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Security Returns Around Earnings Announcements

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SYNOPSIS AND INTRODUCTION: We examine risk, return, and abnormal return behavior in the days around quarterly earnings announcements, using a research design that allows risk to vary daily in event time. We test several hypotheses concerning the effect on security prices of earnings announcements *per se* (i.e., ignoring both the sign and the magnitude of earnings). The first hypothesis concerns the resolution of uncertainty over time. By conveying information about firms' activities, earnings announcements resolve some uncertainty about future cash flows, but the concurrent price reactions increase the variability and covariability of securities' returns during the announcements. Thus, it is hypothesized that return variances and betas, and therefore expected returns, increase during earnings announcement periods (Stapleton and Subrahmanyam 1979; Epstein and Turnbull 1980; Choi and Salamon 1989). Previous research has demonstrated anomalous positive abnormal returns during earnings announcements (Chambers and Penman 1984; Penman 1984, 1987; Chari et al. 1988). Because risk was not allowed to vary in event time in this research, it does not adequately distinguish between increased expected returns and true abnormal returns. We report that abnormal returns remain after controlling for risk increases at earnings announcements. The abnormal returns are not related to any over- or under-reaction by the market to earnings news (see, e.g., DeBondt and Thaler 1985, 1987; Bernard and Thomas 1989) because we do not condition on the earnings realization.

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The second hypothesis (the information hypothesis) is that the timing of an earnings announcement is informative because managers systematically announce good news early and bad news late (Givoly and Palmon 1982; Chambers and Penman 1984; Kross and Schroeder 1984). The hypothesis predicts that average abnormal returns: (1) are positive at the earnings announcement, (2) are negative prior to the announcement, and (3) cumulate to zero by the end of the announcement period. Our tests extend those of Chari et al. (1988), Kross and Schroeder (1984) and Chambers and Penman (1984) by examining the pattern of returns around earnings announcements for the population of stocks. The pattern we observe is not as predicted by the information hypothesis.

Finally, we investigate whether cross-sectional variation in announcement-period risks and returns is a function of firm size, which is a proxy for the increase in information arrival during earnings announcement periods. The evidence reveals that, after controlling for risk increases, abnormal returns generally are positive and decreasing in firm size. For the smallest size decile, abnormal returns in the ten days up to and including the earnings announcement are approximately 1.75 percent in the average quarter, or approximately 7 percent over only 40 trading days per year. This adds to an impressive body of size-related anomalies.

We use these results to reexamine Hand's (1990) reinterpretation of the functional fixation hypothesis. Hand investigated quarterly earnings that included previously announced book gains from debt-equity swaps. He distinguished between "sophisticated" and "unsophisticated" investors, hypothesizing that only the former correctly comprehend the different implications of swap gains and other components of earnings. He found that abnormal returns increase in a variable representing the interaction between the swap gain and a proxy for the probability that the marginal investor is unsophisticated. We are skeptical about both the hypothesis and whether it predicts the observed result. We interpret Hand's result as similar to the puzzling but typical size effect around earnings announcements. It seems unlikely to be due to swap gains, to the sign or magnitude of earnings information released at the time, to errors in measuring the earnings information released, or to functional fixation.

Key Words: *Earnings announcements, Efficient markets, Functional fixation, Risk changes.*

Data Availability: *On request from authors.*

THE remainder of this paper consists of the following. Section I of this article reviews the literature on security risks, returns and abnormal returns at information announcements. including the effect of firm size. Section II describes the data, research design, and results of testing various hypotheses. Section III reexamines Hand's tests of the functional fixation hypothesis, using both his swap data and data for almost all the New York and American Stock Exchange (NYSE-AMEX) population. Section IV provides our conclusions.

I. Hypotheses on Information Arrival and the Evolution of Risk Over Time

Uncertainty Resolution Hypothesis

Assume that all earnings announcements are "routine," which we define as a random drawing from a known earnings distribution, at a known date. This is a reasonable assumption for most firms, though not necessarily for extreme earnings realizations (Kross and Schroeder 1984; Chambers and Penman 1984). The effect of routine information on the evolution of security risk over time is addressed by Robicheck and Myers (1966), Ball and Brown (1969, 315–16), Stapleton and Subrahmanyam (1979), Epstein and Turnbull (1980), Choi and Salamon (1989), and Holthausen and Verrecchia (1988). By conveying information to investors concerning firms' activities, routine earnings announcements resolve some uncertainty about future cash flows. However, the increased flow of information increases the variability of returns during earnings announcement periods. Assuming earnings information is cross-correlated, covariances among returns of securities announcing together and thus their covariances with the market portfolio also, are predicted to increase during earnings announcement periods.[1] The market portfolio's variance is affected only trivially because it is dominated by covariances among the returns of non-announcing securities, which on any day are a clear numerical majority, so announcing securities' relative covariances (i.e., betas) increase in event time. Thus, announcing firms' return variances, betas, and (therefore) expected returns are expected to increase during earnings announcement periods. We call this the uncertainty resolution hypothesis. Unlike prior research (Penman 1984, 1987; Chari et al. 1988) we distinguish between abnormal returns and the effect of risk increases on total returns, by allowing betas to change daily in event time.

Announcements Are Per Se *Informative Hypothesis or Information Hypothesis*

If earnings announcements are not routine, then *per se* they can convey information. Specifically, if managers announce good news earnings early and delay earnings reports that contain bad news (Niederhoffer and Regan 1972; Givoly and Palmon 1982; Chambers and Penman 1984; Kross and Schroeder 1984), then the testable implications for security returns are:

1. Firms announcing late signal bad news and thus earn negative average abnormal returns around their expected announcement dates (which precede their actual dates). Further, firms that do not announce earnings early signal the absence of good news (see 2 below) and thus earn negative average abnormal returns even prior to their expected announcement dates, commencing on or after their earliest feasible earnings announcement dates.
2. Firms announcing early signal good news and thus earn positive average abnormal returns at the time of their announcements.
3. Since essentially all firms announce their earnings each quarter, the fact that an earnings announcement occurs at some time is not *per se* informative. Good and bad news thus combine to produce average abnormal returns that cumulate to zero at the end of the earnings announcement period.

[1] It is not helpful to argue that information is firm-specific and thus influences only securities' "residual" risks. If this premise is integrated across all information sources, then the market portfolio has a vanishingly small variance: i.e., essentially all risk is diversifiable. Earnings information thus is *a priori* unlikely to be independent of covariance effects (Ball and Brown 1968, fn. 40).

The information hypothesis therefore predicts a v-shaped pattern of average abnormal returns in event time. We test this prediction by examining the pattern of abnormal returns for the population of firms, avoiding measurement error in classifying individual announcements as early or late.

Cross-Sectional Variation in Uncertainty Resolution

The final hypothesis addresses cross-sectional variation in uncertainty resolution, with size as an observable proxy for the amount of information arriving concurrently with earnings announcements.[2] Therefore, under the uncertainty resolution hypothesis, announcement-period risks, risk changes, and total returns are expected to decrease in firm size. Notwithstanding the extensive evidence of size-related anomalies (Banz 1981; Reinganum 1981), abnormal returns are not expected to be a function of size.

We investigate the effect of firm size for three subsidiary reasons. First, we report estimates of risk that are allowed to vary daily in event time, to assess whether the negative relation between size and announcement-period abnormal returns documented by Chari et al. (1988) is due in part to risk misestimation. Second, we can assess the effect of increased turnover around earnings announcements on risk estimates (Scholes and Williams 1977). Third, understanding the relation between size and abnormal returns at earnings announcements helps in assessing whether Hand's (1990) results are due to that relation or to functional fixation in the context of swap gains.

