IMPACT OF THE BELGIAN FINANCIAL REPORTING ACT OF 1976 ON THE SYSTEMATIC RISK OF COMMON STOCKS

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N°84/10

Director of Publication:

EDITH PENROSE
Associate Dean: Research and Development
INSEAD

Printed by INSEAD, Fontainebleau
France

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January 1984

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I. INTRODUCTION

On October 8, 1976, the Belgian parliament passed an important piece of legislation requiring corporations to disclose to the public a large amount of financial and accounting data. The Belgian Financial Reporting Act of 1976 stipulates the kinds of financial data to be reported in the annual reports of companies (the 'content' of annual reports) and the way in which this information has to be produced (the 'format' of annual reports). By developing a system of standardized accounting and reporting, the Belgian legislation seeks to harmonize the preparation, presentation, audit and publication of the annual accounts of individual companies. Actually, the Belgian '76 Act anticipated the requirements of the Fourth Directive of the European Economic Community. This directive, adopted on July 25, 1978 to become effective in 1985 at the latest, should have considerable impact on accounting and financial reporting in many of the EEC member states.

The purpose of this paper is to investigate whether the Belgian '76 Act had any impact on the systematic risk of the common stocks of firms whose securities are traded on the Brussels Stock Exchange. The study intends thus to determine if mandatory disclosure of additional financial data as required by the '76 Act provided any "new" information which had an effect on investors' assessments of the systematic risk of disclosing firms.

According to legislators, the financial data of the type called for in the '76 Act should convey new information useful to investors about the risk-return prospects of those firms affected by the legislation. If this view is correct, one should expect the new legislation to have an impact on the price and the risk of the common stocks of firms which did not report such data previously.

In another paper we have examined the effect of the '76 Act on the price of the common stocks of firms affected by the legislation [1]. Our findings are briefly summarized in the next section. The third section of this paper discusses some design issues relevant to testing the adjustment of systematic risk to new information and presents the sample characteristics. The methodology employed in this study is presented in section four. The test results are reported and discussed in section five. The last section contains a brief summary of our findings and concluding remarks.

II. OVERVIEW OF PREVIOUS FINDINGS

In a first part of our study of the informational content of the '76 Act we have examined the effect of the Belgian legislation on the price of the common stocks of firms which did not disclose, on a voluntary basis, the financial data required by the Act. In this section we briefly summarize our findings. For details, the reader is referred to our paper.

An examination of the differential returns between a portfolio of experimental firms (firms that did not report the financial data required by the Act prior to the enactment of the legislation) and a portfolio of control firms (firms that reported voluntarily the financial data required by the Act prior to the enactment of the legislation) reveals that the '76 Act had a significant impact on the stock price of a specific subgroup of firms which did not voluntarily disclose complete financial data prior to the legislation. The common stocks of these firms experienced a significant drop in price. These were firms with two distinguishing characteristics : they had low systematic risk (beta less than one) and they reported, after the legislation took effect, smaller earnings than those expected by the market (they had negative unexpected earnings). Stockholders of those firms suffered a significant loss of wealth : over the 18-month period separating the release of the Act (October 1976) and the first public disclosure of financial data according to the law (May 1978) the cumulative percentage decrease in the wealth of those stockholders (which can be attributed to the informational content of the '76 Act) was equal to 40 percent.

1 See Hawawini and Michel (1983)

The phenomenon was not symmetrical. The stockholders of the other firms in the sample did not experience a significant gain in wealth. Thus the value of the market portfolio fell in response to the new legislation with apparently no significant transfers of wealth between classes of shareholders.

An important aspect of the findings reported above is that the market reaction to the '76 Financial Reporting Act was largely anticipatory. No market reaction is observed around or after the date of first public disclosure (May 1978). It seems, then, that the information conveyed by the new financial data had already been impounded in the price of securities by the time the financial data were required to be publicly disclosed. This result can be interpreted as evidence of a semi-strong form of market efficiency with respect to the date of first public disclosure. The remaining part of this paper is devoted to the examination of the impact of the '76 Act on the systematic risk of the same sample of securities we have used to investigate the effect of the Act on the price of common stocks.

III. DESIGN ISSUES AND SAMPLE CHARACTERISTICS

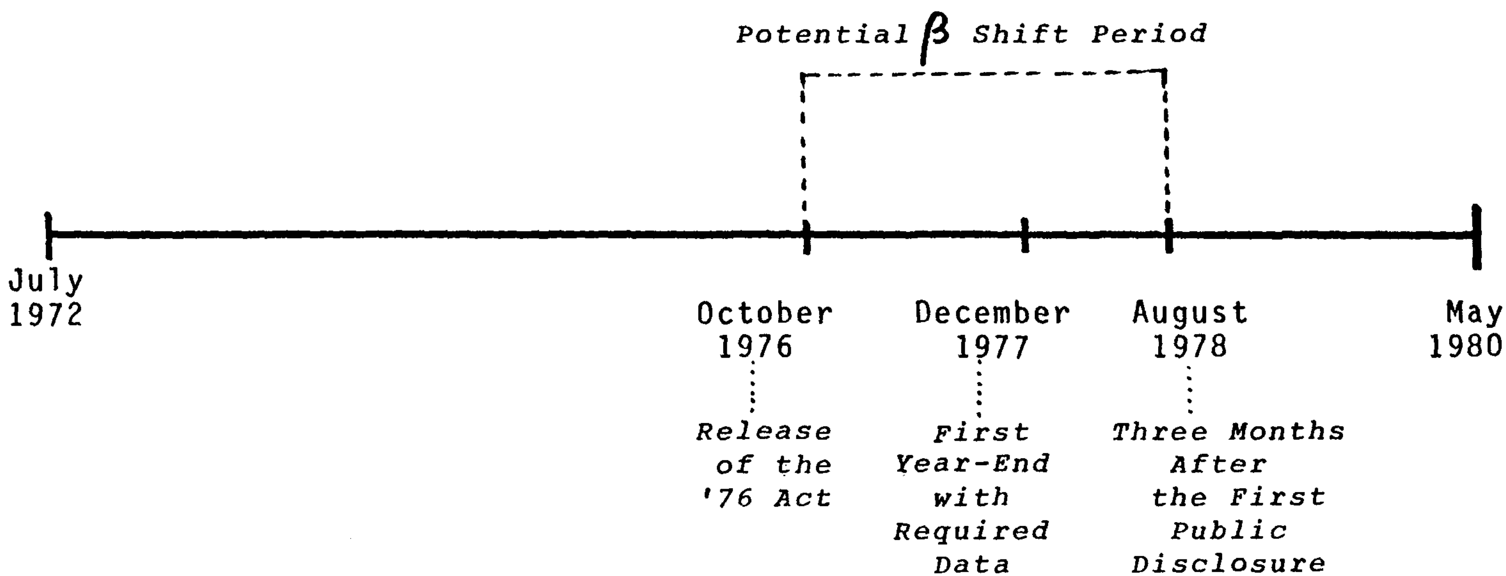
We first consider some design issues relevant to testing the adjustment of systematic risk to new information.

