Journal of Business Finance & Accounting, 26(5) & (6), June/July 1999, 0306-686X

The Accuracy and Incremental Information Content of Audit Reports in Predicting Bankruptcy

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1. INTRODUCTION

The efficiency of investment decisions depends on the accuracy of information available to investors. Auditing provides a means of ensuring that companies provide accurate information – one role of an auditor being to warn investors when a company faces a significant possibility of bankruptcy.[1] However, in recent years there have been a number of well-publicised cases in which auditors failed to warn about impending bankruptcy and this has led to criticism of audit firms.[2]

This paper attempts to evaluate and explain the accuracy and informativeness of audit reports in identifying failing companies – its contribution to the existing literature is three-fold. First, it compares the accuracy of a bankruptcy model and audit reports in both estimation and hold-out samples (Koh, 1991). Secondly, the incremental information content of audit reports is evaluated taking into account a wider set of publicly available information than previously (Hopwood et al. (HMM), 1989). Finally, models of bankruptcy and audit reporting are compared to explain why audit reports were not very accurate signals of financial distress.

Existing UK evidence indicates that audit reports are not accurate indicators of financial distress. Only 20–27% of failing

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quoted companies receive qualified reports (Taffler and Tissaw, 1977; Taffler and Tseung, 1984; Peel, 1989; and Citron and Taffler, 1992). For private companies, the situation appears to be even worse – Barnes and Hooi (1987) found that only 5% of failing companies received going concern qualifications. Moreover, in a sample of 40 quoted companies that received qualified reports, Taffler and Tseung (1984) found that only 10 failed.

This level of inaccuracy does not necessarily mean that auditors are failing in their responsibilities, since bankruptcy may be a highly unpredictable event. Therefore, it is helpful to use a bankruptcy model as a benchmark for evaluating the accuracy of audit reports. This was the approach of Koh (1991) whose sample consisted of 141 failing and 189 non-failing US companies. Koh defined the bankruptcy model's type I error rate as the proportion of failing companies that were incorrectly classified as healthy; the type II error rate was equal to the proportion of non-failing companies that were predicted to fail – the model was found to have a type I error rate of 14.65% and a type II error rate of 0%. In measuring the accuracy of audit reports, the type I error rate was defined as the proportion of failing companies that were given unqualified reports; the type II error rate was equal to the proportion of non-failing companies given qualified reports – the type I error rate for going-concern qualifications was 45.63% and the type II error rate was 0%. Since the bankruptcy model had a lower type I error rate than audit reports (and the same type II error rate), it would appear that audit reports were not very accurate indicators of financial distress. However, a limitation of this study was that the model's accuracy was not compared to audit reports in a hold-out sample. Therefore, it was unclear whether auditors could have used Koh's model to give more accurate audit opinions. In contrast, this paper shows that a bankruptcy model can be more accurate than audit reports outside of the estimation period.

HMM evaluated the incremental information content of audit reports by testing the significance of an audit opinion dummy in the bankruptcy model.[3] Six financial ratios capturing profitability, cashflow and leverage were used to control for publicly available information about the probability of bankruptcy. HMM found that adding an audit qualification dummy significantly increased the bankruptcy model's explanatory power and

concluded that audit reports do signal useful incremental information about financial distress. However, publicly observable variables capturing company size, the economic cycle and industry sector were omitted. Since these variables help to identify failing companies, HMM may have incorrectly rejected the null hypothesis that audit reports do not signal useful information. This problem is addressed by controlling for company size, industry sector and the economic cycle. This paper shows that conditioning the probability of bankruptcy on a wider set of public information reverses the HMM conclusion – audit reports did not signal useful incremental information about the probability of bankruptcy.

Finally, the paper compares bankruptcy and audit reporting models to help explain why audit reports were not accurate or informative signals of bankruptcy – two explanations are found. First, the economic cycle and industry sector were important predictors of bankruptcy, but did not have significant effects on audit reporting. Secondly, there was very strong persistence in audit reporting – auditors were reluctant to give first-time qualifications or to give clean opinions following qualified reports. This is consistent with evidence indicating that a change in opinion can trigger losses for the auditor through litigation and/or client loss (Lys and Watts, 1994; Chow and Rice, 1982; Craswell, 1988; Citron and Taffler, 1992; and Krishnan and Stephens, 1995). Whilst lagged reports are an important determinant of audit reporting, they do not help to identify failing companies. Therefore, persistence in reporting also explains why audit reports were noisy indicators of bankruptcy.