II. Empirical Analysis and Results

Data

The sample is selected from all NYSE-AMEX firms on both the COMPUSTAT Quarterly tape in any quarter q from the first quarter of 1980 to the first quarter of 1988 and the Center for Research in Security Prices (CRSP) daily returns tape. The 51,178 selected firm-quarters satisfy the following data requirements: earnings for quarters q and $q-4$, E_q and E_{q-4}; market value of equity at the beginning of quarter q, MV_{q-1}; earnings announcement date for quarter q; and daily returns for a 21-day window centered on the earnings announcement date.[3] Market capitalizations of the sample firms range from approximately $1 million to $100 billion, with a median of $194 million and a mean of $971 million.

Research Design

Let τ denote event time, with the earnings announcement date denoted as event-day $\tau=0$. The Capital Asset Pricing Model (CAPM) is estimated in risk premium form, sep-

[2] While the phenomenon is not well understood, earnings realizations appear relatively more uncertain for smaller firms (Bathke et al. 1989; Collins et al. 1987; Bamber 1986). Changes in trading volume and return variance around earnings announcements also are size-dependent (Grant 1980; Atiase 1985; Lobo and Mahmoud 1989).

[3] Our sample suffers from a survivorship bias because the COMPUSTAT Quarterly tape contains only the surviving firms. We ignore the survivorship bias problem because Chari et al. (1988) who control it, find evidence similar to that reported here.

arately for each of 21 event-time days $\tau = -10$ to $+10$:[4]

$$R_{it\tau} - R_{ft} = \alpha_\tau + \beta_\tau (R_{mt} - R_{ft}) + \epsilon_{it\tau}, \tag{1}$$

where:

$R_{it\tau}$ = daily return on security i for calendar day t and event-day τ,
R_{mt} = CRSP equal-weighted market return for calendar day t,
R_{ft} = risk-free rate of return on calendar day t based on the monthly T-bill rate of return,
α_τ and β_τ are constants representing Jensen's (1968) alpha (abnormal return) and the CAPM relative risk on event-day τ, and
$\epsilon_{it\tau}$ = a normally distributed disturbance term.

The regression slope estimates the pooled cross-sectional average relative risk β_τ on event-day τ. Because the sample firms do not have identical betas, the ordinary least squares (OLS) estimate of β_τ is unbiased and consistent, but some statistical precision is sacrificed. However, with a sample size of more than 50,000 observations, statistical precision is not a major concern.

Because many firms announce their earnings on the same calendar date, and because of the possibility of industry grouping in announcement dates, the disturbances of equation (1) could, on average, be positively cross-correlated and the significance of the estimated parameters could be overstated (Bernard 1987). To reduce this problem, on each calendar date, we form an equal-weighted portfolio of the firms announcing on that date, similar to Chari et al. (1988). The equation (1) is estimated using 2,203 portfolio observations, which is the number of trading days over the sample period minus those days on which no firms announced earnings.

Evidence: Returns, Abnormal Returns, and Risk Estimates

Table 1 reports statistics from the 21 daily event-time regressions. We do not perform significance tests of changes in event time because (1) given the large sample size, small differences are likely to be significant at conventional levels, and (2) the event-time observations are not strictly independent. The second column reports average daily event-time returns. The average return on day 0 (0.084 percent) is larger than the average return on any of the ten prior or five subsequent days. This is consistent with the uncertainty resolution hypothesis, which predicts announcement-induced increases in relative (beta) risk and thus in expected return. There is no clear evidence of unusual average returns on day -1 or day $+1$.[5]

The third column reports the standard deviation of daily returns for each event-time day. If the information in earnings reports is primarily firm-specific, then using portfolio returns on each calendar date would understate the true increase in return variance of individual securities around their earnings announcement dates. We there-

[4] This is an adaptation of Ibbotson's (1975) technique. It is used by Brennan and Copeland (1988) and Kalay and Lowenstein (1985) with daily returns and by Chan (1988) and Ball and Kothari (1989) with monthly and annual returns.

[5] The sequence of event days $+6$ through $+10$ exhibits five daily average returns, each of which is greater than each of the prior 16 days' returns. Since this pattern is revealed in neither the abnormal returns nor the relative risks, it implies a market-index effect that we cannot explain in the context of the present research design.

Table 1

Daily Average Total Returns, Standard Deviation of Returns, Abnormal Returns, and Systematic Risk Estimates on 21 Days Centered Around Firms' Quarterly Earnings Announcements*

Day τ	R_τ %	$\sigma_{R\tau}$ %	$\hat{\alpha}_\tau$	t-statistic for $\alpha=0$	$\hat{\beta}_\tau$	t-statistic for $\beta=1$	Adjusted R^2	CAR_τ %
−10	0.074	2.87	0.001	0.04	0.98	−0.86	0.445	0.001
−9	0.079	2.97	0.010	0.54	1.02	0.90	0.487	0.012
−8	0.081	3.04	−0.003	−0.14	1.03	1.35	0.494	0.009
−7	0.038	3.17	−0.027	−1.39	1.02	0.89	0.485	−0.018
−6	0.030	3.19	−0.002	−0.09	1.02	0.90	0.484	−0.020
−5	0.050	2.98	0.026	1.27	1.03	1.30	0.475	0.003
−4	0.041	2.84	−0.036	−1.90	0.98	−0.92	0.480	−0.030
−3	0.052	3.15	0.033	1.74	1.00	0.15	0.480	0.003
−2	0.017	3.16	0.004	0.17	1.01	0.41	0.441	0.007
−1	0.058	3.38	0.078	3.50	1.07	2.71	0.438	0.085
0	0.084	4.02	0.066	2.35	1.05	1.54	0.321	0.151
+1	0.058	3.98	0.015	0.56	1.11	3.54	0.366	0.166
+2	0.048	3.47	0.002	0.08	1.08	2.98	0.423	0.168
+3	0.035	3.26	−0.011	−0.52	1.04	1.67	0.460	0.157
+4	0.048	3.17	−0.006	−0.28	1.09	3.77	0.486	0.152
+5	0.075	3.13	−0.007	−0.30	1.08	2.94	0.417	0.144
+6	0.113	3.20	0.025	1.19	0.97	−1.23	0.417	0.170
+7	0.127	2.99	0.027	1.30	1.11	4.53	0.486	0.197
+8	0.095	3.01	−0.031	−1.54	0.99	−0.42	0.443	0.166
+9	0.100	3.03	−0.015	−0.74	1.03	1.26	0.457	0.150
+10	0.120	3.08	0.023	1.10	1.06	2.45	0.460	0.174

