

The Role of ADRs in the Development of Emerging Equity Markets

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Abstract

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Abstract

This paper finds that the growth and expansion of U.S. cross-listings by firms from emerging markets around the world have facilitated an expansion of cross-border equity flows and overall development of their stock markets during the 1990s. However, these benefits have negative “spillover” effects: the capitalization and turnover ratios of local-market firms that do not pursue overseas listings decline as U.S. cross-listings in the form of American Depositary Receipts (ADRs) increase in size and scope. We investigate various possible sources of these negative spillovers and offer new evidence that the growth of ADRs neither facilitate nor hinder local market development, but represent an outcome of poorly-functioning local markets. Policy implications are discussed.

The Role of ADRs in the Development of Emerging Equity Markets

1. Introduction

This paper examines the impact of the growth of international cross-listings of shares on the stock market development of emerging economies. Specifically, we ask whether the large increase in the number of companies from emerging markets that have chosen to cross-list their shares on U.S. markets, typically in the form of American Depositary Receipts (ADRs), has facilitated the development of the domestic stock market or has hindered it. The study encompasses twelve Latin American and Asian emerging markets that had a wide variety of experiences in the growth of their ADR programs during the 1990s in terms of pace, breadth and trading activity. Overall, we find that the expanded ADR presence in these markets has fostered stock market development, which we measure as greater cross-border equity flows, higher market capitalization, more listed companies and greater turnover. But, these benefits accrue primarily to those firms that can and do pursue ADR programs, while the size, scope and liquidity of the non-ADR segment of the domestic markets diminish.

Understanding how ADRs and other financial innovations in global capital markets affect stock market development is important for several reasons. First, stock market development is a catalyst for overall economic development. Many notable economists have argued that vital financial markets can lead to greater economic growth by increasing the productivity of capital through greater liquidity, enhanced portfolio diversification opportunities and better information on the profitability of risky projects (Schumpeter, 1911; McKinnon, 1973). Indeed, there has been an abundance of empirical evidence that stock market development is positively correlated with current and future economic growth (King and Levine, 1993; Levine and Zervos, 1998a, 1998b; Wurgler, 2000; Rajan and Zingales, 2003). Second, in the case of emerging economies which were rapidly liberalizing their markets during the 1980s and 1990s, this positive correlation has been shown to be even stronger. Market liberalization events, such as the easing of regulatory restrictions on foreign ownership or foreign exchange convertibility, have led to greater integration of emerging equity markets with global markets. Greater integration, in turn, has led to improved risk-sharing benefits (Obstfeld, 1992, 1994; Lewis, 1996, 2000), greater investment activity, higher stock market returns, lower return volatility and higher real per capita GDP growth (Bekaert and Harvey, 1995, 2000; Bekaert, Harvey, and Lundblad, 2001, 2002; Henry, 2000a, 2000b; Kim and Singal, 2000; Edison, Levine, Ricci, and Sloek, 2002; and Martell and Stulz, 2003).

Third, the impact of international cross-listings and ADRs for domestic stock market development can be unlike many other forms of government-sponsored market liberalization, however, because they are actions initiated by the firms themselves and not mandated by regulatory authorities. As such, they are likely to be made in the best interests of their shareholders and not necessarily the markets,

as a whole. There is general agreement on the benefits that accrue to the listing firm in terms of improved access to global capital markets, a broader shareholder base, and enhanced visibility before analysts, media and even consumers and also to the current and prospective investors in terms of increased transparency, better liquidity and greater ease of trading.¹ But, there is little understanding to now of how these cross-listings, in aggregate, impact the local markets. Several possible scenarios could arise and it is their study that is the focus of this paper.

One possible scenario is that the expansion of the ADR market in a country facilitates stock market development by acting as a “catalyst” toward greater efficiency. In this view, as more local firms pursue U.S. listings, local stock exchanges, their brokers and regulatory authorities feel increased competitive pressure to modernize operations, improve standards of disclosure and strengthen enforcement of trading regulations. These improvements spur on greater liquidity of trading, increased transparency and efficiency of markets and market intermediaries, which, in turn, attracts more firms to list their shares for trading and more global investors to those markets enhancing liquidity, efficiency and overall development.

Another possible scenario, however, is that the expansion of ADR programs “hinders” stock market development by diverting investment flows and trading activity away from the local market. In this alternative view, there is no competitive response from local market participants leading to further deterioration of operations, diminished trading volume, and fewer new listings and investors. As the quality of the local market declines, increasingly more firms look abroad to opportunities in more developed markets, such as in the U.S. But not all firms can seize upon these opportunities because the stringent foreign listing, registration and reporting requirements imposed by these established exchanges ensure that only the largest and most liquid firms can pursue listings. The result of these ADR issuances is a breakdown of a pooling equilibrium in favor of a signaling equilibrium in which the larger firms with better opportunities signal their higher quality to local and global investors relative to the smaller, marginal firms in the local market, which suffer lower valuations, reduced liquidity and diminished numbers. Instead of acting as a “catalyst” to greater local market development, the ADRs act more as a “hindrance” or “diversion” by driving investment flows and trading activity away from those markets.

A third possibility, and one that we uniquely explore in this study, is that ADRs act as neither a catalyst nor a hindrance for local stock market development, but represent an outcome of it. In this scenario, there are economic, political or institutional forces at work that are the fundamental cause of poorly functioning markets. As a result, the deteriorating quality of the market creates stronger incentives for existing firms to escape by way of international cross-listings. In general, it is difficult to determine the actual direction of causality. After all, even if there is an acceleration of ADR issuances that precede the decline in a local market, it does not necessarily imply that this event caused this decline, as these firms

may simply have had better information about the future trends toward lower valuations, diminished numbers of new listings and decreased liquidity of the domestic market. Nevertheless, in this paper, we argue in favor of this third scenario over the “hindrance” or “diversion” scenario above and provide empirical evidence in support of it. Specifically, we show that not only is the growth of ADR programs negatively associated with local stock market development, it is so regardless of the type of ADR program. What are shown to be adverse effects on local-market turnover and valuations arise are just as large when large, high profile ADR listings occur on the major U.S. exchanges as with the smaller, less-actively-traded over-the-counter listings and private-placement issues, even though the latter types have only limited liquidity in the U.S. The similarity of these results across types of ADRs is surprising because it is very unlikely that OTC ADR listings and private placements divert in any significant way economic activity away from the home market.

Studying the impact of ADRs on stock market development is also important because it has grown so rapidly in many emerging markets of Latin America and Asia during the past decade and because it has stoked a controversial policy debate as a result.² According to the International Federation of Stock Exchanges (FIBV, www.fibv.com), there were just over 700 foreign companies cross-listed on the six largest exchanges in 1986 (New York Stock Exchange, Nasdaq, London, Tokyo, Paris and Frankfurt), but, as of 2002, this number has almost tripled to just under 2,000. The fastest growth over this time took place among non-U.S. companies listing their shares on the U.S. markets in the form of ADRs. According to the Bank of New York, there are now over 1,500 ADR programs for companies from 85 countries around the world, including more than 600 programs trading around \$20 billion annually on the major exchanges.³

Our paper is related to, but distinct from, a large and growing literature on international cross-listings that argues that the benefits stem from a lower global cost of capital (Alexander, Eun and Janakiramanan, 1987, 1988; Foerster and Karolyi, 1999, 2000; Miller, 1999; and Lins, Strickland and Zenner, 2002). By listing shares abroad, the firm makes its shares more accessible to non-resident investors who would otherwise find it less advantageous to hold the shares because of investment barriers.⁴ Empirical support for this market segmentation hypothesis relies on firm-level, event-study tests that show that the announcement of a particular U.S. listing is accompanied by significant positive abnormal returns averaging around 1 percent on the announcement date itself (Miller, 1999) and cumulatively around 12 to 15 percent in the year of listing (Foerster and Karolyi, 1999). But, a number of recent studies have proposed alternative explanations for these findings. Foerster and Karolyi (1999) argue, for example, that the U.S. listing is not necessarily related to investment barriers and segmented markets, but is associated with the benefit of an expanded shareholder base, which reduces the risk premium in the cost of capital all investors require to hold the shares regardless of the barriers that were

in place.⁵ Noronha, Sarin, and Saudagaran (1996), Sofianos and Smith (1997), Foerster and Karolyi (1998, 2000), Hargis (1998), Domowitz, Glen, and Madhavan (1998), and Pulatkonak and Sofianos (1999), by contrast, demonstrate significant improvements in liquidity due to increased competition for order flow across multiple markets trading the shares, which could also account for the benefits of listing. Cantale (1996), Fuerst (1998), and Moel (1999) assume widespread information asymmetries among investors, particularly in emerging markets, and suggest that the benefits of a lower cost of capital stems from a signaling equilibrium in which firms that list on markets with high disclosure standards (like the U.S.) can establish their quality relative to their peer firms before global investors and experience significant revaluation of their shares.⁶ Finally, Coffee (2002), Stulz (1999), Reese and Weisbach (2002), Tribukait (2002), and Doidge, Karolyi, and Stulz (2003) argue that a U.S. listing enhances the legal protection of a firm's investors and reduces the agency costs of controlling shareholders.

Whatever the sources of the cost-of-capital benefits of international cross-listings to the firms themselves, there are several studies that have demonstrated that these listings in aggregate facilitate greater integration of international capital market (Bekaert and Harvey, 1995; Errunza, Hogan and Hung, 1999; Errunza and Miller, 2000; Hargis, 2002; and, Bekaert, Harvey, and Lumsdaine, 2002). Errunza, Hogan, and Hung, for example, estimate an international asset-pricing model that allows for time-variation in market integration and show that a number of factors are statistically related to higher degrees of integration including the number and composition of international cross-listings. Bekaert, Harvey, and Lumsdaine estimate a reduced-form model for a number of financial time-series, like stock returns, dividend yields, cross-border capital flows, to search for a common, endogenous break in the process generating the series around market liberalizations. They uncover such common breakpoints and show that events related to the introduction of the first ADR listing from a country are more closely related to those breaks than official market liberalization or other capital-market event dates.⁷ These studies, like the current one, are country-level investigations, but they focus primarily on the diversification benefits of ADRs for investors and for the integration of capital markets as a whole, and not on the spillover effects on the development of the stock markets.

Our study is most closely related to a select few studies of the "spillover effects" of ADR listings on the domestic stock market development. Most of these studies focus on the impact of trade diversion and migration of order flow to the U.S. markets on the liquidity of ADRs and non-ADRs in the domestic market (Domowitz, Glen, and Madhavan, 1998; Hargis and Ramanlal, 1998; Claessens, Klingebiel, and Schmukler, 2002; Levine and Schmukler, 2003), but some focus on the impact on stock returns and valuations of non-ADR firms (Lee, 2002; Melvin and Valero-Tonone, 2003) while only one examines broader measures of development (Moel, 2001). Moel, in particular, examines the effects of ADR growth for three different proxies of stock market development (market openness, liquidity and the growth in

listings) in 28 emerging markets. Unfortunately, his results are mixed across these different indicators. Hargis and Ramalal focus on liquidity in only four Latin American markets and make the case for a net positive effect from international cross-listings due to expansion of the global shareholder base for local equities and in spite of order-flow migration following listings. Levine and Schmukler, however, examine a broader sample of 55 countries to show that the migration of trading of “international firms” (which include not only ADRs but also firms that issue equity or debt overseas) to major exchanges has led to a significant diversion of trading away from purely-domestic firms into international firms on the local markets. Claessens et al. show that this diversion of activity is concentrated in those countries with lower incomes per capita, less efficient legal systems and less liquid markets in the first place. Consistent with these broad-based findings, both Lee and Melvin and Valero-Tonone uncover negative “spillover” stock returns for “rival” or “peer” firms with three days around ADR listing announcements.

There are two major contributions of the current paper. First, with the exception of the Moel (2001) study, we evaluate a broad array of measures of stock market development, including the ratio of market capitalization to Gross Domestic Product (GDP), the number of publicly-listed firms, overall cross-border equity flows (relative to GDP) and trading activity (measure as the dollar value of trading relative to market capitalization). However, unlike Moel, we measure these development proxies at the firm level and, most importantly, separately for ADR firms and non-ADR firms. This firm-level analysis allows us to isolate the direct effects of the ADR firms themselves from the indirect effects on the other non-ADR firms in the local market. The analysis is also different because it is conducted at monthly (not just annual) horizons in order to be able to better capture the dynamics of the changes in the ADR and domestic markets. To this end, we construct our development proxies by aggregating firm-level data on the number, market capitalization, and dollar value of trading of different firms each month and compile it with information on listing dates for the ADRs from the various exchanges and depository banks. Unlike the results of the Moel study, our results are consistent across all development proxies identifying adverse spillover effects on market capitalization-to-GDP, the number of listed firms and turnover activity for non-ADR firms. Moreover, the results are robust to a number of controls including official market liberalizations, other capital-market events (like country fund introductions) and even the influence of events like the Asian financial crisis.

The second major contribution of this study is that, unlike all other “spillover” studies to date, we distinguish among the different types of ADR listings from the various emerging markets. That is, we measure the scope, size and trading activity in the larger, high-profile ADRs that list on the major U.S. exchanges (New York Stock Exchange, NYSE, and Nasdaq) from those smaller ADRs that list and trade as over-the-counter and as private-placement (by means of Securities Exchange Commission Rule 144a) issues. This distinction is important because over-the-counter listings are typically illiquid and Rule 144a

issues trade only among qualified institutional buyers on the PORTAL system. Our central premise is that these alternative vehicles for listing in the U.S. are unlikely to effect as large a diversion of trading activity away from the home market. Yet, we find surprisingly that increasing numbers of Rule 144a and over-the-counter listings are associated with statistically significant effects on ADR and non-ADR firm numbers, valuations and trading that are as large, if not larger, than the impact of exchange-listed ADRs. We offer new interpretations in light of these findings and discuss their policy implications.

