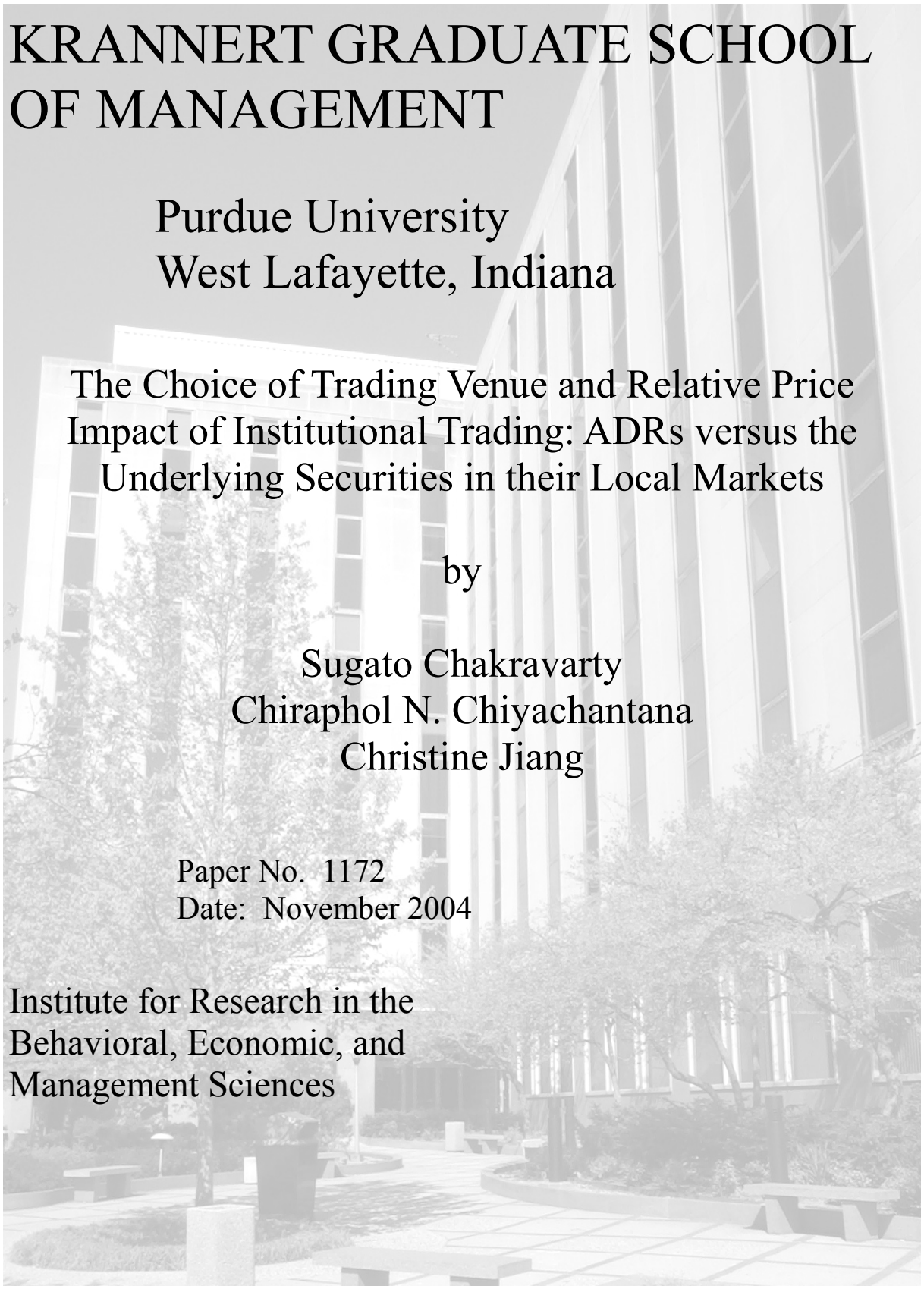

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The Choice of Trading Venue and Relative Price Impact of Institutional Trading: ADRs versus the Underlying Securities in their Local Markets

by

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Abstract

We address two important themes associated with institutions' trading in foreign markets: (1) the choice of trading venues (between a company's listing in its home market and that in the U.S. as an ADR); and (2) the comparison of trading costs across the two venues. To do so, we identify institutional trading in the United States in non-U.S. stocks (i.e., ADRs) from 35 foreign countries and in their respective home markets, using proprietary institutional trading data. We find that for stocks traded as both ADRs and in their respective local exchanges, the distribution of institutional decisions in the ADR markets is higher for stocks with the deeper ADR market, for less complex decisions, for stocks with lower price impact in ADR market or overlapping trading hours, and for emerging market stocks. We also use a multinomial logistic model to examine the factors that influence institutions' decision to trade a cross-listed stock solely in the ADR market versus solely in its home exchange. We conclude that, relative to stocks that are traded by institutions in both venues, stocks with relatively higher local volume, with non-overlapping trading hours, and with smaller market capitalization are more likely to be traded in their home exchanges only while less complex decision are more likely to be executed as ADRs only. We also find that, in terms of the overall trading cost (implicit plus explicit), the trading cost of ADRs is often higher than that of the equivalent security at home. Our multivariate analysis on institutional trading costs reveals that the cost difference between trading in the security's home country and its respective ADR is smaller for stocks associated with less complex trades; for stocks with relatively lower local trading volume; for stocks with overlapping trading hours; and for stocks originating from the emerging markets.

1. Introduction

Investment is rapidly becoming a cross-border exercise with the past decade witnessing a significant globalization of financial markets. Consequently, the number of foreign companies cross-listing their shares in a U.S. exchange has also increased substantially.[1] And institutional investors appear to have been the prime beneficiaries of such increased trading opportunities, since they have the added luxury (by virtue of their size of transactions and relatively flexible capital constraints) of determining which venue to trade when they decide to invest internationally while smaller, or retail, investors in the U.S. settle for investing in foreign stocks indirectly through mutual funds or through transacting a given foreign firm's securities in the United States through American Depository Receipts (ADR)[2] However, even though the United States is considered to be the largest and the most liquid market in the world, it is not clear if institutions would always prefer to trade a cross-listed foreign stock as an ADR in the U.S. market rather than trading the underlying stock in its respective home exchange.

In a recent paper, Baruch, Karolyi and Lemmon (2003) develop, and test, a model of multi market trading to explain the variation in the U.S. share of global trading volume across non-U.S. stocks cross-listed on U.S. exchanges. Their key intuition is that the distribution of trading volume across exchanges competing for order flow is related to the correlation of the cross-listed asset returns with the returns of other assets traded in the respective markets. Thus, the higher the correlation in returns of the cross-listed asset with the domestic asset, the more informative is the domestic asset's order flow which leads both liquidity and informed traders to submit a larger proportion of their orders in the cross-listed asset to that exchange. While such intuition is important in understanding what drives relative volume in the two markets in a macro sense, it sheds little light on what may be driving institutional trading decisions across the two markets.

What makes the understanding of institutional trading decisions, across a firm's home

[1] According to Baruch, Karolyi and Lemmon (2003), while in 1990 there were 352 non-U.S. stocks listed on the NYSE and Nasdaq, the number at the end of 2002 stood at around 850.

[2] An ADR is, for all practical purposes, a stock representing a specified number of shares in a foreign corporation. ADRs are bought and sold in the American markets just like regular stocks. An ADR is issued by a U.S. Bank (such as the Bank of New York or Chase Manhattan), consisting of a bundle of shares of a foreign corporation that are being held in custody overseas. The foreign entity must provide financial information to the sponsor bank. The ADRs are also registered with the U.S. SEC and the companies are required to conform to GAAP in terms of their accounting practices.

exchange versus trading its ADR in the U.S. market, even more relevant is a recent qualitative survey by Thompson Financial and JP Morgan of 100 buy-side analysts and investors, on institutions' preferences for transacting the ADRs versus local shares. This survey reveals that 37 percent of the respondents preferred to transact in local shares due to the generally greater liquidity in local markets; about 30 percent indicated they preferred ADRs due to their transaction efficiency and lower holding and custody costs.[3] Such responses inevitably trigger questions like: What are the factors driving an institution's decision on the trading location of a cross-listed security? What are the relative costs of trading a foreign stock in the U.S versus trading the same company's stock in its home country? And what are the determinants of such trading cost differentials?[4] Trying to answer these questions forms the basis of the current paper.[5]

For 35 foreign countries, we obtain a matched sample of ADR versus the local stock on a country-by-country basis using proprietary institutional trading data from the Plexus Group over a period of three quarters in 2001. To the best of our knowledge, the current study is the first one using institutional trading data to study the choice of trading venue and relative transaction costs between ADRs trading in the U.S. and the underlying stocks in local exchanges. The Plexus data is unique because it provides information on the direction of trade (purchase versus sale), date of release of orders, and other details about the actual orders and trades. This structure facilitates analysis of trading intention (vis-à-vis choice of trading venue, for example) and transaction costs directly associated with an indicated desire to trade, which cannot be accomplished with other publicly available datasets at transaction or aggregated levels.

Our empirical results show that, for the underlying securities traded both as ADRs and in their respective local exchanges, institutions prefer to trade the ADRs for companies with deeper ADR markets, for less complex decisions[6], for stocks with lower price impact or overlapping

[3] The remaining 24 percent of the investors stated that the choice between ADRs and local shares is a case-by-case decision depending on liquidity and market accessibility.

[4] Note that we use the term "stock" loosely to refer to both a firm's traded stock on its home exchange as well as to its equivalent security traded in the U.S. as an ADR.

[5] The Thompson-Morgan survey also raises other interesting questions on an individual client level such as: How do institutions split their orders across the markets? Do institutions trade in both markets simultaneously? Unfortunately, our data are available at the individual broker level and not at the client level. Therefore, we are unable to shed light on these issues.

[6] We define a complex decision involving a stock as one that is relatively large in comparison to the stock's average daily trading volume.

trading hours, and for emerging market stocks. We also employ a multinomial logistic model to examine the factors that influence institutions' decision between trading a cross-listed stock solely in the ADR market and trading it solely in its home exchange. We conclude that, relative to being traded in both venues, stocks with relatively higher local volume, with non-overlapping trading hours, and of smaller capitalization, are more likely to be traded in their home exchanges only, while less complex orders are more likely to be executed exclusively as ADRs.