A. Identification of an Appropriate Test Period.

To evaluate the effect of disclosure requirements on systematic risk, a time period must be identified. Figure 1 presents a time continuum of critical events related to the '76 Act and isolates the potential period of change in systematic risk. It is the period within which the adjustment of systematic risk would most likely have taken place if the data disclosed provided investors with new information. As pointed out in the previous section, we have detected that the market began to anticipate the effect of the disclosure as early as in October 1976. Therefore, the

FIGURE 1

TIME CONTINUUM OF CRITICAL EVENTS
RELATED TO THE '76 ACT



relevant time period to assess the relative stability of systematic risk encompasses the period from the issuance of the Act (October 1976) to three months after the actual release of the financial data (August 1978).

B. Identification of Appropriate Experimental and Control Samples.

We will use in this study the same two groups of firms we used in our previous paper: experimental firms and control firms. The experimental firms are classified on the basis of the signs of unexpected earnings. If the unexpected earnings are positive, then earnings are deemed to convey "good" news, and this may be viewed as having favorable implications for security pricing since investors, upon receiving the new information, would revise upward their previous assessment of the security profitability. If the unexpected earnings are negative, then earnings are deemed to convey "bad" news, and the converse is true.

As a result, three groups of experimental firms are utilized in our testing for a change in the market's assessment of risk: (a) the entire experimental group (50 firms); (b) the experimental firms with positive unexpected earnings (25 firms); (c) the experimental firms with negative unexpected earnings (25 firms).

These experimental firms are compared to control firms (50 firms). A change in the systematic risk of control firms would not be expected during the designated impact period since those firms were not affected by the disclosure requirements.

C. Estimates of Systematic Risk.

The systematic risk was estimated using ordinary least squares regression procedures and the market model. To more precisely estimate systematic risk, the individual firms of each group (experimental and control) were combined into equally weighted portfolios. It is well known that the precision with which the beta coefficient can be estimated is inversely related to the magnitude of unsystematic risk. Unsystematic risk can be substantially reduced by grouping individual securities into portfolios. Collins and Simonds (1979) have determined on the basis of several statistical simulations that a test for adjustments in systematic risk is best conducted at the portfolio level. Firm-level beta changes are more difficult to identify.

A limitation of the portfolio-level analysis is that it does not provide information about the beta behavior of individual firms. If the firms in the portfolio undergo changes in their systematic risk that are not of the same algebraic sign, the shift in the portfolio beta could be small or non-existent while the beta coefficients of some individual firms could have changed appreciably. Since the analysis at either level has associated problems, the testing has been conducted at both levels.

Selection of Sample Firms

Using the 1976 and 1977 files of company annual reports compiled by the Brussels Stock Exchange, we examined specifically the reports of 210 Belgian companies listed on the Brussels Stock Exchange spot market[2], and through a thorough review of their reporting practices we were able to classify the firms into two categories: experimental and control firms. To be categorized as an experimental firm, the firm had to disclose in its 1976 annual report less than 20 % of the disclosure requirements of the new legislation. Likewise, to be categorized as a control firm, the firm already had to meet more than 80 % of the disclosure requirments in its 1976 report. Further, firms for which securities were infrequently traded over the period from November 1971 to May 1980 were eliminated. Applying both constraints simultaneously left 50 experimental firms. The control firms were narrowed down according to the criteria defined above, with an end result of 50 firms.

Monthly closing security prices and dividend data were drawn from the file of the Brussels Stock Exchange for the period November 1971 to May 1980. These data were adjusted for stock splits and stock dividends. The monthly returns on the proxy market portfolio were generated by assuming an equal investment in each one of the securities in our sample. Although there exist several market indexes for the Brussels Stock Exchange, they are usually constructed from a small subsample of the universe of securities traded on this exchange and they generally exclude dividend payments, two undesirable features for a proxy market portfolio. There is evidence indicating that for stocks trading on the Brussels Stock Exchange a substantial portion of total returns is in the form of dividend yields[3].

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2 This sample of 210 firms consists of all the firms for which the securities were listed continuously on the Brussels Stock Exchange spot market over the period from November 1971 to May 1980.

3 In this respect see Hawawini and Michel (1979, 1982).

IV. METHODOLOGY

In this section we present the methodology employed to test for systematic risk adjustments associated with the disclosure requirements.

If the exact location of a possible change in the beta coefficient had been known a priori, an analysis-of-covariance (ANCOVA) test could have been applied to each portfolio and individual firm at the hypothesized shift point. Indeed, the ANCOVA procedure requires prior knowledge of when the change in the underlying structure of the model may have taken place.[4]

However, based on our earlier discussion, it is very difficult to identify a priori a single potential shift point (month) at which to conduct our tests of the constancy of systematic risk. If the shift point is misspecified, it has been shown that the use of ANCOVA procedure increases substantially the probability of committing a type II error because of contamination of regressions (Farley, Hinich, and Mc Guire (1975)).

Given the uncertainty with regard to the exact location of the shift month, we used statistical procedures that, as opposed to the procedures mentioned above, do not require prior knowledge of the shift month but rather test for the presence of such shift occurrence over the period of study.

The statistical procedures employed in the present analysis to test the constancy of systematic risk are thus :

(1) Tests based on the cumulative sum and cumulative sum of squares of recursive residuals ;

(2) The Quandt's log-likelihood ratio technique.

The first procedure is a rigorous and powerful statistical test developed by Brown, Durbin, and Evans (1975). It is specifically designed to determine when a time-series coefficient becomes unstable. We will use the Quandt's log-likelihood ratio statistic to detect the point in time, if any, at which the change in constancy took place. This technique has been

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4 Note that the ANCOVA procedure is frequently referred to as a CHOW test because of the extensions Chow (1960) made to the ANCOVA procedure. Until recently only ad hoc procedures, such as the CHOW test or dummy variables, have been available to test hypotheses concerning the constancy of a regression parameter over time. Such procedures rely upon a priori information of when shifts may have taken place. For more on these procedures, see Fisher (1970), Gujarati (1970), Johnston (1972), and Toyoda (1974).

described by Quandt (1958, 1960), and Goldfeld and Quandt (1974).

These test procedures have been embodied in a comprehensive computer program, TIMVAR[5] developed by Brown, Durbin and Evans. This program includes formal significance tests and graphical methods. We will use the name TIMVAR indifferently to describe either the statistical methods or the computer program itself.

A. The Recursive Residuals and the Cusum and Cusum of Squares Tests.

The following regression model is used to derive the so-called recursive residuals

$$\tilde{y}_t = \underline{\tilde{x}}'_t \underline{\beta}_t + \tilde{u}_t \quad , \qquad t = 1, \ldots, T$$

where, at time t, y_t is the observation on the dependent variable, $\underline{x}_t$ is the column vector of observations on each of k independent variables, and $\underline{\beta}_t$ is the vector of regression parameters (the subscript t indicates that they may change with time). The error terms, $\tilde{u}_t$, are assumed to be independent random variables which are normally distributed with zero means and variances c

To derive the tests of constancy over time it is assumed that $\sigma_1^2 = \sigma_2^2 = \ldots = \sigma_T^2 = \sigma^2$. Writing $\underline{\beta}_t = [\beta_{1t}, \beta_{2t}, \ldots, \beta_{kt}]'$, the null hypothesis is

$$H_0 : \underline{\beta}_1 = \underline{\beta}_2 = \ldots = \underline{\beta}_T = \underline{\beta}.$$

According to the null hypothesis, the parameters of the model remain constant over the entire period of interest. It is tested against the alternative hypothesis that there is a shift in any one of the T monthly subperiods.

