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Mandatory Audit Regulation for Banks: An Empirical Evaluation of Its Effects

This paper examines the effects on stock returns of the mandatory audit regulation imposed on banks by the Securities and Exchange Commission in 1971. It is found that this imposition affected the stock returns negatively for those banks that did not voluntarily choose to employ external audits prior to the regulation. This is contrary to claims that such a mandatory regulation would be beneficial. The methodology employed is based on the familiar market model and the Gonedes approach.

I. Introduction

One of the most striking characteristics of the securities industry is that it is very heavily regulated, especially with respect to information production. There are at least three identifiable levels of intervention dealing with the production of financial information: first, corporations are required to provide certain types of information and some minimum amount of information; second, the financial information, for the most part, has to be certified (audited); and finally, those who certify the statements have themselves to be licensed. All these regulations are instituted for the alleged protection of the investing public.

This study will examine the second type of intervention mentioned above, namely, a mandatory audit requirement. It will specifically examine the effects of a particular Securities and Exchange Commission (SEC) requirement that mandates banks reporting to them to have their

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financial statements audited by certified public accountants. Ideally, it would be desirable to conduct a direct test on the effects of an audit requirement on an unregulated industry. Unfortunately, we are unable to do this because the provision requiring audits for most corporations came together with other disclosure rules in the 1934 Securities Act, so that it is not possible to disentangle the effects of the audit requirement from those of the disclosure rules. What is unique about the requirement for the banking industry to be studied here is that the audit requirement came by itself—there were no accompanying disclosure requirements. Thus, it is possible to study the effects of just the mandatory audit requirement in this instance.

Section II sets out the arguments commonly used to justify mandatory audits. A brief description of the data base is discussed in Section III, with empirical results discussed in Section IV. Section V provides a check on the robustness of the results, and Section VI concludes with a discussion of the public policy implications of the results.

II. Mandatory Audits: Justification

Mandatory audits for banks have been an issue since as long ago as the thirties (Editorial 1930). However, it was not until 1971 that audits first became mandatory for banks. This came about when the SEC adopted amendments to article 9 of regulation S-X and to instructions 13 and 17 as to financial statements of forms 10 and 10K, respectively. Those amendments in essence require that financial statements included in filings with the SEC be audited by independent public accountants.

There are basically three rationales given for mandatory audits. Undoubtedly, these are based on the usual reasons for government intervention in any private market: market failures of one type or other.[1] The first rationale for making audits mandatory is based on the view that financial statements are useful and are widely used by investors in their investment decisions. Given the usefulness of such reports, it is argued that investors may be subject to harm if no guarantee is provided regarding the quality of those financial statements. (See American Accounting Association [1973] for their views on the necessity of external audits, for example.) Since the concern is with some aspect of a safer or better-quality product (namely, better and more reliable financial statements), it can easily be seen that this reason for mandatory audits is similar to reasons for government regulation of the quality of some products.

1. Stigler (1976), in his discussion of the traditional theory of the functions of the state, described three types of alleged market failures that welfare economists have frequently used in their rationalization of state intervention: the presence of externalities, incompetent individuals leading them to make erroneous decisions, and the presence of public goods.

The usual rationale for any form of intervention requiring a "safer" or better product is the alleged market failure which Stigler (1976) calls "incompetent individuals" who would make erroneous decisions if left on their own. It is based on the belief that the consumer is basically dumb and helpless: unless he is protected by some form of government intervention, he is in danger of consuming unsafe or deficient products. It is alleged that producers have no incentive to maintain standards on products, and hence, if the government does not intervene, nothing will be done to maintain standards. This rationale has frequently been used by welfare economists and consumer advocates to justify government intervention in various markets. The main reason for the SEC's requirement of mandatory audits for banks is "investor protection." It was reported that the SEC felt that "the reporting requirements of other agencies (the Federal Reserve Board, Comptroller of the Currency and the FDIC) may not necessarily meet the needs of security investors" (*Wall Street Journal* 1971). The response of the Financial Analysts Federation to the SEC's initial audit proposal for banks also indicates this "investor protection" rationale (U.S. Securities and Exchange Commission 1971*a*): ". . . that *in the interest of good corporate disclosure* and in *fairness to investors,* all financial statements should have the benefit of an audit and certification by a certified public accountant" (emphasis mine). It is believed, then, that a regulation that guarantees the issuance of audited financial statements (namely, a set of better-quality statements) would be valued by the investing public.

These arguments are, however, far from watertight—the fault with the arguments which use this type of market failure as a rationalization for government intervention is that they assume the government is consistently correct in analyzing when the consumer is incompetent. This is not always true: in most cases, the state has no knowledge of when the consumer has made the wrong decision (see Stigler 1976, p. 110).

The second rationale for making audits mandatory is another type of alleged market failure—that of a public good. An audit, it is said, is a public good: once it is produced, it is costless to use and the results are difficult to be kept secret (see Ng 1976). The argument is that even if an investor wants very much to have an audit conducted, he has no incentive to pay for it because the return from his outlay on the audit accrues not only to himself but to others as well. Once the audit is done, it is very difficult for him to keep the results to himself: the information about the results of the audit can be transmitted by his own actions, for example, from the stock transactions he makes. As a result of this difficulty of enforcing property rights on the findings of an audit, the public will not reveal how much they are willing to pay for such an audit. Unless the government or some authority steps in and makes

audits mandatory for every corporation, none or very few will be conducted. Such a regulation, it is believed, will be viewed favorably since it solves the problem of the potential "undersupply" of audits.

