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DETERMINANTS OF ADR RETURNS BEFORE AND AFTER DOMESTIC STOCK SEASONED EQUITY OFFERINGS: EVIDENCE FROM ASIAN AND LATIN AMERICAN EMERGING MARKETS

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Abstract. This paper examines the critical determinants of American depository receipt (ADR) returns before and after domestic stock seasoned equity offerings (SEOs) for Asian and Latin American emerging economies during 1990–2007, which has never been probed in related issues. We employ the Time Series Cross Section Regressions and General Method of Moments methods to document that domestic stock returns play a vital role in explaining Latin American ADR returns, while US investor sentiment is crucial in explaining Asian ADR returns. Local investor sentiment is found to be considerably important than domestic stock returns in Asian ADR returns, while Latin American local investor sentiment (US investor sentiment) is more important before (after) domestic stock SEOs. The results do not support the view that ADR-reconciled earnings per share (EPS) and stock EPS provide significant information to explain ADR returns in Latin American and Asian emerging markets both before and after SEOs. Furthermore, international market differences in a specific geography should be considered when diversifying investments and efficiency accounting communication with accounting convergence does not need to be emphasized.

Keywords: American depository receipts, seasoned equity offerings, accounting information, investor sentiment.

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1. Introduction

The determinants of American depository receipt returns (hereafter ADRNs) have constituted one of the most hotly debated issues in the past two decades, yet never before has a consensus been reached as shown in Table 1. We find that even if the same country and method are employed, the results vary. Regarding the comparison of domestic stock earnings per share (DEPS) and ADR-reconciled earnings per share (AEPS), the results of Chan and Seow (1996) and Luchs (2004), both of whom use regression models to test UK data, are conflicting. For instance, one shows that DEPS dominates the AEPS in influencing ADRNs, while the other indicates that DEPS and AEPS are equally important for UK ADRNs. The findings of previous studies that explore whether local investor sentiment (LD) has dominated US investor sentiment (USI) or vice versa are quite distinct. For example, the results of Jiang (1998) and Ely and Salehizadeh (2001), both of whom use error-correction models to examine the same countries (e.g., Germany, UK, and Japan), are also conflicting, as one shows that LD dominates USI in influencing ADRNs, while the other shows that the opposite situation holds. The differences in these findings might be due to the limitations of the specific information transmitted or the incompleteness of the variables considered.

The purpose of this paper is to expansively investigate and compare the changes in the influence of ADRN determinants for Latin American and Asian emerging markets by controlling domestic stock seasoned equity offering (SEO) events. The role of ADRs in the development of emerging markets brings advantages of liquidity, transparency, and ease of trade that characterize US markets. Firms issuing ADRs are required to file their domestic GAAP financial statements and reconcile their US GAAP accounting procedures with the SEC, thus providing investors with two sets of accounting information. However, the informativeness of the two sets of accounting information is subject to controversy.

This study comprehensively includes two accounting variables (DEPS and AEPS), two investor sentiment variables (proxy by market indices LD and USI), and domestic stock returns (SRs), as well as compares the variable impact changes on ADRNs before and after domestic stock SEOs. If the ADRNs do not fluctuate as do the SR, then there is a question regarding the causes of ADR deviation in response to SRs, LD, and/or USI, DEPS, and/or AEPS. Time Series Cross Section Regression (TSCSREG) is applied in comparing the significance among variables. Evidence of the importance among variables may have a significant bearing upon accounting harmonization and diversify investment. If DEPS contains more information than AEPS, then it signifies that earnings based on foreign GAAP may convey information that may be lost in reconciliation with US GAAP financial statements (Chan, Seow 1996). However, if DEPS and AEPS both contain sparse information regarding ADRNs, then the arguments for accounting harmonization may focus on firms' cost reduction and not on the asymmetry reduction arguments (Kirch 2007). An understanding of an ADR's role in diversification, its interrelationships with the market of origin, and its pricing factors certainly benefit many players in the ADR market (Jiang 1998).

Table 1. Comparison of the empirical results of the determinants of ADR returns

Authors	Period	Empirical methods	Countries	Results	Event
Pope and Rees (1992)	1987–1990	Cross-sectional regression	UK	Local. GAAP earnings changes have incremental information content. US GAAP earnings adjustments appear to add to explanatory power marginally.	
Webb *et al.* (1995)	1985–1989	Cross-sectional regression	UK, Europe, South Africa, Japan, Mexico, Israel, Ireland, and Australia	US market strongly influences ADR returns on a contemporaneous and a one-day lagged basis, indicating US market acts as the lead market in equity pricing.	
Chan and Seow (1996)	1987–1993	General regression	Australia, Canada, Chile, Demark, HK, Italy, Mexico, Netherlands, Norway, Sweden, UK, South Africa, Spain	Foreign GAAP conveys information that may be lost in the reconciliation to US GAAP.	
Jiang (1998)	1980–1994	Vector error correction model and vector autoregressive models	Australia, France, Japan, Netherlands, South Africa, Spain, Sweden, UK	US market, local market, and exchange rate are important in explaining the variation of ADR returns, although ADR returns are significantly associated with the US market returns.	
Choi and Kim (2000)	1990–1996	Cross-sectional regression	Argentina, Chile, Mexico, HK, Japan, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, UK, Australia and New Zealand	Local factors explain ADR returns better than the world factor.	
Alaganar and Bhar (2001)	1994–2000	Bivariate GARCH model	Australia	The 'law of one price' holds. ADRs have an economically significant higher reward than underlying stocks. ADRs have a low correlation with the US market under high states of global and regional shocks.	
Ely and Salehizadeh (2001)	1996–1999	Cointegration and error-correction models	UK, Japan, and Germany	ADRs are cointegrated with ordinary shares. Local markets are a more important source of information.	

End of Table 1

Authors	Period	Empirical methods	Countries	Results	Event
Suh (2003)	1998–1999	Cross-sectional regression	Brazil, China, India, Indonesia, South Korea, Philippines, Taiwan, Thailand	ADR prices co-move with the whole US market. ADR may not exactly be foreign shares.	
Luchs (2004)	1993–1998	General regression	UK, Mexico, Australia, Italy, Netherlands, Argentina, Spain, Chile, France, Sweden, and Ireland.	Country-risk factors are highly significant. The reconciliations to US GAAP generate no significant difference in the association of returns than the domestic GAAP model.	
Mak and Ngai (2005)	1994–2003	Bivariate GARCH model	HK and China	Local market plays a more important role in influencing the pricing of corresponding companies in the US market.	
Aquino and Poshakwale (2006)	1990–2000	Seemingly unrelated regression and feasible generalized least squares models	Australia, Denmark, Finland, France, Ireland, Italy, Japan, the Netherlands, Norway, South Africa, Spain, Sweden, and UK	Movements in the underlying shares are the most influential factor affecting ADR prices. Home stock market impact is not as strong as the one found in the US stock market.	
Grossmann *et al.* (2007)	1996–2003	Panel fixed-effects model	Germany, Denmark, France, Finland, Italy, the Netherlands, Spain, Sweden, and UK	ADRs are more driven by US consumer sentiment rather than that of the local markets.	
Kirch (2007)	1993–2006	CAPM model	Brazil	Structural breaks during earnings announcements are more due to the volatility of betas that may be caused by other international, national, or industry specific factors than due to the effects of local and US GAAP earnings releases.	Earning release
Bae *et al.* (2008)	1998	Time-series model	Australia, France, Japan, and UK	Local market plays a bigger role in determining ADR returns. ADR returns are significantly positively related to exchange rate.	

Two streams of earlier research are related to this paper. One has to do with a comparative study of ADR-related accounting variables, and the other with a comparative study of SRs, LD, and USI. Using data from the UK for 1987–1990, Pope and Rees (1992) found DEPS dominates AEPS in explaining ADRNs, indicating that the market exhibits a limited response to changes in accounting information. Empirical studies were later extended to cover other countries (Kirch 2007; Luchs 2004). However, the findings have been empirically inconclusive. Luchs (2004), for example, held the view that DEPS and AEPS provide the same level of explanatory power in regard to ADRNs. Furthermore, Kirch (2007) claimed that there were no surprises related to ADRNs during releases of both DEPS and AEPS.

