ADR and Domestic Equity Offer Performance of Identical Firms

Klaus S. Beckmann
University of South Dakota

Thanh Ngo
East Carolina University

We analyze and compare the underpricing and buy-and-hold returns of American Depositary Receipt (ADR) equity offers with preceding Initial Public Offerings (IPOs) and Seasoned Equity Offers (SEOs) of the same firms to identify differences and motivations of equity offerings free of any matching bias. We find that domestic equity offerings entail significantly larger underpricing than subsequent foreign equity offerings. The average market-adjusted buy-and-hold returns of depositary receipt equity offers are significantly lower than the underlying firm's performance at preceding domestic equity issuances over holding periods of 1 to 5 years after the respective issuances.

Keywords: underpricing, long-run performance, ADR IPO, IPO, SEO, matching bias

INTRODUCTION

Going public and selling shares to firm outsiders for the first time is one of the cornerstones of any company. Furthermore, subsequent international public issues not only provide companies with equity capital, but they also offer access to international capital markets and thereby create comparative advantages, prestige, and growth. Another benefit of international public issues is the enhanced transparency through additional reporting requirements and analyst followings, especially on the U.S. market, which incites management to maximize shareholder wealth. Equity offerings through Initial Public Offering (IPO) and Seasoned Equity Offering (SEO) programs, both domestic and global, have received substantial research interest for many decades. Two main reasons for such sustained interest are the short run positive and long run negative abnormal returns in the aftermath of equity issues, often referred to as the "two-part puzzle" (Copeland et al., 2004). In this regard, especially IPO literature has shown positive abnormal returns at the end of the first day of trading and negative abnormal returns in the long run, when compared to market indices and benchmark portfolios of matching firms. Although many explanations have been successful in clarifying part of the puzzle, research regarding this phenomenon is ongoing.

When analyzing short and long run performance of equity issuing firms, the vast majority of research uses matching techniques to compare the issuing firms to non-issuing firms with otherwise similar characteristics. Several different matching techniques have been developed over time, ranging from traditional matching techniques (e.g. finding matching firms closest in size, book-to-market and growth) to more recent techniques such as propensity score matching (e.g. finding matching firms that have as much propensity to issue new equity but choose not to issue). Despite these developments in research, the

results have been inconclusive as different techniques yield different results. Criticisms remain on whether a matching non-issuing firm is truly similar to an issuing firm on all aspects, except for the decision to issue, which is critical to identify any effects on the firm performance possibly attributed solely to the issue.

In this study, we reexamine the effects of ADR equity offerings on firm stock price performance by analyzing a sample of firms that cross-list and raise equity in foreign markets after their preceding equity issues in their respective home markets. In particular, we compare and contrast the underpricing and market adjusted buy-and-hold returns of depositary receipt equity offers with those of preceding IPOs and SEOs of the same firms to examine the incremental impacts of cross-listings and domestic equity offerings on firm valuation. In contrast to previous literature, this comparison is free of any matching bias since it involves the same firm at different points in time. Such comparison allows us to measure the added value of ADR equity offerings to the firm.

We document that domestic equity offerings entail significantly larger underpricing than subsequent foreign equity offerings. The average market-adjusted buy-and-hold returns of depositary receipt equity offers are significantly lower than the underlying firm's performance at preceding domestic equity issuances over holding periods of 1 to 5 years after the respective issuances. Furthermore, traditional matching techniques as applied in most research articles comparing the performance after IPOs and SEOs may significantly understate the degree of aftermarket performance and significantly understate the degree of underpricing.

We contribute to the two different strands of existing literature on equity offerings and on matching techniques with this research topic. Moreover, by comparing the performance of a firm upon its ADR offering with its performance upon its preceding domestic equity offerings, we help to shed more light and draw clearer conclusions on the impact of ADR offerings on firm performance. At the same time, we extend the existing literature on detecting abnormal performance with a new matching technique.

The organization of the paper is as follows. Section 2 reviews previous work and develops the hypotheses, while the data is explained in Section 3. The methodology and results appear in Sections 4 and 5, respectively. Section 6 concludes.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Literature Review

There exists extensive literature on short and long run performance of firms around equity issues. This subsection aims at presenting an overview of the results in research with respect to IPO and SEO performances for international firms.

Callaghan, Kleiman, and Sahu (1999) analyze the performance of 66 ADR equity offerings, 41 SEOs (companies that had prior issuance in their respective home markets) and 25 IPOs (no prior issuance anywhere in the world). Overall, their results indicate an underpricing (i.e. they display positive market-adjusted returns on the first trading day) of ADR IPOs and SEOs. The aftermarket return performance, in contrast to empirical research on U.S. IPOs and SEOs, for the combined sample of ADR IPOs and SEOs shows statistically significant positive abnormal returns for ADRs listed on the NYSE and significantly negative abnormal returns for ADRs listed on National Association of Securities Dealers Automated Quotations (NASDAQ) and American Exchange (AMEX). ADR IPOs have statistically significant positive cumulative abnormal market-adjusted returns over the 10-month period following the issuance. The performance of ADR SEOs exhibits significantly positive cumulative market-adjusted returns over the 1-year period subsequent to the issue. ADRs from emerging markets outperform those originating from developed countries.

Foerster and Karolyi (2000) analyze the performance of 333 non-U.S. firms that raise equity capital on the U.S. market in the period 1982-1996. The results indicate that on average, foreign equity offerings underperform home market benchmarks of comparable firms by 8%-15% over the three years following the issuance. Further, they report that firms that issue equity in major public exchanges in the U.S. modestly outperform their benchmark.

Bancel, Kalimipalli, and Mittoo (2009) examine several cross-listing theories employing a sample of 253 ADRs from 19 European countries during the 1970-2002 period. The authors find that Level II and III listings underperform 3 years in the aftermarket of the issue as compared to several benchmarks including U.S. and European industry indices.

