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Information and volatility linkage under external shocks Evidence from dually listed Australian stocks

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Abstract

We examine the information flow between dually listed stocks traded in Australia and the US using a bivariate GARCH model. Our results indicate unidirectional information flow from the US equity market to the Australian market both with the dually listed stocks and the stock indices. Thus, in the case of Australian stocks, the US influence is more pervasive and it occurs at both mean and volatility levels of stock returns. These findings differ from previous research in that we observe the dominance of the American depository receipt (ADR) market on the underlying stocks. This asymmetric behavior in information flow is observable under both world market and regional market shocks. © 2002 Elsevier Science Inc. All rights reserved.

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1. Introduction

Financial decisions such as portfolio selection, risk management, and asset pricing in increasingly global markets require an understanding of intermarket information flows. Volatility flows are also a concern to regulators given the impact on investment and risk management procedures. The effect of volatility on intermarket correlation has also been

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examined by Solnik, Bourcelle, and Le Fur (1996). They report increased level of correlation between markets at times of high volatility using aggregate market indices. This reduces the gains expected from international diversification.

Dually listed stocks, e.g., American depository receipts (ADRs)[1] is an alternative way of achieving international diversification by the US investors. By its design the ADR returns are expected to be mainly influenced by the domestic market. However, this relationship may be undermined by the dominance of the US market, although some researchers document a two-way information flow between the US and the other market. Almost all studies on intermarket information flow are based on aggregate market indices. In this paper, we focus on portfolios of ADRs and the underlying stocks to examine the intermarket correlations and its dependence on external shocks.

Our paper differs from existing studies for two reasons. First, we use dually listed stocks as well as aggregate market indices to isolate the source and direction of information flow under external shocks. Second, we use a bivariate GARCH model to represent the return distribution, which is superior to the vector autoregression (VAR) methodology used in most of the related studies (for example, Hauser, Tanchuma, & Yaari, 1998).

Our paper is organized as follows. Next, we present a literature review followed by a discussion of the use of Australian ADRs. We then propose the hypotheses to be tested and the data used in the study. The bivariate GARCH methodology is then described followed by the analysis of results. The last section contains some concluding remarks.

2. Literature review

A depository receipt is a negotiable receipt representing equity in a non-US company. A depository bank in the US issues ADRs, and each ADR is backed by a fixed number of underlying shares in the custody of a bank (called the custodian bank) in the domestic market. ADRs can be listed on any of the US exchanges. Depository receipts facilitate cross-border trading and equity offerings to US and non-US investors. From a US perspective, ADRs are treated in the same manner as other US securities for legal and administrative purposes. The main advantages of ADRs are as follows (a) there is no currency conversion in trading and in receipt of dividends, (b) they have lower transactions costs and execution risks compared to direct purchase in the overseas market, and (c) they must comply with US disclosure requirements.

Hauser et al. (1998) use the VAR methodology and show that information flow of internationally listed stocks is unidirectional from domestic to the foreign market. Their sample consists of five companies in Israel listed in the Tel Aviv Stock Exchange and the NASDAQ. They employ 5 years of daily data and perform tests on a stock by stock basis. Fleming, Kirby, and Ostdiek (1998) investigate the volatility linkages in the stock, bond, and money markets using a speculative trading model with stochastic volatility representation.

[1] There are two spellings used: depository and depositary.

They identify the information that affects volatility into two types: common and spillover. In the context of our study, both the ADRs and the underling stocks should have a large common information base, since the underlying economic unit is the same. If active cross-market hedging with lower transaction costs exists, there is spillover of information flow between the two markets.

Wong and Zurbruegg (1998) use cointegration methodology to study the Pacific Rim stocks (Australia, Hong Kong, and Japan), which are dually listed in the London Stock Exchange. They find that the price discovery mainly occurs in the home country and that restrictions on capital movement and information flows between markets affect the return behavior of dually listed stocks.

