

Profit Warnings and the Pricing Behavior of ADRs

Dave Jackson and Jeff Madura

We assess the pricing behavior of American Depositary Receipts (ADRs) in response to information about their profitability. Specifically, we test for leakage effects and lagged effects, and we assess the cross-sectional variation in market inefficiencies related to profit warnings by foreign firms listed on U.S. stock exchanges as ADRs. Foreign firms experience strong negative valuation effects at the time of the profit warning. Furthermore, there are pronounced leakage effects, which suggests that some market participants were able to capitalize on inside information before the profit warnings were issued. We also find statistically significant evidence of a three-day lag effect following the profit warning, which suggests that investors who did not have inside information could profit from a warning. When using the leakage as a proxy, the degree of market inefficiency is more pronounced for firms in the technology sector, but the extent of government ownership or countries of origin are not significant determinants of market revaluation following a profit warning. Overall, the pricing behavior of ADRs in response to profit information allows for potential arbitrage opportunities.

Since the mid-1980s, U.S. investors have been seeking new opportunities for growth and portfolio diversification by investing in international securities. And they have found these opportunities by using American Depositary Receipts (ADRs). Compared to the often complex and expensive mechanics of cross-border investments, ADRs offer a convenient and easy-to-use way to add global diversity to U.S. portfolios. At the same time, by issuing ADRs in the U.S. market, foreign firms can raise capital and increase liquidity through broader share-ownership dispersion than would have been possible in the home market.

The rapid growth of the ADR market has motivated numerous theoretical and empirical studies. Researchers have addressed many issues pertaining to the specific nuances of ADRs. For example, Rosenthal [1983] and Webster [1998] examine market efficiency and arbitrage opportunities in the ADR market. Jayaraman, Shastri, and Tandon [1993] examine stock

price volatility, and find that daily excess return and volatility increases following an ADR listing.

Wahab and Khandwala [1993] provide evidence of the diversification benefits of ADRs, while Alexander, Eun, and Janakiraman [1988] examine the impact of an ADR listing on asset pricing. Lastly, Foerster and Karolyi [1998] and Werner and Kleidon [1996] show that an ADR listing improves a stock's liquidity and increases market integration across national boundaries.

We use profit warning announcements to assess the efficiency of the ADR market as well as the behavior of investors in foreign shares. The market efficiency of ADRs has been assessed in terms of the synchronization between the prices in the foreign market and the U.S. market. But we focus on ADR price adjustment in response to information about a firm's profitability. Specifically, we assess whether profit warning information is embedded in ADR prices, and whether investors price foreign stocks to account for earnings information about a single quarter. While there is evidence that profit warnings by U.S. firms cause a stock price response (Jackson and Madura [2002]), there is some question whether the same effect is present in foreign markets.

Background on ADRs

ADRs are negotiable certificates or financial instruments that provide U.S. investors with ownership rights to stocks in a foreign country. An individual ADR may represent either a number of ordinary shares, or just a fraction of a share of the underlying stock.

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ADRs are created when the depository bank that holds the underlying securities in the country of origin issues a negotiable certificate. ADRs trade easily and conveniently in U.S. dollars and settle through U.S. clearinghouses. Their main purpose is to simplify the process of international diversification for U.S. investors, increase liquidity, and thereby reduce costs. ADRs also provide overseas firms with access to U.S. markets.

By enabling foreign firms to tap U.S. equity markets, ADRs offer an additional avenue for raising capital, often at highly competitive costs. For firms with a desire to build a stronger presence in the U.S., an ADR program can help finance U.S. initiatives or facilitate U.S. acquisitions. Additionally, an ADR program can stimulate investor interest, enhance a firm's visibility, broaden its shareholder base, and increase stock liquidity. During 1997 to 1999, foreign firms raised \$50 billion in capital using ADRs.¹

An ADR program may be sponsored or unsponsored. A sponsored program is initiated by the issuing company when it wants to trade its shares in the U.S. to raise capital, increase liquidity, or achieve broader ownership dispersion. Unsponsored programs are initiated by depository banks to meet U.S. investor demand for foreign company shares.

ADR programs fall into four major categories: Levels I, II, III, and private placements.

Level I ADRs are traded in the over-the-counter markets (OTC), or on pink sheets, and do not require Securities and Exchange Commission (SEC) approval. There is no disclosure requirement, and compliance with U.S. Generally Accepted Accounting Principles (GAAP) is not required. These ADRs are the easiest and lowest-cost method for foreign firms to access the U.S. market. Many firms start with a Level I program, with the goal of later upgrading to Level II or III.

