



# Investor protection and the liquidity of cross-listed securities: Evidence from the ADR market

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Received 22 March 2004; accepted 23 March 2005

Available online 14 July 2005

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## Abstract

Using ‘American depository receipt’ (ADR) data on various countries, this paper sets out to investigate the relationship between investor protection and firm liquidity. Since weak investor protection leads to greater expropriation by managers, and thus greater asymmetric information costs, liquidity providers will incur relatively higher costs and will therefore offer higher bid–ask spreads. The empirical results demonstrate that the liquidity costs of poor investor protection were more significant during the period of the Asian financial crisis when the expected agency costs were particularly severe. This issue is further analyzed by investigating whether there is any evidence of increases in the vulnerability of ADRs of firms operating in countries with relatively poor investor protection mechanisms during periods of financial crisis.

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*JEL classification:* G10; G30

*Keywords:* Investor protection; Asymmetric information costs; ADR; Liquidity; Financial crises

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## 1. Introduction

This study sets out to investigate the relationship between firm liquidity and the level of protection provided to investors. Since a good investor protection environment will minimize the costs of information asymmetry, and thereby reduce the probability of trading against informed traders, liquidity providers will incur relatively lower costs and therefore offer narrower bid–ask spreads. Conversely, a weaker investor protection environment with worse economic prospects will result in greater expropriation by managers, and thus, higher asymmetric information costs.

Conducting effective tests of the relationship between cross-country differences in investor protection mechanisms and the liquidity of equities has proved to be extremely difficult because firms operating in distinct investor protection environments also trade in different exchanges. This study attempts to overcome this obstacle by using data on ADRs listed in both the NYSE and the NASDAQ, with the use of ADR data providing a good opportunity to examine the relationship between liquidity and investor protection levels.

Since US securities laws require greater disclosure than those required by the ADR listing firms' home capital markets, US listing could provide potential improvements in information disclosure and might mitigate the problem of information asymmetry.<sup>1</sup> Coffee (1999), Stulz (1999) and Reese and Weisbach (2002), argue that US listing enhances the level of protection for investors and reduces agency costs for the controlling shareholders; however, Siegel (2005) finds that cross-listing in the US did not deter Mexican firm insiders from expropriating corporate resources, demonstrating that listed ADRs do not always serve as an effective bonding mechanism for deterring malfeasance. Levine and Schmukler (2005) also report results that do not support the bonding hypothesis.<sup>2</sup> Pineger and Ravichandran (2004) show that cross-listing choices are much more complicated than the legal bonding hypothesis predicts.

Recent research has revealed the importance of the type of legal system governing an economy, in terms of the quality of the protection afforded to investors within that economy. In an examination of legislation covering the protection of corporate shareholders, ownership concentration and the quality of enforcement of the relevant laws in 49 countries around the world, La Porta et al. (1998) show that there are enormous differences in the level of legal protection provided to outside investors across these different countries. The protection of shareholders provided by the legal system of an economy is central to gaining a complete understanding of the patterns of corporate finance in different countries; indeed, investor protection turns out to be particularly crucial because there is extensive expropriation of minority shareholders and creditors by controlling shareholders.

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<sup>1</sup> Doidge et al. (2004) argued that cross-listing helps to secure the commitment of controlling shareholders to limit their expropriation of minority shareholders and increases the ability of firms to take advantage of growth opportunities.

<sup>2</sup> See Ayyagari (2004), and Licht (2003) for a similar argument.

The effects on asset values stemming from protective measures for minority shareholders have also been demonstrated to be significant in many other ways.<sup>3</sup> Beck et al. (2003) demonstrate that legal origin does have some significance on the financial development of a country, because legal traditions differ in their ability to adjust to changing commercial circumstances. Johnson et al. (2000), in particular, show that measures of the effectiveness of such protection can better explain the extent of exchange rate depreciation and stock market decline in the Asian financial crisis than standard macroeconomic variables. In a comparison of the liquidity of component stocks listed in the Heng Seng Index (HSI) and those of mainland China-related firms listed in the Stock Exchange of Hong Kong, Brockman and Chung (2003) show that the HSI constituents exhibit lower bid–ask spreads and greater depth than the stocks of China-related firms. Their results provide support for the assumption that stocks of firms operating in countries with strong investor protection mechanisms have greater liquidity than those of firms operating in poor protection environments.

The number of non-US stocks listed on the US exchanges has recently been on the increase and, as a result, research into the market microstructure of ADRs has recently gained much greater attention. Bacidore and Sofianos (2002) find that non-US stocks have higher spreads, less depth and greater transitory volatility than US stocks, and that the higher spreads of the non-US stocks come about mainly as a result of higher information asymmetry and increased adverse selection costs. To our knowledge, however, few studies have attempted to document the impact of country-level investor protection mechanisms on the liquidity of cross-listed securities in the US. Following the research design of Brockman and Chung (2003), this study aims to examine the hypothesis that the stocks of firms operating in countries with strong investor protection mechanisms have greater liquidity than those of firms operating in poor protection environments.

Clarke and Shastri (2001) return no significant results in their analysis of the effects of insider trading enforcement on ADR liquidity. In this paper, however, we aim to provide a more comprehensive analysis of the relationship between ADR liquidity and investor protection. In particular, we will explicitly analyze the impact of investor protection and the quality of law enforcement on ADR liquidity levels.

We further examine the issue by testing whether the ADRs originating from countries with poor investor protection mechanisms were more vulnerable during the period of the Asian financial crisis. Since weaker investor protection mechanisms and relatively poor economic prospects lead to greater expropriation by managers, and ultimately to greater asymmetric information costs, the optimal course of action for investors would be to sell off their holdings in countries with poor investor protection mechanisms. This is explored by testing whether there was any stronger net selling pressure on the ADRs of those countries with poor investor protection mechanisms during the period of the Asian financial crisis.

The results show that the ADRs of firms operating in countries with better investor protection mechanisms, as well as higher quality law enforcement levels, had

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<sup>3</sup> See Denis and McConnell (2003) for a review.

both lower asymmetric information costs and higher liquidity. The empirical results demonstrate that the liquidity costs of poor investor protection are more significant during the periods of financial crisis when the expected agency costs are particularly extreme. This paper shows that even after cross-listing, home country investor protection regimes matter in determining information costs and liquidity, thus questioning the extent to which ADR listing firms bond to US laws. Furthermore, the net-selling pressure during the period of the Asian financial crisis (as measured by the daily order imbalance) was stronger for the ADRs of countries providing poor investor protection, indicating the increased vulnerability of liquidity levels for firms where investors are provided with lower levels of protection.