Chan, Fong, Kho, and Stulz (1996) compare the intraday behavior of dually listed stocks and American stocks and they find intraday measures such as volatility, bid–ask spread, and trading volume to be similar. However, they document overnight accumulation of public information resulting in increased volatility in the opening hour. In a study involving US stocks listed in regional exchanges in the US itself, Harris, McInish, Shoesmith, and Wood (1995) examine one stock (IBM) traded on the NYSE and regional exchanges and find two-way information flows between exchanges contributes to the price discovery. They used synchronous transaction data and an error correction methodology. These results contradict earlier research findings (for example, Lee, 1993) where the information flow is shown to be mainly from the NYSE.

Copeland and Copeland (1998) document a significant contemporaneous impact of the US market on foreign equity markets with arbitrage opportunities that could be exploited by institutional traders. Odier and Solnik (1993) and Solnik et al. (1996) suggest the existence of an unfavorable linkage between volatility and correlation among international equity markets. When there is a strong negative shock in the domestic market, the correlation of returns tend to be high, which is quite the opposite of what a domestic investor seeks from international diversification. They also recognize that global institutional investors are becoming an important force in all national markets, often resulting in herd behavior.

3. Australian stocks and their ADRs

Our motivation to study Australian ADRs stem from many peculiarities associated with Australian equities. Empirical studies on international diversification provide conflicting evidence with regard to the degree of correlation and therefore the diversification benefits of direct Australian equity investing to US investors.[2] Analysts have shown a tendency to classify the Australian equity market under a regional grouping called Asia Pacific.[3] However, in the context of the recent turmoil in the Asian economies, Australian stocks have managed to avoid a serious downturn, which casts doubts on the validity of this

[2] See Erb, Harvey, and Viskanta (1994) and Solnik (1974) for details.
[3] For example, Bailey and Stulz (1990).

grouping.[4] The Australian equity market, despite its use of advanced technology and regulations, still constitutes a very small percentage of the global equity market.[5]

The Australian economy is dominated by primary sector industries such as mining and agriculture. As Rudd (1994) reveals, the integration of industries across countries is not uniform. Some sectors show greater integration than others do. The industrial composition of a given country, therefore, influences the diversification benefits of international investing. In terms of information flow, financial reporting, most aspects of market regulations and ownership restrictions, Australian and US financial markets are mostly harmonious. US investors have access to Australian company information readily in a comprehensible form. Finally, the trading hours of Australian Stock Exchange do not overlap with those in the US. This nonoverlapping trading provides a fertile ground to test lead-lag information flow patterns between a big economy such as the US's and of a small equity market.

4. Hypothesis tested

Dual listing of stocks as in the case of ADRs naturally raises the question of causal relations between the prices of the two markets. Since the assets underlying the ADRs are the Australian stocks, we may hypothesize that the main source of information for price formation is in Australia, similar to the conclusions of Hauser et al. (1998). It is possible that in situations like this, the geographical spread of operations of the companies may influence the result. Many of the companies in the Australian ADRs have extensive global operations. It is, therefore, not clear that in our study causality will be only unidirectional from the Australian stocks to the ADRs. It is also possible for the ADRs to show a preemptive response to new information before the Australian market opens. As documented by Copeland and Copeland (1998), the well-established leadership role of the US equity market may create profitable arbitrage opportunities. Yet, the theoretical pricing mechanism given by the depository banks is indicative of a unidirectional information flow ignoring the US-led influence on other markets.

Given the foregoing analysis, we propose to test two competing hypotheses. First hypothesis postulates that there is a unidirectional causality and transfer of pricing information from the domestic (Australian) market to the ADR market. The alternate hypothesis is based on the presumption that the US equity market being the dominant market in the world, the information flow occurs from the US to Australia even at the ADR level. In other words, the intensity of the US market influence is so large that it spills over into the ADRs as well.