We also find that ADRs appear to be more expensive to trade (in terms of total trading costs) relative to trading the equivalent securities in their respective home exchanges. On a country-by-country basis, the overall (implicit plus explicit) costs of trading the ADR are greater for twenty countries in our sample. For the remaining fifteen countries, the overall costs of trading the ADR are either smaller or statistically similar relative to trading the equivalent securities in their home exchanges.

We, however, go further in attempting to delineate the drivers of the difference in total trading costs between the ADR and its matched underlying security in its home country. Upon performing a multivariate analysis, by controlling for relevant determinants of the differences in trading costs between the ADR and its matched security in the respective home exchange, we conclude that the difference in costs between trading in the securities' home country and in its ADR is smaller for (1) stocks associated with less complex trades; (2) stocks with relatively lower local trading volume, (3) stocks with overlapping trading hours, and (4) stocks originating from the emerging markets.

The remainder of our paper is organized as follows. Section 2 provides the background for the current analysis. Section 3 describes the data and provides relevant sample characteristics. Section 4 provides results on institutional choice of trading venue. Section 5 provides results on institutional trading cost differences. Section 6 concludes.

2. Background

Our research addresses two important themes associated with institutions' choice of trading in foreign markets: (1) the choice of trading venues (between a company's home exchange and its ADR in the U.S.); and (2) the comparison of trading costs across these two venues. The extant research on both these themes is relatively sparse. In this section, we discuss

the main research in both areas, especially the theoretical models which, although very stylized, still broadly guide our analysis.

2.1. Choice of trading venues

Institutional traders often trade in significantly larger quantities than do smaller retail investors. And trade size alone allows institutional traders a degree of monopoly power and the ability to choose which market out of all trading venues available to route their orders. Our focus is their choice between the ADR trading in the U.S. and the stock's home exchange. For cross-listed stocks, positive trading externalities might lead to a concentration of trading in a single market, unless some market/trade-driven frictions prevent the orders and volume to gravitate towards the dominant market. Therefore, there is a natural incentive for traders to converge to the more liquid market rather than split their trades across markets. But while in actual markets consolidation is often observed, it is also true that multiple markets coexist to trade the same essential security with superficial differences as in cross-listed securities. In many cases, both markets are active and viable. This duality suggests that the relationship between liquidity and investor behavior is unlikely to be a simple one. Market frictions in the form of informational asymmetries, regulatory obstacles, and differences in market structures may preclude orders from gravitating to a single market.

Positive trading externalities, in the form of the presence of other traders, are important since it reduces the adverse price impact of one's orders, as seen in models with either imperfectly competitive and risk-averse investors or with asymmetric information. The theoretical underpinnings of positive trading externalities lie in the models of Pagano (1989), Admati and Pfleiderer (1988), and Chowdry and Nanda (1991). In particular, and relevant to the current research, Chowdry and Nanda (1991) use the Admati and Pfleiderer (1988) framework and investigate how the ability to choose where (among N possible markets) to trade might affect the functioning and liquidity of a market when some traders have superior information. In particular, Chowdry and Nanda consider a market with informed traders, large discretionary liquidity traders and small non-discretionary liquidity traders. Trading is allowed to occur simultaneously in multiple markets, and all traders except the small liquidity traders are permitted to trade in more than one market. Under the assumption that the small traders do not have the luxury of deciding where to trade (as with our case where the small investors do not enjoy the luxury of trading directly in the foreign markets), the trades of these small traders are

not perfectly correlated across markets, which enables informed traders to trade aggressively in all markets.

The collective empirical evidence from extant research suggests that when a security is traded in more than one market, the volume of trading is not evenly distributed among the markets. In many cases, most of the order flows and trading volume may still reside in the home market. In the Baruch, Karolyi and Lemmon (2003) model, for example, the source of volume differentials across the two markets is the correlation of the cross-listed asset with (the returns of the) other assets trading in the respective markets. From a practitioner's vantage point, Kurokawa (1988) argues: " …*large institutional investors tend to trade foreign stocks in each mother country, where there is greater liquidity. A major portion of the orders from non-residents is directed to each stock's home market*." Additionally, Barclay, Litzenberger, and Warner (1990) find that for the NYSE stocks listed in Tokyo, Tokyo captured less than one percent of the market volume; while for Tokyo stocks listed on the NYSE, NYSE captured only about 8% of the volume. More recently, Pulatkonak and Sofianos (1999) study the distribution of global trading volume in NYSE listed non-U.S. stocks, and find a large variability in the U.S. share of global trading, ranging from less than one percent in some stocks to more than 90% in others.[7] Overall, U.S. trading volume appears to be higher for stocks from countries in similar time zones, in emerging markets, and with higher home market commission rates.[8]

However, one drawback of the above studies is that they draw inferences on trading behavior by focusing on the *total volume* of cross-listed stocks. By contrast, the unique features of our dataset, including a transactional glimpse on a stock-by-stock basis, allow us to examine how institutions trade when multiple markets exist on a stock. In addition, by using a multinomial logistic regression model, we are able to estimate which factors -- including liquidity, asymmetric information, and regulatory obstacles -- affect the probability of an institution's decision to trade exclusively in one of the two trading venues.

[7] Werner and Kleidon (1996) also investigate British stocks that are cross-listed in the U.S. and find that order flow for cross-listed securities is segmented. Using a sample of Japanese government bonds traded in London and Tokyo, Tse (1999) shows that traders have a marked preference for trading in the home market.

[8] Another recent work by Hailing et al (2003) confirms that foreign trading are at extremely low levels, yet there is considerable cross-sectional variation in the persistence of the amount of foreign trading. The foreign market is also more active for stocks of smaller, more export and high-tech oriented firms.

2.2. Comparison of institutional trading costs

The extant literature on the comparison of trading costs across international markets can be broadly classified into two major streams. One stream of research examines the costs of trading in foreign securities in the United States. Bacidore and Sofianos (2002), for example, compare the liquidity of U.S. versus non-U.S. stocks (ADRs) traded on the same exchange (NYSE), and find that ADRs have wider spreads, less depth and larger intraday volatility than comparable U.S. stocks. Eleswarapu and Venkataraman (2003) examine the effect of legal and political institutions on trading costs of the ADRs. They report that the average trading costs are significantly higher for stocks from French-civil law countries than for stocks from common law countries. In addition, ADRs originating from countries with better rating for judicial efficiency, accounting standards, and political stability, have lower transaction costs.

The second stream of literature, and one that the current paper belongs in, examine the trading costs of paired stocks in different locations. In this relatively sparse literature, Huang and Stoll (2001) compare the same set of stocks traded in London Stock Exchange and NYSE and conclude that market characteristics such as tick size, spreads, market depth, and quote clustering are endogenous to the market structure. In particular, spreads are higher on trades executed on the dealer market (the London Stock Exchange). However, as we have argued earlier, traditional measures of transaction cost (e.g., bid-ask spread) using transaction level data cannot accurately account for institutional trading costs.[9]

In sum, none of the existing studies offers a comparison of institutional trading costs in a matched setting and none asks the question (at a decision level) of which market has lower institutional trading costs for the same underlying security. This is another focus of our study.

So, which trading venue is likely to have lower transaction costs for institutional trading? Some suggest that costs are likely to be lower on the stock's local exchange than on the foreign stock exchange (ADRs) since most of the order flow and trading volume in the underlying company may still reside in the home market (see, for example, Barclay, Litzenberger, and Warner, 1990; and Pulatkonak and Sofianos, 1999). Specifically, the Chowdry and Nanda model that we use for guidance with the current analysis predicts that if there exists more than

[9] Another related stream of research examines institutional trading costs solely in international markets (see, for example, Domowitz, Glen and Madhavan (2001), Perold and Sirri (1998), and Chiyachantana, Jain, Jiang and Wood (2004)).

one market for a security, only one will emerge as the dominant market: a "winner-takes-most" phenomenon. Thus, liquidity traders will seek markets with lowest trading costs and informed traders will maximize profits by hiding behind liquidity trades. And given the size of institutional trading, it is even more critical that they trade in markets with greater liquidity, or a greater relative depth, for both their liquidity-motivated and information-based trading. We measure the relative depth of the markets using the ratio of the local volume to the total trading volume on the stock. If the relative local volume is high, institutions are more likely to trade in local markets and trading costs are expected to be lower.

There also exist studies that suggest adverse selection costs for ADRs may be lower than the corresponding stocks in their home countries because of the informational advantage of traders in the home markets relative to the foreign institutional investors (see, for example, Choe, Kho and Stulz, 1999). Therefore, trading costs should be distinct between a given ADR, and the corresponding locally traded stock, and that the cost difference should be a function of the net of the adverse selection and liquidity costs. There are also additional factors that are important in determining institutional trading costs in international stocks. Lins, Strickland, and Zenner (2003), for example, show that firms list in the U.S. to bypass local underdeveloped capital markets and to make firms more valuable. The greater liquidity and efficiency of the U.S. capital markets make those shares originating from underdeveloped markets more accessible to investors. Hence, the higher volume associated with the concentrated order flows in ADR market is expected to lower trading costs of institutions. Furthermore, capital controls are likely to restrict movement of capital across markets and reduce competition for order flows. Thus, trading costs are expected to differ depending on whether a country which stocks originated from has liberalized capital market. Also, several papers have recently provided evidence that investor protections differ across countries (see, for example, La Porta, Lopez-se-Silanes, Shleifer, and Vishny, 2000). Therefore, we also examine the impact of shareholder rights, and enforcement of insider trading laws on institutional trading costs.

3. Data and Sample Characteristics

We obtain a sample of institutional trading data across 35 foreign countries and their corresponding ADRs trading in the U.S. The data is obtained from the Plexus group, an independent consulting firm for institutional clients. Over the period covered by our data, Plexus

had 38 clients trading in international stocks. Our institutional trading data in foreign stocks includes first three quarters of 2001. The corresponding trading data in ADRs are collected from the Plexus US database which includes the same three quarters in 2001. The Plexus data pertaining to international trading is similar in their format to those pertaining to domestic trading in the US. Specifically, the international data contain information on institutional decisions about stocks that were traded, direction of the trade (buy versus sell), quantity of shares desired, value-weighted average stock price on and before decision date, dates of release of orders from institutional clients to trading desks, prevailing stock price at the time of release, number of shares released, the code number of brokers used to fill the order, transaction price, quantity of shares traded, execution date, commissions charged, and the market capitalization of the stock. To maintain data integrity and to eliminate possible errors, we delete observations with missing prices or order quantities. In addition, following the approach of Keim and Madhavan (1995, 1997), we exclude orders or transactions of less than 100 shares, as well as orders for stocks trading under $1.00.

