The Ex-Dividend-Day Behavior of Stock Prices: The Case of Japan

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We provide a comprehensive empirical analysis of stock price behavior around the ex-dividend day in Japan We find that prices rise on the ex-day and that dividend-related tax effects appear to be secondary. Returns around ex-dividend days are ***dominated by the proximity of many ex-days to the fiscal year end Excess returns of I percent, which are independent of any dividend-related considerations, are higher than round-trip transaction costs on medium-sized transactions. Prices seem to imply selling pressure before and buying pressure at the start of the new fiscal year. These trading patterns appear to be motivated by intercorporate manipulative trading around the end of the, firms' fiscal year, which are unrelated to dividends.***

Despite the large body of theoretical and empirical research on dividend policy in the U.S. and other markets, this major corporate financing decision and the corresponding market reaction, as reflected by prices, are not well understood. The theoretical models of

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stock price behavior on the ex-dividend day argue that tax considerations motivate trading and determine prices on that day. The various models differ, however, in their assumptions about the marginal investor who sets prices in the market. The marginal investor may be a long-term investor with a preference for capital gains over dividends, as in Elton and Gruber (1970), or a short-term investor with symmetric tax treatment of dividends and capital gains who eliminates profit opportunities up to his or her transaction costs, as in Kalay (1982). Finally, the marginal investor may prefer dividends to capital gains and be active in dividend capture [Lakonishok and Vermaelen (1986), and Karpoff and Walkling (1990)]. Naturally these models differ in their predictions of prices and volume of trade on ex-dividend days.[1]

Examining stock prices and volume around ex-dividend days in Japan can shed new light on these issues because the institutional features of the Japanese markets differ substantially from those of the U.S. market. First, the tax code is very different. Japanese investors have no tax distinction between short-term and long-term trading. Also, the tax reform of 1988 subjected individuals to capital gains taxes for the first time and constrained corporations' dividend-capture activities severely. Second, the means by which information is disseminated are unusual. For example, Japanese corporations are not required or expected to announce the size of their dividend before the ex-dividend day. Third, the industrial structure in Japan is unique. Most firms are affiliated with business groups, or *keiretsu*, and engage in extensive intercorporate trading and reciprocal shareholding. We expect these and other features in the Japanese markets to affect trading and price behavior around ex-dividend days. We find that, unlike the U.S. markets, substantial trading around ex-dividend days is not motivated by dividend considerations and its corresponding tax effects.

In a recent paper, Hayashi and Jagannathan (1990) analyze ex-day price behavior in Japan by examining a sample of stocks whose fiscal year end ex-dividend day falls in March. They choose one day in March each year during the 1983 to 1987 period. Because ex-days in

[1] A partial list of the empirical studies in this area includes the empirical portion of the papers cited above; Lakonishok and Vermaelen (1983) and Booth and Johnson (1984), who examine stock price behavior around cx-days in the Canadian market. Michaely (1991) studies price effects on the ex-day around the tax reform of 1986. This reform eliminated, upon realization the preferential treatment of capital gains for long-term investors. Eades, Hess, and Kim (1984) compute returns around ex-dividend days and document some puzzling results. First, excess returns are observed around ex-dividend days, and not just on the ex-day itself. Second, excess returns are observed for nontaxable distributions on ex-days. The finding that excess returns are observed on ex-days where tax considerations should not play a role is also documented by Grinblatt, Masulis, and Titman (1987). Barclay (1987) find mixed results in his study of a period before the modern income tax was adopted.

[2] The appendix provides a detailed description of the institutional features of the tax code, transaction costs, and dividend announcements in Japan.

Japan are clustered in calendar time, they are able to capture with this procedure a relatively large proportion of the ex-dividend events (about 40 percent) on the Tokyo Stock Exchange for their sample period. Their main results are a documented negative price drop to dividend ratio (-0.643), and a finding that prices go up by almost 1 percent on ex-dividend days, quite independent of the dividend amount.[3] That is, prices rise on average 1 percent on the event day without including the effects of the dividend. Since theory predicts the price drop to dividend ratio will be about +1, this result is unexpected. The authors attempt to explain that "if good news hits the stock market, there will be a general rise in stock prices. If that hap pens on some of the five ex-days in our sample, the average price drop over the five ex-days may well be negative" [Hayashi and Jagannathan (1990), pages 416-417]. They also notice, however, that stocks with a non-March fiscal year exhibit different price behavior on their event days, which rules out the market effect explanation. They conclude that the price drop on the ex-dividend day equals the dividend, and that a string of unidentified shocks accounts for the excess returns on the ex-days. Hayashi and Jagannathan are puzzled by two other results that they refer to as anomalies: Stocks with a March fiscal year end that pay no end-of-the-year dividend earn higher returns on their (imaginary) ex-day than non-March stocks, and stocks that also go ex-rights on these days earn excess returns.

We initially confirm Hayashi and Jagannathan's (1990) main result. Indeed, we find a negative ratio of price drop to dividend on the ex-dividend day of -0.9317 for our entire sample (-0.5063 for the sample excluding ex-rights) and average positive excess returns of about 1 percent (compared with about 0.1 percent in the United States). Stock prices actually rise on the ex-dividend day in Japan. Abnormal returns appear to exceed round-trip transaction costs for medium-sized transactions, suggesting a trading strategy that even relatively small investors can exploit.

Our sample, however, is both much larger (280 event days with 18,869 observations) and much more diverse than Hayashi and Jagannathan's (1990). In particular, we extend their work in the following areas: First, we compare end-of-year and interim ex-dividend days because we include middle-of-the-year dividends in our sample. We find that, on average, excess returns on ex-dividend days coming at the end of the fiscal year are significantly higher than those on interim

[3]The only other study of ex-dividend stock price behavior in Japan that we are aware of is an earlier paper by Maru, Kon-ya, and Yonezawa (1979). They also concentrate only on year end ex-days in the months of March and September for the period 1968 to 1977, and find an average price drop to dividend ratio of 0.176.

ex-days. Second, we study volume data in more detail and find that trading volume is higher than usual around the end of the fiscal year. Third, we do not concentrate only on ex-dividend days but examine returns on days surrounding the ex-day We document significant negative excess returns for 5 days leading to the ex-day and significant positive excess returns on the ex-day that is the first trading day of record of the new fiscal year. Overall the cumulative excess returns during the event period (days -10 to 10 relative to the ex-day) are insignificantly different from zero.[4] This suggests that the effects that determine the pattern of stock prices during the event period have no lasting economic impact outside the event period. Moreover, we document similar stock price behavior around the end of the fiscal year for a control sample of securities that pay no dividends. Fourth, we also distinguish between firms that voluntarily announce the size of the dividend before the ex-day and firms that do not. To our surprise, we do not find that an announcement affects ex-day returns, perhaps because analysts' forecasts of dividends are relatively accurate. Fifth, we include non-March and non-end-of-the-month events in our sample, which allows us to determine similarities and differences in the pattern of returns for these subsamples. Sixth, we analyze the time series of the price drop to dividend ratio, returns, and volume around ex-dividend days throughout our sample period (1981-1991), inclusive of the tax reform of 1988. The results for the tax regimes before and after the reform differ significantly both in returns and in volume, which is consistent with the notion that taxes affect prices around our event period. Also consistent with the tax effect, we find a strong positive relationship between excess returns and dividend yield.

These extensions enable us to gain new insights, to explain stock price behavior around ex-dividend days in Japan more fully, and to rule out various alternative explanations.

To summarize our main results, the cross-sectional variation of the data is consistent with a dividend-related tax effect. Nevertheless, it is clear that the dividend-related tax effect is secondary in the Japanese market. We fmd that the proximity of ex-dividend days to the fiscal year end, and not the dividends per se, dominates returns around our event period. We call this the end-of-the-fiscal-year effect.

We examine information effects, specific microstructure effects, and other effects unique to Japan (e.g., the March effect). These effects cannot explain our results, however. We present evidence that the end-of-the-fiscal-year effect can be explained largely by extensive in-

[4]We thank Ravi Jagannathan for making this observation to us.

tercorporate trading activities to obtain tax or other benefits that are not necessarily related to dividends. The unique industrial structure in Japan, where reciprocal shareholding is common, presents a natural field for such activities.

This article is organized as follows. We describe the data in Section 2 and Japanese payout policies in Section 3. Section 4 describes our methodology and we present our results in Section 5. A summary and conclusion are provided in Section 6.

1. Data

Our sample includes the 1203 firms listed in January 1992 on the first section of the Tokyo Stock Exchange (TSE)[5] and spans the period from January 1, 1981, to July 31, 1991.