As for one of the leading studies on a comparison of the influence of SRs, LD, and USI, Webb *et al.* (1995) found a significant relationship between ADRs and US market returns, thus signifying the leading role played by USI in relation to ADRNs. Jiang (1998) extended the analysis to apply the VAR and GARCH models that took the exchange rate into consideration and came up with opposite findings. Later results of related studies were found to be fruitful (Alaganar, Bhar 2001; Choi, Kim 2000; Ely, Salehizadeh 2001), although the empirical findings vis-à-vis such relationships were found to be mixed if not downright contradictory. Most of the findings examined the related ADR issue, either without specific events (Choi, Kim 2000; Kim *et al.* 2000; Patro 2000), or with selected events, such as the US market's reaction to ADR initial public offerings (IPOs) (Foerster, Karolyi 2000; Miller 1999; Sundaram, Logue 1996), the domestic stock reaction to ADR IPOs (Alexander *et al.* 1988; Foerster, Karolyi 1999), financial crises (Wang 2003), and profit warnings regarding the underlying stock (Jackson, Madura 2003). However, studies related to financial crises and profit warnings are rare. Furthermore, for ordinary specific event settings based on a discussion of domestic stocks, none of the studies include both accounting and market variables at the same time.

This study is related to, but distinct from, the extensive and growing literature on cross-listing. We probe into more generalized events to understand the intrinsic nature of ADRNs. To date and to the best of our knowledge, no previous study has explained the influence of changes in accounting information and investor sentiment on ADRNs arising from the issuance of SEOs in the home country. Choi and Kim (2000) examined the determinants of ADRNs and mentioned that developed and emerging markets have divergent findings. While Latin American and Asian emerging markets have extensive experience at launching their own ADR programs during the 1990s in terms of pace, breadth, and trading activity (Karolyi 2004), the differences between emerging markets are still open to question.

Level II and III ADR-listed firms must provide financial statements with limited reconciliations moving from local GAAP to US GAAP. This study examines whether the reconciled financial information fully communicates the intrinsic value of the ADRs, and if not what factors are mostly significant in explaining ADRN changes. Barberis *et al.* (2005, hereafter BSW) classified two distinctive views regarding the co-movement of equity prices: one adopts a traditional or fundamental-based approach based on friction-

less economies with fully rational investors, while the other utilizes a behavioral (trading or investor sentiment-based) approach, namely, the market friction approach. BSW (2005) proposed that the behavioral approach is superior to the traditional approach. According to the findings of BSW (2005), investor sentiment rather than fundamental information is a factor in explaining ADRNs. If country-specific market sentiment is crucial, then ADR price movements can be expected to be affected primarily by local and/or US market sentiment, rather than by firm stock price and accounting information. Suh (2003) and Arquette *et al.* (2008) indicated that market-wide sentiment significantly affects ADRNs.

This investigation aims to contribute to the literature in four ways. First, the mixed findings of prior studies may be due to the variety of information transmitted from the local market, the US market, or domestic firms. However, few studies have set event limitations. We analyze the related variables' influence changes on ADRNs both before and after home stock SEOs, which are a common event, especially compared to infrequent financial crises and profit warnings. ADRN determinants can thus be further analyzed during a non-crisis period. Second, this work provides empirical evidence on the significant informativeness of SR, fundamental-based (DEPS and AEPS) and sentiment-based information in explaining ADRNs. Third, prior studies point to the distinct market factors that influence ADRNs between developed and emerging markets. To our knowledge, none of the studies compare the differences among emerging markets in different regions. Finally, most previous studies use time series or cross-sectional regressions. Without controlling the time effects and firm effects, a divergence of findings occurs. This study employs panel data to control for unobservable heterogeneity and eliminates the risk of obtaining biased results due to this heterogeneity (Moulton 1986). Time Series Cross Section Regression (TSCSREG) is employed to compare the importance of the variables, while Panel system General Method of Moments (GMM) models are applied to compensate for the greater accuracy[1].

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the data. Section 4 explains the model and methodology. Section 5 discusses the empirical results, and Section 6 concludes the paper.

2. Literature Review

2.1. Latin American and Asian ADRs in US Markets

In early 1997, as emerging markets boomed, most Asian and Latin American economies looked strong and investors had a strong appetite for Argentine, Brazilian, and Indonesian securities. Asian and Latin American emerging markets seemed also not to experience any major meltdown in 2005 (MacDonald 2005). During the period from 2003 to 2005, Latin America exhibited the best DR performance, as measured by the ADR index

[1] Kennedy (2003) indicates that both the fixed effects and the random effects estimators are biased when a lagged dependent variable is used as an explanatory variable, suggesting the use of panel GMM or instrumental variables methods.

of the Bank of New York. The good performance of Latin American equity markets was driven by factors including a healthy demand from US and other international investors willing to take risks in the area, because of lukewarm returns from US stock markets[2]. In addition, Bailey and Stulz (1990) demonstrated the major benefits from diversification into Asia-Pacific equities. During 2005, 68 Asian issuers from six countries and 23 sectors raised over 17.4 $ billion from DRs, an increase of 164% compared to 2004. ADRs have thus grown rapidly in numerous emerging markets in Latin America and Asia during the past decade. Surely investors want to know what drives ADRNs.

2.2. The Effect from Seasoned Equity Offerings

SEOs occur when a listed firm issues additional shares. Smith (1977) was the first to document significant under-pricing of SEOs. Montier (2002) later stated that insiders realize the stock is overpriced and thus send a signal via a SEO, forcing the market to correct its misperceptions and creating negative announcement returns. Most relevant studies depict the SEO announcement effect as approximately minus 3% in US markets (Mola, Loughran 2004; Foerster, Karolyi 2000).

On the other hand, SEO studies yield diverse findings regarding SEO underpricing. Spiess and Affleck-Graves (1995), along with Denis and Sarin (2001), documented abnormal stock price reactions from post-SEO earning announcements as reliably negative only for the smallest quartile of equity issuers. Lee (1997) and Gombola *et al.* (1997, 1999) demonstrated that mature firms do not share the same negative experience. Nevertheless, it remains unclear whether listed firms from emerging markets that have issued ADRs also exhibit SEO under-pricing. Jayakumar (2002) stated that cross-listing provides a credible commitment to greater firm information disclosure, less information asymmetry, increased transparency, and enhanced value via pure cash flow effects by cutting agency costs. With more analysts following ADR-listed firms, considerable firm information is publicly available (Ejara, Ghosh 2004). Based on the above findings, we estimate that ADRNs react negatively after domestic stock SEOs.

2.3. Co-movement between ADRNs and SRs

BSW (2005) classified co-movement theories into two groups. One contains the traditional or fundamentals-based approach of frictionless economies involving fully rational investors, while the other comprises behavioral (investor sentiment-based) or market friction approaches. Their findings support the latter approach. Moreover, Coakley and Kougoulis (2004) explained that the fundamentals-based approach means that co-movement in fundamental value is instantly mirrored by a return co-movement – that is, price equals fundamental value. Recent studies have indicated that the co-movement of securities prices significantly exceeds their common fundamentals, casting doubt on the orthodox views of the rational pricing model.

Several related studies mention that SRs affect ADRNs. Choi and Kim (2000) showed that ADRs and underlying stocks have closely correlated returns. Alaganar and Bhar

[2] Depository Receipt Markets 2005 Yearbook, please see www.adrbny.com/files/ms7752.pdf.