The argument that the audit is in the nature of a public good, and thus that mandatory audits are required, is not a very strong one. Similar certification of products and services are undertaken voluntarily in various private markets. Friedman (1962) gives some examples:

> This [certification of goods and services] is something the private market generally can do for itself. . . . There are private certification agencies for many areas that certify the competence of a person or the quality of a product. The Housekeeping Seal is a private certification arrangement. For industrial products there are private testing laboratories that will certify to the quality of a particular product. For consumer products, there are consumer testing agencies of which Consumer's Union and Consumer's Research are the best known in the United States. Better Business Bureaus are voluntary organizations that certify the quality of particular dealers. Technical schools, colleges and universities certify the quality of their graduates. . . . [P. 146]

The third and final rationale for mandatory audits is that such a regulation is the cheapest way of enforcing the quality of financial reporting. While one can purchase commodities to test their quality, one cannot purchase an accounting system to test its quality; and while it is easy for consumers to enforce standards by their consumption behavior, it is not as clear that investors can do the same to enforce standards of reporting. This rationale is related to the first one—the investor protection rationale—in the sense that it is based on the notion that investors value the "increased" standards of reporting brought about by audits. Again, if this were true, a mandatory audit regulation will be viewed favorably by financial statement users.

The first rationale, the investor protection rationale, appears to dominate the other two in the case of compulsory audits for banks. (See, for example, Bain [1951], Bettauer [1965], and Fulton [1961] for some discussion of the arguments for and against bank audits.)

All of the justifications for mandatory audits discussed above have assumed that the benefits from such a regulation far outweigh its costs. This, however, is not always true. This is quite evident in the case of bank audits as revealed by the banks themselves in their submissions to the proposed 1971 audit regulation.[2] The banking community felt that the increased audits costs cannot be justified. They argued that the audit would only duplicate the work done by bank examiners and internal

2. The SEC called for public submissions to the proposed audit requirement. These are summarized and analyzed in Izan (1978, chap. 4). The submissions were supplied to me by L. Bloch of the SEC.

auditors. Besides this general negative attitude, the banking community was also particularly concerned that the audit requirement was to be effective immediately and therefore meant that auditors had to be hired at very short notice. The 1971 requirement, in other words, would entail "crash planning" and interference with other administrative arrangements which were already under way, and the incurring of audit costs which were not budgeted for.

The question we pursue here is whether the audit regulation is perceived by the stock market as favorable news, as the Financial Analysts Federation views it, for example, or as unfavorable news as the banking community views it.

III. The Data Base

The market's perception to the regulation is analyzed by examining the behavior of the rate of return of each bank stock affected by the regulation around the time of the announcement of the audit requirement.

The names of the banking companies whose banks are affected by the audit requirement were obtained from the *Directory of Companies Filing Annual Reports with the Securities and Exchange Commission* (U.S. Securities and Exchange Commission 1971*b*). The majority of banking company stocks, like insurance company stocks, are traded over the counter (OTC), and the stocks studied here are OTC stocks. Although there are bank stocks that are traded in national exchanges, they are not studied here because audits may be required as a condition for being listed (Daily and Strawser 1974, p. 46); since all sample stocks are traded OTC, comparisons made among them can be made more readily than if some had been traded on exchanges. Since the major part of the empirical study uses stock return data, the availability of price data is ultimately the criterion for inclusion in the sample. Sixty-three stocks constitute the final sample.

The 63 banking companies are then split up into two groups—Group A (audited) comprises the 23 banking companies that had audits on a voluntary basis prior to 1971, and Group NA (not audited) makes up the other 40. The information as to whether the banks employed audits prior to 1971 is obtained from 1970 SEC 10K reports.

Various sources of price data for OTC stocks are available, including *Barrons*, the *Commercial and Financial Chronicle*, *Over-the-Counter Market Chronicle*, and *OTC Daily Stock Price Record*, and the stock market pages of the *Wall Street Journal* and the *New York Times*. For this study, however, the main sources of price data have been *Barrons* and the *Commercial and Financial Chronicle*. Both of these sources provide Friday bid and asked prices. A total of 208 weekly bid and asked prices were collected for the period January 1970–December

1973. The prices at which transactions take place are not available, and thus the means of the bid and asked prices are used to represent transaction prices. Rates of returns are defined as $\log [(P_t + D_t)/P_{t-1}]$, where P_t = price and D_t is dividend distributed between $t-1$ and t. Data on dividend distributed and stock splits are obtained from *Moody's Dividend Record* for the years of interest.

The market index that is used is proxied by the Standard and Poor's Composite Index, while the industry index is proxied by an index of financial stocks traded on the NYSE. Again, both indexes are widely quoted in various investment journals, and for this study, these indexes are obtained from the "Study of Price Movement: Market Laboratory" section of *Barrons*. The financial stocks index is made up of stocks of insurance, bank, and finance companies traded on the NYSE.