We obtain our data from the QUICK Research Institute. The data include daily closing prices, daily trading volume, and semiannual earnings for individual securities.[6] We also obtain prices for two indices, the Nikkei Stock Average (Nikkei) and the Tokyo Stock Exchange Price Index (TOPIC). The QUICK Research Institute supplied us with the size of the dividends for the firms in our sample, the ex-dividend dates, and other relevant information, such as rights issues and splits. Our sample includes 18,869 ex-dividend days. Finally, we collect manually the dates of the voluntary dividend announcements by corporate executives for the firms in our sample. Of the 1507 such announcements we identify, only 1354 precede the ex-dividend days.

2. Dividend Policy in Japan During the Last Decade

To be listed on the TSE, Japanese firms must pay an annual dividend of at least 5 yen. Once a stock is listed, however, almost nothing prevents the firm from cutting its dividend.', In the past, many Japanese corporate executives believed that dividend payments represented a cost to the corporation, so dividends were often low and remained relatively fixed even when stock prices rose substantially.

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[5] The TSE has three sections: the first, the second, and the foreign section. Trading on the first section involves mainly stocks of large firms. The second section contains stocks of small and growing firms. The first section dominates the other two in trading volume and market capitalization.

[6] Prices and volume of trade are available only from the time the firms are listed on the TSE. Since 1981, 189 firms have been listed on the exchange and 19 have been delisted. Unfortunately we have very little information on the delisted firms. Although this introduces a survivorship bias into our analysis, it should be small, since the number of delistings is limited and only seven are a result of financial distress.

[7] A firm can only be delisted if it has paid no cash dividends in the last 5 business years and its liabilities have exceeded the exchange requirements for the last 3 business years.

Recently, dividend policy became an issue of interest to agents in the Japanese security industry and stock exchanges when a decline in trading volume prompted the exchanges to look for new ways to attract investors. In an article published by the Foundation of the Japanese Security Association (Nihon Shoukengyo Kyokai) on April 17, 1991, the question was raised, "How do we attract the Japanese individual investor?" The first consideration the article dealt with was the importance of dividend policies.

Typically, U.S. corporations pay quarterly dividends. Japanese firms, in contrast, pay dividends once or twice a year. In 1981, about 23 percent of the firms in our sample did not pay any dividends, and only 39 percent paid dividends twice a year. In 1990, in contrast, only 3.4 percent paid no dividends; 69 percent paid semiannually. Therefore, the trend in the last decade is clear: More firms on the TSE pay dividends and the frequency of the payments is increasing.

For dividend-paying firms, the ex-dividend day occurs by the fourth-to-last trading day of the end of the fiscal year (and middle of the year for firms that pay twice a year). Since for most firms the end of the fiscal year occurs in March, there are disproportionally large numbers of ex-dividend days in March and in September (for firms that pay twice a year).[8] Of 17,806 ex-dividend days (1981-1990), 7068 (40%) occur in March and 5640 (32%) in September. Moreover, in a given month, most of the firms that go ex-dividend do so on the same day.

In terms of the dividend size, average dividends for dividend-paying firms increased at a steady rate of about 4 percent per year over the sample period. Since the number of firms making dividend payments and payment frequency also increases, we can conclude that in the last decade Japanese firms increased their payout to shareholders in the form of dividends. If the dividends are measured. on an annual basis per firm (for dividend-paying firms), the average corporation's payout of 8.65 yen in 1981 increased to 11.85 yen in 1990 (adjusted for rights and splits). The average dividend for the entire 1981 to 1990 period is about 10.5 yen.

[8]We note that a growing number of Japanese corporations set their fiscal year end in March. One of the stated reasons is to avoid intervention by the *Sokai-ya* group at the annual shareholders meetings (literally. *Sokai-ya* means a person whose business is to attend shareholders meetings. In the past *Sokai-ya* were mostly freelancers who made certain that shareholders' meetings went smoothly; they received in return a small honorarium from the company. Recently their activities resemble a kind of protection racket, and it is commonly believed that they are under the influence of organized crime syndicates). *Sokai-ya* forces the firms to pay money to avoid the embarrasment of long question sessions and intimidation of other potential speakers. In 1984, *Sokai-ya* prolonged Sony's annual meeting by more than 13 hours. Therefore, many Japanese firms have their annual meetings on the same day. For example, 694 listed firms held their meetings on June 29, 1989, to try to prevent an individual *Sokai-ya* from attending more than one of them [Zielinski and Hollaway (1991)]

The common measures of dividend intensity are dividend yield and the payout ratio. Despite the growth in dividend payments, the average dividend yield fell during the 1980s from more than 2 percent in the first half of the decade to 0.69 percent by 1990. This is not surprising, in light of the general price levels for securities during the period. The TOPIX and the Nikkei rose rapidly throughout the 1980s, reaching their peak early in 1990. At that time stock prices were 5.5 times those in January 1980. Indeed, the growth in dividend payments did not keep up with the growth in prices.

Recently, however, the indices have dropped sharply. This is reflected in the average dividend yield for stocks on the TSE in 1991, which was 0.85 percent. This yield is higher than the average dividend yield in 1990 (0.69 percent), even though we account for dividends only until July 31, 1991 (about 68 percent of annual dividends).

The continuous growth in security prices during the 1980s suggests the use of an alternative measure of dividend intensity, which does not consider price levels. If the median annual payout ratio is the appropriate statistic to examine, we observe a stable payout ratio of 0.4 to 0.45 throughout the period for the median firm.[9]

3. Methodology

We use a number of approaches to analyze stock price behavior in Japan around the ex-dividend day. First, following Elton and Gruber (1970), we calculate the price-drop-to-dividend ratio on the ex-day. Ignoring transaction costs and assuming that the investor can consummate the trade immediately before or after the stock goes ex-dividend, Elton and Gruber (1970) show that the price drop to dividend ratio equals

$$\frac{P_B - P_A}{D} = \frac{1 - \tau_d}{1 - \tau_g}, \qquad (1)$$

where D is the cash dividend, P_B is the price cum dividend, P_A is the price ex-dividend, and τ_g and τ_d are the marginal investor's tax rates on capital gains and dividends.

For tax rates between zero and 100 percent, if $\tau_d > \tau_g$, the ratio of the price drop to the dividend on the ex-dividend day is positive, but less than one. If $\tau_d < \tau_g$, the ratio is greater than One.

This ratio is calculated for the full sample as well as various subsamples: (1) before and after the tax reform; (2) by quintiles of dividend

[9]The average payout ratio in the United States was approximately 0.44 during the 1980s [see French and Poterba (1991)].

yield; and (3) according to whether the stock goes ex-rights on the ex-dividend day or not.

The ratio of the price drop to dividend has an intuitive appeal because it shows clearly the market substitution rate between an after-tax dollar of dividends and an after-tax dollar of capital gains. Unfortunately, this ratio as a test statistic suffers from econometric and economic shortcomings. Without correction, it is potentially subject to heteroskedasticity.[10] Moreover, investors are assumed to be risk neutral. The ratio does not incorporate any adjustment for risk associated with the uncertain price after the ex-period, and most important, it fails to consider general market movements on the ex-dividend day. Since many of the ex-days in our sample are clustered in calendar time, this lack of independence limits our ability to interpret this ratio.

We use a second approach that does not suffer from the limitation above, and which allows us to perform statistical analysis. This approach is based on the difference between rates of return around ex-dividend days and on other days, and it follows Eades, Hess, and Kim (1984). If after-tax returns are constant through time, they get for the observed returns on the ex-dividend day

$$R_{ex} = R + \frac{D}{P_b}\left(\frac{\tau_d - \tau_g}{1 - \tau_g}\right) \tag{2}$$

where R are the observed returns on any day other than the ex-'dividend day.

The difference between the observed returns on the ex-dividend day and on other days, or the excess returns on the ex-dividend day resulting from tax considerations, is equal to the last term in Equation (2). For $\tau_d > \tau_g$, excess returns should be positive, but much lower than the dividend yield if the dividend-related tax hypothesis is supported by the evidence.

We employ a standard event study methodology and use the market model to calculate excess returns on ex-dividend days.[11] Then we regress these excess returns against relevant explanatory variables discussed below.

We also analyze volume data, using similar techniques. Employing the mean-adjusted model, we compare trading volume around our

[10]That is, stocks with low dividends are assigned a disproportionally large weight as illustrated by Eades, Hess, and Kim (1984). Some of the authors, such as Michaely (1991), correct for this

[11]Event studies use various models to measure empirically excess returns. Brown and Warner (1985) examine the event study methodology and analyze the characteristics of the different models. They recommend the market model when the events are clustered in calendar time. We follow their advice because ex-dividend days in Japan are clustered.

