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*The Effects of Market Segmentation and Illiquidity on Asset Prices:  
Evidence from Foreign Stocks Listing in the US*

**Abstract**

We document the effect on share value of a foreign firm listing on the New York, American Stock Exchanges or Nasdaq over-the-counter market. Our sample consists of over 160 firms from 14 countries that listed their shares for the first time in the US as ordinary listings or as American Depositary Receipts (ADRs) from 1976 to 1992. We find that these stocks earned a significant average abnormal return of 0.349% per week during the year before listing, an additional 0.709% during the listing week, but incur a significant average loss of -0.190% per week during the year following listing. The pattern in abnormal returns is shown to be robust to different benchmark models of risk changes and to be significantly related to an increase in the shareholder base and the exchange on which the shares are listed. Cross-sectional regressions provide support for Merton's (1987) investor recognition hypothesis and Amihud and Mendelson's (1986) liquidity hypothesis as partial explanations for the abnormal returns around listing.

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Evidence from Foreign Stocks Listing in the US*

## **1. Introduction**

The globalization of US capital markets has accelerated dramatically in the past decade. The dollar value of security transactions with foreigners have increased from about 8 percent of GDP in 1980 to about 150 percent in 1993 and foreign securities as a fraction of total assets in US pension funds have increased from less than one percent to over 8 percent over the same period.<sup>1</sup> Equity financing has been the driving force in this recent globalization boom. The NYSE estimates that the world's publicly traded equity increased from \$10 trillion to \$17 trillion in only three years from 1990 to 1993, due in large part to the privatization of formerly state-owned enterprises in many countries (\$200 billion worth of state-owned assets from 1991 to 1994)<sup>2</sup> and a massive shift of US institutional investors into foreign equity.<sup>3</sup> American Depositary Receipts (ADRs) have moved to center stage as the equity financing vehicle of choice among foreign firms seeking to raise capital and build a global shareholder base. ADRs are negotiable certificates traded on US exchanges, such as the NYSE or American Exchange (AMEX), or over-the-counter on the National Association of Securities Dealers' Automation Quotation (Nasdaq) system that represent ownership of shares of stock in non-US companies. ADRs are sponsored by a depositary bank (Bank of New

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<sup>1</sup> Statistics are drawn from Bank for International Settlements and the IMF. See *The Economist* "Survey of the World Economy" (October 7, 1995).

<sup>2</sup> See *Euromoney's* "Privatization: Now for the Fight Back" (February, 1996).

<sup>3</sup> Cochrane, Shapiro and Tobin (1995) demonstrate that US investors owning \$7 trillion of the entire \$17 trillion capitalization of world equity markets means that a doubling from 5 to 10 percent of the foreign component of their equity portfolios implied \$350 billion shift into foreign markets. Major corporate pension funds already invest about 12 percent in foreign stocks and plan to double this target to 20 to 25 percent (Committee on Investment of Employee Benefit Assets, 1994).

York, JP Morgan, Citibank, etc.) which provides all stock transfer and agency services, such as maintaining registration of holders, distributing dividends in US dollars and settling broker trades. Growth in ADRs has surged. In 1994 alone, 314 depositary receipt programs were established, a 90 percent jump over 1993, (reaching a total of over 1400 overall programs on the NYSE, AMEX and Nasdaq), with over \$20 billion in new equity financing and over 7 billion shares traded.<sup>4</sup>

The goal of this paper is to study the stock price performance associated with the dual-listing of foreign stocks in US markets. Our sample comprises first-time US listings by 161 foreign firms from Canada, Europe, and the Asia-Pacific Basin region from 1976 to 1992. We are motivated to study this phenomenon because important inferences pertaining to the issue of capital market integration and segmentation can be drawn from the reaction of stock prices to international listings.<sup>5</sup> Segmentation of markets due to investment barriers (e.g., regulatory barriers, taxes, information constraints) create an incentive for firms to adopt financial policies to reduce their negative effects. Theory suggests that stock prices for firms that dually-list from segmented markets will be expected to rise and their subsequent expected returns should fall as an additional built-in risk premium compensating for these barriers dissipates (Stapleton and Subrahmanyam, 1977; Errunza and Losq, 1986; Alexander et

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<sup>4</sup> See *Fortune's Investor's 1995 Guide* "The Rise of ADRs" (March 6, 1995), *Financial Times* "Four-year Surge in ADR and GDR Issues" (November 10, 1994) and *Euromoney* "The Return of ADRs" (December 1995).

<sup>5</sup> Survey papers by Adler and Dumas (1983) and more recently Stulz (1995) argue that an understanding of the extent of international capital market segmentation is a key challenge for research in international finance. Important studies in the asset pricing literature showing growing integration of financial markets include Jorion and Schwartz (1986), Gultekin, Gultekin and Penati (1989), Campbell and Hamao (1992), Mittoo (1992), Chan, Karolyi and Stulz (1992), Bailey and Chung (1995), Bekaert and Harvey (1995), Errunza, Hogan and Hung (1995).

al., 1987). Our overall evidence is consistent with this hypothesis. However, we also report significant differences in abnormal returns across firms by home region in ways inconsistent with the segmentation hypothesis. This new finding contrasts with those of earlier studies of foreign listings in the US, such as Alexander et al. (1988), Jayaraman et al. (1993) and Foerster and Karolyi (1993).<sup>6</sup>

We are also drawn to this question by a second branch of the Finance literature that identify significant changes in share price for firms that choose to change the location for their traded shares from one domestic exchange to another. A number of studies have examined how share price increases for firms that list on the NYSE from the Nasdaq OTC market and have attributed this outcome to increased investor recognition or superior liquidity.<sup>7</sup> Merton (1987), for example, provides a rationale for the effects of greater investor recognition in an extension to the Sharpe-Lintner CAPM which relaxes the assumption of equal information for investors. He shows that expected returns increase with systematic and firm-specific risk but decrease with the size of the firm's investor base, which he characterizes as "the degree of investor recognition." Amihud and Mendelson (1986) develop the liquidity hypothesis in the context of an asset pricing model in which gross returns are an increasing and concave function of liquidity measured by the bid-ask spread. Kadlec and McConnell (1994) show that these two hypotheses can explain in part the abnormal returns to NYSE

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<sup>6</sup> A number of studies have examined stock price reactions for US firms listing their shares abroad, including Howe and Kelm (1987), Howe and Madura (1990), Barclay et al. (1990), Damodoran et al. (1993), Varela and Lee (1993) and Rothman (1995), and Lau et al. (1994).

<sup>7</sup> Baker and Meeks (1991) survey the literature on exchange listings and delistings. Important recent contributions include Sanger and McConnell (1986) and Dharan and Ikenberry (1995) which focuses on the post-listing decline in stock prices following NYSE and AMEX listing and Christie and Huang (1993) which examine the liquidity effects of Nasdaq and AMEX listings to the NYSE using transactions data from the Institute for Study of Security Markets.

listings from Nasdaq for a sample of 273 firms from 1980 to 1989. We propose that a US exchange listing by foreign firms could also be associated with share price changes not due to the effects of investment barriers but due to investor recognition and liquidity factors experienced by purely-domestic exchange listings. We test this hypothesis using information available on changes in shareholder base and capitalization changes due to new issues of equity around the listing period for these foreign firms and find that the abnormal returns before, around and following listing are significantly related to these variables. We interpret this finding as evidence consistent with Merton's investor recognition hypothesis. Finally, we show that the sensitivity of the abnormal returns to shareholder base is different for foreign stocks listing on the NYSE versus the AMEX and Nasdaq, which provides indirect evidence consistent with Amihud and Mendelson's liquidity hypothesis. Finding that foreign stock returns around their US listings is related to investor recognition and liquidity factors is new, although consistent with other recent studies by Foerster and Karolyi (1994), Noronha et al. (1994), Werner and Kleidon (1995), Domowitz et al. (1995).

Section 2 outlines the various hypotheses about stock price effects on international listings. A primer on ADRs is presented in Section 3. Section 4 provides a description of our methodology and data. The main empirical results are presented in Sections 5 and 6. Conclusions follow in Section 7.

## **2. Market Segmentation, Liquidity, International Dual-listings and Share Value**

ADRs have interested the international finance literature because these securities overcome many of the regulatory restrictions, costs and information

problems that comprise barriers to investing in foreign securities.<sup>8</sup> To the extent that these barriers influence how securities are priced in their respective markets, empirical researchers can evaluate the degree to which international capital markets are segmented or integrated. That is, in the context of an equilibrium model of expected returns, they ask whether market risk is “priced” differently in the two capital markets (Black, 1974; Stapleton and Subrahmanyam, 1977; Stulz, 1981; Errunza and Losq, 1986, Alexander et al., 1987). If markets are segmented, firms have an incentive to adopt policies to mitigate the negative effects of investment barriers and promote the positive effects of international diversification by: direct foreign investment, mergers with foreign firms or dually listing their shares for trading on a foreign capital market (Stapleton and Subrahmanyam, 1977). Theory suggests that dually-listing shares abroad between two segmented markets would lead to a higher equilibrium market price for a given stock and a lower expected return (Stapleton and Subrahmanyam, 1977; Alexander et al., 1987). Errunza and Losq (1986) model a two-country context of “partial segmentation” in which investment barriers were asymmetric: country A’s investors could invest in country B’s securities, but country B’s investors were prohibited from investing in country A’s securities. They show that country B’s securities will be priced as if markets were completely integrated, but that country A’s securities will command a “super” risk premium. If a security from country A were to

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<sup>8</sup> Investment barriers are usually grouped into “direct” and “indirect” costs. Direct costs comprise regulatory frictions due to foreign exchange controls, withholding taxes, international tax treaties, limitations on foreign ownership of capital and dividend payments, and higher brokerage and trading costs. Indirect costs stem from higher monitoring costs due to lack of information about the foreign firms, due, for example, to more lax disclosure requirements, or to non-synchronous business and trading hours.

dually-list their shares in country B, the super risk premium would disappear and the expected return would decrease. Eun and Janakiramanan (1986) argue that this super risk premium is also a function of the relative degrees of risk aversion of investors in both countries.<sup>9</sup>

Alexander et al. (1988) were the first to study price reactions for 34 firms from six different countries that were listed on either the NYSE, AMEX or Nasdaq between 1962 to 1982. They demonstrate that the cumulative abnormal returns (CARs) for their non-Canadian benchmark sample of firms increase by an annualized 17 percent in the two years before listing and fall by an annualized 33 percent over the three years following listing. The CARs for the Canadian sample were considerably smaller in both periods which they interpreted as evidence consistent with the market segmentation hypothesis. Foerster and Karolyi (1993) investigate a larger sample of 52 Canadian firms over the 1980 to 1991 period and find a much more dramatic reaction on the order of an annualized 21 percent run-up in the 100-day pre-listing period and an annualized 22 percent post-listing decline. They interpret this finding as evidence of segmentation between Canadian and US markets, consistent with other findings by Booth and Johnston (1984), Jorion and Schwartz (1986), and Mittoo (1992). Recently, Urias (1994) has uncovered similar effects for emerging market stocks from Chile and Venezuela.

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<sup>9</sup> By contrast, Black (1974) and Stulz (1981) introduce a model with diversification costs defined in the form of a proportional tax on the amount invested in one country. They show that investors will be biased toward domestic securities not because of differences in investment and consumption opportunities, but because the benefits of diversification are unable to overcome the deadweight costs of the tax.