(2001), Kato *et al.* (1991), Maldonado and Saunders (1983), Park and Tavakkol (1994), and Wahab *et al.* (1992) confirmed that ADR markets are priced efficiently, and that a 'law of one price' exists, with dominant information flow from underlying stocks to ADRs. Foerster and Karolyi (1999) found that ADRs follow on the heels of abnormally positive stock price performance in the year leading up to the listing. Similar evidence exists for Canadian listings and ADRs, as reported by Alexander *et al.* (1988). Few investigations have explored ADRNs with SR co-movement in common specific events other than ADR IPOs, financial crises, and profit warnings, i.e., SEOs. This work, distinct from the previous literature, explores home stock SEO information transmission to ADRs. Large firms, as ADR-listed firms, enjoy an information-rich environment and firm-specific information is preempted in the market. Thus, we hypothesize that SRs affect ADRNs equally, regardless of whether they are measured before and after SEOs.

2.4. Investor Sentiment Influences ADRNs

Behavioral finance studies routinely challenge the conventional argument that market participants behave rationally. Studies on investor sentiment are therefore crucial: they educate us regarding biases in investor forecasts on the stock market and also in order to gain additional returns. Then again, sentiment indicators are widely recognized as a reliable contrarian indicator of market movement (Siegel 1998). The behavioral finance theory of DeLong *et al.* (1990, hereafter DSSW) predicts noise trader sentiment that persists in financial markets and changes in investor sentiment are obviously difficult to forecast, otherwise they would be arbitraged away. Black (1986) and DSSW (1990) documented how noise traders acting together in response to non-fundamental signals cause asset prices to deviate from intrinsic values. A prime example of twin security puzzles involving Royal Dutch and Shell is mentioned by Froot and Dabora (1999). They showed Royal Dutch and Shell as being claims on the same cash flow. In an efficient market, Royal Dutch and Shell should trade at a constant ratio, but Royal Dutch is more sensitive to moves in the US market, while Shell is more sensitive to the UK market. Specifically, twin securities are correlated with their present market, despite this behavior being unrelated to changes in fundamentals.

If the USI exerts less of an impact on ADRNs than LD, then ADRs can be employed to signal global risk diversification; if USI exerts greater influences than LD, then movements in USI will dominate LD. Alaganar and Bhar (2001) and Kim *et al.* (2000) viewed ADRNs as being more strongly affected by SRs than by US market movements. Jiang (1998) confirmed a relationship between ADR and home market returns. Conversely, if investor-based specific market sentiment is critical to equity pricing, then ADRNs can be expected to be influenced by USI, with ADRs being traded by US traders (Suh 2003). Based on the announcements of SEOs regarding listed firms, ADRNs can be influenced by LD, yet studies demonstrate that listed firms in emerging markets are strongly influenced by global leading US capital markets (Ehrmann, Fratzscher 2005). The correlation between ADRNs and US (local) market indices indicates that US (local) market sentiment influences ADRN movements. Officer and Hoffmeister (1987) found little covariance between ADR prices and the prices of the underlying securities.

Moreover, Webb *et al.* (1995) used information on ADRs and USI to confirm US dominance in lead/lag relationships among equity markets. Since the US is a global leader among capital markets, USI may exert greater influences on ADRs than LD. Therefore, we examine and compare the change in the influence of LD and USI on ADRNs before and after domestic firm SEOs.

2.5. ADR Accounting Communication and Accounting Convergence

ADRs issued by US agencies for non-US firms cross-listed on US markets are negotiable securities issued by a US commercial bank backed by the equity shares of non-US parent firms. Four levels of ADR programs exist: Levels I, II, III, and 144a[3]. Levels II and III comply with all SEC registration and reporting requirements, including ADR program registration on SEC Form F-6, as well as annual reporting on Form F-20, with either partial or full reconciliation of financial statements to increase investor confidence by providing financial statement information. Registration allows issuers to list ADRs on one US stock exchange (NYSE, AMEX, and NASDAQ) provided the listing requirements are met (Callaghan *et al.* 1999).

Previous research on international financial reports identified notable qualitative differences among nations in their financial reporting standards (Meek, Saudagaran 1990). Baumol and Malkiel (1993) argued that further disclosure of ADR issuing requirements in accordance with US GAAP provides scant benefit to investors, contending that information on foreign GAAP numbers may be untranslatable, because of differences in tax laws, corporate governance, inter-corporate ownership of securities, and other institutional features. Level II and III reconciliations may mislead US investors into making unwarranted inferences. Amir *et al.* (1993) as well as Meek (1983) also presented evidence that 20-F announcement dates contain no incremental information. Bradshaw *et al.* (2004) identified several reasons why 20-F may not provide an effective substitute for accounting choice in primary financial statements. Chan and Seow (1996) demonstrated a closer association with 12-month returns for domestic GAAP income than for returns reconciled to US GAAP income. This study expects that if the reconciled items from moving local GAAP to US GAAP in ADR financial statements can effectively eliminate information asymmetries between local and US investors, then reconciliation for ADR listing firms can provide an intermediate by means of attracting US investment and can effectively transfer local information to its ADR price. Conversely, if reconciliation items cannot effectively eliminate such asymmetry between investors in the domestic country and the US, ADR price movements are caused by other factors.
The International Accounting Standards Committee strives to achieve a global set of accounting principles, also known as the International Financial Reporting Standards

[3] Level I ADRs are traded on the US OTC market and do not needs to be reported based on US GAAP, nor do they require full SEC disclosure. Rule 144a issues are traded only among qualified institutional buyers on the PORTAL system. A key difference between Level II and III ADRs is that SEC regulations do not permit a public offering of ADRs under Level II programs, while the Level III program enables the issuer to raise capital via a public offering of ADRs in the US (Callaghan *et al.* 1999).

(IFRS). Intuitive logic regarding convergence is that a thriving global capital market requires greater investor understanding and confidence. Embracing common high-quality accounting standards can reduce costs not only for issuers, but also reduce the costs to firm personnel involved in complying with the requirements of multiple jurisdictions emanating from cross-listing. Moreover, such convergence reduces the costs of preparers and auditors in juggling the application of several sets of national standards within the same consolidated group. Convergence helps optimize the resources dedicated to setting standards and enables more resources to be devoted to establishing a unified accounting model for a particular topic rather than those resources being spread out in the pursuit of separate national accounting standards for the same topic. IFRS can hopefully expedite firms in listing across borders, integrate national capital markets, and increase competition in those markets[4]. If changes in ADRNs cannot be attributed to earnings reconciled from local stock and parent firm earnings, then based on comparability and consistency, global accounting convergence is required.

3. Data

Firms must satisfy the following criteria for inclusion in our study samples: First, ADRs from 13 emerging markets in Latin America (Brazil, Chile, Colombia, Mexico, Peru) and Asia (China, India, Indonesia, South Korea, Malaysia, Philippines, Taiwan, and Thailand) included in the MSCI Emerging Markets Free Index (EMF) as of 2010 and with effective listings following 1990/12/31 are used for investigation[5]. ADRs used in this investigation must belong to Level II and III programs[6] – namely, larger, high-profile ADRs listed on major US exchanges, rather than smaller ADRs listed and traded in OTC and private-placement issues. Data for Level II and III ADRs are listed on the website of the Bank of New York.

Second, a sample firm should conduct an SEO at least one year following the effective issue dates of the underlying ADRs. SEO samples were gathered from the Global New Issues database of Securities Data Company (SDC) during 1990 to 2007. According to D'Mello *et al.* (2003), SDC filing dates serve as the announcement dates. Since this work examines the performance of equity issuers over one year intervals pre- and post-SEO, it is a requirement that firms have not conducted an equity offering over one preceding year. In other words, upon a firm's completion of a SEO, it cannot re-enter the sample for at least one year following the SEO date. Third, this investigation gathers ADRNs and domestic listed firm earnings data from *Compustat*. SR, USI, and LD, as well as exchange rate (EXR) data, are obtained from *Datastream*. After eliminating firms for which relative data are missing, the final sample contains 31 SEO events from

[4] Speech by SEC Deputy Chief Accountant, Erardt (2005), entitled "Remarks before convergence: the future of international financial reporting".

[5] Parent stock price and local price indexes for Asian countries lag US markets by one day owing to time differences. Latin American and US data are from roughly the same time zone and thus same date data are used.

