Why are the wealth effects of UK firms' foreign divestitures so large?

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ABSTRACT

We study the short-run wealth effect of a sample of 165 foreign divestitures by UK firms over the 1986-1995 period. These foreign asset sales by UK firms give rise to significantly positive shareholder wealth effects of about 0.82% around the announcement day and about 4.8% over the 10 days before and after the announcement day. Our findings are robust to factors such as size, market to book, and GARCH effects. Intriguingly, the wealth effects we establish for our sample are several times larger than the corresponding wealth effects reported for US firms. We conclude that an increase in geographical focus is associated with the wealth gains. The industrial focus explanation commonly associated with domestic divestitures is not the factor primarily associated with the wealth gains we find for our sample.

Keywords: international asset sales, GARCH, wealth effects, geographical focus.

JEL Classifications: G14, G34.

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I. Introduction.

Divestitures have been shown to produce wealth gains for the shareholders of the selling firms by increasing their share prices around the announcement date.[1] Moreover, they are often followed by operating improvements (see Schlingemann, Stulz and Walkling 2002 and also Maksimovic and Phillips 2001). These positive effects have, however, been documented largely for domestic divestitures while few studies have reported results for foreign asset sales. The results of domestic asset sales cannot necessarily be generalised to foreign asset sales where the divested assets are located in a different country from that of the seller. The distinctive features of foreign divestitures include foreign exchange risks, different macroeconomic environment of the foreign assets and the parent and differences in the liquidity of the market for foreign corporate assets.

The extant empirical literature on the wealth effects of foreign divestures is sparse and mostly confined to the activities of US firms. Overall, the evidence from previous studies shows significant short run wealth effects. Kim, Miles and Padmanabhan (1994) find that shareholders of US divesting firms earn significant cumulative abnormal returns of 1.06% over the two days around the announcement. Borde, Madura and Akhigbe (1998) report larger significant cumulative abnormal returns of 2.28% for US firms over a 4-day period.

Gleason, Mathur and Singh (2000) report wealth effects of 246 foreign divestments by US firms in the period 1985-2000. They find that shareholders of the selling firm earn significant cumulative

[1] Most of divestiture studies confine themselves to domestic selling firms without specifying the geographic location of divested assets. The present study classifies all such previous studies as referring to domestic divestitures regardless of the location of the divested assets in their samples.

abnormal returns of 0.65% over the (-1 to 0) short term window only. While they find significant abnormal returns for the acquirers also, they find no significant short term effects for either group, for other windows.

There is almost no empirical evidence of the wealth effects associated with foreign asset sales other than those for US firms. The wealth effects of divestments by firms in other countries will not necessarily follow the US pattern because other countries have a relatively smaller domestic market and both the financial markets and the firms are likely to view foreign investments and divestments differently. The foreign divestiture activities of UK firms have specifically not been fully examined. While UK firms have enjoyed a long and distinguished history of overseas operations, their foreign activities has received scant attention in the corporate finance literature.[2]

One exception is the study by Padmanabhan (1993) which examines divestments by UK firms of assets in European economies only. He analyzes the wealth effects of a sample of 46 announcements of the sale of UK firms' European assets over the period 1987-1992. The results show significant abnormal returns of 0.86% for the day after the announcements but no significant cumulative abnormal returns are found over any event window. An investigation using a complete sample of all foreign asset sales by UK firms is thus warranted because the vast majority (nearly 70% in our sample) of foreign divestments by UK firms take place in non-European countries.

Thus, the primary purpose of this paper is to provide a comprehensive evaluation of the wealth effects arising from foreign divestments by UK firms across the globe. Our empirical results from a sample of 165 foreign divestments by UK firms over the period from 1985-1995 decade indicate that foreign asset sales by UK firms elicit significant and substantial short term wealth effects for their

[2] Haynes, Thompson and Wright (2000) investigate divestments by UK firms but focus on industrial organization issues. Furthermore, they do not distinguish between domestic and foreign divestments.

shareholders. These are 0.82% from the day before to the day after the announcement and rise to 4.8% over the 10 days before to the 10 days after the announcement. While the magnitude of the former effect is not out of line with those reported for the US, that of the latter are substantially larger that their US counterparts.