2. THE SAMPLE AND DATA

The population of interest in this study consists of all quoted UK companies between 1987 and 1994. Stock Exchange Financial Yearbooks were used to identify the 160 quoted companies that entered administration, liquidation or receivership during this period. Next audit report data were taken from microfiche copies of annual reports.[4] This provided an initial sample of 1,086 companies, including 123 that failed.

When a company is likely to cease trading in the foreseeable future, the auditor is required to state whether the accounts give a true and fair view subject to the company remaining a going-concern. In the initial sample, there were 124 going-concern qualifications and 79 qualifications given for reasons relating to the quality of financial reporting (these included non-compliance with Statements of Standard Accounting Practice (SSAPs) and uncertainties regarding provisions made for tax, slow moving stocks, bad debts and litigation).

Table 1 is a contingency table showing the correlation between financial health and audit qualifications. The Chi-square statistics show that one can strongly reject the null hypothesis of independence between failure and audit reporting – this was true for both going-concern (GQ_{it}) and non-going-concern qualifications (NGQ_{it}), although the correlation was much stronger for the former. The correlation between non-going-concern qualifications and financial health appears to be capturing the effect of financial distress on the quality of financial reporting. In particular, failing companies were less likely to comply with

Table 1

The Correlation Between Financial Health and Audit Qualifications (1987–94)

Panel A – Initial Sample	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$	$NGQ_{it} = 0$	$NGQ_{it} = 1$
$FAILS_{it} = 0$	6804	177	6878	103	6907	74
$FAILS_{it} = 1$	97	26	102	21	118	5
Type I error (%)	78.86		82.93		95.93	
Type II error (%)	2.54		1.48		1.06	
	χ^2 (1 d.f.) = 150.9*		χ^2 (1 d.f.) = 171.5*		χ^2 (1 d.f.) = 9.9*	
Panel B – Final Sample	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$	$NGQ_{it} = 0$	$NGQ_{it} = 1$
$FAILS_{it} = 0$	6166	160	6234	92	6258	68
$FAILS_{it} = 1$	69	21	74	16	85	5
Type I error (%)	76.67		82.22		94.44	
Type II error (%)	2.53		1.45		1.07	
	χ^2 (1 d.f.) = 140.0*		χ^2 (1 d.f.) = 143.4*		χ^2 (1 d.f.) = 15.8*	

Notes:
* Significant at the 0.01 level ($\chi^2_{0.01}$ (1 d.f.) = 6.63).
$FAILS_{it}$ = 1 if company *i* issued its final report in year *t* prior to entering bankruptcy; = 0 otherwise.
Q_{it} = 1 if company *i* received any type of qualification in year *t*; = 0 otherwise.
GQ_{it} = 1 if company *i* received a going-concern qualification in year *t*; = 0 otherwise.
NGQ_{it} = 1 if company *i* received a qualification for issues other than going-concern in year *t*; = 0 otherwise.

SSAPs and were more likely to face fundamental reporting uncertainties. Thus, in evaluating the accuracy and incremental information content of audit reports, this paper distinguishes between qualifications given for going-concern issues (GQ_{it}) and all types of qualification (Q_{it}).

In Table 1, the type I (II) error rate was large (small) because auditors rarely give qualified reports – this is unsurprising given that the population frequency of failure averaged less than 2% per annum (Morris, 1997).

Next, accounting data were collected from Datastream. Data were unavailable for some of the 1,086 companies in the initial sample – the final sample consisted of 976 companies (90 failures) giving a total of 6,416 observations.[5] Panel B of Table 1 shows that the audit data was very similar in the initial and final samples. Therefore, there is reason to believe that the paper's conclusions would not have been different, had financial data been available for all companies in the initial sample.[6]

The variables used to estimate the bankruptcy model are:

(i) Dependent Variable

$FAILS_{it}$ = 1 if company i issued its final annual report in year t prior to entering bankruptcy; = 0, otherwise.[7]

(ii) Explanatory Variables

F_t = Number of UK quoted companies in the population that entered bankruptcy in year t.
F_t is publicly observable at date t (unlike $FAILS_{it}$) and captures the effect of current economic conditions. Future economic conditions are also likely to affect the probability of bankruptcy. Every four months, the Confederation of British Industry (CBI) publishes the CBI Quarterly Industrial Trends Surveys in which companies are asked, 'Are you more, or less, optimistic than you were four months ago about the general business situation in your industry.' The following variable was used to capture changes in business confidence:

CBI_t = The proportion of respondents replying 'less optimistic' minus the proportion replying 'more optimistic'.

