# STOCK DIVIDENDS AND CAPITAL MARKET EFFICIENCY

By
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## Introduction

The pioneering work of Fama, Fisher, Jensen and Roll (FFJR) on the adjustment of stock prices to new information has spurred a number of other studies designed to test the efficient capital market hypothesis. Most of these studies using the data from the American stock market provided evidence supporting the said hypothesis. This study aims to "replicate" in a limited scope the FFJR study using Philippine stock market data to determine if stock dividends have any informational content valuable to investors and to verify if the Philippine capital market is efficient.

## The Adjustment of Stock Prices to New Information

The efficiency of capital markets depends on the extent to which capital asset prices fully reflect information affecting their value. One type of information is stock dividends, believed by some sectors as capable of affecting the total value of an issue of common stocks. Through stock dividends, the prices of a stock are reduced, but the preference of investors for low-priced stocks increases the demand for such stocks. This folklore excludes the level and volatility of stock earnings during valuation.

This apparent irrationality about stock dividends was questioned and subjected to a comprehensive and rigorous test by FFJR. Their hypothesis was that splits usually accompanying dividend (cash) increases were interpreted by the market as a predictor of dividend change. A dividend change in turn conveys information about the firm's profitability. With Lintner's (4) findings that firms tend to increase dividends only when there is a high probability that future cash flows would be sufficient to support the higher rate of payment, the stock dividends become an indirect signal of the firm's future earning potential.

The empirical findings of FFJR strongly supported this hypothesis. Stock splits do not directly affect stock rates of return. Any effect on the stock rates of return was the result of dividend changes. The U.S. experience as reported in the FFJR study involved stock

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splits which usually signalled dividend increases which in turn resulted in a higher earning potential for the security concerned.

## The Present Study

This study will, firstly, examine the nature of the behavior of the rates of return of a split security during the months surrounding the split; and, secondly, determine if stock splits are associated with more fundamental variables such as dividend change.

*The Sample.* The sample consists of all 23 securities listed in the Manila Stock Exchange (MSE) that issued stock dividends of 20 per cent or more from 1975 to mid-1976. Data on the monthly returns of these securities during the 25 months surrounding the split were compiled from issues of the MSE's *Monthly Review.* The same source was used for all other relevant data. The period covered by the study is from 1974 to mid-1977. For simpler semantics, "stock split" and "split securities" are used interchangeably to refer to the securities included in this sample. Likewise, "splitting process" refers to the process of declaring stock dividends.

*The Market Model.* A security's return is the result of two factors: one is common to all stocks, and the other unique to the individual firm. The former results in the tendency for stock prices to move together while the latter affects only the return on the firm's securities. To abstract the factor affecting only the return on the split securities, the market model is used. Mathematically, this model assumes a linear relationship between the return on the individual security and that on the market, or

$$R_{it} = a_i + B_i R_{mt} + U_{it} \tag{1}$$

where:

$R_{it}$ : price relative of the ith security for month t.

$R_{mt}$ : price relative of the market for month t.

$U_{it}$ : a random error term incorporating the effect of factors affecting the ith security.

$R_{it}$ and $R_{mt}$ of Equation (1) are further defined as:

$$R_{it} = (P_{it} + D_{it}) / P_{it-1} \tag{2}$$

where:

$P_{it}$ : price of ith stock at the end of month t.

$D_{it}$ : cash dividends on the ith security during month t, where the dividend is taken as of the ex-dividend date rather than the payment date.

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When stock dividends are declared or when stock splits occur, $P_{it}$ is adjusted for capital changes.

$R_{mt}$ on the other hand, is defined as a weighted average of the $R_{it}$ for all securities listed in the Manila Stock Exchange at the end of months t and t-1. $M_{mt}$ is the measure of the general market conditions used in this study.

$$R_{mt} = \sum_{t=1}^{N} \left[ (Q_{it} \ P_{it}) \ / \ (\sum_{i=1}^{N} Q_{it} \ P_{it}) \ X \ R_{it} \right] \quad (3)$$

Where:

$Q_{it}$ : number of outstanding shares of stock i at month t.