Since we find evidence of significant GARCH effects in the stock returns of some of our sample firms, we calculate ARCH robust abnormal returns. Although the sub-sample with GARCH effects has higher abnormal returns than the rest of the sample, the differences in these wealth gains are not statistically significant. We conclude the positive wealth effects of foreign divestitures by UK firms are robust to heteroscedasticity. Our findings are also likely to be robust to factors such as size and market to book ratio.

We find that the abnormal returns are associated with an increase in the geographical focus of their operations. Further, we find that those firms that increase their industrial focus as well as their geographical focus earn significant positive abnormal returns of 5.9%. Firms that do not increase their industrial focus also earn significant positive abnormal returns of 4.5%, which we explain as being associated solely with an increase in geographical focus. An increase in geographical focus has the bigger effect on abnormal returns than an increase in industrial focus. There appears to be an association also between the abnormal returns and whether the divested assets are located in developed or less developed economies.

The rest of the paper is organised as follows: section two describes the methodology employed, section three describes the data and reports the results. A final section concludes.

II. Methodology.

Conventional (OLS) Market Model

We follow the standard event study approach of using the market model to estimate the abnormal returns (see Brown and Warner, 1985). The Ordinary Least Square (OLS) regression is employed to estimate the parameters of the model. The estimation period extends from 250 days before (t-250) the announcement to 20 days before (t-20) the announcement. The abnormal return for firm *i* on day *t* in the test period is computed as:

$$e_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{mt}) \quad (1)$$

where, e_{it} is the estimated abnormal return over the test period,

R_{it} is the logarithmic actual return on firm $_i$ over the test period,

R_{mt} is the logarithmic actual return on the FTA index over the test period.

$\hat{a}_i$, $\hat{b}_i$ are coefficients estimated from an OLS regression in estimation period.

To test whether an average abnormal return (AR) on the event day *t* is significantly different from zero, each abnormal returns, e_{it}, is first divided by its estimated standard deviation to yield a standardised abnormal return, SAR_{it}:

$$SAR_{it} = e_{it} / \hat{s}_{it} \quad (2)$$

where $\hat{s}_i$ is the estimated standard deviation of the abnormal return for firm *i* in the market model estimation period. The test statistic for the average abnormal return of event day *t* is given by:

$$Z_t = \sum_{i=1}^{N} SAR_{it} / \sqrt{\sum_{i=1}^{N} (T-2)/(T-4)} \quad (3)$$

where N is the number of firms in the sample, and T is the number of days in the estimation period. Similarly, to test the statistical significance of the cumulative average abnormal return (CAR), the standardised cumulative abnormal return (SCAR) in the event interval for firm *i* needs to be first estimated:

$$SCAR_i = \sum_{t=t_1}^{t_2} SAR_{it} / \sqrt{K} \quad (4)$$

where $K = t_2-t_1+1$, is the number of the days in the event interval. The test statistic for the cumulative average abnormal return over K event days is as follows:

$$Z_k = \sum_{i=1}^{N} SCAR_i / \sqrt{\sum_{i=1}^{N} (T-2)/(T-4)} \quad (5)$$

Conditional Heteroscedastic Market Model

The classical OLS assumptions may be invalid in some situations such as event studies. Morgan and Morgan (1987) show that the OLS results from the market model may be misleading if correcting for conditional heteroscedasticity influences the statistical interpretation of the evidence. Bollerslev (1986) generalised the autoregressive conditional heteroscedasticity (ARCH) class of models Engle (1982) to GARCH proceses. He included lagged values of the conditional variance to avoid the long-lag structure of the ARCH model.[3] We also estimate a GARCH based market model (see Booth, Glastock and Sarkar, 1996 and Corhay and Tourani-Rad, 1996).

[3] Numerous empirical studies, have demonstrated that the analysis of risk-return relationships has been advanced by the development of the GARCH model. See Bollerslev, Chou and Kroner 1(992), Poon and Taylor (1992), and Fraser 1(996).