It is natural to look at residuals to investigate model misspecifications. However, experience has shown that the OLS residuals over the entire time span are not very sensitive indicators of small or gradual changes in the regression parameters. Furthermore it is not easy to develop mathematical techniques to assess the variation of these residuals over time. TIMVAR, however, contains methods based on the "recursive residuals", w_r, which are derived from fitting the regression to the first $r-1$ observations. This regression gives

5 We wish to acknowledge our thanks to the authors for providing us with a copy of the program.

an estimate, denoted by $\hat{\beta}_{r-1}$, of the vector of regression parameters, β. For $r = K+1$ to T, w_r is defined by

$$w_r = \frac{y_r - x_r' \hat{\beta}_{r-1}}{D_r}, \qquad r = K+1, \ldots, T$$

where y_r is the value of the dependent variable at time r and $\underline{x}_r$ is the corresponding column vector of independent variables. The positive quantity D_r depends only on the observations on the independent variables up to time r and is introduced to standardize w_r so that under H_o its variance is σ^2. Apart from D_r the w_r's may be thought of as prediction errors one time interval ahead, since $y_r - \underline{x}_r' \hat{\beta}_{r-1}$ is the difference between the observed value of y at time r and the value predicted from the regression on the time segment from 1 to r - 1.

It is shown in Brown, Durbin, and Evans (1975) that the recursive residuals[6] are normally distributed and that under H_o they are independent with zero mean and constant variance. However, if, for example, the regression parameters are constant up to time r_o but differ from that constant value from then on, each w_r will have expectation zero up to r_o but in general will afterwards have a non-zero expectation. Changes in the means of the w_r's therefore imply departures from H_o. Although there exist other methods of transforming least squares residuals to independent $N(0, \sigma^2)$ variables (Theil(1971)),

> "the recursive residuals seem preferable for detecting the change of model over time since until a change takes place the recursive residuals behave exactly as on the null hypothesis. When the change does occur, one hopes that signs of it will soon be apparent. With the other methods one would normally expect the effects of the change to be spread over the full set of transformed residuals."7

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6 Note that Harvey (1976) developed an analysis-of-covariance procedure using recursive residuals. This test procedure repeatedly divides the entire time period of study into two adjacent subperiods. Recursive residuals calculated for each of the subperiods are then compared to determine if a significant change in regression parameters has occurred.

7 Brown R., J. Durbin, and J. Evans, Techniques for Testing the Constancy of Regression Relationships over Time, Journal of the Royal Statistical Society, vol. 37, N° 2, 1975, p. 150.

A.1 The Cusum Test.

A powerful method of revealing departures of the means of the w_r's from zero is to look at the graph of the cumulative sums or "cusums" of the sample w_r's against time. TIMVAR produces a graph of the quantities

$$W_r = \frac{1}{\hat{\sigma}} \sum_{t=k+1}^{r} w_t \quad ,$$

against r for r = k+1,...,T, where $\hat{\sigma}$,the estimated mean square residual, is a constant scaling factor. This graph has the property that the slope of the line between any two points is proportional to the average value of the w_r's in that time interval. Thus changes in the mean of the w_r's are revealed by changes in the slope of the graph of the W_r's. If H_0 holds, the graph shows a random movement about the line $W_r = 0$. To assess the movement away from this line mathematical techniques have been developed by Brown, Durbin, and Evans.

Given the assumption of constant variance, and any desired level of significance, a pair of straight lines may be drawn to lie symmetrically above and below the $W_r = 0$ line with the property that if the sample path of W_r moves outside the region between these lines at any point then H_0 may be rejected.

The function of these lines is thus to provide a formal test of significance.

To help locate any points of change TIMVAR repeats the whole process of generating the w_r's and cusum graphs in the reverse direction, that is by running the regression over segments from time T backwards to time r.

A.2 The Cusum of Squares Test.

The cusum of squares test is similar to the cusum test but uses the squared recursive residuals, w_r^2. This test, which is useful when the departure from constancy of the regression relationship is haphazard rather than systematic, is based on the plot of the following cusum quantities against time :

$$S_r = \frac{\sum_{t=k+1}^{r} w_t^2}{\sum_{t=k+1}^{T} w_t^2}, \quad r = k+1, \ldots, T,$$

that is, the value of the cumulative sum of w_r^2's divided by the cumulative sum of w_r^2's over the entire period. Thus defined, S_r is the cumulative proportion of variance in each time period. The value of S_r will thus lie between zero and one : $S_r = 0$ if $r < k+1$; $S_r = 1$ if $r=T$.
On the null hypothesis that the regression parameters are constant, S_r has a beta distribution with $E(S_r) = (r-k)/(T-k)$ and the plot of S_r should lie along this mean-value line.

Significance tests can be performed by drawing a pair of lines $S_r = \pm C_o + (r-k)/(T-k)$ parallel to the mean-value line. If the sample path of the statistic S_r crosses either of these significance lines, the null hypothesis of constancy of regression parameters can be rejected. Values for the statistics C_o, for various levels of significance, are provided in Durbin (1969).

The operational procedure for the cusum of squares test can thus be summarized as follows :

(1) Calculate the statistic S_r and plot against time;
(2) Draw the mean-value line, $E(S_r)$; and
(3) For a two-sided test, draw a pair of lines parallel to the mean-value line and lying symmetrically above and below it, at a vertical distance C_o, where C_o is a statistic whose value depends on the desired level of significance.

Note that, once again, the process may be repeated in the reverse direction.

The one-factor market model will be used to calculate the recursive residuals. However, to the extent that the results of our tests may be influenced by changes in alpha (the intercept in the one-factor market model) as well as by changes in the beta coefficient, a constrained market model based on the Sharpe (1964) version of the Capital Asset Pricing Model will also be used to calculate the recursive residuals.

The constrained model is of the form :

$$\tilde{R}_{jt} = R_{Ft} + \beta_j(\tilde{R}_{Mt} - R_{Ft}) + \tilde{\mu}_{jt}$$

$$\text{or } \tilde{R}_{jt} - R_{Ft} = \beta_j(\tilde{R}_{Mt} - R_{Ft}) + \tilde{\mu}_{jt}$$

where $\tilde{R}_{jt}$ = the return on portfolio (or security) j in period t ;

$\tilde{R}_{Mt}$ = the return on the market portfolio in period t ;

R_{Ft} = the risk free rate of return in period t (i.e. the rate of return on short term government bonds) ;

$\tilde{\mu}_{jt}$ = the error term.