Kadiyala and Subrahmanyam (2002) analyze a sample of 112 foreign firms issuing equity in the U.S. to determine the factors that affect IPO and SEO pricing. Specifically, their sample consists of 79 ADR IPOs and 33 ADR SEOs between 1996 and 2000. The authors find that ADR IPO discounts average 21.5% and ADR SEO discounts average 2.07%. SEO discounts are lower for firms listed in the NYSE and AMEX.

Burch and Fauver (2003) investigate the pricing of U.S. IPOs by seasoned foreign firms, i.e. firms that are already listed on their home market. Their sample is comprised of 50 foreign firms that cross-list between 1989 and 2001.The authors find an average first-day return of 12.7% for firms from countries that impose foreign ownership restrictions and capital controls. The authors suggest that this underpricing stems in part from the underwriter's failure to appropriately price the issue. Firms without ownership restrictions do not seem to be underpriced. Francis, Hasan, Lothian, and Sun (2010) analyze a sample of 413 foreign IPOs and 70 SEOs of which 151 are identified as ADRs. The authors report an average underpricing for the IPO sample firms of 10.1% and a negative average abnormal return for the SEO sample.

Schaub and Highfield (2004) examine the short-term and long-term performance of IPOs and SEOs traded as ADRs in the U.S. In particular, their sample is divided into offerings of firms that issue equity for the first time (IPOs) and offerings of firms that have issued equity before (SEOs). Furthermore, their result is split into two subsamples prior and after June 1998 to capture bear market effects after the September 11 attacks. Their results with regard to short-term and long-term performance suggest that ADRs issued prior to June 1998 underperform the S&P 500 and issues after June 1998 outperform the benchmark. The authors conclude that non-negative and even positive significant cumulative wealth effects associated with stock market timing may exist for ADR IPOs and SEOs trading during holding periods in bear markets.

Ejara and Ghosh (2004) analyze the performance of 284 ADR IPOs in the time period 1990-2001. Their results indicate underpricing of ADR IPOs by an average of 12.34%. Their sample contains 83 ADRs from companies with prior trading in the domestic market. When excluding these ADRs from the sample, the average underpricing increases to 16.59%. This implies that cross-listed firms with prior trading on the domestic market should have on average lower underpricing when compared to cross-listed firms without prior trading history. This supports the theory that there is more information available through a trading history and therefore the risk of cross-listed firms with prior trading history should be lower as well as the underpricing.

Callaghan et al. (1999) find that ADR IPOs from emerging markets outperform those from developed countries in the aftermarket performance. Overall, the authors suggest that U.S. IPOs outperform ADR IPOs in the long-run. The authors use the S&P 500 index as market benchmark, which outperforms ADR IPOs initially, and in all periods analyzed. The S&P 500 also outperforms U.S. IPOs in the periods below one year after the issuance. The authors did not test the aftermarket performance for ADR equity offerings with prior trading in the domestic market. Since these have estimated lower underpricing, the aftermarket performance should be even lower. Similar results are presented by Zhang and King (2010), who find that stock returns after listing events are generally negative for ADRs and underperform the market in the post-event window up to 3 years.

Hypotheses

The recognition hypothesis introduced by Merton (1987) implies that a cross-listed firm's valuation increases with the broadening of its U.S. investor base and with a greater visibility of the firm. Hence, cross-listing firms issuing equity in the U.S. should experience positive valuation effects after the listing. Several studies document higher visibility and analyst coverage after issuing equity in the U.S. For example, Baker, Nofsinger, and Weaver (2002) show that firms that cross-list shares on New York Stock

Exchange (NYSE) and London Stock Exchange (LSE) have increased visibility in the form of more analyst coverage and media attention. The authors also report a decrease in cost of equity following the increase in analyst coverage, which, in turn, should increase firm valuation.

However, while Foerster and Karolyi (1999) document abnormal returns for firms before and on the cross-listing date, the authors report a decline in abnormal returns after the cross-listing event. Furthermore, Foerster and Karolyi (2000) find that cross-listing firms underperform home market benchmarks of comparable firms by 8% to 15%. Ejara and Ghosh (2004) document a significant long-run underperformance of ADR equity offerings relative to matching U.S. IPOs up to three years after the issue, while both underperform the market during the same period. Similar results are also presented by Zhang and King (2010). In particular, the authors show a significant drop in profitability and asset turnover for cross-listed firms in the years after ADR IPOs. The authors explain this underperformance with rapid expansion and more intense competition when entering the U.S. market. Furthermore, ADR issuers show no significant increase in sales growth, i.e. issuers do not seem to grow faster than their respective industry peers in the three years after the issue. Finally, cross-listed firms do not seem to benefit from a reduction in the cost of debt during the first few years after the ADR offer. Hence, overall performance may fall below matched firms or benchmarks during the 5 years after the issue. Given that our empirical strategy compares the same firm at different equity issues, similar results for aftermarket performance are expected. This leads to the following hypotheses.

H1: ADR equity offerings underperform domestic IPOs of the same firms in the long-run.

H2: ADR equity offerings underperform domestic SEOs of the same firms in the long-run.

The third hypothesis derives from the bonding hypothesis. The bonding hypothesis suggests that if a foreign company agrees to list shares on stock exchanges with more rigorous regulations such as in the U.S., corporate governance should improve by binding these companies to respect shareholder rights and by increasing the amount of disclosed information about the firm. This, in turn, attracts more investors and has positive effects on a firm's value (Stulz, 1999). Hence, the bonding hypothesis implies a better performance for firms after raising equity in the U.S. compared to before the issuance. In addition, several studies find that enhanced investor protection is mainly beneficial to firm value, if the cross-listing firm lists on a major exchange in the U.S. (Doidge, Karolyi, & Stulz, 2004; Lel & Miller, 2008).