[4] It was pointed out by the referee that one market might behave differently from the other markets in the same region during times of crisis.

[5] According to the Morgan Stanley Capital Index as of April 1998, Australian equity market represented about 2% of the global market capitalization.

5. Data

We examine 24 Australian ADRs traded in the US. Appendix contains a list of these companies with additional information such as the listing dates, conversion ratio (number of Australian stocks per ADR), industry classification, and percentage representation in the Australian equity index. We obtain daily closing prices for the ADRs and the underlying Australian stocks from Datastream International. The period studied spans from January 1, 1994 to June 2000. We compute the returns as log differences of adjusted prices over the entire sample period. The daily returns, therefore, correspond to close-to-close prices. We exclude weekends and holidays in both the countries in calculating daily returns. In this sense the returns are over a trading day and may cover more than one calendar day.

We form a value-weighted portfolio of the ADR stocks and a portfolio of the underlying stocks, both in US dollar, where the weight is determined by the market capitalization at the beginning of the month. These two portfolios are labeled as the ADR portfolio and the domestic or underlying stock portfolio. One of the major problems in using daily returns across countries is the nonsynchronous trading periods for different markets. The portfolio approach helps us avoid this problem when dealing with the ADR portfolio returns and the US market index returns. Karolyi and Stulz (1996) point out that this is of special concern when the two markets are not open at the same time, which is the case with Australia and the US. We also reduce the errors-in-variable problem, as suggested in Fatemi and Park (1996), using this portfolio approach.

In addition to the individual stock price data from both markets, we extract the daily data on the market indices from Datastream International. These daily indices include the Australian market index, the US market index, world market index, and the Europe, Australia, and Far East (EAFE) index. The latter two indices are used to study the effect of external shocks on correlation coefficients. In order to ensure uniformity in the index construction, all the indices are obtained from Datastream International.

6. Methodology

The return distributions of dually listed stocks should have similar characteristics if markets are integrated with the exception of foreign exchange rate impact. Markets are likely to be less integrated due to barriers to arbitrage such as higher transaction costs, taxation, and lack of timely information flow. If the markets are integrated, we expect the impact of external shocks, both in means and variances, on dually listed stocks in both markets to be similar. We applied a bivariate GARCH model to examine the mean and volatility characteristics of both markets. This choice is made following preliminary statistics suggesting nonnormality due to heteroskedasticity. We also examine the stability of the correlation structure of the returns before applying the bivariate GARCH approximation.

The seminal work of Kyle (1985) suggests that the most useful information for pricing assets can be obtained by examining the volatility of stock prices rather than by the price itself. Ross (1989) mentions that the volatility is directly reflective of information flow.

Karolyi and Stulz (1996) who examine the properties of cross-country correlation between Japan and US stocks using GARCH modeling document time varying correlation and its impact on volatility of portfolios and asset prices.

The bivariate GARCH process can provide information on properties such as first- and second-order spillover between markets, autoregressive tendencies, volatility persistence, and volatility clustering.

The bivariate GARCH model we implemented is described below. Let $y_{i,t}$ represent the return from the i-th portfolio at time t. While estimating the underlying portfolio and the ADR portfolio, $i=1$ refers to the former and $i=2$ refers to the latter. Similarly, when the two indices are estimated jointly, $i=1$ refers to the Australian index and $i=2$ refers to the US index. As discussed earlier, the conditional mean and the conditional variance of each return series depends on the other. Therefore, to model the linkages between the first two moments we define,

$$y_{1,t} = w_{10} + w_{11}y_{1,t-1} + w_{12}y_{2,t-1} + \varepsilon_{1,t} \tag{1}$$

$$y_{2,t} = w_{20} + w_{21}y_{1,t-1} + w_{22}y_{2,t-1} + \varepsilon_{2,t} \tag{2}$$

where the error terms have the distribution, $\begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{bmatrix} \sim N(0, \Omega_t)$.