It may be important that the recursive residuals be calculated with only one regression coefficient, that is, in a way that only shifts in the systematic risk affect the tests. This can be accomplished by using the constrained model. Our results presented below indicate that changes in alpha did not significantly affect the test results.

The Quandt's log-likelihood ratio technique is now discussed in the following section.

B. The Quandt's Log-likelihood Ratio Technique.

This technique may be useful if the significance tests tend to reject the null hypothesis and if it is believed that any change over time may be concentrated at a single, unknown point, which it is desired to locate. For each observation, r, from r = k+1 to r = T-k-1, TIMVAR calculates and plots

$$\lambda_r = \log_{10} \left\{ \frac{\text{max likelihood of the observations given } H_o}{\text{max likelihood of the observations given } H_1} \right\}$$

where : H_1 is the hypothesis that the observations in the time segments (1,...,r) and (r+1, ...,T) come from two different regressions ;
H_o is the hypothesis that the observations come from the same regression.

This is the standard likelihood ratio approach for deciding between the two hypotheses H_o and H_1. Statistically, the ratio λ_r is defined as

$$\lambda_r = \frac{1}{2} r \log \hat{\sigma}_1^2 + \frac{1}{2}(T-r) \log \hat{\sigma}_2^2 - \frac{1}{2} T \log \hat{\sigma}_T^2 ,$$

where $\hat{\sigma}_1^2$, $\hat{\sigma}_2^2$, and $\hat{\sigma}_T^2$ are the ratios of the residual sums of squares to the number of observations when the regression is fitted to the first observations, the remaining T-r observations and the entire set of T observations, respectively.

The point at which the λ_r ratio is at a minimum represents the point in time at which the regression relationship changed. Unfortunately no test has yet been derived for λ_r since its distribution on H_o is unknown. However, the way λ_r varies at different points, r, should shed light on the behavior of the regression. Since the ratio is likely to be a minimum at a true change-point the position of the least value of λ_r should be revealing.

V. TEST RESULTS

In this section, we consider the possibility that the impact of the '76 Act was so profound as to alter the basic relationship between the securities' returns of individual firms and those of the market. It might be argued that the decrease and increase in earnings induced by the required disclosure of the new data affected the riskiness of the firms as perceived by investors, with the result that the firms' systematic risk might be altered. It seems, therefore, desirable to examine whether the '76 Act had a "permanent" effect on the basic firm-market relationship.

We now present the test results of our analysis of the behavior of experimental and control firms' systematic risk during the hypothesized impact period of October 1976 to August 1978. For the reasons cited earlier, the tests were conducted at the portfolio and individual-firm levels.

The results for the portfolios are discussed first. For each of the portfolios, we plotted :

- The statistic S_r (shown in figures 2 to 5). On each of the diagrams is drawn the mean-value line, and a set of confidence lines parallel to the mean-value line. This set of lines corresponds to a significance level of 10%.
- The Quandt's log-likelihood ratios (shown in figures 6 to 9).

Recall that the recursive residuals were calculated using the one-factor market model and the constrained market model. The results reported here are those obtained with the constrained model (k=1). The test results with the one-factor model were not significantly different from those described here. The tests conducted at the individual-firm level will be discussed after the tests on portfolios.

A. Portfolio-Level Analysis.

As indicated earlier, our tests were applied to the following portfolios : three experimental portfolios and one control portfolio.

It can be observed that for each portfolio the paths of the statistic S_r do not travel outside the 10 % confidence band. This implies no evidence of structural change in the regression relationship. It appears, therefore, that the three experimental portfolios and the control portfolio did not experience statistically significant changes in systematic risk during the designated impact period (and also during the period prior and after the impact period).

The results for the control portfolio are not surprising and even can be seen as consistent with a priori expectations. This group is comprised of firms for which the disclosure requirements are not relevant, i.e. would provide no new information. Thus it seems reasonable that this group of firms was not affected as a result of the adoption of the new legislation.

For the overall experimental portfolio (figure 2), formed from all the sample experimental firms, no significant market reaction, i.e. no significant change in systematic risk, was found. This result may be due to the fact that the direction of the change in systematic risk for individual firms may be different, thus resulting in no net significant change for the portfolio. We might be thus in a situation where the unfavorable effects of disclosure