* The sample consists of 51,178 NYSE-AMEX firm-quarter observations from 1980–1988. Day τ is trading day relative to the earnings announcement date; R_τ is the equal-weighted total return on event day τ; $\sigma_{R\tau}$ is the cross-sectional standard deviation of event-day τ returns, using return on one randomly selected firm from each calendar date; $\hat{\alpha}$ and $\hat{\beta}$ are abnormal return and systematic risk estimates obtained from:

$$R_{it\tau}-R_{ft}=\alpha_\tau+\beta_\tau(R_{mt}-R_{ft})+\epsilon_{it},$$

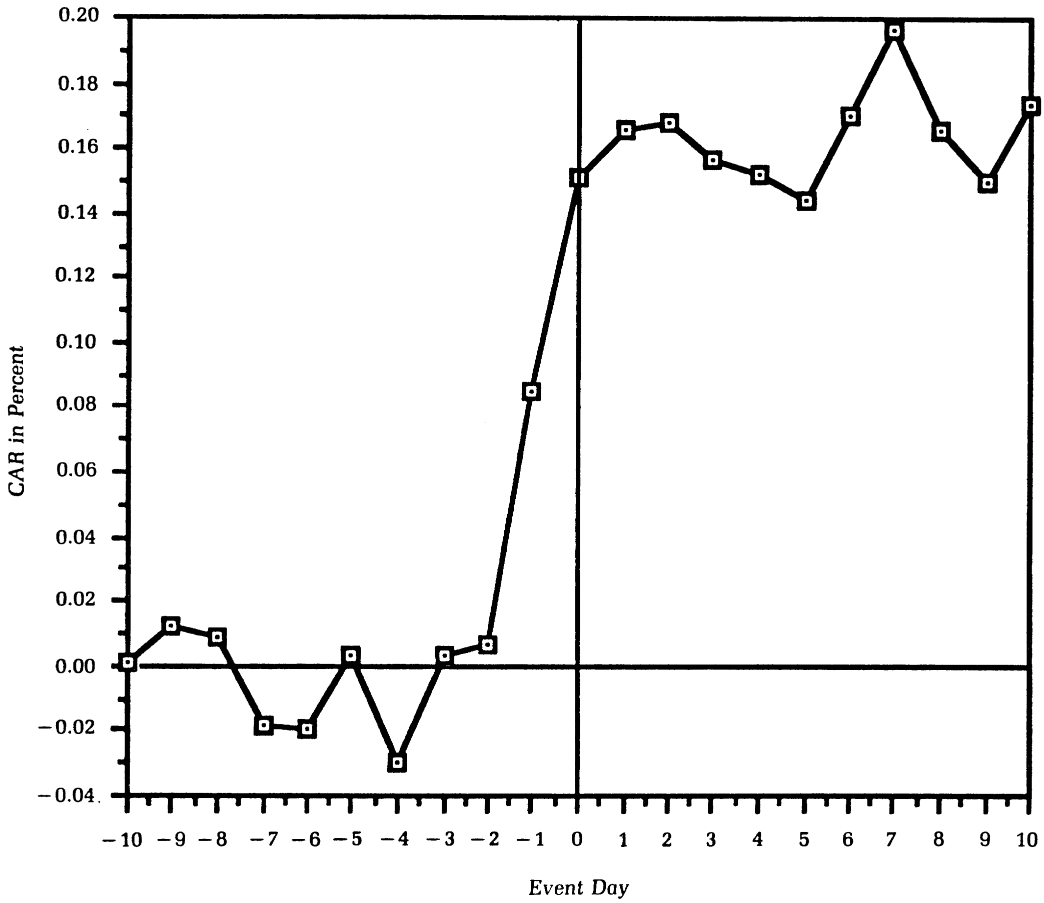
where $R_{it\tau}$ is return on an equal-weighted portfolio of all the firms reporting quarterly earnings on calendar date t (2,203 distinct calendar dates). t-statistics are for the null hypotheses $\alpha_\tau=0$ and $\beta_\tau=1$, for each event-day τ. CAR_τ is the cumulative abnormal return from event-day -10 to τ.

fore randomly select one security on each calendar date instead of using portfolio returns to calculate standard deviation of returns in event time.[6] The standard deviations of returns increase during the earnings announcement period, as first observed by Beaver (1968). The day 0 standard deviation is 30 percent greater than its average over days −10 through −2 and +2 through +10.

The fourth column reports event-time average abnormal returns, with t-statistics reported in the fifth column. Even after controlling for risk shifts, firms earn reliably

[6] Because the amount of error variance in daily returns due to nonsynchronous trading on the earnings announcement days is likely to be smaller than on other days, this procedure induces a bias against finding the hypothesized variance increase in returns around the earnings announcement dates. The Scholes and Williams (1977) beta estimates reported later are consistent with nonsynchronous trading effects being smaller around the earnings announcement period. A second reason for a downward bias is that announcement-period returns are less positively skewed, which reduces the announcement-period return variance estimates (McNichols 1988).

Figure 1
Cumulative Abnormal Returns Around Earnings Announcements



positive abnormal returns on event day −1 (0.078 percent, t-statistic = 3.50) and day 0 (0.066 percent, t-statistic = 2.35). Although these abnormal returns are small in magnitude, they are inconsistent with the uncertainty resolution hypothesis. This anomaly is not explained by the day-of-the-week seasonal observed in stock returns (French 1980; Gibbons and Hess 1981; Keim and Stambaugh 1984).[7]

To test the information hypothesis, we focus on the cumulative abnormal returns (CARs) reported in the last column of table 1 and presented in figure 1. They reveal a step increase on days $\tau = -1$ and 0. There is weak evidence of negative preannouncement abnormal returns during event days −8 through −6, which is consistent with the information hypothesis, but the estimates are statistically insignificant at the conven-

[7] Day-of-the-week return seasonals could affect announcement period returns if there were a daily seasonal in earnings announcements. This is unlikely to explain the abnormal returns we observe because (1) the CAPM in equation (1) controls for the market return, and (2) there is little day-of-the-week seasonal in earnings announcements. For our sample, the relative frequencies of earnings announcements range from 16.6 to 22.4 percent over the five weekdays (see also Penman 1987).

tional level. There is no evidence of the predicted v-shaped pattern of abnormal returns, which are not predominantly negative over the preannouncement period and do not cumulate to zero by the announcement date (they are large and positive). This result was not altered by examining event days $\tau = -30$ to -11, in case some firms delay bad news by more than ten trading days (approximately two weeks). There was no evidence of negative abnormal returns over the extended period: daily average abnormal returns were essentially zero and cumulated to 0.01 percent by $\tau = -11$.[8]

The sixth and seventh columns in table 1 report event-time beta estimates and associated t-statistics against the null hypothesis that the betas equal unity, the expected value of securities' relative risks. There is evidence of a small increase in relative risk at or after earnings announcements. Each of the betas on days -1, 0, and $+1$ exceeds each of the previous ten event-day betas; on average, they are 6.7 percent larger. The t-statistics on days $\tau = -1$ and $+1$ are 2.71 and 3.54, which means that betas on these event days reliably exceed 1. In general, the estimated betas around earnings announcement days are, in absolute terms, only marginally greater than unity. The average of the ten postannouncement betas is 3 percent higher than the preannouncement average.[9] Surprisingly, the beta on day $\tau = 0$ is indistinguishable from unity. Overall, the evidence is that, around earnings announcements, there is only slightly more information than normal that covaries with the market. Given the relatively large increases observed in standard deviations of returns, the implication is that earnings information causes primarily diversifiable risk.

Similarly, the smaller adjusted R^2 estimates reported in column 8 of table 1 on days $\tau = 0$ and $+1$ are consistent with the hypothesis that increased announcement-period volatility is primarily unsystematic (i.e., not a marketwide effect). The regressions use equal-weighted portfolio returns, so the lower R^2 estimates imply that earnings information is highly cross-correlated among firms announcing on a particular day, but that the information is not unusually correlated with the market.[10] This suggests industry effects or other submarket commonalities in firms' earnings information. The implications for the uncertainty resolution hypothesis are unclear.