The effect on share value of listing on the NYSE by OTC Nasdaq stocks has been the focus of empirical investigation for many years (Ying et al., 1977; Sanger and McConnell, 1986), but only recently with the development of transactions databases have studies considered the importance of liquidity as a factor in this decision. Christie and Huang (1994) and Kadlec and McConnell (1994) show that the effective spreads on Nasdaq stocks that list on the NYSE drops significantly. They interpret this finding as consistent with Amihud and Mendelson (1986) who show in their analysis of capital market equilibrium that expected returns are an increasing function of liquidity measured in terms of the bid-ask spread. If spreads drop following listing, the lower expected returns required by investors should give rise to an increase in share value. Kadlec and McConnell (1994), however, also show that the abnormal returns to NYSE listings from Nasdaq are also associated with an increase in the firm's shareholder base. They interpret this finding as consistent with Merton's (1987) extension of the Sharpe-Lintner CAPM with incompleteness in which investors only invest in those securities of which they are aware. This modification allows expected returns to increase with systematic risk, firm-specific risk and relative market value and to decrease with the relative size of the firm's investor base.

A number of recent studies have used transactions data on foreign stocks dually-listing in the US. Foerster and Karolyi (1994) show that Canadian firms listing in the US during the 1980s obtain lower average bid-ask spreads, but that this depends on the extent to which trading volume and order flow is "fragmented" between the US exchange and the Toronto Stock Exchange following listing. Werner and Kleidon (1995) show that intraday patterns in UK ADRs on the NYSE resemble those of other

US stocks and are not affected domestic factors, which they interpret as evidence of fragmentation. Domowitz et al. (1995) examine daily data on spreads, volume and volatility around Mexican ADR listings and find that the impact on liquidity depends on the extent of ownership restrictions. Finally, Noronha et al. (1994) document a small liquidity impact in terms of bid-ask spreads on the NYSE for US firms listing on Tokyo.

In summary, previous research suggests that international listing will lead to a reduction in expected return on a security if the capital markets from which they originate are segmented completely or partially. If the segmentation hypothesis is correct, we should observe several patterns related to foreign firms listing in the US: (1) risk factor sensitivities to home market risk should decrease and to US market risk should increase upon interlisting; (2) abnormal returns around interlisting should vary across stocks by domicile in ways related to differences in degrees of market segmentation; and, (3) inferences about changes in home and US market risk sensitivities and abnormal returns should be robust to different benchmark measures that allow for currency risk and that allow risk measures to vary conditionally over time with changing macroeconomic conditions. Research on domestic listings also implies important cross-sectional differences in abnormal returns related to differences in liquidity or the magnitude of the shift in shareholder base. If the investor recognition hypothesis of Merton (1987) or the liquidity hypothesis of Amihud and Mendelson (1986) is correct, we should further expect: (a) abnormal returns around listing and the decline in post-listing returns to be related to firm-specific risk and the change in shareholder base; and (b) abnormal returns around listing to be related to

listing location (more liquid NYSE versus Nasdaq, for example). We also control for other related factors, such as firm size, industrial composition of listing firms, the type of ADR listing (capital raising or straight exchange listing), size of new equity issue, and reputation of the depository institution.

### **3. A Primer on ADRs**

ADRs were developed by JP Morgan in 1927 as a vehicle for investors to register and earn dividends on foreign stock without direct access to the foreign market itself. US Depository banks hold the foreign securities in custody in the country of origin and convert all dividends and other payments into US dollars to certificate holders in the US. US investors, therefore, bear all currency risk and pays fees to the depository bank. Each depository receipt denotes shares which represent a specific number of underlying shares in the home market and new receipts can be created by the bank for investors when the requisite number of shares are deposited in their custodial account in the home market. Cancellations or redemptions of ADRs simply reverse the process.

An alternative option to firms' seeking a US listing is a direct "ordinary" listing, which is less costly and more efficient. These ordinary listings must take place on a US exchange. They require an exact replication of settlement facilities as for US securities but have somewhat different GAAP (Generally Accepted Accounting Principles) reporting and SEC registration requirements. Canadian firms are the only

firms that maintain ordinary listings.<sup>10</sup> For example, US and Canadian companies file Form 10-K due within 90 days of their fiscal year-ends and Form 10-Q quarterly, whereas non-Canadian foreign issuers trading as ADRs file an annual Form 20-F within only 180 days of fiscal year-end which is less extensive (e.g. fewer footnotes on income taxes, leases, pensions, industry and geographic segment information) and can be based on home country accounting practices.<sup>11</sup>

There are, of course, a number of advantages to ADRs for issuers, including an enlarged investor base, enhanced local market for shares, opportunity to raise new capital and a liquid secondary market in the US. Several different options are available to issuers to balance these advantages with the costs associated with increased scrutiny by the SEC and reconciliation with GAAP reporting requirements. ADRs are usually sponsored by a foreign company seeking access to US markets, but can also be unsponsored, as an initiative by a US securities broker. The ADR issues can also be associated with new capital raised through the program, though usually not. Table 1 outlines the different options with listing, reporting and GAAP requirements. Level 1 ADRs trade OTC as Pink Sheet issues with limited liquidity and require only minimal SEC disclosure and no GAAP compliance. These firms are exempt from SEC filing

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<sup>10</sup> See Cochrane, Shapiro and Tobin (1995) for a discussion of registration and trading of foreign securities in the US including exemptions and key SEC accounting accommodations made. Biddle and Saudagaran (1992) and recently Frost and Kinney (1996) study disclosure choices among foreign registrants in the US. The recent case of Daimler-Benz's Level 2 NYSE listing in October 1993 as the first German firm in the US prompted new attention to disclosure issues (Radebaugh et al., 1995).

<sup>11</sup> Toronto-based Environmental Technologies International, Inc. in 1993 was the first Canadian firm to create an ADR and it is currently traded on Nasdaq's National Market System. As a result, it is required to keep quarterly books in accordance with Canadian GAAP only (*Financial Post*, May 12, 1993). Another advantage accorded to Canadian firms listing in the US is the Multijurisdictional Disclosure System (MJDS) which is an on-going discussion among US and Canadian regulators to harmonize GAAP procedures. Canada's Cott Corp., a beverage and soft drink maker, was the first to list on Nasdaq under the auspices of the MJDS in 1994.

under Rule 12g3-2(b) allowing home country accounting with adequate English translation, if necessary. As of September 1995, 1,173 of 1500 foreign securities in the US trade as Level 1 ADRs. Level 2 ADRs are exchange listed securities, but without a capital-raising element. Level 3 ADRs, the most prestigious and costly type of listing, require full SEC disclosure and compliance with exchange's own listing rules. Finally, Rule 144A, known as RADRs, are capital-raising issues in which foreign securities are privately placed to qualified institutional buyers (QIBs) and, as a result, do not require compliance with GAAP or SEC disclosure. These securities trade OTC among QIBs with very limited liquidity. As of June, 1995, Level 1 programs comprised 55 percent of new ADRs, 23 percent were private placements and 22 percent were exchange listed on the NYSE, AMEX or Nasdaq.

#### **4. Data**

The initial sample of new listings in the US includes all 317 exchange-listing ADR applications that were successful between 1976 to 1992. The sample and listing dates was obtained directly from the NYSE, AMEX and Nasdaq Economic Research departments and were verified in publications like the *NYSE Fact Book*, *AMEX Fact Book*, *Moody's International Manuals* and *Standard and Poor's Stock Reports*.<sup>12</sup> To be included in the sample, the ADR program had to be the first US listing for the firm (i.e., not a transition from RADR private placement to exchange listing ADR) and had

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<sup>12</sup> Announcement dates were not available. Citibank's Securities Services department (*An Information Guide to Depositary Receipts, 1995*) estimates about a 9-week horizon for a Level 1 ADR between establishing a program launch (US counsel, depositary bank) and the start of Pink Sheet trading, a 14-week period for Level 2 or 3 ADRs. The RADR programs require only a 7-week period.

to have weekly (Friday closing) home-market stock price, exchange and stock index quotes data available for 50 weeks before and 50 weeks after the listing date.<sup>13</sup> Our primary data source for prices and exchange rates was Reuter's Exshare International Securities Database, which was accessed using Reuterlink™, its on-line data service. We cross-checked stock price using various English-language sources, including *The Japan Times*, *Asian Wall Street Journal*, *Jerusalem Post*, *Financial Times* and *Wall Street Journal*. Canadian stock price information were obtained directly from the Toronto Stock Exchange/University of Western Ontario database. Listings before 1976 were excluded because of Reuter's Exshare database limitations.

The final sample consists of 161 listings from 14 different countries in four regions of the world, including Europe, Canada, Asia and Australia. Appendix A lists the firms by country with associated listing date. The largest contingent is comprised of the 68 Canadian firms, all of which were non-ADR or ordinary listings, followed by the 36 UK issues, 26 from Europe (excluding UK), 15 Australian issues and 11 Asian listings (all but one from Japan). Table 2 provides summary statistics for the sample organized by home region, listing exchange, industry group, listing year, and type of issue. Several facts are noteworthy. First, the accelerating trend for listings is visible with over 59 new listings in the 1989-92 four-year period in contrast with 12 in 1976-80 or 28 between 1981-1984. Most of the listings (93) occur on Nasdaq and this is dominated by many smaller, resource-based Canadian firms. Overall, however, there is an even distribution across industrial, financial, technology and utility sectors. ADR firms tend to be very large with an average capitalization of \$3 billion, although the

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<sup>13</sup> Exchange rates are based on Friday 10am midpoint quotes from Reuter's Exshare.

distribution is positively-skewed with a median of only \$698 million. We also document that 32 of the ADR issues were capital raising, by studying the descriptions in *Moody's International Manuals* in the year immediately following listing. For each firm, we noted the size of the ADR program in terms of the number of ordinary home-market shares represented, offer price, depository and investment banking syndicate.<sup>14</sup> This may be a conservative count. Finally, we recorded, where available, the depository institution for each ADR accounting for 76 firms. JP Morgan, Bank of New York, Citibank are the primary depository institutions in our sample.<sup>15</sup>

To proxy for changes in shareholder base of each firm, data on the number of registered shareholders for each security are collected prior to the listing announcement and subsequent to listing. These data are obtained directly from *Moody's International Manuals* for the year immediately preceding and following the recorded listing date, as available. Missing observations were supplemented by *Standard and Poor's Stock Reports*. Table 2 shows that for 152 of the ADR firms for which data are available, the mean number of registered shareholders in the year before listing is 48,800, although the sample is strongly positively-skewed with a median of only 9,000. The maximum of 740,000 shareholders belongs to Telefonos de Mexico. On average, the change in shareholder base is positive at 28.8 percent with a median of 9.2 percent. The extreme outliers at 479 percent (Northern Telecom,

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<sup>14</sup> For example, Citibank announced the Level 3 issue for France's Alcatel Alsthom of 10 million American Depositary Shares representing 2 million home market shares at \$23.625 per ADS (proceeds of \$22.795 to company) on May 19, 1992 through Morgan Stanley & Co., Goldman Sachs & Co., Merrill Lynch & Co. and associates. Proceeds for general corporate purposes. Alcatel is an NYSE-listed ADR.

<sup>15</sup> Euromoney (December 1995) estimates that Bank of New York, JP Morgan and Citibank hold more than 95 percent of the ADR market, dominated by BONY at 81 percent alone.

Canada) and -86.7 percent (Petromet Resources, Canada) arise for firms with very low initial bases (below 1500 shareholders).

## **5. Results**

### *A. Pre- and Post-listing Returns Performance*

Summary statistics for weekly returns of ADRs around the listing dates are presented in Table 3. We report both mean excess returns and their standard deviations in local currency and US dollar-denominated terms for all firms and separately by region. The returns are computed in excess of weekly one-month Eurodollar quotes, which were obtained directly from Harris Bank *Foreign Exchange Weekly*.<sup>16</sup> We compute the average weekly returns before listing (Weeks -50 to -2), around listing (Weeks -1 and 0) and after listing (Weeks +1 to +50).