From Eqs. (1) and (2), it is clear that the mean spillover terms controlled by the parameters w_{12} and w_{21}.

The covariance Ω_t is defined to allow for second moment linkage. As will be shown later, the correlation between the two series may be considered time invariant and this allows Ω_t to be defined somewhat parsimoniously. In this context,

$$\Omega_t = \begin{bmatrix} \sigma_{11,t}^2 & \sigma_{12,t} \\ \sigma_{21,t} & \sigma_{22,t}^2 \end{bmatrix}, \sigma_{21,t} = \sigma_{12,t}, \text{ where}$$

$$\sigma_{11,t}^2 = \alpha_{10} + \alpha_{11}\varepsilon_{1,t-1}^2 + \alpha_{12}\varepsilon_{2,t-1}^2 + \beta_{11}\sigma_{11,t-1}^2, \tag{3}$$

$$\sigma_{22,t}^2 = \alpha_{20} + \alpha_{21}\varepsilon_{1,t-1}^2 + \alpha_{22}\varepsilon_{2,t-1}^2 + \beta_{22}\sigma_{22,t-1}^2, \tag{4}$$

$$\sigma_{12,t} = (\rho + \delta \cdot s_t)\sqrt{\sigma_{11,t}^2 \cdot \sigma_{22,t}^2}. \tag{5}$$

Similar to the mean equations, the volatility linkages are controlled by the parameters α_{12} and α_{21} in Eqs. (3) and (4), respectively. The parameter ρ is the correlation between the two series being modeled and while it is time invariant, it is assumed to be influenced by an external shock source, s_t. The parameter δ controls the shift in the parameter ρ due to the external shock (see Eq. (5)). If the estimate of the parameter δ is statistically significant, it would imply that the correlation might depend upon the state of the shock received.

The shock source is defined in term of the world market index and a regional index EAFE (Europe and Far East index), both maintained by Morgan Stanley. The shock source s_t is defined such that it is 1 in the high shock state and 0 in the low shock state. If the shock source index is defined as SHK, then

$$s_t = \begin{cases} 1, & \text{if } |\mathrm{SHK}_t - \mathrm{SHK}_{t-1}| > \text{median} \\ 0, & \text{otherwise.} \end{cases}$$

The parameter estimation problem is, therefore, to maximize the joint log likelihood function under the conditional normality assumption made here. Assuming a sample size of T, the log likelihood function to be maximized with respect to the parameter vector, $\Theta = [\mathrm{w}_{10}, \mathrm{w}_{11}, \mathrm{w}_{12}, \mathrm{w}_{20}, \mathrm{w}_{21}, \mathrm{w}_{22}, \alpha_{10}, \alpha_{11}, \alpha_{12}, \beta_{11}, \alpha_{20}, \alpha_{21}, \alpha_{22}, \beta_{22}, \rho, \delta]'$, is,

$$L(\Theta) = -T\ln(0.5\pi) - 0.5\sum_{t=1}^{T}\ln|\Omega_t| - 0.5\sum_{t=1}^{T}[\varepsilon_{1t}\ \ \varepsilon_{2t}]\Omega_t^{-1}\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\end{bmatrix}. \tag{6}$$

The parameters of the bivariate GARCH model are estimated by numerically maximizing the likelihood function in Eq. (6) using the algorithm developed by Berndt, Hall, Hall, and Hausman (1974). We used GAUSS in implementing our model without imposing any parameter restriction. The results are discussed in the next section.