[6] Kang (2003) used Level II and III programs as a sample, but did not separate them for analysis.

23 firms of six countries, including Latin America (Brazil, Chile, Mexico) and Asia (Indonesia, South Korea, Taiwan)

The market index is one of the most popular indicators of daily investor sentiment (Minana 2003; Wang 2003). Minana (2003) and Wang (2003) employed the local index and S&P 500 as proxies for local and US market sentiment. Hence, this study takes the S&P 500 and local composite price index as a proxy for USI and LD. Table 2 indicates that the largest contingent comprises seven Chilean firms, followed by six Brazilian firms. Other countries are ordinary listings. Among the sample firms, six are in Asia while 17 are in Latin America[7]. Table 3 lists yearly distributions for SEOs in this sample. Table 4 provides summary statistics of the sample organized according to listing year and listing exchange. Most listings occur on the NYSE, with only three firms listing on the NASDAQ. Manufacturing and telecommunications dominate the industry distribution listed in Table 5.

Table 2. Sample of emerging market stock SEOs issued over 1990–2007

No. of firms	Observation	Filing Date	Issuer	Nation
1	1	2003/04/02	Cia Siderurgica Nacional	Brazil
2	2	2001/05/09	EMBRAER	Brazil
	3	2007/01/23	EMBRAER	Brazil
3	4	2002/08/07	NET Servicos	Brazil
4	5	2001/06/28	Petroleo Brasileiro SA	Brazil
5	6	2004/09/28	Sabesp	Brazil
6	7	2003/08/08	Uniao de Bancos	Brazil
7	8	1999/10/14	AFP Provida SA	Chile
8	9	1998/05/29	Cia de Telecom.	Chile
9	10	1998/08/07	Endesa	Chile
	11	1999/09/23	Endesa	Chile
10	12	1998/08/10	Enersis SA	Chile
	13	1999/08/26	Enersis SA	Chile
	14	2003/03/31	Enersis SA	Chile
11	15	2003/06/06	Madeco SA	Chile
12	16	2007/05/10	Lan Airlines SA	Chile
13	17	1998/06/02	SQM	Chile
14	18	2000/12/20	CEMEX SA DE CV	Mexico
	19	2003/10/02	CEMEX SA DE CV	Mexico

[7] Appendix presents more detailed information regarding the sample firms in our examinations.

End of Table 2

No. of firms	Observation	Filing Date	Issuer	Nation
	20	2005/09/28	CEMEX SA DE CV	Mexico
15	21	2005/12/19	Desarrolladora Homex	Mexico
16	22	2003/12/18	Empresas ICA Sociedad	Mexico
	23	2005/08/09	Empresas ICA Sociedad	Mexico
	24	2007/09/01	Empresas ICA Sociedad	Mexico
17	25	2006/10/26	Grupo Simec SAB de CV	Mexico
18	26	2002/05/16	Indosat	Indonesia
19	27	2002/07/16	Telkom	Indonesia
20	28	2002/11/04	Hanaro Telecom Inc	South Korea
21	29	2002/05/07	KT Corp	South Korea
22	30	1999/06/19	SK Telecom Co Ltd	South Korea
23	31	1999/12/18	Macronix International	Taiwan

Note: According to the 2010 MSCI Emerging Markets Index, 13 of 21 emerging market country indices from Asia and Latin America included in this study are: Brazil, Chile, China, Colombia, India, Indonesia, South Korea, Malaysia, Mexico, Peru, Philippines, Taiwan, and Thailand. After matching ADRs with effective date before 2006 from Bank of New York ADR database, 1990–2007 SEO filling data from SDC, and accounting data before 2008 from Computstat, 31 observations from 23 firms are found and used to conduct the empirical analysis. Finally, owing to no matching data from China, Colombia, India, Malaysia, Peru, Philippines, and Thailand, the observations are from six countries: Brazil, Chile, Indonesia, South Korea, Mexico, and Taiwan.

Table 3. Yearly distributions of international equity issues

Year of SEO	No.	Year of SEO	No.
1998	4	2003	6
1999	5	2004	1
2000	1	2005	3
2001	2	2006	1
2002	5	2007	3

Table 4. Descriptive statistics for listed firms on ADRs

Listing Years		Listing Exchange	
1992–1995	9	NYSE	20
1996–1999	6	NASDAQ	3
2000–2004	8		

Table 5. Industry distribution of ADRs

Industry	Number of observations
Banking and general finance	2
Telecommunication and telephone	6
Natural resources	2
Radio/TV/Media	1
Electricity and technology	3
Construction	2
Manufacturing	6
Transportation	1
Total	23

Table 6 lists the descriptive statistics regarding SRs, ADRNs, LD, USI, DEPS, and AEPS for Latin American and Asian one-year pre- and post-SEO interval daily data. Panel A tabulates the related Latin American and Panel B Asian data. This investigation applies the S&P 500 and local composite price index as proxies for USI and LD. By dividing SR by the same date EXR, SR is translated into US dollars to eliminate the confounding effect of EXR. Annual DEPS in US dollars for firm *i* during SEO in year *t* is taken as the figure for underlying stock; annual AEPS for firm *i* during the domestic stock SEO year represents ADR EPS. Table 7 shows the correlation matrix of variables. Panel A tabulates the Latin American data while Panel B tabulates the Asian data.

Table 6. Descriptive statistics

Variable	ΔSR%	ΔADRN%	ΔLD%	ΔUS%	DEPS	AEPS
Panel A. Latin America Pre-SEO						
Mean	0.0016	0.0039	–0.0002	–0.0002	0.7343	0.0006
Median	0.0000	0.0000	0.0000	–0.0002	0.2570	1.2900
Maximum	3.5164	9.2041	0.2157	0.0737	3.8400	4.9200
Minimum	–0.2331	–0.8925	–0.0707	–0.0542	–1.3240	–14.2000
Std. Dev.	0.0526	0.1673	0.0128	0.0117	1.2671	4.4450
Skewness	46.1654	51.3769	1.0115	0.0731	0.9920	–2.4929
Kurtosis	3071.275	2828.138	19.2135	6.2646	3.0800	8.4401
Observations	6475	6475	6475	6475	6475	6475

End of Table 6

Variable	ΔSR%	ΔADRN%	ΔLD%	ΔUS%	DEPS	AEPS
Latin America Post-SEO						
Mean	0.0009	0.0011	0.0008	0.0004	0.6726	0.6299
Median	0.0001	0.0000	0.0003	0.0001	0.2570	1.3900
Maximum	0.2934	0.8333	0.0682	0.0509	4.7700	4.9200
Minimum	–0.1737	–0.4273	–0.0918	–0.0680	–2.0700	–14.2000
Std. Dev.	0.0262	0.0358	0.0133	0.0111	1.4833	3.4116
Skewness	0.5244	2.4065	–0.1119	–0.0734	1.0500	–3.1610
Kurtosis	13.2336	82.0380	6.2316	5.7238	4.1274	14.4643
Observations	6375	6375	6375	6375	6375	6375
Panel B. Asia Pre-SEO						
Mean	–0.0005	–0.0010	–0.0015	0.0001	0.6710	0.5862
Median	0.0000	0.0000	–0.0005	0.0000	0.1815	0.7850
Maximum	0.1791	0.2575	0.1248	0.0885	2.7610	1.4500
Minimum	–0.1789	–0.1557	–0.1107	–0.1138	–0.6650	–0.7100
Std. Dev.	0.0340	0.0324	0.0219	0.0177	1.1543	0.8457
Skewness	0.0486	0.4130	–0.1832	–0.3747	0.7460	–0.2970
Kurtosis	6.2961	8.8902	6.0454	7.2302	2.1970	1.4335
Observations	1554	1554	1554	1554	1554	1554
Asia Post-SEO						
Mean	0.0013	0.0012	–0.0000	0.0003	0.6710	0.5862
Median	0.0000	0.0000	0.0000	0.0000	0.1815	0.7850
Maximum	0.1617	0.2439	0.0986	0.1322	2.7610	1.4500
Minimum	–0.2225	–0.1983	–0.1194	–0.1202	–0.6650	–0.7100
Std. Dev.	0.0371	0.0346	0.0213	0.0206	1.1543	0.8457
Skewness	0.1966	0.8430	–0.2836	0.4893	0.7460	–0.2970
Kurtosis	6.4055	10.8118	5.7536	7.4122	2.1970	1.4335
Observations	1554	1554	1554	1554	1554	1554