Table 1
Price drop to dividend ratio

Panel A: Means of the price drop to dividend ratio for various subperiods and subsamples

		1981–1991	1981–1988	4. 1989–1991
Entire sample	# of obs.	15,192[a]	10,563	3745
	mean	−0.9317	−0.8072	−0.9395
Sample excluding ex-rights	# of obs.	13,198	9133	3345
	mean	−0.5063	−0.4346	−0.3719
Sample with ex-rights	# of obs.	1994	1430	400
	mean	−3.7486	−3.1892	−5.6602

Panel B: The ratio of price drop to dividend arranged by dividend yield

Quintile	# of obs.	Mean *D/P*	Mean ratio	Mean divident	Mean price (cum-dividend)
1 (lowest)	2635	0.0023	−1.0682	4.82	2048.0
2	2635	0.0045	−0.9579	6.36	1355.3
3	2635	0.0070	−0.5110	7.00	1029.1
4	2635	0.0106	−0.1574	7.24	742.8
5 (highest)	2637	0.0206	0.1650	8.93	481.4

[a] We exclude 3676 observations because closing prices are not available for the cum-dividend day or opening prices on the ex-dividend day are missing. A few of these prices are missing for lack of trading, but most of the missing prices belong to firms that were initially listed on the Tokyo Stock Exchange during the sample period. We have the full set of dividends for the entire sample period, but prices only from the time the firms were listed.

event period (the ex-dividend day) with normal volume levels for the securities in our sample. Excess volume around ex-dividend days may indicate a specific trading motivation such as dividend capture, but because of the proximity of many ex-days to the turn of the fiscal year, it may also indicate tax realization strategies or window dressing activities.

4. Results

4.1 The tax effect

We report summary statistics for the price drop to dividend ratio on ex-dividend days in panel A of Table 1. This ratio is calculated with closing prices on the cum-dividend day and opening prices on the ex-day. The ratio is negative (–0.5063 for the sample excluding rights issues), implying price increases on the ex-dividend day.

This puzzling result is even stronger for the subsample of stocks that go ex-rights at the same time they go ex-dividend (the ratio equals –0.9317; dividends and prices are adjusted for the dilution effects of rights.) Also, it appears that the ratio is more negative after the tax changes went into effect in April 1989.

The negative sign of these ratios and their size are not consistent with an explanation that relies solely on dividend related tax considerations. Nevertheless, taxes might explain some of the cross-sectional variation in the ratio. To explore this possibility, we follow earlier research and consider the association between the ratio of price drop to dividend for the securities in our sample and their dividend yield. We divide the sample into five quintiles according to dividend yield and calculate the ratio of price drop to dividend for each quintile.

The results, reported in panel B of Table 1, are striking. The ratio is most negative for low-yield securities and increases gradually as the mean dividend yield increases, becoming positive (0.165) for the highest dividend yield quintile. The Spearman rank correlation between the ratio of price drop to dividend and dividend yield is 0.1, which is significantly different from zero (at a better than 1 percent significance level).[12] Indeed, the variation of the price-drop-to-dividend ratio on the ex-dividend day is consistent with the dividend-related tax effect and the tax induced clientele effect.

The sample period for this study could cause misinterpretation of the results in Table 1. During our sample period, stock prices in Japan rose and dividend yields dropped. This is especially worrisome considering the composition of the sizes of dividend yields in our case. The yield is largely determined by stock prices and not just by the size of the dividend (see the last two columns in Table 1, panel B). If the ratio of price drop to dividend was systematically lower in the later part of the sample period, our interpretation of the results might be unwarranted.

To explore this issue, we repeat the experiment on an annual basis. We arrange the sample by dividend yield in each year and calculate the ratios. In Figure 1 we present the ratios for each year for low-dividend-yield, average-dividend-yield, and high-dividend-yield securities. In 8 of 10 years, high-yield securities have higher ratios than low-yield securities. The results in Table 1 do not seem to be an artifact of the general security price increases throughout the sample period. Interestingly, an examination of Figure 1 reveals that the price drop to dividend ratio on the ex-dividend day is fairly stable for high-yield securities and highly volatile for low-yield securities.

The event study results for the sample without tights (12,356 observations) are reported in column 2 of Table 2.[13] We observe significant

[12]The results presented in panel B of Table 1 for for the subsample that excludes rights. The results for the full sample and for the subsample that includes only ex-dividend days that coincide with ex-rights days are qualitatively the same. The Spearman rank coirrelations for the full sample and for the subsample with rights are 0.125 and 0.312 respectively, both highly significant.

[13]The estimation period is between 124 days and 25 days before the ex-dividend day, our went

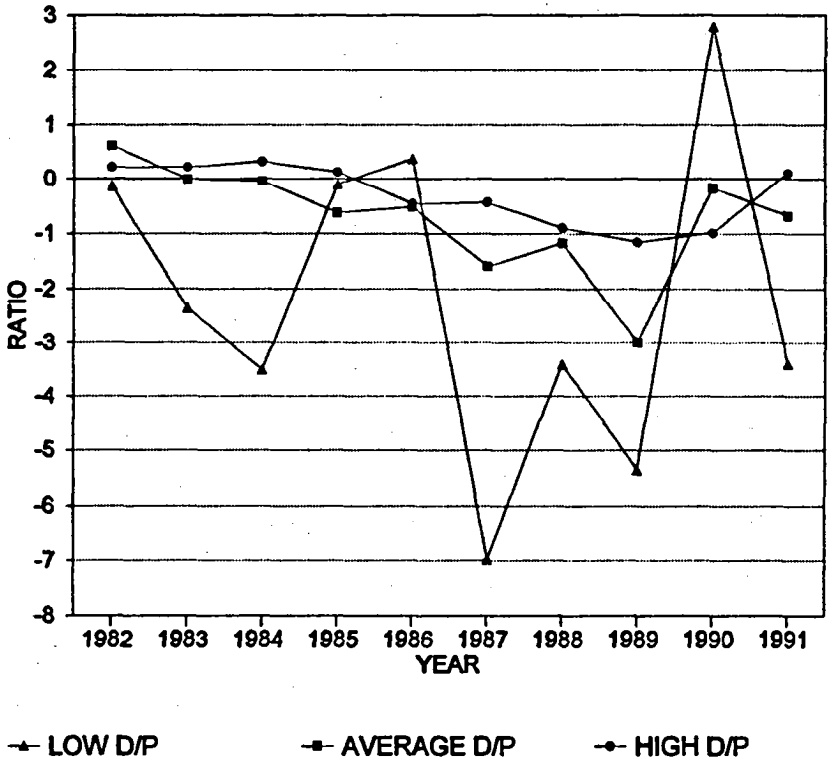

Figure 1
The price drop to dividend ratios for each year in our sample period for low dividend yield, average dividend yield, and high dividend yield securities. In 8 of 10 years, high-yield securities have bigger ratios than low-yield securities. The price drop to dividend ratio on the ex-dividend day is fairly stable for high-yield securities and highly volatile for low-yield securities.

economic and statistical excess returns (approximately 1.1 percent excess returns with a *t*- statistic of 51.95) on the ex-dividend day. On the days leading to the ex-dividend day, the excess returns are negative and statistically significant.[14] After the ex-day excess returns are

day. Although most securities on the first section of the Tokyo Stock exchange trade every day, some do not. We require at least 50 daily returns based on actual trades to include a security in the sample.

[14]This result is in contrast to stock price behavior in the United States. Eades, Hess, and Kim (1984) document positive returns on the days leading to the ex-dividend day and negative returns afterwards. The negative excess returns we observe on the days leading to the ex-dividend day, however, are attributable mainly to observations from the month of March. In a subsample of ex-dividend days that excludes March observations, only day -2 has significant negative excess returns and days -4, -3, and -1 have negative but not significant excess returns.

mixed.[15] Note, however, that the cumulative excess returns (reported in column 3) are not significant when a partial, or the entire, event period is considered (days -7 to 0 or days -7 to 7). Therefore, it appears that substantial economic activities take place within the event period window with little lasting economic effects outside this period. The direction of excess returns during the event period suggest some type of selling pressure for 5 days before the event and buying pressure on the ex-day.

Despite our use of the market model, the inflated t-statistics and the number of days with significant abnormal returns might suggest that we have not fully controlled for the lack of independence in the data.[16] Therefore we repeat the experiment with a portfolio approach, which has less power but is free of the clustering problem. Each ex-dividend day in the sample period (in all, 268 days) is treated as a single observation. That is, all the securities that go ex-dividend on a given day are used to construct the returns of an equally weighted portfolio and the market model is then employed for these portfolios. With this approach, significant excess returns of 1 percent (t-statistic-- 7.704) are observed only on ex-dividend days.

To gain additional insight into these results we arrange the sample in five quintifes by dividend yield. Excess returns, returns, and the beta coefficient for each quintile of dividend yield for the subsample excluding rights issues are reported in Table 3.

There is a strong positive relationship between excess returns and dividend yield. The lowest quintile of dividend yield is associated with an excess return on the ex-dividend day of 0.67 percent, whereas the excess return for the highest yield quintile is 1.62 percent. The Spearman rank correlation coefficient is 0.1547, which is highly significant.[17]

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[15] To assure that the significant abnormal returns are not an artifact of our estimation procedure or methodology, we use a hypothetical exdividend day 60 days after the true ex-day. Four days (out of 21), spread over this hypothetical event period, were significant at the 5% level.