EXPERIMENTAL PORTFOLIO

PORTFOLIO 1 (k=1) FORWARD RECURSIVE REGRESSION

CUSUM SQUARED RESIDUALS NORMALISED

T=95

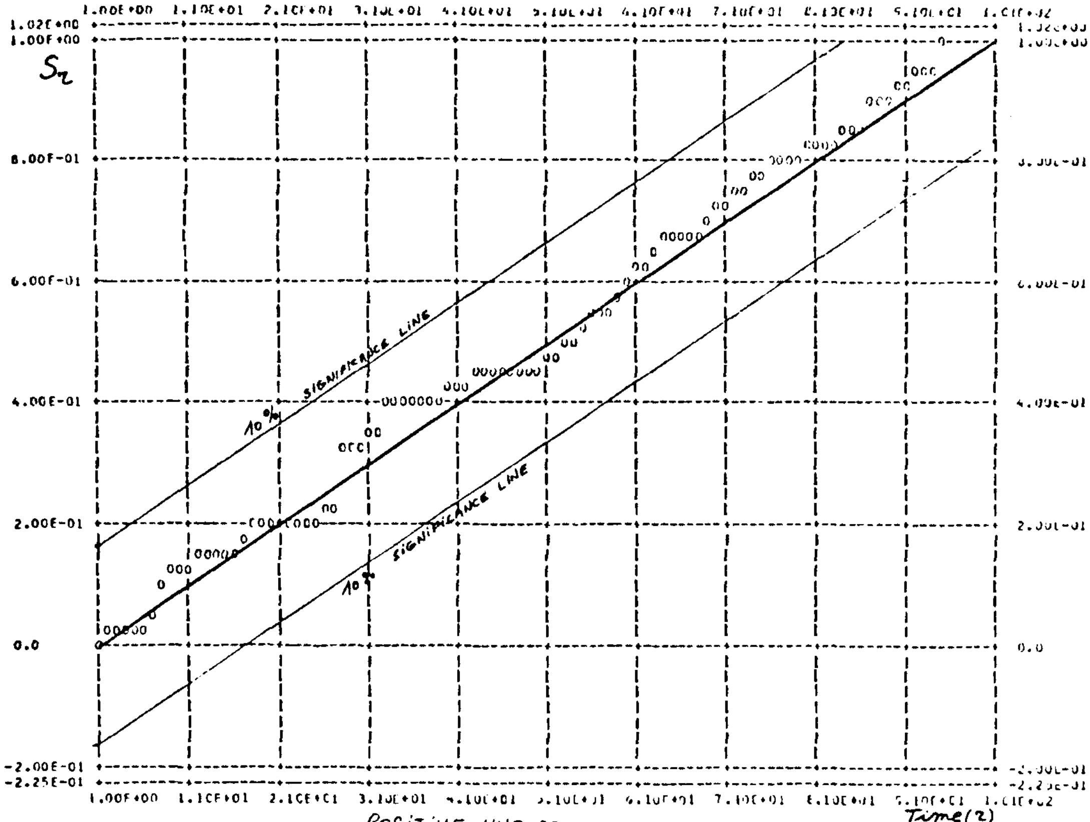

FIGURE 2

POSITIVE UNEXPECTED EARNINGS PORTFOLIO

PORTFOLIO 2 (k=1) FORWARD RECURSIVE REGRESSION

CUSUM SQUARED RESIDUALS NORMALISED

T=95

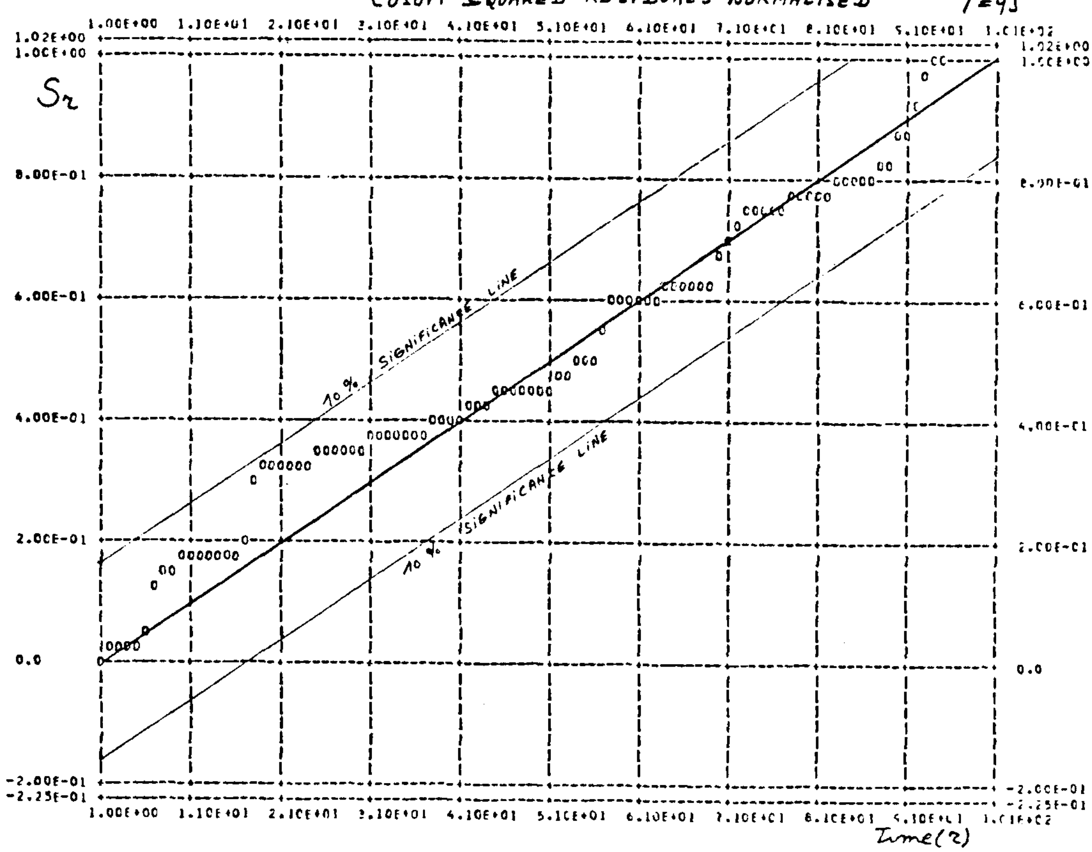

FIGURE 3

NEGATIVE UNEXPECTED EARNINGS PORTFOLIO

PORTFOLIO 3 (k=1)

FORWARD RECURSIVE REGRESSION
CUSUM SQUARED RESIDUALS NORMALISED T=95

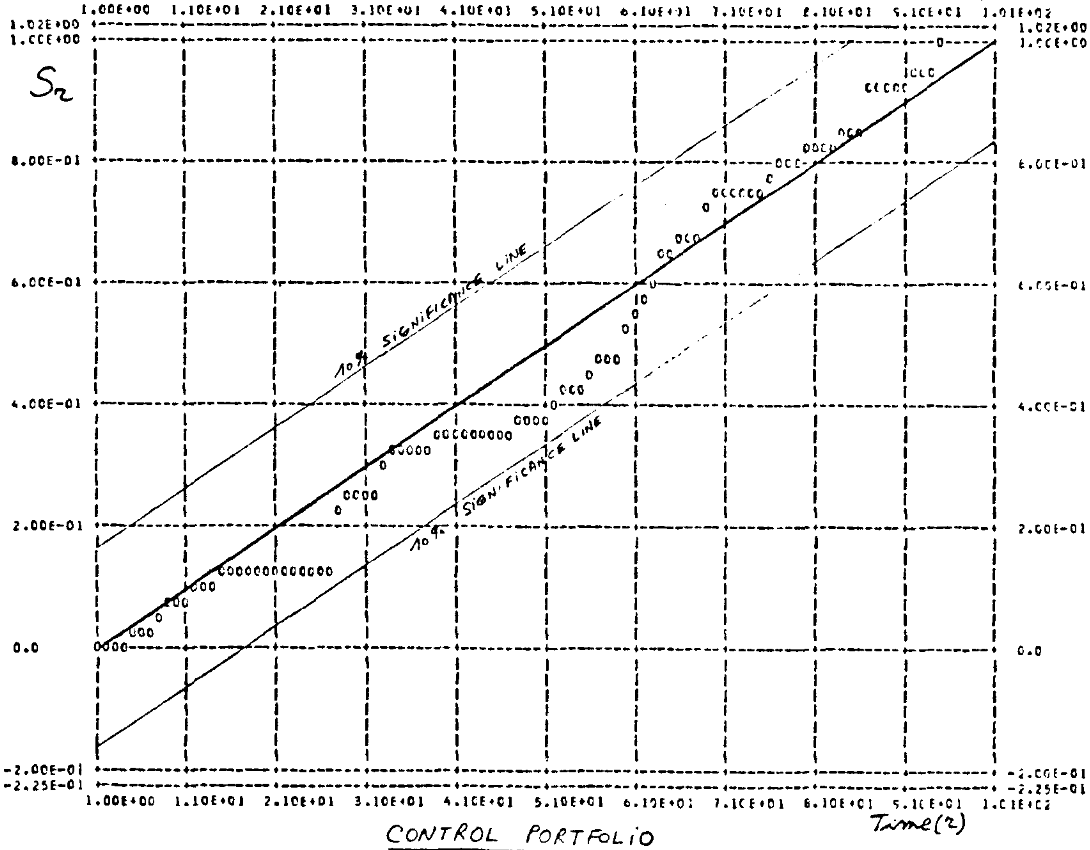

FIGURE 4

CONTROL PORTFOLIO

PORTFOLIO 4 (k=1)