The general pattern of excess returns is similar to that in other studies of interlistings (Alexander et al., 1988; Foerster and Karolyi, 1993). The returns increase by 0.46 percent per week during the period before listing, which is statistically and economically significant. The cumulative return over the 12-month period corresponds to about 26.95 percent. The excess returns are significantly positive during the listing week period, with an average return of 0.88 percent per week. Finally, the cumulative returns dissipate after listing to a significant extent with an average weekly post-listing decline of 0.21 percent. This corresponds to an annualized cumulative return of 11.53 percent, which yields a net cumulative return of 15.87 percent over the entire two-year period.

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<sup>16</sup> We are grateful to Nelson Mark for providing us with this data.

To explain this dramatic return pattern around the listing decision, Alexander et al. (1988), Foerster and Karolyi (1993) and many others proposed the market segmentation hypothesis. That is, since equilibrium expected returns compensate for direct or indirect investment barriers in the form of a super risk premium, the foreign stock price should rise upon interlisting the shares in the US and its expected return should decline. These studies further posit that the returns pattern should be greater for firms for which the domicile market is more likely to be segmented from the US market (e.g. emerging markets) and smaller for firms for which the domicile market is more integrated with that of the US (e.g. Canada). Unlike the early Alexander et al. (1988) findings, we show in comparisons across different regions that the stock price reactions for the Canadian firms are at least as dramatic as most of the others. For example, the Canadian firms on average achieve an average pre-listing stock price rise of 0.46 percent, equal to that of the entire sample. This contrasts with the largest average weekly rise for the Australian firms of 1.19 percent and with the negligible run-ups for Asian firms. The large positive excess returns around the listing week for the Canadian firms is similar to that experienced by the UK firms but surprisingly lower than that for the European (excluding UK) and other (two Mexican, two Israeli and one South African) firms. Finally, the post-listing declines also exhibit considerable variation by region, although not in a way predictable by the segmentation hypothesis. The largest declines stem from the Australian firms (-1.10 percent per week) and for the Asian, UK and European firms the post-listing returns are surprisingly positive.

## *B. Risk Adjusted Performance Measures*

In order to isolate patterns in expected returns around interlistings, existing studies, such as Alexander et al. (1988), Howe and Kelm (1987), Foerster and Karolyi (1993), Damodaran et al. (1993) and Lau et al. (1994), employ standard event study methodology pioneered by Fama et al. (1969) in which expected returns derive from the Sharpe-Lintner Capital Asset Pricing Model (CAPM). This is a limiting approach for several reasons. First, the expected returns are proportional to a market covariance risk (beta) and the excess return on a benchmark portfolio, both defined relative to a domestic stock market index. Asset pricing studies, however, have demonstrated that additional risk mimicking factors are better at describing the cross-section of expected returns (Fama and French, 1992, 1993). In an international context, in particular, it seems appropriate for a firm listing in a foreign market to calibrate its exposure to foreign market risks and perhaps exchange rate risks in measuring expected returns.<sup>17</sup> Second, the nature of these local and foreign market risks are changing over time, not only due to firm-specific factors (changes in capitalization, new equity issues) around interlistings, but also due to changing macroeconomic conditions, in general.<sup>18</sup>

To generate excess returns around the interlisting, we estimate an unconditional CAPM model with both domestic and foreign market risk, where the latter is computed relative to the weekly excess return on the Standard and Poor's (S&P) 500 stock index. That is,

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<sup>17</sup> Empirical studies by Harvey (1991), Chan, Karolyi and Stulz (1992), and Dumas and Solnik (1995) focus on the pricing of domestic and foreign market risks as well as currency risks for stocks. See survey by Stulz (1995).

<sup>18</sup> Ferson and Harvey (1993) investigate the sources of predictability in national equity market returns and its relation to global risks using single- and multi-beta models

$$\varepsilon_{it} = R_{it} - [\alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US}]$$

(1)

where  $\varepsilon_{it}$  is the excess return for security  $i$  at week  $t$ ,  $R_{it}$  is the excess return on security  $i$  at week  $t$ ,  $R_{mt}^{LO}$  and  $R_{mt}^{US}$  are the excess returns on the local and S&P 500 indexes; and  $\alpha_i$ ,  $\beta_i^{LO}$  and  $\beta_i^{US}$  are least squares parameters estimated over different returns horizons in event time.<sup>19</sup> The returns are denominated in local currency and US dollars and are defined in excess of the weekly yield of the one-month Eurodollar rate for US dollar returns and in excess of weekly yields of one-month Euromarket rates for the Canadian dollar, UK sterling, German mark, Japanese yen and French franc, where appropriate.<sup>20</sup> The two-factor model in (1) is estimated separately over the pre-listing period (Weeks -50 to -2) and the post-listing period (Weeks +1 to +50), which allows us to observe important changes in risk exposures for the dual-listing stocks.<sup>21</sup> Mean prediction errors, or abnormal returns, are computed over the event window (Weeks -1 to 0). All test statistics are computed according to the methodology described in Brown and Warner (1985) in addition to a nonparametric binomial test for the percentage of firms with positive abnormal returns.

We extend the model in (1) two ways: (i) to allow for currency risk; and (ii) to allow market risk factors (betas) to change with information variables related to

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<sup>19</sup> Local market indexes chosen for the analysis are all from Reuter's Exshare database, except the TSE/Western index for Canada. All indexes are listed in Appendix B.

<sup>20</sup> Data was not available on Euromarket rates for each country from which sample firms originate. For local currency, excess returns, we make arbitrary assignments, such as Euromark rates for Europe, except UK and French firms, Euroyen rates for all Asian and Australian firms, US Eurodollar rates for all others, except Canadian firms.

<sup>21</sup> Howe and Kelm (1987), Howe and Madura (1990) and Jayaraman et al. (1993) all report statistically significant increases in the covariance or total risk of US firms that list on overseas exchanges or foreign stocks listing in the US. Barclay et al. (1990) demonstrate for Japanese listings of US firms no impact on close-to-open return variances.

macroeconomic conditions. First, we add a factor to the model to capture the sensitivity of local currency or US-dollar-denominated excess returns to contemporaneous weekly exchange rate changes,  $R_{FXt}$ , which is different for each firm by country of origin.

$$\varepsilon_{it} = R_{it} - [\alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US} + \beta_i^{FX} R_{FXt}] \quad (2)$$

We denote this Model 2 in the text and tables. Second, we allow for each of the  $\beta_i$  estimates to change conditionally with information variables,  $Z_t$ , which are available on a weekly basis. We refer to this conditional CAPM model as Model 3. It is similar in spirit to that employed by Shanken (1990), and recently Ferson and Schadt (1996) and Jagannathan and Wang (1996).

$$\varepsilon_{it} = R_{it} - [\alpha_i + \beta_i^{LO}(Z_t) R_{mt}^{LO} + \beta_i^{US}(Z_t) R_{mt}^{US} + \beta_i^{FX}(Z_t) R_{FXt}] \quad (3)$$

where  $\beta_i(Z_t)$  are the time  $t$  conditional market betas for stock  $i$  in week  $t$  relative to the local and US market index and the foreign currency return. We assume that investors condition their forecasts about future market and currency risks through *linear* projections on past information variables,

$$\beta_i(Z_t) = \beta_{0,i} + \sum_k \beta_{k,i} z_{kt} \quad (4)$$

where  $z_{kt}$  are the  $k$  different information variables that comprise  $Z_t$ . The coefficient  $\beta_{0,i}$  can be interpreted as an “average beta,” or the unconditional mean of the conditional beta and the elements  $\beta_{k,i}$  are the response coefficients with respect to the information variables. Equation (4) can be applied to the covariance risk function for the excess return on the local market index,  $R_{mt}^{LO}$ , the S&P 500 index,  $R_{mt}^{US}$ , and foreign

exchange rate,  $R_{FXt}$ . The information variables include Harris Bank quotes for currency forward term spreads between six- and one-month Eurodollar rates and for other Eurocurrency rates (as appropriate), spreads between one-month Eurodollar and other Eurocurrency rates, and the US dividend yield, obtained from the Center for Research in Security Prices (CRSP). Conditional versions of the Sharpe-Lintner CAPM has been shown to perform well in describing the cross-section of security returns (Ferson, 1995; Jagannathan and Wang, 1996).

We also employ an alternative event study methodology to study the abnormal excess returns to international dual-listing during the pre- and post-listing periods. Specifically, we draw on the methodology of Schipper and Thompson (1983) in which we pool the cross-section and time series of returns to estimate our benchmark two-factor CAPM model,

$$R_{it} = \alpha_i D_{it} + \alpha_i^* (1-D_{it}) + \beta_i^{LO} R_{mt}^{LO} D_{it} + \beta_i^{LO*} R_{mt}^{LO} (1-D_{it}) + \beta_i^{US} R_{mt}^{US} D_{it} + \beta_i^{US*} R_{mt}^{US} (1-D_{it}) + \gamma_i LIST_t + \epsilon_{it} \quad (5)$$

where  $D_{it}$  is a dummy variable that equals one if observations in from pre-listing period (Weeks -50 to -1),  $\alpha_i^*$ ,  $\beta_i^{LO*}$ ,  $\beta_i^{US*}$  are parameters that correspond to those for the post-listing period (Weeks +1 to +50) and  $LIST_t$  is a dummy variable that equals one for the weeks around the dual-listing date for firm  $i$ . The advantage of this methodology is that we can measure the pre- and post-listing returns after adjusting for market covariance risks in addition to just the event-period abnormal returns using conventional event study methods. A distinct disadvantage is that by pooling cross-sectionally across the firms, we average the beta risk measures. However, in the next section, we compute these results separately by firm for the univariate and cross-

sectional regressions and identify no major distortions or outliers that should generate concern about the pooled estimation.

Equation (5) corresponds to our model of expected returns that capture both the local and US market risks in Model 1. We also allow for foreign exchange risks (Model 2 in equation 2) and for time-varying conditional market and foreign exchange betas (Model 3 of equations 3 and 4) using the Schipper and Thompson (1983) methodology to be different across pre- and post-listing periods.

Tables 4 and 5 present results on the CAPM model regressions for local-currency and US-dollar-denominated excess returns, respectively. We report the coefficients of the models separately for the pre- and post-listing periods for each of our three benchmark models. For each subperiod in event time, we report the adjusted  $R^2$  and t-statistics which are computed using Newey and West (1987) standard errors correcting for heteroscedasticity and serial correlation (up to six lags). We also compute an F-statistic with p-value which corresponds to a test across models for the null hypothesis that the coefficient for additional foreign exchange return,  $R_{FXt}$ , is zero (Model 2 versus Model 1) and that the coefficients for the information variables interacting with local and US market excess returns and the foreign exchange return is zero (Model 3 versus Model 2). Finally, the final column reports an F-statistic for the Chow test of structural break for the pre- and post-listing coefficients on the local and US market and foreign exchange returns.

Overall, with local currency returns, we find that in the pre-listing period that the average beta on the local market excess return is close to one (1.056) and that of the US market beta is insignificantly different from zero. By contrast, the post-listing

local market betas drop by half to 0.512 and the US market beta increases to 0.164 which is significantly different from zero. The p-value for the Chow test for structural break indicates that this change is statistically significant; the drop in  $R^2$  from 13.35 percent to only 3.95 percent indicates that this result may also be economically important. Important changes in the risk exposure are occurring for firms interlisting their shares in the US market: the exposure to the local market risk is dissipating in favor of greater exposure to US market risk.

Even after we adjust for these changes in risk, however, interlisting firms still generate statistically and economically significant abnormal returns, as measured by the  $\alpha_i$  coefficients, in pre- (0.349 percent per week) and post-listing (-0.190 percent per week) periods. This suggests that the abnormal returns performance around interlistings is robust to changes in expected returns that are captured by shifts in risk exposure.