Level II ADRs are primarily issued to gain access to the U.S. markets and enhance the underlying stocks' liquidity. These types of ADRs are publicly traded on the major exchanges (the NYSE, the AMEX, and Nasdaq), and must meet full disclosure requirements and comply with U.S. GAAP. Note that when Level I and II ADRs are issued, the foreign firm does not issue new shares; instead, shares are purchased by the broker in the secondary market, deposited with the custodian bank, and ADRs are issued in exchange at some fixed ratio.

Level III ADRs represent new shares, are issued to raise capital, and are also publicly traded on the NYSE, the AMEX, and Nasdaq. They must comply with full disclosure and GAAP. Firms issuing Level III ADRs may be going public for the first time, or they may be public companies in their home country that have shares trading in the local market.

Private Placement ADRs are private placement issues that trade among qualified institutional buyers

(QIBs). QIBs are large institutions, dealers, or banks that own and invest (on a discretionary basis) in significant amounts of securities (\$100 million for institutions and banks, \$10 million for dealers). Banks are further required to have a net worth of at least \$25 million. Since these ADRs are not publicly traded, full disclosure and GAAP compliance are not required. By issuing private placement ADRs, a firm can raise capital in the PORTAL, which is an electronic trading system, similar to Nasdaq, in which the QIBs trade.

Related Research

The ADR literature can be grouped into broad categories such as agency theory, signaling theory, and the diversification hypothesis. Most early ADR research focused on the correlation of returns with the underlying stock in the home market. Some researchers also investigated which market exerted greater influence on ADR returns.

Alexander, Eun, and Janakiraman [1988] examined monthly returns for a thirty-six-month period for a sample of thirty-four first-time international listings on the NYSE, AMEX, and Nasdaq between 1969 and 1982. They found that international security listings are generally associated with reductions in expected returns, primarily because of market segmentation. Based on this finding, ADR returns should be generally lower than returns for U.S. stocks in similar industries.

Eun and Resnick [1988] use multicurrency diversification and hedging via forward exchange contracts to control for foreign exchange rate volatility and derive a strategy for predicting international portfolio returns. They include a measure for risk estimation, which improves on earlier work because it quantifies the realizable portion of potential gains from international diversification. The resulting portfolio consistently outperforms the U.S. domestic portfolio in out-of-sample periods, suggesting a practical application of the methodology to investing in the ADR market.

Roll [1992] examines twenty-four international stock market indices and finds that the extent of industry diversification partly determines the fluctuation in values. By using a cross-sectional (interfirm) model and controlling for exchange rate fluctuations, Roll identified the extent of the country and industry effects on the volatility and absolute level of the index. He found that a significant portion of the international structure correlation among country returns can be ascribed to the industrial compositions of the country indices. Hence, two countries will be more highly correlated if their industrial makeup is similar.

This finding provides a guide to international diversification through ADRs. For example, U.S. investors who are heavily invested in the domestic market can diversify using ADRs by taking into account the country effect as well as the industry effect.

Jayaraman, Shastri, and Tandon [1993] examine changes in the risk and return of the underlying stock subsequent to the listing of ADRs on a U.S. exchange. They hypothesize that cross-listing results in greater volatility of the underlying stock, because returns are generated by a two-factor model (the domestic and U.S. market factors) instead of the previous one-factor model. They find a statistically significant increase in stock price volatility, and, by extension, ADR price volatility. And, because the ADR listing provides access to another capital market, companies can choose the lower-cost source when raising capital.

Callaghan, Kleiman, and Sahu [1996] investigate the investment characteristics and performance measures of 134 ADRs over 1983-1992. They show that ADRs provided a higher monthly return and a higher standard deviation than the Morgan Stanley Capital International Perspective (MSCIP) world index. Both the ADR sample and the MSCIP index have lower betas than the S&P 500. ADRs also offered greater return per unit of risk than the MSCIP. This study suggests that ADRs should receive significant weighting in portfolios of investors using an international diversification strategy.

A follow-up study by Callaghan, Kleiman, and Sahu finds that initial public offerings and seasoned equity offerings of ADRs yield significantly positive market-adjusted returns both in early trading and over the longer run. This result differs from several studies of IPOs and seasoned equity offerings of U.S. stocks that consistently provide statistically significant short-term positive abnormal returns and negative long-term returns. This implies that ADR returns are affected by factors other than those of U.S. stocks.

Patro [2000] analyzes 123 ADRs from 16 countries using returns from 1992 to 1997. He finds that the returns on ADRs have significant risk exposures to the world market portfolio and to their respective home market portfolios. He also finds that ADRs do not have significant risk exposures to changes in their home currency's exchange rates.

Hypotheses

Our hypotheses focus on the share price response of ADRs to profit warnings by their respective firms. We conduct tests of these hypotheses to suggest inferences about the pricing of foreign stocks in response to this profit information.