The remainder of this paper is organized as follows. In the next section, we describe and summarize the data on the growth and expansion of ADR programs in our twelve emerging markets. Section 3 presents the stock market development proxies and conducts simple univariate tests for significant changes around official liberalization and major capital-market event dates, including the first major ADR listings. Section 4 presents the main results of the paper and conclusions follow.

2. The Growth and Expansion of ADR Programs in Emerging Markets

The process that governs how companies from emerging markets cross-list their shares is complex partly because ADRs as financial instruments are varied in form and type and partly because companies choose to employ them in different ways and for different purposes. In this section, we offer a brief primer on ADRs and their different forms. We describe the firm-level data on listings used to measure the growth and expansion of the ADR programs in this study and present some summary statistics.

2.1 A Primer on ADR Programs

There are a variety of ways in which firms from around the world cross-list their shares on overseas markets like the New York Stock Exchange or Nasdaq, including ordinary listings, global and New York registered shares. But the most popular vehicle through which these listings occur in the U.S. - especially from emerging markets -- is the ADR. ADRs are negotiable certificates that confer ownership of shares in the foreign company. They are quoted, traded, and pay dividends in U.S. dollars and transactions take place in accordance with U.S. clearing and settlement conventions. The depositary bank that sponsors the ADR program provides all the global custodian and safekeeping services for a fee. Each depositary receipt denotes shares that represent a specific number of underlying shares in the home market. New receipts are created for investors when the requisite number of shares is deposited in the bank's custodial account in the home market. Cancellations or redemptions of ADRs simply reverse the process.

In 1985, regulatory changes by the U.S. Securities and Exchange Commission (SEC) led to a host of new and different ADR financing vehicles.⁸ "Level 1" ADRs were introduced as unlisted securities that could trade over-the-counter (as "pink sheet" issues on Nasdaq). Issuing firms could qualify for financial

reporting exemptions and did not need to register fully with the SEC; however, no capital raising activity was permitted. “Level 2” ADRs and capital-raising “Level 3” ADRs register and disclose financial statements exactly as domestic U.S. companies in accordance with U.S. Generally Accepted Accounting Principles (GAAP) and receive wide coverage among analysts and the press (Baker, Nofsinger, and Weaver, 2002; Bailey, Karolyi, and Salva, 2003; Lang, Lins, and Miller, 2003).

In April 1990, SEC Rule 144a was adopted. It was designed to serve a number of purposes including increasing the overall liquidity of private placement securities. Private placements are only available to qualified institutional buyers (QIBs), with at least \$100 million in securities and registered broker-dealer accounts. These securities trade over-the-counter among QIBs using the PORTAL system. Another purpose of Rule 144a was to provide increased access to U.S. capital markets specifically to non-U.S. issuers, by not requiring them to undergo registration under the 1934 Securities Act. Rule 144a allows non-U.S. issuers to include U.S. tranches in global equity offerings without having to comply with certain disclosure rules.

2.2 Data

In this study, three measures of ADR activity are constructed. The first measure is the fraction of the total number of stocks in an emerging market with shares also listed in the U.S. as ADRs. The second measure is the fraction of the total market capitalization of all stocks in an emerging market with shares also listed in the U.S. as ADRs. Finally, our third measure is the fraction of the total value of shares traded in an emerging market with shares also listed in the U.S. as ADRs. The data for individual stocks in each market are available monthly from Standard and Poor’s Emerging Markets Database (EMDB) and we include all listed firms in the IFC (International Finance Corporation) Global index for that country as they become available and exclude them upon delisting, merger or acquisition. The market capitalization and value of trading variables are in U.S. dollars.

The analysis encompasses twelve emerging markets in Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Venezuela) and Asia (Indonesia, Korea, Malaysia, Philippines, Taiwan, Thailand). The dates of initial availability on the measures of stock market development vary from as early as January 1976 for Mexico to December 1989 for Indonesia. The sample ends in September 2000.

Determining which firms are ADRs and the effective dates of their respective programs is a difficult task. Listing information was obtained from the Bank of New York and was supplemented and cross-checked with data obtained from the NYSE, Nasdaq, OTCBB⁹ and the September 2000 edition of the National Quotation Bureau’s Pink Sheets. An important complication arises, however, as firms regularly change listing type or location in the U.S. (for example, from Rule 144a private placement to exchange listing) so that the effective dates in the primary listings sources are associated with their most recent listing. For example, while the L-class shares of Telefonos de Mexico was the first Mexican listing

on the NYSE in May, 1991, its A-class shares had actually traded OTC since January, 1980.¹⁰ This problem can create a bias against uncovering the earliest development of the ADR market. To alleviate this problem, we checked our dates against annual editions of the Bank of New York listings prior from 1994 to check for systematic changes in listing type.¹¹

It is important to point out two other key limitations of the data. The two value-based measures of ADR activity (ADR fraction of market capitalization and of value of trading) are determined by activity and by shares outstanding in the home country. That is, we do not have data on the fraction of shares outstanding that are locked up in terms of ADRs outstanding as the number of shares flowing “forward” into ADR form or flowing back into home-market ordinary shares changes daily. Similarly, we do not use data on the volume of trading of the ADRs themselves. It could very well be the case that a number of the ADR programs from a given emerging market may be dormant in terms of U.S. investor ownership and trading interest. These can be important distinctions (Foerster and Karolyi, 1999, 2000). Second, while we do distinguish the ADR programs by type (Rule 144a private placements, OTC listings and major exchange listings) in terms of the count of the number of programs, their market capitalization or value of trading, we do not distinguish capital-raising programs from straight listings. Previous research has shown that important capital-market attributes, such as valuation, trading, and analyst coverage, can be significantly different for ADR programs that are associated with new, public issues (see also Claessens, Klingebiel, and Schmukler, Table 3).

2.3 Summary Statistics

Table 1 presents summary statistics for the three measures of the growth of ADR activity. We report four years of data on the number of companies with ADR programs, the number as a percentage of all IFC Global index constituent companies (NUMFRAC), their market capitalization as a total of the total market capitalization of the IFC Global index (MCAPFRAC), and their dollar value of trading as a fraction of the total value of trading (VOLFRAC).

The data show distinctly different patterns across countries and regions. There are substantially higher levels of ADR activity in countries like Argentina, Mexico, Philippines, and Venezuela and lower levels of activity in countries like Colombia, Indonesia, Malaysia, and Thailand. For example, NUMFRAC averages over 50 percent for most of the 1990s and reaches as high as 80 percent in Mexico (45 listings) and Venezuela (12 listings) by 2000. In spite of relatively large numbers of ADR listings in Chile (21), Brazil (38), and Korea (20), however, NUMFRAC for those three countries never exceeds 50 percent and, in the case of Korea, only reaches 12 percent by 2000.

Similar cross-sectional patterns across countries arise for MCAPFRAC and VOLFRAC, but, in some cases, there are unusual patterns across the three different measures of ADR activity for the same country. In most countries, the fraction of the market capitalization and value of trading comprised by

ADRs is typically higher than the fraction represented by the numbers of firms. This result is intuitive in that only the largest and most actively traded firms are most likely to be able to qualify for listing in the U.S. and it is also consistent with the findings of existing studies (Reese and Weisbach, 2002; Doidge et al., 2003). In the case of Korea, by the end of the 1990s the ADR firms constituted over 50 percent of the market capitalization and 33 percent of the value of trading, though they represented only slightly more than 10 percent in terms of count. Other extreme cases include Brazil, Philippines, and Taiwan. Another factor may be the skewed distribution of market capitalization and trading volume among all the listed firms in those markets. For example, among the five largest firms in Argentina (YPF, Telefonica de Argentina, Telecom Argentina, Perez and Banco Rio de la Plata), four have NYSE ADR listings and one (Perez) trades OTC as a Level 1 ADR.

A third feature of the data is the different pace with which they were adopted in various emerging countries. To supplement the data in Table 1, Figures 1, 2 and 3 illustrate the time-series dynamics of listings, their market capitalization and trading activity across selected countries. In Mexico, ADRs now dominate the market and the figure shows that the process began in the late 1980s. By contrast, Argentina did not experience any growth in listings until the early 1990s (Nortel Inversora, November 1992) though they have also come to dominate the market in numbers and market capitalization. Indonesian firms also started the process later (P.T. Indosat, first NYSE listing in October 1994) and their numbers have remained small. At the same time, Malaysia has had only a very few ADR listings, all of which are Level 1 OTC issues. They represent a small fraction of market capitalization and trading, but their firms adopted this innovation relatively early on (Kesang, Berjaya, and Inter-Pacific Industrial Group, all listed ADRs in 1991). It is also worthy of note that “waves” of subsequent listings often follow the first ADR listing from a country. For example, following Telefonos de Mexico’s May, 1991 listing, three other countries followed in 1991, another eight in 1992, 14 more in 1993, followed by 16 listings in 1994. The waves of listings also have region-wide pattern. In Latin America, Mexican companies were the first to initiate U.S. listings in significant numbers, followed by Chilean firms (Compania Telefonos de Chile, January 1990), Argentinian and Venezuelan firms in 1992-93, and by the Brazilians and Colombians in the mid 1990s.

3. The Impact of ADRs on Stock Market Development

To empirically test the effect of ADR listings on stock market development, we propose four measures of stock market development that have been extensively studied in the literature. In this section, we describe the data used to construct the development proxies, present some summary statistics, and conduct univariate tests for structural changes in these development proxies around key liberalization and capital-market events.

3.1 Stock Market Development Measures

Four measures of stock market development are constructed. First, the market capitalization ratio (MKTGDP) equals the value of listed shares divided by GDP, both denominated in current U.S. dollars. Many researchers use this ratio as an indicator of development since stock market size is correlated positively with the ability to mobilize capital and diversify risk. Existing firms' past retained earnings and future growth prospects are also presumed to be embodied in the stock market's capitalization ratio: a higher ratio relative to GDP implies better growth prospects and a more developed market. We follow many studies that have employed this measure for stock market development (Levine and Zervos, 1998; Hargis, 1998; Moel, 2001; Bekaert, Harvey and Lundblad, 2001; Bekaert, Harvey and Lumsdaine, 2002; Rajan and Zingales, 2003). A number of them recognize the key weakness of the indicator that a few companies with appreciated (or depreciated values, such as the technology sector in the U.S. in 2000) can give the impression of equity market development (or contraction) even when there has been no change the breadth of the market in terms of participation or in equity capital raised. Data on market capitalization is aggregated from the individual firms as at month-end from EMDB and the corresponding GDP data is from the World Bank's World Development Indicators database (with supplemental data for Taiwan from the International Monetary Fund's International Financial Statistics data). Qualifying firms are based on membership in the IFC Global index membership. Since we compute market capitalization from individual firms that comprise the index, we can compute the MKTGDP number separately for those firms in a given month that have ADR programs in the U.S. and those that do not.

Our second measure of development is a count of the number of publicly traded companies. A number of studies that use this measure (Moel, 2001; Bekaert, Harvey and Lundblad, 2001; and Rajan and Zingales, 2003) argue in favor of this measure because it captures the breadth of the stock market without being tainted by fluctuations in stock market valuations. But it can be too slow-moving to fully capture high frequency changes in the environment. The measure will also be affected by the process of consolidation as well as by the industrial structure of markets (Rajan and Zingales, 2003). We divide the count by U.S. dollars (in billions) of GDP (NUMGDP) following Bekaert, Harvey and Lundblad (2001), but acknowledge that it differs from Moel (2001) who computes percentage changes in listings and Rajan and Zingales (2003) who deflate the count by the population in millions. Again, with our firm-level data, we can measure NUMGDP separately for ADR and non-ADR markets, separately.

Third, the turnover ratio (TURNOVER) equals the value of total shares traded divided by market capitalization. It is not a direct measure of liquidity, but high turnover is expected to signal lower transactions costs. Month-end value of trading is in millions of U.S. dollars and is drawn from EMDB. This have been actively studied in the market liberalization literature on stock market development (Bekaert, Harvey and Lundblad, 2001; Bekaert, Harvey and Lumsdaine, 2002) and on the few existing

studies of ADR market “spillovers” (Hargis, 1998; Domowitz, Glen and Madhavan, 1998; Moel, 2001; Claessens, Klingebiel, and Schmukler, 2002; and, Levine and Schmukler, 2003). The latter set of studies focuses on liquidity as an outcome measure, but the former set of studies acknowledges a number of weaknesses of liquidity as a measure of development. For example, Levine and Zervos (1998a) contrast turnover with their preferred measure of value traded relative to GDP, which gauges the positive effects of liquidity as a share of national output and thus on an economy-wide basis. But they acknowledge that “price effects” plague this measure because a rise in stock prices will increase value traded even without a change in the number of transactions or a fall in transactions costs. We follow the majority of the studies in using TURNOVER and also compute this measure separately for ADR and non-ADR firms with our firm-level data.

Finally, the capital flow ratio (FLOWGDP) is the total dollar value of monthly gross portfolio equity flows, including purchases and sales of equities from U.S. residents to the emerging market, divided by GDP. The gross flows are obtained from Treasury International Capital (TIC).¹² Many studies have examined the dynamics of capital flows around liberalization events (Levine and Zervos, 1998b; Bekaert and Harvey, 1995, 2000; Bekaert, Harvey and Lumsdaine, 2002); Edison and Warnock (2003c) specifically study the impact of ADR listings from emerging markets on flows. We refer to this as a development measure, but it is better understood as an outcome of development and a facilitator of international financial integration. Unlike some studies, we do not compute net capital flows (purchases less sales of emerging market equity by U.S. investors), because the duration, timing and magnitude has varied dramatically with economic and stock market cycles during the past decades (Karolyi and Stulz, 2003). Of course, TIC flows data are aggregated across investors and stocks, so we are unable to construct separate measures of this proxy for ADR and non-ADR segments of the market. There are a number of other important caveats of the TIC flows data including the fact that coverage is limited to U.S. investors (excluding other countries’ investments in emerging markets), trades through third countries (possibly through foreign intermediaries) are excluded, as are merger-related stock swaps (Edison and Warnock, 2003c).