IV. Empirical Results

The methodology employed here to assess the effects of the audit regulation is based on the widely used two-parameter capital asset pricing model. The technique employed is similar to that used by Benston (1973) and Hagerman (1975) in their studies of the impact of disclosure requirements. The same technique has also been employed in various studies of the information content of changes in accounting techniques, for example, Sunder (1973), Kaplan and Roll (1972), Archibald (1972), and Ball (1972).

In all these studies, the effects of a disclosure requirement or the changes in accounting techniques are assessed by analyzing the effects on stock returns. The rationale for looking at stock returns is as follows: if an event has economic implications for a firm, or if an information has "information content," then one would observe equilibrating price adjustments to take account of the effects of that particular event or information. A study of the actual rates of return will thus reveal whether or not the event has an effect and the nature of the effect. In the case of the bank audit regulation, the effect on stock returns can be of three types. First, the effect can be positive to reflect that the requirement is "good news"—the audit requirement is good news if it signals the prospect of better scrutiny over banks, better financial reporting, and a reduction in the probability of future frauds, all of which would reflect the investor-protection rationale of audits. Second, the audit requirement can have a negative effect to reflect that it generally is perceived as "bad news"—it is bad news if it signals future audit costs, which are for the most part fixed (unavoidable) costs, nonpecuniary costs associated with the fact that there is another constraint within which banks have to operate, and organizational and set-up costs called for by the regulation. Third, the audit requirement can have no effect, that is, the new piece of requirement is simply

another piece of paperwork that does not have any economic significance.

To test the effects of an event that is specific to a particular security, one has to isolate the effects of general market conditions from the firm-specific event. The familiar market model which gives the relationship between the rate of return on security j and the rate of return on the market portfolio can be used to isolate marketwide events. The market model is written as follows:

$$\tilde{R}_{jt} = \alpha_j + \beta_j R_{mt} + \tilde{e}_{jt}, \tag{1}$$

where R_{jt} is the rate of return on the individual security, R_{mt} is the rate of return on the market index, and $\tilde{e}_{jt}$ is the disturbance term.

Suppose an event takes place between time t_1 and t_2. If the event has economic significance, equilibrating price adjustments would have taken place during the period t_1–t_2. Since this is the time period to be analyzed, equation (1) should be estimated with observations between t_1 and t_2 excluded:

$$\tilde{R}_{jt} = \alpha_j + \beta_j R_{mt} + \tilde{e}_{jt}, \tag{2}$$

where $t = 1, \ldots, t_{1-1}, t_{2+1}, \ldots, T$ periods and $j = 1, \ldots, N$ securities. The effects of marketwide events are given simply by the relationship estimated for (2) above. That is, the predicted value of R_{jt} for given values of R_{mt} is

$$\hat{R}_{jt} = \hat{\alpha}_j + \hat{\beta}_j R_{mt}. \tag{3}$$

The difference between the realized rate of return and the predicted rate of return will thus give us the effects of firm-specific events. That is, the forecast error, defined as $\hat{u}_{jt} = R_{jt} - \hat{\alpha}_j - \hat{\beta}_j R_{mt}$, $t = t_1, \ldots, t_2$, will reflect firm-specific factors.

If the event has no effect, then the expected value of the forecast error is zero. If it has an effect, then the forecast error has a nonzero expectation.

For this study, the event of interest is the announcement of the audit requirement. The effects of that announcement are analyzed for the two groups of securities in the sample. Recall that Group A securities are those that undertook voluntary bank audits, and Group NA are those that did not choose to undertake audits.

It should be noted here that since the event took place at one particular time in history the use of equation (1) is not entirely satisfactory for our purposes here due to cross-correlation among securities. Usually such a correlation effect can be eliminated by aggregating across firms in different industries. In this case, this cannot be accomplished. An obvious way to eliminate this is to include an industry-specific variable. Unfortunately, a banking industry index based on Friday prices is not available for the entire period; the

National Association of Securities Dealers Automated Quotation bank index is available only for periods after February 1971. The first set of results presented here uses a financial index based on financial stocks on the New York Stock Exchange; this financial index is somewhat broader than a banking industry index but will probably be a satisfactory proxy.

The rate of return on the financial index is itself dependent on the market rate of return. In order to get the appropriate industry index that is filtered for the effect of the market rate of return, we use the residuals from a regression of the financial rate of return on the market rate of return. By construction, we have an industry index that is orthogonal to the market rate of return, so that it picks up the industry effect over and above the market effect, which is what we require.

The estimating equation is thus

$$\tilde{R}_{jt} = \alpha_j + \beta_{1j} R_{mt} + \beta_{2j} R_{It} + \tilde{e}_{jt}, \tag{4}$$

where R_{It} is the industry-specific index which is constructed in the manner described in the last paragraph.[3]

In the estimation of equation (4), observations for the period April 30–August 6, 1971, are deleted from the analysis, as this is the period in which the audit requirement was introduced. The effects of the announcement are considered in this 15-week period instead of only 1 week following the initial proposal to allow for the possibility that the initial proposal would not pass.[4] To illustrate the plausibility of such a possibility, when the SEC first proposed the mandatory requirement, it was to have covered life insurance companies as well. However, the requirement for the insurance companies was not passed that year. Equation (4) is estimated for each security using observations from January 1970 through December 1973, with the 15 weeks deleted