Our results are consistent with the theoretical models of contagion of financial crises, such as [Kodres and Pritsker \(2002\)](#), which demonstrate that information asymmetry costs are a major factor in traders' selling off of securities in a number of countries. If poor investor protection is the key to asymmetric information costs, then stocks afforded poor protection will be much more vulnerable to contagion during periods of financial crisis. During the Asian financial crisis, for example, the net-selling pressure on the ADRs of countries with weaker investor protection mechanisms was relatively stronger, providing a clear indication that the asymmetric information costs incurred during a period of financial crisis are much more severe for securities which are afforded relatively poor levels of protection.

The remainder of this paper is organized as follows. Section 2 provides a description of the data and the research methodology adopted for this study. The penultimate section presents the empirical results, with the final section providing some concluding remarks drawn from this study.

## **2. Data source and research methodology**

### *2.1. Data source*

This study employs intra-day ADR trading data taken from the NYSE Trade and Quote (TAQ) database, whilst the current list of ADRs is obtained from the Bank of New York website ([www.adrbny.com](http://www.adrbny.com)). Similar to [Clarke and Shastri \(2001\)](#) and [Huang and Stoll \(1996\)](#), we select the ADRs which had an average price in excess of \$5.00 to control for the potentially extreme illiquidity. Following [Bacidore and Sofianos \(2002\)](#), we exclude stocks that have average daily number of trades less than two. The sample covers the ADRs of firms operating in 29 different countries and comprises of 204 ADRs traded on the NYSE and NASDAQ from April 1997 onwards. The period under examination is from 1 July 1997 to 31 December 1997. A brief chronology of the Asian financial crisis is presented in [Kaminsky and Schmukler \(1999\)](#), which also demonstrate that July–December 1997 was the crisis period for Asian countries only.

We delete all trades and quotes that are out of time sequence, as well as those which involve any errors. We also omit any quotes coming within the following three conditions: (i) where either the bid or the ask price is equal to, or less than, zero; (ii)

where either the bid or the ask depth is equal to, or less than, zero; and (iii) where either the price or volume is equal to, or less than, zero. The NASDAQ market is based on a competing dealer system in which each dealer continually posts firm bid and ask quotes on an electronic screen, and trades are typically double counted. Following Weston (2000), for ADRs traded on the NASDAQ, the trading volume is divided by two.

Following Huang and Stoll (1996), we attempt to further minimize data errors by eliminating quotes with the following characteristics: (i) all quotes with a negative bid–ask spread, or a bid–ask spread of greater than US\$4; (ii) all trades and quotes which are either ‘before-the-open’ or ‘after-the-close’; (iii) all  $P_t$  trade prices, where:  $|(P_t - P_{t-1})/P_{t-1}| > 0.1$ ; (iv) all  $a_t$  ask quotes, where  $|(a_t - a_{t-1})/a_{t-1}| > 0.1$ ; and (v) all  $b_t$  bid quotes, where  $|(b_t - b_{t-1})/b_{t-1}| > 0.1$ .

## 2.2. Measures of investor protection

We consider the following two measures of shareholder protection in the home country of a cross-listing firm, obtained from La Porta et al. (1998).

### 2.2.1. Anti-director rights

The anti-director rights index is calculated by aggregating the following six important shareholder rights, as reported in La Porta et al. (1998). The index is formed by adding a value of 1 where: (i) the country allows shareholders to mail their proxy votes to the firm; (ii) shareholders are not required to deposit their shares prior to the general shareholders’ meeting; (iii) cumulative voting or proportional representation of minorities in the board of directors is allowed; (iv) an oppressed minorities mechanism is in place; (v) the minimum capital shareholding which entitles a shareholder to call an extraordinary shareholders’ meeting is equal to, or less than, 10% (the sample median); and (vi) shareholders have preemptive rights which can only be waived by a shareholders’ vote. The index ranges from zero to six.

### 2.2.2. Quality of law enforcement

The enforcement of investor protection laws has been shown to be an important factor in the development of an economy’s equity market. A strong legal enforcement system can substitute for weak rules since active and well-functioning courts have the ability to step in and rescue investors abused by the management. In this study, the measure of the quality of law enforcement is the average of the five proxy variables employed in La Porta et al. (1998): the efficiency of the judicial system, the rule of law, corruption, the risk of expropriation and the risk of contract repudiation. The index ranges from 0 to 10.

## 2.3. Measure of liquidity

### 2.3.1. Bid–ask spread and depth

The analysis of ADR liquidity covers two dimensions of liquidity: spread and depth. The following measures of trading costs are used in this study with each being

computed by using transaction data. They are then averaged for each security for each month of the sample. The percentage spread of ADR  $i$  at time  $t$ , *Percentage Spread* $_{it}$ , is calculated as  $(Ask_{it} - Bid_{it})/[(Ask_{it} + Bid_{it})/2]$ , where  $Ask_{it}$  and  $Bid_{it}$  are the respective intraday ask and bid prices at time  $t$  for ADR  $i$ .

As noted in Stoll (2003), prior research has established that cross-sectional variations in spreads can be explained by economic variables and that the relationship between the spread of a security and the trading characteristics of that security is one of the strongest and most robust relationships in finance. Demsetz (1968) shows that spreads are positively related to price and volume, whilst Stoll (1978) reports that spreads are positively related to volatility. Using TAQ data on ADRs traded on the NYSE, Clarke and Shastri (2001) find that the ADRs from the emerging markets have higher spreads, greater adverse selection costs and less quote depth than those from the developed market.