Evidence: Small and Large Firms

Tables 2 and 3 report statistics, corresponding to those reported in table 1, for the smallest and largest deciles of firms. We form equal-weighted portfolios of all the small or large firms announcing earnings on a common calendar date. Size is measured as equity market value and proxies for cross-sectional variation in the amount of information arrival around earnings announcements. The information hypothesis implies that smaller firms have larger standard deviation and beta increases around earnings announcements.

[8] It is, however, possible that some firms delay the reporting of bad news by more than 30 trading days (approximately six weeks) and that we have failed to capture the market's reaction to these firms on their expected announcement dates. We examine this possibility for the decile of smallest firms in our sample by cumulating returns from their earliest feasible earnings announcement dates following a fiscal quarter-end. These results are discussed later in this section.

[9] We will show later that this is not explained by increased trading volume around earnings announcements (Beaver 1968) affecting the beta estimates (Scholes and Williams 1977).

[10] If the earnings information and the associated increased volatility were cross-correlated neither with other announcing firms nor with the market, then at a portfolio level (i.e., the portfolio of firms announcing earnings on a common calendar date), it would be diversified away and therefore would not lower the regression R^2s on earnings announcement days.

Table 2

Daily Average Total Returns, Standard Deviation of Returns, Abnormal Returns, and Systematic Risk Estimates for the Decile of Smallest Market Capitalization Firms for the 21 Days Around Their Quarterly Earnings Announcements*

Day τ	R_τ %	$\sigma_{R\tau}$ %	$\hat{\alpha}_\tau$	t-statistic for $\alpha=0$	$\hat{\beta}_\tau$	t-statistic for $\beta=1$	*Adjusted* R^2	CAR_τ %
−10	0.157	4.33	0.058	0.84	0.88	−1.57	0.071	0.058
−9	0.159	4.64	0.112	1.69	0.76	−3.22	0.057	0.170
−8	0.125	4.41	0.022	0.31	0.88	−1.58	0.072	0.192
−7	0.182	4.23	0.092	1.38	0.94	−0.82	0.086	0.284
−6	0.112	4.13	0.068	1.06	0.76	−3.38	0.062	0.352
−5	0.138	4.04	0.024	0.39	0.91	−1.32	0.093	0.376
−4	0.119	4.19	0.034	0.50	0.78	−2.88	0.057	0.410
−3	0.247	4.76	0.143	1.89	0.73	−3.11	0.039	0.554
−2	0.210	4.41	0.121	1.74	0.79	−2.71	0.057	0.675
−1	0.287	5.05	0.213	2.72	0.97	−0.35	0.069	0.888
0	0.501	6.38	0.543	5.45	1.11	1.01	0.056	1.431
+1	0.328	6.11	0.308	3.19	0.87	−1.20	0.036	1.739
+2	0.057	4.84	0.004	0.05	0.93	−0.84	0.067	1.743
+3	−0.063	4.56	−0.092	−1.25	0.78	−2.65	0.049	1.651
+4	0.107	4.60	0.101	1.45	0.92	−1.02	0.073	1.752
+5	−0.017	4.48	−0.118	−1.62	0.91	−1.01	0.056	1.633
+6	0.056	4.34	−0.023	−0.33	0.83	−2.17	0.061	1.611
+7	0.142	4.60	0.071	0.98	1.16	1.78	0.087	1.682
+8	0.035	4.23	−0.003	−0.04	0.87	−1.57	0.060	1.679
+9	0.104	4.46	−0.001	−0.02	0.86	−1.69	0.058	1.678
+10	0.012	4.04	−0.110	−1.74	1.00	−0.17	0.094	1.568

* The sample consists of the decile of smallest market capitalization stocks selected from among 51,178 NYSE-AMEX firm-quarter observations from 1980–1988. Day τ is trading day relative to the earnings announcement date; R_τ is the equal-weighted total return on event day τ; $\sigma_{R\tau}$ is cross-sectional standard deviation of event-day τ returns, using the return on one randomly selected firm from each calendar date; $\hat{\alpha}$ and $\hat{\beta}$ are abnormal return and systematic risk estimates obtained from:

$$R_{it\tau} - R_{ft} = \alpha_\tau + \beta_\tau(R_{mt} - R_{ft}) + \epsilon_{it},$$

where $R_{it\tau}$ is the return on an equal-weighted portfolio of all the firms reporting quarterly earnings on calendar date t (1,721 distinct calendar dates). t-statistics are for the null hypotheses $\alpha_\tau = 0$ and $\beta_\tau = 1$, for each event-day τ. CAR_τ is the cumulative abnormal return from event-day −10 to τ.

The small firms' announcements occurred on 1,721 unique calendar days. Their announcement-period total returns are relatively large, compared both to the returns of small firms on days farther away from the earnings announcement date and to the returns of firms on average during equivalent days (table 1). For example, average returns on days −1, 0, and +1 are 0.287, 0.501, and 0.328 percent. In contrast, the daily average total return over days −10 through −2 is 0.161 percent and over +2 through +10 the average is 0.048 percent.

The 6.38 percent standard deviation of returns on event day $\tau=0$ is 1.45 times the 18-day average of 4.41 percent for these firms (excluding −1 through +1). Compared to the corresponding factor of 1.30 for firms in general in table 1, this implies a greater relative amount of information arriving at the time of small firms' earnings announcements. Systematic risk estimates in event time are reported in column 6 of table 2. The announcement day beta is 1.11, which is larger than the beta on surrounding days.

Table 3

Daily Average Total Returns, Standard Deviation of Returns, Abnormal Returns, and Systematic Risk Estimates for the Decile of Largest Market Capitalization Firms for the 21 Days Around Their Quarterly Earnings Announcements*

Day τ	R_τ %	$\sigma_{R\tau}$ %	$\hat{\alpha}_\tau$	t-statistic for $\alpha=0$	$\hat{\beta}_\tau$	t-statistic for $\beta=1$	Adjusted R^2	CAR_τ %
−10	0.037	1.97	−0.040	−0.97	0.90	−2.39	0.265	−0.040
−9	0.047	1.98	0.003	0.08	0.96	−0.97	0.295	−0.037
−8	0.059	2.05	−0.036	−0.89	1.09	2.18	0.352	−0.073
−7	0.019	1.97	−0.064	−1.64	0.95	−1.27	0.312	−0.137
−6	0.018	2.02	−0.049	−1.26	1.01	0.25	0.324	−0.186
−5	0.078	1.96	0.055	1.41	1.04	0.98	0.336	−0.131
−4	0.043	1.84	0.010	0.29	1.02	0.53	0.366	−0.121
−3	0.037	2.00	0.026	0.70	1.07	1.77	0.361	−0.094
−2	−0.067	1.96	−0.027	−0.76	1.07	1.83	0.379	−0.122
−1	−0.018	2.17	0.027	0.68	1.08	1.89	0.337	−0.094
0	0.012	2.54	0.023	0.48	1.05	1.01	0.260	−0.072
+1	0.055	2.47	−0.001	−0.02	1.08	1.65	0.280	−0.073
+2	0.044	2.15	−0.037	−0.94	1.07	1.67	0.337	−0.110
+3	0.002	2.11	0.002	0.05	1.00	0.17	0.308	−0.108
+4	0.025	2.22	0.027	0.69	1.14	3.35	0.367	−0.080
+5	0.084	1.99	0.020	0.54	1.12	3.11	0.395	−0.061
+6	0.160	2.01	0.082	2.12	0.97	−0.67	0.268	0.021
+7	0.107	1.95	0.011	0.30	1.11	2.94	0.408	0.032
+8	0.094	1.97	−0.025	−0.63	0.90	−2.32	0.254	0.007
+9	0.141	1.99	0.023	0.61	0.93	−1.72	0.289	0.030
+10	0.150	2.00	0.017	0.46	1.06	1.42	0.327	0.047