3. Note the rate of return on the financial index could be used directly in eq. (4). The predictions made would be exactly the same. Under the current scheme, we have $\tilde{R}_{jt} = \alpha_j + \beta_{1j} R_{mt} + \beta_{2j} R_{It} + \tilde{e}_{jt}$, where $R_{It} = R_{ft} - (\hat{a}_0 + \hat{a}_1 R_{mt})$, R_{ft} is the rate of return on the financial index, and $\hat{a}_0$ and $\hat{a}_1$ are estimates of the constant term and the relative risk of the financial index, obtained by regressing R_{ft} on R_{mt}. Now (4) can be written as

$$R_{jt} = \alpha_j + \beta_{1j} R_{mt} + \beta_{2j} (R_{ft} - \hat{a}_0 - \hat{a}_1 R_{mt}) + \tilde{e}_{jt},$$

$$= (\alpha_j - \beta_{2j}\hat{a}_0) + (\beta_{1j} - \beta_{2j}\hat{a}_1) R_{mt} + \beta_{2j} R_{ft} + \tilde{e}_{jt}.$$

If the rate of return on the financial index was used directly, i.e., R_{ft} instead of R_{It}, then the coefficient on the market rate of return will no longer reflect the relative risk measure of security j, but instead, it is $(\beta_{1j} - \beta_{2j}\hat{a}_1)$ and the constant term is $(\beta_j - \beta_{2j}\hat{a}_0)$, where $\hat{a}_1$ is the estimated relative risk of the financial index. If the industry variable had been ignored, the forecast errors or excess returns obtained will be biased due to what is akin to an omitted variables problem.

4. From the submissions received by the SEC, which are reviewed in Izan (1978, chap. 4), it does appear that the probability that the audit requirement may not be passed that year is relatively high. Only three comments received were completely favorable. The others were negative toward either the whole audit requirement or the passage of the requirement in midyear.

TABLE 1 Summary of Regression Results

	Group A			Group NA		
	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$
Mean	−.00047	.38124	.36572	.00134	.49431	.35306
Minimum	−.00391	.05733	.01830	−.00149	.09000	.00070
Maximum	.00501	.71650	1.26300	.00777	.94240	.90980
Standard deviation	.00202	.20696	.33463	.00193	.22515	.23002

NOTE.—α, β_1, β_2 are defined in eq. (4).

around the time the audit requirement was introduced. The estimates obtained using observations over this 4-year period are summarized in table 1. The average value for the estimated coefficients on the market rate of return ($\bar{\beta}_1$), which is an estimate of the average relative risk, is .38 for the Group A and is .49 for Group NA. This observation is interesting, since on the surface it implies that, over the 4-year period, the relative risk for the Group A is on average lower than that for Group NA. This difference is not, however, significant at the .10 level. (See Izan [1978, chap. 7] for details of the test on changes in relative risk and on the test of differences in means of the relative risk for Group A and Group NA securities.)

Residuals—or excess returns, as they are referred to in the finance literature (they are simply forecast errors)—for the 15 deleted weeks are estimated for each security as: $\hat{u}_{jt} = R_{jt} - \hat{\alpha}_j - \hat{\beta}_{1j}R_{mt} - \hat{\beta}_{2j}R_{It}$. These forecast errors are then averaged across securities for each of the 15 weeks. The average residual is defined simply as:

$$\bar{\hat{u}}_t = \sum_{j=1}^{N} \hat{u}_{jt}/N,$$

where N is the number of securities.

The average residuals estimated for both groups are given in table 2. Columns 1 and 3 of table 2 show the estimated average residuals for Group A (the group with voluntary audits) and for Group NA, respectively. Columns 2 and 4 of table 2 show the cumulative average residuals, defined for the τth weeks as:

$$U_\tau = \sum_{t=1}^{\tau} \bar{\hat{u}}_t.$$

The rationale for looking at the cumulative average residuals is as follows: If the event is "bad news,"[5] then it is expected that the average residuals will be negative for most of the 15-week period; hence the plot of the cumulative average residuals will have a negative

5. "Bad news" and "good news" here refer to the market's reactions to the event.

TABLE 2 Average and Cumulative Average Residuals

	Group A		Group NA	
	$\bar{u}_t$*	(U_τ)†	$\bar{u}_t$	(U_τ)†
1	.01293	.01293	.00889	.00889
2	−.01046	.00247	−.00380	.00509
3	.00315	.00562	−.00220	.00289
4	−.00147	.00415	−.00348	−.00059
5	−.00183	.00397	−.00031	−.00090
6	−.00665	−.00268	−.00675	−.00765
7	.00269	.00001	−.00485	−.01250
8	.00197	.00198	.00784	−.00466
9	−.01318	−.01120	−.01185	−.01651
10	.00316	−.00804	−.00719	−.02370
11	.00271	−.00533	−.00200	−.02569
12	.00606	.00073	.00060	−.02509
13	−.00413	−.00340	−.00635	−.03144
14	−.00460	−.00800	−.00028	−.03171
15	−.00013	−.00813	.00241	−.02930

*$\bar{u}_t = \sum_{j=1}^{N} \hat{u}_{jt}/N$ (average residuals).