In the analysis of the liquidity of ADRs, following Stoll (2000), the averages of each of the underlying variable are taken across all of the days in each month in order to reduce the errors associated with a single day. So as to control for the factors that might be important in determining the spread, we investigate the following regression model:

$$SP_{it} = \beta_0 + \beta_1 \text{Log} P_{it} + \beta_2 \text{Log} \sigma_{it} + \beta_3 \text{Log} V_{it} + \beta_4 \text{Prot}_i + \beta_5 \text{QLE}_i + \varepsilon_{it}, \quad (1)$$

where  $SP_{it}$  is the monthly average of the percentage spread for ADR  $i$  at month  $t$ ;  $P_{it}$  is the monthly average trading price;  $V_{it}$  is the monthly average trading volume; and  $\sigma_{it}$  is the standard deviation of the quote midpoint for ADR  $i$  in the previous month.  $\text{Prot}_i$  represents anti-director rights, which aggregates six important shareholder rights for the country where the ADR  $i$  firm is operating.  $\text{QLE}_i$  is the quality of law enforcement in the home country of ADR  $i$ .<sup>4</sup>

This paper calculates the monthly averages, for ADR  $i$ , of percentage spread, trade price and trading volume, over the sample period from July 1997 to December 1997. The tests are based on pooled time-series cross-sectional data so as to maximize the number of observations carried out in each test. The specifications assume that errors have a first-order moving-average structure, contemporaneous correlation and group-wise heteroskedasticity. A generalization of the  $R$ -squared measure proposed by Buse (1973) is reported. For the sample of observations at  $T$  time points on each of  $N$  cross-sectional units, the observations are arranged first by cross-sections, and then by time periods within the cross-sections. Since the analysis comprises of six-monthly data,  $T$  corresponds to 6.

As noted by Lee et al. (1993), market liquidity has both a price dimension (the spread) and a quantity dimension (the depth). These dimensions show that liquidity providers are sensitive to changes in information asymmetry risks and use both

<sup>4</sup> Our analysis does not encompass the effects of firm-specific governance attributes on the liquidity of ADRs, since no firm-level corporate governance scores are available for the period of the Asian financial crisis. Some firm-level corporate governance scores have been compiled by both Credit Lyonnais Asia and Standard and Poor, but whilst they are being increasingly applied to many studies, such as Durnev and Kim (2005), once again, these scores were not available for the period of the Asian financial crisis.

spread and depth to actively manage this risk. If the liquidity provider believes that the probability of some traders possessing superior information has increased for ADRs from countries with lower levels of investor protection, he may respond by increasing the bid–ask spread. Alternatively, the liquidity provider could protect himself by quoting lower depth. We extend the above analysis to ADR depth, whilst also analyzing Eq. (1) for ADR depth. Following Brockman and Chung (1999), which argue that dollar depth provides a more relevant measure of liquidity, we define (dollar) depth as the number of shares at the highest bid and lowest ask price multiplied by their respective prices.

### 2.3.2. Information asymmetry component

In the literature on market microstructure, the bid–ask spread is modelled as arising from three sources: adverse selection, order processing costs and inventory holding costs due to risk aversion. The adverse-selection component compensates the market-maker for losses incurred on trades against informed traders. If weak investor protection and poor economic prospects lead to greater expropriation by managers, and thus higher asymmetric information costs, these costs may be inversely related to the extent of investor protection.

We go on to investigate the impact of investor protection on the adverse selection components of the ADR bid–ask spread. Van Ness et al. (2001) compare several structural models for estimating the adverse selection costs and conclude that no single model appear to perform better than any other; this paper employs the model of Lin et al. (1995) in this study, since it is the method most often used in practice.

The method of estimating components of effective spread developed by Lin et al. (1995) is an extension of the model of Huang and Stoll (1994), which defines the signed effective half spread,  $z_t$ , as the transaction price at time  $t$ ,  $P_t$ , minus the spread midpoint,  $M_t$ . The signed effective half spread is negative for sell orders and positive for buy orders. In the Lin et al. (1995) framework, the adverse selection and order persistence parameters are estimated from the following regressions:

$$M_{t+1} - M_t = \lambda z_t + \varepsilon_{t+1}, \quad \text{and} \quad z_{t+1} = \theta z_t + \eta_{t+1}, \quad (2)$$

where  $\lambda$  is the proportion of the effective spread due to adverse selection,  $\delta = (\theta + 1)/2$  is the order persistent parameter and  $\varepsilon_{t+1}$  and  $\eta_{t+1}$  are random error terms. It is important to note that the LSB (Lin et al., 1995) model measures the proportion of the effective spread attributable to adverse selection. Since the previous studies have found that the estimation results of adverse selection costs can vary significantly from one model to the next, we also employ the GKN (George et al., 1991) model to check the robustness of their decomposition results. George et al. (1991) allow expected returns to be serially dependent and propose the estimation of information asymmetry component using the following model:

$$2RD_t = \pi_0 + \pi_1 s_t (Q_t - Q_{t-1}) + V_t, \quad (3)$$

where  $RD_t$  is the difference between mid-point return and transaction return at time  $t$ ;  $s_t$  is the percentage bid–ask spread; and  $Q_t$  is a +1/–1 buy–sell indicator at time  $t$ . The information asymmetry component is then computed as  $1 - \pi_1$ .

### 2.3.3. Net buy volume

2.3.3.1. *Order imbalance.* Information asymmetry is at the root of financial contagion in the theoretical model of Kodres and Pritsker (2002). In particular, any small panic-trading signal can become a precipitating factor for investors, leading to an overall loss of confidence and an increase in the perceived risk of holding a range of investments in different equities, with these countries ultimately being pushed into poor equilibrium and financial distress. This research investigates whether the net selling pressure on ADRs from countries with poor investor protection was greater during the period of the Asian financial crisis.

The research design aims to tackle the question of whether ADRs from countries with lower investor protection levels suffer from serious net selling pressure, or panic selling, during episodes of severe financial crisis. Following Bailey et al. (2000), we analyze this issue by first applying the method proposed by Lee and Ready (1991) to classify the trade, and then calculate the cumulative daily net buying volume during the period from July to December 1997. This is undertaken first of all by comparing the transaction price with the prevailing quotes, and then by classifying each transaction as a buyer-initiated or seller-initiated trade.

Our analysis of net-buying pressure adopts the relative measure of order imbalance, i.e., the ratio of buyer initiated volume to seller initiated volume. Although Chordia et al. (2002) provide a complete analysis of market order imbalance using time-series data, studies into the cross-sectional determinants of order imbalance are quite sparse. In addition to the volume and volatility variables, following Bailey et al. (2000), the return variable is employed as the control variable in our analysis of the ratio of buyer-initiated volume to seller-initiated volume. Hence, we explore the monthly net-buying pressure for the six-month period from July to December 1997 in the following model to test the relationship between net-buy volume and investor protection during the period of the Asian financial crisis:

$$(BUY-V/SELL-V)_{it} = \delta_0 + \delta_1 Ret_{it} + \delta_2 \text{Log}V_{it} + \delta_3 \text{Log}\sigma_{it} + \delta_4 Prot_i + \delta_5 QLE_i + \varepsilon_{it}, \quad (4)$$

where the dependent variable is the ratio of buyer initiated volume (*BUY-V*) divided by seller initiated volume (*SELL-V*) for ADR *i* in month *t*. *Ret<sub>it</sub>* is the average daily return for a given month, *t*. *V<sub>it</sub>* is the average daily trading volume in month *t*. *σ<sub>it</sub>* is the volatility (standard deviation of return) for ADR *i* in month *t*. *Prot<sub>i</sub>* represents the anti-director rights, which aggregate six important shareholder rights for the country in which ADR firm *i* is operating, and *QLE<sub>i</sub>* is the index of the quality of law enforcement.