Note: SR figures are expressed in US dollars. Samples of 23 firms are screened from Datastream for LD, USI, SR, and ADRN. LD and USI, and SR and ADRN are expressed in change percentages. DEPS and AEPS are obtained from Compustat. $ADRN_{i,t}$ represents the change in daily returns for ADR for firm i during day t; $SR_{i,t}$ is the change in daily returns for every stock in US dollars for firm i during day t; USI_t denotes the daily change in the S&P 500 during day t; $LD_{i,t}$ is the daily change in the domestic market index for firm i during day t; $DEPS_{i,t}$ is the annual domestic stock EPS for firm i during SEO year t, $AEPS_{i,t}$ is annual ADR EPS for firm i during SEO t year.

Table 7 reveals that, first, Latin American and Asian ADRNs are strongly positively correlated with LD for the entire period, meaning that LD is important in explaining Latin American and Asian ADRNs. Second, for the Latin American sample the only difference in the results for the two sub-periods is that AEPS is strongly and negatively correlated with ADRNs pre-SEO, while USI significantly impacts ADRNs, meaning the change in AEPS decreases with increasing ADRNs. Third, USI is positively correlated with Asian ADRNs for the entire period.

Table 7. Correlation coefficients

	SR	ADRN	LD	USI	DEPS	AEPS
Panel A. Latin-America Pre-SEO						
SR	1.00					
ADRN	0.04**	1.00				
LD	0.42**	0.04**	1.00			
USI	0.15**	0.02	0.43**	1.00		
DEPS	–0.03*	–0.02	–0.04**	–0.01	1.00	
AEPS	–0.01	–0.06**	0.01	–0.02	0.32**	1.00
Latin America Post-SEO						
SR	1.00					
ADRN	0.50**	1.00				
LD	0.47**	0.28**	1.00			
USI	0.26**	0.22*	0.45**	1.00		
DEPS	0.01	–0.00	0.01	–0.00	1.00	
AEPS	–0.01	–0.01	–0.00	–0.01	0.32**	1.00
Panel B. Asia Pre-SEO						
SR	1.00					
ADRN	0.47**	1.00				
LD	0.54**	0.37**	1.00			
USI	–0.13**	0.14**	0.21**	1.00		
DEPS	–0.01	0.00	–0.02	0.00	1.00	
AEPS	–0.01	0.00	0.00	0.03	0.47**	1.00
Asia Post-SEO						
SR	1.00					
ADRN	0.48**	1.00				
LD	0.41**	0.35**	1.00			
USI	–0.24**	0.19**	0.24**	1.00		
DEPS	0.01	0.01	–0.01	–0.01	1.00	
AEPS	–0.02	–0.02	–0.01	–0.02	0.47**	1.00

Note: ** (*) denote significance at the 1% (5%) level (a two-tailed test). USI is the S&P 500 composite stock price index. LD is the composite price index.

4. Model and Methodology

4.1. Random Effects Model

Follow the methodology of Areal *et al*. (2007), this study uses panel data regression method, which takes the firm-specific and time effects to analyze the relation between ADRNs and its correlated variables. Panel data follow the same firms (countries) over time, helping to facilitate the analysis of dynamic responses and the control of unobserved heterogeneity (Arellano 2003). By combining time series of cross-section observations, panel data provide more informative data and are better suited to study the dynamic of change that simply cannot be observed in pure cross-section or pure time series data (Gujarati 2003). With the indication that the impacts on ADRN are different among SR, LD, USI, DEPS, and AEPS, additional analysis is needed to determine if indeed the differing influences are diverse between domestic stock before and after SEO. The basic structure for analyzing the panel data is given by the following equation (1):

$$y_{it} = \sum_{k=1}^{K} X_{itK}\beta_K + u_{it} \quad i = 1,\ldots, N; \quad t = 1,\ldots, T, \tag{1}$$

where N denotes the number of cross sections, T represents the length of the time series for each cross section, K is the number of exogenous or independent variables, and β is the estimated coefficient of vectors across cross-sectional observations, where i denotes the company and t denotes time. Therefore, y_{it} is the dependent variable pooling N cross-sectional observations and T time-series observations, and X_{itK} are the independent variables pooling N cross-sectional observations and T time-series observations. Here, u_{it} is a random error term, and $u_{it} = u_{it} + v_{it}$, where v_{it} denotes the remainder of the disturbance.

The two-way (time-invariant / firm-specific) effect is randomly distributed and is uncorrelated with the vector of exogenous variables. Using the Hausman (1978) test, the sample data employ random effects, rather than fix effects. The panel data have four model types: basic model, individual-effect model, fixed effects model, and random-effects model. Both fixed-effects and random-effects models can be further divided into one-way and two-way types of models. The difference between ordinary least squares (OLS), fixed-effects model, and random-effects model is that OLS calculation can only be analyzed either through cross-sectional or time-series data at a time. Therefore, when a combination of data appears, using OLS may overlook the differences embedded in the cross-sectional data and thus generate unreliable estimate results. While the fixed-effects model and random-effects model can deal with the two data types simultaneously, given special consideration to the differences within cross-sectional data, we can eliminate discrepancies among samples. The estimation result gained will also be more efficient and consistent (Cheng *et al*. 2010).

4.2. Time Series Cross Section Regression (TSCSREG) Analysis

The TSCSREG procedure is used to compare the significance of variables. One of the main strengths of the TSCSREG design is that it allows for controlling heterogeneity bias, or the confounding effect of time-invariant variables omitted from the regression

model (Nielsen 1999). The TSCSREG procedure involves panel datasets that comprise time series observations for each of several cross-sectional units. The performance of any estimation procedure for the model regression parameters depends on the statistical characteristics of the model's error components. The TSCSREG procedure requires that the time series for each cross section have the same number of observations and cover the same time range. The test performs *F*-tests of linear hypotheses regarding regression parameters in the preceding models. Each equation specifies a linear hypothesis to be tested. All hypotheses in one test are tested jointly. Variable names in equations must correspond to regressors in the preceding model, and each name represents the coefficient of the corresponding regressor (Santiago-Castro, Brown 2007).

Chan and Seow (1996) incorporated annual accounting earnings under US GAAP and foreign GAAP as the independent variables in order to probe the association between SR and foreign GAAP earnings *versus* earnings adjusted to US GAAP. We extend their models by including investor sentiment and accounting information variables. The hypotheses are tested using the following panel regression model (2):

$$\mathrm{ADRN}_{i,t} = \beta_0 + \beta_1 \mathrm{SR}_{i,t} + \beta_2 \mathrm{USI}_t + \beta_3 \mathrm{LD}_{i,t} + \beta_4 \mathrm{DEPS}_{i,t} + \beta_5 \mathrm{AEPS}_{i,t} + \varepsilon_{i,t}. \quad (2)$$

Here, the β*s* are the estimated coefficients and ε is the random disturbance term. Employing the balanced panel dataset, equation (2) is investigated to examine the impact change of the main variables on ADRNs.

5. Empirical Results

The Hausman (1978) test results provide the choice of the random effects model for all conventional significance levels in four sample groups (Latin American and Asian data pre- and post-SEO). In this study the fixed effect model is thus infeasible, because annual EPS variables exhibit minimal time variation. Consequently, this study employs a random effects model to examine the variables determining the ADRNs. The TSCSREG procedure is mainly employed to compare the significant associations of related variables with ADRNs. Tables 8 and 9 provide Latin American and Asian results of the two-way random effects models and TSCSREG, where the dependent variable is daily ADRN. While the models (Latin American and Asian pre- and post-SEO results) do not have high *F* values and R^2, they exhibit a key variable impact on ADRNs, and the probabilities are significant at the 1% level. Furthermore, models excluding insignificant variables in Tables 8 and 9 are also examined to check the stability of results, as shown in Tables 10 and 11. Finally, this study uses the panel system GMM to perform the robustness check. Table 12 summarizes the findings.