†$(U_\tau) = \sum_{t=1}^{\tau} \bar{u}_t$ (cumulative average residuals).

trend in it. If, on the other hand, it is "good news," then it is expected that a majority of the average residuals will be positive, giving us a positive trend in the plot of cumulative average residuals. And if it has no effect, then the plot of the cumulative average residuals should have no distinct trend in it and should simply meander around zero. The advantage of looking at the cumulative average residuals is that it enables us to determine easily from the plot if the event tends to be "good news," "bad news," or neither.

Week 1 refers to April 30, and week 15 refers to August 6. The initial proposal comes in week 4, taken here to be the first sign of the impending requirement; the final announcement of the audit requirement, the final form of the actual requirement, is not known until week 13. As mentioned earlier, there is some probability, possibly changing with time, that the audit requirement may not actually pass, and as a result the effect between the initial proposal and the final requirement is of importance—this is the period beyond week 4.

The cumulative average residuals for the two groups are plotted in figure 1. As can be seen, the announcement of the mandatory audit requirement has more negative implications for Group NA securities than for Group A securities; that is, it has more negative implications for the group at which the SEC audit requirement is especially directed from the viewpoint of benefiting shareholders. The discrepancy between the performance of the two groups appears to increase from

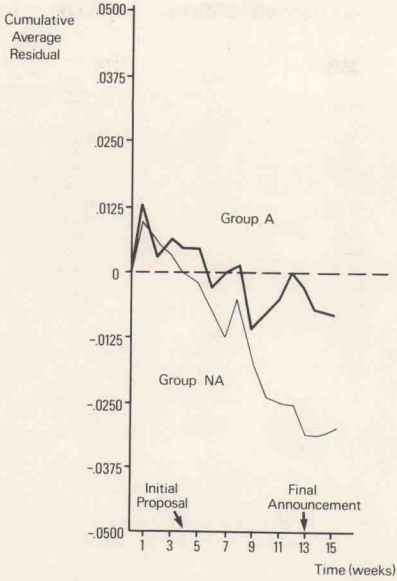

FIG. 1.—Cumulative average residuals

week 8 on. One explanation for this negative effect beyond week 8 is that, as comments and views regarding the audit requirement are heard, the market adjusts the probability that the final requirement will be passed. Although the proposal came in week 4, the final form of the regulation and the corresponding liabilities were not known until week 13. This makes good economic sense. The value of the cumulative average residual for the 15-week period for Group NA is −2.9 percentage points (see table 2).

To test for the significance of the average residual, first we perform a simple t-test of the hypothesis: H_0: $E(\bar{u}_t) = 0$, H_A: $E(\bar{u}_t) \neq 0$. Table 3 shows the t-values computed for each of the 15 weeks. For Group A only two of the negative residuals are significant at the .10 level, while for Group NA, five of the 11 negative residuals are significant at the .10 level for a two-tailed test. These are significant at the .05 level for a one-tailed test. This again makes intuitive sense, since it indicates that the regulation affects most the banks forced to take an audit.

TABLE 3 *t*-Values for Testing the Significance of the Average Residuals

	Group A		Group NA	
	$\hat{s}_A$*	*t*-Value	$\hat{s}_A$†	*t*-Value
1	.00618	2.0922	.00312	2.8480
2	.00623	−1.6789	.00353	−1.0765
3	.00564	− .5585	.00442	− .4977
4	.00432	− .3403	.00354	− .9831
5	.00522	− .3505	.00463	− .0669
6	.00379	−1.7546	.00355	−1.9014
7	.00641	.4196	.00264	−1.8371
8	.00371	.5309	.00339	2.3126
9	.00481	−2.7401	.00300	−3.9500
10	.00671	.4709	.00305	−2.3570
11	.00552	.4038	.00309	− .6472
12	.00873	.6942	.00338	.1953
13	.00323	−1.2786	.00389	−1.8732
14	.00534	− .8614	.00389	− .0720
15	.00393	− .0331	.00489	.4928

NOTE.—Values of the average residuals are given in table 2.

$$*(\hat{s}_A) = \sqrt{\sum_{j=1}^{23} (\hat{u}_{jt} - \bar{\hat{u}})^2/(22)(23)}.$$

$$\dagger(\hat{s}_{NA}) = \sqrt{\sum_{j=1}^{40} (\hat{u}_{jt} - \bar{\hat{u}})^2/(39)(40)}.$$

Second, we test for the difference between the excess returns of the two groups averaged over all 15 weeks: H_0: $E(\bar{u}_A) = E(\bar{u}_{NA})$; H_A: $E(\bar{u}_A) > E(\bar{u}_{NA})$, where $\bar{u}_i$ is the average residual (excess return) over all securities in group i and over all 15 weeks. The above alternative hypothesis is chosen since our earlier results indicate that Group NA is more adversely affected than Group A. This test is an overall summary test and is carried out by running the following regression: $\bar{\hat{u}}_j = \lambda_1 D_1 + \lambda_2 D_2 + e_j$, where $D_1 = 1$ if security j belongs to Group A, 0, otherwise; $D_2 = 1$ if security j belongs to Group NA, 0 otherwise; and $\bar{\hat{u}}_j = \sum_{t=1}^{15} \hat{u}_{jt}/15$. The OLS estimates for λ_1 and λ_2 will give the group means. Testing the above hypothesis is simply equivalent to testing the hypothesis that $\lambda_1 > \lambda_2$. This test gives an observed *t*-value of 1.37, which is significant at the .10 level. We can thus conclude that excess returns for the audited group are larger (less negative) than those for the unaudited group.