3.2 Summary Statistics

Table 2 presents data on each of the four stock market development indicators for selected years. Though our data is available on a monthly basis, for many of the flow-based measures, such as annual trading volume, turnover and gross flows (relative to GDP), the statistics are reported on an annualized basis for the year; the stock-based variables like market capitalization and number of listed companies are reported as at year-end. There are a number of interesting patterns across countries and years. Typically, the countries with the largest market capitalization in billions of U.S. dollars, such as Brazil, Korea, Mexico, and Taiwan, also have among the highest capitalization ratios. For example, Taiwan’s \$205

billion market represents almost 72 percent of its GDP in 2000. There are important exceptions, such as Chile, for which the capitalization ratio has remained above 60 percent for most of the 1990s, and Malaysia, for which the ratio has even exceeded over 230 percent prior to the Asian financial crisis in mid-1997. Across most markets, there has been a steady trend upward in the capitalization ratios (MKTGDP), particularly relative to the early period before 1990.

In almost all countries, the number of listed companies has increased substantially, although there are again interesting exceptions. In countries like Brazil, Chile, Malaysia, Philippines, and Korea, the number has doubled or even tripled during the 12 year period of analysis, yet the number of firms in Argentina, Colombia, and Venezuela have remained the same, which means relative to GDP (in billions of U.S. dollar, or NUMGDP), they have declined. Part of the problem with this measure is that it is constrained by the eligibility of firms for the IFC Global index and may not be representative of the entire population of publicly-listed firms in those markets on smaller, regional exchanges or those trading over-the-counter. It is unlikely to affect our analysis systematically, however, as the eligibility criteria are applied uniformly across all markets.¹³

Turnover ratios have remained reasonably steady across the period of analysis for most countries. Some countries, like Chile and Venezuela, have relatively low turnover (below 10 percent per year) whereas others, like Korea and Taiwan, represent unusual outliers with very high turnover (over 100 percent per year). There are bursts of trading activity creating some volatility in these ratios. For example, turnover in Argentina averages around 30 percent per year but has swung from 15 percent in 1988, to 90 percent in 1992 and back to around 20 percent for the remainder of the 1990s.

In every country in our analysis, the fraction of GDP comprised of by gross flows has increased. In some cases, like Korea and Taiwan, the expansion of gross flows from the early 1990s to 2000 is six to nine times larger in magnitude. The ratios are low, averaging well below 10 percent, but it is important to remember that the TIC flows data are bilateral (between U.S. and local emerging market residents) and do not include flows between local residents and among other developed and emerging market investors.

An important feature of the monthly time series for each of these development indicators is that they are constructed from trending series, which indicates the possibility of a unit root. Non-stationarity can affect our inferences in tests below because any statistical association with the growth of ADR activity variables uncovered may be spurious. We compute (though do not report) Dickey-Fuller (1979) unit-root tests (in augmented form with linear time trend, intercept and one or more lags) and cannot reject the null of unit root for all MKTGDP and NUMGDP series, but reject it easily for all but three TURNOVER series and each of the FLOWGDP series. For many of the MKTGDP series, the first-order autocorrelation coefficients for MKTGDP and NUMGDP often exceed 0.95 and 0.90, respectively, and Box-Ljung Q-statistics (unreported) easily reject the null of zero autocorrelation to one to six lags. Similar

autocorrelation statistics arise for TURNOVER and FLOWGDP. One possibility is to perform our analysis by differencing the series to ensure stationarity and reliable inferences. But this simple approach may risk over-differencing some of the series. Instead, we specify our pooled cross-sectional time-series regression models (to be presented in Section 4) with lagged dependent variables and compute Newey and West (1987) heteroscedasticity-consistent standard errors with serial correlation correction up to six lags. This transformation is useful not only because it ensures stationarity by construction, but also because it allows each of our stock market development indicators to define its own adjusted monthly growth rates. We elaborate on these issues further in Section 4.

3.3 Tests of Structural Change in Stock Market Development

Table 3 presents the results of a number of univariate tests for changes in each of the stock market development series around key liberalization and capital-market events. For each country, we identify the official liberalization dates from Table 2 of Bekaert, Harvey, and Lumsdaine (2002). These dates typically include regulatory events related to changes in foreign ownership restrictions or the relaxation of currency conversion restrictions (e.g. Resolution 51 in February 1991 in Colombia). We also report tests of changes around the introduction of the first country fund (also, from Table 2, Bekaert et al., 2002), the first ADR program and the first exchange-traded (NYSE or Nasdaq Level 2 and 3) ADR program from the particular country. We compute two-sided t -statistics with heteroscedasticity- and serial-correlation-corrected standard errors from Newey-West (1987). The sample periods vary in length by country according to the start of the series (indicated in parentheses beside the name) and end commonly in September 2000.

In each of the countries around the different event dates, statistically significant and economically large changes occur in capitalization ratios. For example, in Chile, MKTGDP increases 48 percent around the four key dates (which are clustered within six months of each other) from a ratio of 22 percent of GDP in the late 1980s to 65 percent of GDP at the end of the sample. Malaysia, Philippines, and Thailand experienced similarly large rates of growth in MKTGDP, whereas other countries, like Argentina, Colombia, Korea, and Venezuela experienced modest increases of less than 10 percent, though these are all statistically significant. The growth rates in NUMGDP are mixed. Some countries, like Korea, Malaysia, and Philippines, have statistically significant and steady increases around 10 percent around these events. A 10 percent increase for Korea, for example, represents an increase of over 100 listed firms relative to the \$260 billion increase in GDP experienced over the period from 1988 to 2000. For five countries, NUMGDP decreased significantly around these key events and, by economically large magnitudes in three countries in particular (Chile, Colombia, and Indonesia). In Chile, the number of listed firms actually increased from 25 to 47 over this period, but the GDP rose dramatically from \$20 billion to \$68 billion during the same period. TURNOVER increased for most countries and around most

event dates, with Chile (insignificant), Mexico (negative), and Philippines (negative) as exceptions. The typical increase in TURNOVER ranged from 3 percent per year (Colombia) to almost 50 percent per year (Korea). In every country, statistically significant increases in FLOWGDP arose around the dates of interest. The economic magnitudes of these changes in gross flows, as a percentage of GDP, are small (ranging from 1 to 3 percent), but represent large dollar amounts. For Mexico, GDP rose from \$150 billion in 1988 to \$490 billion in 2000, a 324 percent increase, but gross flows rose from \$0.3 billion in 1988 to almost \$20 billion in 2000, which is a much larger in growth terms.

With some exceptions, inferences about the impact of the different liberalization and capital-market events on the stock market development indicators are quite consistent and of similar magnitudes. This is not surprising given how clustered many of these events across these countries.¹⁴ Interesting exceptions include TURNOVER in Argentina, for which there were statistically significant increases following official liberalization and country fund introduction in 1989 and 1991, but no significant changes following the ADR introductions of Alpargatas (OTC) in 1992 and BAESA (NYSE) in 1993. Similar divergences occur in TURNOVER for Philippines, Taiwan, and Venezuela, but these results stem from unusually early liberalization dates, such as for Venezuela, or country fund introduction dates, as for the other two countries.

Overall, Table 3 provides evidence that there are significant advances in these stock market development indicators, notwithstanding the limitations that each of these indicators face in terms of construction or with their interpretation. We also see that the changes in capitalization ratios, numbers of listed firms, their turnover and overall gross flows are similar across different liberalization events. As a result, in the following analysis, we introduce our monthly measures of ADR activity and test for a statistical association with the development indicators only after controlling for these other liberalization and capital-market events.

4. Results

4.1 Estimation Methodology

In this section, we investigate the influence of the ADR activity variables on the stock market development proxies using a multi-country, multivariate analysis. We specify and estimate a pooled cross-sectional time-series regression model of the development indicators, y_{it} :

$$y_{it} = \alpha_i + \mathbf{x}_{it}'\boldsymbol{\beta} + \mathbf{z}_{it}'\boldsymbol{\gamma} + \delta_i y_{it-1} + \varepsilon_{it} \quad (1).$$

The ADR activity variables, \mathbf{x}_{it} , are projected onto the indicator variables and we control for a number of other factors, \mathbf{z}_{it} , which may be related to development. The coefficients associated with these ADR and control variables are common across countries. In estimation, we allow for fixed effects by setting a different intercept, α_i , for each country. In some specifications, we have constrained the intercept to be

constant across countries to infer the average monthly value of the indicator variable of interest. Because some of our development indicators, like MKTGDP and NUMGDP, are close to non-stationary series, we allow for a lagged dependent variable, y_{it} , in the specification, and because the degree of potential non-stationarity in these indicators varies across countries, we allow the coefficient, δ_i , on the lagged dependent variable to be different (although, in some tests, we also impose that they are equal).

Panel data can be well-suited for examining dynamic effects like the first-order model (1), but substantial complications arise in estimation. One difficulty in such a fixed-effects setting is that the lagged dependent variable may be correlated with the disturbance, even if it is assumed that ε_{it} is not itself autocorrelated. Greene (2000, Section 14.7) shows how the estimator may not unbiased though it is consistent, although he points out the problem is more severe in a random-effects specification than in a fixed-effects specification like ours. Ahn and Schmidt (1993) propose a general instrumental variables estimator that allows for differences ($y_{it-1} - y_{it-2}$, $y_{it-2} - y_{it-3}$) or lagged levels (y_{it-1} , y_{it-2}) as candidate instruments to alleviate the bias. They argue that the level of y is likely uncorrelated with the differences of disturbances one or two periods (months) subsequent. We, therefore, include up to six lags of the levels of the development indicators and also compute Newey-West (1987) heteroscedasticity-consistent standard errors with serial-correlation corrections up to six lags.

4.2 Overall Results

Table 4 presents the results of our regression analysis. We present several different specifications for each of the four stock market development indicators.¹⁵ We estimate the model over a common sample period from December 1989 through September 2000. To generate additional power for the test of the null hypothesis about the importance of the ADR variables, we introduce two control variables (z_{it}) that have been examined by other researchers. The first variable, denoted LDATE, is a dummy variable that corresponds to the official liberalization dates in the respective markets. These dates are examined in Table 3 and are from Bekaert, Harvey, and Lumsdaine (2002). Second, we follow Bekaert (1995) and Edison and Warnock (2003a) and compute a measure of openness (denoted OPENNESS) as the ratio of the market capitalization of the constituent members of the IFC Investible and the IFC Global indexes for each country. This variable measures the extent to which the stocks in a market are available to foreign investors. For each development indicator, we estimate a simple specification with each control variable separately and then proceed to add each of the three ADR activity variables to the base model in turn.

The results for MKTGDP (top-left panel) are generally weak. None of the control variables or ADR activity variables is significant. This is surprising given the findings in Table 3 and in Bekaert, Harvey and Lumsdaine (2002, Tables 3 and 6) in which they show that capitalization ratios have among the most dramatic reactions to market liberalizations. Part of the problem may be that ours is a contemporaneous measure of association and theirs covers an event window ranging from five months to

three years. They do confirm, in fact, that the “breakpoint” in time for their capitalization ratio occurs, on average, more than one year after the actual liberalization date. Another possibility is that pooling across countries washes out the effect of the ADR factors on MKTGDP. In separate country-specific regressions (not reported), NUMFRAC, MCAPFRAC and VOLFRAC have significantly positive coefficients on MKTGDP in Chile, Indonesia, Mexico, and Argentina and significantly negative coefficients in Malaysia, Thailand, and Venezuela.

By contrast, the regression tests for NUMGDP (top right panel) are robust across all specifications and show a statistically significant decline in the numbers of listed firms (per billions of U.S. dollars of GDP) following liberalization, with greater openness and with the growth in the ADR programs. For example, the coefficient on LDATE is -1.18 percent (with a t -statistic of -5.73) per month. Compared to the country-specific constant (α_i) for, say, Chile, of 0.81 percent per month, this negative coefficient implies a net decline of -0.37 percent per month following liberalization, or -48 percent over the 130-month period, which is close to the figure reported in the univariate tests of Table 3. Economically, this is a significant decline for Chile from a ratio of 1.25 listed companies per billions of U.S. dollars of GDP before liberalization to less than 0.70 by the end of 2000. NUMFRAC, MCAPFRAC, and VOLFRAC all have significantly negative coefficients even after controlling for LDATE and OPENNESS. In model (3), for example, the coefficient on NUMFRAC for NUMGDP is -0.0169 (t -statistic of -4.43) and its introduction in the regression model reduces the magnitude of the negative coefficients on LDATE and OPENNESS, though they remain significant. We can gauge the economic magnitude of this coefficient for the case of Chile by calibrating it with NUMFRAC, which experienced an increase from 0 percent before its first listing in 1990 to 45 percent by 2000 (Table 1), to yield a decline of -0.76 percent (-0.0169×0.45) per month. This factor explains about 64 percent of the overall decline of -1.18 percent per month that Chile experienced following its liberalization.

Our analysis of TURNOVER is mixed (lower left panel). Although the coefficients on LDATE and OPENNESS are statistically significant and positive across the various specifications - a result consistent with Bekaert, Harvey, and Lumsdaine (2002) and Kim and Singal (2000, Table 7) - only one of the ADR activity variables, NUMFRAC, is significant. NUMFRAC has a negative impact on TURNOVER with a statistically and economically significant coefficient of -0.0650 (t -statistic of -2.52). In the case of Argentina, a country that experienced a significant increase in annual turnover ratios from around 15 percent in the early years following liberalization to over 30 percent by 2000 (Table 2), this coefficient implies that the growth in the number of listed companies from 0 percent before 1992 to 52 percent by 2000 limited this increase in turnover by 3.38 percent (-0.0650×0.52), which is a substantial fraction of the overall 15 percent increase in turnover that occurred.