[16] An alternative explanation for the frequency of days around the event day with significant excess mums should be considered. Our sample is very large, and Lindley's paradox might apply. According to this paradox, for large samples, very small returns will cause a rejection of the null hypothesis at conventional significance levels. Therefore, we also employ a Bayesian approach of calculating posterior odds ratios for the null hypothesis of zero excess returns on event days. The posterior odds ratio reflects the ratio of the probability that the null hypothesis is me to the probability that the alternative hypothesis is true given the prior beliefs of the researcher and the sample information. In this case our prior bcliefs about the probabilities of the hypotheses are half and half respectively. We use both a uniform prior and a normal prior to calculate the posterior odds ratio (see Zellner (1971) for details of the procedure]. Days -4 to -1 have significant negative excess returns (i.e., the probability that the null hypothesis is true is very small relative to the alternative). The ex-dividend day is positive and significant and days +3, +5, and +8 also have excess returns significantly different from zero using both our specifications of priors. Other days have excess returns that are not significantly different from zero.

[17] These results persist throughout the sample period. In every year cxcept 1987, excess returns are higher for high-yield than for low-yield securities.

Table 2

	Excess returns around ex-days for dividend paying securities		Excess returns around the end of the fiscal year for zero-dividend securities	
(1)	(2)	(3)	(4)	(5)
Event day	Excess returns (t-statistic)	Cumulative excess returns	Excess returns (t-statistics)	Day of record relative to fiscal year end
−7	−0.0003 (−1.4391)	−0.0003	−0.0012 (−1.314)	Last day of fiscal year −6
−6	0.0001 (0.5948)	−0.0002	−0.0012 (−1.303)	Last day of fiscal year −5
−5	−0.0013 (−6.0707)	−0.0015	−0.0047 (−5.291)	Last day of fiscal year −4
−4	−0.0019 (−8.9167)	−0.0034	−0.0026 (−2.856)	Last day of fiscal year −3
−3	−0.0015 (−7.0262)	−0.0049	−0.0026 (−2.887)	Last day of fiscal year −2
−2	−0.0026 (−12.243)	−0.0075	−0.0056 (−6.210)	Last day of fiscal year −1
−1	−0.0019 (−9.1588)	−0.0094	−0.0042 (−4.748)	Last day of fiscal year
Ex-day	0.0110 (51.9492)	0.0016	0.0097 (10.775)	First day of new fiscal year
1	0.0004 (1.8252)	0.0020	0.0012 (1.315)	Second day of new fiscal year
2	−0.0006 (−2.7188)	0.0014	0.0003 (0.313)	Third day of new fiscal year
3	0.0010 (4.7653)	0.0024	0.0005 (0.520)	Fourth day of new fiscal year
4	−0.0002 (−0.9052)	0.0022	0.0024 (2.573)	Fifth day of new fiscal year
5	−0.0029 (−13.465)	−0.0007	−0.0032 (−3.499)	Sixth day of new fiscal year
6	0.0004 (1.9818)	−0.0003	0.0007 (0.768)	Seventh day of new fiscal year
7	−0.0008 (−3.7493)	−0.0011	−0.0004 (−0.431)	Eighth day of new fiscal year

The event day for dividend paying firms is the ex-dividend day. The event day for firms that do not pay an end-of-year dividend is their imaginary ex-day, the first day of record of the new fiscal year.

Table 3
Excess returns, returns, and beta coefficients arranged by dividend yield

Quintile	No. of observations	Dividend yield	Excess returns	Mean returns	Beta coefficients
1	2125	0.002546	0.006694	0.009958	0.81239
2	2125	0.004834	0.010236	0.014929	0.82546
3	2125	0.007328	0.009883	0.013842	0.72396
4	2125	0.010900	0.011829	0.014230	0.63600
5	2125	0.020850	0.016155	0.019048	0.43081

A similar significant relationship is observed between dividend yield and raw returns on the ex-dividend day (the Spearman correlation coefficient is 0.127). We find a strong negative relationship, however, between the beta coefficient (estimated during the estimation period) and dividend yield. The Spearman correlation coefficient is -0.2656, which is significantly different from zero.

The positive documented relationship between dividend yields and excess returns is consistent with cross-sectional variation associated with the tax effect.[18] Nevertheless, the excess returns are 'too high in relation to the theoretical value implied by the tax model. Indeed, in a matched-pair test of the difference between excess returns and dividend yields for each observation in the sample, excess returns are significantly higher than dividend yields (with a t-statistic of 10.07 for the difference). Excess returns are also significantly higher than dividend yields for the four lower quintiles of dividend yield. In contrast, for 'the highest quintile of dividend yield, the yield is higher than the excess returns by 0.364 percent, which is highly significant (t-statistic = –6.64).[19] The highest quintile of dividend yield is the only case that is consistent with the tax model, implying that tax considerations may be more relevant for these securities. Clearly these are the most attractive securities for dividend capture by corporations, which prefer income in the form of dividends.

The cross-sectional variation associated with the dividend yield is consistent with dividend-related tax-motivated trading. Nevertheless, the magnitude of the abnormal returns suggests that taxes provide only a partial and secondary explanation for the behavior of stock

[18] To measure the market substitution rate between an after-tax dollar of dividends and an after-tax dollar of capital gains, we follow Hayashi and Jagannathan (1990) and regress the percentage price drop against the dividend yield. If taxes are irrelevant, we expect the slope coefficient on the dividend yield variable to equal one. Furthermore, if the ex-dividend day is otherwise a normal day, the intercept of this regression should equal zero or a small negative number to reflect the daily drift term in returns. To account for cross-sectional correlation in light of the clustering of event days, we run a cross-sectional regression for each point in time and pool the regressions by constraining the slope coefficients to be the same over time. The resulting intercept of regression is - 1.11 and the slope coefficient equals 0.67. In the remainder of the paper, we attempt to identify the source of the 1.11 percent price increase after controlling for dividends on ex-days. We note, however, that the slope coefficient on the dividend yield variable is significantly lower than one. For a direct comparison with Hayash and Jagannathan (1990), we use the "seemingly unrelated" regression model [see Zellner (1971)] for a subsample of end-of-the-year ex-days of stocks whose fiscal year ends in March. We regress the percentage price drop against the dividend yield and find a slope coefficient of 0.71, which is significantly different from one (t-statistic = 3.086). This result is in contrast to Hayashi and Jagannathan who report a slope coefficient close to one.

[19] The matched-pair test is also useful in cases where the data are characterized by many outliers skewness. The Wilcoxon sign rank nonparametric test for the difference between excess returns and dividend yield produces similar results for these quintiles. The difference is positive and significant (at the 1 percent level) for the first three quintiles, negative and insignificant for the fourth quintile, and negative and significant for the fifth quintile (highest dividend yield). For the whole sample the sign rank test is insignificant.

prices on the ex-dividend day. Next we present evidence that prices around the ex-day are affected by the proximity of ex-days to the turn of the fiscal year for Japanese corporations.

4.2 The end-of-the-fiscal-year effect

Stock prices around ex-dividend days in Japan appear to be affected by something other than dividends. To verify that there is an effect unrelated to dividend payments, we construct a subsample of securities paying no end-of-year dividends. For a security in this subsample (1070 observations), the "zero ex-dividend day" is like any other day except that it coincides with the first trading day of record of the new fiscal year.[20] The event study results for the sample containing only zero ex-dividend days are reported in column 4 of Table 2.

Although dividend-related considerations are not an issue for this subsample, around the end of the fiscal year the prices of these stocks behave much like the prices of dividend-paying stocks (compare columns 2 and 4 in Table 2). There are positive and significant excess returns on the first day of record of the new fiscal year (about 1 percent; t-statistic = 10.7751, in contrast to the negative excess returns observed on the final days of the fiscal year.[21] Cumulative excess returns for the entire event period are insignificant. This pattern of stock prices is consistent with selling pressure before the end of the fiscal year and buying pressure on the first day of record of the new fiscal year independent of any dividend-related considerations.

The fiscal year for most Japanese firms ends at the end of a month, although a very few firms end their fiscal years in the middle of the month. In addition, as we have noted, many Japanese firms pay dividends twice a year. To help us further understand the significance of the economic activities on our event day, we compare the ex-dividend day pricing effects of different types of events. We divide the entire sample into three categories: fiscal-year-end ex-dividend days that coincide with the end of the month,[22] middleof-the-year (interim) ex-dividend days, and fiscal-yearend ex-dividend days that do not coincide with the end of the month.

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[20]The implicit assumption that the market is aware that a zero dividend is associated with this ex-dividend day. This is not obvious in Japan because of the lack of consistent dividend announcements before the ex-dividend day. Nevertheless, the results of our regression analysis below suggest that the market is sufficiently informed from other sources (e.g., analysts' forecasts) about the size of the dividend on the ex-dividend day.