V. Checks on the Robustness of the Market Model Results

The excess returns approach used in previous sections assumes that the equilibrium prices of different securities in each group are affected

in the same way by the audit requirement. For each group, we have a portfolio of securities with an equal fraction of the portfolio invested in each security. Gonedes (1975) introduced a different test where he allowed for the possibility that distributions of returns on different types of assets may be affected in different ways by the same information. In this section, the Gonedes approach is implemented as a check on the robustness of the results from the "market model" analysis.

The theoretical background of the Gonedes approach is given in Gonedes (1975) and in Gonedes and Dopuch (1974). A brief summary is given here. Any event or announcement is said to have information content or an effect if it induces equilibrating price adjustment. Let $\tilde{R}_{it}$ be the rate of return on asset i for the period $t-1$ to t, and Θ_{it} be the random variable that is thought to have "information content," in the sense that it is important in our assessment of asset i at time t. Information content of Θ_{it} can thus be assessed by comparing the distribution function of $\tilde{R}_{it}$ conditional on the realization of Θ_{it} and the unconditional distribution of $\tilde{R}_{it}$, or alternatively by comparing $\tilde{R}_{it}$ conditional on different realizations of Θ_{it}. If the comparison shows that the distributions are unequal, then Θ_{it} is said to have information content in the sense that some realizations of Θ_{it} induce probability reassessments. The approach then basically involves testing for inequality of distribution functions. An assumption made is that all conditional and unconditional distributions of returns are multivariate normal. This assumption implies that differences between distribution functions can be tested by testing for differences in means and covariance matrices. In our implementation of the test, only a test of differences in means is conducted. The Gonedes test is based on returns on portfolios of shares rather than on returns on individual shares; the reason for using portfolios is to reduce the effects of sampling error and hence increase the precision of the results.

Gonedes then uses the implications of the two-parameter capital asset pricing model in the implementation of the test. Recall that the two-parameter model describes equilibrium expected returns as

$$E(\tilde{R}_{jt}) = E(\tilde{R}_{zt}) + [E(\tilde{R}_{mt}) - E(\tilde{R}_{zt})]\beta_{jt}, \tag{5}$$

where, at t, $\tilde{R}_{jt}$ is the rate of return on asset j, $\tilde{R}_{mt}$ is the rate of return on the market portfolio, β_{jt} is the relative risk of asset j, and $\tilde{R}_{zt}$ is the rate of return on asset z whose relative risk (β_{zt}) is 0. Assume now that there are two portfolios of assets P_1 and P_2 such that $\beta_{P_1} = \beta_{P_2}$, and that P_1 is constructed using the information that $\tilde{\Theta}_{P_1} = 1$, and P_2 is constructed from randomly selected assets. Thus the difference between P_1 and P_2 is that P_1 has $\tilde{\Theta}_{P_1} = 1$, while P_2 does not. Now if $\tilde{\Theta}_{P_1} = 1$ has information content in the sense that it induces equilibrating price adjustments, then equation (5) implies that $E(\tilde{R}_{P_1} \mid \tilde{\Theta}_{P_1} = 1) \neq E(R_{P_2})$

since $\beta_{P_1} = \beta_{P_2}$; and if $\bar{\Theta}_{P_1} = 1$ has no "information content," then $E(\bar{R}_{P_1} \mid \bar{\Theta}_{P_1} = 1) = E(\bar{R}_{P_2})$.[6]

For this specific application, the event of interest is the new audit requirement for banks, and there are two groups of securities constructed on the basis of whether or not the banks affected have been voluntarily audited prior to 1971 or not. The audit requirement would be essentially nonbinding for Group A if it is assumed that they will continue to employ audits in the future.[7] From the comments received by the SEC from the banking community, it appears that this group would be relatively unaffected in the sense that the audit requirement would not induce any further organizational costs, etc. Group NA is the group that was more directly affected by the requirement. Results based on the market model show that Group NA is more negatively affected than Group A.

There is one realization of the event and thus there is only one portfolio formation date, which is April 30, 1971. This date is also the first date of the analysis from the market model. This one portfolio formation date is also justified since the examination of differences in rates of return will only be studied for a short period of 15 weeks.

For each security in each group, the relative risks are estimated using the market model using observations prior to April 30, 1971. The securities are then ranked in descending order in terms of the estimated relative risks. Two portfolios are formed for each group. Recall that Group A contains 23 securities and Group NA contains 40 securities. To have an equal number of securities in each portfolio, only 22 securities in each group are used in the test here. Each portfolio then contains 11 securities. The 11 securities with highest estimated risk in each group form the first portfolio for each group. These two portfolios are then the "high-risk" portfolios. For Group A, the "low-risk" portfolio is formed using the 11 securities with lowest estimated risks. For Group NA, a selection of 11 of the remaining securities comprises the "low-risk" portfolio for the group. The selection is made such that the estimated relative risks of the "low-risk" portfolios are approximately the same for both groups.

The rate of return on each portfolio is then calculated and is simply the arithmetic average of the rates of return of its component securities, and the relative risk of each portfolio is simply the arithmetic average of the risks of the component securities. Characteristics of the portfolios are summarized in table 4.