Very few studies have employed the GARCH market model to examine the shareholder wealth effect of an event. Booth, Glascock and Sarkar (1996) examine the wealth effects of asset sales of US real estate over the period 1980-1989 but find that the OLS and GARCH models provide essentially identical wealth effects. Corhay and Tourani Rad (1996) investigate the wealth effects of divestitures by Dutch firms during the period 1989-1993. They observe that the GARCH model produces insignificant abnormal returns, and the conventional OLS model produces higher returns than the GARCH model.

Attention is restricted to a GARCH(1,1)-*t* specification, the conditional *t*-distribution market model with first-order autoregressive and first-order moving average components. This specification has been shown to be a parsimonious representation of conditional varianc, and it adequately fits many economic time series.[4] Unlike previous GARCH event studies, we permit the conditional distribution of the market model's residuals to be non-normal.[5]

Specifically, the GARCH(1,1)-*t* market model we apply can be described as follows:

$$R_{it} = a_i + b_i R_{mt} + \varepsilon_{it} \tag{6}$$

$$\varepsilon_{it} \left| \Omega_{t-1} \sim t(0, h_{it}, d_i) \right. \tag{7}$$

$$h_{\text{it}} = \gamma + \alpha_i h_{i,t-1} + \beta_i \varepsilon_{i,t-1}^2 \tag{8}$$

[4] Bollerslev (1986) and Bollerslev, Chou, and Kroner (1992) suggest that a GARCH(1,1) specification, with the number of lags one, is adequate in modelling heteroscedasticity. Such a restriction also makes the model much easier to be identified and estimated.

[5] To capture the high level of kurtosis in observed distributions of return series, a leptokurtic conditional distribution in GARCH models would be more appropriate than the normal conditional distribution. Baillie and DeGennaro (1990) prove that conditional *t*-distribution performs a better GARCH fit to the residual terms of the returns series than other conditional leptokurtic distributions.

Equation (6) is the market model where R_{it} is the daily return of firm *i* for day *t*, R_{mt} is the corresponding market return, and ε_{it} is the error term. The market beta b_i of the share, the covariance of the share return with the market return, is a measure of the relative volatility of a share to the overall market. Equation (7) specifies that the error term, given the information set available, Ω_{t-1}, follows a *t*-distribution with a zero mean, a time dependent variance h_{it}, and d_i degrees of freedom. The conditional variance h_{it} in Equation (8) is time varying and is a function of the immediate past squared prediction error and its immediate past value.

Some return series will not fit the GARCH(1,1)-*t* specification due to the absence of heteroscedasticity. Three special cases of the GARCH(α_i, β_i)-*t* model are evaluated (see Booth et al. 1996). First, if d_i is large (typically > 30), and $\alpha_i = \beta_i = 0$, the equivalent OLS market obtains. Second, if d_i is not very large, but $\alpha_i = \beta_i = 0$, the conditional distribution of the prediction errors is thicker tailed than a normal distribution but the conditional distribution is not time varying. Finally, if d_i is very large, and $\alpha_i = 1$ and/or $\beta_i = 1$, the conditional distribution is normal but is time varying. These models are referred to as GARCH (0,0)-*N*, GARCH(0,0)-*t*, and GARCH(1,1)-*N*, respectively, and are estimated together with the GARCH(1,1)-t model and these GARCH models are nested.[6] The log-likelihood ratio test is employed to select the best model for each firm.[7]

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[6] Booth et al. (1996) describe that, not only are the three special cases nested within the general model, but also the conventional market model is nested within the second special case. However, the second and third special cases- GARCH(0,0)-*t* and GARCH(1,1)-*N* are not nested. Thus, in the cases where the final selection comes down to choosing between an i.i.d. conditional *t*-distribution and a time-varying normal distribution, the former is chosen by applying Occam's razor.

[7] In addition to the LR test, the Schwarz Bayesian Criterion (SBC) method is also employed to check the appropriateness of the GARCH model selected. Both model criteria on average provide consistent outcomes for the GARCH model selection.