H3: Long-run performance after ADR equity offerings is significantly higher than performance after domestic IPO and SEO offerings of the same firms when listed on major US exchanges.

Foreign firms that cross-list and raise equity in the U.S. must abide by the rules and requirements set by the Security and Exchange Commission (SEC). In particular, the SEC requires firms that cross-list and issue equity under the Level III program to restate their financial statements in U.S. GAAP and to issue Form 20-F[1] each year. This leads to higher visibility of the firm, and the information asymmetry between issuer and investor should mitigate. Research on domestic IPOs suggests that underpricing relates to information asymmetry between the issuer and investors. In particular, managers underprice new issues to signal positive future prospects of the firm to uninformed investors by setting an offer price below market value. In turn, this suggests that investors who possess more information about the issuing firm should price new shares closer to its actual value and so that no signaling is necessary. This leads to the following hypothesis.

H4: ADR equity issues are less underpriced than home market IPOs of the same firms.

In addition, many firms that raise equity in foreign markets have already issued equity in their respective home markets and established an investor base with prior market trading. As such, information

about firms with trading history should be more readily available to the public than for firms without prior trading history or public issue. Hence,

H5: ADR equity issues are less underpriced than home market SEOs of the same firms.

DATA

We obtain the list of Global Depositary Receipts (GDRs) that raise capital along with information on the amount of capital raised, country of origin, exchange, effective date, industry, initial price and lead underwriter from several sources, including J.P. Morgan, Bank of New York, Citibank and NYSE. The sample period starts in 2000 and ends in 2013. All depositary receipts are publicly listed on NYSE or NASDAQ. For performance comparison, we collect similar information from the same firms with preceding equity offerings in their home markets from SDC Platinum Global New Issues. Information on financial performance including first day closing prices and stock returns is obtained from Datastream and the University of Chicago's Center for Research in Security Prices (CRSP) database. Accounting data of the sample firms upon ADR issuance are obtained from Compustat North America and prior to ADR issuance from Compustat GlobalVantage.

TABLE 1
SAMPLE DISTRIBUTION BY HOME COUNTRY

Country	Number	Percent	Country	Number	Percent
Argentina	5	2.72	Israel	6	3.26
Australia	1	0.54	Italy	6	3.26
Austria	1	0.54	Japan	8	4.35
Brazil	8	4.35	Korea	15	8.15
Chile	4	2.17	Mexico	13	7.07
China	13	7.07	Netherlands	14	7.61
Denmark	1	0.54	New Zealand	2	1.09
France	11	5.98	Norway	9	4.89
Germany	5	2.72	Portugal	7	3.80
Greece	2	1.09	Russia	4	2.17
Hong Kong	1	0.54	S. Africa	7	3.80
Hungary	2	1.09	Spain	2	1.09
India	6	3.26	Switzerland	1	0.54
Indonesia	2	1.09	Taiwan	13	7.07
Ireland	8	4.35	U.K.	7	3.80
			Total	**184**	**100.00**

Geographical information is obtained from Compustat, Bank of New York and Citibank.

We report the underpricing and after-market performance for all ADRs to show the consistency of our results with prior studies. However, our focus is on the sample of ADRs that have information on both ADR equity offer, and preceding home market equity offer. Table 1 presents the sample distribution by home country. Most firms in the sample are domiciled in Korea (15) followed by the Netherlands (14), China, Mexico and Taiwan (13). The total number of ADRs in the sample is 184 over the period 2000-2013.

METHODOLOGY

Analysis of Underpricing

Following Ejara and Ghosh (2004) and Francis et al. (2010), we measure underpricing as the percentage difference between the closing price on the first trading day and the offer price as follows.

$$UP_{DR} = \frac{CP_{DR} - OP_{DR}}{OP_{DR}} \tag{1}$$

$$UP_{EO} = \frac{CP_{EO} - OP_{EO}}{OP_{EO}} \tag{2}$$

$$UP_{Diff} = UP_{DR} - UP_{EO} \tag{3}$$

where UP_{DR} is the underpricing of the depositary receipt; CP_{DR} is the closing price of the depositary receipt at the end of the first trading day; OP_{DR} is the offer price of the depositary receipt; UP_{EO} is the underpricing of the preceding equity offering of the same firm in the home market; CP_{EO} is the closing price of stock at the preceding equity offering at the end of the first trading day; and OP_{EO} is the offer price of the preceding equity offering. Larger underpricing will result in larger positive values for both measures. Employing t-test, Wilcoxon test and bootstrapped t-test, we compare and contrast the average underpricing with the average underpricing of preceding equity issues of the same firms in their respective home market as well as matching U.S. equity issues.

We explore the determinants of underpricing by estimating the following equation:

$$UP_{i,t} = \alpha + \beta_1 LNOFFSIZE_{i,t} + \beta_2 RANK_{i,t} + \beta_3 SYND_{i,t} + \beta_4 RECPRC_{i,t} + \beta_5 DEV_{i,t} + \beta_6 HT_{i,t} + \beta_7 EXCH_{i,t} + \beta_8 LNSIZE_{i,t-1} + \beta_9 ADR_{i,t} + \epsilon_{i,t} \tag{4}$$

We pool the underpricing observations of firms from their ADR offers and their preceding domestic SEOs, i.e., we combine the underpricing observations at ADR offering and SEO along with their respective explanatory variables. In the above equation, $UP_{i,t}$ is the underpricing of firm i at time t. The independent variable of interest is the binary variable with a value of 1 if the issue is an ADR offering, and zero otherwise (ADR). To be consistent with hypotheses 4 and 5, we expect the coefficient on the ADR variable to be negative and statistically significant. This would indicate that ADR underpricing is significantly lower compared to IPO and SEO underpricing prior to the ADR equity offering.