We also augment our data with Datastream International stock market indices for the 35 countries. This enables us to control for market-wide returns. Thus, for example, if the Finnish market on a given day rises significantly, then purchases in a Finnish stock in Finland are likely to have a greater positive price impact for purchases and a negative price impact for sales. This may not be the case for the corresponding ADR trading in the U.S. Therefore, for robustness purposes, our analysis also includes transactions costs computed by accounting for such market-wide movements.

Table 1 provides sample characteristics. Our unit of examination is a trading decision by an institution in our dataset. Out of all the cross-listed stocks reported in Plexus database, institutions trade some of the stocks exclusively in local markets, and some entirely in ADR markets, and the remaining in both the ADR and their respective local markets. Specifically, there are 237 distinct stocks trading in foreign exchanges and 237 matched ADRs trading in the U.S. Our sample of 237 stocks covers a substantial portion of the foreign stocks cross-listed on U.S. exchanges as the dollar trading volume of ADRs included in our sample accounts for approximately 80% of the volume of all ADRs listed on NYSE, NASDAQ and AMEX during the period of our study. Interestingly, institutions trade a much larger number of securities (658) in local markets only, while trading 94 securities exclusively in ADRs. Institutions also appear

to trade more frequently in local markets based on the number of institutional decisions. For stocks traded in both venues (locally as well as through ADRs), the total number of decisions in the foreign stocks (ADRs) in our sample is 71,928 (32,251), once again indicating that the ADR market is used less frequently than the corresponding home market. There are also a higher number of decisions per stock routed to local markets. Additionally, for stocks trading in both venues, institutions trade more aggressively when trading stocks in local markets, as evidenced by the greater number of shares per decision, and a greater dollar value per decision for home stocks, relative to their corresponding ADRs (298,147 shares versus 61,081 shares; $2,242,823 versus $1,440,153). Interestingly, for stocks traded exclusively in one market, although the average decision shares are higher for the local-market-only stocks, the corresponding average decision dollar volume is smaller than those associated with ADR-only stocks. This is consistent with the fact that local-market-only stocks have lower prices, as discussed below.

For stocks that trade in one venue only, about 54.38% of the trades in the home markets were purchases while only about 46.51% of the ADR trades were purchases.[10] Similarly, for stocks that are traded as both ADRs and in their home exchanges, purchase decisions in their local markets (as ADRs) account for 52.85% (46.60%) of the total institutional decisions. We also evaluate if orders are routed differently depending on the degree of order difficulty captured by the metric, *Order Complexity*, calculated as the ratio of decision-size to the average daily trading volume in the previous five trading days for that stock. We find that *Order Complexity* is, in general, significantly lower for stocks traded in both markets, relative to stocks traded exclusively in one market or the other. The average market capitalization numbers show that larger stocks are traded in both markets, while stocks traded exclusively in one venue appear to be much smaller. Stocks with the lowest market capitalization, on average, are traded exclusively in their respective local markets.

The volume-weighted average trade price (all in U.S. dollars) is approximately $25 for the stocks traded in local markets and $28 for the ADRs, for those stocks traded in both markets. For stocks traded as ADRs only, the average share price is $48.75, while stocks bought and sold

[10] Chan and Lakonishok (1993) argue that since an institutional investor typically has limited alternatives amongst its current portfolio to sell a security, such a decision does not necessarily convey negative information. In contrast, the choice of one specific issue to buy, out of virtually all the stocks trading in the market, is more likely to convey positive firm-specific news. Alternatively, they suggest that brokers are willing to facilitate institutional sells and accumulate long inventory position for smaller price concessions but not so willing to facilitate institutional purchases because they have to undertake short selling. Similar arguments are also set forth in Keim and Madhavan (1996).

in local markets only have an average price of $8.19. The average daily volume for the stocks in local markets (ADRs) in our sample is 927,830 (106,720) shares suggesting that for stocks traded in both venues, the local (i.e., foreign) markets are much deeper. In addition, the market for stocks traded as ADRs only is also thin with daily average volume of less than 146,800 shares. Overall, the ADR market appears to be significantly thinner than local markets for cross-listed securities.

Trading costs are the highest for stocks traded as ADRs-only, possibly due to the larger decision dollar values and order complexity. The stocks traded in both markets have the lowest trading costs likely a result of competition among exchanges to compete for order flows. As for commission costs, the stocks that are traded in both venues have higher commission costs, possibly due to order fragmentation. Also note that the stocks traded as ADRs only have the lowest commission costs. We also find that, for the group of stocks in our sample that trades in both markets, about 76% of the total volume transacted in both markets is, in fact, in the respective local markets for that stock.

In sum, the evidence in Table 1 indicates that institutions are relatively less active in the ADR market compared to trading the same stocks in their respective home markets. Such a distinction between paired ADRs and the corresponding stocks in their respective home-markets is absent in the literature.

4. Empirical Results on Choice of Trading Venue

From the evidence presented so far, it is clear that institutions often trade both the ADR and the same stock in its respective home exchange. But, what determines the distribution of their decisions across these two markets? We first examine this issue at country level and report the decision volume distribution on a country-by-country basis. In addition, we study the distribution of institutional decisions at the individual stock level

We first partition all stocks in our sample based on the relative liquidity of the markets for the stocks, and examine if the distribution of institutional decisions is positively correlated with the relative liquidity of the two markets. We also perform a regression analysis to the various factors that influence the distribution of institutional decision volume across the two venues. We also underscore the fact that out of the 989 distinct stocks in our sample only 237 are traded in both venues, while the rest are traded exclusively in one market with majority of the

stocks in local markets only. Since we are interested in understanding why institutions forego the opportunity to trade in both venues and, instead, concentrate in one market only, we employ a multinomial logistic regression model to identify the determinants of institutional choice of trading venues.

4.1. Distribution of institutional decisions by country and by the relative liquidity in local and ADR markets

In Table 2, we provide details on the number of decisions, share volume, and dollar volume for all institutional trades in our sample, on a country-by-country basis, between the local stocks and their corresponding ADRs. Note that the number of stocks reflects the number of local stocks, which is also the number of ADRs for that country. Thus, for example, our sample has 5 stocks listed in Argentina and 5 Argentinean ADRs. The range varies from 1 stock each in Belgium, Greece, Hungary, Philippines, Portugal, Turkey, and Venezuela, to 26 cross-listed stocks from Japan, 23 Brazilian stocks, and 22 stocks from the Netherlands. In terms of decisions, our sample is as varied as 14,651 decisions (Japan) and 9,031 decisions (the Netherlands) to 9 decisions (Venezuela). Similarly, the corresponding ADR decisions vary from 6,727 for ADRs from the Netherlands to only 1 decision involving ADRs originating from Belgium. Our sample also embraces countries where the decisions involving the home stocks are either greater than those involving the corresponding ADRs in the U.S. (24 countries), or where the reverse is true (11 countries). This variation across countries allows us to examine the role of relative liquidity, information asymmetry and other country level institutional differences in the determination of trading venues between ADRs versus the same stocks in their respective home markets.

Dollar volume in the home market varies from $9.543 billion traded in Japanese stocks to $1.91 million in stocks from Venezuela. Dollar trading volume in ADRs is the highest Netherlands at $7.514 billion and the lowest for Belgium at $0.73 million.[11] The emergent message is that institutions followed by Plexus are most active in home markets for countries like Japan, Germany, and Netherlands. By the same token, trading in ADRs is most active for stocks originating in Netherlands, followed by those from Mexico, and the UK. We also compute

[11] Since one share of an ADR is not always equivalent to 1 share of the underlying stock in its home exchange, direct comparison of share volume is not appropriate. Formally, the ADR ratio provides the number of foreign shares represented by one ADR. The ratio is typically depicted as, for example, "1:3", which implies that one share of the ADR represents 3 foreign shares, and so on.

the ratio of institutional dollar volume in ADRs as a percentage of total institutional volume in both ADRs and local markets. The ratio varies from 1% to about 98% in ADRs. Thus, our sample encompasses the entire gamut ranging from stocks with a majority of the trading in the local markets (e.g., Japan, Switzerland, and Hong Kong, where ADR shares is less than 2%), stocks where active trading takes place only as ADRs (e.g., U.K. (98%), Mexico (84%) and few others), and stocks with active trading present both in local exchanges and as ADRs (e.g., the Netherlands, with 49% of institutional volume in ADRs and 1% in local markets).

In Table 2, we also report the average aggregate trading volume of the cross-listed stocks traded as ADRs and in their respective local markets, as a measure of the depth of the market. If liquidity, or the depth of the market, is the primary concern of institutions, we would expect to see that a larger share of institutional decisions in the more liquid (i.e., deeper) venue. Our results show that the average dollar volume of stocks in their home markets are about 10 times larger than the corresponding ADRs and, as expected, a larger share of institutional decisions occurs in the stocks' local markets. We also calculate the correlation between (a) the percentage of decisions (in dollars) in the local markets relative to total dollar volume of all the decisions, and (b) the percentage of all total dollar trading volume in local markets relative to the total dollar trading volume of both the local and ADR markets. This correlation is estimated at 0.54 and is statistically significant. Thus, institutions appear to be concentrating their trades in deeper markets (see, for example, Argentina and Mexico).

A closer look at the country-level data, however, shows that institutions do not always trade in the market with the higher volume. For instance, for cross-listed stock originated from Brazil, the preferred trading venue of institutions is in the ADR market with ADRs account for 81% of the institutional dollar volume, while the local market is deeper as indicated by a significantly higher share (and dollar) volume (account for 99% of the total volume). As for stocks originating from the United Kingdom, much more active trading is seen in the ADR market rather than in the deeper U.K. market. In a related study, Pagano, Roell, and Zechner (2002) report that U.K. suffers from a large net order outflow of its cross-listed stocks because of its high trading costs. More importantly, our findings above suggest that relative liquidity alone cannot fully explain institutions' decision on where to trade. Accordingly, other relevant factors related to an institution's choice of trading venue are investigated for in a regression analysis later.

In Figure 1, we also plot (a) institutional trades in ADRs as a percentage of total institutional trades against (b) all trading volume in ADRs as a percentage of total volume, for all the countries in our sample. From the figure, we confirm our earlier observation that institutions choose to trade in the deeper market in many of the countries (e.g., Argentina, Luxemburg, Mexico, to name a few). However, exceptions are also seen for countries like Belgium, Brazil and the United Kingdom, where institutional trading is concentrated in the market with less overall volume.