5.1. Latin American Results

Table 8 presents estimation results as well as some traditional tests for Latin American markets. The Durbin-Watson statistics are near 2, implying that there is little evidence of serial correlation in our sample since the null hypothesis of no autocorrelation in the residuals would not be rejected if the DW statistic is near 2 (Brooks 2002).

Table 8. Two-way random effects model of Latin American markets

	Pre-SEO			Post-SEO			Summary
Variable	Coefficient	t-value	Probability	Coefficient	t-value	Probability	
Constant	0.3715	1.450	0.147	0.0455	0.883	0.377	
SR	0.0808	1.791	**0.073***	0.6328	18.805	**0.000*****	H_0^1 **: NR**
LD	0.4647	3.332	**0.001*****	0.0524	0.783	0.434	H_0^2 **: R**
USI	–0.0447	–0.157	0.875	0.3060	4.385	**0.000*****	H_0^3 **: R**
DEPS	0.0155	0.237	0.813	–0.0067	–0.295	0.768	H_0^4 **: NR**
AEPS	–0.2132	–1.437	0.151	–0.0054	–0.649	0.516	H_0^5 **: NR**
Adj. R^2	0.005			0.257			
DW statistic	2.193			2.766			
Heteroskedasticity test (p-value)	0.000			0.000			
TSCSREG test:	F value	Probability	Result	F value	Probability	Result	
SR vs. LD = 0	5.21	**0.023****	**SR < LD**	43.78	**0.000*****	**SR > LD**	
SR vs. USI = 0	0.19	0.661		17.61	**0.000*****	**SR > USI**	
SR vs. DEPS = 0	0.67	0.412		314.07	**0.000*****	**SR > DEPS**	
SR vs. AEPS = 0	3.66	0.056**	**SR > AEPS**	346.50	0.000***	SR > AEPS	
LD vs. USI = 0	1.68	0.195		4.51	**0.034****	LD < USI	
LD vs. DEPS = 0	9.11	**0.003*****	**LD > DEPS**	0.60	0.438		
LD vs. AEPS = 0	10.52	**0.001**	**LD > AEPS**	0.72	0.396		
USI vs. DEPS = 0	0.04	0.839		18.99	**0.000*****	**USI > DEPS**	
USI vs. AEPS = 0	0.28	0.595		19.84	**0.000*****	**USI > AEPS**	
DEPS vs. AEPS = 0	1.21	0.271		0.00	0.955		
Results of TSCSREG test:							
LD > SR > AEPS; LD > DEPS				SR >USI > LD; SR > USI > DEPS; SR > USI > AEPS			

Note: The table presents regression results where the dependent variable is the ADRN change percentage. *** (**,*) indicate significance at the 1% (5%, 10%) level. The sample consists of 25 observations over one-year intervals pre-SEO and post-SEO. The final column represents the null hypothesis: the coefficient corresponding to the explanatory variable does not vary before and after domestic stock SEO. R = null is rejected, NR = null is not rejected.

On the other hand, the data are plagued by heteroskedasticity, and thus we adopt robust estimates to correct for cross-sectional heteroskedasticity. The estimation results show that SR variables exert a significantly positive effect on ADRNs both before and after domestic stock SEOs. The null hypotheses of SRs affecting ADRNs equally for domestic stock both pre- and post-SEO cannot be rejected. In other words, SR equally and considerably affects ADRN full period returns in the Latin American sample. However, LD markedly affects Latin American ADRN pre- but not post-SEOs and USI post- but not pre-SEOs. This study rejects the hypotheses that LD and USI affect ADRNs equally pre- and post-SEO. Variables which are shown to insignificantly impact ADRN include DEPS and AEPS for the full period, implying that investors do not refer to DEPS and AEPS when investing in Latin American ADRs, either pre- or post-SEO.

Table 8 shows the TSCSREG tests to examine the relative importance of different factors on ADRNs and whether the difference between these factors is significant. The results show that SR in Latin American markets has a uniform effect on full period ADRN and that the effect is significantly lower than LD pre-SEO, but higher post-SEO. The intuition behind this observation is as follows. Firm capital will expand after SEOs, and investors will pay more attention to the issue of whether SR can remain after the expansion of firm capital since SEO may dilute the EPS or reduce the rate of return on equity. As with the pecking order theory of capital structure, the issuance of stock should be the final choice when the firm needs to raise funds, because of asymmetric information between firm managers and investors. Thus, it could be inferred that investors of ADRs might pay more attention to the change of SRs after SEOs.

The results on the TSCSREG tests of other pairs present a simpler pattern. The SR has a dominant effect over USI, DEPS, and AEPS on ADRNs after SEOs, but the difference is not so significant pre-SEO except for the comparison with AEPS. This somewhat corresponds to the observation above that the effect of SRs is important post-SEO. The effect of investor sentiment dominates that of EPS, with LD being significant pre-SEO and USI post-SEO. The influence of USI is higher than that of LD, but only in the post-SEO period. Overall, our findings indicate that SR constitutes the most important determinant of Latin American ADRNs in the two sub-periods. However, EPS has no effect on ADRNs, whether it is represented by local accounting standards or reconciled to US GAAP. Moreover, the relative importance between DEPS and AEPS cannot be distinguished as well. Finally, the effect of investor sentiment is mixed in the two sub-periods.

5.2. Asian Results

Table 9 lists the Asian regression results both pre- and post-SEO. As shown, the problem of serial correlation is absent because the DW statistic is near 2. The robust standard error estimates are still employed because of heteroskedasticity problem. The SRs, LD, and USI exert roughly equal positive and significant influences over ADRNs during the full period, except for LD as it strongly and negatively impacts ADRNs post-SEO. The null hypotheses that the SRs, LD, and USI affect ADRNs equally during domestic stock pre- and post-SEOs cannot be rejected. DEPS and AEPS exert an insignificant effect

Table 9. Two-way random effects model of Asian markets

	Pre-SEO			Post-SEO			Summary
Variable	Coefficient	t-value	Probability	Coefficient	t-value	Probability	
Constant	–0.0798	–0.704	0.481	0.1274	0.928	0.354	
SR	0.0689	2.124	**0.034****	0.0592	2.013	**0.044****	H_0^1 **: NR**
LD	0.1429	2.844	**0.005*****	–0.1185	–2.484	0.013**	H_0^2 **: NR**
USI	0.2261	5.029	**0.000*****	0.3178	8.925	**0.000*****	H_0^3 **: NR**
DEPS	0.0343	0.451	0.652	0.0501	0.602	0.547	H_0^4 **: NR**
AEPS	–0.0279	–0.240	0.811	-0.0920	–0.717	0.473	H_0^5 **: NR**
Adj. R^2	0.039			0.037			
DW statistic	2.189			2.068			
Heteroskedasticity test (p-value)	0.000			0.000			
TSCSREG Test:	F value	Probability	Results	F value	Probability	Results	
SR vs. LD = 0	1.02	0.313		9.93	**0.002*****	**SR > LD**	
SR vs. USI = 0	8.37	**0.004****	**SR < USI**	34.42	**0.000*****	**SR < USI**	
SR vs. DEPS = 0	0.17	0.678		0.01	0.915		
SR vs. AEPS = 0	0.65	0.419		1.28	0.258		
LD vs. USI = 0	1.27	0.261		45.50	**0.000*****	**LD < USI**	
LD vs. DEPS = 0	1.30	0.255		2.78	**0.096***	**LD < DEPS**	
LD vs. AEPS = 0	1.86	0.173		0.04	0.843		
USI vs. DEPS = 0	4.68	**0.031****	**USI >DEPS**	8.39	**0.004*****	**USI > DEPS**	
USI vs. AEPS = 0	4.28	**0.039****	**USI > AEPS**	9.36	**0.002*****	**USI > AEPS**	
DEPS vs. AEPS = 0	0.15	0.701		0.61	0.434		
Results of TSCSREG test :							
USI > SR; USI > DEPS; USI > AEPS				**USI > SR > LD; USI > DEPS > LD; USI > AEPS**			

Note: The table presents regression results where the dependent variable is the ADR return change percentage. *** (**,*) indicate significance at the 1% (5%, 10%) level. The sample consists of six observations over one-year intervals pre-SEO and post-SEO. Parent stock price (SR) and local price indices (LD) are lagged one period, because Asian countries lag US markets by one day owing to time differences. The final coefficient corresponding to the explanatory variable does not vary before and after domestic stock SEO. R = null is rejected, NR null is not rejected.

on ADRNs for the full period. Thus, the Asian sample exhibits limited informativeness of AEPS and DEPS in amplifying ADRNs, which is consistent with the findings for Latin America.