[21]We replicated this experiment excluding March observations and found that for 406 observations the excess return on the first day of record of the new fiscal year is 0.42 percent (t-statistic = 2.9). The excess returns for the last two trading days of record of the fiscal year are -0.37 percent (t-statistic = -2.6) and -0.35 percent (t-statistic = -2.4, respectively.

[22]We exclude March observation from this subsample to control for the March effect discussed below.

Table 4
Excess returns arranged by type of ex-dividend day

	(1) Fiscal year end and end of the month ex-dividends, non-March	(2) Middle of the year ex-dividends days	(3) Fiscal year-end and middle of the month ex-dividends days
No. of observations	1954	4731	319
Abnormal returns (%)	1.31	0.574	0.557
t-statistic for difference from (1)		15.951	6.894

The results are shown in Table 4. Excess returns on ex-dividend days are significantly lower for interim dividends. Excess returns on fiscal-year-end ex-dividend days that do not coincide with the end of the month are also smaller. The differences are highly significant in both cases. The equality of means test for this difference produces t-statistics of 15.95 and 6.89 for the two subsamples.[23]

In summary, we document negative excess returns leading to the end of the fiscal year and positive excess returns on the first day of record of the new fiscal year quite independent of the dividend.[24] We detect this end-of-the-fiscal-year effect in two ways: first, by examining price behavior for a subsample of stocks that do not go ex-dividend at the end of their fiscal year, and second by comparing different types of ex-days and observing that. excess returns are significantly higher when the ex-ay coincides with the first day of record of the new fiscal year.

4.3 Volume

Using returns data, our results are consistent with, selling pressure on securities before the end of the fiscal year and buying pressure afterward. Such pressures would lead us to expect higher than usual trading volume around the turn of the fiscal year. To test whether this occurs, we perform an event study using volume data for our

[23] This is a univariate test, however. When we control for other variables in our regression analysis below, we find a smaller difference between excess returns on ex-dividend days coinciding with month end fiscal year ends and those on ex-days coinciding with mid-month fiscal year ends. See footnote 26.

[24] Since individual securities earn excess returns on the first day of record of a new fiscal year, it is interesting to examine the returns of a proxy for the market portfolio on such days. We use the mean-adjusted model for both our indices. Event days are defined as the dates in our sample period that represent the end of a fiscal year (coinciding with the end of the month) for any of our sample stocks. For 118 such event days, we find the rates of return on the indices to be significantly higher around the turn of the fiscal year than mean returns for these indices on other days. There is compelling evidence for excess returns on individual securities around the turn of their fiscal year. These excess returns appear to affect the prices of the indices as well.

Table 5
Excess volume (in millions of shares) around ex-dividend days

Day in relation to event day	Entire sample period, 1981–1991		Before tax reform, 1981–1988		After tax reform, 4/1989–1991	
	Excess volume	t-statistics	Excess volume	t-statistics	Excess volume	t-statistics
−5	0.095	4.4281	0.161	6.1678	−0.073	−2.4608
−4	0.107	4.9604	0.155	5.9289	−0.018	−0.6158
−3	0.054	2.5030	0.098	3.7426	−0.011	−0.3691
−2	−0.001	−0.0465	0.024	0.8990	0.012	0.3995
−1	0.036	1.6757	0.080	3.0416	−0.008	−0.2783
0	0.472	21.9281	0.639	24.4275	0.013	0.4399
+1	0.215	9.9959	0.289	11.0301	−0.037	−1.2488
+2	0.191	8.8735	0.243	9.2705	−0.007	−0.2436
+3	0.178	8.2743	0.232	8.8550	−0.059	−1.9748
+4	0.229	10.6418	0.335	12.8171	−0.126	−4.2319
+5	0.122	5.6574	0.124	4.7477	−0.022	−0.7290

sample of securities. We use the mean-adjusted model and estimate parameters during the period from 124 to 25 days before the ex-day for each security. Excess volume around the event day is calculated and reported in Table 5.

The most striking result is the difference in trading volume before and after the tax reform of 1988, which took effect on April 1, 1989. Before the tax reform, excess volume around ex-dividend days is large and generally highly significant.[25] After the reform, in contrast, excess volume is mostly insignificantly different from zero. Recall that the tax reform had two relevant effects. First, individual investors were taxed on capital gains for the first time. Second, trading by corporations in other firms' stocks around those firms' fiscal year end for dividend-capture purposes was restricted and made more costly.

The general perception is that corporations dominated trading in the Japanese markets throughout our sample period. Nevertheless, consider the case in which individual investors account for excess volume around ex-dividend days before the tax reform of 1988. Standard theory supports the notion that individual investors have an incentive to sell their stocks cum-dividend to avoid high tax payments on dividends, especially when capital gains are excluded from taxation. Once capital gains taxes are introduced, dividends become more attractive and individual investors hesitate to sell before the ex-dividend day and buy afterward. With this explanation, however, some pieces of the puzzle are still missing. Specifically, excess returns are observed at the end of the fiscal year even when no dividends are paid out (see

[25]We exclude the transition period between January 1,1989, and March 31, 1989. Even if we extend the event period window to indude days -10 to +10, we still observe significant positive excess volume on every day except day -2.

Table 2). Excess returns on ex-days are higher for year end than for interim dividends (Table 4). Prices, on average, go up on ex-dividend days (Table 1), so that the usual trade-off between dividend income and capital losses does not apply. For these reasons we are reluctant to argue that the introduction of taxes on capital gains fully explains our results.

Alternatively, if corporations or financial institutions dominated trading throughout our sample period, as is commonly believed, the reduction in trading volume around our events could be explained by the limitation imposed in 1988 on intercorporate trading around the turn of fiscal years. We typically associate corporate trading around ex-dividend days with dividend-capture activities, and when dividend-capture trading occurs, we expect buying pressure cum-dividend and selling pressure ex-dividend. That is, dividend capture reduces excess returns on the ex-day up to the marginal transaction costs. In Japan, however, we observe negative excess returns before the event day and positive excess returns on ex-dividend days that are not related to dividends. This suggests other than dividendcapture-motivated trading. We explore the roots of excess volume on the ex-day in more detail and present the evidence in Table 6.

We arrange our sample of securities by dividend yield and average trading volume. If dividend capture occurs, we expect excess volume to be positively related to dividend yield and liquidity [see Lakonishok and Vermaelen (1986) and Karpoff and Walkling (1990)]. We use a measure of average volume during our estimation period as a proxy for liquidity.

Some of the results in Table 6 are consistent with dividend cap ture. Excess volume as a percentage of normal trading volume was larger for high-yield securities before the tax reform of 1988. Also, securities in the higher groups of average trading volume (our proxy for liquidity) have significant positive excess volume before the tax reform and generally negative or insignificant excess volume after the reform.

In contrast, Table 6 reveals other results that are inconsistent with dividend capture, and which imply different motivations for excess trading. First, we find excess volume for all yield and volume groups before the tax reform of 1988. second, excess volume as a percentage of normal trading volume is generally higher for less-liquid securities. Third, less-liquid stocks have significant excess volume even after the reform, regardless of the dividend yield group.

Our interpretation of the trading volume results is as follows. There are two distinct motives for trading around ex-dividend days. High-yield, liquid securities were excessively traded for dividend-capture reasons before the tax reform of 1988. This activity was eliminated by

Table 6
Excess trading volume (in thousands of shares) on ex-days arranged by dividend yield and average volume

		Entire sample			1981–1988			4/1989–1991		
Yield group	Volume group	Avg. volume	Excess volume	t-stat.	Avg. volume	Excess volume	t-stat.	Avg. volume	Excess volume	t-stat.
1	1	24.14	67.43	4.62	23.44	44.75	3.44	20.59	37.65	2.88
	2	76.88	125.32	4.26	76.08	100.82	3.50	65.64	148.70	1.83
	3	180.81	184.94	4.23	182.26	122.35	3.52	161.25	69.61	1.95
	4	445.65	274.79	3.10	465.39	590.32	3.77	414.61	231.43	1.84
	5	3153.3	288.44	0.40	3362.1	4024.9	2.72	2607.4	−1444.8	−3.96
2	1	22.56	60.94	5.70	18.71	62.74	5.53	32.03	151.29	3.33
	2	80.35	87.10	5.33	62.87	89.81	5.68	102.94	271.30	2.23
	3	194.09	179.43	2.88	148.86	176.15	3.09	214.61	241.49	2.07
	4	497.05	334.82	3.06	371.58	255.40	3.27	510.44	186.20	1.38
	5	3520.8	1408.7	1.67	2512.4	1345.9	2.56	3692.5	−1853.7	−3.03
3	1	17.90	40.53	6.37	14.46	33.53	4.97	43.92	72.66	2.44
	2	63.43	98.78	4.20	48.88	86.03	5.07	135.55	111.56	1.70
	3	151.55	139.48	4.41	121.41	197.82	3.94	282.39	205.10	1.16
	4	372.93	419.08	3.99	306.28	273.20	3.61	644.36	−204.16	−5.70
	5	2678.9	1521.0	2.97	2744.4	1513.2	2.26	2959.0	−1491.0	−5.09
4	1	15.90	31.48	6.00	13.78	25.02	5.57	36.23	36.31	2.66
	2	50.67	103.71	5.85	44.44	111.38	5.25	119.51	33.90	1.32
	3	118.13	141.43	4.23	102.57	147.69	4.98	249.93	34.90	0.79
	4	299.60	394.12	5.02	274.46	822.69	3.31	558.30	−173.03	−4.90
	5	2717.9	2333.0	2.06	2677.7	4829.7	2.73	2568.8	95.26	0.17
5	1	10.77	34.70	4.69	10.14	33.49	3.56	30.98	20.06	2.32
	2	29.82	62.91	4.92	25.54	58.69	4.21	93.39	4.69	0.37
	3	73.88	250.65	3.28	61.01	243.18	2.36	198.64	37.85	0.82
	4	199.17	562.19	4.27	162.90	652.77	3.65	448.47	86.59	0.66
	5	1710.0	3101.5	4.25	1488.2	2612.4	4.53	2493.1	−387.25	−0.94