After estimating the parameters of the chosen model for each share, the Booth et al. (1996) procedure is followed to compute the standardised prediction errors over the test period, from day –20 to day +20. This is accomplished by iteratively solving the model using $e_{i,-20}$ and $h_{i,-20}$ as starting points. In particular:

$$\hat{e}_{it} = R_{it} - (\hat{a}_i + \hat{b}_i R_{mt}) \quad (9)$$

$$\hat{h}_{it} = \hat{\gamma}_i + \hat{\alpha}_i \hat{h}_{i,t-1} + \hat{\beta}_i \hat{e}^2_{i,t-1} \quad (10)$$

$$SAR_{it} = \hat{e}_{it} \hat{h}_{it}^{-0.5} \quad (11)$$

where ^ stands for the estimate and SAR_{it} is as defined in equation (11). Since the event dates in the sample are not clustered, the degree of cross-sectional dependence of the abnormal returns can reasonably be assumed to be small.

The standardised residual is used to test whether the abnormal returns are significant. The test statistic, Z_t, for the daily abnormal return is defined as:

$$Z_t = \sum_{i=1}^{N} SAR_{i,t} / \sqrt{\sum_{i=1}^{N} (T-2)/(T-4)} \quad (12)$$

where N is the number of event occurrences, and T is the number of days in the estimation period. Similarly, to test the significance of the average standardised cumulative abnormal return, the interval statistic Z_k is computed as follows:

$$Z_K = \sum_{i=1}^{N} \sum_{t=t_1}^{t_2} SAR_{it} \Big/ \sqrt{K \sum_{i=1}^{N} (T-2)/(T-4)} \quad (13)$$

where K is the event days ($t_1 + t_2 - 1$) in the test interval.

III. Data and Results.

Data

All selling firms involved in foreign divestitures are identified from the "UK Divestment" section of *Acquisitions Monthly* over the ten-year period 1986-1995. Initially, we identify 922 voluntary foreign divestiture announcements by UK firms. The final sample of selling firms meet the following criteria:

(1) The UK selling firm should have traded continuously on the London Stock Exchange (LSE) during the event study period and the share return data of the firm for the relevant period must be available in the *Datastream* database;

(2) The seller must have been a single firm divesting foreign assets so that asset sales by joint ventures are excluded.

(3) The firm must not have confounding events (such as mergers or divestitures) during the estimation or the test periods.

(4) The seller must not be a property or financial firm.

This selection procedure yields a final sample of 165 foreign divestiture announcements by UK firms over the period of 1986-1995.

Descriptive Statistics

Table 1 shows the monthly distribution of the final sample over the period 1986-1995. The announcement dates are spread evenly across the sample period and are not clustered in time. There are 17 foreign divestiture announcements per year on average, with a maximum of 25 and a minimum of 7 announcements. There are 14 announcements per month on average. The monthly maximum and minimum observations are 19 and 8, respectively.

Table 1 Here

To examine whether there are any differences in the time distribution of the observations between the final sample and the population of sellers, chi-squared tests were performed. If the distributions are different, there could be some doubt that our sample selection criteria inadvertently picked firms with features not generally representative of the population. We find that the p-values of the chi-squared statistic that the distribution of the final sample is different from the initial sample, across the months and across the years are 0.63 and 0.11, respectively. We conclude that the time distribution of the observations for our sample is representative of that for the population of 922 sellers.

The distribution of the seller sample by the geographic location of divested asset is shown in table 2.

Table 2

It shows that the majority of divested assets were located in North America, mainly the U.S. and Canada, and account for 44% of the seller sample. Divestitures from European countries are 31% of the sample. The other divestitures account for the remaining 25% of divestitures of which Australia and New Zealand comprise 9%. This geographic distribution of the observations is not even across the globe and is indicative of the preference of previous cross-border investments by UK firms, and more generally of the culture and long-term trading relations between the UK and these countries. Since the location of the divested assets spans seven broad regions and 27 countries, we provide more conclusive evidence of the wealth effects of UK foreign divestitures than Padmanabhan (1993), which focuses only on divestitures from European countries (a third of our sample).

Market Model Estimates

Table 3 presents the distribution of the different specifications for the GARCH model we selected for each observation in the sample.