FORWARD RECURSIVE REGRESSION
CUSUM SQUARED RESIDUALS NORMALISED T=95

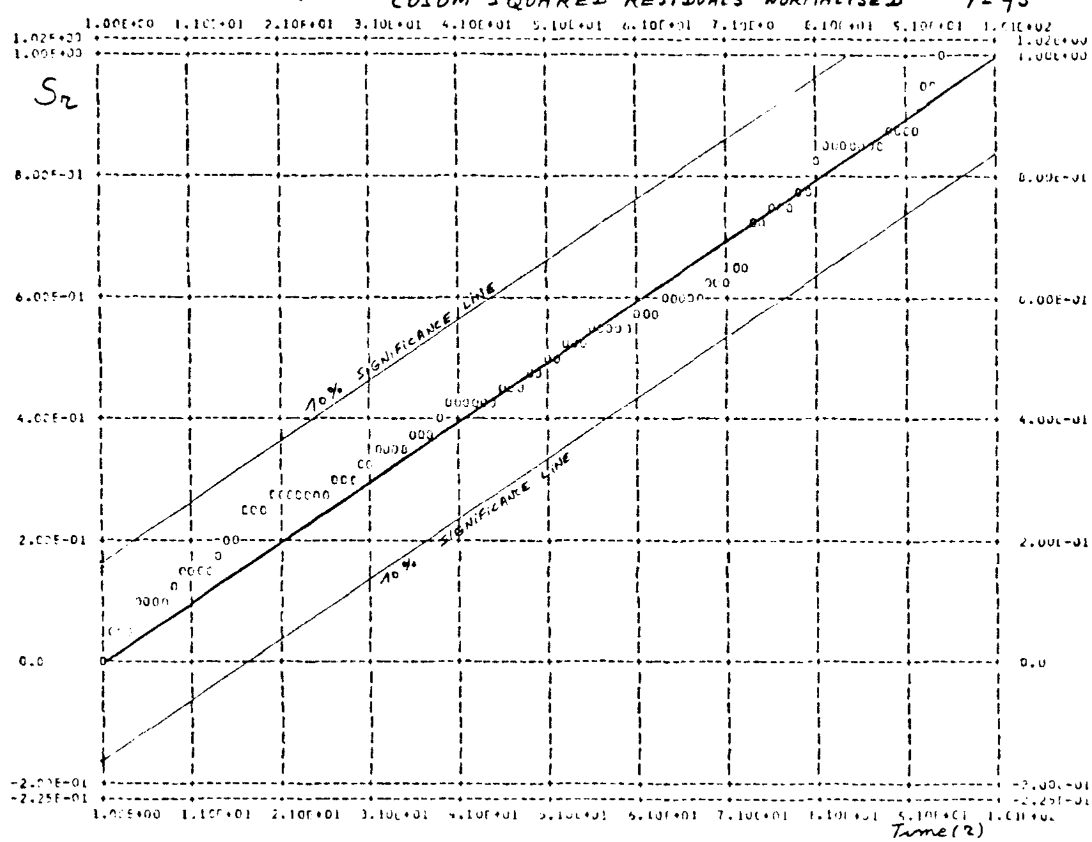

FIGURE 5

requirements on net income tend to offset favorable effects.

However, this group of firms a priori might demonstrate a change in systematic risk subsequent to the required disclosures of new data. Indeed, arguments could be advanced that managers might withhold financial information to mislead investors about the relative riskiness of the firm. That is, managers might avoid disclosure to hide their poor performance, in the hope that this practice would cause investors to perceive the firm to be less risky than it really is. If such an attempt was successful, then required disclosure of financial data might result in higher risks being perceived by investors. The diagram with the plots of the statistic S_r reveals that there was no statistically significant shift in systematic risk for the whole group of experimental firms.

For the two other experimental portfolios, the positive and negative unexpected earnings portfolios (figures 3 and 4), the direction of the changes in systematic risk was believed to be predictable, since it would be a function of the sign of unexpected earnings. Therefore, the a priori expectations for these two portfolios were that the empirical test would result in the rejection of the null hypothesis of systematic risk constancy during the impact period, i.e. that the disclosure of the new information would result in a significant change in the investors' evaluation of firms'future earnings and thus in their expectations about the firms ' relative risk prospects. Contrary to expectations, the test results for these two portfolios are consistent with the hypothesis of systematic risk stability over time.

The figures 6 to 9 give the graphs of the Quandt's log-likelihood ratios. These ratios were computed from August 1972 to January 1980, and are plotted against time for each of the four portfolios. It is important to note that the initial and final values of the Quandt ratio are of little analytical significance. In this study, the first regression equation for purpose of calculating the Quandt ratio (the one fitted to the first r observations) is based on only two data points. At the other end of the data set, while the first equation is now based on r = 91 data points, the second regression equation (the one fitted to the T-r observations) utilizes only four data points. This makes interpretation tenuous. Thus, if the Quandt ratios indicate a minimum value in the first or last periods, they are not likely to reflect a change in systematic risk.

EXPERIMENTAL PORTFOLIO

PORTFOLIO 1 ($h=1$) QUANDT'S LOG LIKELIHOOD RATIO ($\tau = 2$ to 91)