the reform, which explicitly limited dividend capture. There is, however, a second motive for excess trading around ex-days and it involves less liquid securities. This motive-a manipulate motive-was not eliminated by the tax reform and appears to be quite independent of the dividend. We will elaborate on this hypothesis below.

4.4 Regression analysis

So far we have used a univariate procedure to study the tax effect, the end-of-the-fiscal-year effect, and trading volume around ex-dividend days separately. We noted that overall, when returns are accumulated, the trading activities around the event day have no lasting pricing effects. Nevertheless, we can shed new light on the variables that affect the pricing patterns within the event period if we control for the variables simultaneously. To measure the combined effects of the above, and other relevant variables on returns on ex-dividend days, we run the following simple OLS regression:

$$\begin{aligned} ABR = {} & \beta_0 + \beta_1 DVYLD + \beta_2 LOGFV + \beta_3 VOL + \beta_4 AVVOL \\ & + \beta_5 RGHT + \beta_6 ANN + \beta_7 INTRM + \beta_8 NOEND \\ & + \beta_9 TAXREF + \beta_{10} MARCH + \beta_{11} SUBSID, \end{aligned}$$

where excess returns, *ABR*, is the dependent variable and

$DVYLD$ = dividend yield,
$LOGFV$ = log of equity value, which serves as a proxy for firm size,
$RGHT$ = dummy variable for ex-rights days coinciding with ex-dividend days,
ANN = dummy variable for observations where the dividend was announced,
$INTRM$ = dummy variable for mid-year dividends,
$NOEND$ = dummy variable for fiscal year-end not at the end of the month,
$MARCH$ = dummy variable for March observations,
$TAXREF$ = dummy variable for the period before the tax reform of 1988,
VOL = trading volume on the ex-dividend day,
$AVVOL$ = average volume estimated during the estimation period, and
$SUBSID$ = dummy variable for firms that are subsidiaries of other firms

Table 7
OLS regression for excess returns

Independent variable	1	2	3	4	5	6
Intercept	0.0462	0.0586	0.0533	0.0563	0.0467	0.0462
	(10.94)	(12.61)	(11.19)	(11.83)	(10.22)	(10.11)
DVYLD	0.2467	0.1311	0.1578	0.1373	0.2386	0.2366
	(5.177)	(2.364)	(2.836)	(2.473)	(4.880)	(4.841)
LOGFV	−0.0017	−0.0023	−0.0020	−0.0022	−0.0018	−0.0018
	(−7.921)	(−9.963)	(−8.564)	(−9.156)	(−7.725)	(−7.719)
RGHT	0.0082	0.0075	0.0075	0.0075	0.0081	0.0081
	(9.569)	(8.602)	(8.509)	(8.539)	(9.095)	(9.088)
ANN	0.0002	0.0002	0.0001	0.0002	−0.0003	−0.0003
	(0.234)	(0.188)	(0.081)	(0.178)	(−0.345)	(−0.374)
INTRM	−0.0061	−0.0065	−0.0063	−0.0065	−0.0050	−0.0050
	(−9.81)	(−7.715)	(−7.427)	(−7.657)	(−5.963)	(−5.971)
NOEND	−0.0045	−0.0039	−0.0042	−0.0040	−0.0030	−0.0030
	(−2.792)	(−2.436)	(−2.561)	(−2.478)	(−1.588)	(−1.585)
TAXREF	−0.0051	−0.0056	−0.0052	−0.0056	−0.0051	−0.0045
	(−7.459)	(−7.927)	(−7.436)	(−7.898)	(−7.202)	(−6.052)
MARCH	—	0.0011	0.0013	0.0011	0.0015	0.0015
		(1.468)	(1.735)	(1.480)	(1.969)	(1.998)
VOL	—	3.0E-10	—	3.4E-10	3.3E-10	3.3E-10
		(8.931)		(9.036)	(9.200)	(9.169)
AVVOL	—	—	1.9E-10	−2.7E-10	−3.0E-10	−3.0E-10
			(1.779)	(−2.247)	(−2.552)	(−2.539)
SUBSID	—	—	—	—	0.0037	0.0080
					(3.818)	(4.256)
SUBSID × TAXREF	—	—	—	—	—	−0.0059
						(−2.688)
F-statistic	64.179	58.613	49.793	53.274	46.326	43.090
Prob > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

The coefficients and their t-statistics (in parentheses) for an OLS regression for excess returns (ABR) is the dependent variable. DVYLD is the dividend yield, LCGFV is the log of equity value, RGHT is a dummy variable for ex-rights day coinciding with ex-dividend days, ANN is a dummy variable for observations where the dividend was announced, INTRM is a dummy variable for mid-year dividends, NOEND is a dummy variable for fiscal year end not at the end of the month, MARCH is a dummy variable for march observations, TAXREF is a dummy variable for the period before the tax reform of 1988, VOL is the trading volume on the ex-dividend day, AVVOL is the average volume during the estimation period, and SUBSID is a dummy variable for firms that are subsidiaries of other firms.

The coefficients for the variables along with their t-statistics (in parentheses) are reported in Table 7.

The results are generally consistent with those of the univariate analysis. Dividend yields are positively related to abnormal returns, consistent with the tax effect. The coefficient on the *RGHT* variable shows that excess returns are higher if securities also go ex-rights on ex-dividend days. The coefficient on the dummy variable *INTRM,* which controls for mid-year ex-dividend days, is negative and significant. That is, excess returns on fiscal year end ex-dividend days are significantly higher than excess returns on interim ex-dividend days.

Similarly, we distinguish between end of the month ex-dividend days and other ex-dividend days using the variable *NOEND.* The co-

efficient on this variable is negative and marginally significant.[26] Finally, a potential March effect [see Bremer and Kato (1992)] is not supported by the results of our regressions. The coefficient for the relevant variable, *MARCH*, is small and generally insignificantly different from zero.

Interestingly, the coefficient on the announcement variable, *ANN*, is insignificant. Japanese investors appear to trust alternative sources of information about the size of the dividends, such as analysts' forecasts. Whether corporate executives officially announce the amount of the next dividend or not, excess returns are not affected. This suggests that the perceived risk on the ex-dividend day is normal.

The results also reveal that the tax reform of 1988 had a significant impact on stock prices on ex-dividend days. The coefficient on the relevant variable, *TAXREF*, is negative and significant. Apparently excess returns were significantly lower before the tax reform than afterward. Considering that the reform imposed capital gains taxes on individual investors for the first time, this finding is puzzling. Recall, however, that the tax reform also imposed severe restrictions on dividend capture by firms. Corporations have a tax preference for returns in the form of dividends, and dividend capture tends to reduce excess returns. The results suggest that corporate and institutional investors were actively involved in dividend capture before the tax reform and less active in this type of trading afterward. This notion is also supported by our results on trading volume and excess returns on securities arranged by dividend yield.

In our regression we also consider the effects of volume variables on excess returns. High volume on our event days *(VOL)* is associated with high excess returns (t-statistics are about 9 in the different regression specifications). We should point out, however, that average historical volume as measured in our estimation period, *AVVOL*, has a negative and significant coefficient when both volume variables are incorporated in the regression. If average volume is a proxy for liquidity, the combined effect of these coefficients lends itself to the following interpretation. Excess returns are observed primarily on less liquid stocks with high excess volume on the event day. This last result is consistent with manipulation of stock prices around the end of the fiscal year. Clearly, thinly traded stocks are prime candidates for price manipulation.