We proceed to explore, in detail, the correlation between the relative allocation of trading decisions between the respective home markets and their ADRs, and the relative liquidity across the two markets – on a stock-by-stock basis. Toward this end, we further partition our sample of matched stocks into quintiles based on our measure of the depth of the market, calculated as the local volume on a stock relative to the total volume in both the local and ADR markets. For these five groups, our results show that, in general, as the depth of the local market declines, so does the percentage of institutional decisions in the local market. Thus, for example, for the first quintile, which has the deepest local markets, the percentage of institutional decision is as high as 70.7%, while for fifth quintile, which has the least depth in the local market, only 44.7% of the institutional trading volume is in the local markets. This further supports the notion that relative liquidity, or the depth of the alternative trading venue, is one of the important drivers of the distribution of institutional decision on trading venue.[12]

4.2. Determinants of trading volume across local and ADR markets

To further understand how institutional decisions split across the local and the ADR market, we perform a regression analysis on the institutions' dollar trading volume of local market (relative to the total institutional volume in both local and ADR markets) using the following equation:

$$\%\,ofLocalVol\ \ ume = \alpha + \beta_1 Complex\ + \beta_2\ \mathrm{Re}\ lvol + \beta_3\ \mathrm{Pr}\ ice\ \mathrm{Im}\ pact + \beta_4 Purchase\ + \beta_5 Volatility + \beta_6 Overlap\ + \beta_7 Emerge\ + \beta_8 CR + \beta_9 Liberal\ + \beta_{10} ITL + \varepsilon$$

where *% of Local Volume i*s the dollar decision volume in the local market relative to the total decision volume of the stock in both the local and ADR markets; *Complex* is the difference in

[12] We also find, at the individual stock level, that the correlation between the percentage of local volume and the percentage of institutional decisions in local markets is a statistically significant 0.39.

order complexity, calculated as the ratio of decision shares relative to average daily trading volume over the prior five trading days, in the local stock and the corresponding ADR; *Price Impact* is the difference between the price impacts of local shares and that of ADRs; *Purchase* is the difference in percentage of purchase-to-sell decision of foreign stocks and the corresponding ADR; *Relvol* refers to the relative stock trading volume in local exchange to overall trading volume; *Volatility* is the difference in the standard deviation of the foreign stock and the corresponding ADR; *Overlap* takes a value of 1 if the local stock and ADR have overlapping trading hours, and zero otherwise; *Emerge* takes the value of *1* for markets classified as emerging markets by MSCI, and zero for developed markets; *CR* is the index of shareholders' rights constructed by La Porta et al. (1998), and ranges from 0 for worst to 5 for best; *Liberal* signifies whether a country has liberalized capital flow policies with minimal restrictions based on Bekaert and Harvey (2000); *ITL* takes the value of *1* if the insider trading laws have been enforced in the country through at least one prosecution, and zero otherwise.

We report our regression results in Table 3. We find that the percentage of total local volume, and order complexity, are positively correlated with the percentage of institutional decision volume in local markets. In addition, the stocks that have higher price impact on local trading (compared with trading ADR) are expected to attract less trading interests from institutional investors. Furthermore, a stock with a higher percentage of buy orders has more of its orders executed in its local market. This finding, coupled with the results reported in the extant literature (see, for example, Keim and Madhavan, 1995, 1997; and Chan and Lakonishok, 1993), suggesting that institutional buys are often more informed than institutional sells,[13] would imply that more informed trading activity should gravitate towards a stock's home exchange rather than the ADR market.

Several studies have also examined the extent of market integration by comparing spreads and trading volume when both the home market and the NYSE are open. Werner and Kleidon (1996), for example, report that volume and volatility are much higher over the 2-hour trading period each day when both the London Stock Exchange and the NYSE are open. In a related paper, Hupperets and Menkveld (2002) perform a similar study for a sample of Dutch ADRs and find that the spreads for the Dutch ADRs traded on the NYSE increase during non-overlapping

[13] This follows since buys are supposed to be based on extensive research of the whole universe of stocks while sells are triggered more mechanically when target prices are hit.

hours, indicating that competitive pressure for order flow caused by trading on multiple exchanges reduces adverse selection and drives spreads down during the overlapping period. We, therefore, include a dummy variable, *Overlap*, in our regression to gauge the effect of overlapping trading hours on the distribution of institutional decisions. The coefficient of the overlapping variable is negative, and statistically significant, suggesting that, there is greater relative trading in the ADR market for those firms domiciled in countries sharing overlapping trading hours with the United States. Also, a larger share of decisions is routed to the ADR market for emerging market stocks. This finding, similar to that reported in Pulatkonak and Sofianos (1999), is consistent with the fact that emerging markets tend to have higher transaction costs (Chiyachantana, Jain, Jiang and Wood, 2004). In addition, institutions are less likely to have trading facilities and other infrastructure located in the local stock exchange, which makes trading on the NYSE more convenient. Finally, we find that the local share of institutional decisions is positively correlated with the proxy for the enforcement of insider trading laws. Also institutions appear to prefer to trade a higher percentage of their transactions in ADRs for issues originating from countries with liberalized capital markets and better shareholder rights.

4.3. Trade in one market or in both markets?

In forming our matched sample, we observed that institutions do not always trade cross-listed stocks on both the local exchange and also in its ADR form. Accordingly, in Table 1, we report that there are 658 stocks traded in local markets exclusively, while only 94 securities are traded as ADRs exclusively. Thus, while institutions have the choice of trading in both markets, it is clear they do not always do so. The fact that a majority of stocks in our sample are traded exclusively in their respective home markets by institutions appears to be at odds with the firms' stated motive to list their shares on a major exchange (such as the NYSE), which is to improve the company's exposure to foreign investors. Our sample seems to suggest that the targeted foreign investors of cross-listed firms are often individual investors. We are interested in discovering the factors that affect institutions' decisions on where to trade. We analyze the decision of trading the ADR versus trading the corresponding stock in its home exchange, within a multivariate setting using a multinomial logistic framework on a stock-by-stock basis. In particular, our dependent variable takes the value 1 for stocks that trade in the ADR market only and 2 for stocks that trade in the local exchange only. Additionally, our base (or, reference) group comprises of those stocks in our data that were traded both as ADRs and in their

corresponding home exchanges. These stocks are assigned a value of zero in our analysis. Our independent variables encompass similar variables used in the decision volume regression.

Table 4 provides the estimates averaged over all stocks. It is clear that, relative to stocks traded in both markets, stocks traded in the ADR market solely are associated with a lower level of order complexity (i.e., smaller relative size), and lower relative volume. Correspondingly, stocks trading solely in their home exchanges are associated with relatively smaller capitalization, higher relative local volume and lower volatility. Emerging markets stocks are also less likely to be traded in their home exchanges exclusively. The implication of the above findings is that stocks with relatively higher volume and relatively smaller market capitalization are more likely to be traded in their home exchanges while less complex trades, and stocks with lower relative local volume, are more likely to be traded in the ADR market. The probability that institutions trade exclusively in ADRs (local only) is negatively (positively) associated with a higher (lower) price impact although this price impact does not appear to be statistically significant.

5. Methodology and Results on Comparison of Institutional Trading Costs

We now turn our attention to the computation of institutional trading costs over the sample period. Total execution costs comprise of an implicit cost (through the price impact associated with a given trade) and an explicit cost (i.e., commissions). Unlike commissions, however, the price impact of a trade – the deviation of the transaction price from the 'unperturbed' price that would prevail had the trade not occurred – is arguably more difficult to measure. Much depends on the proper identification of the unperturbed price. In particular, the trade itself should least influence the measure of price impact. Keim and Madhavan (1997) discuss the importance of this issue in great detail. One method that is popular with academics and practitioners alike is comparing the average price at which an order is executed with the unperturbed price prevailing just prior to the trading decision. Following Keim and Madhavan (1997), we compute price impact at the decision level as the ratio of the volume weighted average trade price of the component trades (*WTP*) in that decision to the closing price on the day before the trading decision is made (P_{d-1}). Thus price impact based on decision price is calculated as $\frac{WTP}{P_{d-1}} - 1$ for buys and $-(\frac{WTP}{P_{d-1}} - 1)$ for sells. Buy (sell) decisions executing at a

higher (lower) average price relative to the closing price on the day before the decision would have a positive price impact. Similarly, buy (sell) decisions executing at a lower (higher) average price relative to the benchmark price would display a negative price impact.

Furthermore, following Jones and Lipson (2001), we also calculate the price impact at release level as the ratio of the volume weighted average trade price (*WTP*) of the component trades in that decision to the price prevailing at the time the institutions release an order to the trading desk (P_r). Thus price impact based on release price is calculated as $\frac{WTP}{P_r}-1$ for buys and $-(\frac{WTP}{P_r}-1)$ for sells. Once again, positive and negative price impacts for buy and sell decisions are similar to those provided above. Finally, the explicit cost is calculated as commission in dollars per share as a percentage of the transaction price.

5.1. Comparisons of institutional trading costs by country

Panel A of Table 5 provides the implicit, explicit and total costs based on the two measures discussed above on a county-by-country basis. Overall, the implicit costs of trading the ADR are significantly greater relative to trading the stock in his home market (0.66% versus 0.51%). This is true for both benchmark prices (DECISION and RELEASE).

On a country-by-country basis, in terms of explicit costs, home markets do not appear to enjoy the same dominance as seen with implicit costs. Specifically, for a majority of the countries in our data, commission costs of trading the ADRs are lower than those associated with trading the corresponding stocks in their home countries.

Overall, the total trading costs using both implicit and explicit costs reveal that trading in the ADR is significantly more expensive than trading in the corresponding stock in its home country. On a country-by-country basis, however, for twenty countries, the total cost of trading the ADR is significantly greater than trading the corresponding stock at home. For the remaining fifteen countries, the total trading costs associated with trading the ADR are less than those incurred by trading the corresponding stocks in their respective home countries.

There also does not appear to be a geographic pattern to our findings: Countries like United Kingdom, Norway and Greece (all from Europe), Venezuela (South America), and Korea (Asia) all show that trading the ADR is significantly cheaper than trading the same stocks in their respective home markets. Contrarily, for countries like Japan, Indonesia, India and Singapore

(all from Asia), Mexico (North America), and the Netherlands (Europe), the total cost of trading the ADR is significantly greater than trading the same company at home.