Table 9 shows the *t*-values that Asian ADRNs are most influenced by USI for the full period, and the TSCSREG tests present that USI dominates SR, DEPS, and AEPS in explaining ADRNs during the two sub-periods and dominates LD in the post-SEO period. The TSCSREG results cannot determine the relative significance either before or after domestic stock SEOs in the following pairs: SR versus DEPS, SR versus AEPS, LD versus AEPS, and DEPS versus AEPS. In sum, our findings support the view that USI is the most important determinant of Asian ADRNs in all periods.

The panel model and TSCSREG procedures above confirm that the most notable effect comes from USI for the Asia sample, while for the Latin American sample the SRs dominate. Consistent with Phylaktis and Xia (2007), Asian markets are more responsive to the US markets than to other regional markets. The TSCSREG results cannot distinguish the relative importance of DEPS versus AEPS both for the Asia and Latin American samples, which is consistent with Kirch's (2007) findings that indicate that DEPS and AEPS contain little information about ADRNs. Choi and Kim (2000) examined the determinants of ADRNs and mentioned that developed and emerging markets have divergent findings in terms of the determinants of ADRNs. Our findings indicate that even emerging markets have diverse findings in terms of the determinants of ADRNs. Ferguson (2000) stated that investor sentiment shifted more rapidly in Asia than it did in Latin America, because investors were already more familiar with the regional structural inefficiencies and difficulties in Latin America than in Asia. This article to some extent reflects Ferguson's point since our findings demonstrate that investor sentiment, either in the local or US markets, plays a more important role on ADR returns for the Asia sample than for the Latin American sample.

5.3. Robustness Checking

To examine the stability of previous results, we exclude insignificant variables in the initial model and perform the same analysis for the four sample groups. The results are presented in Tables 10 and 11. As can be seen from the two tables, our findings are qualitatively the same as the results above. The domestic stock return still plays a critical role both pre- and post-SEO for Latin American samples, USI dominates ADRNs over other factors for the Asia sample, and the significance of other variables is similar to the initial model. Hence, our observations are robust.

Since SR might be an endogenous variable, an instrumental variable approach should be used (Pangan, Ullah 1988). The instrumental estimation technique used in this study is the panel system GMM estimator. This technique estimates a system by combining two sets of equations. An alternative would be the first-differenced GMM procedure. However, the procedure suffers from weak instrument problems and can produce biased results – for instance, owing to heteroskedasticity problems and autoregressive parameters with values around unity (Blundell, Bond 1998). In all estimations, this study controls for time effects and firm effects by adopting random effects models.

Table 10. Robustness checking: Two-way random effects model of Latin American markets – excluding insignificant variables in initial model

	Pre-SEO			Post-SEO			Summary
Variable	Coefficient	t-value	Probability	Coefficient	t-value	Probability	
Constant	0.3823	1.292	0.196	0.0402	1.044	0.297	
SR	0.0847	1.878	**0.061***	0.6429	21.466	**0.000*****	H_0^1 **: NR**
LD	0.4329	4.164	**0.000*****				H_0^2 **: R**
USI				0.3279	5.474	**0.000*****	H_0^3 **: R**
Adj. R^2	0.002			0.257			
DW statistic	2.186			2.766			
Heteroskedasticity test (p-value)	0.000			0.000			
TSCSREG test:	F value	Probability	Result	F value	Probability		Result
SR vs. LD = 0	6.30	**0.012****	**SR < LD**				
SR vs. USI = 0				17.61	**0.000*****		**SR > USI**
Results of TSCSREG test :							
LD > SR				**SR > USI**			

Note: See Table 8.

Table 11. Robustness checking: Two-way random effects model of Asian markets – excluding insignificant variables in initial model

	Pre-SEO			Post-SEO			Summary
Variable	Coefficient	t-value	Probability	Coefficient	t-value	Probability	
Constant	–0.0732	–0.976	0.329	0.1069	1.285	0.199	
SR	0.0690	2.131	**0.033****	0.0600	2.035	**0.042****	H_0^1 **: NR**
LD	0.1423	2.826	**0.005*****	–0.1185	–2.484	**0.013****	H_0^2 **: NR**
USI	0.2258	5.017	**0.000*****	0.3183	8.938	**0.000*****	H_0^3 **: NR**
Adj. R^2	0.040			0.038			
DW statistic	2.189			2.067			
Heteroskedasticity test (p-value)	0.000			0.000			
TSCSREG Test:	F value	Probability	Results	F value	Probability	Results	
SR vs. LD = 0	1.00	0.318		9.96	**0.002*****	SR > LD	
SR vs. USI = 0	8.32	**0.004****	**SR < USI**	34.29	**0.000*****	SR < USI	
LD vs. USI = 0	1.27	0.259		45.60	**0.000*****	LD < USI	
Results of TSCSREG test :							
USI > SR				**USI > SR > LD**			

Note: See Table 9.

Table 12 lists the robustness check for panel system GMM findings. The results are approximately the same as previous empirical results for the Asian sample. The coefficients are similar to the initial results, and variables significantly affecting ADRNs remain the same. On the other hand, the results of post-SEO for the Latin American sample are qualitatively similar, except that LD becomes significant in the system GMM model. Finally, differences emerge in the pre-SEO results for the Latin American sample. SR still significantly affects ADRNs, but the effect of LD is not significant now. Sample characteristics might be the reason for this difference. As shown in Table 6, the pre-SEO Latin American sample reveals some difference in skewness and kurtosis in SR and ADRNs compared to other groups. Even so, the dominance of SR remains in the system GMM specifications. Largely, the above robustness checks produce similar empirical results.

Table 12. Robustness checking: Panel system GMM models

Country	Latin America		Asia	
Variable	Pre-SEO	Post-SEO	Pre-SEO	Post-SEO
Panel A: initial model				
Constant	0.2916 (0.230)	0.0797 (0.068)*	–0.0882 (0.381)	0.1303 (0.229)
SR	0.8878 (0.000)***	0.5387 (0.000)***	0.1131 (0.000)**	0.0741 (0.008)***
LD	–0.1618 (0.473)	0.1668 (0.000)***	0.1724 (0.000)***	–0.1081 (0.018)**
USI	–0.1426 (0.488)	0.2961 (0.000)***	0.2145 (0.000)***	0.3171 (0.000)***
DEPS	0.0489 (0.776)	–0.0064 (0.821)	0.0394 (0.618)	0.0514 (0.545)
AEPS	–0.2241 (0.000)***	–0.010 (0.417)	–0.0275 (0.381)	–0.0940 (0.418)
Panel B: excluding insignificant variables in initial model				
Constant	0.3259 (0.117)	0.0779 (0.051)*	–0.0780 (0.333)	0.1097 (0.206)
SR	0.8990 (0.000)***	0.5565 (0.000)***	0.1123 (0.000)***	0.0744 (0.008)***
LD	–0.2414 (0.253)		0.1724 (0.000)***	-0.1075 (0.018)**
USI		0.3690 (0.000)***	0.2152 (0.000)***	0.3181 (0.000)***

Note: ( ): p-value. *** (**,*) indicate significance at the 1% (5%, 10%) level.

