.86)	0.271
Greece	19960718	19991018	3	-0.08	(-0.31)	-0.12	(-0.53)	0.65	(2.06)	0.299
Hong Kong	19881209	20000822	68	-0.03	(-0.51)	0.09	(1.28)	-0.10	(-1.14)	0.299
Hungary	19941227	19980312	2	0.60	(1.47)	-0.69	(-2.84)	0.48	(2.78)	0.328
India	19930802	20010720	18	0.12	(0.84)	-0.13	(-0.96)	-0.10	(-0.59)	0.331
Indonesia	19941227	19941227	1	1.15		1.16		-0.32		0.113
Ireland	19870129	19990826	8	-0.14	(-1.38)	-0.22	(-1.75)	-0.13	(-0.94)	0.294
Israel	19951114	19990831	6	0.18	(0.87)	0.26	(1.66)	-0.19	(-0.99)	0.331
Italy	19870716	19981102	16	-0.06	(-0.83)	0.18	(1.39)	-0.09	(-0.97)	0.381
Japan	19750908	20010927	133	0.09	(2.17)	-0.01	(-0.32)	0.01	(0.22)	0.309
Luxembourg	19930630	19941227	2	1.06	(7.84)	-0.18	(-0.73)	-0.49	(-3.27)	0.115
Malaysia	19930802	19950118	13	-0.16	(-0.82)	-0.14	(-0.73)	0.21	(1.11)	0.272
Mexico	19911120	19971117	21	0.09	(0.72)	-0.11	(-0.47)	0.16	(1.26)	0.393
Netherlands	19841101	20011018	22	-0.20	(-2.00)	0.03	(0.39)	0.16	(1.46)	0.277
New Zealand	19960621	19960621	1	-0.56		-0.08		0.32		-0.036
Norway	19860625	19990831	14	-0.25	(-0.72)	0.63	(1.35)	0.00	(-0.01)	0.266
Peru	19960515	19970618	2	0.02	(0.04)	-0.14	(-0.25)	-0.20	(-0.33)	0.087
Philippines	19930802	19950130	4	0.13	(0.34)	0.07	(0.22)	0.82	(3.42)	0.203
Portugal	19920612	19970114	3	0.34	(1.11)	0.11	(1.00)	-0.05	(-0.15)	0.205
Russia	19970214	20010824	8	0.32	(1.81)	0.41	(1.13)	-0.72	(-2.12)	0.308
Singapore	19930802	19990513	17	-0.06	(-0.61)	0.1	(0.88)	-0.48	(-4.27)	0.238
South Africa	19800930	19990928	26	0.04	(0.23)	-0.15	(-1.10)	0.19	(0.98)	0.201
South Korea	19930802	20011102	12	-0.02	(-0.26)	-0.02	(-0.16)	0.20	(0.87)	0.384
Spain	19880601	19991130	7	-0.22	(-2.21)	0.07	(0.37)	0.11	(0.54)	0.282
Sweden	19830815	20001003	18	-0.06	(-0.40)	0.13	(0.87)	-0.08	(-0.29)	0.202
Switzerland	19930802	19970610	3	-0.09	(-0.34)	0.16	(4.99)	-0.40	(-1.74)	0.291
Taiwan	19941018	20001002	11	0.05	(0.36)	-0.01	(-0.11)	0.23	(2.07)	0.454
Thailand	19930802	20000601	7	0.13	(0.38)	0.15	(0.62)	0.28	(1.98)	0.36
Turkey	19931116	19991222	7	-0.15	(-2.04)	0.07	(0.14)	0.95	(1.72)	0.294
UK	19780515	20010611	126	0.10	(2.46)	0.05	(1.18)	-0.04	(-0.81)	0.168
Venezuela	19930323	19990113	6	-0.13	(-0.43)	0.08	(0.24)	0.01	(0.01)	0.403
World	19750908	20011119	957	0.02	(0.63)	0.06	(2.03)	0.00	(-0.05)	0.231

Table IX
Comovement Change Around ADR De-listing: Segmentation v. Investor Base

The de-listing date for each ADR is determined as the starting date documented in Datastream International. This table regresses daily returns of the underlying stocks on contemporaneous U.S., local market returns, non-US and non-local market returns, and their interactions with the dummy variable for ADR de-listing. Regression windows are (-200, -101) and (101, 200) for pre- and post-de-listing respectively, where 0 is the de-listing date.