$P_{it}$ : price of stock i at month t.

Both $P_{it}$ and $Q_{it}$ are adjusted when stock splits occur.

*Estimating the Market Model Parameters.* Using the time series on $R_{it}$ and $R_{mt}$, least squares were used to estimate $a_i$ and $B_i$ in Equation (1) for each of the 23 split securities included in the sample.

Using the logarithmic form of the market model,

$$\log R_{it} = a_{it} + B_i \log R_{mt} + u_{it} \quad (4)$$

the regression equations for the 23 split securities were estimated. The values of the parameters of the market model are summarized in Table 1.

**TABLE 1**

**Estimated Values of the Market Model Parameters**
**for the Twenty Three (23) Split Securities**

| Parameters | Mean | Standard Deviation |
|---|---|---|
| a | .000 | .03 |
| $\beta$ | 1.057 | .40 |
| $r^2$ | .553 | .23 |
| r | .719 | .19 |
| First order autocorrelation | .102 | .22 |
| D.W. | 2.068 | .19 |

TABLE 1.a

**Summary of Frequency Distribution of Estimated Coefficients
for the Different Split Securities (FFJR)**

| Statistic | Mean | Standard Deviation |
|---|---|---|
| a | .000 | .007 |
| β | .894 | .305 |
| r | .632 | .132 |
| First order autocorrelation | .10 | |

From Table 1, it can be inferred (as was done in FFJR on the basis of data similar to those shown in Table 1.a) that a fairly strong relationship exists between market returns and individual stock returns with mean $r^2 = .553$ and mean $r = .719$. The first order autocorrelation and the Durbin Watson statistic show no serious serial dependence of the residuals.

The zero mean value of a indicates that the difference between the individual stock returns and the market returns is solely due to the residual or that the effect of variables other than those common to all stocks as indicated by the market returns is captured by the disturbance term u. Thus, if a stock split is associated with abnormal behavior during months surrounding the split date, this behaviour should be reflected in the estimated regression residuals of the security for these months.

## The Effects of Splits on Returns

To find out whether the process of splitting is generally associated with specific types of return behavior, the behavior of cross-sectional averages of estimated regression residuals during the months surrounding the split date is examined. The procedure involves two major steps:

. Estimating the average residual for month t, where t is measured relative to the split month. (t = −1 is then the month immediately preceding the split month; t = 0 is the split month; and t = 1

is the month immediately following the split month). The average residual is computed as

$$\bar{u}_t = \sum_{i=1}^{N_t} u_{it}/N_t \qquad (5)$$

where:

$u_{it}$ : sample regression residual for security i in month t.

$N_t$ : number of splits for which data are available in month t.

2. Estimating the cumulative effects of the abnormal return behavior during the months surrounding the split month, the cumulative average is computed as

$$U_t = \sum_{k=12}^{t} U_k \qquad (6)$$

The average residual is interpreted as the average deviation of the return of split stocks from their normal relationship with the market. The cumulative average residual $U_t$ is interpreted as the cumulative deviation showing the cumulative effects of the differences in the returns of split stocks from their normal relationships with market movements.