To assess whether our inferences about these structural tests are sensitive to different benchmarks for risk, we compare our results with Model 2 that allows for foreign exchange risk. Interestingly, we reject the null that the beta coefficient for the foreign exchange return is zero. The beta,  $\beta_i^{FX}$ , is statistically significantly negative in the pre-listing period (-0.147) and this jumps to a significantly positive coefficient (0.768) in the post-listing period. The other beta coefficients and abnormal returns are essentially intact. This finding suggests important changes in the currency risk exposure are occurring for these interlisting firms. Finally, results for the conditional

CAPM model (Model 3) are somewhat weaker.<sup>22</sup> The p-value is less than 0.001 so that we can reject that the conditional time-varying betas with the information variables are zero and the Chow tests still reject the null that the model coefficients are the same across the pre- and post-listing periods. However, the increase in the S&P 500 beta is now smaller (0.067 in the post-listing period) compared to Models 1 and 2 and it is marginally significant only at the 10 percent level. The local market beta, foreign exchange rate beta and the pattern in abnormal returns across listing periods are robust, however.

Table 5 shows that the overall similar results obtain for US-dollar-denominated returns also. For the unconditional two-factor CAPM benchmark model, we find, however, that the increase in US market risk is weaker ( $\beta_i^{US}$  is only 0.012 post-listing versus 0.063 pre-listing, both insignificant from zero). With the Model 2 that incorporates foreign exchange risk, the familiar pattern returns for all risk changes. Finally, our inferences about the relative success of the two models and how the structural break around interlisting affects the beta coefficients and the abnormal returns in  $\alpha_i$  are unchanged.

Both Tables 4 and 5 report similar results by groups of firms according to the region of their home market. We find important differences. First, the dramatic shift in local market betas is evident for the Australian stocks in both local currency and US-dollar returns.  $\beta^{LO}$  falls from about 1.579 during the pre-listing period to 0.839 during

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<sup>22</sup> We only report the average beta coefficients for the conditional CAPM estimates, i.e. those that correspond to  $\beta_{0,i}$  in equation (4) for the local, US excess returns and foreign exchange rate returns. The interactive beta coefficients with the information variables,  $\beta_{k,i}$  are available from the authors.

the post-listing period;  $\beta^{US}$  increases from a small negative value (-0.152) to a statistically significant 0.313. The pattern in foreign exchange rate risk and overall abnormal returns is similar to the overall sample. For the Canadian firms, the significant positive abnormal pre-listing returns (0.532 percent per week) and negative abnormal post-listing returns (-0.291 percent per week) obtain, as in Foerster and Karolyi (1993), except unlike other markets, the local market betas are significant and those of the US market beta are not, even during the post-listing period. This may stem from the high correlation between the TSE/Western index and the S&P 500 (0.78 on average for 1980-89). Also noteworthy is that the exchange rate beta increases from a significantly negative value of -0.798 to almost zero (0.085), similar in both local currency and US dollar returns. Both Europe (excluding UK) and the UK sample of ADRs retain the familiar increase in pre-listing abnormal returns, but do not yield a significant decline in post-listing abnormal returns (statistically significant 0.228 percent per week for Europe and 0.057 percent per week for UK). The local market betas do drop to one third their pre-listing values (0.572 to 0.153), but the increase in US market betas obtain significantly only for the European ADR sample. Finally, the Asian and other (Mexican, Israeli and South African) ADRs generate some strange results with only weak and negative pre-listing abnormal return run-ups, respectively, although both have negative post-listing abnormal returns. The local market risk drops significantly after listing in the US, but the familiar increase in US market betas does not result.

In order to observe the time series patterns in abnormal returns in event time, we compute estimates of the two-factor unconditional CAPM model using Ibbotson's

(1975) RATS model (Regression across Time and Securities). That is, we re-estimate equation (5) pooled across all securities (and by regional groups), but in event-time on a week-by-week basis. We obtain estimates of the coefficients ( $\alpha_i$ ,  $\alpha_i^*$ ,  $\beta_i^{LO}$ ,  $\beta_i^{LO*}$ ,  $\beta_i^{US}$ ,  $\beta_i^{US*}$ ) for each week  $\tau$ , where  $\tau$  runs from -50 to +50, listing week corresponding to  $\tau$  equal to zero. The cumulative values for the  $\alpha_i$ 's are computed. Figure 1 exhibits the results by region. The cumulative abnormal returns pattern for the Australian and Canadian firms follow most clearly the pre-listing run up and post-listing decline. The drop for the Australian stocks occurs about Week 5, whereas that for the Canadian stocks is more gradual. The cumulative abnormal returns for the European and UK firms follow a steady increase for the entire pre- and post-listing period. The Asian ADRs demonstrate no discernible pattern at all.

We have computed measures of abnormal returns for a cross-section of ADRs before, around and following their US listing. This pattern is robust even after accounting for statistically important risk changes around the listing. Further, these abnormal returns patterns differ by region, but not necessarily in a way predicted by our theories about market segmentation or integration. Our next step is to examine whether there are important differences in these abnormal returns that are related to firm-specific variables, such as the listing location, the industry group to which the firm belongs and the type of ADR program.

### *C. Univariate Cross-sectional Tests*

Table 6 reports dummy variable regressions of the abnormal returns on different variables by industry group, listing location and type of ADR program. The first panel is for local currency returns, the latter panel, for US-dollar-denominated

returns. The abnormal returns are computed as described in the previous section using the Schipper and Thompson (1983) methods for pre- and post-listing periods and using the traditional event-study method abnormal returns for the listing weeks (Weeks -1 and 0). We test for differences across categories using an F-statistic (with p-value) of the null hypothesis that the coefficients for the dummy variables are zero and we also report the adjusted  $R^2$  for the regression.

The first two sections of each panel report differences across regions for each of the three models. For the pre- and post-listing periods, these are identical to those average  $\alpha_i$ s presented in Tables 4 and 5. However, for the listing weeks, we note that on average the ADR firms yield a statistically significant positive abnormal return of about 0.709 percent per week. This is a substantial jump and the finding is robust to any of the three benchmark models of expected returns. The fraction of firms with positive abnormal returns in the post-listing weeks ranges from 51 to 56 percent of the firms, which are significant using the non-parametric binomial test. The differences across regions in the second part of each panel indicate similar patterns to those uncovered above. Indeed, when we test whether the regional differences are significant, we generally reject the null with p-values ranging from 0.09 to 0.01.

When comparing the abnormal returns for ADR listings by exchange location, we find no important differences on average. The Nasdaq listings seem to generate higher positive abnormal returns not only in the pre-listing period, but also smaller declines than AMEX firm following listing and highest of all three exchanges during the listing weeks. However, the p-values for the F-statistic of the null that they are equal range from 0.434 to 0.753. The bottom of the panel indicates that differences in

abnormal returns across ADRs according to depository institution are also small. ADRs for the Bank of New York, which is responsible for the vast majority of new ADRs in the market and for 45 percent of our sample, generate moderate pre-listing abnormal returns, but achieve positive abnormal returns during the listing weeks and surprisingly also in the post-listing period. The ordinary/non-ADR listings (primarily the Canadian sample) and the Chemical Bank ADRs (e.g., Coles Myer, National Australian Bank, Western Mining of Australia, Montedison of Italy, Makita and Pioneer of Japan) are associated with the negative post-listing declines. Again, however, the differences are not significant by the F-statistic.

Industry differences appear to be statistically and economically important across the ADR sample. For the pre-listing period, the abnormal returns increase consistently but differences range from as low as 0.028 percent per week for the Utilities to 1.154 percent per week for the Technology stocks. Similarly, the post-listing decline for the Technology stocks is the highest, and contrasts nicely with the post-listing increase observed for the Utilities. The p-values for the F-statistic that these coefficients are equal range from 0.011 to 0.072 for the pre-listing period and from less than 0.001 to 0.045 in the post-listing period. The listing period abnormal returns are also different but with a shorter returns horizon, the F-statistic has limited power to reject the null that they are equal. These results are consistent with earlier findings of differences across industry sectors in Foerster and Karolyi (1993) and

complement those studies examining the important role of industrial structure in international diversification strategies.<sup>23</sup>

## 6. Abnormal Returns and Changes in the Shareholder Base

### A. Merton's (1987) Investor Recognition Hypothesis

Merton's (1987) analysis of capital market equilibrium is distinct from that of the Sharpe-Lintner CAPM in that investors consider only securities of which they are aware, an assumption about incomplete information. With this assumption, Merton shows that expected returns depend on other factors than just market risk; specifically, the shadow cost of incomplete information for stock  $i$  is given as,

$$\lambda_i = \delta \sigma_i^2 x_i (1 - q_i)/q_i \quad (6)$$

where  $\delta$  is the coefficient of aggregate risk aversion,  $\sigma_i^2$  is the firm-specific component of the stock's return variance,  $x_i$  is the relative market value of the firm, and  $q_i$  is the size of the firm's investor base relative to the total number of investors. The expected excess return of the stock,  $E(R_i)$  is related to that,  $E(R_i^*)$ , for the complete information case (where  $q_i=1$ ), by

$$E(R_i) - E(R_i^*) = \lambda_i E(R_i^*)/R_0 \quad (7)$$

where  $R_0$  is the return on the zero-beta asset. The intuition behind the result is that since investors consider only a part of the opportunity set, full diversification is not

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<sup>23</sup> Roll (1992) and Heston and Rouwenhorst (1994) debate the importance of industry and country factors in international stock returns. Recent evidence is also found in Karolyi and Stulz (1996) and Griffin and Karolyi (1995).

possible and firm-specific risk is priced with a higher premium in equilibrium. Moreover, this firm-specific risk is weighted by the relative market value. One might expect that for firms with a relatively small shareholder base, these factors are likely to be very significant, on average. Indeed, firms would have incentives to incorporate policies that actively expand the investor base of the firm's shares. For foreign firms interlisting their shares in the US, we know that this is one of the primary motivations.

We construct an empirical proxy for the shadow cost of incomplete information,  $\lambda_i$ , for each firm, following Kadlec and McConnell (1994). Specifically, we measure the change in  $\lambda$  around the interlisting by,

$$\Delta\lambda_i = \sigma_{\epsilon_i}^2 \text{SIZE}_i (1/\text{SHR}_{t+1} - 1/\text{SHR}_t) \quad (8)$$

where  $\sigma_{\epsilon_i}^2$  is the residual variance from our two-factor CAPM benchmark model regressions, as in equation (5),  $\text{SIZE}_i$  is the US-dollar market capitalization of the ADR firm as measured by the price of the stock in Week 0 and the number of shares outstanding, and is indexed by the level of the S&P 500 stock index as at the end of the year before listing.  $\text{SHR}_t$  is the number of shareholders of record in the year before (t) and after (t+1) listing. The data on the number of shares outstanding and the shareholders of record are obtained from various publications of *Moody's International Manuals* in the year before and after listing.. Due to data availability, our sample is pared down to only 152 firms.

In Section 3 and Table 2, we demonstrated that ADR firms experience an increase in their shareholder base by about 28.8 percent. The investor recognition

hypothesis of Merton (1987) suggests that the abnormal returns experienced by ADR firms during the pre- and post-listing period may be due to changes in the shareholder base, adjusted by the stock's residual variance and relative size. We follow Kadlec and McConnell (1994) and use cross-sectional regressions:

$$AR_{it} = \gamma_0 + \gamma_1 \Delta\lambda_i + e_{it}$$

(9)

where  $AR_{it}$  is the pre- or post-listing or listing week abnormal returns. Given  $\Delta\lambda_i$  is negative for most firms with an increase in shareholder base, we expect that  $\gamma_1$  will be significant and negative in the cross-sectional regressions.