We hypothesize that since weak investor protection and poor economic prospects lead to greater expropriation by managers, and thus larger asymmetric information costs, it would be optimal for investors to sell off their securities holdings from countries with poor investor protection mechanisms. Hence, ADRs from countries where *Prot<sub>i</sub>* is low will tend to have high net selling pressure, i.e., a small (*BUY-V/SELL-V*)<sub>it</sub> value. In general, positive signs will be observed for  $\delta_4$  and  $\delta_5$  if ADRs from countries with poor investor protection mechanisms suffer from serious net selling pressure during a period of financial crisis.



#### 2.3.4. Asymmetric depth

If, during periods of financial crisis, the probability that some traders possess superior information increases for ADRs from countries with lower investor protection levels, the liquidity provider could protect himself by quoting a relatively lower bid depth. We can therefore use *asymmetric depth* as an alternative measure of net selling pressure, since this measure may have a greater correlation to adverse selection costs than average depth. Huang and Stoll (1994) analyze the effect of depth at the ask to the depth at the bid on quotes returns and price returns. Following Brockman and Chung (1999), we use dollar depth in the calculation of asymmetric depth (*AsyDep*), which is defined as the dollar depth at the best bid price divided by the dollar depth at the best ask price.

We calculate the average asymmetric depth for each month for each ADR and explore the following regression model:

$$AsyDep_{it} = \beta_0 + \beta_1 Ret_{it} + \beta_2 \text{Log } \sigma_{it} + \beta_3 \text{Log } V_{it} + \beta_4 Prot_i + \beta_5 QLE_i + \varepsilon_{it}. \quad (5)$$

The tests are based on pooled time-series cross-sectional regression that assumes that errors have a first-order moving-average structure, contemporaneous correlation and group-wise heteroskedasticity. In general, positive values for  $\beta_4$  and  $\beta_5$  would indicate that ADRs from countries with better investor protection mechanisms receive relatively greater submissions of limit orders from the buy side.

### 3. Empirical results

#### 3.1. Descriptive statistics

Table 1 reports the average values of the percentage spread, asymmetric information costs, mean price, trading volume and volatility; Panel A provides the summary statistics for each legal origin, whilst Panel B provides the summary statistics for each country. The asymmetric information costs are estimated by using the methods proposed by Lin et al. (1995).

As demonstrated by La Porta et al. (1998), legal protections for outside investors vary considerably across countries, with common law countries tending to provide much higher levels of protection than civil law countries; we thus calculate the average percentage spread and asymmetric information costs for ADRs from each legal origin. Preliminary analysis of Table 1 shows that the average percentage spread of ADRs for firms from French civil law countries is higher than that for firms from English common law countries. The average percentage spread for ADRs of firms operating in common law countries is 0.0146, whilst that for ADRs of firms operating in French civil law countries is 0.0162. Table 1 also presents the average value of asymmetric information costs for each legal origin, and for each country.

Rather interestingly, Panel A shows that average asymmetric information costs of ADRs from French civil law countries is 0.5955, which is 12% higher than that of firms from English common law countries, whilst Panel B shows that the highest asymmetric information costs is 0.7098 for ADRs from Venezuela, a country which

Table 1  
Summary statistics, by origin of law and by country

Legal origin/country	No. of ADRs	Average values across ADRs				
		Percentage spread	Information asymmetry costs	Price	Volume	S.D. (daily return)
<i>Panel A: By legal origin</i>						
England	67	0.0146	0.4742	36.67	92395.33	0.02052
France	112	0.0162	0.5955	32.26	164246.47	0.01937
Germany	17	0.0144	0.5099	44.22	71227.41	0.02146
Scandinavia	8	0.0101	0.4644	37.51	145219.87	0.01790
<i>Panel B: By country</i>						
Argentina	9	0.0116	0.5868	31.77	239230.11	0.01350
Australia	3	0.0097	0.5569	45.56	23254.36	0.01382
Brazil	2	0.0118	0.5883	29.17	204266.19	0.01182
Chile	19	0.0182	0.6523	25.83	166283.57	0.01669
Denmark	2	0.0120	0.5618	39.95	60243.85	0.01317
France	12	0.0105	0.4461	38.05	81248.82	0.01817
Germany	3	0.0158	0.6108	25.96	87429.49	0.02522
Hong Kong	3	0.0196	0.5773	22.06	74937.25	0.02222
Indonesia	4	0.0228	0.5850	18.66	59319.74	0.03433
Ireland	5	0.0151	0.4947	41.06	71643.79	0.01671
Israel	1	0.0211	0.4322	18.65	7304.55	0.02225
Italy	10	0.0200	0.6310	33.09	116642.24	0.01978
Japan	8	0.0095	0.4411	70.29	29747.49	0.01788
South Korea	3	0.0212	0.5569	18.94	208251.79	0.02577
Mexico	25	0.0234	0.6710	19.13	203065.37	0.02245
Netherlands	17	0.0094	0.5436	55.97	228722.76	0.01860
Norway	2	0.0058	0.6170	55.88	59225.38	0.01574
New Zealand	4	0.0120	0.4500	29.47	35556.82	0.01310
Peru	3	0.0208	0.5456	16.46	155744.44	0.02065
Philippines	1	0.0101	0.6624	34.27	141426.15	0.01522
Portugal	3	0.0107	0.5809	31.59	47182.20	0.02342
South Africa	5	0.0205	0.3767	22.46	47067.45	0.02011
Singapore	2	0.0216	0.4301	14.82	83248.74	0.02928
Spain	6	0.0121	0.5211	44.04	68702.47	0.01545
Sweden	4	0.0113	0.2924	27.11	230705.13	0.02135
Switzerland	2	0.0225	0.5919	15.82	17404.60	0.01895
Taiwan	1	0.0134	0.4202	23.12	51033.08	0.03099
United Kingdom	44	0.0139	0.4718	40.23	119739.38	0.02269
Venezuela	1	0.0072	0.7098	44.07	267447.69	0.01816

*Notes:* The table contains summary statistics for our sample of ADRs for July–December 1997. Percentage spread, information asymmetry costs, daily trading volume and standard deviation are calculated for each company using the NYSE trade and quote databases. Reported values are the average values for each origin of law or country. Asymmetric information costs are calculated using the method proposed by Lin et al. (1995).

has an anti-director rights score of 1. Furthermore, the average asymmetric information costs are in excess of 60% for ADRs from countries with protection scores of 1, such as Germany, Italy, Mexico and Venezuela. In summary, the results from

Table 1 indicate that the average liquidity of ADRs from English common law countries is higher than that of ADRs from French civil law countries.