Share Price Response of ADRs to Profit Warnings

The capital markets in developing countries are less efficient, less integrated with the U.S. capital markets, and more risky than developed country capital markets (Bailey and Lim [1992]). Hence, U.S. investors incur

higher costs to gather information about companies from developing countries. The implication is that investors will rely more heavily on company information issued by ADR firms than U.S. firms. As a result, profit warnings from ADR firms could have a pronounced impact on their valuations.

However, it is important to note that investors in a foreign country may process profit information differently than U.S. investors. We argue that profit warnings may not be material because they may only affect profits over the prevailing quarter. To the extent that investors in foreign stocks use a long-term perspective, this information may be discounted.

Leakage of Profit Warning Information

Beyond the impact, we expect some leakage of profit warning information, particularly because foreign securities are not subject to the provisions of SEC Regulation FD (which governs fair disclosure). Given that foreign firms can still use selective disclosure, we assess whether there is a leakage of information that would be beneficial to some investors. Such evidence would suggest a form of market inefficiency, as some investors would appear to act on information ahead of the firm's formal profit warning announcement.

Lagged Effect of Profit Warnings

We also test for lagged effects of the profit warning announcement to determine the speed of investor response. If the market response is not complete at the time of the announcement, that is evidence of another type of market inefficiency.

Factors Affecting Share Price Response of ADRs to Profit Warnings

To the extent that there are market inefficiencies associated with ADRs, the degree of inefficiency varies. First, profit warnings that reflect an expected loss may be more of a shock than those that reflect positive profits. And the potential to capitalize on an inefficiency should be greater for profit warnings that are more shocking.

Second, there is more uncertainty surrounding ADRs of technology firms, which may result in greater inefficiencies for these firms. Third, since the level of information asymmetry is expected to be greater for ADRs from developing countries, inefficiencies are also more likely for these firms.

Fourth, firms with a large proportion of government ownership usually underperform the market (see Megginson, Nash, and Randenborgh [1994]). So profit warnings may be more surprising for firms with less government ownership. In addition, firms with a high level of government ownership may keep investors

more informed about their performance. Therefore, firms with less government ownership may be subject to greater market inefficiencies.

Methodology

We derive abnormal returns in order to test the three hypotheses. The abnormal return for each stock is measured using standard event study procedures such as those used by Comment and Jarrell [1991]. ADRs have been shown to mirror the U.S. stock market (e.g., Officer and Hoffmeister [1987]), although the underlying stock represents a firm's operations in foreign countries. Hence we calculate the market model residual, the difference between the stock's actual and predicted return based on the market return for that period. To determine individual stock price betas, we use an estimation period of 200 trading days,² ending fifteen days before the event date.

To determine whether the leakage of information is conditioned on characteristics about the foreign firm that issued the profit warning, we apply the following cross-sectional model:

$$CAR_j = \beta_0 + \beta_1 IND_j + \beta_2 PROFDUM_j + \beta_3 DEV_j + \beta_4 GOV_j + \epsilon \quad (1)$$

where:

AR_j = the announcement day abnormal return for ADR firm j .

$PROFDUM_j$ = a dummy variable with a value of 1 for firms that have profit warnings despite forecasting positive profits, and 0 otherwise.

IND_j = a dummy variable with a value of 1 for technology firms, and 0 otherwise.

DEV_j = a dummy variable with a value of 1 for developed country firms, and 0 otherwise.

GOV_j = a dummy variable with a value of 1 for firms with a large percentage of government ownership (> 25% ownership, obtained from SEC filings online), and 0 otherwise.

ϵ = an error term.

Data

The sample of ADR firms is derived from financial news announcements from foreign markets.³ The initial data set of ADR warnings totaled 121, but was reduced to a sample of 110 as some firms do not have sufficient available data in the CRSP database. ADRs

trading on U.S. stock exchanges between October 1988 and September 2001 are analyzed. The sample is summarized in Table 1.

Results

The results are segmented into share price response to profit warnings and the cross-sectional analysis of those responses.

ADR Share Price Response to Profit Warnings

The daily abnormal returns and CARs for selected windows are shown in Table 2. The mean abnormal return on the announcement day is -6.47%, significant at the 0.01 level. Thus, investors penalize a foreign firm's stock price in response to profit warnings.

We assess the ten-day (-10, -1) window prior to the announcement period. The CAR over this period is -4.61%, significant at the 0.01 level. Although the size of the leakage effect is less pronounced than the size of the announcement effect, the strong evidence of a significant share price response prior to the announcement period suggests some market inefficiency. Some ADR market participants appear to receive the profit warning information and act on it before the firm's warning is disclosed to the public.