Finally, the regression results for FLOWGDP (bottom right panel) are consistent across all specifications. The coefficients on all three ADR factors are positive and significant, even after controlling for LDATE and OPENNESS. The growth of ADR programs facilitates greater cross-border capital flows in these emerging markets. This effect is important beyond the increase in flows that stems from government liberalizations and from greater investability in these home markets. These coefficients imply economically significant growth in flows associated with these ADR programs. In the case of Mexico, a country for which ADRs grew to represent about 85 percent of the market capitalization by 2000 from only 5 percent in 1988, the coefficient on MCAPFRAC of 0.0067 implies an increase of 0.74 percent in FLOWGDP (0.0067×0.80). This factor thus explains about 20 percent of the overall growth in gross flows as a fraction of GDP (Table 2) during this period, which totals about \$4 billion of the \$21 billion increase in gross flows in dollars.

4.3 Isolating the Impact of ADR Activity on the Domestic Stock Market

One important concern with the tests in Table 4 is that the measures of financial development, such as the number of listed firms, their market capitalization and turnover, include the ADR firms that are also in the ADR factor proxies. It is not an unreasonable first approximation as they, as well as the non-ADR firms that trade exclusively in the local market, do capture the overall vitality of the stock market. But, it may be useful to focus attention on those companies that do not list ADRs in the U.S. The key hypothesis of this paper, after all, describes a scenario in which growth in ADR programs can represent a “catalyst” for expansion of the local market in terms of number, capitalization and liquidity through existing companies, but also through the attraction of new companies to the local market. Table 5 presents tests for three of the stock market development indicators (MKTGDP, NUMGDP, and TURNOVER) for which the firm-level data allows us to separate the analysis for ADR and non-ADR firms.¹⁶

In comparing the separate results for MKTGDP of ADR and non-ADR firms (left panel), we note a stark contrast that likely explains the mixed results found in Table 4. For the ADR firms, the coefficients on NUMFRAC, MCAPFRAC, and VOLFRAC are all significantly positive, even after controlling for the continued weak effects of the LDATE and OPENNESS control variables. It is not surprising that MCAPFRAC is positively associated as the numerators in the dependent and independent variables are identical, but that is not the case for the number of firms (NUMFRAC) and the dollar value of trading (VOLFRAC). More interesting still, the coefficients on NUMFRAC, MCAPFRAC, and VOLFRAC for the non-ADR firms are significantly negatively related to MKTGDP. That is, the growth and expansion of the ADR market is negatively associated with the capitalization of the other firms in the local market. The economic magnitudes associated with these coefficients are large. Consider the case of Brazil for which the volume of trading comprised of by ADRs grew from less than 2 percent in the early

1990s to almost 70 percent by 2000. Our results indicate that the increase in VOLFRAC was associated with a decrease of 0.31 percent (-0.0045×0.70) per month in the capitalization ratio of Brazil's non-ADR firms which represents about 40 percent of the long-run average increase of 0.72 percent per month during the period.

The impact of the ADR factors on the number of listed ADR and non-ADR firms in the home market (NUMGDP, middle panel) and their trading activity (TURNOVER, right panel) is similar to that for MKTGDP. In Table 4, we found negative coefficients on the ADR factors for NUMGDP overall; however, in Table 5, significantly negative coefficients from all three ADR factors are consistently obtained for the non-ADR firms, while those for the ADR firms are all positive. The adverse impact on non-ADR firms is robust to inclusion of the control variables LDATE and OPENNESS for which the coefficients remain significant and negative, also. The impact of ADR factors on TURNOVER for ADR and non-ADR firms provides the most interesting evidence. In the case of TURNOVER for the non-ADR firms, the control variables, LDATE and OPENNESS, have positive coefficients that are statistically significant while the coefficients on the ADR factors, NUMFRAC and VOLFRAC, are significantly negative. For the ADR firms, the turnover ratio is increasing overall (unreported positive intercept coefficients), but not in a way that is related to these ADR factors or control variables. For example, the positive coefficient on OPENNESS in model (1) for non-ADR firm TURNOVER is 0.0438 (t -statistic of 3.95), but, when NUMFRAC is added to the regression as in model (3), the coefficient on OPENNESS increases to 0.0775 (t -statistic of 4.21) and that on NUMFRAC is -0.1153 (t -statistic of -4.24). A unique interaction arises between OPENNESS and NUMFRAC or VOLFRAC for non-ADR firms and provides an important new implication: non-ADR turnover, like that of ADR firms, rose over our period of study, but the rate at which it rose was slower than for ADR firms and this slower rate of growth is correlated (negatively) with the expansion of the ADR markets.

4.4 Does the Type of ADR Listing Matter?

Not all types of ADR listings are the same. As discussed in Section 2, the most prominent U.S. listings are Level 2 and 3 ADRs, which involve exchange listings on the NYSE and Nasdaq. But there are many companies from these emerging markets that pursue Level 1 OTC listings and Rule 144a private placements to access U.S. markets. These alternative listing types have fewer and less stringent reporting and registration requirements, but they are typically less actively traded, have more limited ownership in the U.S., attract fewer analysts and generally have lower investor profiles. Most papers that study the ADR market do uncover significant differences among different types of ADRs for capital market reactions around listings (Miller, 1999; Foerster and Karolyi, 1999), capital-raising activity (Foerster and Karolyi, 2000), for valuation (Doidge, Karolyi, and Stulz, 2003), and for disclosure activity (Lang, Lins, and Miller, 2003; Bailey, Karolyi, and Salva, 2002). In this section, we investigate whether the impact of

the ADR market factors for various development measures of the local market stems primarily from these higher profile exchange listings or whether all types of U.S. listings make a difference. We reconstruct the ADR factors (NUMFRAC, MCAPFRAC, and VOLFRAC) based on the three types for each country and introduce them as separate variables using the same specifications as in previous sections. Table 6 presents the results. Note that we report the results only for the non-ADR stock market development indicators for MKTGDP, NUMGDP, and TURNOVER, although results are available for the ADR firms and all firms in aggregate. Our FLOWGDP results are, of course, only available for the overall sample of firms, as they based on gross flows from the TIC database.

We find that the coefficients on components of NUMFRAC, MCAPFRAC, and VOLFRAC by ADR type on the local stock market development indicators are very similar in magnitude and statistical significance. In many cases, those ADR factors associated with the Rule 144a issues and OTC listings are larger and significant when those associated with exchange listings are not. Consider the example of MKTGDP (far left panel) for the NUMFRAC variable. In this case, the significant negative coefficient of -0.0094 in Table 5 for the overall listings NUMFRAC variable is broken out by type in Table 6 such that the effect is concentrated in the Rule 144a private placements (-0.0147 , with t -statistic of -2.07) and in OTC listings (-0.0108 , t -statistic of -2.21), and not in the Level 2 and 3 listings (-0.0062 , t -statistic of -1.28). In the case of MCAPFRAC and VOLFRAC, there is a similar ordering of coefficients in terms of magnitude, though all are statistically significantly negative. For NUMGDP (left center panel), the coefficients on the ADR factors are statistically significant and negative for each of the different types of listings, but the magnitude of the coefficients for MCAPFRAC and VOLFRAC are higher for Level 2 and 3 listings. The results for TURNOVER (right center panel) are most surprising yet, as it is through the actively-traded exchange listings on the NYSE and Nasdaq that most of the order flow and trading activity of the home market would be expected to be diverted away. In fact, we show that the negative coefficient on OTC, especially for MCAPFRAC and VOLFRAC, is as large as that for the Level 2/3 ADR listings. For example, for VOLFRAC, the coefficient on TURNOVER for all ADRs from Table 5 is -0.1275 , but this is concentrated in the OTC listings (-0.2469 , t -statistic of -8.21), though both the Level 2/3 (-0.0956 , t -statistic of -4.97) and Rule 144a issues (-0.0905 , t -statistic of -2.88) are statistically significant. Finally, for FLOWGDP, the coefficient on Level 2/3 exchange-listings is statistically significant and positive for MCAPFRAC and VOLFRAC, but it is the NUMFRAC of OTC listings, and not the exchange listings, which is the dominant factor for FLOWGDP.¹⁷

These results are surprising. The fact that the statistically significant and economically important coefficients of these ADR factors for stock market development are similar across the different types of ADR listings leads us to ask whether the ADR factors are as much an outcome of market conditions as a cause of it. It is unlikely that Rule 144a private placements and OTC ADR listings can divert as much

trading activity and investment flows away from the domestic market as exchange listings can as they are not very actively traded and limited to institutional investors. We offer this evidence as consistent with an alternative to the diversion hypothesis, advocated by Hargis and Ramanlal (1998), Moel (2001), Claessens, Klingebiel, and Schmukler (2002), and Levine and Schmukler (2003). We propose that the scope, size and trading activity in the domestic (non-ADR) market may be declining for fundamental economic, political and other institutional reasons, to which many firms in those markets respond by seeking out listings in whatever form that is available to them. Smaller, illiquid stocks in these markets may not be able to qualify for the listing standards of the major exchanges and will have to pursue OTC listings or Rule 144a issues. Larger, more liquid stocks will qualify for the major exchanges and will have choices among listing types available to them. The result is a breakdown of a pooling equilibrium in favor of a signaling equilibrium in which the larger firms signal their quality by listing ADRs enjoying higher valuations and enhanced liquidity at the expense of smaller firms which suffer reduced liquidity and lower valuations. We can also interpret this evidence as supportive of signaling models of the ADR issuance process introduced by Cantale (1996), Fuerst (1998), and Moel (1999).

4.5 Robustness Tests

We incorporate a number of alternative specifications to evaluate the robustness of our findings, which are available upon request. One set of tests examines the sensitivity of our basic inferences associated with the ADR factors to different numbers of lags of the dependent variable used as instruments in our pooled cross-sectional time-series model. All of the results reported above use six lags, but we re-estimate the model with only three lags and one lag, respectively. Most of the basic results of Table 4 remain with small changes in the coefficients and their statistical significance. Most importantly, there does not appear to be any systematic pattern to these variations across lag-length specifications that might suggest a problem with biased coefficients that can stem from the cross-autocorrelations in the residuals and the independent variables (Ahn and Schmidt, 1993). To address this concern further, we also adjusted the number of lags allowed in the Newey-West (1987) covariance matrix and found little change in the inferences. Finally, we introduced a specification that lagged all the NUMFRAC, MCAPFRAC and VOLFRAC variables by one month and even included specifications with up to three lagged values. In these tests, we found that the magnitude and significance of the coefficients on the lagged ADR factors declined with longer lags. Although their effect was weaker, the basic patterns were similar to those with the contemporaneous factors. A richer analysis of the joint dynamics of these development indicators and the ADR factors would represent a useful extension to the current paper.

A second set of tests evaluated the potential explanatory power of other factors that might influence development. We are especially concerned about the perturbing influence of the Mexican peso crisis in late 1994 and the Asian financial crisis of 1997. We construct country-specific dummy variables

that equal one for months in which the individual stock market returns are larger in absolute value than 25 percent. The stock index returns are the IFC Global index returns from the EMD database and are denominated in U.S. dollars. We find that the crisis dummy variable is statistically significant and negative in the MKTGDP regressions and significant and positive in the TURNOVER regressions. Crisis periods with large absolute stock returns were associated with large declines in capitalization and large increases in turnover activity across these twelve countries. The dummy variable is not significant for either the NUMGDP or FLOWGDP specifications. More importantly, in spite of these important influences for capitalization and turnover ratios, the basic results associated with the ADR factors remain. Another possible influence is the introduction of other capital-market instruments that may facilitate stock market development by helping global investors diversify into emerging markets. We employ the same event-date dummy variable associated with the country fund introduction from Table 3, which we originally obtained from Bekaert, Harvey, and Lumsdaine (2002). We include it in the place of LDATE in our specifications of Table 4. Overall, the coefficients associated with the country-fund introduction are weaker than for LDATE, but, more importantly, we find that the inferences in regards to the ADR factors are not changed.

5. Conclusions

This paper finds that the growth and expansion of ADR programs in emerging markets around the world facilitated an expansion of cross-border equity flows and overall development of the stock markets in those countries. However, the development was uneven across the different stocks in those markets. Specifically, we find the capitalization and turnover ratios of those domestic firms that do not pursue listings on overseas exchanges decline significantly as ADRs grow in importance in the local stock market in terms of numbers listed, their market capitalization and their trading volumes. These results at first glance appear consistent with the view that ADR programs help to divert trading activity and investment flows to the U.S. markets at the expense of other firms in the domestic market. That is, though ADRs spur on overall stock market development, they also create negative “spillovers” on the liquidity, valuations, and breadth of the domestic market.

However, when we examine in greater detail the potential sources of these spillovers, we find evidence that is not necessarily consistent with this “diversion” hypothesis. We specifically distinguish ADR programs by type, separating out the potential influence of smaller and less-liquid OTC listings and Rule 144a private placements from the larger, actively-traded exchange listings on the NYSE and Nasdaq markets. Surprisingly, we find that the negative spillovers associated with these smaller ADR listings are as statistically and economically large as with the larger high-profile ADR programs in spite of the fact that they do not trade very actively in the U.S. and are restricted to institutional investors. We offer an

alternative interpretation of this new evidence that is different from other studies of the spillover effects of ADR programs to the local market (Hargis and Ramanlal, 1998; Moel, 2001; Claessens, Klingebiel and Schmukler, 2002; Levine and Schmukler, 2003; Lee, 2002; and, Melvin and Valero-Tonone, 2003).