We also conduct the analysis for the correlation matrix of various liquidity measures and investor protection variables. The results are omitted for saving space. We find that percentage spread is positively related to information asymmetry costs and is negatively related to depth. Furthermore, percentage spread and information asymmetry costs are negatively related to both of the investor protection variables, quality of law enforcement and anti-director rights. Two other related measures of investor protection, accounting standards and the emerging market dummy are closely related to the quality of law enforcement. As noted by La Porta et al. (1998), richer countries have a higher quality of law enforcement. We also find that the dummy variable of emerging countries has a negative correlation with the quality of law enforcement. Both accounting standards and the emerging market dummy demonstrate a significant correlation with percentage spread and information asymmetry costs.

### 3.2. Impacts on liquidity

It is already well documented that important stock characteristics such as price, volatility and volume may have an effect on spread. This issue is examined in this study by using a multivariate regression approach similar to that used by Stoll (2000) and Brockman and Chung (2003). Table 2 presents the regression results from the sample data comprising of average liquidity measures and related variables for the ADRs for each month from July to December 1997. We use three multivariate specifications to examine the relationship between shareholder protection levels and ADR liquidity.

In the first regression, in addition to anti-director rights and the quality of law enforcement, three other important variables, the average trade price, the average daily trading volume and the standard deviation of returns, are also used as explanatory variables. Since the analysis covers 204 ADRs and each ADR has six monthly observations, the total number of observations is 1224. The second regression adds a dummy variable,  $D^{ASIA}$ , which takes a value of 1 if the company is operating in Asia; otherwise 0. This variable aims to control for the cross-sectional differences in liquidity that might arise simply because the company is operating in Asia. In the third regression, in order to control for the potential differences in liquidity between the NYSE and NASDAQ, we use a dummy variable,  $D^{EXCH}$ , which takes a value of 1 if the ADR is listed in the NASDAQ, and 0 if it is listed in the NYSE.

We find, from regression (1), that the percentage spread has a negative relationship with price and trading volume, but a positive relationship with volatility. These results are consistent with the earlier studies, such as Stoll (2000) and Clarke and Shastri (2001). The regression coefficients for anti-director rights and the quality of law enforcement are  $-0.037$  and  $-0.023$ , respectively and significant at 5% level, indicating that after controlling for price, trading volume and volatility, the ADRs of companies operating in a good investor protection environment tend to have lower

Table 2

Regression results of percentage spread on firm characteristics and investor protection: July 1997–December 1997

	(1)		(2)		(3)	
	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value
Intercept	8.948***	39.266	8.967***	38.925	9.549***	41.390
Log $P^a$	-0.979***	-33.712	-0.980***	-33.685	-0.987***	-35.124
Log $V^b$	-0.197***	-16.958	-0.196***	-16.816	-0.217***	-18.922
Log $\sigma^c$	0.226***	9.599	0.228***	9.584	0.289***	12.111
Quality of Law Enforcement	-0.023**	-1.993	-0.024**	-2.051	-0.005*	-1.735
Anti-director Rights	-0.037***	-3.151	-0.036***	-3.121	-0.019*	-1.957
$D^{ASIA}d$	-	-	-0.040	-0.559	-0.042	-0.612
$D^{EXCH}e$	-	-	-	-	-0.320***	-5.435
Observations <sup>f,g</sup>	1224		1224		1224	
$R^2$	0.690		0.692		0.714	

Notes: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

<sup>a</sup>  $P$  is the average trade price.

<sup>b</sup>  $V$  is the average daily trading volume.

<sup>c</sup>  $\sigma$  is the standard deviation on daily returns for ADRs in the previous month.

<sup>d</sup>  $D^{ASIA}$  is a dummy variable which is equal to 1 for companies operating in Asian countries; otherwise 0.

<sup>e</sup>  $D^{EXCH}$  is a dummy variable which is equal to 1 for NASDAQ-listed ADRs, and 0 for NYSE-listed ADRs.

<sup>f</sup> The tests are based on pooled time-series cross-sectional data so as to maximize the number of observations for each test. The specifications assume that errors have a first-order moving-average structure, contemporaneous correlation and group-wise heteroskedasticity.

<sup>g</sup> The sample period is from 1 July 1997 to 31 December 1997 and the dependent variable is the monthly average percentage spread, whilst monthly averages of price, volume and volatility are used as explanatory variables.

percentage spreads. The negative relationship is consistent with our theoretical prediction that as the rights attached to securities become critical, company managers will act in their own interest; therefore, where there are weak investor protection levels and worse economic prospects, there will be greater expropriation by managers, and thus, wider spreads and higher asymmetric information costs.

The results of regression (2) indicate that the ADRs of firms operating in Asia do not have a higher quoted percentage spread than non-Asian ADRs; thus, Asian ADRs did not exhibit lower liquidity levels during the period of the Asia financial crisis. In regression (3), the exchange dummy variable is negatively significant at the 1% level, indicating that there are salient differences between the liquidity levels of ADRs listed in the NYSE and the NASDAQ. In general, we find that after controlling for price, volatility, trading volume and stock exchange difference, there are wider spreads amongst the ADRs from weak investor protection countries.

As reported in Table 2, the estimated coefficient of the exchange dummy variable is significant; however, it would seem inappropriate to relate these results to the difference in trading mechanisms, because the relatively small number of NASDAQ ADRs does not represent a good comparable base. More specifically, the sample of 204 ADRs used in this study contains only 42 NASDAQ ADRs.

As a check for robustness, the regression models are also analyzed for ADRs excluding those from UK and Mexico. Since the UK and Mexico are the two countries with the highest number of ADRs, this analysis can help to provide an understanding of whether the results in Table 2 are dominated by ADRs originating from either Mexico or the UK. Mexico is ranked in the governance literature as providing relatively weak legal protection for outside investors; indeed, as Siegel (2005) demonstrates, US law enforcement neither prevented nor punished a group of Mexican firm insiders that expropriated corporate resources. In fact, the results for ADRs excluding those from UK and Mexico are very similar to those in Table 2. Since the results are rather similar, they are omitted for the purpose of space saving.