We assess the three-day window following the announcement period to test for lagged effects. The CAR over the three-day period following the announcement period is negative (-2.32%), and significant at the 0.05 level. Hence, the share price response to warnings is not completed on the announcement day, and market participants without inside information can capitalize on the inefficiency of the stock price adjustment.

Table 1. ADR Profit Warnings: October 1998–September 2001

Event Date	Number of Events
October–December 1998	12
January–March 1999	16
April–June	4
July–September	5
October–December	4
January–March 2000	10
April–June	7
July–September	7
October–December	13
January–March 2001	4
April–June	19
July–September	9
Total	110

Table 2. *Daily Abnormal Returns and CARs for Selected Windows for ADRs with Profit Warnings Market Model, Equally Weighted Index*

Day	Mean Abnormal Return	Percentage Negative	t-value
-10	-0.15%	48	-0.469
-9	-0.35%	58	-1.013
-8	-0.35%	54	-0.792
-7	-0.23%	57	-0.656
-6	-0.13%	49	-0.340
-5	-0.14%	54	-0.498
-4	-0.25%	55	-0.610
-3	-1.04%	63	-2.604**
-2	-0.44%	60	-1.175
-1	-1.53%	65	-2.918**
0	-6.47%	72	-5.076***
+1	-1.19%	51	-1.389
+2	-0.85%	52	-1.517
+3	-0.28%	55	-0.663
+4	0.79%	49	1.483
+5	0.24%	48	0.408
+6	-0.08%	52	-0.166
+7	-0.07%	55	-0.239
+8	0.32%	52	0.922
+9	0.45%	47	0.987
+10	-0.61%	57	-2.202
Days	Mean Cumulative Abnormal Return	Percent Negative	t-value
(0, 0)	-6.47%	72%	-5.076***
(-10, -1)	-4.77%	70%	-4.157***
(+1, +3)	-2.32%	55%	-2.009**

Note: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test. Abnormal returns calculated as the market model residual using an equal-weighted index.

Cross-Sectional Effects of ADR Share Price Responses to Profit Warnings

We find no problems of multicollinearity in the correlations between the independent variables in the cross-sectional equation. The pairwise correlations between the variables are within tolerance limits, and the variance inflation factors (VIF) are all significantly lower than the acceptable limit of 7.0. (See Table 3.)

The DEV coefficient is statistically insignificant, implying that investors did not pay particular attention to the home country of the ADR firm when revaluing the stock. There are two possible reasons for this. First, investors may not be fully aware of the particular nuances of the ADR home markets and hence ignore them altogether. Second, the information flow for ADRs may not be differentiated based on home country location, so investors may be left "in the dark" with respect to the ADR's financial performance.

The GOV coefficient is not significant, so ADRs with large government ownership (> 25%) did not perform differently than those with little or no government ownership. This result is surprising, but may result from the lack of information about firm structure. Or, as anecdotal evidence seems to infer, firms with government

ownership and private sector management may be just as efficient as firms with full private sector ownership.

Summary

Our objective was to determine whether investors revalued ADR stocks in response to profit warnings. We also tested for leakage effects and lagged effects, and assessed the cross-sectional variation in market inefficiencies related to profit warnings by foreign firms.

We first find that foreign firms are punished when issuing profit warnings. Second, we find strong evidence of leakage effects, which implies that market participants with inside information capitalize on market inefficiencies in the ADR market. Third, we find evidence of lagged effects following the profit warning, which implies that the share price response is not complete at the time of the announcement. Fourth, market inefficiencies vary among the foreign firms that issue profit warnings.

When using leakage as a proxy, we find the degree of market inefficiency is more pronounced for firms in

Table 3. Cross-Sectional Analysis

$AR_j = \beta_0 + \beta_1 IND_j + \beta_2 PROFDUM_j + \beta_3 DEV_j + \beta_4 GOV_j + \varepsilon_j$				
Descriptive Statistics	IND	PROFDUM	DEV	GOV
Coefficient	-0.337 (-3.101)**	0.078 (0.708)	-0.060 (-0.547)	0.029 (0.269)
R-Squared	= 0.123			
Adjusted R-Squared	= 0.076			
F	= 2.618**			

Note: The regression coefficients are reported along with their z-values in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

the technology sector. Thus, market participants capitalize to a greater degree when using inside information to sell technology stocks in advance of the profit warning.

Overall, the pricing behavior of ADRs in response to profit information allows for potential arbitrage opportunities.

Notes

1. Obtained from J.P. Morgan. Available at http://www.adr.com/adr/adr_about_benefits.html.
2. A few ADRs, such as newly created ones, did not have 200 trading days of historical data. Any ADR with less than 40 trading days of historical data is excluded from the analysis.
3. Foreign newspapers such as the London Financial Times are available through an online search using Lexis Nexis and Proquest Online.

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