The other control variables have been documented by existing literature to be significant in explaining IPO and SEO underpricing. In particular, these variables include: the natural logarithm of the issue size (LNOFFSIZE) of firm i at equity offering, underwriter rank (RANK) for the underwriters of firm i at the equity offering, number of underwriters in the underwriting consortium (SYND) of firm i, the reciprocal of the offer price (RECPRC), a developed country dummy (DEV) for firm i with a value of 1 if the firm is domiciled in an developed country, and 0 otherwise, a high-tech dummy (HT) with a value of 1 if the firm is in the high-tech industry, and 0 otherwise, a binary variable with a value of 1 if the firm is cross-listed in an exchange, and zero otherwise, and the natural logarithm of the firm size the year prior to the offering. Furthermore, we include year-fixed effects and country-fixed effects to control for additional potential omitted variable biases.

Analysis of Aftermarket Performance

To analyze and compare the aftermarket performance of ADR equity offerings with that of preceding home market equity issues, we calculate the buy-and-hold abnormal returns as suggested by Loughran and Vijh (1997) and Barber and Lyon (1997). The buy-and-hold abnormal return is the difference between market-adjusted holding period returns of sample ADRs and matching stocks (of the same firms at home market equity issuance) up to five years after the equity issuance events.

$$BHAR_{Issuer} = BHR_{Issuer} - BHR_{Home\ Market\ Offering} \tag{5}$$

We measure annual intervals of up to five years after the cross listing as the buy-and-hold periods starting from the month following the offering month. To explore the determinants of abnormal buy-and-hold returns, we estimate the following equation:

$$BHR_{i,t} = \alpha + \beta_1 LNOFFSIZE_{i,t} + \beta_2 RANK_{i,t} + \beta_3 SYND_{i,t} + \beta_4 RET_{i,t} + \beta_5 DEV_{i,t} + \beta_6 HT_{i,t} +$$
$$\beta_7 EXCH_{i,t} + \beta_8 ADR_{i,t} + \epsilon_{i,t} \tag{6}$$

We pool the after-market performance observations of firms from their ADR offerings and their preceding domestic SEOs, i.e., we combine the market-adjusted buy-and-hold returns of each firm for each holding period after ADR offering and SEO along with their respective explanatory variables. In the above equation, the dependent variable is the market adjusted buy-and-hold returns up to 5 years after the ADR or domestic SEO issues. The independent variables of interest are the binary variables with a value of 1 if the issue is an ADR offering, and zero otherwise (ADR) and the binary variable (EXCH) with a value of 1 if the firm is cross-listed on an exchange, and zero otherwise. Consistent with hypotheses 1 and 2, we expect the coefficient on the ADR variable to be negative and significant. This would indicate that ADR aftermarket performance is significantly lower than the aftermarket performance of the firm's stocks after the domestic offerings. Consistent with hypothesis 3, the coefficient on the EXCH variable is expected to be positive and significant, indicating that the aftermarket performance of exchange listed ADRs exceeds the performance of receipts trading over-the-counter when compared to IPO and SEO offerings of the sample firms prior to the ADR equity offering.

We control for variables that have been found significant in explaining the long-run aftermarket performance after international equity offerings. These variables include: the natural logarithm of the issue size (LNOFFSIZE) of firm i at equity offering, underwriter rank (RANK) for the underwriters of firm i at the equity offering, number of underwriters in the underwriting consortium (SYND) of firm i, the return on the first trading day of the offering (RET), a developed country dummy (DEV) for firm i with a value of 1 if the firm is domiciled in an developed country, and 0 otherwise, and a high-tech dummy (HT) with a value of 1 if the firm is in the high-tech industry, and 0 otherwise. We also include year-fixed effects and country-fixed effects to control for additional potential omitted variable biases.

RESULTS

Underpricing

Table 2 reports average underpricing as percentages for ADR offerings and for alternative matching samples by market listing. In Panels A and B, we look into the underpricing of all ADRs to show the consistency of our results with prior studies results. The average initial day return for all ADRs is 6.92% as compared to 25.31% initial day return for a sample of matching U.S. IPOs in the same year as the ADR offering (Panel A). The difference between the samples is negative and statistically significant, suggesting that ADR offerings are significantly less underpriced than the matching sample. In Panel B, we compare the same sample of ADR offerings with another sample of matching U.S. IPOs in the same offering year with the closest offer price and principal amount raised at the offering[2]. The results reveal that when matched on these characteristics, the underpricing of U.S. IPOs is reduced to just 0.6 percent. The difference between the samples changes to be positive and statistically significant, suggesting that ADR offerings are significantly more underpriced than the matching sample when changing the parameters of the matching sample.

The results in Panels A and B of Table 2 suggest the existence of a matching bias for comparison purposes. Specifically, with alternative matching techniques, the matching sample may change and so can the analysis of underpricing and its determinants. To avoid such matching bias, we compare the underpricing of the sample ADRs with that of preceding equity offerings of the same firms in their

respective home market in Panels C and D. Given that data on preceding domestic IPO and SEO is not available for all ADRs, the sample size in Panels C and D is smaller than in Panels A and B. The average underpricing of our sample of interest is 13.08% for ADR offerings, in comparison to the 43.16% average underpricing for these firms at their respective domestic IPO offering.