* The sample consists of the decile of largest market capitalization stocks selected from among 51,178 NYSE-AMEX firm-quarter observations from 1980–1988. Day τ is trading day relative to the earnings announcement date; R_τ is the equal-weighted total return on event day τ; $\sigma_{R\tau}$ is cross-sectional standard deviation of event-day τ returns, using the return on one randomly selected firm from each calendar date; $\hat{\alpha}$ and $\hat{\beta}$ are abnormal return and systematic risk estimates obtained from:

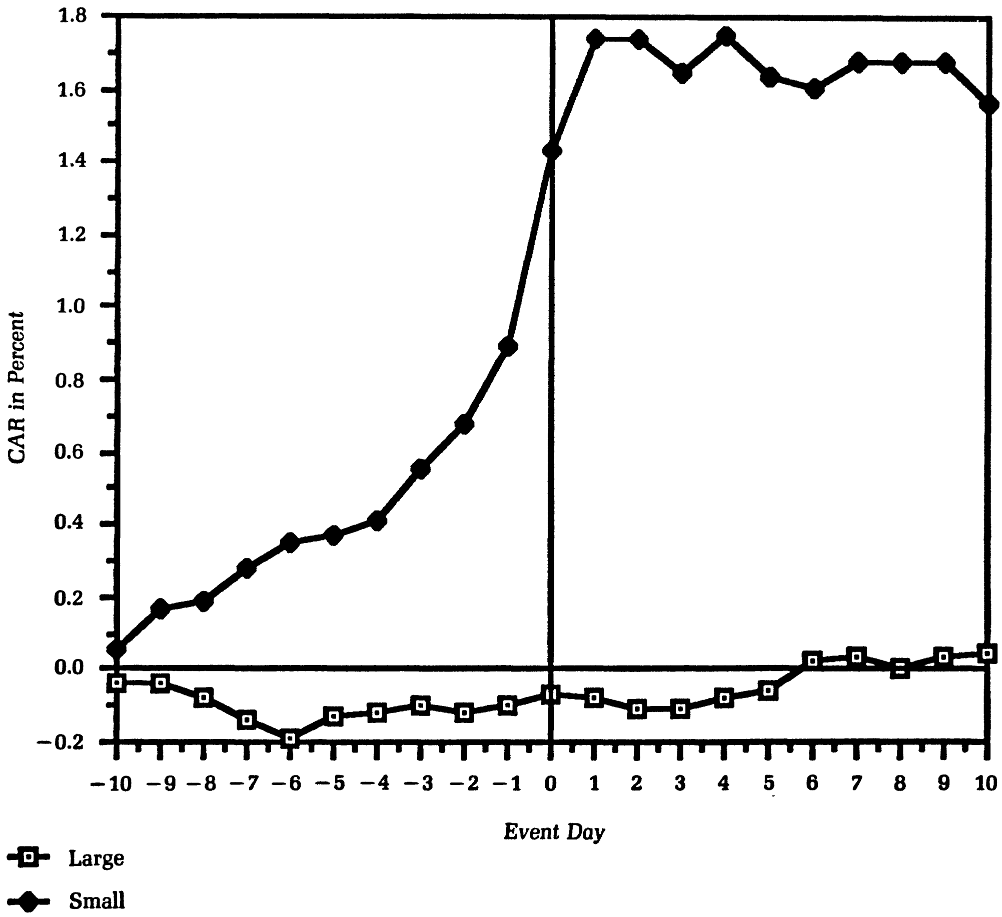
$$R_{it\tau}-R_{ft}=\alpha_\tau+\beta_\tau(R_{mt}-R_{ft})+\epsilon_{it},$$

where $R_{it\tau}$ is the return on an equal-weighted portfolio of all the firms reporting quarterly earnings on calendar date t (1,283 distinct calendar dates). t-statistics are for the null hypotheses $\alpha_\tau=0$ and $\beta_\tau=1$, for each event-day τ. CAR_τ is the cumulative abnormal return from event-day −10 to τ.

Thus, estimates of small firms' event-time systematic risk are consistent with both uncertainty resolution and the smaller firms' earnings being proportionally more informative.

The daily abnormal returns in column 4 and the CARs in the last column reveal that small firms earn significant positive abnormal returns prior to and around earnings announcement days. The α_τ values for event-days −1, 0, and +1 reliably exceed zero at the conventional significance level. Small firms earn an average cumulative 1.33 percent abnormal return over a five-day trading period from $\tau=-3$ to +2. Thus, four quarterly earnings announcement periods each year provide an opportunity to earn a 5.32 percent abnormal return from holding the portfolio of small stocks over a total of 20 trading days per year. In other words, a substantial proportion (if not all) of the size-effect observed in daily returns (see, e.g., Banz 1981; Reinganum 1981; Keim 1983) could be because of return behavior around earnings announcements. These average

Figure 2
Cumulative Abnormal Returns Around Earnings Announcements



abnormal returns appear too large to attribute to biases in estimating risk, given the average daily risk premium.

The small firms' CAR is plotted in figure 2. Comparison with the CAR for all firms in figure 1 reveals larger abnormal return magnitudes around the small firms' earnings announcements. The presence of positive abnormal returns around earnings announcements for small firms is inconsistent with the uncertainty resolution hypothesis. The CAR pattern is inconsistent with the information hypothesis.[11]

Table 3 reports corresponding estimates for the decile of largest firms in equity

[11] We also examined security returns over trading days $\tau = -52$ to -11, beginning at the earliest feasible earnings announcement date. We found no evidence that the small firms earned negative cumulative average returns in the days preceding their actual earnings announcement dates. We did not examine returns earlier than $\tau = -52$ trading days (approximately 75 calendar days) because there then would be the confounding effect of the previous quarter's earnings announcement.

market value, using 1,283 portfolio return observations.[12] Their total and abnormal returns around earnings announcement days are as expected; only one of the 21 event-day abnormal returns reliably differs from zero at the 5 percent level, which is approximately the relative frequency expected by chance. The standard deviation of returns on day 0 is 2.54 percent, which is 1.26 times the average during the interval −10 through +10, excluding −1 through +1. However, large firms' relative risk estimates do not appear to increase around their earnings announcements.

The CAR values reported in table 3 and graphed in figure 2 suggest that large firms earn only a 0.047 percent total abnormal rate of return over the 21 event days. The CAR pattern for large firms is not consistent with the information hypothesis because the small negative abnormal returns in the preannouncement period are not reversed by the earnings announcement day. In addition, none of the preannouncement or announcement-period abnormal returns is significantly different from zero.

Evidence: Nonsynchronous Trading

One explanation for betas increasing for small but not large firms is the differential effect of nonsynchronous trading. The effect of nonsynchronous trading on relative-risk estimates for small firms is likely to be lower on the earnings announcement day. This is because the fact that even small firms' stocks are traded frequently on earnings announcement days. The small firms' announcement-day beta is expected to differ from the nonannouncement-day beta, which is likely to be biased downward. Hence, estimated betas of small firms would increase around earnings announcements. In contrast, large firms are more actively traded over the entire 21-day period and thus are likely to exhibit smaller beta shifts. We estimate Scholes and Williams (1977) betas, which reduce the bias due to nonsynchronous trading, to discriminate between alternative explanations for beta shifts.