We suggest, by contrast, that the growth and expansion of ADR markets in these emerging economies may be an outcome of the declining market conditions and not a cause of them. It is possible that fundamental economic, political, legal or other institutional forces are contributing to the deteriorating quality of the local markets and that these poorly functioning markets are creating incentives for firms to leave. Of course, the larger firms are able to escape these markets by qualifying for ADRs in the U.S. thereby enjoying higher valuations and enhanced liquidity, while the smaller firms suffer lower valuations and reduced liquidity. This alternative hypothesis is important because it has a very different policy implication for market regulators, for companies and for investors in these emerging markets. ADR programs, in and of themselves, do not necessarily divert investment flows and trading activity away from the local market. Rather, their growth and popularity may simply be the outcome of poor economic policies, weak legal protections of shareholders and lack of transparency that are leading to poorly functioning stock markets.

It is important to caution readers of several limitations of the current study. The scope of analysis is limited to only twelve emerging markets from Latin America and Asia during the 1990s, which is a relatively short time period. Also, we only study four measures of stock market development. One important extension of this study would be to incorporate a longer historical analysis with capital market data from developed markets. ADR programs in Europe, and especially the U.K., France, Netherlands, Sweden and Italy, grew dramatically during the 1970s and 1980s and were similarly associated capital market liberalization activity, such as the Thatcher government privatizations of British Gas, British Telecom and British Airways.

Another extension would be to examine other possible outcome measures of stock market development. While proxies for the overall size and liquidity of the markets and cross-border capital flows are useful, it would be interesting to consider measures of the efficiency of the markets, including equity and debt issuances, IPO activity, and the size and presence of the financial services sector. It may also be helpful to broaden the analysis to examine the potential impact on overall economic growth. A third extension would refine the horizon of analysis. In this study we examine monthly data on stock market development and the ADR programs and their activity. Our analysis has made us aware of important dynamics in these variables, but we do not investigate sufficiently the rich joint dynamics potentially underlying these time-series. A multivariate simultaneous equation system may be a fruitful econometric specification to consider.

Finally, our measures of ADR activity are narrow and ignore important institutional facets of global equity markets that need to be reconciled. For example, the ADR variables consider only activity in the home market. This distinction is important because some ADR programs from emerging markets are associated with greater trading activity, broader ownership geographically and more aggressive capital-raising activity, while other programs are dormant. We also focus only on the economic impact of cross-listings in the U.S. markets by way of ADRs. While the U.S. is where most of the activity has occurred over the past decade for firms (Pagano, Roell, and Zechner, 2002; Sarkissian and Schill, 2002), it would be important to consider the broader impact of cross-listings in other major markets, such as Tokyo, Singapore, and London.

References

- Ahearne, Alan G., William L. Grier and Francis E. Warnock. "Information Costs and Home Bias: An Analysis of U.S. Holdings of Foreign Equities," *Journal of International Economics*, forthcoming 2003.
- Ahn, Seung C. and Peter Schmidt. "Efficient Estimation Of Models For Dynamic Panel Data," *Journal of Econometrics*, 1995, v68(1), 5-27.
- Alexander, Gordon J., Cheol S. Eun and S. Janakiramanan. "Asset Pricing And Dual Listing On Foreign Capital Markets: A Note," *Journal of Finance*, 1987, v42(1), 151-158.
- Alexander, Gordon J., Cheol S. Eun and S. Janakiramanan. "International Listings And Stock Returns: Some Empirical Evidence," *Journal of Financial and Quantitative Analysis*, 1988, v23(2), 135-152.
- Bailey, Warren, G. Andrew Karolyi and Carolina Salva. "The Economic Consequences of Increased Disclosure: Evidence from International Cross-listings" Ohio State University Working Paper, 2002.
- Baker, H. Kent, John R. Nofsinger, and Daniel G. Weaver. "International Cross-Listing and Visibility," *Journal of Financial and Quantitative Analysis*, 2002, v37(3), 495-521.
- Bekaert, Geert. "Market Integration and Investment Barriers in Emerging Equity Markets," *World Bank Economic Review*, 1995, v9, 75-107.
- Bekaert, Geert and Campbell R. Harvey. "Time-Varying World Market Integration," *Journal of Finance*, 1995, v50(2), 403-444.
- Bekaert, Geert and Campbell R. Harvey. "Foreign Speculators And Emerging Equity Markets," *Journal of Finance*, 2000, v55(2), 565-613.
- Bekaert, Geert, Campbell R. Harvey and Robin L. Lumsdaine. "Dating the Integration of World Equity Markets," *Journal of Financial Economics*, 2002, v65(2), 203-247.
- Bekaert, Geert, Campbell R. Harvey and Christian Lundblad. "Emerging Equity Markets And Economic Development," *Journal of Development Economics*, 2001, v66(2), 465-504.
- Bekaert, Geert, Campbell R. Harvey and Christian Lundblad. "Growth Volatility and Equity Market Liberalization," Duke University Working Paper, 2002.
- Cantale, Salvatore. "The Choice of a Foreign Market as a Signal," Tulane University Working Paper, 1996.
- Claessens, S., D. Klingebiel and S. Schmukler, "Explaining the Migration of Stocks from Exchanges in Emerging Economies to International Centres," Center for Economic Policy Research Working Paper, No. 3301, 2002.

- Coffee, John C. Jr. "Racing Towards the Top: The Impact of Cross-listings and Stock Market Competition on International Corporate Governance" *Columbia Law Review*, 2002, 102 (7), 1757-1831.
- Dickey, David A. and Wayne A. Fuller. "Distribution Of The Estimators For Autoregressive Time Series With A Unit Root," *Journal of the American Statistical Association*, 1979, v74(366), 427-431.
- Doidge, Craig A., G. Andrew Karolyi and René M. Stulz, "Why Are Firms that List in the U.S. Worth More?," *Journal of Financial Economics*, forthcoming 2003.
- Domowitz, Ian, Jack Glen and Ananth Madhavan. "International Cross-Listing and Order Flow Migration: Evidence from an Emerging Market," *Journal of Finance*, 1998, v53(6), 2001-2027.
- Edison, Hali, Ross Levine, Luca Ricci and Torsten Sloek. "International Financial Integration and Economic Growth," *Journal of International Money and Finance*, 2002, v21, 749-776.
- Edison, Hali, and Frank Warnock. "A Simple Measure of the Intensity of Capital Controls," *Journal of Empirical Finance*, forthcoming 2003a.
- Edison, Hali, and Frank Warnock. "U.S. Investors' Emerging Market Equity Portfolios: A Security-Level Analysis," *Review of Economics and Statistics*, forthcoming 2003b.
- Edison, Hali, and Frank Warnock. "Cross-border Listings, Capital Controls and Equity Flows to Emerging Markets," Board of Governors of the Federal Reserve System International Finance Discussion Paper, 2003c.
- Errunza, Vihang, Ked Hogan and Mao-Wei Hung. "Can The Gains From International Diversification Be Achieved Without Trading Abroad?," *Journal of Finance*, 1999, v54(6), 2075-2107.
- Errunza, Vihang R. and Darius P. Miller. "Market Segmentation And The Cost Of Capital In International Equity Markets," *Journal of Financial and Quantitative Analysis*, 2000, v35(4), 577-600.
- Fanto, James and Roberta Karmel. "Report on the Attitudes of Foreign Companies Regarding a U.S. Listing," *Stanford Journal of Law, Business and Finance*, 1997, v3, 37-58.
- Foerster, Stephen and G. Andrew Karolyi. "Multimarket Trading And Liquidity: A Transaction Data Analysis Of Canada-US Interlistings," *Journal of International Financial Markets, Institutions and Money*, 1998, v8(3-4), 393-412.
- Foerster, Stephen R. and G. Andrew Karolyi. "The Effects Of Market Segmentation And Investor Recognition On Asset Prices: Evidence From Foreign Stocks Listing In The United States," *Journal of Finance*, 1999, v54(3), 981-1013.
- Foerster, Stephen R. and G. Andrew Karolyi. "The Long-Run Performance Of Global Equity Offerings," *Journal of Financial and Quantitative Analysis*, 2000, v35(4), 499-528.
- Fuerst, Oren. "A Theoretical Analysis of the Investor Protection Regulations Argument for Global Listing of Stocks," Yale University Working Paper, 1998.
- Greene, William H. *Econometric Analysis*, Fourth Edition, 2000, Prentice Hall, Upper Saddle River, NJ.

- Hargis, Kent. "Forms of Foreign Investment Liberalization and Risk in Emerging Markets" *Journal of Financial Research*, 2002, v25(1), 19-38.
- Hargis, Kent. "Do Foreign Investors Stimulate or Inhibit Stock Market Development in Latin America?," *Quarterly Review of Economics and Finance*, 1998, 38(3), 303-318.
- Hargis, Kent. "Forms of Foreign Investment Liberalization and Risk in Emerging Stock Markets," *Journal of Financial Research*, 2002, v25(1), 19-38.
- Hargis, Kent and Pradipkumar Ramanlal. "When Does Internationalization Enhance The Development Of Domestic Stock Markets?," *Journal of Financial Intermediation*, 1998, v7(3), 263-292.
- Henry, Peter Blair. "Do Stock Market Liberalizations Cause Investment Booms?," *Journal of Financial Economics*, 2000a, v58(1-2), 301-334.
- Henry, Peter Blair. "Stock Market Liberalization, Economic Reform, And Emerging Market Equity Prices," *Journal of Finance*, 2000b, v55(2), 529-564.
- Karolyi, G. Andrew. "Why Do Companies List Shares Abroad? A Survey Of The Evidence And Its Managerial Implications," *Financial Markets, Institutions and Instruments*, 1998, v7(1), 1-60.
- Karolyi, G. Andrew and René M. Stulz. "Are Financial Asset Priced Locally or Globally?," in *The Handbook of the Economics of Finance*, George Constantinides, Milton Harris and René Stulz, editors, forthcoming 2002, North-Holland, Amsterdam, The Netherlands.
- Kim, E. Han, and Vijay Singal. "Stock Market Openings: Experience Of Emerging Economies," *Journal of Business*, 2000, v73(1), 25-66.
- King, Robert G. and Ross Levine. "Finance And Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics*, 1993, v108(3), 717-737.
- Lang, Mark, Karl Lins, and Darius Miller. "ADRs, Analysts and Accuracy: Does Cross-Listing in the U.S. Improve a Firm's Information Environment and Increase Market Value?," *Journal of Accounting Research*, forthcoming 2003.
- Lee, Dongwook, "Where Do the Gains from ADR Programs Come From?," *Ohio State University Working Paper*, 2002.
- Levine, Ross and Sergio Schmukler. "Migration, Spillover and Trade Diversion: The Impact of Internationalization on Stock Market Liquidity," *University of Minnesota Working Paper*, 2003.
- Levine, Ross, and Sara Zervos. "Stock Markets, Banks, And Economic Growth," *American Economic Review*, 1998a, v88(3), 537-558.
- Levine, Ross, and Sara Zervos. "Capital Control Liberalization and Stock Market Development," *World Development*, 1998b, v26(7), 1169-1183.
- Lewis, Karen. "What Can Explain The Apparent Lack Of International Consumption Risk Sharing?," *Journal of Political Economy*, 1996, v104(2), 267-297.

- Lewis, Karen. "Why Do Stocks and Consumption Imply Such Different Gains from International Risk Sharing?," *Journal of International Economics*, 2000, v52, 1 -52.
- Lins, Karl, Deon Strickland and Marc Zenner. "Do Non-U.S. Firms Issue Equity on U.S. Stock Exchanges to Relax Capital Constraints?," *University of North Carolina Working Paper*, 2002.
- Martell, Rodolfo and René M. Stulz. "Equity Market Liberalizations as Country IPOs," *American Economic Review Papers and Proceedings*, 2003, v93(2), 97-101.
- McKinnon, Ronald. *Money and Capital in Economic Development*, 1973, Washington D.C., Brookings Institution.
- Melvin, Michael and M. Valero-Tonone. "The Effects of International Cross-Listing on Rival Firms," *University of Arizona Working Paper*, 2003.
- Miller, Darius. "The Market Reaction To International Cross-Listing: Evidence From Depository Receipts," *Journal of Financial Economics*, 1999, v51(1), 103-123.
- Mittoo, Usha. "Managerial Perceptions of the Net Benefits of Foreign Listing: Canadian Evidence," *Journal of International Financial Management and Accounting*, 1992, v4, 40-62.
- Moel, Alberto. "The Role of Information Disclosure on Stock Market Listing Decisions: The Case of Foreign Firms Listing in the U.S.," *Harvard Business School Working Paper*, 1999.
- Moel, Alberto. "The Role of American Depository Receipts in the Development of Emerging Markets" *Economia*, 2001, v2(1), 209-257.
- Newey, Whitney K. and Kenneth D. West. "A Simple, Positive Semi-Definite, Heteroskedasticity And Autocorrelation Consistent Covariance Matrix," *Econometrica*, 1987, v55(3), 703-708.
- Noronha, Gregory M., Atulya Sarin and Shahrokh M. Saudagaran. "Testing For Micro-Structure Effects Of International Dual Listings Using Intraday Data," *Journal of Banking and Finance*, 1996, v20(6), 965-983.
- Obstfeld, Maurice. "International Risk Sharing And Capital Mobility: Another Look," *Journal of International Money and Finance*, 1992, v11(1), 115-121.
- Obstfeld, Maurice. "Risk-Taking, Global Diversification, And Growth," *American Economic Review*, 1994, v84(5), 1310-1329.
- Pagano, Marco, Ailsa A. Roell and Josef Zechner. "The Geography Of Equity Listing: Why Do Companies List Abroad?," *Journal of Finance*, 2002, v57(6), 2651-2694.
- Pulatkonak, Melek and George Sofianos. "The Distribution of Global Trading in NYSE-Listed Non-U.S. Stocks," *New York Stock Exchange Working Paper*, 1999.
- Rajan, Raghuram, and Luigi Zingales. "The Great Reversals: The Politics of Financial Development in the 20th Century," *Journal of Financial Economics*, 2003, 69(1), 5-49.