To determine whether stock splits or stock dividends are associated with dividend (cash) changes, the sample is stratified into two: one is composed of split securities experiencing dividend increases, and the other is composed of split securities with dividend decreases. "Increases" and "decreases" are determined by the ratio of total cash dividends declared twelve months following the split to the total cash declared twelve months prior to the split. If the ratio is greater compared to that of the total number of securities in the Manila Stock Exchange, the split security is classified under the "dividend increase" category; if lower, the split is classified under "dividend decrease." Six securities belong to the first category and seventeen to the second.
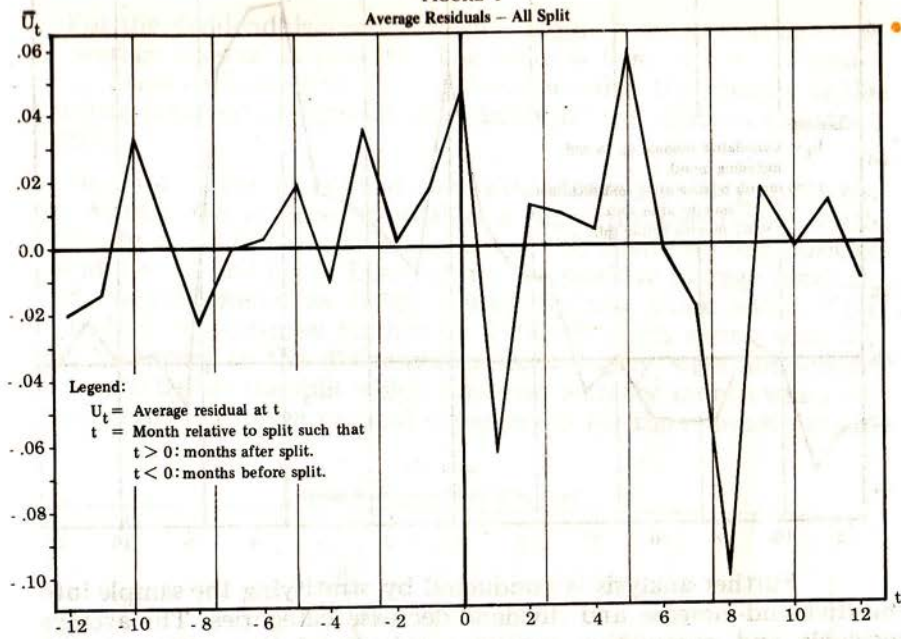
*Empirical Results.* The results of the study are summarized in Table 2 and Figures 1-6. Table 2 presents the average residuals and the cumulative average residuals for the dividend-increase and dividend-decrease stock categories as well as for all the split securities. Figures 1-6 present the graphs of the average and cumulative average residuals for each of these three categories of split securities.

Table 2 and Figure 1 show that the behavior of the average residuals of the split securities follows a pattern of increase, decrease, increase, etc. or a series of positive and negative values both before

TABLE 2

## Average and Cumulative Average Residuals
### in Months Surrounding the Splits

| Month | All Splits | | Splits with Dividend "Increases" | | Splits with Dividend "Decreases" | |
|---|---|---|---|---|---|---|
| | Ave. | Cum. | Ave. | Cum. | Ave. | Cum. |
| -12 | -.020 | -.020 | .0254 | .0254 | -.0356 | -.0356 |
| -11 | -.014 | -.034 | -.0584 | -.033 | .0009 | -.0347 |
| -10 | .033 | .001 | .005 | -.027 | .043 | .0083 |
| -9 | .007 | .006 | -.1025 | -.1301 | .040 | .0483 |
| -8 | -.024 | -.018 | -.0598 | -.1899 | -.011 | .0373 |
| -7 | -.001 | -.019 | -.0275 | -.2174 | .009 | .0463 |
| -6 | .002 | -.017 | .0158 | -.2016 | -.002 | .0443 |
| -5 | .018 | .001 | .0248 | -.1768 | .0156 | .0599 |
| -4 | -.011 | -.010 | .0100 | -.1668 | -.018 | .0419 |
| -3 | .035 | .025 | .1227 | -.0441 | .004 | .0459 |
| -2 | .001 | .026 | -.0200 | -.0641 | .009 | .0549 |
| -1 | .017 | .043 | .0319 | -.0322 | .011 | .0659 |
| 0 | .047 | .090 | .0185 | -.0137 | .057 | .1229 |
| 1 | -.063 | .027 | .0527 | .0390 | -.066 | .0569 |
| 2 | .012 | .039 | .0090 | .0480 | .0126 | .0695 |
| 3 | .009 | .048 | .0501 | .0981 | -.005 | .0645 |
| 4 | .004 | .052 | .0040 | .1021 | .004 | .0685 |
| 5 | .058 | .110 | -.0150 | .0871 | .085 | .1535 |
| 6 | -.002 | .108 | -.0710 | .1581 | -.027 | .1265 |
| 7 | -.019 | .089 | -.0420 | .1161 | -.011 | .115 |
| 8 | -.102 | -.013 | .0114 | .1275 | -.142 | -.0265 |
| 9 | .016 | .003 | -.0330 | .0945 | .033 | -.0065 |
| 10 | -.002 | -.001 | -.0590 | .0355 | .019 | .0255 |
| 11 | -.012 | .013 | .0390 | .0745 | .003 | .0285 |
| 12 | -.014 | -.001 | .0330 | .1075 | -.031 | -.0025 |