The Scholes and Williams betas exhibit a more pronounced increase in small firms' relative risk around earnings announcements than OLS betas, although both types exhibit higher volatility over event time. Thus, consistent with the uncertainty resolution hypothesis, controlling for nonsynchronous trading results in an increase in small firms' betas on earnings announcement days. The increase, however, is too small to account for the increase in total returns for small firms around earnings announcement days: on the event days in which small firms earn the largest abnormal returns (days −1, 0, +1), the OLS and the Scholes-Williams estimated betas are essentially identical. As a result, the abnormal returns around small firms' earnings announcements are not explained by risk increases.

The Scholes and Williams beta estimates of large firms do not reveal substantial changes in event-time and generally are smaller than OLS betas. This is consistent with an upward bias in the large firms' OLS betas because of their higher-than-market turnover.

[12] The number of unique calendar days on which large firms' announcements occur is smaller than that for small firms, because large firms' announcements are more likely to bunch in calendar time. Smith and Pourciau (1988) report that large firms are more likely to have December 31 year-ends.

III. Reexamination of Hand's Tests of the Functional Fixation Hypothesis

We first summarize Hand's (1990) hypothesis and his tests using debt-equity swap data, and argue that his hypothesis does not predict a size-related effect. We present evidence showing an effect similar to what he observes in swap-gain firms for the population of NYSE-AMEX firms. We then analyze Hand's sample of swap-gain firms and demonstrate that the effect Hand observes in his data is indistinguishable from the firm-size effect.[13]

Summary of Hand's Hypothesis and Tests

Under the extended functional fixation hypothesis (EFFH), only "unsophisticated" investors fail to correctly distinguish the valuation implications of components of reported earnings and their response to reported earnings is mechanistic, which governs stock valuation when the marginal investor (who is assumed to alone determine price) is unsophisticated. Hand tests this hypothesis using debt-equity swap data. During 1981–1984, some firms swapped debt, that was selling below par, for equity. The resulting nontaxable book gain flowed into quarterly earnings. The swap and its effect on earnings typically (but not always) were reported in *The Wall Street Journal* within two days. The earnings announcement was a median of 44 days *after* the swap announcement.

Hand (1990) hypothesizes that unsophisticated investors (1) perceive the swap gain to be real; (2) react to the swap gain (again) at the time of the quarterly earnings announcement; yet (3) might not realize that the debt-equity swaps are transitory one-period gains. Hand hypothesizes a positive stock price reaction, increasing with the swap gain, but only when the marginal investor is unsophisticated. His tests use a proxy for the probability that the marginal investor at the time of the earnings announcements is unsophisticated, as this cannot be observed.[14] One proxy that Hand uses is a negative, log-linear transformation of firm size, denoted by PR_i:[15]

$$PR_i = [\log(\max MV) - \log(MV_i)]/[\log(\max MV) - \log(\min MV)],$$

where max MV and min MV are, respectively, the maximum and minimum market values of equity of the NYSE-AMEX firms at the end of 1982, and MV_i is the market value of equity of firm i at that date.

Hand then estimates the following regression (all right-hand side variables are deflated by the market value of equity at the beginning of the two-day announcement period):

$$AR_i = a_1 + a_2 UZ_i + a_3 SGAIN_i + a_4(PR_i \times SGAIN_i) + \epsilon_i, \quad (2)$$

where:

AR_i = two-day earnings announcement period stock prediction error,
UZ_i = unexpected earnings, defined as reported earnings minus the swap gain and the *Value Line* earnings forecast,

[13] We are grateful to John Hand for supplying these data.

[14] It is not even given an exogenous specification in the theory. Hand (1990, 741) defines an "unsophisticated" investor as one who "can be systematically misled by firms' accounting methods and choices," which is tantamount to defining the causal variable in terms of its result.

[15] Hand uses two other scaled measures as alternative proxies: number of institutional holders of the stock and proportion of the stock held by institutions. Because proxies are positively correlated with PR_i, which is based on firm size, and yield very similar results (Hand 1990), we work with PR_i alone.

$SGAIN_i$ = earnings resulting from the debt to equity swap,
PR_i = probability that the marginal investor pricing the firm's stock is unsophisticated, and
a_1, a_2, a_3, and a_4 are regression constants and ϵ_i is a disturbance term.

Ordinary least squares and weighted least squares results reported in Hand (1990) reveal that a_4 is positive and statistically significant. Hand interprets this as evidence inconsistent with the efficient markets hypothesis, but consistent with the EFFH.

A Critique of Theory and Proxy Variables

We emphasize three properties of the swap data. First, as observed above, PR_i is a negative log-linear transform of firm size. Second, the swap gain and the interaction ($PR_i \times SGAIN_i$) variables are significantly positively correlated: the product moment correlation between these two variables is 0.97 (Hand 1990, table 4). The swap gain variable thus is likely to be positively correlated with PR_i: the product moment correlation between these two variables is 0.33, p-value < 0.01. Finally, the unexpected earnings variable is essentially uncorrelated with the swap gain variable (Hand 1990, table 4), so the coefficients on these variables are unaffected by including them in a multiple regression.

Inadequate Theory. Hand's model is not developed in terms of excess demand. The model appears to confuse stocks and flows of securities: it assumes a fixed supply of securities, independent of price, and thus of events such as earnings outcomes and swap gains. But fixed supply connotes the total number of shares outstanding at a point in time, not those exchanged. The model assumes that degree of sophistication is a characteristic of demand alone. For example, if the seller is sophisticated and the ask price does not reflect swap gains, then price is not determined by an unsophisticated buyer alone.

Equilibrium requires that *every* investor must be "marginal." For an equilibrium to exist at closing in Hand's model, it therefore must be prohibitively costly for sophisticated investors to trade with others. Closing prices cannot exceed sophisticated investors' assessments of a stock's worth, at the margin, a condition that is violated in Hand's model; sophisticated investors would be net sellers.[16] In summary, we believe the market setting assumed in Hand (1990) is too simple to predict the hypothesized price behavior.

We also are not convinced that Hand's model allows for predictions unambiguously different from those of market efficiency and functional fixation hypotheses. If "efficiency" is defined as a property of competitive capital markets, then it is a statement about returns in relation to economic costs (see Ball 1990). An important issue is whether the implications of market efficiency in this context are as Hand portrays them. If unsophisticated investors are simply those investors with higher costs of processing information (including the valuation implications of various earnings components), then in competitive equilibrium sophisticated investors can be inframarginal and can earn higher returns than the unsophisticated. (Their rents would be equated across securities, however, so no size effect would be predicted.) Positive information processing costs are not inconsistent with market efficiency.

[16] Hand (1990, fn. 9) ignores such behavior on the part of the sophisticated investors (1) for the sake of analytical tractability; and (2) due to his belief that the costs and risks to sophisticated investors from trading with unsophisticated investors are large.

Size as a Proxy. It is even more difficult to see how unsophisticated investors' behavior can vary systematically with the firm-specific proxies used. Hand's hypothesis requires some barrier to prevent sophisticated investors from trading with the unsophisticated. The proxies used for the likelihood that the marginal investor is sophisticated are essentially costlessly observable since all are public information. We therefore do not see a clear theoretical case that unsophisticated investors increase the likelihood of higher prices in swap-gain quarters, or that size is an appropriate proxy in this context.