6. One of the advantages of this approach is that it is based on rates of returns, and hence we avoid the estimation problems of the market model residuals analysis (see Gonedes 1975, pp. 222–23, n. 2).

7. There may be changes in the liability structure of these banks because of the mandatory nature of the audit.

TABLE 4 Selected Characteristics of Portfolios Formed

Group	Portfolio Type	Number in Portfolio	Estimated Relative Risk	Estimated Mean Return 4/30/71–8/6/71 (15 Weeks)	Estimated Standard Deviation of Return 4/30/71–8/6/71 (15 Weeks)
A	High risk	11	.679	−.002516	.01285
	Low risk	11	.276	−.003543	.00968
NA	High risk	11	.675	−.006357	.01400
	Low risk	11	.277	−.004601	.00752

It is interesting to note the following from table 4. First, for Group A, the high-risk portfolio's average rate of return for the 15 weeks is −0.002516, and the low-risk portfolio's average rate of return is −0.003543—this is consistent with our expectation that a high-risk asset should earn a rate of return higher than a low-risk asset (less negative in this instance). But for Group NA, the average rate of return for the high-risk portfolio is more negative than the average rate of return for the low-risk portfolio. The average rate of return for the 15 weeks for the high-risk portfolio is −0.006357 and that for the low-risk portfolio is −0.004601. This result would suggest that the high-risk portfolio is affected more adversely than the low-risk portfolio for the group of firms which have not voluntarily employed audits.

Second, the average rates of return for both portfolios in Group A are greater than the average rates of return of Group NA—these differences are summarized in table 5. Comparisons of the average rates of return here are valid since the relative risks of the corresponding portfolios are approximately the same. The comparisons conducted here are consistent with those seen earlier.

From the two portfolios for the two groups, a set of two minimum variance portfolios are formed, with estimated relative risk β^* equal for each minimum variance portfolio. Several different values of β^* are used. Since there are only two assets (high-risk and low-risk portfolios) for our formation of the minimum variance portfolio for each group, the portfolio weights can be obtained by solving for x in the equation: $\beta^* = x\,\beta_1 + (1 - x)\,\beta_2$, where β^* is the prespecified relative risk of the minimum variance portfolio, β_1 is the relative risk of the high-risk port-

TABLE 5 Means and Standard Deviations of Differences in Rates of Return (4/30/71–8/6/71)

Portfolio Type	Mean	Standard Deviation
High risk	.00384	.01044
Low risk	.00106	.00835

folio, β_2 is the relative risk of the low-risk portfolio, and x is the weight of the high-risk portfolio in the minimum variance portfolio. The null hypothesis can be formulated as $E(R_A^* \mid \Theta^1) = E(R_{NA}^* \mid \Theta^2)$, where R_A^* is the minimum variance portfolio return for Group A with $\beta_A = \beta^*$, and R_{NA}^* is the minimum variance portfolio return for Group NA with $\beta_{NA} = \beta^*$, Θ^1 is the announcement of the audit requirement given that the banks were previously audited, and Θ^2 is the announcement of the audit requirement given that the banks were not audited. The alternative hypothesis is: $E(R_A^* \mid \Theta^1) > E(R_{NA}^* \mid \Theta^2)$. A univariate t-test of differences in the mean returns is employed. The statistic is:

$$t = \frac{\Sigma_t(\hat{R}_{At}^* - \hat{R}_{NAt}^*)/T}{s^*} = \frac{\bar{R}_A - \bar{R}_{NA}}{s^*},$$

where $\Sigma(\hat{R}_A^* - \hat{R}_{NA}^*)/T$ are estimates of the differences in returns, s^* is the estimated standard deviation of the differences in returns, and T is the number of observations over which the comparison is made ($T = 15$ in this case).

In the application of the test, various values of β^* are used, with each value of β^* implying a unique combination of high-risk and low-risk portfolio weights. The results are summarized in table 6. Column 1 of the table shows the β^* used to form the minimum variance portfolio. Column 2 shows the mean of the differences in returns over the 15-week period for each β^*. Note that the difference between the mean returns is positive in all cases, that is, the mean return for the Group A portfolio is larger than that for the Group NA portfolio. Since the mean difference between the high-risk portfolio returns of the two groups is larger than the mean difference for the low-risk portfolio returns, the mean of differences in returns for the minimum variance portfolio decreases as β^* decreases; this is because less weight is given to the high-risk portfolios as β^* decreases. Column 4 shows the t-statistics for the univariate test on differences in means: the maximum value of t is achieved when $\beta^* = 0.54$, implying a weighting of approximately .6 for the high-risk portfolio and .4 for the low-risk portfolio in the construction of the minimum weight portfolio. An examination of the value of t for different levels of β^* shows that it first increases as β^* decreases and then decreases as β^* is decreased. It can be seen that for some β^*, the mean differences between returns are significant at the .10 level using a one-tailed test which reinforces our conclusion from the earlier empirical section.