Table 3

The GARCH(1,1)-t model, which has previously been suggested for modelling return series, fits 21 of the 165 observations in our sample. More significantly, 27 additional observations exhibit GARCH effects (i.e. have a time-varying variance) though without marked kurtosis.[8] The results show that nearly half of the sample follows a t-distribution error process, which is a departure from the normal-distribution assumption of the OLS model. This vindicates the use of a GARCH model.

Table 4 provides a comparison of the average estimates for the intercept and the slope for the OLS and the selected GARCH market models.

Table 4

The time-varying models, GARCH(1,1)-t and GARCH(1,1)-N, produce smaller estimates for the 48 observations with GARCH effects than the OLS estimates for the same 48 observations. This is the opposite of the results in Corhay and Tourani-Rad (1996) where the intercept and slope estimates are larger for GARCH than for OLS. Similar results are found in the coefficient estimates of the GARCH(0,0)-t and the OLS models for the 60 observations that have a t-distribution structure. The average estimates of the intercept and the slope for the GARCH(0,0)-t model are smaller than those for the OLS model.

Based on the parameter estimates of the OLS and the GARCH models, we compute the abnormal returns in the estimation period and the standard deviation of these abnormal returns is our estimate of the expected standard deviation for the first day of the test period. For the OLS case this is constant for the whole test period, while for GARCH we calculate a time varying standard deviation for each

[8] The appropriateness of the GARCH(1,1)-t and the GARCH(1,1)-N models we have selected is assured by the evidence of having statistically significant GARCH parameter estimates for the α and the β coefficients, and the sum of these estimates is also less than the unity.

day of the test period. In the estimation period, the average value of the conditional standard deviation under the GARCH models (0.019) is higher than with the OLS model (0.017). The standard deviations for GARCH models are higher in the test period than in the estimation period.

Abnormal Returns

The ARs and the CARs under the OLS and GARCH models over the 41-day test period are reported in Table 5.

Table 5

Both models produce significant and identical abnormal returns of 0.69% and 0.70% respectively, on the day before the announcement.

These results are consistent with the general findings of previous divestiture studies.[9] The results are qualitatively similar to those reported for both models after an adjustment was made for possible thin trading.[10] The GARCH models have higher abnormal returns than the OLS model, the opposite result from Corhay and Tourani-Rad (1996). There are, however, no significant differences between these returns, consistent with Booth et al. (1996).

Figure 1 displays the graphs of the respective CAR for the OLS and the GARCH market models over the test period.

[9] The results are not driven by the outliers. The maximum prediction errors under the OLS and the GARCH models on day -1 are 23.82% and 24.08%, and the minimum prediction errors are –18.51% and –18.49%, respectively. In addition, 56% of the observations have positive prediction errors under the two models on day -1. Furthermore, 48% to 59% of the observations produce positive abnormal returns over twenty-one days around the announcement.

[10] To take account of the thin trading effects in the UK stock market, this study also employs the Dimson (1979) Aggregate Coefficients (AC) method to compute the adjusted beta estimates of the OLS model. However, the results reveal that such adjustment does not significantly affect the abnormal returns.

Figure I.

It shows that the CAR graph of both models follow a similar pattern during the period. The levels of the CAR gradually drift up during day t-10 to day t-1, which suggests that the market may have partially anticipated the forthcoming announcement. The upward trend in the CAR slows between the announcement day and day +20. Since all the abnormal returns from the GARCH models are higher than from the OLS model, the CAR plot for the GARCH models is constantly above that of the OLS model and the divergence between them increases over time.

The CAR for various event intervals around the announcement date is shown in Table 6.[11]

Table 6

The CAR for the 11-day, 21-day and 41-day intervals are statistically significant at the 1% level but the differences in the estimates between the OLS and the GARCH models are small and insignificant.[12] These findings suggest that the OLS result of the positive wealth effects for UK selling firms is robust to time-varying variances. The intervals after the event announcement, from day 0 to day +10 and from day +11 to day +20, exhibit positive but insignificant CAR as would be expected.