Since the effects of a recession vary across industries some industry dummies were included (dummies with insignificant or non-constant effects were omitted). The included dummies were:

$D1_i$ = 1 if company *i* operated in the energy or water sector (SIC code 1); = 0, otherwise.
$D2_i$ = 1 if company *i* operated in the mining sector (SIC code 2); = 0, otherwise.
$D4_i$ = 1 if company *i* operated in the manufacturing sector (SIC code 4); = 0, otherwise.
$D5_i$ = 1 if company *i* operated in the construction sector (SIC code 5); = 0, otherwise.
$D8_i$ = 1 if company *i* operated in the financial services sector (SIC code 8); = 0, otherwise.
$D8500_i$ = 1 if company *i* operated in real estate (SIC code 8500); = 0, otherwise.

The number of employees was used as a proxy for company size.

EMP_{it} = The number of employees for company *i* in year *t*.

Finally, financial ratios capturing cashflow, leverage and profitability were included. These ratios are defined by Datastream and are shown in Table 2.

$DBTN_{it}$ = The debtor-turnover ratio for company *i* in year *t*.

The debtor-turnover ratio captures whether a company was experiencing difficulty in receiving payment for past sales.

$CASHRAT_{it}$ = The cash (quick) ratio for company *i* in year *t*.

The cash ratio is a measure of a company's short-term liquidity.

GCF_{it} = The gross cashflow ratio for company *i* in year *t*.

The gross cashflow ratio captures the fact that as profitability increases, a company is less likely to experience cashflow problems.
The final two ratios capture the effects of leverage and profitability.

$CAPG_{it}$ = Capital gearing ratio for company *i* in year *t*.
ROC_{it} = Return on capital for company *i* in year *t*.

Table 2

Datastream Definitions for the Cashflow, Leverage and Profitability Ratios

Variable	*Definition*	*Datastream Number*
$DBTN_{it}$	$\frac{(\text{Total sales}) \times 100}{\text{Total debtors}}$	726
$CASHRAT_{it}$	$\frac{(\text{Total cash}) \times 100}{\text{Current liabilities}}$	743
GCF_{it}	$\frac{(\text{Profits earned for ordinary shareholders} + \text{Depreciation} + \text{Tax equalisation}) \times 100}{\text{Capital employed} + \text{Current liabilities} - \text{Intangibles}}$	735
$CAPG_{it}$	$\frac{(\text{Preference capital} + \text{Subordinated debt} + \text{Loan capital} + \text{Short-term borrowings}) \times 100}{\text{Capital employed} + \text{Short-term borrowing} - \text{Intangibles}}$	731
ROC_{it}	$\frac{(\text{Total interest charged} + \text{Pre-tax profit}) \times 100}{\text{Capital employed} + \text{Short-term borrowing} - \text{Intangibles}}$	707

Note:
Tax equalisation (Datastream number 161) reflects the effect of timing differences between reported income and expenses allowed for tax purposes.

The next section uses these variables to control for publicly available information about the probability of bankruptcy in order to evaluate the accuracy and informativeness of audit reports.

3. ACCURACY AND INFORMATIVENESS OF AUDIT REPORTS

Table 3 reports the results for six bankruptcy models. All these models were tested for omitted variable bias and heteroscedasticity using Lagrange Multiplier tests (Davidson and MacKinnon, 1984). As in previous studies, the model's specification was first assumed to be linear – however, this was found to cause heteroscedasticity problems. When polynomials in gross cashflow (GCF_{it}) and leverage ($CAPG_{it}$) were included to take account of their non-linear effects, the null hypothesis of homoscedasticity could no longer be rejected.

Model 1 was estimated for the period 1987–94.[8] The negative coefficients on the number of failures in the population (F_t) and

Table 3

Probit Models of Bankruptcy
($FAILS_{it}$ is the dependent variable – z-statistics in parentheses)