FIGURE 1
Average Residuals – All Split

Legend:
$U_t$ = Average residual at t
t = Month relative to split such that
t > 0: months after split.
t < 0: months before split.

and after the split month, $t = 0$. Since the fluctuation runs from $t = -12$ and all throughout the 25-month period, it seems unlikely that this is caused by the stock splits. Obviously, the effect of a stock split could not be felt a year ahead of the split month when no information about the split is available in the market nor is it likely for the effect of the split to be felt 11 months after the split. The latter is only possible when delays in news dissemination about the split occur. This however is remote because splits are decided during a stockholder's meeting prior to the record date of the split.

A close look at Figures 1 and 2 yields the following observations:

1. The average residual is positive from $t = -3$ up to the split month, $t = 0$.
2. The cumulative average residual exhibits lesser fluctuations during the twelve-month period preceding the split compared to the twelve-month period following the split.

The first observation indicates that from $t = -3$ up to $t = 0$, the average residual seems to be affected by the split while the second points to the possibility of a relationship between stock returns and the splitting process.

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FIGURE 2

**Cumulative Average Residuals — All Split**
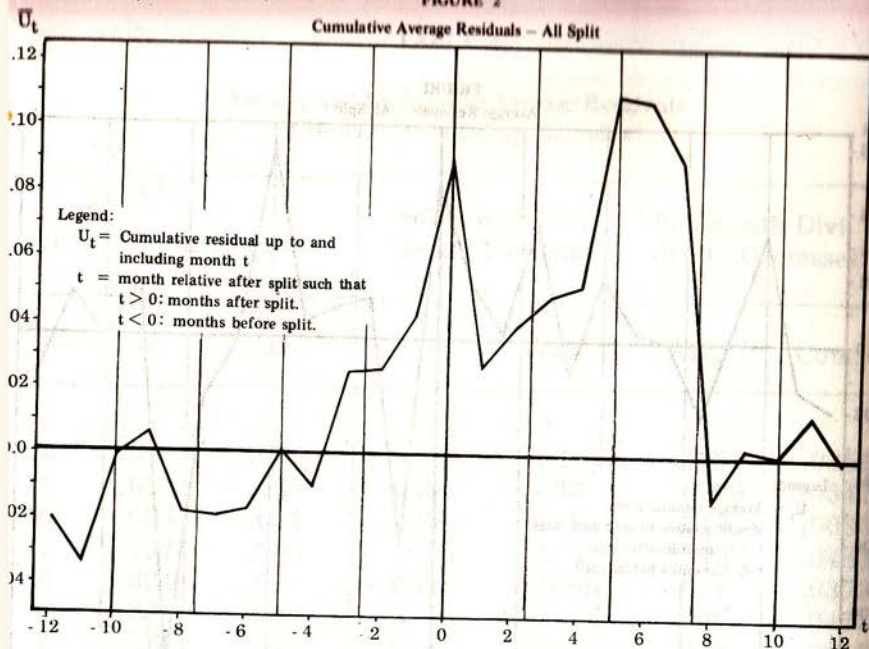


Further analysis is conducted by stratifying the sample into
the dividend-increase and dividend-decrease categories. The average
residuals and cumulative average residuals of the split securities
belonging to each of these two categories are graphically shown in
Figures 3-6.