A weaker interpretation of the results is that firms tend to unload less liquid securities before the end of the fiscal year and buy them

[26] In fact, when we employ a Bayesian approach and calculate posterior odds ratios of the coefficient for the *NOEND* variable, we cannot reject the null hypothesis that the coefficient is different from zero.

back afterwards for end-of-the-year tax reasons or window dressing. The selling pressure before and the buying pressure after the end of the fiscal year for these illiquid securities may account for the price effects that we observe.[27]

To appreciate potential price manipulation in the Japanese stock market, one needs to consider the peculiar industrial structure of Japanese firms. Most firms belong to business groups called *keiretsu.*[28] The *keiretsu* affiliation involves substantial interfirm and reciprocal shareholdings. In fact, in most cases the largest shareholder in the firm is another corporation in the same *keiretsu.* It is not surprising that firms that are so tightly interlocked engage in mutually beneficial stock price manipulation, or at least exploit the timing option for realization of capital gains or losses. The absence of dealers and the mechanics of trading on the Japanese stock exchanges allow for such cross-trading, particularly in less liquid stocks.

We argue that this manipulation hypothesis along with some dividend-capture activities before the tax reform accounts for our results.[29] Nevertheless, we attempt to test the manipulation hypothesis directly. The variable *SVBSID* in our regression identifies the stocks of firms that are subsidiaries of other firms (the parent company owns more than 30 percent of the shares). Presumably the prices of these securities are most likely to be manipulated for mutually beneficial tax or other purposes around the end of the fiscal year. Indeed, the coefficient on this variable is positive and highly significant.[30] We interpret

[27]To investigate this hypothesis, we divide the sample of fiscal year end days into six subsamples arranged by price appreciation (depreciation) during the year. If the tax loss realization hypothesis dominates our results, we should see high excess returns on the first day of the new fiscal year for securities that depreciated in price during the previous year, and no significant excess returns for securites that appreciated in price. The excess returns, however, are different from this prediction. Excess returns for firms with the highest price appreciation are 1.6 percent, firms with moderate price appreciation experience 1.4 percent excess returns, and firms with the slightest price appreciation (less than 5 percent during the year) have 1.3 percent excess returns. These excess returns are all significant at the 0.1 percent level. Their economic magnitude is similar to excess returns for securities that depreciated in price (1.6 percent, 1.3 percent, and 1.1 percent for firms that have highest, moderate, and lowest price depreciation respectively).

[28]See Nakatani (1984) for a detailed description of the organization of the *keiretsu.*

[29]An alternative explanation is what we refer to as the anonymity hypothesis. Suppose the shareholders of a firm are reluctant to be on record by the end of the fiscal year, but would like to reopen their position for the new fiscal year. A similar phenomenon can be seen in the Italian stock market. In that market, the registration day for common stocks coincides with the ex-dividend day. On that day, the stockholder's name is registered in the company shareholders' book and provided to the tax authorites. Michaely and Murgia (1995) attribute excess returns on the ex-dividend day to the desire of individual investors to maintain their anonymity on the registration day for tax purposes. If demand for securities is not infinitely elastic, we might observe prices falling before the end of the fiscal year and rising afterward. This is, in fact, what is observed in the Japanese market (see Table 2). Unfortunately, we are unable to identify a reason for Japanese investor to maintain their anonymity around our event period.

[30]Most firms in Japan belong to *keiretsu.* We identified the firms that do not belong to one of the six major *keiretsu.* If they were truly independent (which most of them are not), and if

this result as lending strong support to the manipulation hypothesis.[31] To assess the effect of the tax reform, we also include a measure of the interaction between our subsidiary variable and the tax reform variable. We find that excess returns were also lower for this group before the tax reform, which is consistent with dividend-capture activities.

Finally, excess returns on our event days are also affected by firm size, with larger firms showing lower excess returns. If stocks of small firms are easier to manipulate, this is further indirect evidence for our hypothesis.

4.5 Information effects, specific microstructure effects, and other effects

Next we examine various effects and **hypotheses** that might provide alternative explanations for some of our results. For example, if we are not capturing some information effects during our event period, we may be misinterpreting our results. Because dividend announcements before the ex-dividend day are voluntary in Japan and fairly rare, we first verify that corporations do not systematically release official information, whether related to the dividend or not, around the end of the fiscal year. That is, except when a voluntary announcement is made, investors have no official information about the size of the dividend until shortly before the annual shareholders' meeting a few months alter the ex-day. Nevertheless, if analysts' forecasts are published very shortly before the ex-dividend day, information effects could be contaminating our return series around our event. We find, however, that the average time that elapses between the forecast and the ex-day is 17.67 days, with a minimum of 5 days. Furthermore, for March observations, which constitute a large fraction of our sample, the average time between the forecast and the ex-day is 26 days, with a minimum of 18 days. Incidently, the analysts' forecasts are accurate in slightly more than 80 percent of the cases, and in about 0.5 percent of the cases the forecast is in a form of a range rather than a point estimate.

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our hypothesis is expect, we would expect less manipulation of prices for this group. When we include an identification variable for this group in our regression, the coefficient is negative, as expected, but not significantly different from zero. Interestingly, Maru et al. (1979) report in their Table 3 a negative price-drop-to-dividend ratio for firms that are at least 50 percent owned by other corporations, and a positive ratio for firms that are at least 50 percent owned by individuals. Although Maru et al. provide very little discussion and no explanation for this result, it lends additional support to our hypothesis.

[31] One might consider stock price manipulations for other than tax reasons. For example, window dressing activities due also potentially consistent with our results. In Japan, consolidated financial statements are generally ignored [see French and Poterba (1991)]. Therefore, parent companies have an Incentive to trade their subsidiaries' stocks to manipulate their own financial statements around the fiscal year end.

The existence of microstructure effects in the form of hidden transaction costs associated with the tick size or implicit bid-ask spread might also affect our results.[32] Suppose investors time their investment so that they tend to buy the stock after the ex-dividend day and sell it before the ex-day to avoid paying taxes on the dividends. If, in addition, the tick size or the spread is large, the excess returns that we document could simply reflect these transaction costs. We find, however, that the tick size is 1 yen for securities with a price of less than 1000 yen and 10 yen for securities in the price range of 1000 to 10,000 yen. To examine potential tick-size effects, we construct a sample of securities priced below 1000 yen (7938 observations) and repeat our experiment. The average price for this sample is 518.08 yen, so the tick size is on average less than 0.2 percent of the price. Nevertheless, we find excess returns of 1.06 percent on the ex-dividend day, suggesting that tick size cannot explain our results.

It is more difficult to categorically rule out the bid-ask spread as an explanation, because we do not have the data to measure the spread. Consider, however, a comparison with the bid-ask spreads in the U.S. equity markets. Harris (1994) reports an average spread of 0.84 percent for a typical stock in the $20 to $40 price range. The relative spread is on average lower for higher-priced stocks and higher for lower-priced stocks. A large majority of the stocks in the major equity markets in the United States, however, have a tick size of $1/8, so for low-priced stocks a bid-ask spread of just one tick implies a large relative spread. This is not so in Japan, where the tick size is very small for low-priced securities. For the sample of stocks with prices below 1000 yen, the bid-ask spread would have to be more than 2 percent of the average stock price, or 10 ticks, to potentially explain our excess returns. Such a large spread appears unlikely, especially since there is no intermediary who explicitly sets spreads to make a living in the Japanese markets. Indeed, Hamao and Hasbrouck (1993) who examined in detail three Japanese stocks priced above 1000 yen (and therefore likely to have larger spreads because of the relatively larger tick size), report that "average spreads are very close to their respective minimum tick size, and in percentage terms, they are all 1 percent or less." Furthermore, many pieces of the puzzle as reflected in the full set of our results are not consistent with an explanation based on the bid-ask spread. A few of the pieces that don't fit are the following. First, we observe excess returns around the turn of the fiscal year for zero-dividend securities: An explanation based on

[32] The bid-ask spread in Japan is implicit and reflect the difference in prices between buy and sell limit orders because there is no market maker to set explicit spreads.

the bid-ask spread requires that many investors buy the stock right after the ex-day to avoid receiving the dividends, but for this subsample this incentive does not exist. Second, higher excess returns occur on fiscal-yearend ex-dividend days than on other ex-days, which implies different behavior by investors around similar events. Third, higher excess returns occur after the tax reform of 1988. If the bid-ask spread explained our results, we would expect lower excess returns after the reform, since dividends became relatively more desirable. Fourth, we observe significant excess volume for less liquid securities throughout our sample period. One can accept higher returns on these securities associated with higher transaction costs, but with this explanation, the excess volume remains a puzzle. Fifth, there is a lack of negative excess returns after the ex-day to balance excess returns on the ex-day, attributable to our recording the ask price on that day and the middle of the spread on other days. For all these reasons, we are confident that the spread is not responsible for our results. We note, however, that cumulative excess returns during the 20-day event window are insignificant. Therefore, in a more general sense, our results are consistent with microstructure effects.