$R_{i,t}=\alpha_i + \beta_{i,L}*R_{Local,t} + \beta_{i,US}*R_{US,t} + \beta_{i,DNLUS}*R_{DNLUS,t} + \beta_{i,D}*D_t + \beta_{i,DLocal}*D_t*R_{Local,t} + \beta_{i,DUS}*D_t*R_{US,t} + \beta_{i,DNLUS}*D_t*R_{NLUS,t} + \varepsilon_{i,t}$.

At least 120 daily observations, of which at least 40% should be from post-listing, are required for the regressions. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

Country/Region	Start	End	N	β_{DLocal}	t	β_{DUS}	t	β_{DNLUS}	t	Adj. R^2
Argentina	20001207	20001207	1	0.26		0.08		-0.27		0.101
Australia	19970317	20020306	15	0.37	(0.51)	-0.27	(-1.01)	-0.07	(-0.16)	0.043
Austria	20010910	20010910	1	0.29		0.10		-0.58		-0.001
Belgium	19971001	19990609	2	-0.14	(-0.92)	0.16	(1.51)	0.00	(0.01)	0.125
Brazil	20001207	20020110	4	0.10	(0.22)	0.11	(0.70)	-0.26	(-0.79)	0.209
Canada	19890329	20020305	12	-0.56	(-1.18)	0.54	(0.92)	-0.98	(-1.46)	0.007
Chile	20010319	20010319	1	-0.11		-0.07		-0.31		0.092
China	20010910	20010910	5	0.71	(3.48)	-0.09	(-2.47)	0.26	(1.50)	0.199
Finland	20010910	20010910	1	0.02		-0.01		-0.27		0.037
France	19970702	20000901	2	-0.16	(-0.92)	-0.08	(-3.19)	0.37	(0.91)	0.054
Germany	19990325	20010910	8	0.11	(0.59)	-0.17	(-1.24)	0.28	(1.72)	0.073
Greece	20010910	20010910	1	0.22		-0.05		0.16		0.564
Hong Kong	19980716	20010910	20	0.10	(0.78)	-0.20	(-1.56)	-0.28	(-1.63)	0.151
Hungary	19980318	20010910	3	0.07	(0.36)	-0.27	(-4.45)	0.32	(6.62)	0.391
India	20001207	20020429	9	-0.02	(-0.10)	-0.07	(-0.84)	0.17	(1.02)	0.207
Ireland	20010910	20010910	2	-0.34	(-6.57)	0.01	(0.09)	-0.16	(-0.50)	0.015
Israel	20010611	20010910	2	0.36	(1.21)	-0.01	(-0.08)	-0.26	(-3.35)	0.379
Italy	19970228	20010910	9	0.05	(0.34)	0.03	(0.20)	-0.13	(-1.17)	0.221
Japan	19980331	20020423	38	0.29	(3.60)	0.04	(0.51)	-0.03	(-0.21)	0.197
Luxembourg	20010830	20010830	1	-0.94		0.27		-0.18		0.018
Malaysia	19991216	20011221	10	0.20	(0.95)	-0.07	(-0.69)	-0.16	(-1.12)	0.249
Mexico	19970228	20010910	5	-0.23	(-2.35)	0.25	(0.89)	-0.33	(-1.11)	0.256
Netherlands	19980701	19980701	1	-0.28		0.23		0.70		0.239
Norway	20001016	20010910	5	-0.09	(-0.37)	-0.16	(-1.62)	0.18	(0.60)	0.112
Peru	20010824	20010824	1	-0.77		-0.27		1.03		0.044
Philippines	20010910	20010910	2	0.23	(0.93)	0.48	(13.05)	-0.32	(-1.06)	0.405
Portugal	20010524	20010910	2	-1.13	(-4.81)	-0.13	(-3.23)	0.78	(30.03)	0.006
Russia	20010910	20010910	1	0.30		0.18		-0.20		0.352
Singapore	19970516	20010910	3	0.28	(0.86)	0.30	(0.70)	-0.09	(-0.16)	0.117
South Africa	20001207	20020410	5	-0.10	(-0.49)	-0.24	(-1.23)	0.49	(2.41)	0.135
South Korea	20010905	20011227	5	0.17	(1.54)	0.23	(1.95)	-0.10	(-0.29)	0.270
Spain	20010910	20010910	2	-0.38	(-4.50)	0.00	(0.06)	0.13	(0.96)	0.078
Sweden	20001207	20020131	4	0.00	(0.00)	-0.04	(-0.14)	0.51	(0.98)	0.073
Taiwan	19980318	20010910	3	0.12	(2.84)	0.02	(0.29)	-0.05	(-0.34)	0.304
Thailand	20010313	20011221	3	-0.47	(-3.59)	0.46	(1.68)	0.01	(0.02)	0.493
Turkey	19980610	20011204	4	0.02	(0.10)	0.02	(0.19)	0.17	(0.58)	0.401
UK	19970429	20020318	9	0.52	(2.87)	-0.16	(-1.08)	-0.31	(-2.25)	0.055
World	19890329	20020429	202	0.09	(1.30)	0.00	(-0.08)	-0.08	(-1.16)	0.167