**FIGURE 3**

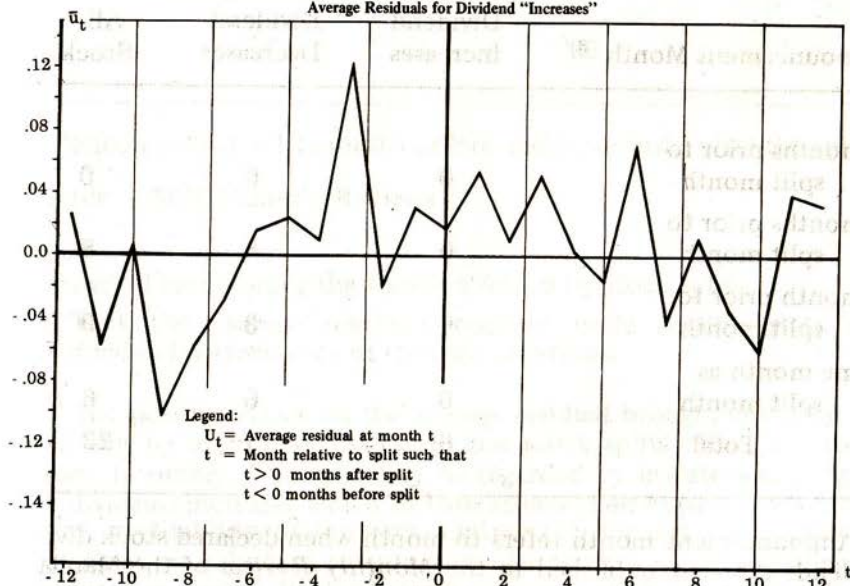**Average Residuals for Dividend "Decreases"**
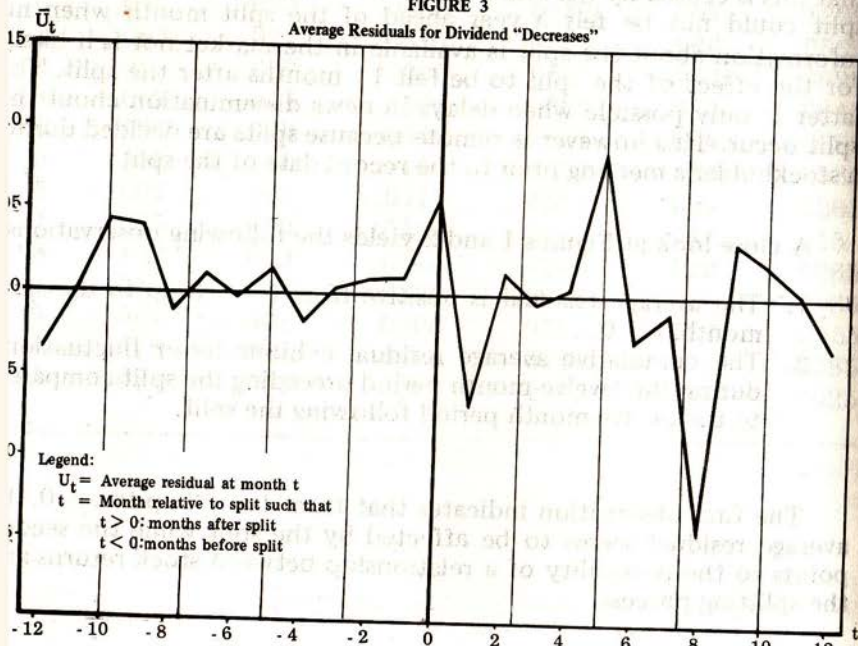
These graphs show that the process of stock splitting seems to affect the behavior of the average residuals.