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[11] The test statistics assume cross-sectional independence in the security-specific abnormal returns. Tests based on the assumption of cross-sectional dependence are also performed. Since, we find that the results are not significantly changed, only the test statistics that assume cross-sectional independence are, therefore, reported.

[12] The similarity in wealth effects between the two market models may be due to the fact that only a small portion (29%) of the seller sample possesses GARCH effects. We, therefore, also measure the wealth effects for the sub-sample of 48 observations that have a definite GARCH effect. Although the sub-sample generally produces higher cumulative abnormal returns than the whole sample, the differences in the returns between the two samples are not statistically significant. Moreover, the differences in the returns,

The significant positive CAR during the short intervals is consistent with the findings of previous studies. The ten-day day period around the announcement date has CAR of about 5% which is very different from previous studies on foreign divestiture, which show either no gains or lower returns of around 1%, for the longer intervals. In general, the results reveal that the stock market reacted positively to the foreign divestiture decisions made by UK firms over the period of 1986-1995. We associate the abnormal returns with an increase in the geographical focus that resulted from the sale of foreign assets.

The CARs associated with industrial focus and the developed state of the economy are reported in Table 7.

Table 7.

We investigate the effect of changes in industrial focus on the abnormal returns. We classify the sample firms as having increased their industrial focus if the divested foreign asset was stated to be in the same industry as the seller firm and as having decreased their industrial focus otherwise. The CAR associated with the firms that increased (decreased) their industrial focus is 1.3% (0.7%) close to the announcement up to 5.9% (4.5%) from ten days before to ten days after the announcement. There is a significant difference in the CAR's due to the focus effect. This is consistent with the results reported for domestic divestitures.

We also investigate the whether the state of the foreign economy from which assets have been divested has an effect on the abnormal returns realized from foreign asset sales. If the divested asset

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in the sub-sample, between the OLS and the GARCH models are also insignificant, which is similar to the findings for the whole sample.

is located in a G7 economy, then the divested assets are located in a highly developed economy, otherwise the asset sale is from a less developed economy. We find mixed results here. The abnormal returns are positive and significant irrespective of the state of the economy from which assets are divested. Nevertheless, we find significant variation in the abnormal returns for different event windows. Very close to the announcement (-1 to +1), the abnormal returns are small but significantly higher by 0.3% for assets divested from Non-G7 economies. Around ten days before to ten days after the announcement, the abnormal returns are significantly higher by 1.5% for those firms that have divested assets from G7 economies.

Robustness Checks.

To test that the results may be artefacts of the size effect and the book-to-market effect, the asset sale sample is compared to the population of all firms and we perform further tests. These two effects can dominate the abnormal returns only if the sample is drawn from specific subsets of the population, such as small firms or firms with low book-to-market ratios. We compared the mean and median of the size (market value) and the ratio of the book-to-market value for the firms in our sample to those in the population. The size and the ratio of the book-to-market value for the firms in the seller sample, on average, are similar to those in the population. The p-values are 0.38 and 0.74 for the test of the difference in the means of size and the ratio of the book-to-market value between the seller sample and the population. The results above imply, therefore, that the abnormal return results reported here are unlikely to be affected by the size effect and the book-to-market effect.[13]

[13] The mean and the median of the size value for the firms in the seller sample are £954 million and £244 million, respectively, while those for the firms in the population are £950 million and £156 million, respectively. The mean and median for the ratio of the book-to-market value are also similar for both groups although the variation in the population is higher than that in the seller sample. The mean and the median of the ratio of the book-to-market value for the firms in the seller sample are 2.99 and 2.04, respectively, while those for the firms in the population are 3.28 and 2.23, respectively.

4. Conclusion.

The study concludes that the announcements of foreign asset sales by UK firms realise significant positive shareholder wealth effects of 0.82% around the announcement day and 4.8% over the 10 days before and to 10 days after the announcement. The cumulative abnormal returns from the foreign divestitures are robust to GARCH effects. We find that the GARCH model computes larger abnormal returns than the OLS model but there are no significant differences. The results are also likely to be robust to the book-to-market effect and the size effect. An adjustment for thin trading does not change the results qualitatively. The wealth gains of around five percent reported here are five times larger than in previous studies. The wealth gains are associated with an increase in geographical focus. We find that there is a significant and higher wealth gain associated with those firms that increased their industrial focus as well as their geographical focus.