Our results in Table 2 provide further evidence on the effects on the liquidity of equities based upon legal origin, and provide some general support for recent findings that cross-country differences in legal origin help to explain variations in financial development. Beck et al. (2003) find that legal origin is important to financial development because legal traditions differ in their ability to adapt efficiently to evolving economic conditions. Indeed, an influential strand of the comparative law literature holds that common law evolves more efficiently since judges respond to unforeseen and changing conditions on a case-by-case basis. Our results demonstrate a relationship between cross-sectional differences in the percentage spread of ADRs and cross-country differences in investor protection.

We also analyze the relationship between investor protection and quote dollar depth of ADRs. As the main results are very similar to those reported in Table 2, the results are omitted for saving space. We find that quote depth has a negative relationship with volatility, but positive relationships with both price and trading volume. The market depth of ADRs also appears to be affected by investor protection levels. The quality of law enforcement does not have any significant impact on depth, which may be due, in part, to the fact that average depth is not perfectly correlated to asymmetric information costs. However, asymmetry depth, as measured by the ratio of bid-depth to ask-depth, may provide a better measure. This issue is investigated more carefully later in this section.

A good investor protection environment minimizes the costs of information asymmetry and reduces the probability of trading against informed traders. Hence, the above test can be directly analyzed into the asymmetric information costs. The pooled cross-sectional, time series (CSTS) regression results on the relationship between adverse selection costs and ADR characteristics are presented in Table 3, which shows that asymmetric information costs have a negative correlation with trading volume and a positive relationship with volatility. The smaller number of observations for the regression sample of information asymmetry costs is mainly due to the failure of the methods of Lin et al. (1995) and George et al. (1991) to produce reasonable estimates of information asymmetry components for some ADRs. We delete those ADRs with estimates of information asymmetry components which are greater than 1 or less than 0.

As in Clarke and Shastri (2001), price is not an important factor in terms of its effects on the asymmetric information components of ADR spreads. The dummy

Table 3

Regression results of asymmetric information costs on firm characteristics and investor protection during the Asian financial crisis

	LSB (1)		LSB (2)		GKN (1)		GKN (2)	
	Coeff.	<i>t</i> -Value	Coeff.	<i>t</i> -Value	Coeff.	<i>t</i> -Value	Coeff.	<i>t</i> -Value
Intercept	0.872***	14.937	0.897***	17.490	0.570***	12.672	0.577***	15.959
Log <i>P</i>	0.014	1.594	0.007	0.956	-0.016	-1.493	-0.019*	-1.896
Log <i>V</i>	-0.006*	-1.665	-0.016***	-4.692	-3.543***	-10.071	-1.844***	-6.341
Log $\sigma$	0.868**	2.234	0.835**	2.058	0.030***	9.942	0.021***	8.722
Quality of Law Enforcement	-0.027***	-7.068	-0.019***	-5.417	-0.016***	-5.342	-0.006**	-2.504
Anti-director Rights	-0.022***	-5.859	-0.014***	-4.034	-0.014***	-4.800	-0.007***	-2.818
$D^{ASIA}$	-0.004	-0.186	-0.018	-0.883	0.097**	2.477	0.088**	2.066
$D^{EXCH}$	-	-	-0.114***	-3.514			-0.120***	-3.125
Observations	1152		1152		1164		1164	
$R^2$	0.251		0.305		0.381		0.421	

Notes: The sample period is from 1 July 1997 to 31 December 1997, and the dependent variable is adverse selection costs calculating using the method of Lin et al. (1995, LSB) and the GKN method of George et al. (1991).

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

variable,  $D^{ASIA}$ , is not significant, indicating that there are no differences between the asymmetric information costs of Asian and non-Asian ADRs.

The GKN method is also applied to calculate the information asymmetry costs for each ADR, with the regression results based on this method being reported in Table 3. As the table shows, these results are the same as those of the LSB method. Furthermore, with all control variables included, the coefficients of the investor protection variables are significant at the 1% level for both of the information asymmetry models. In particular, the estimated coefficient of 'anti-director rights' is 0.014, indicating that one point increase in the 'anti-director rights' score represents a 1.4% reduction in the information asymmetry component of the bid-ask spread.

Mitton (2002) provides a comparison within countries between those companies which issue ADRs and those that do not, whereas this study focuses on a comparison between ADRs from various countries; thus, our results do not necessarily contradict those of Mitton (2002). Mitton's (2002) results show that in certain countries, during the period of the Asian financial crisis, the share prices of companies issuing ADRs were higher than comparable domestic companies with no ADR issues, whereas this paper finds differences in liquidity between ADRs from various countries.

In order to test the robustness of the results, we conduct further empirical studies of the effects on the liquidity of ADRs from accounting standards and the emerging market dummy; the results of these additional regressions are presented in Table 4. The analysis is conducted by performing purely cross-sectional regressions, as opposed to the pooled cross-sectional, time series (CSTS) regressions reported in the previous sections. The CSTS approach yields more observations, but its estimated coefficients can be more influenced by a few extreme observations. If the proposed relationship between investor protection and liquidity is strong, then it should also

Table 4  
Relationship between percentage spread, accounting standards and trading characteristics, July–December 1997

	(1)		(2)		(3)		(4)	
	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value
Intercept	8.583***	16.122	7.862***	12.649	8.400***	15.523	8.585***	15.580
Log <i>P</i>	−0.958***	−15.112	−0.948***	−15.041	−0.998***	−16.848	−0.959***	−14.991
Log <i>V</i>	−0.195***	−8.316	−0.202***	−8.633	−0.188***	−8.105	−0.195***	−8.294
Log $\sigma^a$	0.140***	2.501	0.132**	2.368	0.126**	2.255	0.140**	2.492
Quality of Law Enforcement	−0.056**	−2.220	0.020	0.459			−0.056*	−1.739
Anti-director Rights	−0.055**	−2.358	−0.062***	−2.668	−0.056**	−2.379	−0.055**	−2.317
$D^{EMER}b$			0.298**	2.188				
Acc Std <sup>c</sup>					−0.006	−1.616	−0.002	−0.115
Observations <sup>d</sup>	204		204		204		204	
$R^2$	0.760		0.766		0.757		0.761	

Notes: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

<sup>a</sup>  $\sigma$  is the standard deviation on daily returns for ADRs.