6. Conclusions

What drives the returns of ADR? This paper initially studies the issue of impact changes regarding accounting/investor sentiment and local/US variables on ADRNs by controlling the information transmission of domestic stock SEOs for ADRs in Latin American and Asian emerging markets from 1990 to 2007. We empirically contrast the long-run determinants of ADRNs both before and after domestic stock SEOs and contrast Latin America with Asia emerging economies. By following the model of Chan and Seow (1996) and Grossmann *et al.* (2007), we apply the two-way random effects panel data models and TSCSREG to investigate the changing influence of relative factors on ADRNs. Finally, panel system GMM models are also employed in the robustness check. This study incrementally contributes to the behavioral finance and accounting literature by providing evidence of the informativness of investor sentiment and ADR-reconciled accounting information.

This paper demonstrates the following empirical results. First, the estimated coefficient on the SR is positively and statistically significant in Latin American pre- and post-SEO models. The estimated coefficient on the SR in Table 8, for example, is 0.6. This means that a one unit increase in SR after domestic stock SEO increases ADRNs by 0.6% over a 1-year period. The relationship between SRs and Latin American ADRNs is consistent with 'law of one price'. However, USI positively dominates in the Asian sample, indicating one unit increase in USI increases Asian ADRN by 0.2 to 0.3% over a 1-year period before and after domestic stock SEO, respectively. Remarkably, LD even dominates SR in explaining Asian ADRNs. The results provide similar evidence with Ferguson (2000) in that investor sentiment shifted more rapidly in Asia than it did in Latin America, because investors were already more familiar with the regional structural inefficiencies and difficulties in Latin America than in Asia. Consistent with Grossmann *et al.* (2007) and Kirch (2007), this study ascertains that the USI has a leading relationship among equity markets, and AEPS and DEPS convey little information regarding ADRNs. However, our study expands the research sample into the Latin American/Asian emerging markets and makes before and after domestic stock SEO comparisons. The TSCSREG results also permit us to conclude that SR is more important than USI for Latin American ADRNs, with the reverse holding true in Asia.

Second, regarding the difference between pre- and post-SEOs, TSCSREG and two-way random effects models specify that USI (LD) considerably affects Latin American ADRNs post (pre)- but not pre (post)-SEO. The sole difference between the pre- and post-SEOs based on the Asian market is that SRs dominate LD in explaining ADRNs post-SEO, but this state is not significant pre-SEO. Moreover, SRs, LD, and USI exert significant influences on ADRNs during the full period for the Asian sample. Both of Latin American and Asian markets' results cannot pinpoint the comparative significance of DEPS versus AEPS. However, Latin American and Asian findings identify USI presents more salient influence than LD post-SEO. Although classic finance theory does not acknowledge behavioral factors as market sentiment, the empirical findings imply that asset prices are affected by the place they are traded (Suh 2003), especially confirmed in Asian ADRs of the research. We offer that ADRs from Latin America and

Asia emerging markets have distinct and similar features that need to be noticed when planning investment strategies. Also, our findings suggest that ADRs provide diversification benefits through two different sources: a market of origin diversification, and a specific feature of domestic stock diversification.

Finally, the estimated coefficients on the DEPS and AEPS variables for both Latin American and Asian ADRNs are statistically insignificant at conventional levels, indicating that changes in DEPS and AEPS have little impact on ADRNs from Latin American and Asian emerging markets, whether pre- or post-SEO. This finding may result from the distinctly important influence of annual accounting information versus daily investor sentiment data. Our finding is different from both Pope and Rees (1992) and Chan and Seow (1996), showing that DEPS dominates AEPS, or from Luchs (2004), indicating that DEPS has the same importance as AEPS. Their results may be mainly caused by no information transmission considerations and/or no comparison with other factors in the previous literature. Thus, we support the cost reduction view of accounting convergence and not that of a reduction in asymmetrical information.

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APPENDIX

ADR summary of sample firms

No.	DR issue	Exchange	Country	Industry	Effective date
1	COMPANHIA SIDERURGICA NACIONAL	NYSE	Brazil	Manufacturing	3 Nov 97
2	EMBRAER	NYSE	Brazil	Manufacturing	26 Jul 00
3	NET SERVICOS DE COMUNICACAO	NASDAQ	Brazil	Media	17 Dec 01
4	PETROLEO BRASILEIRO S.A.- COMMON	NYSE	Brazil	Oil & Gas Producers	9 Aug 00
5	SABESP	NYSE	Brazil	Water Supply	9 May 02
6	UNIBANCO – UNIAO DE BANCOS BRASILEIROS	NYSE	Brazil	Banks	27 Mar 01
7	AFP PROVIDA S.A.	NYSE	Chile	General Finance	16 Nov 94
8	COMPANIA DE TELECOMUNICACIONES	NYSE	Chile	Fixed Line Telecom.	1 Jan 97
9	ENERSIS S.A.	NYSE	Chile	Electricity	26 Oct 93
10	MADECO S.A.	NYSE	Chile	Manufacturing	28 May 93
11	LAN AIRLINES SA	NYSE	Chile	Transportation	25 Mar 03
12	SOC. QUIMICA Y MINERA DE CHILE, S.A.	NYSE	Chile	Manufacturing	1 Sep 93
13	ENDESA-EMPRESA NACIONAL DE ELECTRICIDAD	NYSE	Chile	Electricity	12 Jul 94
14	CEMEX S.A. DE CV	NYSE	Mexico	Manufacturing	1 Sep 99
15	DESARROLLADORA HOMEX	NYSE	Mexico	Construction	29-Jun-04
16	EMPRESAS ICA, S.A. DE C.V.	NYSE	Mexico	Construction	1 Apr 92
17	GRUPO SIMEC SAB DE CV	NYSE	Mexico	Manufacturing	30 Jun 93
18	PT INDOSAT TBK	NYSE	Indonesia	Mobile Telecom.	1 Oct 94
19	PT TELEKOMUNIKASI INDONESIA TBK	NYSE	Indonesia	Fixed Line Telecom.	21 Nov 95
20	KT CORPORATION	NYSE	S. Korea	Fixed Line Telecom.	26 May 99
21	HANARO TELECOM INC.	NASDAQ	S. Korea	Fixed Line Telecom.	30 Mar 00
22	SK TELECOM	NYSE	S. Korea	Mobile Telecom.	2 Jul 96
23	MACRONIX INTERNATIONAL COMPANY LIMITED	NASDAQ	Taiwan	Technology Hardware & Equipment	9 May 96

Note: See Table 2.

DEPOZITORINIŲ PAKVITAVIMŲ PASISKIRSTYMAS: AZIJOS IR LOTYNŲ AMERIKOS RINKOSE

C.-C. Lee, M.-P. Chen, C.-A. Li, C.-H. Chang

Santrauka

Nagrinėjami pagrindiniai Amerikos depozitoriumo pakvitavimų (ADR) grąžinimai, apimantys 1990–2007 metų laikotarpį. Straipsnio autoriai tai traktuoja kaip iki šiol netirtą reiškinį, nes analizuojamos dvi skirtingos rinkos – Azijos ir Lotynų Amerikos. Pasirinktu periodu šiose rinkose buvo jaučiamas ekonominis pakilimas. Straipsnio autoriai taiko laiko eilutės regresijos ir bendrąjį fiksuoto momento metodą. Tyrimo rezultatai parodė, kad yra tam tikrų skirtumų ne tik tarp regionų, bet ir tarp atskirų investuotojų bei jų susiformavusių požiūrių į šias rinkas. Pažymima, kad turi būti įvertinami tiek rinkos, tiek geografiniai skirtumai difersifikuojant investicijas.

Reikšminiai žodžiai: Amerikos depozitoriumo pakvitavimai, apskaitos informacija, investicijos, investuotojų požiūriai.

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