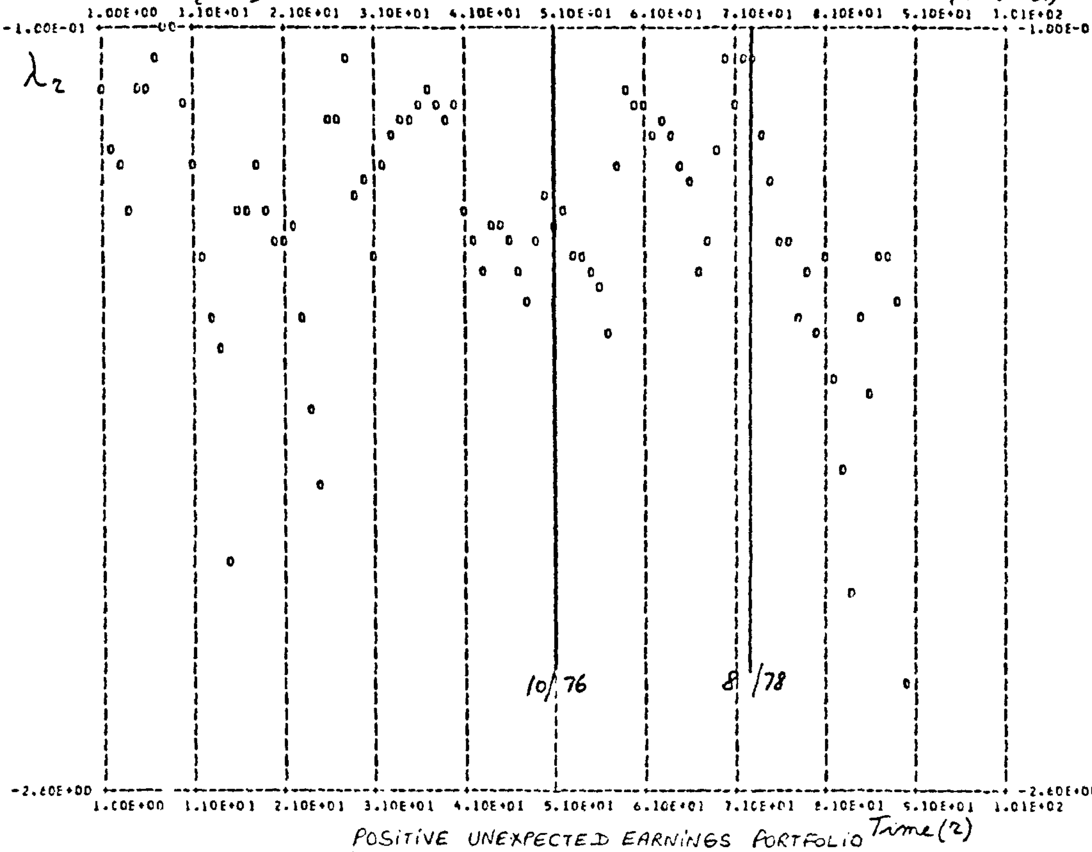

FIGURE 6

POSITIVE UNEXPECTED EARNINGS PORTFOLIO

PORTFOLIO 2 ($h=1$) QUANDT'S LOG LIKELIHOOD RATIO ($\tau = 2$ to 91)

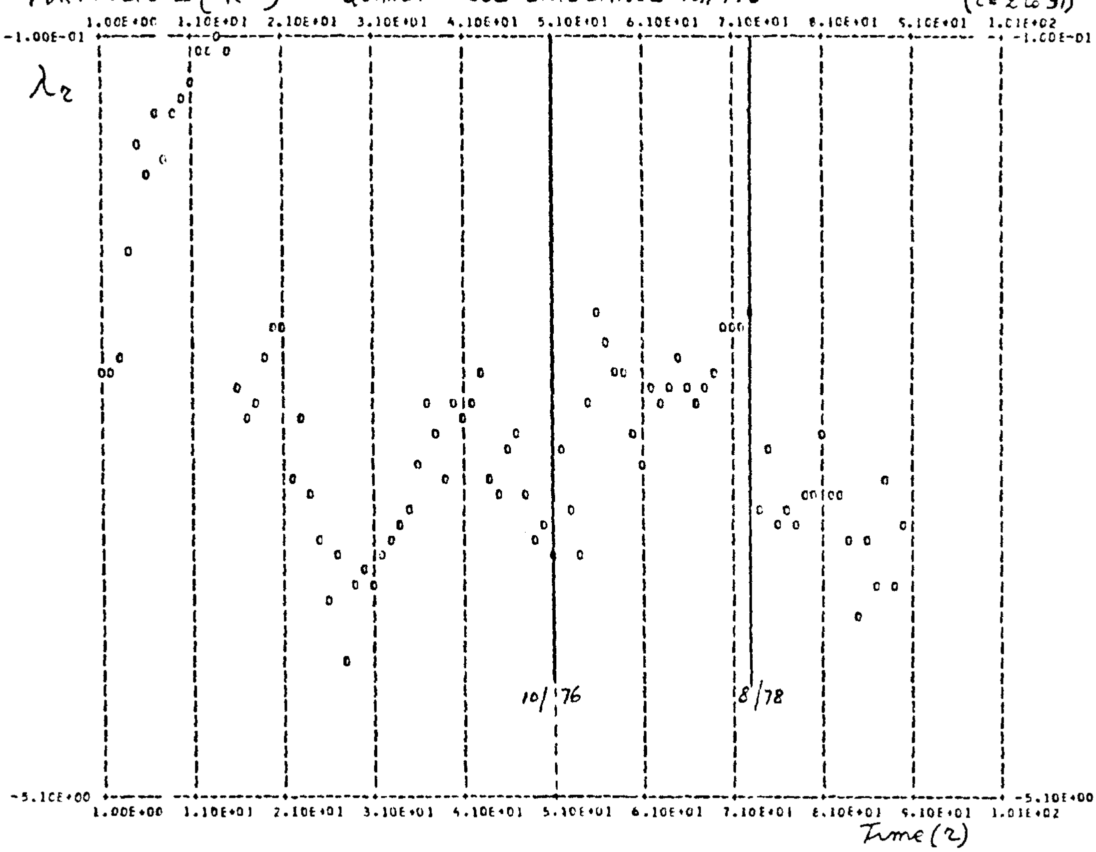

FIGURE 7

NEGATIVE UNEXPECTED EARNINGS PORTFOLIO

PORTFOLIO 3 ($k=1$) QUANDT'S LOG LIKELIHOOD RATIO ($\tau = 2$ to 91)

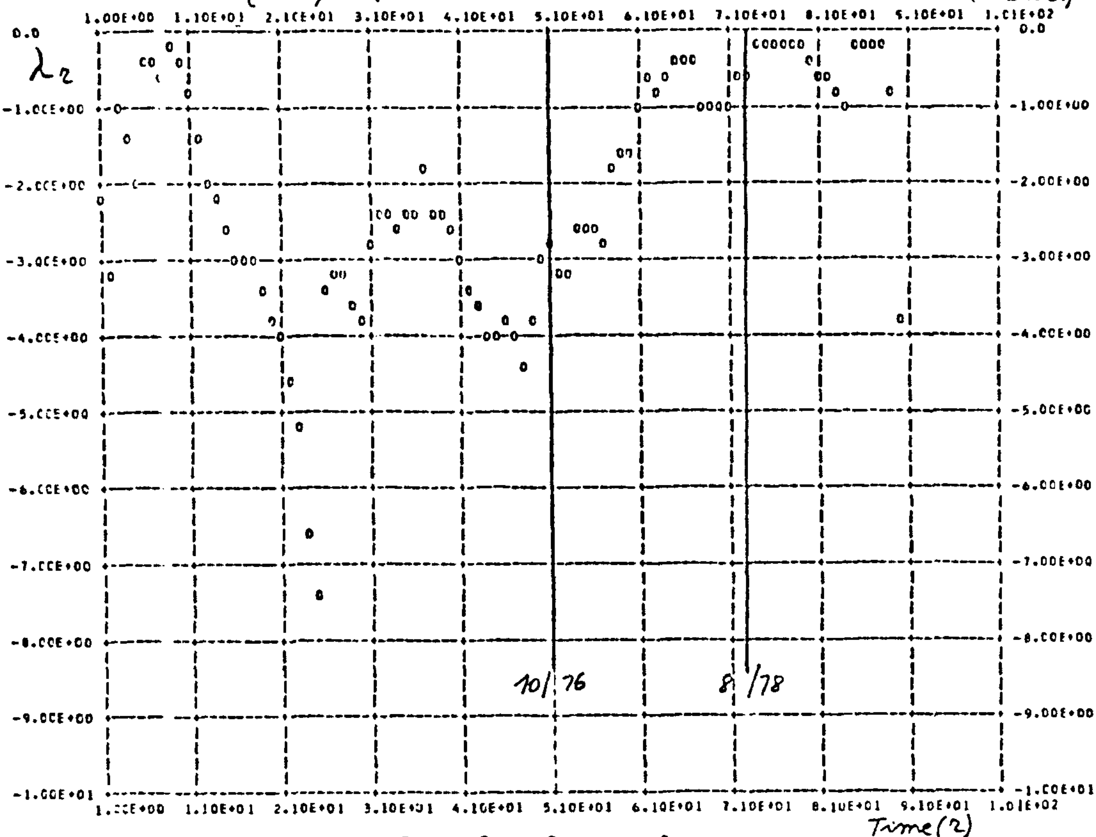

FIGURE 8

CONTROL PORTFOLIO

PORTFOLIO 4 ($k=1$) QUANDT'S LOG LIKELIHOOD RATIO ($\tau = 2$ to 91)