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Table 1 Distribution of Foreign Divestitures by UK firms: 1986-1995.

Year/ Month	86	87	88	89	90	91	92	93	94	95	Total
Jan.	1	2	1	1	3	1	2	1	1	3	16
Feb.		1				5		3		1	10
Mar.	1	2	1	3	2			2		1	12
Apr.		1	3	2	3			2		1	12
May			1	3		1	2	1	2		10
Jun.	1	4	1	4	2	2	2	1			17
Jul.	1	3	3	1	2	2	2			1	15
Aug.	1	2	3	3	3	3	2				17
Sept.		1	2	1		2	1		1		8
Oct.			2	3	3	3	2	1	2		16
Nov.	1		3	1	2		1	2	1	2	13
Dec.	2	2	4	3	1	1	2	4			19
Total	8	18	24	25	21	20	16	17	7	9	165

Table 2 Distribution of Divestitures by Geographic Location of Divested Asset.

Location	Number of Announcements	%
North America	73	44%
Europe	51	31%
Australia & N. Zealand	15	9%
Africa	12	8%
Asia	6	4%
South America	4	2%
Others	4	2%
Total	165	100%

Table 3 Distribution of GARCH Effects.

	GARCH(1,1)		GARCH(0,0)		
	t	N	T	N	Total
No. of Observations	21	27	60	57	165
%	13%	16%	36%	35%	100%

GARCH(1,1)-t is the time-varying market model with a t-distribution error;

GARCH(1,1)-N is the time-varying normal distribution model;

GARCH(0,0)-t is the conventional OLS market model with a t-distribution error; and

GARCH(0,0)-N is the equivalent OLS model.

Table 4 Average Values of Intercept and Slope for OLS & GARCH.

Panel A. For the 48 observations with GARCH effects

	OLS	GARCH(1,1)	Difference	% Change
Intercept	-0.0009	-0.0012	-0.0003	-33.3%
Slope	0.9509	0.8339	-0.1170	-12.3%

Panel B. For the 60 observations with t-distribution errors

	OLS	GARCH(0,0)-t	Difference	% Change
Intercept	-0.0003	-0.0007	-0.0004	-133.3%
Slope	1.0350	0.9553	-0.0797	-7.7%

Table 5 Abnormal Returns (ARs) and Cumulative Abnormal Returns (CARs) from OLS & GARCH Market Models.

	OLS		GARCH		Difference in ARs
DATE	ARs	CARs	ARs	CARs	(OLS-GARCH)
-10	0.60%**	-0.44%	0.63%**	-0.18%	-0.03%
-9	0.46%**	0.03%	0.49%**	0.31%	-0.03%
-8	0.36%**	0.39%	0.38%**	0.69%	-0.02%
-7	-0.16%	0.23%	-0.14%	0.55%	-0.02%
-6	0.44%	0.67%	0.48%	1.04%	-0.04%
-5	0.23%	0.90%	0.26%	1.30%	-0.04%
-4	0.28%	1.18%	0.31%	1.60%	-0.02%
-3	0.21%	1.39%	0.24%	1.85%	-0.03%
-2	0.35%	1.75%	0.37%	2.22%	-0.02%
-1	0.69%***	2.44%	0.70%***	2.92%	-0.01%
0	0.12%	2.56%	0.16%	3.08%	-0.03%
1	0.01%	2.56%	0.02%	3.10%	-0.02%
2	0.36%	2.92%	0.40%	3.50%	-0.04%
3	0.29%	3.21%	0.32%	3.81%	-0.03%
4	0.11%	3.32%	0.15%	3.96%	-0.04%
5	-0.01%	3.31%	0.03%	3.98%	-0.03%
6	-0.07%	3.24%	-0.03%	3.95%	-0.03%
7	0.02%	3.26%	0.06%	4.01%	-0.04%
8	0.11%	3.37%	0.15%	4.16%	-0.03%
9	0.35%**	3.72%	0.36%*	4.52%	-0.01%
10	0.05%	3.77%	0.07%	4.58%	-0.02%
11	0.09%	3.86%	0.13%	4.71%	-0.04%
12	-0.07%	3.79%	-0.04%	4.68%	-0.04%
13	0.23%	4.02%	0.27%	4.94%	-0.04%
14	0.11%	4.13%	0.13%	5.08%	-0.02%
15	-0.07%	4.05%	-0.04%	5.04%	-0.03%
16	-0.03%	4.02%	0.00%	5.03%	-0.03%
17	0.23%**	4.25%	0.26%**	5.29%	-0.03%
18	0.13%	4.38%	0.17%	5.46%	-0.04%
19	0.05%	4.43%	0.09%	5.55%	-0.04%
20	0.04%	4.48%	0.05%	5.60%	0.00%