Table X
Comparing Comovement Change Around ADR Listing for Parent Stocks and Their Home-matched Stocks

This table uses ADRs that have at least 40% trading volume of their parent stocks. Daily returns of parent stocks and their home-matched stocks are regressed on contemporaneous U.S. and/or local market returns before and after ADR listing. Regression windows are (-200, -101) and (101, 200) respectively, where 0 is the listing date. At least 35 daily observations are required in the regressions. On the left of the table are the changes of beta and adjusted R^2 before and after ADR listing for parent stocks: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. The right-hand side of the table compares parent stocks with their home-matched stocks and the differences between $\Delta\beta_{Local}$ of parent stocks and $\Delta\beta_{Local}$ of home-matched stocks are reported as $\Delta\Delta\beta_{Local}$, i.e., $\Delta\Delta\beta_{Local}$ = $\Delta\beta_{Local}$ of parent stocks - $\Delta\beta_{Local}$ of home-matched stocks. The notations, $\Delta\Delta\beta_{US}$ and $\Delta\Delta$(Adj. R^2), are similarly defined for the U.S. beta and the adjusted R^2. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

	Parent			Parent Minus Home-matched Stock					
Country/Region	$\Delta\beta_{Local}$	$\Delta\beta_{US}$	Δ(Adj. R^2)	$\Delta\Delta\beta_{Local}$	t	$\Delta\Delta\beta_{US}$	t	$\Delta\Delta$(Adj. R^2)	t
Australia	-0.16	1.01	0.089	-1.59		0.39		-0.056	
Brazil	0.48	-1.02	0.063	2.51		-3.64		0.166	
Canada	-0.32	0.42	0.022	-0.40	(-1.21)	0.55	(1.87)	0.030	(2.49)
Chile	0.01	-0.44	0.004	0.15	(0.44)	-0.24	(-0.47)	0.050	(0.49)
France	-0.07	-0.26	-0.005	1.11		-0.57		0.061	
India	0.23	0.05	0.038	0.27	(2.48)	0.45	(2.63)	-0.051	(-2.06)
Israel	-0.22	0.44	-0.001	-0.35		0.60		0.170	
Italy	-0.23	-0.43	-0.051	-0.60		-0.71		0.027	
Mexico	-0.41	0.93	-0.357	-1.02	(-2.57)	1.94	(1.04)	-0.348	(-2.39)
Sweden	-0.31	-0.16	-0.159	0.20	(0.66)	-0.17	(-0.37)	-0.100	(-37.75)
Switzerland	0.09	-0.11	0.262	-0.27		-0.28		0.197	
UK	0.73	0.30	0.067	0.94	(2.77)	0.07	(0.23)	0.140	(2.23)
World	-0.23	0.34	0.013	-0.26	(-1.01)	0.42	(1.77)	0.027	(2.05)