- Reese, William A., Jr. and Michael S. Weisbach. "Protection Of Minority Shareholder Interests, Cross-Listings In The United States, And Subsequent Equity Offerings," *Journal of Financial Economics*, 2002, v66(1), 65-104.
- Sarkissian, Sergei and Michael J. Schill. "The Overseas Listing Decision: New Evidence of Proximity Preference," McGill University Working Paper, 2002.
- Schumpeter, Joseph. *The Theory of Economic Development*, 1911, Cambridge, Massachusetts, Harvard University Press.
- Sofianos, George and Katherine Smith. "The Impact of an NYSE Listing on the Global Trading of Non-U.S. Stocks," New York Stock Exchange Working Paper, 1997.
- Stulz, René M. "Globalization of Equity Markets and the Cost of Capital," *Journal of Applied Corporate Finance*, 1999, v12(5), 8-25.
- Tesar, Linda L. and Ingrid M. Werner. "Home Bias And High Turnover," *Journal of International Money and Finance*, 1995, v14(4), 467-493.
- Tribukait, Hermann. "The Invisible Enforcer? Price Behavior of Mexican Firms Cross-listed on the NYSE around Earnings Announcements" Harvard University Department of Economics Working Paper.
- Wurgler, Jeffrey. "Financial Markets And The Allocation Of Capital," *Journal of Financial Economics*, 2000, v58(1-2), 187-214.

Table 1
Summary Statistics for Measures of Growth in ADR Activity

Statistics for monthly data on three measures of the growth of the ADR market in each emerging market. They are: (1) NUMFRAC, the fraction of total number of stocks included in the IFCG Global index for each market which have ADRs listed in the U.S.; (2) MCAPFRAC, the fraction of the U.S. dollar market capitalization of the IFCG Global index for each market that is represented by the market capitalization of the ADRs listed in the U.S.; and (3) VOLFRAC, the fraction of U.S. dollar value of trading in the IFCG Global index for each market that is comprised of trading in ADRs listed in the U.S. The data are from Standard & Poor's Emerging Markets Database and ADR constituent stocks and listing dates are drawn from the NYSE, Amex, Nasdaq, Citibank Universal Issuance Guide (<http://www.citissb.com/adr>), Bank of New York ADR database (<http://www.adrbny.com>), OTC Bulletin Board and "pink sheet" lists.

	Number of Companies with ADR Programs	Number of ADRs as % of All Listed Companies (NUMFRAC)	ADRs Market Cap as % of Total Market Cap (MCAPFRAC)	ADRs Trading Volume as % of Total Trading Volume (VOLFRAC)		Number of Companies with ADR Programs	Number of ADRs as % of All Listed Companies (NUMFRAC)	ADRs Market Cap as % of Total Market Cap (MCAPFRAC)	ADRs Trading Volume as % of Total Trading Volume (VOLFRAC)
Argentina					Malaysia				
1988	0	0.00%	0.00%	0.00%	1988	2	3.23%	5.88%	6.10%
1992	4	13.79%	67.63%	31.31%	1992	4	6.45%	14.07%	7.21%
1996	14	40.00%	76.98%	49.98%	1996	7	4.73%	6.84%	5.74%
2000	12	52.17%	70.83%	85.66%	2000	10	7.25%	19.85%	26.80%
Brazil					Mexico				
1988	3	5.36%	2.45%	1.59%	1988	1	1.92%	5.99%	6.45%
1992	7	10.14%	22.79%	65.36%	1992	19	30.65%	62.50%	72.61%
1996	26	30.23%	46.04%	83.44%	1996	52	68.42%	77.12%	77.66%
2000	38	45.78%	64.00%	67.05%	2000	45	80.36%	85.29%	84.91%
Chile					Philippines				
1988	0	0.00%	0.00%	0.00%	1988	0	0.00%	0.00%	0.00%
1992	4	11.43%	20.25%	28.44%	1992	7	23.33%	70.55%	57.47%
1996	16	34.04%	55.09%	69.88%	1996	12	23.08%	45.66%	37.80%
2000	21	44.68%	53.57%	64.11%	2000	13	22.81%	58.48%	56.42%
Colombia					Taiwan				
1988	0	0.00%	0.00%	0.00%	1988	0	0.00%	0.00%	0.00%
1992	0	0.00%	0.00%	0.00%	1992	3	4.29%	10.73%	2.79%
1996	7	25.93%	25.79%	17.01%	1996	13	14.44%	14.50%	21.30%
2000	5	21.74%	13.92%	16.38%	2000	26	24.76%	59.77%	52.47%
Indonesia					Thailand				
1988	0	N.A.	N.A.	N.A.	1988	0	0.00%	0.00%	0.00%
1992	1	1.59%	6.23%	2.40%	1992	3	5.88%	5.35%	1.60%
1996	5	10.00%	33.01%	51.23%	1996	5	5.68%	13.88%	11.19%
2000	6	11.11%	23.23%	20.87%	2000	10	15.63%	35.40%	24.46%
Korea					Venezuela				
1988	0	0.00%	0.00%	0.00%	1988	0	7.69%	13.97%	78.54%
1992	4	4.35%	7.51%	2.57%	1992	6	35.29%	31.41%	78.22%
1996	17	10.49%	46.72%	22.81%	1996	12	66.67%	52.62%	75.65%
2000	20	12.50%	54.96%	33.21%	2000	12	80.00%	72.61%	70.19%

Table 2
Summary Statistics for Stock Market Development Measures

Data on equity market capitalization, in current U.S. dollars and as a fraction of annual GDP (in current U.S. dollars) is computed as at year end. The value of trading volume is measured in U.S. dollars for the year. Gross capital flows represent the sum of both U.S. residents' purchases from and sales to emerging market residents in local market equities for the year (as a fraction of GDP). Data are from Standard & Poor's Emerging Markets Database, Treasury International Capital, the International Monetary Funds' International Financial Statistics and the World Bank's World Development Indicators database.

	Market Cap (US\$m)	Market Cap (%GDP)	Annual Trading Volume (US\$m)	Turnover (% per year)	Number of Listed Companies	Annual Gross Flows (%GDP)		Market Cap (US\$m)	Market Cap (%GDP)	Annual Trading Volume (US\$m)	Turnover (% per year)	Number of Listed Companies	Annual Gross Flows (%GDP)
Argentina							Malaysia						
1988	1370.1	1.23%	218.6	15.96%	24	0.03%	1988	18617.7	57.85%	1374.5	7.44%	62	0.15%
1992	14292.6	7.53%	13338.3	93.36%	29	0.92%	1992	47940.5	97.57%	9279.2	19.32%	62	3.10%
1996	27184.6	10.52%	4064.4	15.00%	35	2.49%	1996	205961.6	231.86%	46018.8	22.32%	148	6.47%
2000	13320.2	4.70%	3901.3	29.28%	23	3.12%	2000	83407.2	105.53%	13594.7	16.32%	138	4.14%
Brazil							Mexico						
1988	13599.4	4.62%	3931.2	28.92%	56	0.05%	1988	8844.6	6.31%	3933.5	44.52%	52	0.20%
1992	23199.8	5.69%	9639.1	41.52%	69	0.79%	1992	66108.2	21.02%	21675.0	32.76%	62	3.92%
1996	133958.3	19.02%	89060.1	66.48%	86	3.25%	1996	74283.1	25.96%	27734.5	37.32%	76	3.94%
2000	141037.6	18.77%	87815.7	62.28%	83	3.62%	2000	112005.5	23.15%	23248.1	20.76%	56	4.37%
Chile							Philippines						
1988	4473.6	21.62%	197.7	4.44%	25	0.06%	1988	2525.3	7.62%	691.6	27.36%	18	0.07%
1992	21932.5	63.30%	1153.0	5.28%	35	0.42%	1992	7994.8	17.60%	1004.3	12.60%	30	0.42%
1996	40283.8	61.77%	4680.2	11.64%	47	1.47%	1996	56105.7	75.70%	13958.5	24.84%	52	1.83%
2000	43822.2	64.95%	3534.5	8.04%	47	3.17%	2000	18653.9	24.37%	3042.1	16.32%	57	1.52%
Colombia							Taiwan						
1988	1007.3	2.77%	39.4	3.96%	21	0.03%	1988	73746.9	72.61%	229912.1	311.76%	62	0.08%
1992	5107.2	12.31%	280.8	5.52%	20	0.00%	1992	60454.1	33.70%	38059.5	63.00%	70	0.03%
1996	10587.3	11.44%	1426.1	13.44%	27	0.29%	1996	167015.0	63.04%	268496.6	160.80%	90	0.72%
2000	5322.7	6.15%	205.3	3.84%	23	0.24%	2000	205922.8	71.53%	328966.0	159.72%	105	9.85%
Indonesia							Thailand						
1988	N.A.	N.A.	N.A.	N.A.	N.A.	0.00%	1988	4737.5	9.37%	1326.6	27.96%	19	0.12%
1992	8661.3	6.76%	3115.8	36.00%	63	0.23%	1992	28368.4	28.88%	22522.1	79.44%	51	0.82%
1996	63208.3	31.27%	33691.2	53.28%	50	1.45%	1996	67027.7	39.90%	17780.6	26.52%	88	1.39%
2000	18146.7	12.73%	5182.5	28.56%	54	4.42%	2000	21617.4	17.38%	13199.1	61.08%	64	0.56%
Korea							Venezuela						
1988	55926.5	41.20%	96894.7	173.28%	61	0.04%	1988	1156.5	2.41%	269.8	23.28%	13	0.05%
1992	66698.8	22.59%	72202.2	108.24%	92	0.52%	1992	4997.3	9.35%	1148.7	23.04%	17	0.04%
1996	88280.2	18.04%	38935.5	44.16%	162	0.69%	1996	7505.5	9.70%	1444.1	19.20%	18	1.10%
2000	161453.8	39.68%	309927.9	192.00%	160	6.05%	2000	3514.5	3.44%	232.3	6.60%	15	1.11%

Table 3**Univariate Tests for Changes in Stock Market Development around Official Liberalization, Country Fund and ADR Introduction Events**

Univariate tests of changes monthly data on four stock market development measures around key dates, including official market liberalizations, the introduction of the first country fund and ADR listing. The official market liberalization and first country fund dates are from Bekaert, Harvey and Lumsdaine (2002). The four development measures are: (1) MKTGDP, the month-end market value of all listed shares divided by GDP (both in current U.S. dollars); (2) NUMGDP, the month-end number of all listed companies divided by GDP (in U.S. dollar billions); (3) TURNOVER, the annualized monthly value of trades divided by market capitalization (both in current U.S. dollars), and (4) FLOWGDP, the annualized monthly gross equity flows between U.S. and emerging market residents divided by GDP (both in U.S. dollars millions). The table reports the change in the development variable around the key date. Two-sided *t*-statistics are computed with heteroskedasticity and autocorrelation consistent standard errors obtained from Newey-West procedures; statistical significance at the 10%, and 5% levels are denoted by * and **, respectively. The sample periods vary by country with start dates indicated in parentheses and ending date of September 2000.

	Date	MKTGDP	NUMGDP	TURNOVER	FLOWGDP		Date	MKTGDP	NUMGDP	TURNOVER	FLOWGDP
Argentina (Jan-85)						Malaysia (Dec-84)					
Official	Nov-89	6.82%**	-5.80%**	14.40%**	2.07%**	Official	Dec-88	86.18%**	17.17%**	17.76%**	4.63%**
Country Fund	Oct-91	7.30%**	-9.68%**	11.76%**	2.46%**	Country Fund	Dec-87	81.85%**	19.54%**	15.36%**	N.A.
First ADR	Nov-92	6.05%**	-9.16%**	3.72%	2.58%**	First ADR	Mar-91	89.01%**	0.60%**	19.08%**	5.17%**
Level 2/3 ADR	May-93	5.99%**	-8.75%**	-1.20%	2.63%**	Level 2/3 ADR	N.A.	N.A.	N.A.	N.A.	N.A.
Brazil (Dec-87)						Mexico (Jan-85)					
Official	May-91	11.83%**	0.39%**	16.08%**	2.78%**	Official	May-89	16.40%**	0.24%	-36.72%**	4.59%**
Country Fund	Oct-87	N.A.	N.A.	N.A.	N.A.	Country Fund	Jun-81	N.A.	N.A.	N.A.	N.A.
First ADR	May-92	12.69%**	-0.01%	15.72%**	3.02%**	First ADR	Jan-84	N.A.	N.A.	N.A.	N.A.
Level 2/3 ADR	Nov-95	8.94%**	-3.78%**	15.12%**	3.63%**	Level 2/3 ADR	May-91	17.37%**	-2.41%**	-24.48%**	5.02%**
Chile (May-85)						Philippines (Jan-86)					
Official	Jan-90	48.54%**	-44.49%**	0.24%	1.96%**	Official	June-91	30.86%**	12.72%**	-2.88%	1.54%**
Country Fund	Sep-89	47.94%**	-45.89%**	0.84%	2.02%**	Country Fund	May-87	27.45%**	8.51%**	-14.16%**	N.A.
First ADR	Mar-90	48.76%**	-43.59%**	0.36%	1.98%**	First ADR	Jun-90	29.37%**	14.77%**	-7.80%**	1.37%**
Level 2/3 ADR	Mar-90	48.76%**	-43.59%**	0.36%	1.98%**	Level 2/3 ADR	Oct-94	31.16%**	9.53%**	3.60%	1.69%**
Colombia (Jan-85)						Taiwan (Jan-86)					
Official	Feb-91	8.22%**	-21.97%**	3.24%**	0.33%**	Official	Jan-91	4.94%	-7.23%**	-87.72%**	1.22%**
Country Fund	May-92	8.27%**	-22.63%**	3.48%**	0.37%**	Country Fund	May-86	50.78%**	-8.70%**	47.16%**	N.A.
First ADR	Feb-93	7.28%**	-23.22%**	3.36%**	0.39%**	First ADR	May-92	5.69%	-7.61%**	-62.64%**	1.46%**
Level 2/3 ADR	Nov-94	3.55%**	-24.24%**	2.04%**	0.17%**	Level 2/3 ADR	Oct-97	18.43%**	-3.98%**	7.68%	3.18%**
Indonesia (Dec-89)						Thailand (Jul-88)					
Official	Apr-91	9.98%**	-30.32%**	-14.64%**	0.99%**	Official	Jan-91	22.00%**	4.86%**	7.32%**	0.94%**
Country Fund	Jan-89	N.A.	N.A.	N.A.	N.A.	Country Fund	Jul-85	N.A.	N.A.	N.A.	N.A.
First ADR	Feb-91	9.93%**	-31.16%**	-15.96%**	0.98%**	First ADR	Apr-91	21.85%**	4.43%**	3.72%**	0.96%**
Level 2/3 ADR	Oct-94	11.30%**	-15.32%**	0.00%	0.92%**	Level 2/3 ADR	N.A.	N.A.	N.A.	N.A.	N.A.
Korea (Dec-84)						Venezuela (Jan-86)					
Official	Jan-92	7.60%**	11.16%**	52.80%**	1.77%**	Official	Jan-90	5.91%**	4.02%**	17.40%**	1.29%**
Country Fund	Aug-84	N.A.	N.A.	N.A.	N.A.	Country Fund	N.A.	N.A.	N.A.	N.A.	N.A.
First ADR	Dec-90	8.84%**	10.89%**	35.76%**	1.57%**	First ADR	Sep-91	3.84%**	0.24%	4.08%	1.44%**
Level 2/3 ADR	Oct-94	7.85%**	7.81%**	57.72%**	2.01%**	Level 2/3 ADR	Mar-93	0.91%	-2.63%**	-1.44%	1.63%**