Column 5 of the table gives the probability that the mean difference is greater than zero, that is, that the mean return for Group A is larger than the mean return for Group NA. As we can see, the probability that this is true is greater than .85 for all β^* except when $\beta^* = 0.28$ (which is

TABLE 6 **Results from a *t*-Test on Differences between Returns on Minimum Variance Portfolios with $\beta = \beta^*$ (4/30/71–8/6/71)**

β^{**}	Means of Differences between Returns on M.V. Portfolios	Standard Deviation of Differences between Returns on M.V. Portfolios	t	Posterior Probability That $\bar{R}_A > \bar{R}_{NA}$†
.98	.005927	.020564	1.1183	.858
.88	.005232	.017638	1.1880	.872
.78	.004536	.013658	1.2869	.890
.68	.003840	.010439	1.4275	.912
.58	.003145	.007654	1.5920	.932
.54	.002728	.006428	1.6450	.938
.48	.002449	.005936	1.6024	.933
.38	.001754	.006242	1.0886	.852
.28	.001060	.008350	.4930	.685

*$\beta^* = x\ \beta_{\text{high-risk}} + (1 - x)\ \beta_{\text{low-risk}}$.

†$\bar{R}_A$ = the unknown mean return for the Group A portfolio, and $\bar{R}_{NA}$ is the unknown mean return for the Group NA portfolio.

when only the low-risk portfolio forms the minimum variance portfolio for each group).[8]

To summarize, the implementation of the Gonedes test gives results that are consistent with those reported in Section IV. That is, the Group NA securities (without prior audits) appear more negatively affected by the audit requirement than are Group A securities. It should, however, be noted that the differences in returns between the groups appear more significant for high-risk portfolios than for low-risk portfolios. That is, the results here appear to indicate that the high-risk stocks of Group NA are affected more negatively than the low-risk stocks. In fact, if one were to hold only the low-risk bank stocks, the difference in mean returns between the two groups is not significant.

Other checks on the robustness of the results were also conducted. In particular, the test was duplicated to take into account changes in relative risk; an industry index comprising of 25 banking stocks was constructed and used in lieu of and in addition to the financial index used in the estimation of (4); and the market model residuals were analyzed to see if there were factors other than the Group A–Group NA classification that can explain the sign and magnitude of the residuals. All these tests produce results that are consistent with those reported here, namely that the banks in Group NA were negatively affected by the regulation, that is, that the requirement was in general bad news for them (see Izan [1978] for details).

VI. Concluding Comments

The results indicate quite clearly that the announcement of the mandatory audit requirement was perceived as bad news by the banks that were forced to take on an audit. This result is contrary to the belief that mandatory audits signal good news in the sense that they would guarantee the supply of reliable information, provide scrutiny over banks, etc. An obvious explanation of the negative effect is the imposition of costs such as annual audit costs which are for the most part fixed (unavoidable) costs, organizational and set-up costs to be incurred for undertaking an audit for the first time, nonpecuniary costs associated with crash planning, and the opportunity cost associated

8. The probabilities are obtained using the Bayesian framework. With a diffused prior,

$$Pr\{\bar{R}_A > \bar{R}_{NA} \mid \text{Data}\} = \int_{-\infty}^{\infty} d\bar{R}_{NA} \int_{\bar{R}_{NA}}^{\infty} d\bar{R}_A \, P_n\{\bar{R}_{NA} \mid D\} \, P_n\{\bar{R}_A \mid D\},$$

where $\bar{R}_A$ and $\bar{R}_{NA}$ are the unknown means of the returns for Group A and Group NA, respectively, and $P_n\{\bar{R}_A \mid D\}$ is the posterior distribution of $\bar{R}_{NA}$ based on a sample size of n, and $P_n\{\bar{R}_{NA} \mid D\}$ is the posterior distribution of $\bar{R}_{NA}$ based on a sample size of n. When the variance is unknown, these posterior distributions are of the form of the Student t-distribution: $Pr\{\bar{R}_A > \bar{R}_{NA} \mid D\} = Pr\{t > -(\bar{R}_A - \bar{R}_{NA})/\hat{s}\}$, where $\hat{s}$ is the estimated standard error of the differences in the means.

with funds that have now to be channeled to external audits. These costs appear to have far outweighed whatever benefits may be brought by external audits for these banks, especially in the presence of various other examinations on their banking activities.

This general negative reaction would also explain the attitude of the banking community toward this form of mandatory regulation, since in essence it implies that the banks have an additional constraint under which they have to operate. Since there was a group of banks which did not on their own choose to undertake audits (Group NA), this regulation becomes immediately binding for them.

Another possible reason for the negative trend is that the audit requirement may signal possible changes in reporting techniques that could substantially reduce reported income for the unaudited group. For example, the unaudited group could have used reporting procedures that are not generally acceptable, which have resulted in relatively higher net income than if generally accepted accounting procedures are used. It is then possible that the audit requirement would signal the expected changes in reporting procedures and the possible future decrease in reported income. The assumption behind this scenario is that the type of accounting procedure used is not known to the public prior to the introduction of the audit.

For those banks which had voluntarily employed audits, the effect appears to be negligible, indicating that the audit requirement is essentially nonbinding for them. For these banks, the costs and/or benefits of an audit have already been expected or realized. Although the effect was small, it was negative. Possible explanations for the negative excess returns include: (1) these banks are now liable if they do not meet the law; and (2) these banks may lose a competitive edge that their audited status had given them over those banks which were previously unaudited but which now take an audit under the new regulation.

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