#### *B. Amihud and Mendelson's (1986) Liquidity Hypothesis*

Amihud and Mendelson (1986) develop an equilibrium asset pricing model in which gross returns are shown to be an increasing and concave function of liquidity. They proxy for liquidity using the bid-ask spread. Unlike studies of the share price and liquidity impact of Nasdaq firms listing on AMEX or the NYSE, no data on bid-ask spreads in home markets is systematically available for the cross-section of foreign firms. In single-country studies, such as Foerster and Karolyi (1994) on Canadian firms interlisting in the US and Domowitz et al. (1995) on Mexican ADR listings, important changes in spreads and market depth occur, but that the relationship is complex. Moreover, Christie and Huang (1993) and Kadlec and McConnell (1994) show that the Nasdaq listings on the NYSE enjoy uniformly lower spreads and that these changes in market depth are associated with the abnormal returns for these firms around listing.

We propose to test this liquidity hypothesis of Amihud and Mendelson (1986) indirectly by allowing the dependence of the abnormal returns in the pre-, post-listing or listing weeks themselves in the regression model of equation (9) to be differentially sensitive for NYSE, AMEX and Nasdaq listings. We employ a series of controls associated with the size of the firm, whether it is a Level 3 capital-raising ADR or not, and, if so, the size of the new issue.

### *C. Multivariate Cross-sectional Tests*

Table 7 presents the cross-sectional regressions of the abnormal returns. Six different models are examined using the abnormal returns as measured by conditional CAPM benchmark model (Model 3, as equation (5) expanded with interactive information variables). We present regressions for the abnormal returns from the pre-, post-listing periods and for the listing weeks in three panels and separately for local currency and US-dollar-denominated returns. In each regression, we report the coefficient estimates, denoted as statistically significant based on t-statistics from Newey and West (1987) standard errors, adjusted  $R^2$  and a p-value for the F-statistic for the joint significance of the regression model.

The first three regressions show that the abnormal returns around the listings are not significantly related to the market value of the firm, but negatively related to Merton's market incompleteness factor. The coefficient on  $\Delta\lambda$  is -1.322 using local currency returns and -1.646 using US dollar returns for the pre-listing period. During the listing weeks, we find that the relationship is still negative on  $\Delta\lambda$  at -4.090 (local) and -3.722 (US dollar), but the relationship is significant only at the 10 percent level. Finally, in the post-listing period, the magnitude of the coefficient on  $\Delta\lambda$  is smaller -

0.865 (local) and -0.867 (US dollar), but again statistically significant at the 5 percent level. The F-statistic that size and  $\Delta\lambda$  are jointly significant is comfortably rejected in local and US dollar returns for pre- and post-listing periods, but not for the listing weeks.

When the size and Merton incompleteness factors are introduced into the regressions of abnormal returns, the intercept term is statistically indistinguishable from zero. However, with  $R^2$  measures around 1 to 3 percent, it appears that these two variables cannot explain much of the cross-sectional variation in abnormal returns across the 152 ADR and ordinary listings. The economic significance is likely low due to measurement errors in the incompleteness factor. Nevertheless, we interpret these multivariate cross-sectional regression results are consistent with the investor recognition hypothesis.

To gauge the robustness of these tests, we consider confounding influences of other firm-specific variables, such as the type of ADR issue. For example, we control for whether the ADR listing is Level 3 (capital-raising) and measure the size of the new issue. One alternative hypothesis suggested by Dharan and Ikenberry (1995) is that post-listing negative stock returns following Nasdaq listings on the NYSE can be explained by managers of firms acting opportunistically in timing their listing. These managers, typically of smaller firms, strategically apply for listing just before a decline in performance. Dharan and Ikenberry refer to this as the opportunism hypothesis. One possible explanation for the abnormal returns for the ADRs around their listing in the US is that the managers of these firms are timing their listing precisely when poor fundamental performance will follow. Regression (4) in Table 7 demonstrates that the

dummy variable for a capital-raising ADR (ICAP) is statistically significant in the pre-, and post-listing and actual listing periods. The coefficient of the size of the issue is not significantly different from zero. Interestingly, the ICAP coefficient is significantly negative in the pre-listing and listing week periods, which suggests that the positive abnormal returns are mitigated for those with new issues. Moreover, the coefficient is significantly positive in the post-listing period, which again suggests that the post-listing decline in returns is less dramatic. The findings are robust for local currency and US-dollar returns. We interpret this evidence as being inconsistent with the opportunism hypothesis.

We combine the SIZE,  $\Delta\lambda$ , ICAP and new issue variables in regression (5). The negative coefficient for the Merton market incompleteness factor variable is robust to this alternative specification. The statistical significance of the positive ICAP coefficient in the post-listing period is lower in the joint regression.

Finally, in order to test the Amihud and Mendelson (1986) liquidity hypothesis, we allow the coefficient on the Merton incompleteness factor to interact with a dummy variable for the NYSE, AMEX and Nasdaq. We know from Table 6 that the average abnormal returns in any of the subperiods around interlisting are not different by exchange listing location. However, studies by Christie and Huang (1993) and Kadlec and McConnell (1994) have shown important liquidity effects for Nasdaq stocks listing on the NYSE. Regression model (6) indicates that the impact of changes in the shareholder base around listings for these ADRs does matter. For the pre-listing period, using both local currency and US-dollar-denominated returns, we find that the significance of the negative coefficient on the Merton incompleteness factor derives in

large part from the subset of NYSE listings. In fact, the coefficient on  $\Delta\lambda$  for the NYSE listings is -5.75 and those for the AMEX and Nasdaq are positive coefficients of 4.719 and 3.907, respectively. A similar pattern obtains for the listing weeks. The values of  $\Delta\lambda$  are highly collinear across different subgroups, which may explain why none of the coefficients are individually significant. However, an F-statistic (not reported) of the joint significance of the interactive variables for  $\Delta\lambda$  is statistically significant in both the pre-listing period and around listing. In the post-listing period, the pattern in  $\Delta\lambda$  coefficients across the three exchanges is consistent, except now the individual t-statistics of the interactive variables are all significant at the 10 percent level with both local currency and US dollar returns.

We interpret these findings as indirectly consistent with the liquidity hypothesis of Amihud and Mendelson (1986). Of course, the investor recognition and liquidity hypotheses are not mutually exclusive. For example, it could be that the superior liquidity for ADR listings on the NYSE stems from the larger shareholder base that such a prestigious listing attracts. Similarly, the greater increase in the number of shareholders for the NYSE-listed ADRs may arise from the superior liquidity for NYSE-listed securities, in general.

## **7. Conclusions**

We document the effect on share value of a foreign firm listing on the New York, American Stock Exchanges or Nasdaq over-the-counter market. Our sample consists of over 160 firms from 14 countries that listed their shares for the first time in the US directly or as American Depositary Receipts (ADRs) from 1976 to 1992. We find that these stocks earned a significant average abnormal return of 0.349% per week during the year before listing, an additional 0.709% during the listing week, but incur a significant average loss of -0.190% per week during the year following listing.

Existing studies have interpreted these dramatic patterns in share values around foreign listings as evidence of market segmentation due to direct or indirect investment barriers. To the extent that a higher risk premium is built into the expected returns of such stocks as compensation for these investment restrictions, the listing of a new ADR program in the US overcomes these barriers and their stock prices adjust accordingly. However, we find that the abnormal returns for these firms are robust to different benchmark models of expected returns that allow for changing risk exposures around the interlisting event. Moreover, the cross-sectional patterns in abnormal returns by home market region do not conform to the predictions of the market segmentation hypothesis.

We propose and find evidence consistent with two alternative hypotheses. One possible explanation for the abnormal return patterns for ADR listings stems from the larger shareholder base that these firms achieve upon listing in the US. We show that a proxy for a market incompleteness factor, which captures the impact of a heightened level of investor recognition, is significantly related to the abnormal patterns in the

pre- and post-listing periods. This market incompleteness factor derives from the incomplete information asset pricing model of Merton (1987). Secondly, we show that the statistical importance of this increased investor recognition derives in large part from the subset of ADRs which list on the NYSE. Numerous studies have shown that the superior liquidity and greater market depth for NYSE-listed securities is an important factor for firms changing domestic location from Nasdaq and AMEX. The association between the increase in the investor base and the abnormal return patterns around ADR listings represents additional evidence of the greater liquidity of the NYSE. We offer this finding as indirect evidence of the liquidity hypothesis of Amihud and Mendelson (1986).

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**Table 1. Depositary Receipt Programs by Type.** Four different levels of American Depositary Receipt programs are available with various conditions on trading, registration requirements with the SEC (Securities Act of 1933) and reporting requirements (Securities and Exchange Act of 1934). More details are available from *An Information Guide to Depositary Receipts* by Citibank's Security Services Department (1995).

Item	Use of Existing Shares to Broaden Shareholder Base			Raising Capital with New Share Issue	
	Level-I	Level-II	Level-III	Rule 144A (RADR)	Global Offering
<b>Description</b>	Unlisted in US	Listed on Major US Exchange	Offered and Listed on Major US Exchange	Private US Placement to Qualified Institutional Buyers (QIBs)	Global offer of securities in 2 or more markets, not home market of issuer
<b>Trading Location</b>	OTC Pink Sheet trading	NYSE, AMEX or Nasdaq	NYSE, AMEX or Nasdaq	US Private Placement Market using PORTAL	US and Non-US Exchanges
<b>SEC Registration</b>	Registration Statement Form F-6	Registration Statement Form F-6	Form F-1 and F-6 for initial public offering	None	Depends: (a) private placement, as Rule 144A; or, (b) new issue, as Level III
<b>US Reporting Required</b>	Exemption under Rule 12g3-2(b)	Form 20-F filed annually	Form 20-F filed annually; short forms F-2 and F-3 used only for subsequent offerings	12g3-2(b) exemption or agree to provide info on request	Depends: (a) private placement, as Rule 144A; or, (b) new issue, as Level III
<b>GAAP Requirement</b>	No GAAP Reconciliation required	Only Partial reconciliation for financials	Full GAAP reconciliation for financials	No GAAP reconciliation required	See above

**Table 2. Descriptive Statistics for ADR Firms Listing on US Exchanges, 1976-1992.**

Firms listing American Depositary Receipt programs in the US with associated listing dates are obtained from the *New York Stock Exchange Fact Book*, *American Stock Exchange Fact Book*, American Stock Exchange and Nasdaq Economic Research departments directly. Market capitalization values, information about type and sponsor institution of ADR program, and size of new issue for Level-III ADRs are obtained from *Moody's International Manuals* (various issues). Data on shareholder base is obtained from *Moody's Manuals* and supplemented with *Standard and Poor's Stock Reports* (various issues). Sample of 161 firms screened for data on home-market weekly stock price, local stock index values and New York Friday 10am midpoint quotes for home-market exchange rate for 50 weeks before and after listing date, all obtained from Reuter's Exshare International Securities Database using *Reuterlink* on-line data service and supplemented with various local periodicals. Data availability for certain variables is indicated in parentheses.