Explanatory Variables	*Model 1 (1987–94)*	*Model 2 (1987–90)*	*Model 3 (1988–94)*	*Model 4 (1988–94)*	*Model 5 (1988–94)*	*Model 6 (1988–94)*
F_t	−0.015	−0.027	−0.018	−0.018	−0.018	.
	(−3.682)**	(−3.218)**	(−4.013)**	(−4.011)**	(−3.917)**	.
CBI_t	−0.030	−0.034	−0.031	−0.031	−0.030	.
	(−6.775)**	(−4.217)**	(−6.565)**	(−6.581)**	(−6.751)**	.
EMP_{it}	−0.455e−04	−0.452e−04	−0.430e−04	−0.429e−04	−0.435e−04	.
	(−2.342)*	(−2.005)*	(−2.245)*	(−2.237)*	(−2.637)*	.
$D1_i$	0.540	0.423	0.544	0.548	0.546	.
	(2.127)*	(1.150)	(2.076)*	(2.094)*	(2.042)*	.
$D2_i$	−0.145	−0.082	−0.158	−0.151	−0.150	.
	(−0.812)	(−0.346)	(−0.853)	(−0.822)	(−0.805)	.
$D4_i$	0.108	0.259	0.126	0.128	0.123	.
	(0.865)	(1.643)	(0.984)	(1.001)	(0.977)	.
$D5_i$	0.455	0.527	0.513	0.482	0.481	.
	(3.103)**	(2.663)**	(3.351)**	(3.179)**	(3.159)**	.
$D8_i$	0.392	0.281	0.452	0.453	0.444	.
	(3.339)**	(1.785)	(3.720)**	(3.733)**	(3.759)**	.
$D8500_i$	−0.185	−0.074	−0.262	−0.237	−0.247	.
	(−1.260)	(−0.395)	(−1.694)	(−1.550)	(−1.560)	.
$DBTN_{it}$	−0.226e−03	−0.881e−04	−0.239e−03	−0.235e−03	−0.230e−03	−0.252e−03
	(−1.804)	(−0.687)	(−1.788)	(−1.796)	(−1.900)	(−2.299)*
$CASHRAT_{it}$	−0.353e−02	−0.631e−02	−0.247e−02	−0.244e−02	−0.241e−02	−0.737e−02
	(−1.627)	(−1.570)	(−1.165)	(−1.158)	(−1.492)	(−3.196)**
GCF_{it}	−0.117e−01	−0.131e−01	−0.011	−0.012	−0.011	−0.013
	(−1.250)	(−0.854)	(−1.220)	(−1.256)	(−1.464)	(−3.745)**
GCF_{it}^2	−0.279e−03	−0.468e−03	−0.308e−03	−0.310e−03	−0.311e−03	.

	(−2.020)*	(−1.694)	(−2.334)*	(−2.235)*	(−2.602)*	.
$CAPG_{it}$	0.254e−03	0.708e−03	0.259e−03	0.258e−03	0.258e−03	0.108e−04
	(6.986)**	(4.276)**	(6.848)**	(6.837)**	(7.764)**	(3.617)**
$CAPG_{it}^2$	−0.849e−08	−0.636e−07	−0.893e−08	−0.886e−08	−0.894e−08	.
	(−4.662)**	(−3.268)**	(−4.770)**	(−4.741)**	(−5.279)**	.
$CAPG_{it}^3$	0.597e−13	0.224e−11	0.637e−13	0.631e−13	0.638e−13	.
	(3.884)**	(2.837)**	(4.098)**	(4.050)**	(4.840)**	.
$CAPG_{it}^4$	−0.116e−18	−0.235e−16	−0.125e−18	−0.123e−18	−0.125e−18	.
	(−3.171)**	(−2.451)**	(−3.455)**	(−3.393)**	(−4.614)**	.
ROC_{it}	−0.638e−04	−0.470e−04	−0.768e−04	−0.747e−04	−0.749e−04	0.141e−05
	(−1.821)	(−0.800)	(−2.136)*	(−2.042)*	(−2.388)*	(0.217)
Q_{it}	.	.	0.674	0.504	0.294	0.694
	.	.	(1.739)	(1.690)	(1.485)	(4.450)**
ΔQ_{it}	.	.	−0.272	.	.	.
	.	.	(−0.729)	.	.	.
GQ_{it}	.	.	−0.381	−0.302	.	.
	.	.	(−0.786)	(−0.876)	.	.
ΔGQ_{it}	.	.	0.159	.	.	.
	.	.	(0.349)	.	.	.
CONSTANT	−2.529	−3.453	−2.528	−2.526	−2.520	−1.895
	(−11.324)**	(−7.250)**	(−11.000)**	(−11.013)**	(−13.703)**	(−21.680)**
LM1	0.025	0.070	0.120	0.684	0.134	0.440
$\chi^2_{0.05}$	9.390	9.390	12.300	10.900	10.100	1.600
LM2	9.663	10.556	12.590	11.127	8.777	32.221
$\chi^2_{0.05}$	23.300	23.300	29.82	26.500	24.900	5.200
Number of observations	6,416	3,128	5,569	5,569	5,569	5,569

Notes:
LM1 = Lagrange Multiplier test for omitted variable bias.
LM2 = Lagrange Multiplier test for heteroscedasticity.