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TABLE 2
COMPARISONS OF UNDERPRICING BETWEEN ADR AND ALTERNATIVE MATCHING SAMPLES

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	Percentage Underpricing (%)		
		Exchange Listed	
Type of Offering	Total	ADRs	OTC ADRs
Panel A: ADR vs. US IPO in the same offering year			
ADR	6.918	6.398	8.524
US – IPO	25.310	21.940	35.721
Difference in Underpricing	-18.392	-15.542	-27.197
t-stat	(-6.44 ***)	(-4.65 ***)	(-5.13 ***)
Panel B: ADR vs. US IPO in the same offering year with the closest offer price and principal amount raised at the offering			
ADR	6.918	6.398	8.524
US – IPO	0.604	0.505	0.912
Difference in Underpricing	6.313	5.893	7.612
t-stat	(2.79 **)	(2.19 **)	(1.85 *)
Panel C: ADR vs. the respective domestic IPO			
ADR	13.076	0.785	19.694
Sample Firm Domestic IPO	43.158	33.997	48.091
Difference in Underpricing	-30.082	-33.213	-28.396
t-stat	(-2.80 **)	(-3.89 ***)	(-1.76 *)
Panel D: ADR vs. the respective domestic SEO			
ADR	4.607	2.562	9.442
Sample Firm Domestic SEO	12.456	19.396	-3.949
Difference in Underpricing	-7.848	-16.834	13.391
t-stat	(-1.29)	(-2.35 **)	(1.48)

Underpricing is measured as the percentage difference between the closing price on the first trading day, and the offer price. Offer price is obtained from Compustat, Bank of New York and Citibank. Closing price is obtained from Datastream. Exchange listed refers to NYSE. OTC refers to over-the-counter ADRs including NASDAQ.
*, **, *** represent significance at 10 percent, 5 percent, and 1 percent levels, respectively.

The difference between the underpricing of these two types equity offerings is negative and statistically significantly, suggesting that companies on average significantly less underprice their ADR equity offering compared to their domestic IPO. This result provides supporting evidence for Hypothesis 4. Similar results are observed when comparing the sample of ADRs to preceding SEOs (Panel D) in the home market. However, the difference is only statistically significant and negative for exchange listed ADRs providing some supporting evidence for Hypothesis 5.

Table 3 presents the results of the cross-sectional analysis of underpricing for ADR offerings and their respective domestic IPOs. In this analysis, we pool the underpricing observations of firms from their ADR offerings and their preceding domestic IPOs, i.e., we combine the underpricing observations at ADR offering and IPO along with their respective explanatory variables. In all four models, the

dependent variable is underpricing (UP). The variable of interest is ADR. The coefficient on the ADR variable is negative and statistically significant at the 1% level across all four models, suggesting that the underpricing observed at ADR equity offerings is significantly lower than the underpricing observed at domestic IPOs of the same firms.

TABLE 3
ANALYSIS OF UNDERPRICING OF ADR IPO VS. DOMESTIC IPO

Independent Variables	Model 1	Model 2	Model 3	Model 4
LNOFFSIZE	0.016	0.026	0.035	0.023
	(0.835)	(1.153)	(1.596)	(0.867)
RANK	0.006	0.007	-0.001	0.001
	(1.147)	(1.106)	(-0.176)	(0.187)
SYND	0.022	0.038	0.055	0.054
	(0.669)	(1.037)	(1.596)	(1.434)
RECPRC	-0.499	-0.021	0.373	0.557
	(-0.919)	(-0.034)	(0.659)	(0.813)
DEV	0.102**	0.053	0.425***	0.347*
	(2.227)	(1.007)	(2.860)	(1.945)
HT	0.020	0.042	-0.058	-0.050
	(0.487)	(0.955)	(-1.382)	(-1.050)
EXCH	0.017	-0.044	0.023	-0.007
	(0.340)	(-0.792)	(0.410)	(-0.098)
LNSIZE	-0.015***	-0.014**	0.004	0.009
	(-2.677)	(-2.214)	(0.393)	(0.672)
ADR	-0.313***	-0.347***	-0.242***	-0.274***
	(-4.760)	(-4.904)	(-3.903)	(-4.148)
Constant	0.113	0.315	-0.646	-0.371
	(0.306)	(0.756)	(-1.553)	(-0.720)
Year-fixed effects	No	Yes	No	Yes
Country-fixed effects	No	No	Yes	Yes
Observations	174	174	174	174
Adj. R-squared	0.210	0.297	0.523	0.568
F	4.836***	2.097***	4.173***	2.745***

The dependent variable is the underpricing of ADR and their preceding domestic IPO. LNOFFSIZE is the natural logarithm of the total dollar amount offered at ADR equity offering, RANK is the underwriter rank obtained from Jay Ritter's website, SYND is the number of underwriters in the consortium including the lead underwriter, RECPRC is the reciprocal of the offer price, DEV is a dummy variable that has the value of 1 if a company is domiciled in a developed country as defined by the World Bank, and 0 otherwise; HT is a dummy variable that has the value of 1 if the company is in the high-tech industry, EXCH is a dummy variable that has the value of 1 if the ADR is listed on the NYSE, LNSIZE is the natural logarithm of the size of the firm the year before the offering, ADR is a dummy variable that has the value of 1 if the issue is an ADR issue, and zero otherwise. t-statistics in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

This is consistent with the prediction of Hypothesis 4. The negative coefficient of -0.313 in Model 1 of Table 3 suggests that on average for every dollar left on the table at domestic IPOs the same company leaves only around 69 cents on the table[3] at ADR equity offerings. The result illustrates how underpricing can vary depending on market locale. Given the average amount of equity raised at equity offerings this difference may also be of economic significance. The other statistically significant coefficient across three of four models is the status of country development (DEV). In particular, the positive and statistically significant coefficient suggests that companies from developed countries leave on average more money

on the table at ADR and IPO offerings compared to companies from developing countries. This result is consistent with the findings by Ejara and Ghosh (2004).

Table 4 presents the results of the cross-sectional analysis of underpricing for ADR offerings and their respective domestic SEOs. In this analysis, we pool the underpricing observations of firms from their ADR offerings and their preceding domestic SEOs, i.e., we combine the underpricing observations at ADR offering and SEO along with their respective explanatory variables. In all four models, the dependent variable is underpricing (UP).