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<b>Listing Region:</b>		<b>Listing Exchange:</b>		<b>Industry Group:</b>	
Canada	68	New York	59	Industrial	38
Australia	15	American	9	Resource	51
Europe ex UK	26	Nasdaq	93	Consumer	37
Asia	11			Financial	14
UK	36			Technology	12
Other	5			Utilities	9
<b>Listing Year:</b>		<b>Depository:</b>	<b>(76)</b>	<b>Capital Raising:</b>	
1976-1980	12	JP Morgan	35	Level-III ADR	32
1981	7	Bank of New York	17	Non-capital raising	129
1982	6	Citibank	12		
1983	11	Chemical	6	<b>New Share Issue:</b>	
1984	4	Irving Trust	2	Mean (% of shs o/s)	1.6%
1985	7	Chase	1	Maximum	51.9%
1986	12	Bankers Trust	1	75%	5.1%
1987	21	Sumitomo, NY	2	Median	0%
1988	22	Unsponsored/No data	17	25%	0%
1989	22	Ordinary/Non-ADR	68	Minimum	0%
1990-1992	37				
<b>Capitalization:</b>		<b>Shareholder Base:</b>	<b>(152)</b>	<b>Change in Base:</b>	<b>(152)</b>
Mean (\$mills)	3002.4	Mean (000s)	48.8	Mean (%)	28.8%
Maximum	87235.	Maximum	740.3	Maximum	479.%
75% percentile	2244.9	75% percentile	52.1	75% percentile	41.4%
Median	698.1	Median	9.1	Median	9.2%
25% percentile	73.9	25% percentile	1.6	25% percentile	1.4%
Minimum	3.8	Minimum	0.5	Minimum	-86.7%

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**Table 3. Summary Statistics for Weekly Returns of ADRs around Listing Dates.** Weekly (Friday close) returns for 161 ADR listings are denominated in US dollars and local currency terms using foreign exchange rates based on 10am (New York) midpoint quotes, all obtained from Reuter's Exshare International Securities Database using *Reuterlink* on-line data service and supplemented with various local periodicals. The returns are computed in excess of weekly one-month Treasury bill yields obtained from Harris Bank quotes. Means and standard deviations are computed separately across weeks (-50,-2) before listing, (-1,0) during listing, and (+1, +50) after listing. Significance at the 95% level is indicated by '\*\*' and at the 90% level, by '\*'.

Stocks	Firm / Weeks	Mean Returns		Standard Deviation	
		Local	Dollar	Local	Dollar
<i>Before US Market Listing (Weeks -50 to -2)</i>					
All	7209	0.45% **	0.46% **	7.14%	7.17%
Australia	730	1.14% **	1.19% **	8.76%	8.86%
Canada	3060	0.47% **	0.46% **	8.77%	8.72%
Europe ex UK	1055	0.35% **	0.37% **	4.25%	4.43%
Asia	515	0.09%	0.04%	4.32%	4.53%
UK	1632	0.24% *	0.33% **	4.83%	4.97%
Other	217	0.59%	0.49%	6.48%	6.49%
<i>Around US Market Listing (Weeks -1 to 0)</i>					
All	332	0.83% *	0.88% **	7.76%	7.77%
Australia	30	-0.79%	-1.01%	6.21%	6.41%
Canada	136	0.87% *	0.82% *	8.31%	8.48%
Europe ex UK	52	1.68% **	1.92% **	4.60%	4.80%
Asia	22	-0.11%	-0.15%	2.21%	2.32%
UK	72	0.79% *	1.12% *	4.27%	4.79%
Other	10	3.06% *	2.73% *	4.74%	4.81%
<i>After US Market Listing (Weeks +1 to +50)</i>					
All	8101	-0.21% **	-0.19% **	7.20%	7.41%
Australia	780	-1.15% **	-1.10% **	9.22%	9.43%
Canada	3424	-0.32% *	-0.33% **	8.51%	8.53%
Europe ex UK	1273	0.18%	0.27% *	4.50%	5.26%
Asia	572	-0.04%	0.14%	4.49%	5.00%
UK	1793	0.05%	0.06%	5.65%	6.14%
Other	259	-0.08%	-0.23%	6.26%	6.26%

**Table 4. Market Model Regressions for ADRs around Listing Date using weekly Local Currency-denominated Excess Returns on Local Country and US Market Indexes.** We estimate three CAPM market model regressions of ADR excess returns on a constant, a local market index excess return (Appendix B) and the S&P 500 index excess return. The first is an unconditional CAPM model with two index returns only; the second unconditional CAPM model includes additionally the foreign currency return; and, the third conditional CAPM model include the excess returns on the local country and US indexes, the foreign currency return and their products with a vector of predetermined instruments. The instruments are a term spread between the six-month and one-month Treasury bill yields (TERMUS), a local country six-month net of one-month term spread based on Euromarket yields from Harris Bank (TERMLO), an interest rate differential between the one-month US Treasury bill yield and a local one-month Euromarket yields (SPR1MO), and the dividend yield of the CRSP US value-weighted NYSE/AMEX index (DIVYLD). We employ Euroyen rates for Asia, Euromark rates for Europe (ex UK), Pound sterling rates for U.K, EuroCDollar rates for Canada and Euromark rates for all others. T-statistics are computed using heteroscedasticity-consistent and serially uncorrelated (lags=6) standard errors using Newey and West (1987) procedures. F-statistics evaluate marginal significance of one additional  $R_{FX,t}$  variable in the unconditional CAPM regression and of the 12 additional interactive variables in the conditional CAPM regressions, denoted “F test p-value” and a Chow test of the structural break in the coefficients before listing (weeks -49 to -1) and after (weeks 0 to +50), denoted “Chow test p-value”.

$$\begin{aligned} \text{Model 1: } R_{it} &= \alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US} + \varepsilon_{i,t} \\ \text{Model 2: } R_{it} &= \alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US} + \beta_i^{FX} R_{FX,t} + \varepsilon_{i,t} \\ \text{Model 3: } R_{it} &= \alpha_i + \beta_i^{LO} (Z_{t-1}) R_{mt}^{LO} + \beta_i^{US} (Z_{t-1}) R_{mt}^{US} + \beta_i^{FX} (Z_{t-1}) R_{FX,t} + \varepsilon_{i,t} \end{aligned}$$

	<i>Before US Market Listing (Weeks -50 to -2)</i>					<i>After US Market Listing (Weeks +1 to +50)</i>					F test	Chow test
	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	p-value	p-value
All Stocks:												
Model 1			0.041		13.35%	-				3.95%		0.000
	0.349**	1.056**				0.190**	0.512**	0.164**				
Model 2	0.352**		0.039	-	13.39%	-				5.53%	0.000	0.000
		1.052**		0.147**		0.198**	0.569**	0.155**	0.768**			
Model 3			0.056	-	13.60%	-		0.067*		5.88%	0.000	0.000
	0.353**	0.998**		0.152**		0.176**	0.563**		0.774**			
Australia:												
Model 1			-0.152		26.75%	-0.765%				8.38%		
	0.851**	1.579**					0.839**	0.313**				
Model 2			-0.170	-0.334	26.87%	-				9.14%	0.207	0.000

	0.862**	1.605**				0.795**	0.799**	0.363**	0.686**			
Model 3			0.212	-0.131	29.53%	-	0.130*	0.174*		13.69%	0.000	0.000
	0.563**	2.225**				0.487**			0.832**			
Canada:												
Model 1			-0.048		8.54%	-		-0.043		4.35%		0.000
	0.532**	1.237**				0.291**	0.979**					
Model 2			-0.039	-0.798*	8.80%	-		-0.045	0.085	4.33%	0.059	0.000
	0.517**	1.186**				0.289**	0.986**					
Model 3			0.089	-0.734*	9.61%	-		-0.222	0.087	4.38%	0.000	0.000
	0.553**	0.936**				0.306**	1.133**					

**Table 4. Market Model Regressions for ADRs around Listing Date using weekly Local Currency-denominated Returns on Local Country and US Market Indexes.** (continued)

	<i>Before US Market Listing (Weeks -50 to -2)</i>					<i>After US Market Listing (Weeks +1 to +50)</i>					F test	Chow test
	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	p-value	p-value
Europe ex												
UK:												
Model 1			0.035		14.19%	0.228**				2.57%		0.000
	0.232**	0.572**					0.153**	0.228**				
Model 2			0.035	-0.047	14.14%	0.192**				15.63%	0.000	0.000
	0.234**	0.568**					0.314**	0.192**	1.048**			
Model 3			0.147*	-0.059	15.69%	-0.028		0.280*		17.48%	0.000	0.000
	0.214**	0.628**					0.354**		1.096**			
Asia:												
Model 1	0.018		0.046		19.96%	-0.009		0.097		1.82%		0.011
		1.308**					0.284**					
Model 2	0.017		0.046	-0.028	19.80%	-0.237*		0.031		12.09%	0.593	0.017
		1.313**					0.177**		1.315**			
Model 3	0.127		0.397*	-0.146	24.39%	-0.268*		0.107		14.92%	0.151	0.022
		0.466**					0.342**		1.349**			
UK:												
Model 1	1.158		0.055		28.35%	0.057	0.431**	0.038		4.48%		0.000
		1.045**										
Model 2	0.126		0.054	-0.118*	28.43%	0.064		0.022		8.34%	0.000	0.000
		1.042**					0.508**		0.696**			
Model 3	0.148		0.079	-0.112*	28.93%	0.147		0.259*		9.74%	0.527	0.000
		0.932**					0.566**		0.718**			
Others:												
Model 1	-0.229		0.267		27.14%	-0.235		0.033		4.19%		0.000
		0.823**					0.406**					

Model 2	-0.247		0.275	-0.209	26.90%	-0.281		0.095	-0.324	4.10%	0.000	0.000
		0.819**					0.398**					
Model 3	-0.285		0.151	-0.213	25.83%	-0.304		0.184	-0.032	4.53%	0.002	0.000
		0.836**					0.164**					

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**Table 5. Market Model Regressions for ADRs around Listing Date using weekly US Dollar-denominated Excess Returns on Local Country and US Market Indexes.** We estimate three CAPM model regressions of ADR excess returns on a constant, a local market index excess return (Appendix B) and the S&P 500 index excess return. The first is an unconditional CAPM model with two index returns only; the second unconditional CAPM model includes additionally the foreign currency return; and, the third conditional CAPM model include the excess returns on the local country and US indexes, the foreign currency return and their products with a vector of predetermined instruments. The instruments are a term spread between the six-month and one-month Treasury bill yields (TERMUS), a local country six-month net of one-month term spread based on Euromarket yields from Harris Bank (TERML0), an interest rate differential between the one-month US Treasury bill yield and a local one-month Euromarket yields (SPR1MO), and the dividend yield of the CRSP US value-weighted NYSE/AMEX index (DIVYLD). We employ Euroyen rates for Asia, Euromark rates for Europe (ex UK), Pound sterling rates for U.K, EuroCDollar rates for Canada and Euromark rates for all others. T-statistics are computed using heteroscedasticity-consistent and serially uncorrelated standard errors (six lags) using Newey and West (1987) procedures. F-statistics evaluate marginal significance of one additional  $R_{FX,t}$  variable in the unconditional CAPM regression and of the 12 additional interactive variables in the conditional CAPM regressions, denoted “F test p-value” and a Chow test of the structural break in the coefficients before listing (weeks -49 to -1) and after (weeks 0 to +50), denoted “Chow test p-value”.

$$\begin{aligned} \text{Model 1: } R_{it} &= \alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US} + \varepsilon_{i,t} \\ \text{Model 2: } R_{it} &= \alpha_i + \beta_i^{LO} R_{mt}^{LO} + \beta_i^{US} R_{mt}^{US} + \beta_i^{FX} R_{FX,t} + \varepsilon_{i,t} \\ \text{Model 3: } R_{it} &= \alpha_i + \beta_i^{LO} (Z_{t-1}) R_{mt}^{LO} + \beta_i^{US} (Z_{t-1}) R_{mt}^{US} + \beta_i^{FX} (Z_{t-1}) R_{FX,t} + \varepsilon_{i,t} \end{aligned}$$