We are skeptical of using size as a proxy for other reasons as well. The empirical relation between size and abnormal returns is well known (see e.g., Banz 1981; Reinganum 1981). Using size as a proxy for any independent variable, when the dependent variable is returns or abnormal returns, increases the likelihood of rejecting the null hypothesis. It is a low-power test to discriminate between the extended functional fixation hypothesis and size related effects on security prices. This is especially true at the turn of the year (Keim 1983) and, as previously reported in section 2, at earnings announcements.

Further, if size proxies for investor sophistication in some (i.e., swap-gain) quarters, then consistency requires it should also serve as a proxy of a similar nature in other quarters. Then our results in section 2 would suggest that unsophisticated investors (i.e., primarily the small-firm investors) routinely earn higher total and abnormal returns around earnings announcements than do sophisticated investors (i.e., primarily the large-firm investors). This results in an implausible conclusion that, on average, investor unsophistication yields positive abnormal returns.

Further Evidence: All-Firm Results

A central issue is whether the *PR* variable proxies for investor sophistication, or whether it captures a version of the anomalous size effect we observe in section 2 for firms in general. We first estimate the relation between *PR* and abnormal returns for the population of firm quarters. The hypothesis is that *PR* is associated with abnormal returns, without conditioning on the existence or magnitude of events (notably, swap gains) that might mislead unsophisticated investors.

We estimate the following regression, which is similar to Hand's (1990) equation (2):

$$R_{i\tau} = a_1 + a_2 R_{m\tau} + a_3 UE_i + a_4 PR_i + \epsilon_{i\tau}, \tag{3}$$

where:

$R_{i\tau}$ = (total or market-adjusted) return for a τ-day period, including the earnings announcement (day 0) on COMPUSTAT for firm-quarter i,

$UE_i = E_q - E_{q-4}$, where E_q is earnings before extraordinary items and discontinued operations for quarter q, deflated by the market value of equity at the beginning of the quarter,

$R_{m\tau}$ = CRSP equal-weighted market return for the τ-day period, and

PR_i = [log(max MV) − log(MV_i)]/[log(max MV) − log(min MV)], max MV = \$99 billion, min MV = \$1 million, and MV_i = market value of equity at the beginning of firm-quarter q for firm i, in millions.

We exclude firms with market capitalization under \$1 million, or with unexpected earnings (assuming a seasonal random walk model) exceeding 100 percent in absolute

Table 4

Regression of Earnings Announcement Period Returns on the Market Return, Unexpected Earnings, and Transformed Size: Ordinary Least Squares Analysis of NYSE-AMEX Firms

$$R_{i\tau}=a_1+a_2R_{m\tau}+a_3UE_i+a_4PR_i+\epsilon_{i\tau}{}^a$$

Return Metric	Return Window τ	a_1 (t-statistic)	a_2 (t-statistic)	a_3 (t-statistic)	a_4 (t-statistic)	Adjusted R^2
Total Return	−1 to +1	−0.0005 (−1.73)	1.00 (0.10)	0.04 (18.85)	0.06 (11.86)	0.14
	−1 to +1	0.0004 (1.23)		0.03 (16.72)	0.07 (13.13)	0.01
	−1 to 0	0.0000 (0.02)	1.04 (3.65)	0.07 (25.54)	0.04 (10.41)	0.17
	−1 to 0	0.0004 (1.68)		0.07 (21.94)	0.05 (11.92)	0.01
	0	−0.0000 (−0.14)	1.05 (3.58)	0.06 (25.55)	0.03 (7.36)	0.11
	0	0.0003 (1.53)		0.06 (23.12)	0.03 (8.36)	0.01
Market-Adjusted Return[b]	−1 to +1	−0.0005 (−1.71)		0.04 (18.84)	0.06 (11.88)	0.01
	−1 to 0	0.0000 (0.09)		0.07 (25.49)	0.04 (10.50)	0.02
	0	−0.0000 (−0.06)		0.06 (25.50)	0.03 (7.43)	0.01

[a] The sample is 49,864 NYSE-AMEX firm-quarter announcements in 1980–1988. $R_{i\tau}$ = return over a τ-day period including the earnings announcement date (day 0); $UE_i=(E_{it}-E_{it-4})/MV_i$, where E_{iq} is earnings for firm i in quarter q and MV_i is market value of equity at the beginning of fiscal quarter q, in millions of dollars (all observations with $|UE_i|>100\%$ are deleted); $R_{m\tau}$ = CRSP equal-weighted market return for the τ-day period; $PR_i=[\log(\max MV)-\log(MV_i)]/[\log(\max MV)-\log(\min MV)]$, max MV=\$99 billion, min MV=\$1 million.

[b] Market-adjusted returns are $R_{i\tau}-R_{m\tau}$.

value, to avoid excessive influence on the parameter estimates. This reduces the sample size by 2.6 percent to 49,864.[17]

Does PR Measure Investor Sophistication? Results of estimating an OLS regression model of the relation between earnings announcement period returns and *UE* and *PR* are reported in table 4.[18] The first row reports results using three-day total returns. To assess the robustness of the findings, we report results from alternative return metrics, return windows, and estimation methods in other rows of the table.

[17] The results are similar when fewer observations (e.g., if $|UE_q|>200$ percent) are excluded, consistent with Brown et al. (1987a).

[18] The adjusted R^2s of the regressions reported in table 4 are considerably smaller than those reported in table 1. We obtain higher R^2s in table 1 because regressions are estimated using data on *portfolios* consisting of stocks announcing earnings on a common calendar date. We use *firm-specific* data in table 4 because unexpected earnings is also included as an independent variable.

The coefficient on R_m, 1.00, estimates the cross-sectional average beta of the sample stocks. The *t*-statistic that it equals 1 is 0.10 which means that the average relative risk of the sample stocks is indistinguishable from the market portfolio's relative risk. The coefficient on *UE*, 0.04 (*t*-statistic = 18.84), reliably exceeds zero, but in absolute terms it is small and suggests that the seasonal random-walk earnings expectation proxy is noisy, given the three-day return window (see, e.g., Brown et al. 1987b).

The coefficient of 0.063 on *PR* is significantly positive (*t*-statistic = 11.86). Thus, *PR* is positively related to earnings-announcement-period returns regardless of earnings news (after partialling out the effect of the earnings variable).[19] This result questions the validity of the *PR* variable as a proxy for investor sophistication, since it would imply that unsophisticated investors routinely earn more than sophisticated investors at earnings announcements.

Specification Checks. Regressions without R_m as an independent variable are reported in the second row of table 4. The coefficient on *PR* increases slightly to 0.07 (*t*-statistic = 13.13). We conjecture the increase is due to size proxying for the effect of relative risk on returns. The next four rows of table 4 reveal robust findings in connection with the return window. The *PR* variable is always significantly positive. We also estimate all regressions in table 4 using weighted least squares, weighting observations by the inverse of their standard deviation of daily returns, with virtually unchanged results.