TABLE 4
ANALYSIS OF UNDERPRICING OF ADR IPO VS. DOMESTIC SEO

Independent Variables	Model 1	Model 2	Model 3	Model 4
LNOFFSIZE	0.005	0.007	0.023	0.010
	(0.255)	(0.348)	(1.014)	(0.369)
RANK	0.008	0.008	0.005	0.006
	(1.521)	(1.520)	(0.964)	(1.023)
SYND	0.006	0.018	0.028	0.030
	(0.183)	(0.529)	(0.801)	(0.804)
RECPRC	-0.652	-0.079	0.033	0.346
	(-1.297)	(-0.138)	(0.059)	(0.515)
DEV	0.115**	0.067	0.441***	0.367**
	(2.547)	(1.334)	(2.810)	(1.985)
HT	-0.068*	-0.054	-0.124***	-0.128***
	(-1.690)	(-1.265)	(-2.795)	(-2.636)
EXCH	0.074	0.026	0.093	0.080
	(1.508)	(0.476)	(1.551)	(1.163)
LNSIZE	-0.009*	-0.007	-0.004	-0.001
	(-1.795)	(-1.149)	(-0.386)	(-0.041)
ADR	-0.087*	-0.104**	-0.133***	-0.143***
	(-1.898)	(-2.136)	(-2.887)	(-2.921)
Constant	0.061	0.291	-0.453	-0.201
	(0.172)	(0.732)	(-1.044)	(-0.382)
Year-fixed effects	No	Yes	No	Yes
Country-fixed effects	No	No	Yes	Yes
Observations	191	191	191	191
Adj. R-squared	0.099	0.203	0.358	0.420
F	2.201**	1.413*	2.384***	1.735***

The dependent variable is the underpricing of ADR and their preceding domestic SEO. LNOFFSIZE is the natural logarithm of the total dollar amount offered at ADR equity offering, RANK is the underwriter rank obtained from Jay Ritter's website, SYND is the number of underwriters in the consortium including the lead underwriter, RECPRC is the reciprocal of the offer price, DEV is a dummy variable that has the value of 1 if a company is domiciled in a developed country as defined by the World Bank, and 0 otherwise; HT is a dummy variable that has the value of 1 if the company is in the high-tech industry, EXCH is a dummy variable that has the value of 1 if the ADR is listed on the NYSE, LNSIZE is the natural logarithm of the size of the firm the year before the offering, ADR is a dummy variable that has the value of 1 if the issue is an ADR issue, and zero otherwise. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The variable of interest is the dummy variable for ADR offerings. The coefficient on the ADR variable is negative and statistically significant across all four models, suggesting that the underpricing observed at ADR equity offerings is significantly less compared to underpricing observed at domestic SEOs. Moreover, the negative coefficient of -0.087 in Model 1 of Table 4 suggests that on average for

every dollar left on the table at domestic SEOs the same company leaves only around 91 cents on the table at ADR equity offerings. This result again underlines the importance of differences in underpricing depending on market locale. The other two statistically significant coefficients across three of four models are the status of country development and company sector. The positive and statistically significant DEV coefficient suggests that companies from developed countries leave on average more money on the table at ADR and SEO offerings than companies domiciled in developing countries. The negative and statistically significant HT coefficient suggests that high-tech firms significantly less underprice their SEO and ADR offerings than non-high-tech firms do.

Aftermarket Performance
In Panels A, B and C of Table 5, we compare the underpricing of all ADRs with alternative matching U.S. IPO samples to show the consistency of our results with prior studies results.

TABLE 5
BUY-AND-HOLD RETURN (BHR) AND BUY-AND-HOLD ABNORMAL
RETURN (BHAR) COMPARISON

	Average Holding Period Returns				
	Year 1	Year 2	Year 3	Year 4	Year 5
Panel A: Average BHR for ADR equity offerings					
ADR IPO	19.40%	24.63%	32.20%	47.05%	60.28%
CRSP value-weighted index	8.70%	15.40%	22.56%	29.33%	35.32%
Diff (market adj. BHR)	10.70%	9.24%	9.64%	17.71%	24.96%
t-stat	(1.79*)	(1.25)	(1.28)	(1.99**)	(2.40**)
Panel B: Avg. market-adj. BHR for US IPO matching firms in the same offering year					
Market adj. ADR	10.70%	9.24%	9.64%	17.71%	24.96%
Market adj. US IPO	-7.54%	-8.12%	-7.07%	-8.33%	-9.51%
Diff (market adj. BHAR)	18.25%	17.35%	16.71%	26.04%	34.46%
t-stat	(2.98***)	(2.28**)	(2.16**)	(2.86***)	(3.27***)
Panel C: Avg. market-adj. BHR for US IPO matching firms in the same offering year with the closest offer price and principal amount raised at the offering					
Market adj. ADR	10.70%	9.24%	9.64%	17.71%	24.96%
Market adj. US IPO	0.14%	0.15%	0.20%	0.19%	0.23%
Diff (market adj. BHAR)	10.56%	9.08%	9.44%	17.52%	24.73%
t-stat	(1.77 *)	(1.23)	(1.25)	(1.97 **)	(2.37 **)
Panel D: Avg. market-adj. BHR for sample firm domestic IPO					
Market adj. ADR	-3.06%	-15.46%	-11.22%	-2.89%	-7.31%
Market adj. sample IPO	12.89%	31.56%	16.80%	16.87%	41.21%
Diff (market adj. BHAR)	-18.79%	-45.06%	-19.16%	-18.24%	-55.17%
t-stat	(-2.50**)	(-3.03***)	(-1.16)	(-0.84)	(-2.12**)
Panel E: Avg. market-adj. BHR for last sample firm domestic SEO					
Market adj. ADR	3.87%	-1.03%	3.50%	-4.47%	-3.52%
Market adj. sample SEO	13.04%	8.92%	-1.05%	-3.06%	19.14%
Diff (market adj. BHAR)	-7.85%	-7.95%	2.84%	-0.98%	-27.70%
t-stat	(-0.66)	(-0.59)	(0.20)	(-0.48)	(-1.98 **)

*, **, *** represent significance at 10 percent, 5 percent, and 1 percent levels, respectively.