	<i>Before US Market Listing (Weeks -50 to -2)</i>					<i>After US Market Listing (Weeks +1 to +50)</i>					F test	Chow test
	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	p-value	p-value
All Stocks:												
Model 1	0.349**	1.013**	0.063		14.24%	-0.161**		0.012		7.77%		0.000
Model 2	0.350**	1.052**	0.039	-0.198**	14.28%	-0.187**	0.810**			10.91%	0.000	0.000
Model 3	0.349**	1.008**	0.053	-0.176**	14.49%	-0.169**	0.568**	0.156**	0.860**	11.27%	0.000	0.000
Australia:												
Model 1	0.854**	1.414**	-0.081		27.55%	-0.706**				12.36%		0.000
Model 2	0.858**	1.600**	-0.169	-0.918**	28.64%	-0.781**	0.991**	0.248**		13.23%	0.703	0.000

Model 3	0.566**	2.050**	0.272	-0.879**	30.59%	-0.552**	0.807**	0.363**	1.181**	16.59%	0.000	0.000
							0.219	0.171*	1.176**			
Canada:												
Model 1	0.520**	1.110**	0.036		7.45%	-0.289**		-0.053		4.37%		0.000
Model 2	0.514**	1.186**	-0.038	-0.986**	7.86%	-0.289**	0.997**	-0.045	0.092	4.37%	0.015	0.000
Model 3	0.548**	0.968**	0.074	-0.865**	8.58%	-0.315**	0.987**	-0.236	0.173	4.43%	0.000	0.000
							1.140**					

**Table 5. Market Model Regressions for ADRs around Listing Date using weekly US Dollar-denominated Returns on Local Country and US Market Indexes. (continued)**

	<i>Before US Market Listing (Weeks -50 to -2)</i>					<i>After US Market Listing (Weeks +1 to +50)</i>					F test	Chow
	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	$\alpha(\%)$	$\beta^{LO}$	$\beta^{US}$	$\beta^{FX}$	Adj.R <sup>2</sup>	p-value	test p-value
Europe ex												
UK:												
Model 1			0.006		18.87%	0.224		0.104*		12.38%		0.807
	0.230**	0.646**					0.627**					
Model 2			0.034		20.13%	0.125				37.96%	0.000	0.000
	0.232**	0.569**		0.388**			0.314**	0.195**	1.732**			
Model 3			0.157*		21.53%	0.179		0.250*		39.10%	0.000	0.000
	0.229**	0.625**		0.379**			0.342**		1.771**			
Asia:												
Model 1	0.035		0.072		27.03%	0.085		-0.002		13.75%		0.007
		1.185**					0.991**					
Model 2	0.016		0.047	-0.343	27.20%	-0.221		0.032		28.85%	0.355	0.019
		1.313**					0.807**		2.149**			
Model 3	0.089		0.262	-0.497*	30.68%	-0.299*	0.219	0.111		31.49%	0.124	0.025
		0.827**							2.342**			
UK:												
Model 1	0.117		0.082*		32.26%	0.083		-		14.39%		0.002
		0.992**					0.853**	0.199**				
Model 2	0.124		0.052	-	32.38%	0.082		0.024		21.93%	0.000	0.000
		1.044**		0.164**			0.510**		1.181**			
Model 3	0.151		0.036	-0.107	32.67%	0.156		-		23.36%	0.756	0.000
		1.016**					0.611**	0.286**	1.176**			
Others:												
Model 1	-0.245		0.271		27.82%	-0.331		-0.16		4.27%		0.000
		0.819**					0.418**					
Model 2	-0.249		0.271	-0.031	27.49%	-0.282		-0.096	0.292	4.11%	0.000	0.000

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Model 3	-0.268	0.821**	0.195	0.003	26.41%	-0.316	0.398**	-0.275	0.512	4.64%	0.004	0.000
		0.785**					0.270*					

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**Table 6. Mean Abnormal Returns for ADRs by Variables Related to Home Country, Choice of US Exchange, Depository Sponsor and Industry Group.** Abnormal returns are computed for weeks (-1,0) using regression model estimates of ADR excess returns from before listing (weeks -50 to -2) for two unconditional CAPM models using excess returns of local market index, S&P 500 and foreign currency return (Models 1 and 2), and a conditional model including product of index excess returns with vector of predetermined instruments (Model 3). Mean abnormal returns are computed across weeks -50 to -2 and weeks +1 to +50 using intercept from same regression models. Distributions of ADR firms by region, US exchange location, depository sponsor, and industry group are provided in Table 2. Abnormal returns are computed separately using local currency and US dollar-denominated excess returns. pval(F) gives the one-sided F-test p-value for the difference between the mean abnormal returns across different groupings. Tests for significance use a t-statistic and binomial Z-test for percent of positive/negative abnormal returns are indicated only for overall sample with significance at the 10% (\*) and 5% (\*\*) levels, respectively.

*Panel A. Local Currency Returns*

Category	Model 1			Model 2			Model 3		
	Weeks (-50,-2)	Weeks (-1, 0)	Weeks (+1,+50)	Weeks (-50,-2)	Weeks (-1, 0)	Weeks (+1,+50)	Weeks (-50,-2)	Weeks (-1, 0)	Weeks (+1,+50)
<i>Overall Mean Abnormal Returns</i>									
Mean	0.349**	0.709*	-0.190*	0.352**	0.733*	-0.198*	0.353**	0.804*	-0.176*
%+/%-	62/38**	51/49	49/51	63/37**	51/49	48/52	65/35**	54/46*	47/53
<i>By Region</i>									
Australia	0.851	-0.697	-0.765	0.862	-0.750	-0.795	0.563	-0.917	-0.487
Canada	0.532	0.931	-0.291	0.517	1.018	-0.289	0.553	0.962	-0.306
Europe	0.232	1.186	0.228	0.234	1.167	0.192	0.214	1.536	-0.028
Asia	0.018	-0.868	-0.009	0.017	-1.102	-0.237	0.127	-1.111	-0.268
UK	1.158	0.779	0.057	0.126	0.809	0.064	0.148	1.138	0.147
Other	-0.229	2.656	-0.235	-0.247	2.763	-0.281	-0.285	2.493	-0.304
R <sup>2</sup>	0.065	0.020	0.037	0.073	0.023	0.057	0.070	0.022	0.052
pval(F)	0.007	0.077	0.073	0.009	0.052	0.051	0.008	0.014	0.089
<i>By Exchange Listing Location</i>									
NYSE	0.238	0.531	-0.074	0.235	0.498	-0.091	0.209	0.761	-0.051
AMEX	0.184	-0.139	-0.716	0.243	-0.288	-0.575	0.412	0.206	-0.676
NASD	0.427	0.912	-0.075	0.448	0.988	-0.116	0.555	0.893	-0.108
R <sup>2</sup>	0.009	0.003	0.016	0.009	0.004	0.008	0.019	0.001	0.011
pval(F)	0.434	0.758	0.533	0.423	0.663	0.677	0.140	0.922	0.595
<i>By Industry Sector</i>									
Industrial	0.427	0.628	-0.114	0.418	0.630	-0.247	0.461	0.870	-0.359
Resource	0.391	0.565	-0.198	0.448	0.718	-0.191	0.569	0.776	-0.083
Consumer	0.051	0.803	-0.041	-0.019	0.687	-0.004	0.062	0.307	-0.014
Financial	0.264	-0.151	-0.018	0.365	-0.186	-0.031	0.183	0.717	0.022
Technology	1.154	2.089	-0.515	1.184	2.084	-0.498	1.259	1.761	-0.357
Utility	0.028	1.141	0.507	0.078	1.208	0.484	0.054	1.570	0.354
R <sup>2</sup>	0.071	0.008	0.028	0.074	0.008	0.028	0.067	0.005	0.020
pval(F)	0.047	0.552	0.000	0.039	0.533	0.000	0.011	0.937	0.045
<i>By ADR Program Depository</i>									
Unspons.	0.467	0.848	-0.247	0.492	0.886	-0.281	0.548	0.795	-0.293
B of NY	0.193	0.458	0.201	0.176	0.419	0.209	0.108	0.149	0.158
JPMorga	0.176	1.048	0.084	0.197	1.104	0.071	0.321	1.664	0.246

n									
Chemical	0.324	-1.772	-0.616	0.178	-1.984	-0.635	0.216	-2.033	-0.587
Citibank	0.118	0.262	0.169	0.151	0.277	0.167	0.222	0.848	-0.019
R <sup>2</sup>	0.020	0.011	0.033	0.020	0.012	0.035	0.018	0.015	0.035
pval(F)	0.317	0.416	0.030	0.342	0.396	0.029	0.337	0.204	0.028

**Table 6. Mean Abnormal Returns for ADRs by Variables Related to Home Country, Choice of US Exchange, Depository Sponsor and Industry Group.** (continued)

<i>Panel B. US Dollar Denominated Returns</i>									
<i>Category</i>	<i>Model 1</i>			<i>Model 2</i>			<i>Model 3</i>		
	<i>Weeks (-50,-2)</i>	<i>Weeks (- 1, 0)</i>	<i>Weeks (+1,+50)</i>	<i>Weeks (-50,-2)</i>	<i>Weeks (- 1, 0)</i>	<i>Weeks (+1,+50)</i>	<i>Weeks (-50,-2)</i>	<i>Weeks (- 1, 0)</i>	<i>Weeks (+1,+50)</i>
<i>Overall Mean Abnormal Returns</i>									
Mean	0.349**	0.724*	-0.161**	0.350**	0.761*	-0.187**	0.349**	0.705*	-0.169**
%+/%-	63/37**	51/49	48/52	63/37**	54/46	47/53	63/37**	56/44*	48/52
<i>By Region</i>									
Australia	0.854	-0.820	-0.706	0.858	-0.896	-0.781	0.566	-0.950	-0.552
Canada	0.520	0.927	-0.289	0.514	0.990	-0.289	0.548	0.986	-0.315
Europe	0.230	1.174	0.224	0.232	1.291	0.125	0.229	1.571	0.179
Asia	0.035	-0.992	0.085	0.016	-1.206	-0.221	0.089	-1.054	-0.299
UK	0.117	0.984	0.083	0.124	1.027	0.082	0.151	0.681	0.156
Other	-0.245	2.385	-0.331	-0.249	2.538	-0.282	-0.268	2.123	-0.316
R <sup>2</sup>	0.077	0.022	0.064	0.073	0.026	0.061	0.069	0.020	0.174
pval(F)	0.002	0.038	0.015	0.008	0.020	0.039	0.006	0.017	0.082
<i>By Exchange Listing Location</i>									
NYSE	0.241	0.542	0.003	0.233	0.486	-0.074	0.186	0.413	-0.053
AMEX	0.241	-0.149	-0.657	0.243	-0.231	-0.569	0.349	0.274	-0.577
NASD	0.411	0.931	-0.119	0.447	1.041	-0.109	0.524	0.941	-0.441
R <sup>2</sup>	0.006	0.003	0.015	0.009	0.005	0.008	0.019	0.002	0.004
pval(F)	0.556	0.753	0.409	0.419	0.644	0.661	0.146	0.825	0.506
<i>By Industry Sector</i>									
Industrial	0.419	0.619	-0.101	0.417	0.740	-0.237	0.428	0.687	-1.161
Resource	0.393	0.543	-0.202	0.446	0.628	-0.187	0.545	0.758	-0.103
Consumer	0.026	0.839	-0.038	-0.021	0.731	0.012	0.042	0.383	-0.004
Financial	0.271	-0.085	-0.012	0.364	-0.167	-0.014	0.156	-0.535	0.070
Technology	1.146	2.144	-0.502	1.186	2.169	-0.482	1.201	1.808	-0.387
Utility	0.050	1.240	0.544	0.073	1.437	0.489	0.034	2.171	0.432
R <sup>2</sup>	0.067	0.009	0.028	0.075	0.009	0.028	0.069	0.011	0.024
pval(F)	0.072	0.489	0.000	0.037	0.356	0.000	0.026	0.406	0.048
<i>By ADR Program Depository</i>									
Unspns. B of NY	0.464	0.828	-0.271	0.491	0.899	-0.276	0.514	0.893	-0.625
JPMorgan	0.185	0.448	0.257	0.176	0.388	0.230	0.123	-0.237	0.160
Chemical	0.157	1.082	0.114	0.195	1.148	0.087	0.285	1.161	0.234
Citibank	0.361	-1.657	-0.514	0.178	-1.948	-0.624	0.239	-1.885	-0.569
R <sup>2</sup>	0.117	0.468	0.211	0.149	0.474	0.182	0.177	0.696	0.009
pval(F)	0.020	0.010	0.038	0.020	0.012	0.036	0.017	0.012	0.015
	0.317	0.416	0.030	0.342	0.396	0.029	0.337	0.204	0.028