Table 4
Regression Tests of Stock Market Development on Growth of ADR Activity

Pooled cross-sectional time-series regressions of the four stock market development variables (MKTGDP, NUMGDP, TURNOVER and FLOWGDP, in Tables 2 and 3) on various factors related to market liberalizations and development of the ADR markets. These factors include: OPENNESS, the fraction of the market capitalization of the firms in the International Finance Corporation's (IFC) index that is investable (see *The IFC Indexes: Methodology, Definitions and Practices*, February 1998, Emerging Markets Database), LDATE, the market liberalization dates from Bekaert, Harvey and Lumsdaine (2002); NUMFRAC, the fraction of total number of stocks included in the IFCG Global index for each market which have ADRs listed in the U.S.; VOLFRAC, the fraction of U.S. dollar value of trading in the IFCG Global index for each market that is comprised of trading in ADRs listed in the U.S.; and MCAPFRAC, the fraction of the U.S. dollar market capitalization of the IFCG Global index for each market that is represented by the market capitalization of the ADRs listed in the U.S. Standard errors in parentheses are heteroskedasticity and autocorrelation consistent obtained from Newey-West procedures; statistical significance at the 10% and 5% levels are denoted by * and **, respectively. We allow the country-specific intercepts and country-specific coefficients on six lags of the dependent variable. Our sample runs from December 1989 to September 2000 (130 observations).

Model	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
			MKTGDP					NUMGDP		
OPENNESS	0.007 (0.24)		0.0016 (0.39)	-0.0034 (-0.96)	-0.0026 (-0.77)	-0.0118 (-5.73)**		-0.0052 (-1.93)*	-0.0073 (2.78)**	-0.0089 (-3.59)**
LDATE		0.0026 (1.16)	0.0019 (0.64)	0.0035 (1.17)	0.0034 (1.17)		-0.0086 (-4.35)**	-0.0057 (2.65)**	-0.0048 (2.19)**	-0.0049 (2.22)**
NUMFRAC			-0.0062 (-1.38)					-0.0169 (4.43)**		
MCAPFRAC				0.0043 (1.16)					-0.0097 (-3.16)**	
VOLFRAC					0.0029 (1.16)					-0.0048 (2.59)**
			TURNOVER					FLOWGDP		
OPENNESS	0.0405 (3.61)**		0.0431 (2.67)**	0.0251 (1.65)*	0.0191 (1.28)	0.0029 (2.52)**		0.0006 (0.40)	0.0009 (0.61)	0.0014 (1.05)
LDATE		0.0327 (3.50)**	0.0274 (1.92)*	0.0286 (2.14)**	0.0247 (2.24)**		0.0016 (2.13)**	0.0007 (0.81)	0.0006 (0.62)	0.0006 (0.69)
NUMFRAC			-0.0650 (-2.52)**					0.0099 (3.34)**		
MCAPFRAC				0.0039 (0.19)					0.0067 (3.61)**	
VOLFRAC					0.0156 (0.98)					0.0034 (2.24)**

Table 5
Regression Tests of the Development of ADR versus Non-ADR Segments of the Stock Market

Pooled cross-sectional time-series regressions of the four stock market development variables (MKTGDP, NUMGDP, and TURNOVER, in Tables 2 and 3) on various factors related to market liberalizations and development of the ADR markets. Each development variable is divided into components according to whether the firm has an ADR or not and is recomputed each month according to this criterion. The factors include: OPENNESS, the fraction of the market capitalization of the firms in the International Finance Corporation's (IFC) index that is investable (see *The IFC Indexes: Methodology, Definitions and Practices*, February 1998, Emerging Markets Database), LDATE, the market liberalization dates from Bekaert, Harvey and Lumsdaine (2002); NUMFRAC, the fraction of total number of stocks included in the IFCG Global index for each market which have ADRs listed in the U.S.; VOLFRAC, the fraction of U.S. dollar value of trading in the IFCG Global index for each market that is comprised of trading in ADRs listed in the U.S.; and MCAPFRAC, the fraction of the U.S. dollar market capitalization of the IFCG Global index for each market that is represented by the market capitalization of the ADRs listed in the U.S. Standard errors in parentheses are heteroskedasticity and autocorrelation consistent obtained from Newey-West procedures; statistical significance at the 10% and 5% levels are denoted by * and **, respectively. We allow the country-specific intercepts and country-specific coefficients on six lags of the dependent variable. Our sample runs from December 1989 to September 2000 (130 observations).

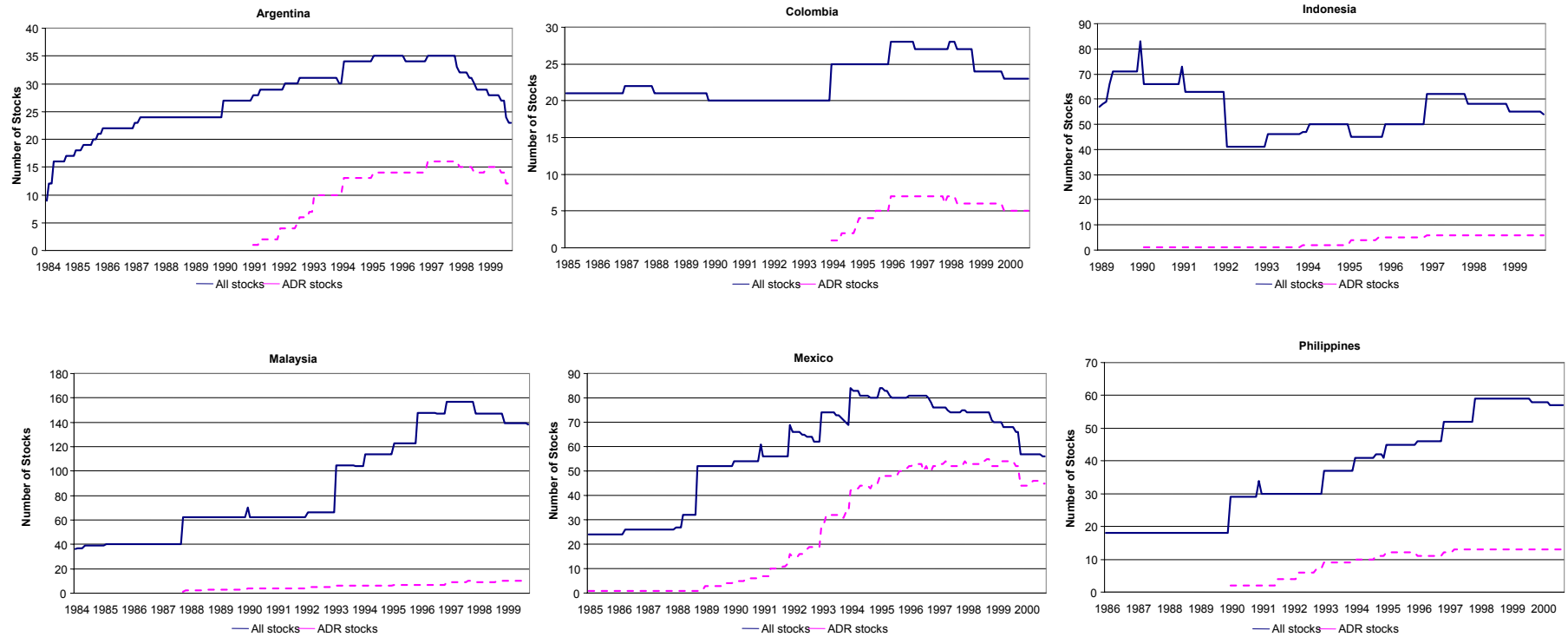
Model	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
						Non ADR Firms									
			MKTGDP					NUMGDP				TURNOVER			
OPENNESS	-0.0014 (-0.71)		0.0020 (0.72)	-0.0008 0.0035	-0.0022 (-0.94)	-0.0134 (-5.59)**		-0.0021 (-0.76)	-0.0055 (-1.97)**	-0.0085 (-3.02)**	0.0438 (3.95)**		0.0775 (4.21)**	0.0344 (2.09)**	0.1046 (6.09)**
LDATE		0.0028 (1.56)	0.0021 (0.97)	0.0035 (1.66)*	0.0042 (2.01)**		-0.0119 (-5.72)**	-0.0091 (-4.36)**	-0.0072 (-3.19)**	-0.0082 (-3.72)**		0.0268 (3.05)**	0.0154 (1.00)	0.0235 (1.66)*	0.0289 (1.98)**
NUMFRAC			-0.0094 (-3.97)**					-0.0776 (-11.8)**					-0.1153 (-4.24)**		
MCAPFRAC				-0.0068 (-4.37)**					-0.0239 (-7.17)**					-0.0080 (-0.04)	
VOLFRAC					-0.0045 (-3.31)**					-0.0109 (-5.45)**					-0.1275 (-7.45)**
						ADR Firms									
			MKTGDP					NUMGDP				TURNOVER			
OPENNESS	0.0009 (1.18)		-0.0005 (-0.37)	-0.0042 (-2.86)**	0.0001 (0.09)	0.0041 (4.79)**		0.0025 (3.16)**	0.0041 (4.86)**	0.0039 (4.52)**	0.0130 (0.41)		0.0076 (0.56)	0.0152 (0.41)	-0.0584 (-1.86)*
LDATE		0.0006 (0.89)	0.0005 (0.45)	0.0022 (1.91)*	0.0001 (0.11)		0.0014 (4.01)**	0.0008 (2.29)**	0.0008 (2.20)**	0.0008 (2.10)**		0.0137 (0.72)	0.0116 (0.56)	0.0148 (0.76)	-0.0208 (-1.17)
NUMFRAC			0.0060 (2.29)**					0.0394 (14.7)**					0.0301 (0.27)		
MCAPFRAC				0.0278 (9.68)**					0.0146 (12.5)**					-0.0244 (-0.36)	
VOLFRAC					0.0078 (5.07)**					0.0070 (8.29)**					0.4841 (13.6)**

Table 6**Regression Tests of Stock Market Development on Growth in Different Types of ADR Activity: Rule 144a Private Placements, OTC and Exchange Listings**

Pooled cross-sectional time-series regressions of the four stock market development variables (MKTGDP, NUMGDP, TURNOVER and FLOWGDP, in Tables 2 & 3) are run on various factors related to market liberalizations and development of the ADR markets. The development variables for MKTGDP, NUMGDP and TURNOVER are computed only for non-ADR firms; FLOWGDP is for the market as a whole. The three ADR activity measures (NUMFRAC, the fraction of total number of stocks included in the IFCG Global index for each market which have ADRs listed in the U.S.; VOLFRAC, the fraction of U.S. dollar value of trading in the IFCG Global index for each market that is comprised of trading in ADRs listed in the U.S.; and MCAPFRAC, the fraction of the U.S. dollar market capitalization of the IFCG Global index for each market that is represented by the market capitalization of the ADRs listed in the U.S.) are computed separately for Rule 144a private placement issues, over-the-counter (OTC) listings and Level 2/3 major U.S. exchange listings. Standard errors in parentheses are heteroskedasticity and autocorrelation consistent obtained from Newey-West procedures; statistical significance at the 10% and 5% levels are denoted by * and **, respectively. We allow the country-specific intercepts and country-specific coefficients on six lags of the dependent variable. Our sample runs December 1989 to September 2000 (130 observations).