* Significant at the 0.05 level.
** Significant at the 0.01 level.

the CBI indicator of business confidence (CBI_t) show that bankruptcies occurred more (less) frequently when the economy was expected to move from boom (recession) to recession (boom). The negative coefficient on the number of employees (EMP_{it}) shows that small companies were more likely to fail. Industry effects were also important – companies operating in the construction ($D5_i$) and financial services ($D8_i$) sectors were particularly prone to failure.

The negative coefficient on the debtor-turnover ratio ($DBTN_{it}$) shows that failing companies were more likely to experience difficulty in receiving payments for past sales. The negative coefficients on the cash ratio ($CASHRAT_{it}$) shows that short-term liquidity was also an important determinant of failure. The negative coefficients on gross cashflow (GCF_{it}) indicate that low profits increased cashflow problems and the likelihood of bankruptcy. Leverage ($CAPG_{it}$) was also an important determinant of failure – highly geared companies were more likely to fail and the effects of gearing were found to be highly non-linear. Finally, the coefficient on the return on capital (ROC_{it}) was negative showing that companies with low profitability were more likely to fail.

Model 2 reports the results for 1987–90 – the observations for 1991–94 were then used to compare the model's accuracy with that of audit reports in a hold-out sample. In Table 4, the cut-off probabilities for model 2 were chosen such that the number of companies classified as financially distressed was equal to the number of qualified reports. For example, auditors gave 58 qualifications between 1987–90 (22 of these were for going-concern issues). Therefore, model 2's in-sample accuracy was found by choosing cut-off probabilities giving 58 (and 22) predicted failures.

Panel A of Table 4 shows that model 2's type I and II error rates were lower than those of audit reports – this was true for both the estimation (1987–90) and hold-out (1991–94) periods. Therefore, audit reports were not very accurate indicators of financial distress, and auditors may have been able to improve reporting accuracy between 1991–94 by using model 2. A Chi-square test was used to investigate whether the difference in classification rates was statistically significant. For example, consider Panel A for 1987–90, where model 2 correctly classified 3,037

Table 4

The Accuracy of Audit Reports and Model 2

Panel A: Bankruptcy Horizon is One Reporting Period

Audit Reports

	In-sample – 1987–90				*Out-sample- - 1991–94*			
	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$
$FAILS_{it} = 0$	3021	50	3055	16	3145	110	3179	76
$FAILS_{it} = 1$	49	8	51	6	20	13	23	10
Type I error (%)	85.96		89.47		60.61		69.70	
Type II error (%)	1.54		0.52		3.38		2.33	

Model 2's Predictions

	In-sample – 1987–90				*Out-sample – 1991–94*			
	Survive	*Fail*	*Survive*	*Fail*	*Survive*	*Fail*	*Survive*	*Fail*
$FAILS_{it} = 0$	3025	46	3055	16	3155	100	3185	70
$FAILS_{it} = 1$	45	12	51	6	10	23	17	16
Type I error (%)	78.95		89.47		30.30		51.52	
Type II error (%)	1.50		0.52		3.07		2.15	
	$\chi^2 = 0.09$		$\chi^2 = 0$		$\chi^2 = 1.73$		$\chi^2 = 0.80$	

Panel B: Bankruptcy Horizon is Two Reporting Periods

Audit Reports

	In-sample – 1987–90				*Out-sample – 1991–94*			
	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$	$Q_{it} = 0$	$Q_{it} = 1$	$GQ_{it} = 0$	$GQ_{it} = 1$
$FAILS_{i(t,\ t+1)} = 0$	2949	43	2979	13	3138	108	3172	74
$FAILS_{i(t,\ t+1)} = 1$	121	15	127	9	27	15	30	12
Type I error (%)	88.97		93.38		64.29		71.43	
Type II error (%)	1.44		0.43		3.33		2.28	

Model 2's Predictions

	In-sample – 1987–90				*Out-sample – 1991–94*			
	Survive	*Fail*	*Survive*	*Fail*	*Survive*	*Fail*	*Survive*	*Fail*
$FAILS_{i(t,\ t+1)} = 0$	2957	35	2980	12	3143	103	3176	70
$FAILS_{i(t,\ t+1)} = 1$	113	23	126	10	22	20	26	16
Type I error (%)	83.09		92.65		52.38		61.90	
Type II error (%)	1.17		0.40		3.17		2.16	
	$\chi^2 = 0.86$		$\chi^2 = 0.02$		$\chi^2 = 0.40$		$\chi^2 = 0.33$	

Notes:
Critical value $-\chi^2_{0.1}$ (1 d.f.) = 2.71.
$FAILS_{it}$ = 1 if company i issued its final report in year t prior to entering bankruptcy; = 0 otherwise.
$FAILS_{i(t,t+1)}$ = 1 if company i issued its final or penultimate report in year t prior to entering bankruptcy; = 0 otherwise.
Q_{it} = 1 if company i received any type of qualification in year t; = 0 otherwise.
GQ_{it} = 1 if company i received a going-concern qualification in year t; = 0 otherwise.

observations and incorrectly classified 91 observations – the corresponding numbers for audit reports were 3,029 and 99 respectively. The Chi-square test statistics show that one cannot reject the null hypothesis that model 2 and audit reports were equally accurate (at the 10% level).[9] Therefore, the superior accuracy of model 2 over audit reports was not statistically significant.