<sup>b</sup>  $D^{EMER}$  is a dummy variable which is equal to 1 for companies operating in Asian countries; otherwise 0.

<sup>c</sup> ‘Acc Std’ is the rating of accounting standards reported in La Porta et al. (1998).

<sup>d</sup> Total number of observations is 204. The dependent variable is the average percentage spread over the period July 1997–December 1997. The *t*-statistics are computed from the heteroskedasticity robust standard errors following White

show up in purely cross-sectional regressions. Hence, the analysis is further explored for the average percentage spread over the period July 1997–December 1997.

Model (1) of Table 4 presents the results of the purely cross-sectional regressions. The estimated coefficients of the quality of law enforcement and anti-director rights variables are both significant at the 5% level. The *t*-statistics are computed from the heteroskedasticity robust standard errors following White (1980). The second regression model presented in Table 4 presents the results when adding the emerging market dummy variable, indicating that the quality of law enforcement is no longer significant. This is to be expected since emerging markets tend to have a lower quality of law enforcement; these two variables are highly correlated.

Since many studies have employed accounting standards as an alternative measure of investor protection, we also examine the effects of accounting standards on the liquidity of ADRs. The related results are given in models (3) and (4) of Table 4, which shows that accounting standards has a negative relationship with ADR liquidity; however, the result is not significant, even at the 10% level. Furthermore, when the variable, ‘quality of law enforcement’, is added, the accounting standard variable has little impact on ADR liquidity. This is consistent with Johnson et al. (2000), which demonstrate that the rating of accounting standards has little effect in terms of explaining the exchange rate depreciation during the 1997–1998 financial crisis period.

### 3.3. Results for the post-financial crisis period

In order to determine whether our results may be sensitive to the sample period under examination, our test is extended to cover analysis of the post-Asian financial

crisis, so as to provide some reasonable assurances that the current results do not disappear as soon as we focus on a period in which there is no financial distress. We therefore present further results on the impact of investor protection on ADR liquidity for the post-financial crisis period from February 1999 to December 2001.<sup>5</sup>

In this extended study, to ensure that the huge intraday data is more manageable, we analyze the intra-day data of the closing half hour (3:30–4:00 pm), employing the same data filtering method as was described in Section 2. The average percentage spread and information asymmetry costs are calculated for the period from February 1999 to December 2001. The analysis for the post-financial crisis period is conducted by performing purely cross-sectional regressions and the results are presented in Table 5 which shows that the effects on the liquidity of equities from price, volatility and trading volume are the same as those presented in Table 2. The smaller number of observations for the information cost regression is due to the failure of the Lin et al. (1995) method to produce reasonable estimates for information asymmetry costs in some cases. Although the estimated coefficients of the anti-director rights and quality of law enforcement variables remain negative throughout this period, the coefficient of the former is no longer significant, whilst that of the latter is significant only at the 10% level.

The effects of the anti-director rights and quality of law enforcement variables are somewhat stronger on information asymmetry costs than on percentage spreads, whilst the results in Panel B of Table 5 reveal that asymmetric information costs will tend to be higher in relatively poor investor protection environments because weak investor protection mechanisms lead to higher asymmetric information costs.

A comparison of the results in Tables 2 and 5 shows that the liquidity costs of poor investor protection are more significant during periods of financial crisis. Since poor economic prospects during financial crisis periods will tend to lead to greater expropriation by managers, and thus greater asymmetric information costs, the impact of investor protection on the liquidity of equities may be more significant when expected agency costs are particularly severe.<sup>6</sup> Since this analysis covers only the closing half-hour intra-day data, we also conduct the same analysis using full day intra-day data for the year 2000; since the results are rather similar, they are omitted for the purpose of space saving.

Although US listing may bring improvements in information disclosure, and thereby reduce the problem of asymmetric information, our results show that there are significant cross-country differences in ADR information asymmetry costs. The results indicate a clear link between ADR liquidity levels and external governance mechanisms, measured by the extent to which the laws of the ADR's home country

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<sup>5</sup> Since the financial crisis in Brazil was observed in January 1999, our analysis of the post-financial crisis period starts from February 1999.

<sup>6</sup> For the period of 1999–2001, the relationship between the investor protection variables and ADR liquidity might be weaker due to the improvement in corporate governance in recent years. For example, Taiwan revised their corporate laws in recent years. See also Denis and McConnell (2003, p. 26) for the recent improvement in investor protection and convergence in corporate governance system around the world.



Table 5

Regression results of percentage spread and asymmetric information costs on firm characteristics and investor protection: 1999–2001

	(1)		(2)	
	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value
<i>Panel A: Percentage spread</i>				
Intercept	10.469***	26.074	9.871***	21.867
Log <i>P</i> <sup>a</sup>	−0.522***	−13.490	−0.519***	−13.530
Log <i>V</i> <sup>b</sup>	−0.305***	−19.918	−0.297***	−19.252
Log $\sigma^c$	1.158***	12.824	1.003***	9.528
Quality of Law Enforcement	−0.036*	−1.727	−0.046**	−2.220
Anti-director Rights	−0.011	−0.795	−0.004	−1.106
<i>D</i> <sup>EXCHd</sup>			0.205***	2.796
Observations		346		346
<i>R</i> <sup>2</sup>		0.740		0.745
<i>Panel B: Asymmetric information costs</i>				
Intercept	0.603	1.485	1.362***	7.816
Log <i>P</i>	0.001	0.045	−0.003	−0.188
Log <i>V</i>	−0.039***	−3.884	−0.049***	−7.834
Log $\sigma$	0.182	1.377	0.164	1.227
Quality of Law Enforcement	−0.035***	−3.661	−0.017**	−2.218
Anti-director Rights	−0.015**	−1.983	−0.012	−1.354
<i>D</i> <sup>EXCH</sup>			−0.051	−0.834
Observations <sup>e</sup>		321		321
<i>R</i> <sup>2</sup>		0.262		0.392

Notes: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

<sup>a</sup> *P* is the average trade price.

<sup>b</sup> *V* is the average daily trading volume.

<sup>c</sup>  $\sigma$  is the standard deviation on daily returns for ADRs.

<sup>d</sup> *D*<sup>EXCH</sup> is a dummy variable which is equal to 1 for NASDAQ-listed ADRs, and 0 for NYSE-listed ADRs.