We further attempt to compare our numbers to those reported by other studies although the risks of doing so are obvious in terms of ensuring the comparison of "apples-to-apples" by way of similar measures over the same period of time and using similar samples, etc. In spite of such inherent risks, we find that trading ADRs result in a much higher implicit cost. The release-price-based price impact for all ADR trades is 0.66%, while CJJW (2004) reports the same measure of institutional transaction cost of US stocks at 0.18%. This is perhaps due to the fact that the stocks in our sample are traded in multiple markets and, for many countries, the winners are the local markets where a majority of the trading occurs.

A possible criticism of the results presented in Panel A of Table 5 is that they are not adjusted for market-wide variations. That is, if there is an overall upward market movement on a given day (or period) in a given country that is not reflected in the U.S. market, then a buy decision in the home market might lead to a greater price impact compared to a purchase decision of the same company's ADR in the U.S. market. The same argument holds for a selling decision made in a downward trending market of a given country that is not similarly reflected in the U.S. over the same period of time. More generally, to the extent that the price impact is a function of the liquidity available on the other side of the trading decision (i.e., the sell side liquidity for a buy decision and vice versa) and to the extent that there may exist a differential condition across the two markets (a particular foreign market versus the U.S. market), our results may be skewed in one direction or another. To see if such issues make a difference in the trading costs across different countries versus the U.S., we present, in Panel B of Table 5, the same costs adjusted for market-wide price movements. We use the Datastream International stock market indices for the 35 countries from which the companies' local stocks (and their corresponding ADRs) originate. The market adjusted price impact is the raw price impact for a decision in a particular stock in excess of the price changes on the foreign market index (of the market the stock originates from) between the decision date and the date when the last transaction in the given decision is completed. By presenting these additional results adjusted for market-wide movements in each of the foreign markets represented in our data, we are able to examine transactions costs with and without such market-timing costs. Overall, our results remain the same qualitatively as in Panel A and attest to the robustness of our findings. Thus,

for example, for all stocks, the price impact (using DECISION) without factoring in market-wide factors were 0.51% and 0.66% for trading the stocks in the Korean markets versus their respective ADRs in the U.S., respectively. After factoring in market-wide effects, the corresponding costs are 0.38% and 0.76%, respectively. Overall, the price impact of the home stocks diminishing slightly while simultaneously increasing slightly the price impact of the corresponding ADR. Collectively, such changes result in a larger gap between the price impacts of trading in local versus the ADR markets. A reasonable explanation for this is likely due to the larger movement (i.e., higher volatility) of foreign market indices relative to the U.S. To corroborate this intuition, we use Datastream International stock market indices to compute the volatility of foreign markets and the U.S., and find that 20 out of the 35 foreign markets included in our sample have considerably higher volatility than that in the U.S.

5.2 Institutional trading costs across various partitions of the data

In this section, we investigate institutional trading costs across trading the home stocks versus the corresponding ADRs for various important partitions of the data. All partitions are motivated by extant research on trading costs in general and institutional trading costs in particular. The results are presented in Table 6.

Large, medium and small stocks. Large stocks are often the most liquid, and are associated with lower transaction costs while small stocks are often speculative and traded in thinner markets with poorer liquidity. To see if institutional trading costs differ significantly along stock sizes, we partition our sample of stocks into large, medium and small by dividing the sample equally into three groups ranked by the market capitalization. From Table 7, we confirm that price impact is higher for smaller stocks, regardless the location of trades. More importantly, we find that overall the cost of trading the ADRs of both large and medium foreign companies in the U.S. is significantly higher than the cost of trading the corresponding companies' stocks at its home country (0.23% versus 0.59% based on DECISION for large companies and 0.44% versus 0.66% for medium companies). By contrast, trading smaller stocks in ADRs appears to be associated with a cost savings of 0.14%. In terms of explicit trading costs, the commissions are lower with ADRs than with the stocks in their home markets. For example, the commission for large ADRs is 0.15% compared to 0.23% for the corresponding stocks traded in the home exchange. Similarly, for small stocks, the commissions are 0.27% in the home market versus 0.19% in the ADR market. The commissions in the U.S. market are smaller for small

capitalization stocks in spite of lower relative volume, possibly due to the cross subsidization across stocks (ADR and domestic) by U.S. brokers. In sum, for medium and large companies, the total cost of trading the ADR is significantly higher than trading the same stocks in their home markets, while no significant difference is observed for trading small stocks in the two alternative venues. This conclusion is robust to using the benchmark price given by either DECISION or RELEASE.

Easy, moderate and difficult trading decisions. We partition the sample into three equal groups (easy, moderate, and difficult) based on the complexity of the decision. Decision complexity is calculated as the ratio of decision-size to the average daily trading volume in the previous five trading days for that stock. From Table 6, we see that while the overall trading costs (price impact and commission) are higher for the ADRs relative to the same stocks in their home exchanges, they are significantly higher only for the difficult decisions. For easy and moderate decisions, the costs are statistically similar. Hence, institutions are better off trading difficult decisions in a stock's home exchange rather than trading them as ADRs.

Buy versus sell trades. We turn our attention to the relation between trading costs and the direction of trades (i.e., buy versus sell). Unlike many studies of transaction costs that rely on unsigned trading volume, or use the Lee and ready (1991) algorithm to infer the direction of trades, our unique dataset includes information on institutions' intended trade direction. Purchases are often considered more informative than sells and, consequently, the price impacts associated with a buy or a sell trade should be distinct from each other. Thus, we compare the relative price impact across the two markets for the two groups, partitioned by the percentage of purchases relative to all trades. Interestingly, for the group with higher percentage of purchases, trading costs in the local markets are on average 0.18% lower than that of the ADR markets, showing a larger cost advantage compared with the group with relatively lower percentage of purchases.

High volume versus low volume stocks. Chowdry and Nanda (1991) posit that liquidity traders prefer markets with the lowest trading costs and informed traders maximize profits by hiding behind liquidity traders' trades. Thus, in the presence of multiple markets, the venue with a higher overall trading volume is likely to offer better liquidity to institutions. We partition the sample firms into two equal groups based on the local volume relative to the combined trading volume of ADRs and the same firm in its local market. Consistent with above argument, for

stocks with relatively high local volume, the price impact of local stocks are considerably lower than its corresponding ADRs. The difference in the price impact of the two trading venues is 0.29% and statistically significant. Moreover, for stocks with a relative high trading volume in the ADRs (or relatively low volume in local markets), the overall trading cost is also slightly higher relative to trading the same companies' stocks in their respective home markets, but the difference is not statistically significant.

Overlapping versus non-overlapping trading periods. Foreign markets normally have trading hours that are different from that of the ADRs trading in the U.S. The existence of an alternative trading location for stocks and the presence of overlapping trading hours between the firm's home exchange and the ADR market lead to conjectures about relative liquidity and overlapping trading hours. Hupperets and Menkveld (2002), for example, show that the competitive pressure for order flow caused by trading on multiple exchanges drives spreads down during the overlap period. In the same vein, we expect the difference in price impact to be wider for stocks originating from countries with non-overlapping trading hours with the U.S. market. We divide our sample into overlapping and non-overlapping groups based on whether the local market has overlapping trading hours with the U.S. Consistent with our conjecture, the difference in price impact is larger when the local market trading hours do not overlap with that of the ADR market. And when market-wide price changes are adjusted for, the price impact of ADRs is 0.59% higher than the same set of stocks on local exchange for the non-overlapping group -- consistent with the findings of Pulatkonak and Sofianos (1999), and Clarke and Shastri (2001). [14]

Developed versus emerging markets. We also partition our data along the lines of developed markets and emerging markets using the Morgan Stanley Capital International's (MSCI) classification system. For stocks from developed markets, we find that the overall trading costs of transacting the ADR are slightly higher than the corresponding stocks in their home markets (0.48% versus 0.41%), and the difference is not statistically significant. Institutional trading costs in stocks from emerging markets are much higher in ADRs (0.95%) than on their local exchanges (0.67%). Thus, our results seem to indicate that institutions prefer to trade stocks from emerging markets as ADRs despite the higher price impact.

[14] Werner and Kleidon (1996) also report that spreads are substantially lower for cross-listed securities in London during the overlap period than for their matching firms.

5.3 Determinants of the difference in price impact

The significantly different price impacts displayed by institutional trading in the ADRs versus trading the same companies' stocks in their home listing markets prompt us to further investigate the determinants of this difference. We perform a multivariate regression analysis to better understand the causes of the differences in trading the same firm's stock in alternative locations. The dependent variable is the difference in the price impact (based on the price prevailing at release time) between the foreign stock and corresponding ADR. The explanatory variables include the usual suspects related to order-specific and firm-specific factors. Following CJJW (2004), we also include country-specific variables capturing the level of economic development, the level of shareholder rights protection, the state of financial liberalization, the legal enforcement of insider trading laws. In particular, our empirical model is defined as follows:

$$PI = \alpha + \beta_1 Complex + \beta_2 \,\mathrm{Re}\, lvol + \beta_3 Purchase + \beta_4 Volatility + \beta_5 Overlap + \beta_6 Emerge + \beta_7 CR + \beta_8 Liberal + \beta_9 ITL + \varepsilon$$

where *PI* is the difference in the measures of price impact for a foreign stock and the corresponding ADR; *Complex* is the difference in order complexity, calculated as the ratio of decision shares relative to average daily trading volume over the prior five trading days, of the local stock and the corresponding ADR; *Relvol* refers to the relative stock trading volume in local exchange to overall trading volume; *Purchase* is the difference in percentage of purchase to sell decision of foreign stocks and corresponding ADR; *Volatility* is the difference in the standard deviation of the foreign stock and the corresponding ADR; *Overlap* takes a value of 1 if local stock and ADR have the overlapping trading hours; *Emerge* takes the value of 1 for markets classified as emerging markets by MSCI, and 0 for financially developed markets; *CR* is the index of shareholders' right constructed by La Porta et al. (1998) and it ranges from 0 for worst to 5 for best; *Liberal* signifies whether a country has liberalized capital flow policies with minimal restrictions based on Bekaert and Harvey (2000); ITL takes the value if the insider trading laws have been enforced in the country through at least one prosecution.