In Panel A, the bankruptcy horizon was assumed to be a single reporting period which accords with the Accounting Guideline's definition of the 'foreseeable future'. However, the superior accuracy of the model was found to be robust across different bankruptcy horizons. For example, Panel B compares the accuracy of audit reports and model 2 for a horizon of two reporting periods.[10] As in Panel A, model 2 has greater accuracy than audit reports for both going-concern and all types of qualifications – similar results were found for bankruptcy horizons of less than a single year and horizons of more than two years.

Models 3–6 in Table 3 test whether audit reports signalled useful incremental information about the probability of bankruptcy. Both going concern (GQ_{it}) and all types of qualification (Q_{it}) were included because the information content of audit reports could depend on whether the qualification was given for going-concern reasons. Moreover, a change in audit opinion could be informative – for example, a first-time qualification could be a signal of worse news than a repeat qualification and an unqualified report following a qualified report could be a signal of better news than a repeated clean opinion ($\Delta GQ_{it} = GQ_{it} - GQ_{it-1}$ and $\Delta Q_{it} = Q_{it} - Q_{it-1}$).[11] In contrast to HMM, models 3–5 control for public information about the economic cycle (F_t and CBI_t), company size (EMP_{it}), and industry sector ($D1_i$, $D2_i$, $D4_i$, $D5_i$, $D8_i$ and $D8500_i$). Model 6 omits these variables and imposes the linear specification chosen by HMM.

In model 3, the lack of significance for the ΔGQ_{it} and ΔQ_{it} variables indicates that a change in audit opinion does not signal useful incremental information. In models 3–5, the coefficients on Q_{it} are positive but statistically insignificant. The coefficients on the going concern dummy (GQ_{it}) are negative which is contrary to what might have been expected; however, these are also insignificant. In contrast to the conclusion of HMM, these

results imply that audit reports did not signal incremental information about the probability of bankruptcy.

The results for model 6 are similar to those reported by HMM – in particular, the coefficient on audit qualifications (Q_{it}) is positive and highly significant. Therefore, HMM's conclusion – that audit reports signal valuable incremental information – may be misleading.[12] Omitting publicly observable predictors of financial distress leads one to incorrectly reject the null hypothesis that audit reports do not signal valuable information.

To help explain why audit reports were not very accurate or informative signals of bankruptcy, it is useful to consider the pattern of bankruptcy and audit reporting over the sample period. Table 5 shows that the majority of failures occurred during the 1989–91 recession whilst the majority of audit qualifications occurred after 1990. This suggests that audit reporting failed to anticipate the recession and the subsequent recovery.

Table 6 compares the results from bankruptcy and audit reporting models – the dependent variable in models 1 and 2 is failure ($FAILS_{it}$), whilst the dependent variable in models 3–6 is the audit opinion (Q_{it} and GQ_{it}). The highly significant LM2 statistic for model 3 shows that including polynomial terms for gross cashflow (GCF_{it}) and leverage ($CAPG_{it}$) did not overcome the heteroscedasticity problem in the audit reporting model. In contrast the LM2 statistic for model 1 indicates that one cannot reject the null hypothesis of homoscedasticity in the non-linear bankruptcy model. To control for heteroscedasticity, models 4–6 were estimated using a heteroscedastic probit model.[13] To compare the heteroscedastic bankruptcy and audit reporting

Table 5

Bankruptcy and Audit Qualifications (1987–94)

	1987	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*Total*
$NFAILS_t$	0	7	24	26	23	6	3	1	90
NQ_t	10	13	9	26	34	30	30	29	181
NGQ_t	0	3	3	16	24	24	20	18	108

Notes:
$NFAILS_t$ = Number of companies which issued their final annual reports in year *t*, prior to entering bankruptcy.
NQ_t = Number of companies which received qualified reports in year *t*.
NGQ_t = Number of companies which received going concern qualifications in year *t*.