<sup>e</sup> The sample period is from 1 February 1999 to 31 December 2001, and the dependent variables in Panels A and B are the average percentage spread and adverse selection costs, respectively. The *t*-statistics are computed from the heteroskedasticity robust standard errors following White (1980).

can protect investor rights, and the extent to which those laws are enforced. Our analysis of the data for the periods both during and after the financial crisis indicates that the relationship is stronger for the financial crisis period when expected managerial agency costs are higher.

### 3.4. Net-buying pressure during the period of the financial crisis

We further analyze the relationship between investor protection and firm liquidity by investigating whether net-selling pressure was any stronger on ADRs from countries with poor investor protection mechanisms during the period of the Asian financial crisis. The results for net buying volume are presented in Table 6, where the

dependent variable is the buy-to-sell volume ratio, calculated as the total buy-volume divided by the total sell-volume at month  $t$ . We add the explanatory variables  $Ret_i$  and  $V_i$  in order to control for the potential effect of trade initiation being dependent on return and volume. Since the coefficient of  $Ret_i$  is positive, this demonstrates that trades tend to be initiated by buyers when the average return on ADR  $i$  is high.

Since the dependent variable in first regression model of Table 6 is the buy-volume versus the sell-volume ratio, positive coefficients on the investor protection variables would reveal higher buying pressure on ADRs with good protection levels. Our results indicate that the coefficient of anti-director rights is positive; hence, ADRs originating from countries with poor investor protection mechanisms tended to suffer from serious net-selling pressure during the period of the Asian financial crisis. The results support our hypothesis that during such periods of financial distress, net-selling pressure will tend to be observed for the ADRs of firms operating in poor investor-protection countries.

The second regression model in Table 6 presents the regression results for the dependent variable, asymmetric depth, which is calculated as the dollar depth at the bid price divided by the dollar depth at the ask price. The estimated coefficient of the dummy variable,  $D^{ASIA}$ , is negative, which indicates the provision of lower bid-depth for Asian ADRs. The relative submission of best buy-order to best

Table 6  
Regression results of net-buying pressure and asymmetric depth on firm characteristics and investor protection

	Net-buying pressure		Asymmetric depth	
	Coefficient	<i>t</i> -Value	Coefficient	<i>t</i> -Value
Intercept	-0.298	-0.833	0.944**	2.335
$Ret^a$	5.989**	1.974	20.800***	4.246
Log $V^b$	-0.080*	-1.828	-0.054	-1.571
Log $\sigma^c$	-0.080***	-3.048	0.040*	1.891
Quality of Law Enforcement	0.030*	1.756	0.035*	1.902
Anti-director Rights	0.065***	2.813	0.053**	2.501
$D^{ASIA}d$	0.067	0.633	-0.305**	-2.390
$D^{EXCH}e$	-0.133	-1.087	-0.309***	-3.772
Observations <sup>f</sup>		1224		1224
$R^2$		0.063		0.157

Notes: \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

<sup>a</sup>  $Ret$  is the average daily return.

<sup>b</sup>  $V$  is the average daily trading volume.

<sup>c</sup>  $\sigma$  is the standard deviation on daily returns for ADRs.

<sup>d</sup>  $D^{ASIA}$  is a dummy variable which is equal to 1 for companies operating in Asian countries; otherwise 0.

<sup>e</sup>  $D^{EXCH}$  is a dummy variable which is equal to 1 for NASDAQ-listed ADRs, and 0 for NYSE-listed ADRs.

<sup>f</sup> The sample period is from July 1997 to December 1997, and the dependent variables are the net-buying pressure and asymmetric depth, respectively. The net-buying pressure is calculated as the ratio of buyer initiated trading volume to seller initiated trading volume. Asymmetry depth is defined as the dollar depth at the bid side divided by the dollar depth at the ask side.

sell–order in the limit order book is positively related to the return, whilst trading volume is negatively related to asymmetric depth. The results show that the coefficients of the quality of law enforcement and anti-director rights variables are both positive, which suggests the receipt of a relatively greater level of submissions of limit orders from the buy side for ADRs from countries with good investor protection mechanisms.

The relative bid depth provided by liquidity suppliers seems to be lower for ADRs operating in countries with poor investor protection mechanisms. The results thus provide evidence to suggest that ADRs originating from poor investor protection countries receive a higher portion of their limit orders from the selling side, which would also suggest that selling pressure in crisis periods might be higher for ADRs that are afforded poorer levels of investor protection.

#### **4. Conclusions**

This paper links ADR liquidity levels to external governance mechanisms, which are measured by the extent to which a country's laws protect investor rights, and the extent to which those laws are enforced. Asymmetric information costs will tend to be higher in relatively poor investor protection environments because weak investor protection mechanisms and poor economic prospects lead to greater expropriation by managers, and thus higher asymmetric information costs. In an attempt to overcome the problem of the tendency of firms from distinct investor protection environments trading in different exchanges, this study investigates the relationship between investor protection levels and firm liquidity by using data on ADRs. The aim is to provide empirical analysis of the relationship between the liquidity of cross-listed securities and country-level investor protection mechanisms.

Despite the fact that US listing may provide potential improvements in the area of information disclosure, and thus mitigate the problem of information asymmetry, our results reveal that the ADRs of firms operating in good investor protection environments tend to have both lower information asymmetry costs and higher liquidity levels. This finding questions the bonding hypothesis that legal protections provided by cross-listing are effective enough to cause firms to change their governance structure. The liquidity costs from poor investor protection are more significant during periods of financial crisis, when the expected agency costs are particularly severe. Our results further show that ADRs with poor investor protection receive a higher portion of their limit orders from the selling side. The supply of bid depth relative to ask depth, by dealers or market-makers, is positively related to investor protection levels, indicating that selling pressure during a crisis period seems to be higher for ADRs originating from countries with relatively weak investor protection mechanisms.

Our results also suggest a need for improvement in corporate governance around the world towards a more effective mechanism in protecting minority shareholders. Furthermore, as microstructure data becomes more available for emerging markets, in order to further analyze this issue, future research can compare liquidity of ADRs to that of comparable domestic companies that did not list as ADRs.

## Acknowledgements

The author would like to acknowledge the constructive comments offered by two anonymous referees, Robin Chou, and the seminar participants at European Financial Management Association 2004 Annual Meeting, National Taiwan University, National Tsing Hua University, and National Kaohsiung First University of Science and Technology. The financial support of the National Science Council of Taiwan is also gratefully acknowledged.

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