We calculate the market-adjusted buy-and-hold returns up to five years starting from the second day following the offering as suggested by Loughran and Vijh (1997). The market-adjusted buy-and-hold return is the difference in the buy-and-hold return of ADR equity offerings and that of the CRSP value weighted index[4]. In Panel A of Table 5, the ADR sample on average outperforms the market in all periods. While Ejara and Ghosh (2004) show a slight underperformance of ADRs as compared to the S&P 500 over the same period, their reported result is not statistically significant.

Panel B compares the average market adjusted buy-and-hold returns for ADRs and for the sample of all U.S. IPOs in the same year of the ADR offering. In all periods, the ADRs significantly outperform the matching sample. Similar results are obtained in Panel C when the matching subsample includes all U.S. IPOs in the same offering year with the closest offer price and principal amount raised at the offering[5]. These results stand in sharp contrast to those obtained in Panel D, where ADR performance is compared to the sample firms' domestic IPOs[6]. In all periods analyzed, the ADR performance is on average less than the performance after domestic IPOs. Similar results are obtained when comparing ADR performance with preceding SEO performance as shown in Panel E. These results provide strong empirical support for Hypotheses 1 and partially for Hypothesis 2. In summary, the long-run performance after ADR equity offers compared to home market offers of the same companies is inferior over periods of 1 to 5 years.

Table 6 presents the results of the cross-sectional analysis of the BHR analysis for ADR offerings and their respective domestic IPOs. In this analysis, we pool the BHR observations of firms from their ADR offerings and their preceding domestic IPOs, i.e., we combine the buy-and-hold returns of each firm for each holding period after ADR offering and IPO along with their respective explanatory variables. The dependent variables are the market-adjusted buy-and-hold returns (BHR) for the periods between 12 months (BHR12) and 60 months (BHR60) after the ADR or domestic IPO equity offering.

TABLE 6
BHR ANALYSIS OF ADR IPO VS. DOMESTIC IPO

Independent Variables	BHR12	BHR24	BHR36	BHR48	BHR60
LNOFFSIZE	0.169	0.290	0.352	-0.130	0.235
	(1.244)	(1.077)	(1.175)	(-0.089)	(0.498)
RANK	-0.036	0.185	0.155	0.978	0.048
	(-0.159)	(0.414)	(0.312)	(0.362)	(0.061)
SYND	-0.080	0.120	-0.004	-1.334	-0.009
	(-0.411)	(0.312)	(-0.010)	(-0.457)	(-0.014)
RET	-0.024	-0.590	-1.008	1.718	-1.470
	(-0.050)	(-0.618)	(-0.948)	(0.241)	(-0.878)
DEV	-1.428***	-2.302**	-4.651***	-3.255*	-2.080
	(-2.774)	(-2.252)	(-4.088)	(-1.767)	(-1.161)
HT	0.210	0.127	0.448	3.519	0.800
	(0.453)	(0.138)	(0.437)	(0.531)	(0.496)
EXCH	0.210	0.886	0.659	-1.151	0.076
	(0.467)	(0.990)	(0.662)	(-0.311)	(0.048)
ADR	-0.188**	-0.451***	-0.192	-0.188	-0.552**
	(-2.533)	(-3.060)	(-1.169)	(-0.808)	(-2.138)
Constant	-1.762	-5.886	-4.589	-4.634	-3.604
	(-0.432)	(-0.727)	(-0.510)	(-0.368)	(-0.254)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	62	62	62	62	62
Adj. R-squared	0.808	0.772	0.841	0.760	0.720
F	4.343***	3.497***	5.485***	3.054***	2.662***

The dependent variables are the market-adjusted aftermarket performance of ADRs and matching sample measured as the buy-and-hold returns following Loughran and Vijh (1997), and computed on the closing prices (after adjustment for dividends and stock-splits) on second trading day after equity offering, and the last day of the holding period. BHR12 refers to a one-year holding period; BHR24 refers to a two-year holding period; BHR36 refers to a three-year holding period; BHR48 refers to a four-year holding period and BHR60 refers to a five-year holding period; t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The independent variables of interest are the dummy variables ADR and EXCH. Over all periods, the coefficient on the ADR variable is negative and statistically significant at various levels, suggesting that on average the long-run performance observed after ADR equity offerings is significantly lower compared to the long-run performance after domestic IPOs of the same firms. These findings are consistent with Hypothesis 1 and point towards differences in long-run performances depending on market locale. The other statistically significant coefficient across four of the five years analyzed is the status of country development. In particular, the negative and statistically significant coefficient on DEV suggests that on average companies from developed countries experience fewer valuation effects than companies from emerging countries. Finally, although the coefficient for the EXCH variable is positive in 4 out of the 5 analyzed periods, it is not statistically significant providing no support for Hypothesis 3.

Table 7 presents the results of the cross-sectional analysis of the BHRs for ADR offerings and their respective domestic SEOs. In this analysis, we pool the BHR observations of firms from their ADR offerings and their preceding domestic SEOs, i.e., we combine the buy-and-hold returns of each firm for each holding period after ADR offering and SEO along with their respective explanatory variables. Although, the coefficients for the ADR variables are negative for the first two years of the analysis, their magnitude is not statistically significant giving no empirical support for Hypothesis 2. The coefficient for the EXCH variable is positive in all analyzed periods and statistically significant in year 2 at the 1% level. This provides some support for Hypothesis 3.