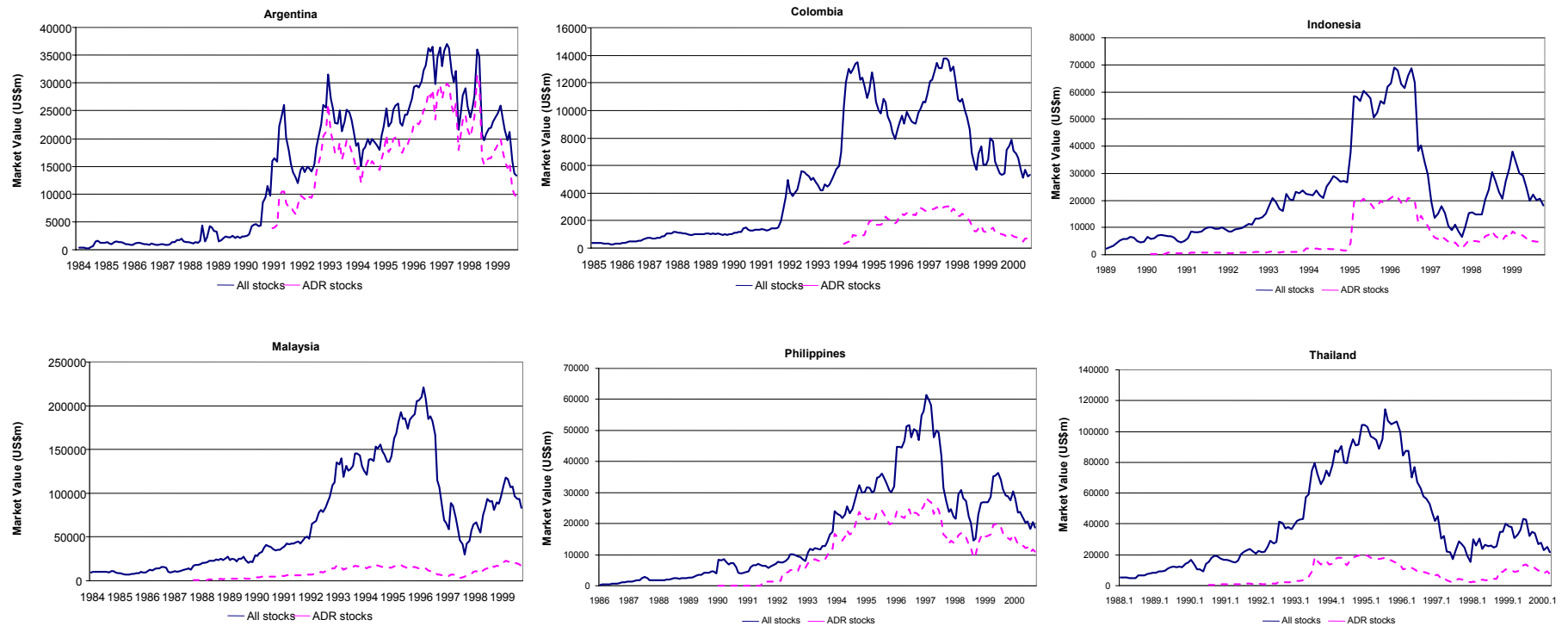
Model	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
		MKTGDP			NUMGDP			TURNOVER			FLOWGDP		
OPENNESS	0.0027 (0.85)	-0.0005 (-0.18)	-0.0020 (-0.86)	-0.0012 (-0.44)	-0.0036 (-1.23)	-0.0083 (-2.83)**	0.0804 (4.21)**	0.0311 (1.77)*	0.0835 (4.82)**	0.0006 (0.46)	0.0008 (0.56)	0.0014 (1.03)	
LDATE	0.0017 (0.74)	0.0031 (1.43)	0.0043 (2.01)**	-0.0092 (-4.38)**	-0.0066 (-3.03)**	-0.0088 (-3.99)**	0.0095 (0.58)	0.0269 (1.79)*	0.0388 (2.65)**	0.0004 (0.42)	0.0006 (0.66)	0.0008 (0.93)	
NUMFRAC	Rule 144a -0.0147 (-2.07)**			-0.0805 (-7.92)**			0.0312 (0.43)			0.0087 (1.44)			
	OTC -0.0108 (-2.21)**			-0.0835 (-8.41)**			-0.1574 (-2.27)**			0.0289 (3.82)**			
	Level 2/3 -0.0062 (-1.28)			-0.0686 (-7.71)**			-0.1568 (-3.09)**			0.0014 (0.21)			
MCAPFRAC	Rule 144a -0.0101 (-3.31)**			-0.0122 (-2.48)**				0.2565 (4.96)**			0.0071 (2.26)**		
	OTC -0.0097 (-2.33)**			-0.0271 (-4.69)**				-0.2769 (-8.21)**			0.0057 (1.30)		
	Level 2/3 -0.0049 (-2.34)**			-0.0296 (-6.03)**				-0.0956 (-4.97)**			0.0069 (2.59)**		
VOLFRAC	Rule 144a -0.0095 (-2.45)**					-0.0069 (-1.86)*			-0.0905 (-2.88)**			0.0010 (0.37)	
	OTC -0.0057 (-2.57)**					-0.0107 (-3.91)**			-0.2469 (-8.21)**			-0.0006 (-0.23)	
	Level 2/3 -0.0034 (-2.17)**					-0.0121 (-4.23)**			-0.0956 (-4.97)**			0.0062 (3.32)**	

FIGURE 1. – TOTAL NUMBER OF STOCKS LISTED IN EACH STOCK MARKET AND THE NUMBER OF STOCKS CROSS-LISTED AS ADRs ON U.S. MARKETS



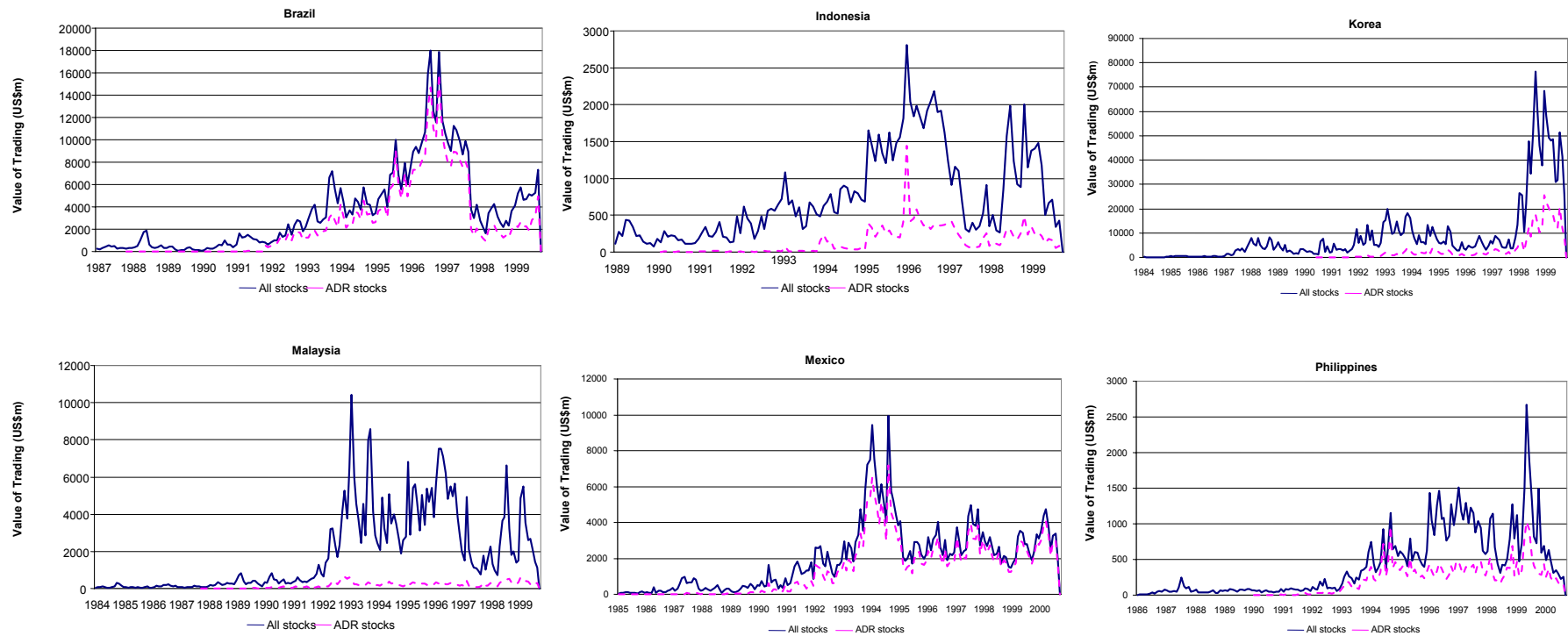
Note: The solid line represents the monthly total number of stocks listed in each of the selected emerging equity markets. The dashed line represents the monthly number of stocks that are cross-listed in the form of American Depositary Receipts in the U.S. markets. The sample of listed stocks is defined by Standard and Poor's Emerging Market Database.

FIGURE 2. – THE MARKET CAPITALIZATION OF STOCKS LISTED IN EACH STOCK MARKET AND THE MARKET CAPITALIZATION OF STOCKS CROSS-LISTED AS ADRs ON U.S. MARKETS



Note: The solid line represents the monthly total market capitalization (in millions of U.S. dollars) of stocks listed in each of the selected emerging equity markets. The dashed line represents the monthly market capitalization of stocks (in millions of U.S. dollars) that are cross-listed in the form of American Depositary Receipts in the U.S. markets. The sample of listed stocks is defined by Standard and Poor's Emerging Market Database.

FIGURE 3. – THE VALUE OF TRADING OF STOCKS LISTED IN EACH STOCK MARKET AND THE VALUE OF TRADING OF STOCKS CROSS-LISTED AS ADRs ON U.S. MARKETS



Note: The solid line represents the monthly total value of trading (in millions of U.S. dollars) of stocks listed in each of the selected emerging equity markets. The dashed line represents the monthly value of trading on the home market of stocks (in millions of U.S. dollars) that are cross-listed in the form of American Depositary Receipts in the U.S. markets. The sample of listed stocks is defined by Standard and Poor’s Emerging Market Database.

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- ¹ See the article “How Institutions View ADR programs” *International Investment Trends* (Winter 2001), Broadgate Consultants, New York, NY, and the managerial survey studies of Mittoo (1992) and Fanto and Karmel (1998).
- ² See the volume of the Federation des Bourses de Valeurs (FIBV, www.fibv.com) conference on “Price Discovery and the Competitiveness of Trading Systems” in 2000. The theme of the 2002 FIBV Emerging Markets Forum as well as a Stanford Law School Conference sponsored by the Korean Securities and Futures Commission (November 2002) was devoted to this debate. The media have featured numerous stories on the policy debate; see “The Incredible Shrinking Markets” cover story of *Latin Finance* (September 1999), “Latin America’s Stock Markets: High and Dry” *The Economist* (February 19, 2000), and “ADRs Prove a Double-Edged Sword” *Financial Times* (April 6, 1998).
- ³ See annual reports of Bank of New York’s ADR division at www.bankofny.com. Among the most actively-traded ADRs on major exchanges include Nokia (Finland), SAP (Germany), BP (U.K.) as well as those from emerging markets, like Taiwan Semiconductor, Cemex (Mexico), Tele Norte (Brazil), and Korea Electric Power.
- ⁴ See Karolyi (1998) for dozens of related references on international cross-listings.
- ⁵ Ahearne, Grier, and Warnock (2003) and Edison and Warnock (2003a, 2003b) show that U.S. investors prefer to invest in shares of non-U.S. companies with U.S.-based listings in the form of ADRs.
- ⁶ Baker, Nofsinger, and Weaver (2002), Lang, Lins, and Miller (2003) and Bailey, Karolyi, and Salva (2002) demonstrate significant changes occur in the information environment of the firms that cross-list in the U.S., including increased media and analyst coverage and increased accuracy of analyst forecasts.
- ⁷ Edison and Warnock (2003c) show that when an emerging-market firm lists on a major U.S. exchange, it has a statistically significant, though transitory, impact on cross-border capital flows.
- ⁸ See www.bankofny.com/adr for more details on the different types of listings in the U.S.
- ⁹ OTCBB denotes ‘Over-the-counter Bulletin Board.’ See www.otcbb.com/static/symbol.htm for details.
- ¹⁰ It is interesting to note that a number of the studies of capital market liberalization that use the first ADR listing as an important event date often focus on those associated with major U.S. exchanges. In the case of Mexico, before Telefonos de Mexico’s 1991 NYSE listing, several other Mexican companies had been trading in the U.S., such as Tubos de Acero de Mexico (OTC, since January 1964), Grupo Sidek B (OTC, September 1989), Grupo Synkro B (OTC, June, 1990), and FEMSA (Rule 144a, since April 1991).
- ¹¹ An appendix of all ADR listings for the twelve markets is available from the author upon request.
- ¹² See <http://www.treasury.gov/tic/ticsec.html> for data construction. Also, Tesar and Werner (1995).

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- ¹³ See *The IFC Indexes: Methodology, Definitions and Practices* (February 1998) published by the International Finance Corporation (which has since been acquired by Standard and Poor's) on eligibility criteria.
- ¹⁴ Note that there are instances in which the date of interest precedes that of the sample period. In addition, there are some countries, like Malaysia, that still have not listed a Level 2 or 3 ADR, and Venezuela, which still has no country fund.
- ¹⁵ To save space, we do not report the country-specific intercepts and the country-specific coefficients on the lagged dependent variables. These detailed results are available from the author upon request.
- ¹⁶ The results of this supplementary exercise are most closely related to those of Moel (2001), Claessens, Klingebiel, and Schmukler (2002), and Levine and Schmukler (2003), but they focus only on turnover and not market capitalization and numbers of listed firms. The comparisons are not easy, however. For example, Claessens et al. separate their analysis into "international" and "domestic" firms which is closely related to ADR and non-ADR firms, but could also include those that raise capital abroad without a U.S. listing.
- ¹⁷ This result is an important corollary to the findings of Edison and Warnock (2003c) who study the impact of only Level 2 and 3 exchange-listings on TIC flows. It appears that Rule 144a and OTC listings directly or indirectly spur substantial purchase and sales activity in emerging market stocks between U.S. and local investors.