Table XI
Comparing Comovement Change Around ADR De-listing for Parent Stocks and Their Home-matched Stocks

This table regresses daily returns of parent stocks and their home-matched stocks on contemporaneous U.S. and/or local market returns before and after ADR de-listing, where at least 50 daily observations are required. On the left of the table are the changes of beta and adjusted R^2 before and after ADR de-listing for parent stocks: $\Delta\beta_{Local}$ for the local beta, $\Delta\beta_{US}$ for the U.S. beta and Δ(Adj. R^2) for the adjusted R^2. The right-hand side of the table compares parent stocks with their home-matched stocks and the differences between $\Delta\beta_{Local}$ of parent stocks and $\Delta\beta_{Local}$ of home-matched stocks are reported as $\Delta\Delta\beta_{Local}$, i.e., $\Delta\Delta\beta_{Local}$ = $\Delta\beta_{Local}$ of parent stocks - $\Delta\beta_{Local}$ of home-matched stocks. The notations, $\Delta\Delta\beta_{US}$ and $\Delta\Delta$(Adj. R2), are similarly defined for the U.S. beta and the adjusted R2. All associated t-statistics are in parentheses. Country and regional averages are computed across all stocks applicable.

	Parent			Parent Minus Home-matched Stock					
Country/Region	**$\Delta\beta_{Local}$**	**$\Delta\beta_{US}$**	**Δ(Adj. R^2)**	**$\Delta\Delta\beta_{Local}$**	**t**	**$\Delta\Delta\beta_{US}$**	**t**	**$\Delta\Delta$(Adj. R^2)**	**t**
Argentina	0.72	0.28	0.275	0.47		-0.05		0.330	
Australia	0.88	-0.63	0.071	0.09		-0.43		-0.014	
Canada	1.16	-1.64	-0.003	1.77	(1.90)	-1.23	(-0.95)	-0.013	(-0.29)
Finland	0.22	-0.57	0.092	0.50		-0.48		0.139	
Hong Kong	-0.11	-0.17	-0.120	0.02		-0.09		0.071	
Hungary	0.30	-0.11	-0.010	0.12		0.04		0.179	
India	0.35	-0.04	0.066	0.39	(1.44)	-0.21	(-1.06)	0.075	(1.05)
Italy	0.25	0.19	0.068	-0.05	(-0.46)	0.39	(1.89)	-0.040	(-0.83)
Japan	0.32	-0.02	0.156	0.52	(1.80)	-0.21	(-1.57)	0.142	(1.93)
Malaysia	0.58	-0.03	0.119	0.39	(0.80)	-0.25	(-2.14)	0.261	(9.48)
Mexico	0.14	0.02	-0.172	-0.02		0.03		-0.154	
Poland	0.28	-0.10	0.224	0.01	(0.12)	-0.22	(-1.04)	0.118	(6.01)
Singapore	0.66	0.79	0.218	-0.19		0.51		0.117	
South Africa	-0.27	-0.15	0.055	-0.54		0.36		0.024	
South Korea	0.20	-0.63	0.007	0.21		-1.22		0.022	
Sweden	0.41	-0.11	0.148	0.75	(11.04)	-0.63	(-1.99)	0.189	(2.00)
Switzerland	0.09	0.07	-0.054	0.52		0.12		0.029	
Taiwan	0.23	0.04	0.116	-0.08		0.22		-0.086	
Turkey	-0.17	0.05	0.060	-0.20		0.03		0.019	
UK	0.52	-1.03	0.138	0.50		-1.25		0.090	
World	0.42	-0.26	0.081	0.42	(2.81)	-0.29	(-1.73)	0.076	(3.45)

Figure 1: Comparing the Benefits of International Diversification

This figure uses daily data from January 2000 to December 2002 to compare diversification benefits expressed as proportion of average stock variance as the number of stocks increases. U.S. stocks and market index are from CRSP; ADRs, parent stocks, home-matched peers, Global index, ADR index are all from Datastream.