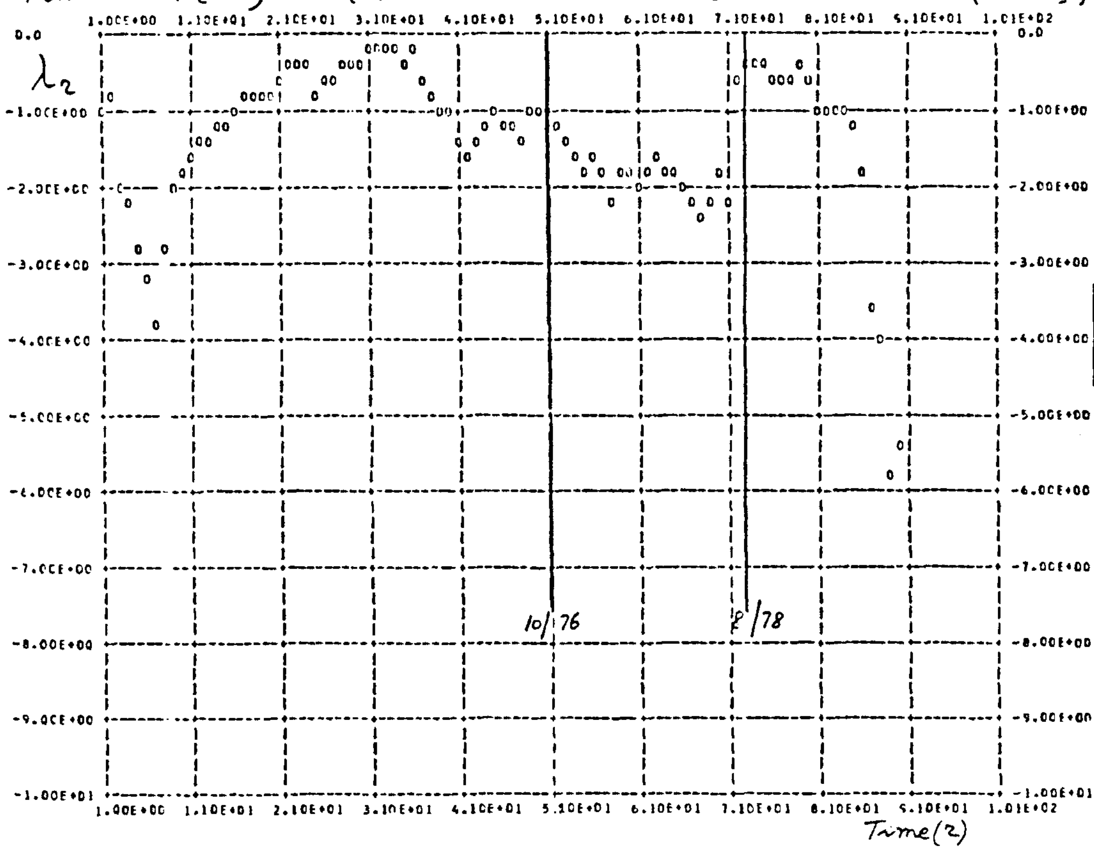

FIGURE 9

The behavior of the Quandt ratios indicates whether structural changes in regression relationship occur as an abrupt transition or gradually : the point in time at which the ratio achieves its minimum is viewed as the most likely location of a change in systematic risk. One can argue that comparison of these graphs for the four portfolios once again reveals no difference between the portfolios. No drop can be noticed at any point within the impact period. The plots of the ratios for the experimental portfolios (the overall portfolio and the two unexpected earnings portfolios) seem to reveal indications of structural shift between August 1974 and November 1974. But these points in time at which the Quandt ratios achieve their minimum are outside the impact period of October 1976 to August 1978. After November 1974, there is no indication of a shift in systematic risk. It has to be pointed out, however, that the Quandt's log-likelihood ratios only indicate the possibility of significant shifts in the regression relationship. Through our analysis of the cumulative sum of the squared residuals, we have found out that the results obtained could not reject the hypothesis (at the.10 level) that systematic risk remained constant for both experimental and control portfolios.

All these results reinforce our conclusions that there was no significant systematic risk adjustment at the portfolio level associated with the disclosure requirements of the '76 Act.

B. Individual Firm-Level Analysis.

In the previous section, inferences were based on equally-weighted portfolios of the sampled firms. Here, examination is extended to the indivi firm level.

Portfolio betas might provide misleading information to the extent the betas of individual firms could change appreciably, but in opposite directi, yielding a portfolio beta that would exhibit little or no change. Note, howe that for unexpected earnings portfolios we would expect betas of individual firms to change in the same direction. In order to exploit more of the sample information, we decided thus to disaggregate the sample and examine the po effects of disclosure requirements on individual firms' systematic risk. Consequently, the cusum of squares test was run for each sampled firm.

The results of this test are presented in Table I for each group of sampled firms.

TABLE I

RESULTS OF THE CUSUM OF SQUARES TEST

(level of significance 10 %)

	Number* of Firms for Which: Systematic Risk Estimates Did Not Change	Systematic Risk Estimates Did Change
CONTROL FIRMS	40 *(8.0%)*	10 *(2.0%)*
EXPERIMENTAL FIRMS		
1/ Overall Group	38 *(7.6%)*	12 *(2.4%)*
2/ Positive Unexpected Earnings Group	20 *(8.0%)*	5 *(2.0%)*
3/ Negative Unexpected Earnings Group	18 *(7.2%)*	7 *(2.8%)*

* *The percentages of total sample are given in parentheses.*

It is evident that for the large majority of the sampled firms, the null hypothesis of no shift in systematic risk during the period October 1976 to August 1978 was maintained. Moreover, with respect to the firms for which the systematic risk has significantly changed, there was very little difference (4 % only) between the percentage of firms in the overall experimental group and the percentage of firms in the control group. Thus, the individual firm-level results corroborate the portfolio-level results.

VI. CONCLUSION

This study investigated whether the Belgian Financial Reporting Act of 1976 induced a change in the systematic risk of the firms that were required to disclose new financial data. The statistical procedures used to test the constancy of systematic risk were: (a) tests based on the cumulative sum and cumulative sum of squares of recursive residuals and (b) the Quandt's log-likelihood ratio technique. The evidence presented in this paper indicates that there was no significant change in the beta coefficient of the firms disclosing new financial information of the type called for in the '76 Act. These results imply that the disclosure requirements did not have any impact on the market's perceived risk characteristics of the disclosing firms. It appears that the information conveyed by the required disclosures may have already been impounded in the systematic risk of the firms.

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