Table 6

Probit Models of Bankruptcy and Audit Reporting (1988–94)
(z-statistics in parentheses)

	Bankruptcy Models		*Audit Reporting Models*			
Dependent Variable	$FAILS_{it}$	$FAILS_{it}$	Q_{it}	Q_{it}	Q_{it}	GQ_{it}
Explanatory Variables	*Model 1*	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
F_t	-0.017	-0.022	0.107e-02	-0.078e-02	.	.
	(-3.835)**	(-3.906)**	(0.360)	(-0.248)	.	.
CBI_t	-0.031	-0.038	-0.070e-02	-0.228e-02	.	.
	(-6.670)**	(-5.756)**	(-0.240)	(-0.795)	.	.
EMP_{it}	-0.433e-04	-0.550e-04	-0.088e-04	-0.059e-04	.	.
	(-2.671)**	(-2.178)*	(-1.379)	(-1.148)	.	.
$D1_i$	0.555	0.624	0.128	0.008	.	.
	(2.039)*	(1.989)*	(0.574)	(0.034)	.	.
$D2_i$	-0.142	-0.189	0.025	-0.002	.	.
	(-0.764)	(-0.872)	(0.204)	(-0.016)	.	.
$D4_i$	0.119	0.189	-0.062	-0.083	.	.
	(0.935)	(1.247)	(-0.598)	(-0.826)	.	.
$D5_i$	0.508	0.606	-0.159	-0.210	.	.
	(3.366)**	(3.241)**	(-1.286)	(-1.428)	.	.
$D8_i$	0.451	0.526	0.067	0.010	.	.
	(3.814)**	(3.558)**	(0.631)	(0.095)	.	.
$D8500_i$	-0.262	-0.218	0.171	0.144	.	.
	(-1.699)	(-1.146)	(1.686)	(1.395)	.	.
$DBTN_{it}$	-0.238e-03	-0.275e-03	0.124e-04	0.175e-04	.	.
	(-1.902)	(-1.645)	(0.559)	(0.878)	.	.
$CASHRAT_{it}$	-0.269e-02	-0.361e-02	-0.353e-02	-0.182e-02	.	.
	(-1.568)	(-1.488)	(-2.261)*	(-1.653)	.	.
GCF_{it}	-0.121e-01	0.012	-0.444e-01	-0.091e-01	.	.
	(-1.719)	(0.841)	(-8.639)**	(-1.461)	.	.
GCF_{it}^2	-0.322e-03	.	-0.307e-03	.	.	.

	(-3.081)**	.	(-4.747)**	.	.	.
$CAPG_{it}$	0.264e-03	0.548e-04	0.206e-04	0.325e-04	0.325e-04	0.214e-04
	(7.988)**	(2.273)*	(2.696)**	(7.276)**	(7.458)**	(5.094)**
$CAPG_{it}^2$	-0.903e-08	.	0.524e-10	.	.	.
	(-5.383)**	.	(0.686)	.	.	.
$CAPG_{it}^3$	0.644e-13	.	-0.244e-15	.	.	.
	(4.926)**	.	(-1.960)*	.	.	.
$CAPG_{it}^4$	-0.126e-18	.	-0.556e-21	.	.	.
	(-4.690)**	.	(-0.512)	.	.	.
ROC_{it}	-0.820e-04	-0.972e-04	-0.269e-04	-0.945e-04	-0.893e-04	-0.489e-04
	(-2.781)**	(-1.939)	(-1.348)	(-6.749)**	(-8.811)**	(-3.168)**
Q_{it-1}	0.431	0.474	1.506	1.531	1.605	.
	(1.535)	(1.048)	(10.263)**	(12.465)**	(14.162)**	.
GQ_{it-1}	-0.266	-0.071	.	.	.	1.875
	(-0.636)	(-0.109)	.	.	.	(10.846)**
CONSTANT	-2.524	-2.215	-1.836	-1.726	-1.846	-2.004
	(-13.815)**	(-8.870)**	(-15.702)**	(-14.759)**	(-34.021)**	(-27.056)**
Heteroscedasticity						
GCF_{it}	.	-0.128e-01	.	-0.221e-01	-0.281e-01	-0.483e-01
	.	(-3.372)**	.	(-5.656)**	(-9.794)**	(-8.242)**
$CAPG_{it}$	.	0.505e-04	.	-0.026e-04	.	.
	.	(3.933)**	.	(-1.338)	.	.
LM1	0.101	.	0.219	.	.	.
$\chi^2_{0.05}$	11.600	.	9.390	.	.	.
LM2	9.091	.	150.997	.	.	.
$\chi^2_{0.05}$	28.160	.	23.300	.	.	.
Number of observations	5,569	5,569	5,569	5,569	5,569	5,569

Notes:
LM1 = Lagrange Multiplier test for omitted variable bias.
LM2 = Lagrange Multiplier test for heteroscedasticity.