Table 7 provides the regression results. Complex is negative and significant indicating that the difference in price impact is greater for more complex trades and, by implication, it is

cheaper to trade a stock in its home country than its ADR. Similarly, Relvol is negative and significant, implying that it is cheaper to trade stocks for which the relative local volume is larger in the local market. It is also cheaper to trade stocks with a higher percentage of purchases in their respective home markets. The difference in price impact is smaller for stocks domiciled in countries that have overlapping trading hours with the U.S. markets, suggesting that competition for order flows helps to lower trading costs. It is cheaper to trade underdeveloped countries' stocks in their home markets, although that option may not always be available. Finally, it appears to be cheaper to trade stocks of countries enforcing insider trading laws in their respective home markets (rather than their ADRs).

6. Conclusion

Using proprietary institutional trading data over 2001, we investigate how institutions trade a firm's stock in its home exchange versus trading the same firm's stock as an ADR in the U.S. For stocks traded as both ADRs and also in their respective local exchanges, we find that the distribution of institutional decisions in the ADR markets is higher for stocks with a deeper ADR market, for less complex orders, for stocks with lower price impact in ADR market or overlapping trading hours, and for emerging market stocks. We also use a multinomial logistic model to examine what factors drive a stock to be (1) traded solely in the ADR market, (2) traded solely it its respective home exchange, or (3) traded in both venues, by institutional investors. We conclude that stocks with relatively higher local volume, and of smaller market capitalization, and non-overlapping trading hours are more likely to be traded solely in their home exchanges, while less complex orders are more likely to be traded solely as ADRs in the U.S.

We also compare institutional trading costs between trading a foreign company's ADR in the U.S. versus trading the equivalent security in its respective home market. In terms of the overall trading cost (implicit plus explicit), the trading cost of ADRs is often higher than trading the same stock at home. Specifically, the overall trading cost (implicit plus explicit) of trading the ADR is greater than trading the same firm's stock at home for twenty countries in our sample. Specifically, for countries like Japan, Indonesia, Hong Kong, India, Mexico, the Netherlands, and Singapore, the total cost of trading the ADR is significantly more expensive than trading the same company's stocks at home. Contrarily, for countries like the United

Kingdom, Venezuela, Norway, Korea and Greece, trading the ADR is significantly cheaper than trading the same stocks in their respective home markets.

Given that significant cost differences do exist between trading the ADR versus trading the equivalent security at home, we take the logical next step in determining the drivers of such cost differences. Our multivariate analysis on institutional trading costs reveals that the difference in costs (between trading in the securities' home country and in its ADR) is smaller for stocks associated with less complex trades, for stocks with relatively lower local trading volume or overlapping trading hours and for stocks originating from the emerging markets.

Overall, our research sheds light on the choice of trading venues and the relative costs faced by institutions in trading foreign company stocks, either in the U.S. through ADRs versus trading the equivalent stocks in the firms' home exchange. To the best of our knowledge, ours is the first paper to attempt to do so. Much work remains, however. Future research can consider issues of correlation across world markets and its relationship to the flight to quality seen in recent years in some international trading arena, in order to better understand the true costs of trading in international markets.

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Table 1. Institutional Trading in Foreign Stocks and ADRs

Data on institutional trading in foreign stocks are obtained from Plexus Group for the first three quarters of 2001. This table contains sample characteristics of institutional trading in ADRs and foreign stocks in 35 countries. We report characteristics for three groups. Stocks traded in local market only, ADR only and both local markets.

Trading Characteristics	Local	ADR	Both ADR & Local	
			Local	ADR
Number of Securities	658	94	237	237
Number of Decisions	69,419	6,006	71,928	32,251
Average Number of Decision per Security	105.50	64.49	303.49	136.08
Average Decision Size (shares)	1,525,872	41,085	298,147	61,081
Average Decision Size (in dollars)	630,514	724,561	2,242,823	1,440,153
Percentage of $ Purchase Decision	54.38%	46.51%	52.85%	46.60%
Order Complexity (%)	52.21%	48.54%	31.19%	28.63%
Average Market Capitalization (million $)	3,104	5,958	36,975	32,805
Average Daily Volume (Number of Shares)	4,477,100	146,800	927,830	106,720
Median Volume weighted Transaction Price ($)	8.19	48.75	25.43	28.00
Relative Local Trading Volume	100.00%	0%	75.83%	24.17%
Price Impact Cost (%)	0.72	1.10	0.51	0.66
Commissions Cost (%)	0.12	0.04	0.21	0.22

Table 2. Overall and Country Statistics on Institutional Decisions and Trading Volume

This table contains Number of stocks and Number of decisions, and dollar volume of institutional trading in ADRs and foreign stocks for the 35 countries. Average overall trading volume is the total dollar volume of the stock in either local or ADR market.

	Number of stocks	Number of institutional decisions		Total institutional dollar volume ($ million)			Average Overall Trading Volume ($)		
		Local	ADR	Local	ADR	% of ADR volume by institutions	Local	ADR	% of total ADR volume
All trades	237	71927	32251	53497	18832	26%	2002192	213132	10%
ARGENTINA	5	260	448	44.7	114.6	72%	22700	47981	68%
AUSTRALIA	7	3375	1277	1761.58	341.1	16%	367533	76855	17%
BELGIUM	1	242	1	62.52	0.73	1%	133638	90917	40%
BRAZIL	23	778	3526	306.71	1281.78	81%	12835228	117540	1%
CHILE	9	32	1341	6.94	149.58	96%	8848	8993	50%
CHINA	10	2119	798	1410.79	206.23	13%	207404	54290	21%
DENMARK	3	1029	111	486.14	6.83	1%	260500	19027	7%
FINLAND	3	1928	211	2334.68	220.83	9%	2071515	1533785	43%
FRANCE	16	7470	2152	7421.81	1237.06	14%	1226435	382821	24%
GERMANY	11	6698	186	5738.41	56.18	1%	2859492	802446	22%
GREECE	1	280	11	169.46	3.32	2%	145165	29258	17%
HONG KONG	9	3661	68	2134.43	15.04	1%	244027	86645	26%
HUNGARY	1	102	106	23.65	33.55	59%	72500	14945	17%
INDIA	6	466	446	318.09	94.8	23%	58165	80036	58%
INDONESIA	2	177	63	47.44	14.38	23%	50344	15364	23%
ISRAEL	3	120	181	43.27	79	65%	2940828	294894	9%
ITALY	6	2271	364	1747.39	196.31	10%	991856	590843	37%
JAPAN	26	14651	1314	9543.56	204.96	2%	680949	123378	15%
KOREA	5	2073	2055	1853.85	631.36	25%	479523	442770	48%
LUXEMBOURG	2	10	81	2.06	5.05	71%	5470	18414	77%
MEXICO	20	1306	5489	529.18	2857.48	84%	63166	133149	68%
NETHERLANDS	22	9031	6727	7951.32	7514.11	49%	1613267	266296	14%
NEW ZEALAND	2	361	45	112.02	1.66	1%	59340	4678	7%
NORWAY	3	572	81	156.49	3.6	2%	222825	55268	20%
PHILIPPINES	1	141	238	25.54	46.62	65%	20129	24599	55%
PORTUGAL	1	613	104	381.68	12.23	3%	534970	33413	6%
SINGAPORE	4	1335	43	477.22	24.2	5%	157194	104312	40%
SOUTH AFRICA	4	969	101	358.52	4.59	1%	101591	74295	42%
SPAIN	6	3408	1120	2683.49	250.7	9%	1755990	120777	6%
SWEDEN	5	1524	73	1321.27	57.27	4%	1258579	385744	23%
SWITZERLAND	9	3510	494	3062.85	72.5	2%	1645643	198739	11%
TAIWAN	6	1280	1269	902.31	536.78	37%	380305	188727	33%
TURKEY	1	86	96	20.1	9.48	32%	717	14318	95%
UNITED KINGDOM	3	40	1516	55.44	2506.89	98%	3507826	610653	15%
VENEZUELA	1	9	115	1.91	41.51	96%	3991	66745	94%

Table 3. Regression Analysis of Volume Distribution

This table presents regression analysis on the institutions' dollar trading volume of local market relative to the total volume in both local and ADR markets using the equation:

$$\%ofLocalVolume = \alpha + \beta_1 Complex + \beta_2 \,\mathrm{Re}\, lvol + \beta_3 \,\mathrm{Pr}\, ice\, \mathrm{Im}\, pact + \beta_4 Purchase + \beta_5 Volatility + \beta_6 Overlap + \beta_7 Emerge + \beta_8 CR + \beta_9 Liberal + \beta_{10} ITL + \varepsilon$$

where *% of Local Volume i*s the dollar decision volume in the local market relative to the total volume of the stock in both local and ADR markets; *Complex* is the difference in order complexity, calculated as the ratio of decision shares relative to average daily trading volume over the prior five trading days, of the local stock and the corresponding ADR; *Price Impact* is the difference between the price impacts of local shares and that of ADRs; *Purchase* is the difference in percentage of purchase to sell decision of foreign stocks and corresponding ADR. *Relvol* refers to the relative stock trading volume in local exchange to overall trading volume. *Volatility* is the difference in the standard deviation of the foreign stock and the corresponding ADR; Overlap takes a value of 1 if local stock and ADR have the overlapping trading hours. *Emerge* takes the value of 1 for markets classified as emerging markets by MSCI, and 0 for financially developed markets; *CR* is the index of shareholders' right constructed by La Porta et al. (1998) and it ranges from 0 for worst to 5 for best; *Liberal* signifies whether a country has liberalized capital flow policies with minimal restrictions based on Bekaert and Harvey (2000); *ITL* takes the value of 1 if the insider trading laws have been enforced in the country through at least one prosecution. * and *** denote significant level at 10% and 1%, respectively.