TABLE 7
BHR ANALYSIS OF ADR IPO VS. DOMESTIC SEO

Independent Variables	BHR12	BHR24	BHR36	BHR48	BHR60
LNOFFSIZE	-0.090	-0.197	-0.292**	-0.343***	-0.196
	(-0.700)	(-1.355)	(-2.026)	(-2.854)	(-1.430)
RANK	0.182**	0.019	0.041	-0.001	-0.041
	(2.213)	(0.202)	(0.442)	(-0.010)	(-0.474)
SYND	0.183	-0.025	-0.228	-0.316	-0.151
	(0.677)	(-0.081)	(-0.759)	(-1.338)	(-0.528)
RET	0.140	-0.063	-0.440	-0.125	0.036
	(0.201)	(-0.080)	(-0.567)	(-0.211)	(0.050)
DEV	2.881***	2.190**	0.140	0.005	-0.744
	(3.236)	(2.183)	(0.141)	(0.005)	(-0.789)
HT	-0.441	-0.571	-0.144	0.215	0.145
	(-0.800)	(-0.919)	(-0.235)	(0.424)	(0.248)
EXCH	1.117	3.271***	1.336	0.711	0.529
	(1.548)	(4.024)	(1.660)	(1.029)	(0.694)
ADR	-0.170	-0.044	0.096	0.084	-0.167
	(-1.262)	(-0.287)	(0.638)	(0.724)	(-1.170)
Constant	-3.969	-1.312	5.043	5.263	4.483
	(-1.240)	(-0.364)	(1.412)	(-1.694)	(1.324)
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	104	104	104	104	104
Adj. R-squared	0.469	0.579	0.539	0.655	0.617
F	1.575*	2.455***	2.083***	3.149***	2.874***

The dependent variables are the market-adjusted aftermarket performance of ADRs and matching sample measured as the buy-and-hold returns following Loughran and Vijh (1997), and computed on the closing prices (after adjustment for dividends and stock-splits) on second trading day after equity offering, and the last day of the holding period. BHR12 refers to a one-year holding period; BHR24 refers to a two-year holding period; BHR36 refers to a three-year holding period; BHR48 refers to a four-year holding period and BHR60 refers to a five-year holding period; t-statistics in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness of Results

The validity of the results from the OLS regressions in the preceding section rests on the assumptions of uncorrelated exogenous independent variables and homoscedastic and serially uncorrelated errors. We run a series of tests to assess whether such assumptions hold and thus OLS is the proper estimator for equations (4) and (6). First, as it is possible that there are high correlations among predictor variables, leading to unreliable and unstable estimates of regression coefficients, we test for multicollinearity using the tolerance (TOL) and variance inflation factor (VIF). The results indicate that both measures are within the acceptable range[7], suggesting no issues with multicollinearity. Second, we employ the White test as developed by White (1980) to establish whether the residual variance in the regression model is constant. The results of the analysis show no evidence of heteroscedasticity[8]. Third, we use the Jarque-Bera normality test as introduced by Jarque and Bera (1980). The results suggest no rejection of the null hypothesis of normal distribution of the residuals for most models analyzed[9]. Furthermore, the normality test has known issues with small sample sizes, i.e. the Chi-squared approximation is overly sensitive and can lead to rejection of the null hypothesis while normality is in fact present. The models showing rejection of the null hypothesis are in fact the models with the smallest sample sizes.

CONCLUSIONS

In this study, we reexamine the effects of DR equity offerings on firm stock price performance by analyzing a sample of firms that cross-list and raise equity in foreign markets after their preceding equity issues in their respective home markets. In particular, we compare and contrast the underpricing and market-adjusted buy-and-hold returns of depositary receipt equity offers with those of preceding IPOs and SEOs of the same firms to examine the incremental impacts of cross-listings and domestic equity offerings on firm valuation. In contrast to previous literature, this comparison is free of any matching bias since it involves the same firm at different points in time. Such comparison allows us to measure the added value of DR equity offerings to the firm.

The results indicate that firms underprice their domestic equity offerings significantly more than their foreign equity offerings. This suggests that firms signal relatively higher future expectations about firm performance after their domestic offers. At the same time, we report that the average market-adjusted buy-and-hold returns for ADRs underperform the companies' preceding domestic issuances over holding periods of 1 to 5 years after the equity issuance giving additional support for the signaling hypothesis. Finally, comparing our results to prior literature, we find that ADRs that issue equity and that have prior trading in their domestic market are significantly less underpriced than pure ADR IPOs as reported by Ejara and Ghosh (2004). This gap in underpricing may be explained by less information asymmetry for firms with trading history. By comparing the performance of a firm upon its ADR offering with its performance upon its preceding domestic equity offerings, we shed more light and draw clearer conclusions on the impact of ADR offerings on firm performance. At the same time, we extend the existing literature on detecting abnormal performance with a novel matching approach.

ENDNOTES

1. Annual report pursuant to section 13 or 15(d) of the Security Exchange Act of 1934. The financial statements shall disclose an information content substantially similar to financial statements that comply with U.S. generally accepted accounting principles and Regulation S-X.

2. We also employ matching techniques based on year and SIC code with similar results as those reported in Panel B.
3. The negative ADR coefficient of -0.313 implies that for every unit change in IPO underpricing, the ADR underpricing is around 31% lower. This implies that when companies left $1.00 on the table at home market IPO issues they only left $0.69 on the table at ADR issues. For other models, the numbers vary slightly.
4. Using alternative indices such as CRSP equally weighted index yield similar results.
5. We also employ matching techniques based on year and SIC with similar results as reported in Panel C.
6. The domestic IPO and SEO performances are adjusted by their respective domestic MSCI-index.
7. Only in two models analyzed two VIF values exceeded the value of 2 suggesting acceptable range and no concerns with multicollinearity.
8. The white test is based on the null hypothesis that the variance is constant. All models analyzed have large probabilities (p-value > 0.2) suggesting acceptance of the null hypothesis of constant variance.
9. The Jarque-Bera test is based on the null hypothesis that the residuals follow a of normal distribution. With the exception of two models, all models analyzed have large probabilities suggesting acceptance of the null hypothesis of normal distribution of the residuals error terms.

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