Since we observe higher excess returns on ex-dividend days at the end of the month, our results may be related to the end-of-the-month effect in Japan. Kate (1990) and Ziemba (1991) report excess returns around the turn of the month on the TSE. Higher returns are observed on the last several trading days of the month, and lower returns on the first several days. We are able to rule out this explanation, however, with the following experiment. We construct a sample of all the securities' that do not have an ex-dividend day in a given month. We measure excess returns around the end of such months and find no special pattern. That is, consistent significant excess returns are observed around the end of the month only if it is an ex-dividend month or the last month of the fiscal year for a security. Indeed, it is likely that the end-of-the-month effect in Japan is subsumed by the fiscal-year-end effect we document.

An alternative explanation that we are also able to rule out is in the context of the March effect documented by Bremer and Kato (1992). They present evidence of excess trading volume in March in comparison with other months, especially for securities that have appreciated in price in the preceding quarter.

To investigate this hypothesis, we divide the sample of ex-dividend days that coincide with the end of the fiscal year into 12 subsamples arranged by month. If the March effect dominates our results, we should see high excess returns in March and no significant excess returns in other months. The excess returns we find, however, are different from this prediction. Beginning in January, excess returns

on the ex-dividend days are 1.98 percent, 1.38 percent, 1.52 percent, 1.24 percent, 1.55 percent, 1.56 percent, 2.20 percent, 0.93 percent, 1.48 percent, 1.88 percent, 1.36 percent and 1.31 percent. Excess returns for all months are significant at the 0.1 percent level, and their economic magnitude appears to be similar across months. Moreover, if securities experience excess returns during March, whether or not it is the last month of the fiscal year, we should observe similar excess returns for both types of securities. In fact, however, on the first trading day in April, the excess return is 0.24 percent for securities whose fiscal year does not end in March. This is significantly lower both economically and statistically than the excess returns observed for securities that have a March fiscal-year-end even if they do not pay dividends (see Table 2).

Another possible explanation for excess returns around the turn of the fiscal year is the settlementday effect, first proposed by Gibbons and Hess (1981) to explain the day-of-the-week effect. Stock transactions in Japan are normally settled after 3 business days. Transactions on ex-dividend days, however, are settled after 4 business days. Once opportunity costs are considered, the returns on ex-dividend days must therefore be higher than on other days. Nevertheless, the opportunity costs are so small in relation to the observed excess returns that we are reluctant to pursue this hypothesis. Furthermore, the settlement-day effect is inconsistent with the results reported in Table 4, where different subsamples show different excess returns even though the settlement rules are identical.

5. Summary and Conclusion

In a comprehensive empirical analysis of stock price behavior around ex-dividend days in Japan, we find that tax considerations associated with dividends are able to explain cross-sectional price behavior on ex-dividend days, but that this tax effect appears to be of secondary importance. Return patterns around ex-dividend days are dominated by the institutional regularity of many of the ex-dividend days coinciding with the first trading day of record of a new fiscal year. This accounts, on average, for excess returns of almost 1 percent independent of any dividend-related considerations.

We are able to rule out information effects, specific microstructure effects, and alternative effects, such as the March effect or the end-of-the-month effect. Excess returns of this magnitude are higher than round-trip transaction costs on medium-sized trades, and on any trade by a securities company acting for its own account. Moreover, the last few days of the fiscal year are characterized by significant negative excess returns. Prices seem to imply selling pressure before the end

of the fiscal year and buying pressure at the start of the new fiscal year.

We find, too, that trading volume is higher around the turn of the fiscal year. This result is attributable mainly to the period before the tax reform of 1988. Combined with the lower excess returns before the tax reform, this result suggests dividend-capture activities. Finally, there are strong indications of manipulative intercorporate trading around the fiscal year end.

To our knowledge, we are the first to identify the fiscal-yearend effect in Japan. We present evidence that otherwise puzzling results can be explained by manipulation of prices around the end of the fiscal year to secure tax or other benefits. The unique industrial structure in Japan presents a natural field for such manipulative activities.

Appendix

Institutional environment

Taxes.[33] The Japanese economy experienced major tax reform in 1988 that took effect April 1, 1989. At that time, private investors held 23.6 percent of the securities on the TSE and accounted for 23 percent of trading volume. Before the reform, individual investors were essentially exempt from taxes on capital gains but were taxed on dividend income. The basic rule was that investors were subject to a 20 percent withholding tax when dividends were paid; in addition, they were subject to composite taxation. A tax credit of 10 percent (up to a total taxable income of 10 million yen and 5 percent for higher taxable income) was also applicable.[34]

For corporations, capital gains were taxed as ordinary income before the tax reform. Dividends received from other corporations were exempt from taxation unless they exceeded the dividends the firm itself paid out. In these cases, 25 percent of the dividends were taxed.

The tax reform of 1988, which taxes capital gains for individuals in Japan for the first time, makes dividends relatively more attractive for these investors. Individual investors may choose between two methods in paying taxes on their capital gains. Either they pay a 26 percent tax on gains and use capital losses to offset their gains, or they pay

[33] The description of the tax environment before the tax reform of 1988 is based on *Securities Market in Japan 1988*, published by the Japan Securities Research Institute. For the period after the reform, we use Bremer and Kato (1992) and Hayashi and Jagannathan (1990).

[34] There were, however, some exceptions: investors who received less than 100,000 yen in annual dividends on a single stock did not need to file a return and were therefore subject only to the withholding tax, but they could not take advantage of the credit. An investor who received between 100,000 and 500,000 yen in annual dividends from a corporation could either pay a 35 percent withholding tax and forego the credit or follow the basic rule.

a gross proceeds tax of 1 percent of the value of the securities sold. The gross proceeds method is preferred if the gains are more than 4 percent and there are no losses to offset them.

The tax reform also affects institutions and corporations. The corporate tax rate on capital gains was reduced from 42 percent to 40 percent, and then to 37.5 percent, beginning in April 1990. Dividend income from other corporations is exempt from taxation if the corporation owns more than 25 percent of the paying firm. Otherwise, 90 percent of dividends are exempt (80 percent as of April 1990).

Finally, the reform limits intercorporate trading for dividend capture around the fiscal year end of the firm whose stock is being bought. Corporations may not exclude from taxation dividends on stocks purchased within 1 month of the fiscal year end (for the dividend-issuing firm) and sold less than 2 months after the end of the fiscal year. This restriction on the minimum holding period is more severe than the restriction on dividend capture in the United States, where the minimum holding period was extended from 16 to 45 days by the tax reform of 1984.

Transaction costs. Stock trading rules on the TSE are different from those on the New York Stock Exchange (NYSE). Instead of specialists who maintain inventories and make markets, the intermediary on the TSE is a clerk who matches buy and sell orders. Investors intending to buy or sell stocks execute their transactions through securities companies that charge a commission or brokerage fee. The fee decreases with the size of the transaction. In 1988, the brokerage rate on transactions up to 1 million yen was 1.2 percent. For transactions of 1 to 3 million yen the fee was 1 percent, and for transactions of 10 to 30 million yen the rate was 0.55 percent. The minimum rate for transactions over 1 billion yen was 0.15 percent.[35] Securities companies, which execute about a quarter of stock trades on their own account, pay only floor fees as members of the exchange and a minimal transaction fee of 0.0024 percent (this fee was raised to 0.0049 percent after October 1991.) Note also that securities companies are subject to corporate taxes (see above). Therefore, traders in the Japanese markets do not have the neutrality to dividend income that short-term traders had in the United States before the 1986 Tax Reform Act. This does not, however, rule out the existence of tax-exempt investors who are neutral between dividend income and capital gains and foreign investors who might be indifferent too.

[33]The source for brokerage fees is Securities Market in Japan 1988, published by the Japan Securities Research Institute.

Dividend announcements. Japanese firms are not required to announce the size of their next dividend before the ex-dividend day. That is, the dividend is officially known only shortly before the annual meeting of shareholders, who approve the amount of the dividend payment at that meeting.[36] The annual meeting typically takes place 2 to 3 months after the ex-dividend day. Below we describe the sequence of dividend-related events.

where

t_1 = the, rights announcement date (if any rights are issued) and occasionally the dividend announcement day (which sometimes occurs after the analysts' forecast date),
t_2 = the analysts' forecast date for the next dividend,[37]
t_3 = the ex-dividend and ex-rights date,
t_4 = the voluntary disclosure of a financial statement, including the amount of the dividend payment,
t_5 = the annual meeting, at which dividends are officially approved by shareholders,
t_6 = the dividend payment day.

The size of the stock price drop on the ex-dividend day is by no means certain even in the United States, where dividends are routinely announced in advance [see Heath and Jarrow (1988)]. The lack of dividend announcements before the ex-dividend day in Japan introduces additional uncertainty about stock price behavior around the ex-day.

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[36]This is especially true for dividends paid at the end of the fiscal year. At the annual meeting, the shareholders also approve the amount of reserves from earnings that can be used to pay out the following year's mid-year dividend, making that dividend mote predictable.

[37]The analysts' forecast date is, on average, 17.67 days before the ex-dividend day, with a minimum of 5 days (which occured once, in 1982).

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