Regression Variables	**Estimate**
Intercept	1.432***
Complexity of Decision	0.610***
Relative Trading Volume	0.164***
Price Impact	-0.032***
Volatility	0.002
Percentage Buy/Sell	0.033*
Overlap	-0.318***
Emerging Market	-0.431***
Shareholder Rights	-0.088***
Liberalized Market	-0.449***
Insider Trading Laws	0.192***

Table 4. Coefficient Estimates of Multinomial Logit Regression

This table presents the multinomial logit regression. Stocks traded in both local and ADR markets are used as our reference group. ADR refers to stocks traded in ADR form only; and Local refers to stocks traded in local markets only. Cap refers to the difference in market capitalization of the foreign stock and the corresponding ADR; *Complex* is the difference in order complexity, calculated as the ratio of decision shares relative to average daily trading volume over the prior five trading days, of the local stock and the corresponding ADR; *Purchase* is the difference in percentage of purchase to sell decision of foreign stocks and corresponding ADR. *Relvol* refers to the relative stock trading volume in local exchange to overall trading volume. *Volatility* is the difference in the standard deviation of the foreign stock and the corresponding ADR; Price impact is the ratio of the volume weighted trade price of the component trades in a decision to the closing price on the day before the trading decision is made Overlap takes a value of 1 if local stock and ADR have the overlapping trading hours. *Emerge* takes the value of 1 for markets classified as emerging markets by MSCI, and 0 for financially developed markets; *CR* is the index of shareholders' right constructed by La Porta et al. (1998) and it ranges from 0 for worst to 5 for best; *Liberal* signifies whether a country has liberalized capital flow policies with minimal restrictions based on Bekaert and Harvey (2000); *ITL* takes the value if the insider trading laws have been enforced in the country through at least one prosecution. *** indicate statistical significance at the 10% level.

	Intercept[1]	**Cap**[1]	**Complex**[1]	**Purchase**	**Relative Volume**	**Volatility**	**Price Impact**	**Overlap**	**Emerging Market**
ADR	0.01 ***	0.01	-1.92 ***	-5.62	-163.00 ***	2.18	-0.12	1.88	-0.83
Local	-0.77 ***	-0.03 ***	2.72 ***	-1.40	779.40 ***	-1.32 ***	0.33	-2.14 ***	-4.51 ***

[1] Coefficients are multiplied by 1000.

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Table 5. Panel A: Institutional Trading Costs by Country

This table reports the execution costs of institutional trading during the sample period. Total execution cost consists of implicit cost (price impact) and explicit cost (commission cost). Implicit cost is calculated as the ratio of volume weighted trade price of the component trades in an order relative to two benchmark prices. Decision based benchmark use the closing price on the day before the decision to trade is made, and the release benchmark used the price when an institution releases an order to trading desk. Explicit cost is calculated as commission per share relative to transaction price. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

	Price Impact							Commission			Total Cost						
Benchmark	Decision				Release						Decision				Release		
	Local	ADR	*Diff*		Local	ADR	*Diff*		Local	ADR	*Diff*	Local	ADR	*Diff*		Local	ADR	*Diff*	
All trades	0.51	0.66	-0.16	***	0.39	0.44	-0.05	*	0.21	0.22	-0.01	0.72	0.88	-0.17	***	0.60	0.67	-0.07	*
COUNTRY																			
ARGENTINA	0.83	1.12	-0.29		0.76	0.74	0.01		0.32	0.23	0.10	1.16	1.35	-0.19		1.08	0.97	0.11	
AUSTRALIA	0.49	0.40	0.08		0.26	0.29	-0.03		0.23	0.39	-0.17	0.71	0.80	-0.08		0.48	0.68	-0.20	
BELGIUM	0.39	0.20	0.19		0.35	1.58	-1.22		0.11	0.05	0.06	0.50	0.25	0.25		0.46	1.63	-1.17	
BRAZIL	0.48	0.70	-0.22		0.15	0.62	-0.47		0.26	0.26	0.00	0.74	0.96	-0.22		0.41	0.88	-0.47	
CHILE	0.82	0.81	0.01		1.14	0.59	0.55		0.69	0.30	0.38	1.51	1.11	0.40		1.82	0.89	0.93	
CHINA	1.21	0.86	0.35		0.93	0.65	0.28		0.13	0.20	-0.08	1.34	1.06	0.27		1.06	0.85	0.21	
DENMARK	0.36	0.99	-0.63		0.47	0.36	0.11		0.17	0.15	0.02	0.53	1.14	-0.61		0.64	0.51	0.12	
FINLAND	0.14	0.72	-0.58		0.17	0.04	0.14		0.14	0.17	-0.03	0.28	0.89	-0.61		0.31	0.21	0.11	
FRANCE	0.23	0.07	0.15		0.43	0.25	0.18		0.14	0.13	0.01	0.37	0.20	0.17		0.58	0.38	0.20	
GERMANY	0.17	0.54	-0.38		0.10	-0.49	0.59		0.12	0.11	0.01	0.29	0.65	-0.37		0.22	-0.38	0.60	
GREECE	0.38	-0.44	0.82		0.35	-0.44	0.79		0.39	0.25	0.13	0.77	-0.19	0.96		0.73	-0.19	0.92	
HONG KONG	0.80	0.40	0.40		0.21	0.14	0.07		0.16	0.19	-0.02	0.96	0.58	0.37		0.37	0.32	0.05	
HUNGARY	0.30	0.41	-0.11		0.29	0.19	0.10		0.48	0.07	0.41	0.78	0.48	0.30		0.77	0.26	0.51	
INDIA	0.74	1.07	-0.32		0.15	0.50	-0.35		0.48	0.29	0.19	1.22	1.35	-0.13		0.63	0.78	-0.15	
INDONESIA	0.74	3.92	-3.17		0.33	2.50	-2.18		0.46	0.57	-0.11	1.21	4.48	-3.28		0.79	3.07	-2.28	
ISRAEL	0.73	2.30	-1.57		0.80	1.03	-0.22		0.32	0.19	0.13	1.05	2.49	-1.44		1.12	1.21	-0.09	
ITALY	0.27	-0.02	0.29		0.19	-0.15	0.35		0.10	0.17	-0.07	0.36	0.15	0.22		0.29	0.01	0.28	
JAPAN	0.27	0.52	-0.26		0.09	0.40	-0.30		0.08	0.11	-0.03	0.35	0.64	-0.28		0.18	0.51	-0.33	
KOREA	0.29	-0.26	0.55		0.13	-0.36	0.48		0.34	0.18	0.16	0.63	-0.07	0.71		0.47	-0.17	0.64	
LUXEMBOURG	0.66	0.89	-0.24		0.87	0.76	0.11		0.11	0.07	0.04	0.77	0.97	-0.20		0.98	0.83	0.15	
MEXICO	0.90	1.17	-0.27		0.72	0.64	0.08		0.24	0.41	-0.17	1.14	1.58	-0.44		0.96	1.06	-0.09	
NETHERLANDS	0.26	0.72	-0.46		0.37	0.75	-0.38		0.13	0.20	-0.07	0.39	0.91	-0.52		0.50	0.95	-0.45	
NEW ZEALAND	0.37	-1.07	1.44		0.21	0.32	-0.11		0.08	0.15	-0.07	0.45	-0.92	1.37		0.30	0.47	-0.18	
NORWAY	0.25	-0.42	0.67		0.23	-1.22	1.45		0.13	0.26	-0.12	0.39	-0.16	0.55		0.36	-0.96	1.33	
PHILIPPINES	0.61	1.01	-0.40		0.46	0.39	0.06		0.52	0.29	0.23	1.13	1.30	-0.18		0.97	0.68	0.29	
PORTUGAL	0.21	0.23	-0.02		0.13	0.40	-0.27		0.15	0.42	-0.27	0.37	0.65	-0.28		0.28	0.82	-0.54	
SINGAPORE	0.75	1.43	-0.68		0.63	1.26	-0.64		0.19	0.08	0.12	0.94	1.51	-0.57		0.82	1.34	-0.52	
SOUTH AFRICA	0.34	1.18	-0.84		0.28	1.01	-0.74		0.26	0.14	0.12	0.60	1.32	-0.72		0.54	1.15	-0.61	
SPAIN	0.28	0.14	0.14		0.18	0.11	0.07		0.14	0.21	-0.07	0.42	0.35	0.07		0.32	0.32	0.00	
SWEDEN	0.30	1.34	-1.04		0.21	0.75	-0.54		0.14	0.11	0.03	0.44	1.45	-1.01		0.34	0.86	-0.51	
SWITZERLAND	0.17	0.47	-0.31		0.22	0.66	-0.44		0.20	0.35	-0.15	0.36	0.82	-0.46		0.42	1.01	-0.59	
TAIWAN	0.78	0.68	0.10		0.45	0.47	-0.02		0.29	0.32	-0.03	1.07	1.01	0.06		0.75	0.79	-0.05	
TURKEY	0.06	2.14	-2.08		0.39	0.40	-0.01		0.12	0.99	-0.87	0.18	3.13	-2.95		0.51	1.40	-0.89	
UNITED KINGDOM	1.92	0.01	1.92		0.97	0.13	0.84		0.14	0.08	0.05	2.06	0.09	1.97		1.11	0.21	0.89	
VENEZUELA	1.16	-0.48	1.64		2.09	0.11	1.97		0.80	0.20	0.61	1.96	-0.29	2.25		2.89	0.31	2.58	

Table 5. Panel B: Institutional Trading Costs by Country Adjusted for Market-Wide Returns