7. Results

Our sample period for daily returns of Australian stocks (representing about 40% of the Australian market index)[6] and their ADRs is from January 1994 to June 2000. This is due to the heightened popularity of ADR programs since 1994 according the Bank of New York.[7] We present the descriptive statistics for the daily returns of the four portfolios in Table 1. These four portfolios are (1) underlying stocks, (2) ADRs, (3) Australian index, and (4) the US index. We observe that daily returns are not significantly different from zero. ADR and portfolio daily returns have different means, but the difference is not statistically significant. Since both returns are US dollar-based, some of the difference in returns is due to exchange rate changes. The unconditional variance is 1.31% and 1.23% for the underlying stocks and the ADRs, respectively. Results of the Jarque–Bera (1980, JB) test reject normality of returns

[6] The most widely used market index for Australia is the All Ordinaries Index, which is a value-weighted index of mostly traded stocks.

[7] Source: Bank of New York website (www.adrbny.com).

Table 1
Descriptive statistics of the return series

	Mean (%)	Variance (%)	Kurtosis	JB	LB	LB^2
Underlying stock	0.0175	1.3090	4.845	.000	.014	.000
ADR	0.0078	1.2252	4.812	.000	.108	.000
Australian index	0.0153	1.1017	6.942	.000	.442	.000
US index	0.0664	1.0074	8.579	.000	.048	.000

Percentage of equal correlation between underlying stock and ADR portfolios for various sample windows

Sample window	50	75	100	125	150	175
Equal correlation (%)	100	100	100	100	100	100

The sample period covers daily data from January 1994 to June 2000. There are 1536 observations in the sample. The underlying stock refers to the value-weighted portfolio of the underlying stocks traded in Australia with prices converted to US dollars using daily exchange rates and the ADR refers to the value-weighted portfolio of the corresponding ADRs. LB refers to *P* values for Ljung–Box (1978) statistic with returns for 10 lags and LB^2 refers to *P* values for Ljung–Box (1978) statistic with squared returns for 10 lags. JB represents the *P* values for the Jarque–Bera (1980) normality test for the return series. Equality of correlations is tested using the procedure described in Jenrich (1970) between successive samples of different sizes at 5% level of significance.

for all portfolios. The Ljung–Box (1978) test result, as indicated by the LB statistic, show that the returns are serially correlated for all portfolios.

Lower panel of Table 1 contains the results of the test of equal correlation based on Jenrich (1970). These results support a stable correlation between the ADR returns and domestic

Table 2
Estimation results for the bivariate GARCH model

Australian index		US index	
Mean equation			
w_{10}	.0001 (0.01)	w_{20}	.0009 (4.50)
w_{11}	− .0180 (− 0.71)	w_{22}	.0711 (2.70)
Mean spillover			
w_{12}	.4472 (14.71)	w_{21}	− .0084 (−0.40)
Volatility equation			
α_{10}	.0001 (0.01)	α_{20}	.0001 (0.01)
α_{11}	.0650 (3.35)	α_{22}	.1104 (2.71)
β_{11}	.8746 (13.58)	β_{22}	.8735 (19.72)
Volatility spillover			
α_{12}	.0202 (1.21)	α_{21}	.0115 (1.12)
Correlation	.0951 (3.34)		

Numbers in parentheses are *t* statistics. Maximization of the likelihood function is carried out in GAUSS using BHHH algorithm and the standard errors are obtained from the information matrix form of the covariance matrix of the parameters.

Table 3
Estimation results for the bivariate GARCH model external shock source: world market

Underlying stock portfolio		ADR portfolio	
Mean equation			
w_{10}	.0006 (2.00)	w_{20}	.0004 (1.33)
w_{11}	− .3987 (− 9.27)	w_{22}	.1028 (2.08)
Mean spillover			
w_{12}	.5681 (11.96)	w_{21}	− .0575 (− 1.30)
Volatility equation			
α_{10}	.0000 (0.01)	α_{20}	.0000 (0.01)
α_{11}	.0001 (0.01)	α_{22}	.1132 (2.45)
β_{11}	.8236 (9.06)	β_{22}	.8017 (10.62)
Volatility spillover			
α_{12}	.1139 (2.40)	α_{21}	.0279 (1.34)
Correlation	.8301 (64.35)		
Correlation shift due to external shock	− .0786 (− 3.54)		

Numbers in parentheses are *t* statistics. Maximization of the likelihood function is carried out in GAUSS using BHHH algorithm and the standard errors are obtained from the information matrix form of the covariance matrix of the parameters.

stock returns over the sample period. This condition permits us to use the bivariate GARCH approach in modeling the return and volatility in the subsequent analysis.