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Figure 1 Cumulative Abnormal Returns (CARs) from OLS and GARCH

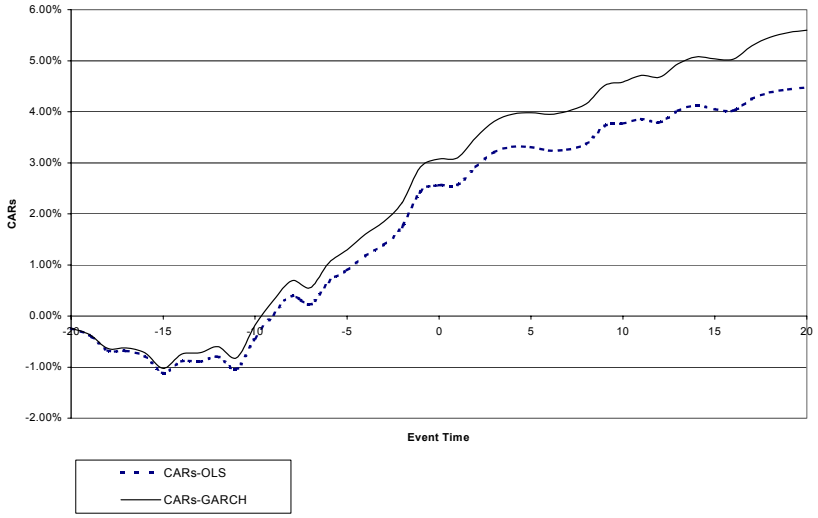

Table 6 CAR for OLS and GARCH Models.

Intervals	OLS	GARCH	(OLS-GARCH)
t-20~t+20	4.48%***	5.60%***	-1.12%
t-20~t-11	-1.04%	-0.82%	-0.22%
t-10~t+10	4.80%***	5.40%***	-0.60%
t-10~t-1	3.47%***	3.74%***	-0.27%
t-5~t+5	2.64%***	2.95%***	-0.31%
t-1~t+1	0.82%***	0.88%***	-0.06%
t-1~t0	0.81%***	0.86%***	-0.05%
t0~t+10	1.33%	1.66%	-0.33%
t+11~t+20	0.71%	1.01%*	-0.30%

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 7 CAR associated with industrial focus and status of the economy .

Panel A: Effect of Change in Industrial Focus on CAR.

Intervals	Industrial Focus		
	Increase (n=25)	Decrease (n=140)	Difference
t-10~t+10	0.059***	0.045***	0.014***
t-10~t0	0.040***	0.036***	0.005
t-5~t+5	0.046***	0.023**	0.024***
t-1~t+1	0.013**	0.007**	0.006***
t-1~t0	0.010**	0.008***	0.002**

Panel B: Effect of Status of Foreign Economy on CAR.

Intervals	Foreign Economy Status		
	G7 (n=120)	Non-G7 (n=45)	Difference
t-10~t+10	0.052***	0.036***	0.015***
t-10~t0	0.027***	0.040***	-0.013***
t-5~t+5	0.032***	0.012	0.020***
t-1~t+1	0.006**	0.013	-0.007***
t-1~t0	0.008***	0.010**	-0.003***

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.