This table reports the execution costs of institutional trading during the sample period. Total execution cost consists of implicit cost (price impact) and explicit cost (commission cost). Implicit cost is calculated as the ratio of volume weighted trade price of the component trades in an order to the closing price on the day before the decision to trade is made (decision) and the time the institution releases an order to trading desk (release). Explicit cost is calculated as commission per share relative to transaction price. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Benchmark	Price Impact								Commission			Total Cost						
	Decision				Release							Decision				Release		
	Local	ADR	*Diff*		Local	ADR	*Diff*		Local	ADR	*Diff*	Local	ADR	*Diff*		Local	ADR	*Diff*	
All trades	0.38	0.76	-0.38	***	0.34	0.44	-0.10	*	0.21	0.22	-0.01	0.59	0.98	-0.40	***	0.55	0.66	-0.11	*
COUNTRY																			
ARGENTINA	0.36	0.99	-0.64		0.67	0.73	-0.06		0.32	0.23	0.10	0.68	1.22	-0.54		0.99	0.96	0.03	
AUSTRALIA	0.49	0.54	-0.05		0.35	0.29	0.07		0.23	0.39	-0.17	0.72	0.94	-0.22		0.58	0.68	-0.10	
BELGIUM	0.46	-3.90	4.36		0.35	-1.34	1.69		0.11	0.05	0.06	0.57	-3.85	4.42		0.46	-1.28	1.74	
BRAZIL	0.58	0.82	-0.25		0.09	0.63	-0.54		0.26	0.26	0.00	0.84	1.08	-0.25		0.35	0.90	-0.54	
CHILE	0.32	0.83	-0.51		0.74	0.53	0.21		0.69	0.30	0.38	1.00	1.13	-0.13		1.43	0.84	0.60	
CHINA	1.15	0.76	0.38		1.01	0.83	0.18		0.13	0.20	-0.08	1.27	0.96	0.31		1.14	1.03	0.10	
DENMARK	0.36	0.47	-0.12		0.44	0.45	-0.02		0.17	0.15	0.02	0.53	0.63	-0.10		0.61	0.61	0.00	
FINLAND	0.08	0.57	-0.49		0.18	0.02	0.15		0.14	0.17	-0.03	0.22	0.75	-0.52		0.32	0.20	0.12	
FRANCE	0.13	-0.06	0.19		0.42	0.19	0.24		0.14	0.13	0.01	0.27	0.07	0.20		0.56	0.31	0.25	
GERMANY	0.20	0.58	-0.38		0.14	-0.34	0.47		0.12	0.11	0.01	0.32	0.69	-0.37		0.25	-0.23	0.48	
GREECE	0.53	-0.04	0.57		0.46	0.24	0.23		0.39	0.25	0.13	0.92	0.22	0.70		0.85	0.49	0.36	
HONG KONG	0.43	0.64	-0.21		0.21	0.14	0.06		0.16	0.19	-0.02	0.59	0.83	-0.24		0.37	0.33	0.04	
HUNGARY	0.03	0.54	-0.51		0.02	0.19	-0.17		0.48	0.07	0.41	0.50	0.60	-0.10		0.50	0.26	0.24	
INDIA	0.50	1.15	-0.65		0.15	0.52	-0.37		0.48	0.29	0.19	0.98	1.44	-0.46		0.63	0.80	-0.18	
INDONESIA	0.74	3.52	-2.77		0.33	2.21	-1.88		0.46	0.57	-0.11	1.21	4.08	-2.88		0.79	2.77	-1.99	
ISRAEL	0.60	2.49	-1.89		0.74	1.04	-0.30		0.32	0.19	0.13	0.92	2.68	-1.75		1.06	1.23	-0.17	
ITALY	0.29	0.26	0.03		0.23	0.08	0.15		0.10	0.17	-0.07	0.39	0.42	-0.04		0.33	0.25	0.08	
JAPAN	0.22	1.34	-1.12		0.13	0.41	-0.28		0.08	0.11	-0.03	0.30	1.45	-1.14		0.21	0.52	-0.31	
KOREA	0.18	-0.16	0.34		-0.07	-0.33	0.25		0.34	0.18	0.16	0.53	0.03	0.50		0.27	-0.14	0.41	
LUXEMBOURG	-0.12	0.13	-0.25		-0.08	0.58	-0.66		0.11	0.07	0.04	-0.01	0.20	-0.21		0.04	0.65	-0.62	
MEXICO	0.75	1.31	-0.56		0.73	0.54	0.19		0.24	0.41	-0.17	0.99	1.73	-0.74		0.97	0.95	0.02	
NETHERLANDS	0.09	0.73	-0.64		0.29	0.75	-0.46		0.13	0.20	-0.07	0.22	0.92	-0.71		0.42	0.95	-0.53	
NEW ZEALAND	0.53	-1.02	1.54		0.17	0.32	-0.15		0.08	0.15	-0.07	0.61	-0.86	1.47		0.25	0.47	-0.22	
NORWAY	0.16	-0.68	0.84		0.21	-1.24	1.46		0.13	0.26	-0.12	0.30	-0.42	0.72		0.35	-0.99	1.33	
PHILIPPINES	0.05	1.09	-1.04		0.11	0.43	-0.32		0.52	0.29	0.23	0.57	1.38	-0.81		0.62	0.72	-0.10	
PORTUGAL	0.17	0.42	-0.24		0.12	0.40	-0.28		0.15	0.42	-0.27	0.33	0.84	-0.51		0.28	0.82	-0.54	
SINGAPORE	0.67	1.04	-0.36		0.60	0.98	-0.38		0.19	0.08	0.12	0.86	1.11	-0.25		0.79	1.05	-0.26	
SOUTH AFRICA	0.22	1.50	-1.27		0.30	1.04	-0.74		0.26	0.14	0.12	0.49	1.64	-1.15		0.56	1.18	-0.62	
SPAIN	0.22	0.14	0.08		0.16	0.11	0.05		0.14	0.21	-0.07	0.36	0.35	0.01		0.30	0.32	-0.02	
SWEDEN	0.29	1.16	-0.87		0.25	0.70	-0.45		0.14	0.11	0.03	0.43	1.27	-0.84		0.38	0.81	-0.42	
SWITZERLAND	0.20	0.66	-0.46		0.19	0.72	-0.52		0.20	0.35	-0.15	0.40	1.01	-0.61		0.39	1.06	-0.67	
TAIWAN	0.54	0.89	-0.35		0.32	0.68	-0.37		0.29	0.32	-0.03	0.83	1.22	-0.39		0.61	1.01	-0.40	
TURKEY	-0.24	2.25	-2.49		0.51	0.41	0.10		0.12	0.99	-0.87	-0.12	3.25	-3.37		0.63	1.41	-0.77	
UNITED KINGDOM	1.00	-0.08	1.08		0.84	0.15	0.68		0.14	0.08	0.05	1.14	0.00	1.13		0.97	0.24	0.74	
VENEZUELA	0.86	-0.34	1.20		1.55	0.17	1.38		0.80	0.20	0.61	1.67	-0.14	1.81		2.36	0.37	1.98	

Table 6. Institutional Trading Costs by Various Partitions

This table presents institutional trading costs classified by market capitalization, complexity of decision, percentage of purchase to sell decisions, local volume relative to total trading volume of stock, and developed versus emerging market. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Benchmark		Price Impact								Commission				Total Cost							
		Decision				Release								Decision				Release			
		Local	ADR	*Diff*		Local	ADR	*Diff*		Local	ADR	*Diff*		Local	ADR	*Diff*		Local	ADR	*Diff*	
Market Capitalization	*Large*	0.23	0.59	-0.36	***	0.14	0.32	-0.19	*	0.15	0.23	-0.07		0.38	0.82	-0.44	***	0.29	0.55	-0.26	*
	Medium	0.44	0.66	-0.22	***	0.35	0.43	-0.08		0.21	0.25	-0.04		0.65	0.91	-0.26	***	0.56	0.68	-0.12	
	Small	0.84	0.70	0.14		0.66	0.54	0.12		0.27	0.19	0.08		1.10	0.89	0.21		0.93	0.73	0.20	
Complexity of Decision	*Easy*	0.05	0.20	-0.15		0.03	0.09	-0.07		0.13	0.14	-0.01		0.17	0.34	-0.16		0.15	0.23	-0.08	
	Moderate	0.24	0.39	-0.14		0.17	0.14	0.04		0.14	0.18	-0.04		0.39	0.57	-0.18		0.32	0.32	0.00	
	Difficult	0.55	0.82	-0.28	***	0.37	0.42	-0.05		0.19	0.25	-0.05		0.74	1.07	-0.33	***	0.56	0.66	-0.10	**
Percentage of Purchase to Sell	High	0.38	0.56	-0.18	***	0.31	0.41	-0.10	***	0.21	0.22	-0.02		0.58	0.78	-0.20	***	0.52	0.63	-0.12	***
	Low	0.63	0.76	-0.13	*	0.46	0.47	-0.01		0.22	0.23	-0.01		0.85	0.99	-0.14	*	0.68	0.70	-0.02	
Relative Local Volume	High	0.47	0.76	-0.29	***	0.34	0.49	-0.15	***	0.21	0.22	-0.01		0.69	0.98	-0.29	***	0.55	0.71	-0.16	***
	Low	0.54	0.56	-0.02		0.44	0.39	0.04		0.21	0.23	-0.02		0.75	0.79	-0.04		0.64	0.62	0.03	
Trading Hour	Overlapping	0.46	0.62	-0.16		0.42	0.42	0.01		0.22	0.23	-0.01		0.68	0.85	-0.17		0.64	0.65	-0.01	
	Non-overlapping	0.58	0.73	-0.15	*	0.33	0.49	-0.16	**	0.20	0.21	-0.01		0.78	0.94	-0.16	*	0.53	0.70	-0.17	***
Developed versus Emerging	*Developed*	0.41	0.48	-0.08		0.31	0.34	-0.03		0.13	0.18	-0.04		0.54	0.66	-0.12		0.45	0.52	-0.07	
	Emerging	0.67	0.95	-0.28	***	0.51	0.60	-0.10		0.34	0.30	0.04		1.00	1.25	-0.24	***	0.85	0.90	-0.06	

Table 7. Regression Analysis of Price Impact

This table presents regression analysis on the differences of price impact of institutional using the equation:

$$PI = \alpha + \beta_1 Complex + \beta_2 \,\mathrm{Re}\, lvol + \beta_3 Purchase + \beta_4 Volatility + \beta_5 Overlap + \beta_6 Emerge + \beta_7 CR + \beta_8 Liberal + \beta_9 ITL + \varepsilon$$

where *PI* is the difference in the measures of price impact for a foreign stock and the corresponding ADR; *Complex* is the difference in order complexity, calculated as the ratio of decision shares relative to average daily trading volume over the prior five trading days, of the local stock and the corresponding ADR; *Purchase* is the difference in percentage of purchase to sell decision of foreign stocks and corresponding ADR. *Relvol* refers to the relative stock trading volume in local exchange to overall trading volume. *Volatility* is the difference in the standard deviation of the foreign stock and the corresponding ADR; Overlap takes a value of 1 if local stock and ADR have the overlapping trading hours. *Emerge* takes the value of 1 for markets classified as emerging markets by MSCI, and 0 for financially developed markets; *CR* is the index of shareholders' right constructed by La Porta et al. (1998) and it ranges from 0 for worst to 5 for best; *Liberal* signifies whether a country has liberalized capital flow policies with minimal restrictions based on Bekaert and Harvey (2000); *ITL* takes the value if the insider trading laws have been enforced in the country through at least one prosecution. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Regression Variables	**Estimate**	
Intercept	-0.741	***
Complexity of Decision	-0.263	***
Percentage Purchase to Sell	-1.252	***
Relative Trading Volume	-1.051	***
Volatility	-0.002	
Overlap	0.468	***
Emerging Market	-0.566	**
Shareholder Rights	0.212	**
Liberalized Market	1.391	*
Insider Trading Laws	-0.610	*

Figure 1. Insitutional Trading Volume in ADRs and Total Volume in ADRs