In Table 2, we provide the bivariate GARCH results using Eq. (1) corresponding to the US and Australian indices. At the aggregate market index level, US index shows a significant positive AR1 coefficient, while that of the Australian index is not significant. As given in the top part of Tables 3 and 4, returns of both the underlying stocks and the ADRs follow an autoregressive process. However, these coefficients differ in sign in that underlying stocks carry a negative autoregressive coefficient for the first lag while that of the ADR portfolio has a positive coefficient.

We examine the mean spillover (w_{12} and w_{21}) as reported in Tables 2–4 for the indices and stocks. The mean spillover coefficients suggest a large impact of ADRs on the underlying stocks (.57/.56), while there is a marginally significant negative spillover effect from the stocks to the ADRs. These results are indicative of a strong one-way influence from the ADRs to the stocks at the level of mean returns. With aggregate indices, there is strong influence from the US to the Australian index with no influence from Australia to the US. We find evidence of asymmetrical information flow in the mean returns between the US and Australia both at the aggregate index level and with the dually listed Australian stocks. Thus, spillover characteristic from the ADRs to the underlying stocks is similar to that between the US and the Australian indices. However, there is no mean spillover effect from the Australian index to the US index. A very low correlation between the two indices

Table 4
Estimation results for the bivariate GARCH model external shock source: regional market (EAFE)

Underlying stock portfolio		ADR portfolio	
Mean equation			
w_{10}	.0006 (2.00)	w_{20}	.0005 (1.67)
w_{11}	− .3965 (− 9.29)	w_{22}	.1040 (2.10)
Mean spillover			
w_{12}	.5593 (12.02)	w_{21}	− .0579 (− 1.30)
Volatility equation			
α_{10}	.0000 (0.01)	α_{20}	.0000 (0.01)
α_{11}	.0001 (0.01)	α_{22}	.1025 (2.61)
β_{11}	.8388 (10.06)	β_{22}	.8193 (12.90)
Volatility spillover			
α_{12}	.1069 (2.39)	α_{21}	.0327 (1.64)
Correlation	.8177 (58.83)		
Correlation shift due to external shock	− .0563 (− 2.58)		

Numbers in parentheses are *t* statistics. Maximization of the likelihood function is carried out in GAUSS using BHHH algorithm and the standard errors are obtained from the information matrix form of the covariance matrix of the parameters.

(when the US return is preceded by Australian returns, given the nonoverlapping trading hours) is consistent with this one-waydominance.

Tables 2–4 also carry bivariate GARCH results at the volatility level for aggregate market indices and the stocks. Volatility persistence or GARCH effect can be seen for all four portfolios as indicated by significant β_{11} coefficient. Volatility spillover (α_{12}) occurs from the ADRs to the underlying stocks, with no such effect from the stocks to the ADRs. At the index level, however, there is no volatility spillover in either direction. This means the US investors will be better off investing in the Australian index or non-ADR stocks to mitigate or insulate from the volatility impact from the US markets.

Wei, Lui, Yang, and Cheung (1995) show that dual listings themselves contribute to the interdependency of the two markets. They use both developed and emerging markets in their study. However, in our study of Australian dually listed stocks, we find only one-way dependence.

We also see a very high correlation (.83) between the daily returns of the stocks and the ADRs as reported in Table 3. At the aggregate index level, this correlation is only .09 as given in Table 2. The correlation between the ADRs and the underlying stocks drop 7.8% when these portfolios are subjected to external shocks from the world market index. This is found in Table 3. Table 4 reports similar results when the external shock originates from the regional index (EAFE).