Further Evidence: Analysis of Hand's Swap-Firm Data

We next address the swap-gain firms themselves. Abnormal returns in the two-day quarterly earnings announcement period are estimated from the market model, fitted over the 300 days after the announcement (see Hand 1990), using the CRSP equal-weighted daily return index. Unexpected earnings (*UE*) are calculated using a seasonal random-walk model, with the swap-gain subtracted from reported earnings. In conformance with Hand (1990), *PR* is calculated using his log-linear transform of market value at the end of December 1982, and *UE* and *SGAIN* are deflated by the market value of equity at the beginning of the two-day announcement period. Because Hand's OLS and weighted least squares results are virtually indistinguishable, we report OLS results only. We analyze those 223 of Hand's 239 firms for which we could obtain complete return data.[20]

Table 5 reports estimates from the following expanded version of equation (3):

$$AR_i = a_1 + a_2 UE_i + a_3 SGAIN_i + a_4 (PR_i \times SGAIN_i) + a_5 PR_i + \epsilon_i. \tag{4}$$

When *PR* is not included, the results are very similar to those in Hand (1990, table 3). In the first row, the coefficients on *UE* and *SGAIN* are significantly positive. When *SGAIN* and ($PR \times SGAIN$) are both included (second row), neither coefficient is significant, in part because the two variables are highly collinear. In the third row, the coefficient on the ($PR \times SGAIN$) variable is 0.83 (*t*-statistic = 2.17). This is consistent with the EFFH.

[19] It is important to note that the coefficient on *PR* is not biased upward because of the noise in measuring *UE*. The reason is that *PR*, which is a transformation of firm size, is included in the regression by itself; not as an interaction with *UE*. Shevlin and Shores' (1990) detailed examination of this issue yields the same conclusion.

[20] Of the 16 excluded firms, five are listed on NASDAQ. We further exclude four observations because of their extreme influence on the regression parameters, as suggested by the diagnostic tests.

Table 5

Regression of Earnings Announcement Period Returns on the Swap Gain, Unexpected Earnings, and the Probability that the Marginal Investor is Unsophisticated: Ordinary Least Squares Analysis of Hand (1990) Data

$$AR_i = a_1 + a_2UE_i + a_3SGAIN_i + a_4(PR_i \times SGAIN_i) + a_5PR_i + \epsilon_i^*$$

a_1 (t-statistic)	a_2 (t-statistic)	a_3 (t-statistic)	a_4 (t-statistic)	a_5 (t-statistic)	Adjusted R^2
0.0027 (0.98)	0.20 (2.80)	0.48 (2.09)			0.0344
0.0035 (1.12)	0.20 (2.77)	−0.01 (−0.01)	0.85 (0.55)		0.0313
0.0035 (1.35)	0.20 (2.79)		0.83 (2.17)		0.0358
−0.0084 (−1.07)	0.17 (2.41)			0.036 (1.95)	0.0319
−0.0057 (−0.71)	0.19 (2.72)		0.64 (1.53)	0.024 (1.21)	0.0379
−0.0065 (−0.75)	0.19 (2.73)	0.23 (0.25)	0.24 (0.15)	0.025 (1.24)	0.0336

* The sample consists of 219 of the 239 firm-quarter observations included in Hand (1990). All these firms reported debt-to-equity swaps sometime between 1981 and 1984. AR_i is two-day market model prediction error; $UE_i = (E_{iq} - E_{iq-4})/MV_i$, where E_{iq} is earnings before extraordinary items and discontinued operations and the debt-to-equity swap gains for quarter q, and MV_i is the market value of equity at the beginning of fiscal quarter q, in millions of dollars; $SGAIN_i$ = earnings from debt-to-equity swaps in millions of dollars divided by the market value of equity at the beginning of the swap fiscal quarter; $PR_i = [\log(\max MV) - \log(MV_i)]/[\log(\max MV) - \log(\min MV)]$, max MV = \$58 billions, min MV = \$5 million.

Hand (1990) does not report the effect of PR alone on abnormal returns. Results in the fourth row reveal that the coefficient on PR is 0.036, which is significant by itself ($t = 1.95$, one-tailed p-value < 0.05). Thus, abnormal returns at swap-gain quarters' earnings announcements did increase with firm size, which is consistent with the results for the NYSE-AMEX population reported earlier. When ($PR \times SGAIN$) and PR are included simultaneously in the regression (fifth row), neither coefficient is significant, in part because of their collinearity. Finally, when all four variables in equation (4) are included simultaneously (sixth row), only the coefficient on earnings is significantly positive.

The magnitude of the coefficient on PR is comparable to that of the coefficient estimated for all firms and quarters in general (see table 4). The similarity of the coefficient magnitude on PR in tables 4 and 5 makes it less likely that the security return behavior around the swap-gain quarters is indicative of the market's extended functional fixation.[21]

[21] The coefficient estimated for ($PR \times SGAIN$) also is of interest. Hand (1990, 753–54) interprets the estimate in terms of joint hypotheses concerning the ability of unsophisticated investors to discern that the swap gain is a "one-off" event, the probability that the marginal investor is unsophisticated, and possible bias in PR as a proxy for that probability. The coefficient magnitude, however, cannot be used to discriminate between alternative specifications of the functional fixation hypothesis because PR is an arbitrary transform of

IV. Conclusions

We examine the existence and pattern of positive abnormal returns around earnings announcements. These estimated abnormal returns could indicate: market inefficiency; inadequacy of the CAPM or of the index of security returns (Ball 1978); risk changes that are not captured by our research design; tax effects (including capital gains taxes); a variation of Keim's (1989) trading-mechanism bias due to trading behavior around earnings announcements; and a chance result that, during the sample period, on average, more good news than bad news was released via earnings announcements for firms in general and for small firms in particular.[22]

We use these results to reexamine Hand's (1990) research on functional fixation. We assess the theory as not sufficiently well-specified to predict cross-sectional variation in the price response to swap gains as a function of variation in investor sophistication. It is particularly unable to predict such variation as a function of size, which is what Hand's empirical research essentially tests. We analyze almost the entire population of NYSE-AMEX firms around their quarterly earnings announcements during a nine-year period overlapping the period examined by Hand. We also analyze his swap-gain firms. We conclude that Hand's *PR* variable (the probability that the marginal investor is unsophisticated) is in effect a proxy for an anomalous size effect at earnings announcements. Although, while this does not prove that *PR* fulfills an identical role for the swap-gain firms in the swap quarters, as it appears to for the population of firm quarters, it does raise serious doubts about whether the anomaly uncovered by Hand is explained by his hypothesis.

This is far from a complete explanation of the phenomenon. There are no credible theories to predict a systematic relation between size and abnormal returns at earnings announcements. The size-related return anomalies at earnings announcements await a credible explanation.

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size. The scalar (9.4) is the estimated range of NYSE-AMEX firm sizes, with "IBM taken as *maxlv*= $\log_e$($58,000)=11.0 and *minlv* was arbitrarily (but prior to empirical analysis) set equal to $\log_e$($5)=1.6." Assuming the smallest firm to be capitalized at $1 million, rather than $5 million, would scale the sample $\{PR_i\}$ values by 11.0, increasing the regression coefficient for ($PR \times SGAIN$) by 22.2 percent. The coefficient has no natural scale, so inferences on the basis of its magnitude are invalid. In the case of the number of institutional investors—the second proxy—Hand (1990, 761) arbitrarily sets the minimum value at 0.69 [$=\log_e(2)$]. If the minimum number of institutional investors had been assumed to be (say) unity, which does not seem an economically important change from 2, then the coefficient on this variant of *PR* numbers would have been 10 percent larger. To demonstrate how arbitrary is the scale of *PR*, and thus the regression slope on $PR \times SGAIN$, note that there are many small firms with no institutional investors and that the log of zero is minus infinity.

[22] Our control for the market index makes this explanation seem unlikely.

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