**Table 7. Regressions of Abnormal Returns for ADRs on Variables Related to Size, Shareholder Base, and Size of New Issue.** Abnormal excess ADR returns are computed for listing weeks (-1, 0) using conditional CAPM regression model (Model 3, Tables 3 and 4) and mean abnormal returns from intercept of same model for before listing period (weeks -50 to -2) and after listing period (weeks +1 to +50). Variables related to market capitalization (SIZE), change in shareholder base (SHR<sub>t</sub> for before and after listing), capital raising dummy (ICAP) and issue size (ISSUE) are as in Table 2. Market incompleteness factor ( $\Delta\lambda$ ) is from Merton (1987) based on Kadlec and McConnell (1994):

$$\Delta\lambda = (\sigma_{\varepsilon}^2 \text{ SIZE}) \cdot (1/\text{SHR}_{t+1} - 1/\text{SHR}_t),$$

where  $\sigma_{\varepsilon}^2$  is the residual variance from CAPM model regression before listing period. Abnormal returns are computed separately using local currency and US dollar denominated returns.  $R^2$  is the adjusted coefficient of determination and pvalue(F) is a one-sided F-test p-value for the significance of the regression. T-statistics use Newey and West (1987) standard errors corrected for heteroscedasticity and serial correlation. Significance at the 10% level is denoted by ‘\*’ and at the 5% level by ‘\*\*’.

Variable	Local Currency Returns						US Dollar Denominated Returns					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	<i>Before US Market Listing (Weeks -50 to -2)</i>											
Constant	0.009	0.004**	0.011	0.005**	0.008	0.011	0.009	0.004**	0.010	0.005	0.007	0.010
SIZE	-0.397		-0.484		-0.190	-0.495	-0.380		-0.488		-0.202	-0.483
$\Delta\lambda$		-1.244**	-1.322**		-1.310**	-5.757		-1.567**	-1.646**		-1.634**	-6.703
ICAP				-0.004**	-0.004**					-0.004**	-0.004**	
ISSUE				-1.300	-0.917					-0.894	-0.371	
$\Delta\lambda$ (AMEX)						4.719						5.269
$\Delta\lambda$ (NASD)						3.907						4.759
$R^2$	0.005	0.021	0.028	0.020	0.043	0.034	0.005	0.036	0.044	0.021	0.060	0.050
pvalue(F)	0.489	0.001	0.003	0.009	0.000	0.003	0.483	0.000	0.000	0.009	0.000	0.000
	<i>Around US Market Listing (Weeks -1 to 0)</i>											
Constant	-0.002	0.008*	0.001	0.010*	-0.009	-0.001	-0.002	0.007	0.001	0.009*	-0.007	0.000
SIZE	0.788		0.521		1.485	0.732	0.691		0.448		1.290	0.566
$\Delta\lambda$		-4.175*	-4.090*		-4.063*	-11.471		-3.795*	-3.722*		-3.698*	-4.384
ICAP				-0.012*	-0.016**					-0.010	-0.014*	
ISSUE				27.635	31.540					21.675	25.148	
$\Delta\lambda$ (AMEX)						6.361						-0.079
$\Delta\lambda$ (NASD)						10.501						2.678
$R^2$	0.001	0.010	0.010	0.004	0.017	0.012	0.001	0.008	0.009	0.003	0.014	0.009

pvalue(F)		0.786	0.075	0.205	0.419	0.131	0.266		0.816	0.075	0.204	0.543	0.188	0.319
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**Table 7. Regressions of Abnormal Returns for ADRs on Variables Related to Size, Shareholder Base, and Size of New Issue.**  
(continued)

Variable	Local Currency Returns						US Dollar Denominated Returns					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	<i>After US Market Listing (Weeks +1 to +50)</i>											
Constant	-0.007	-0.001	-0.007	-0.001	-0.005	-0.008	-0.007	-0.003	-0.007	-0.001	-0.005	-0.008
SIZE	0.480		0.474		0.285	0.586	0.462		0.444		0.254	0.545
$\Delta\lambda$		-0.930**	-0.865**		-0.872**	-7.242*		-0.873**	-0.867**		-0.874**	-4.994
ICAP				0.003**	0.003*					0.003*	0.003*	
ISSUE				-1.794	-0.940					-2.227	-2.107	
$\Delta\lambda$ (AMEX)						5.954*						3.666
$\Delta\lambda$ (NASD)						7.844*						5.578
R <sup>2</sup>	0.007	0.009	0.018	0.009	0.024	0.033	0.007	0.001	0.018	0.010	0.024	0.030
pvalue(F)	0.366	0.003	0.004	0.142	0.008	0.000	0.386	0.004	0.007	0.136	0.009	0.000

**Appendix A**  
**ADR Firms and Listing Dates**

<b>Australia:</b>	Date	<b>Canada (cont.):</b>	Date	<b>Canada (cont.):</b>	Date
Boral	88072 9	Giant Bay Res	88071 5	Sceptre Res	911108
Broken Hill Prop	86080 8	Gold Knight Res	92071 4	Softkey Softward	820409
Central Pacific	90102 6	Goldex	89071 4	Tudor	830610
Coles Myer	75111 4	Greenstone Res	87080 7	Tee Comm	830819
FAI Insurance	88102 8	Granges	92061 2	Total Energold	890512
Natl Australia Bank	82021 9	Healthcare	91041 2	Transcda Pipelines	780901
News Corp	85032 9	Hemlo Gold	88061 7	Westburne Intl	890609
Orbital Engine	88061 7	Horsham	85061 4	Wharfe Res	881223
Pacific Dunlop	86120 5	Highwood Res	86110 7	<b>France:</b>	
Pelsart Res	89021 7	Corona	88111 1	Alcatel Alsthom	920522
Santos	84082 4	Intl Platinum	92052 9	LVMH Motet	871023
Southern Pacific	88092 3	Intercity Products	91041 2	Societe Elf Aquitaine	910614
Transglobe Res	77021 1	IPSCO	91061 4	Thomson	860725
Western Mining	86062 0	Intl Colin Energy	83110 4	Total	911025
Western Pacific	88111 1	Lac Minerals	77060 3	<b>Hong Kong:</b>	
<b>Canada:</b>		Laidlaw	83102 1	Hong Kong Teleph	860822
American Barrick	87071 7	Loewen	82040 2	<b>Israel:</b>	
Aber Res	88093 0	Magna Intl	89021 7	Frutarom	870807
BCE Inc	89012 7	Mitel	89033 1	Israel Land Devel.	920731
BII Enterprises	90062 9	Mirtronics	90021 6	<b>Italy:</b>	
Belmoral Res	87121 1	MSR Explorations	91112 2	Benetton	810313

Bunker Hill	89072	Minven Gold	76111	Fiat	900323
	8		2		
Central Fund Cda	89092	Norcen Energy	77060	Montedison	870605
	9		3		
Centurian Gold	91100	NHI Nelson	92062	<b>Japan:</b>	
	4	Hldgs	6		
Consolidated Merc	87073	Northern	83100	CSK	810206
	1	Telecom	7		
Cornucopia Res	90113	Nova Corp of	85080	Hitachi	880624
	0	Alta	2		
Canadian Pacific	91051	Newfield Mines	87070	Honda	860523
	7		3		
Consolidated	90100	Nowsco Wells	91102	Kubota	911206
Profsr	5		5		
Cineplex Odeon	85053	Petromet	87061	Makita	890323
	1		2		
Cognos	90120	Pegasus	87060	Mitsubishi	881104
	7		5		
Davidson Tisdale	91100	Pop Shoppes	87082	Pioneer	810313
	4		8		
Deprenyl	89042	Quadra Logic	89092	Sanyo	900105
	8		2		
Dickenson Mines	88060	Quebec Sturgeon	85102	TDK	810501
	3		5		
Dreco Energy	91031	Rea Gold	86102	Wacoal	760820
	5		4		
ECO Corp	87013	Repap Res	89122	<b>Mexico:</b>	
	0		9		
Energex	92121	SHL	83090	Telefonos de Mexico	880930
	8	Systemhouse	2		
Eastmaque Gold	86091	Scintilore Res	87013	Vitro	920807
	2		0		
Fahnestock Vine	77040	Sonora	77012		
	1		8		

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**Appendix A (continued)**  
**ADR Firms and Listing Dates**

<b>Netherlands:</b>	Date	<b>Sweden:</b>	Date	<b>United Kingdom:</b>	Date
Aegon	90011	AB Electrolux	88061	Grand Metropolitan	891208
	9		0		
Ahold	87012	AB SKF	81011	Hanson	920117
	3		6		
Akzo	89011	ASEA AB	81052	Huntingdon Intl	761217
	3		2		
Oce Van Grinten	83020	AB Volvo	87051	Imperial Chemical	870417
	4		5		
Philips	89090	<b>United Kingdom:</b>		LEP Group	830624
	8	<b>m:</b>			
<b>Norway:</b>		Allied Irish	89102	London Intl Group	841102
		Banks	0		
Hafslund Nycomed	90062	Attwoods	89030	Medeva	910517
	2		3		
Norsk Data	89081	Auto Security	88121	Micro Focus Group	830218
	1		6		
Norsk Hydro	87070	Barclays	86062	Natl Westminster	820827
	3		7		
<b>Portugal:</b>		Bass	88020	Ratners Group	780512
			5		
Banco Comercial	88010	Beazer	88010	Royal Bank of Scot	860801
	8		1		
<b>South Africa:</b>		BET	83020	RTZ Corp	900601
			4		
Lydenburg	83072	Cable &	89052	Saatchi & Saatchi	880318
Platinum	2	Wireless	6		
<b>Spain:</b>		Cadbury	82061	Smithkline Beecham	890728
		Schwpp	8		
Banco Bilbao Vizca	89031	Carlton	88030	Tiphook	860725
	7	Commun.	4		
Banco Central	90060	CRH	92052	Tomkins	870731
	1		2		
Banco De Santader	87070	Danka Business	87061	United Newspapers	920828
	3		2		
Empresa Electricidad	85120	ECC Group	90100	Waterford Wedgwd	841026
	6		5		
Telefonica Espana	81031	ELAN Corp	84120	Wellcome	911220
	3		7		
		Glaxo Holdings	87062	Willis Corroon	871023
			6		
				WPP Group	910104

**Appendix B**  
**Local Market Indexes**

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Australia	All-Ordinaries (275) NAUD	Netherlands	MS Capital International NNLG
Canada	TSE-Western Index	Norway	FT-Actuaries-Norway
France	CAC Broad Index NFRF	Portugal	Lisbon BPA NPTE
Hong Kong	Hang Seng Index NHKD	South Africa	FT-Actuaries-South Africa
Israel	Jerusalem Post Index	Spain	Madrid Gesant Index NESP
Italy	BCI-Milan 260 Index NITL	Sweden	J-P Index (40) NSEK
Japan	Topix Index (First Sect) NJPY	UK	FT-Actuaries UK
Mexico	FT-Actuaries-Mexico	US	Standard & Poor 500

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