For the dividend-decrease category, Figure 3 shows that at t = 0, the average residual is positive. The same is true at t = −2 and t = −1. These indicate that during these months, the returns of the securities involved are greater than those of the split on the stock returns.

Figure 4 on the other hand, shows that three months prior to the split month, the average residual is a high, positive figure which eventually drops to a negative level at t = −2, then rises to a positive level at t = −1 and t = 0. Like before, the positive average residuals could be interpreted as being caused by the stock splits. This observation is explained further by Table 3 which shows that the splits belonging to the dividend-increase category were announced one month before the split which coincides with the month when the highest positive average residual is registered for the relevant period.

FIGURE 4
Average Residuals for Dividend "Increases"



Legend:
$U_t$ = Average residual at month t
t = Month relative to split such that
t > 0 months after split
t < 0 months before split

A possible explanation for the high positive average residual at the end of t = 3 is evident from the related events occurring during the said month. Of the six split securities, four had experienced a split three months before a subsequent split and two had declared cash dividends during the same month. These related events could very well account for the high positive average residual at t = − 3.

After the split month, the average residuals in Figures 3 and 4 tend to behave more according to the dividend performance of the

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split securities. For the dividend increase stocks, the average residuals fluctuated less than those of the dividend-decrease stocks. Similarly, the cumulative average residuals of the dividend decrease stocks tend to fall after the sixth month following the split. These imply that stocks having higher dividend earnings after the split also enjoyed higher returns while stocks experiencing dividend decreases have lower stock returns. Thus, the behavior of the average residuals seems to respond more to the dividend performance of the stocks rather than to just the splitting process, otherwise the behavior of the average and cumulative average residuals should have been uniform for both dividend categories of split stocks.

**TABLE 3**

**Announcement Month of Stock Dividends
for Twenty-Three Stocks, 1975-1976 (June)**

| Announcement Month a/ | Stocks with Dividend Increases | Stocks with Dividend Decreases | All Stocks |
|---|---|---|---|
| 3 months prior to split month | 0 | 0 | 0 |
| 2 months prior to split month | 0 | 8 | 8 |
| 1 month prior to split month | 6 | 3 | 9 |
| Same month as split month | 0 | 6 | 6 |
| Total | 6 | 17 | 23 |

a/Announcement month refers to month when declared stock dividends are first published in the *Monthly Review* of the Manila Stock Exchange.

The dramatic increase in the average residual at t=+5 for the dividend decrease stocks could no longer be attributed to the stock split. Such delayed effect is only possible when the dissemination of information about the split is delayed, which rarely occurs. At this point, two findings are evident:

(1) That the behavior of the average residuals during the three-month

**TABLE 4**

**Dividend Record of Twenty-Three Stocks
Before and After Split**

| | Before[a] Split | After[a] Split |
|---|---|---|
| **Number of Stocks with** | | |
| 4 quarterly cash dividends | 4 | 1 |
| 3 quarterly cash dividends | 2 | 1 |
| 2 quarterly cash dividends | 3 | 6 |
| 1 quarterly cash dividends | 7 | 3 |
| 0 quarterly cash dividends | 7 | 12 |
| Total | 23 | 23 |

[a] Period covered is 12 months before and 12 months after the split.

Source:  MSE Monthly Reviews

period surrounding the split is affected by stock split;

(2) That the average residuals respond quite sensitively to the dividend performance of the split securities.

The positive effect on the average residual brought about by the split can be interpreted to mean that stock splits affect the stock return favorably. The split may be regarded by investors as a signal for dividend increases which in turn affects their expectations of the future profitability of the firm. Lintner (4), for instance, suggested that firms are reluctant to reduce dividends; thus, a split implying an increased expected dividend signals the market that company directors are confident that future earnings will be sufficient to maintain higher dividend payments.