Table 5
Diagnostic tests P values for Ljung–Box $Q(10)$ statistics

Panel A	Australian index	US index
z	0.999	0.198
z^2	0.999	0.623
$z_1 z_2$	0.999	
Panel B (external shock source: world market)	**Underlying portfolio**	**ADR portfolio**
z	0.186	0.693
z^2	0.998	0.018
$z_1 z_2$	0.999	
Panel C (external shock source: regional market)	**Underlying portfolio**	**ADR portfolio**
z	0.183	0.582
z^2	0.999	0.038
$z_1 \cdot z_2$	0.999	

z represents the standardized residual for the corresponding equation, i.e., either the underlying stock portfolio or the ADR portfolio. $z_1 \cdot z_2$ indicate product of the two standardized residuals.

The diagnostic statistics are given in Table 5. These include the tenth-order serial correlation in the level, square, and the product of the standardized residual series. The Ljung–Box (1978) statistics indicate absence of linear and nonlinear dependence in the standardized innovations. The overall conclusion from these diagnostics is that the models fit the data quite well.

Our results contradict the results of Solnik et al. (1996) that suggest the existence of an unfavorable linkage between volatility and correlation. They report that the correlation between the international equity markets is higher when the markets are in a recession. With dually listed stocks, we find a decline in correlation when the markets are subject to external shocks.

8. Conclusion

We find evidence supporting information flow predominantly from the US equity market to the Australian market. This influence is also seen on stocks with ADRs as well as on aggregate indices. Thus, in the case of Australian stocks, the US influence is more pervasive and it occurs at both mean and volatility levels of stock returns. These results contradict the earlier finding that the direction of information flow for dually listed stocks such as ADRs occur mainly from the home country to the US. This asymmetry in information flow is observed while the return-generating process is subjected to external shocks originating from the world market index as well as from the regional market index. Future research should focus on the impact of this asymmetric information flow on international diversification gains.

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Appendix. List of Australian companies in the ADR sample

Name	Ratio (stock/ADR)	Beginning date[a] in Datastream	Weight in AOI as of 31/05/1997[b]	Industry
Amcor	1:04	06/26/92	1.40	pulp and paper
Ashton Mining	1:05	08/02/93	0.03	metals
Australia and New Zealand Banking	1:05	04/04/95	3.40	banking and financial
Boral	1:08	01/04/88	1.21	building materials
Broken Hill	1:02	01/04/88	9.48	mining
Central Pacific	1:02	01/04/88	0.16	mining
Coles Myer	1:08	01/04/88	1.68	retail
Comalco	1:05	12/27/94	1.04	metals
Delta Gold	1:01	12/27/94	0.11	mining
Email	1:02	08/02/93	0.30	building materials
FAI Insurance	1:05	01/04/88	0.04	insurance
Faulding	1:04	12/27/94	0.25	health care
Goodman Fielder	1:04	12/27/94	0.53	food
National Australia Bank	1:05	01/04/88	7.01	banking and financial
News Corporation	1:04	01/04/88	4.80	media
Orbital Engine	1:08	12/04/91	0.03	industrial machinery
Pacific Dunlop	1:04	12/02/94	0.95	industrial
Pioneer International	1:01	01/03/95	1.00	building materials
Resolute	1:04	12/27/94	0.07	mining
Santos	1:04	01/04/88	0.82	energy
Simsmetal	1:04	01/16/95	0.12	steel
Southern Pacific	1:02	01/04/88	0.27	mining
Westpac Banking	1:05	03/17/89	3.21	banking and financial
WMC	1:04	01/10/90	2.42	mining
Total			40.33	

[a] It is not necessarily the same as the listing date.

[b] AOI represents the commonly quoted index of Australian equities, All Ordinaries Share Price Index. This is a capitalization-weighed index covering about 90% of the total market capitalization.