Unlike FFJR's findings however, the stock splits included in this study were not accompanied by dividend increases. Out of the 23 split securities, only 6 or about 25 per cent did actually experience dividend increases.  Table 4 shows the dividend record of these securities. This phenomenon may however be peculiar to the particular period covered by this study. It is probable that investors did

experience dividend increases for split securities in the past and thus expected these stock splits to perform accordingly. For instance, a brief survey of stock splits occurring in 1969 showed that out of 12 splits, eight experienced dividend increases and only 4 had dividend decreases.

After the split, when the expected dividends are declared, the cumulative average residual of these securities continues to stay high (see Figure 6) but when the expected dividends do not materialize, the cumulative average residual drops (see Figure 5). Figures 5 and 6 show that when the effects of the dividend changes are considered, the effect of the stock split is either obscured or wiped out.

## FIGURE 5
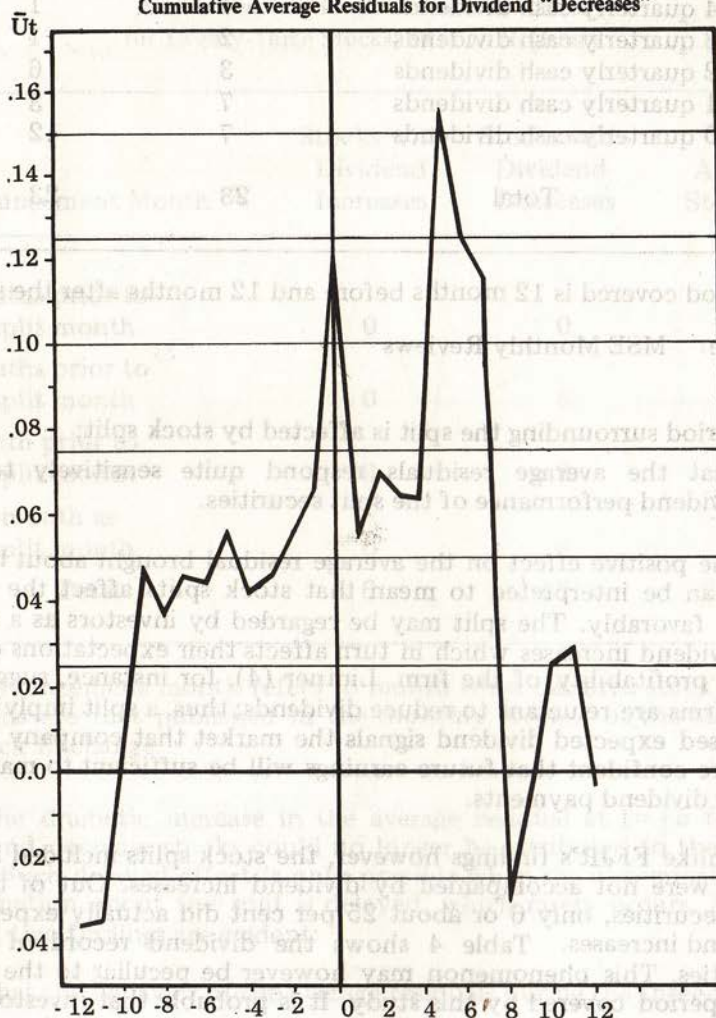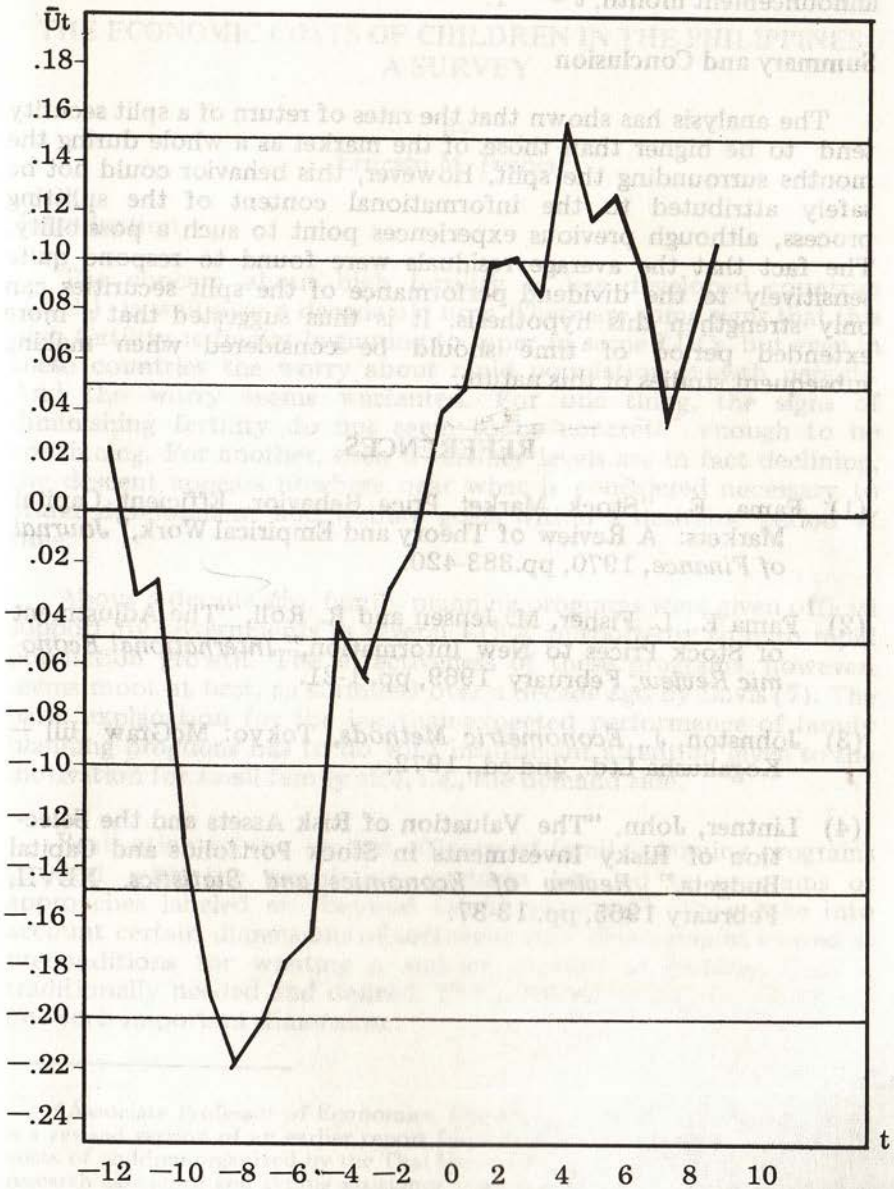### Cumulative Average Residuals for Dividend "Decreases"



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**FIGURE 6**

**Cumulative Average Residuals for Dividend "Increases"**



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During the relevant period surrounding the split month, the average is highest during the split month for all splits. This means that the information assumed to be implicit in the split is reflected in the stock prices at the end of the split month. The adjustment is even faster with the dividend increase stocks where the largest positive average residual during the relevant period is at the end of the announcement month, $t = -1$.

## Summary and Conclusion

The analysis has shown that the rates of return of a split security tend to be higher than those of the market as a whole during the months surrounding the split. However, this behavior could not be safely attributed to the informational content of the splitting process, although previous experiences point to such a possibility. The fact that the average residuals were found to respond quite sensitively to the dividend performance of the split securities can only strengthen this hypothesis. It is thus suggested that a more extended period of time should be considered when making subsequent studies of this nature.

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