* Significant at the 0.05 level.
** Significant at the 0.01 level.

models, model 2 drops the polynomial variables and imposes a linear functional form. This causes heteroscedasticity which is controlled for by allowing the variance in the error term to depend on gross cashflow (GCF_{it}) and leverage ($CAPG_{it}$). The significance of these variables in the heteroscedastic part of model 2 confirms that these variables explain the error term's variance.

Models 1 and 2 show that lagged audit reports (Q_{it-1} and GQ_{it-1}) did not help to identify failing companies. This is important because in models 3–6, the significantly positive coefficients on lagged audit reports mean that there was very strong persistence in audit reporting. An auditor was more (less) likely to give a qualified report if the company received a qualified (unqualified) report in the previous period. Since lagged reports did not have significant effects in the bankruptcy models, they cannot be capturing the effects of unobserved financial distress in models 3–6. Therefore, persistence in reporting failed to reflect changes in the probability of bankruptcy.

Models 1–4 reveal other differences between the determinants of bankruptcy and audit reporting. In models 1 and 2, the significant negative coefficients on the number of failures (F_t) and the CBI measure of business confidence (CBI_t) indicate that companies were more likely to fail if the economy was expected to move from a boom to a recession. However, models 3 and 4 show that these cyclical variables had insignificant effects on audit reporting.[14] The coefficients on the industry dummies bear very little resemblance in the bankruptcy and audit reporting models. Thus, audit reports did not reflect differences in financial distress across industry sectors – companies operating in the construction ($D5_i$) and financial services ($D8_i$) sectors were most likely to enter bankruptcy, but this was not reflected by audit reporting. Therefore, audit reports did not reflect differences in financial distress across industry sectors.

The negative coefficients on the number of employees (EMP_{it}) show that large companies were less likely to fail and were also less likely to receive qualified reports. Therefore, audit reporting reflected the effects of company size on the probability of bankruptcy. In models 1 and 2, the negative coefficients on the debtor-turnover ratio ($DBTN_{it}$) indicate that a company was

more likely to enter bankruptcy if it was having problems in recovering money from debtors. However, the relationship between debtor-turnover ($DBTN_{it}$) and audit reporting was insignificant. In models 1–6, the negative coefficients on gross cashflow (GCF_{it}) indicate that cashflow was an important determinant of bankruptcy and auditors were more likely to give qualified reports to companies with low profit-generated cashflow. The positive coefficients on leverage ($CAPG_{it}$) show that debt increased the probability of bankruptcy and that auditors were more likely to give qualified reports to highly leveraged companies. However, audit reports did not accurately reflect the non-linear relationship between leverage and bankruptcy – this is true for both the homoscedastic (models 1 and 3) and heteroscedastic specifications (models 2 and 4–6). The negative coefficients on profitability (ROC_{it}) indicate that profitable companies were less likely to enter bankruptcy and auditors were more likely to give qualified reports to companies with low profitability.

Model 5 omits all variables with insignificant effects on audit reporting. The statistically significant determinants of audit reporting were leverage ($CAPG_{it}$), profitability (ROC_{it}) and lagged audit reports (Q_{it-1}) – similar results are shown in model 6 for going-concern qualifications (GQ_{it}). Re-estimating models 3 and 4 for going-concern qualifications (GQ_{it}) rather than all types of qualification (Q_{it}) gave very similar results.

To summarise, auditors were more likely to give qualified reports to financially-distressed companies that were small, unprofitable, highly leveraged and were suffering cashflow problems. However, audit reports failed to reflect the effects of the economic cycle and industry sector on the probability of bankruptcy. Moreover, lagged reports had very important effects on audit reporting even though they did not help to identify failing companies – thus, persistence in audit reporting reduced the accuracy of audit reports.

4. CONCLUSION

This paper has shown that public concerns over the accuracy and information content of audit reports may have been justified.

The first contribution of the study was to show that a bankruptcy model could be more accurate than audit reports in a hold-out period as well as in the estimation sample. The study's second contribution was to evaluate the incremental information content of audit reports, controlling for public information about the economic cycle, company size and industry sector. Thus, it was shown that audit reports did not signal useful incremental information about the probability of bankruptcy.

The paper's third aim was to explain why audit reports were not accurate or informative signals of financial distress – two reasons were identified. First, audit reports did not reflect publicly available information about financial distress. In particular, the probability of bankruptcy varied across industry sectors and decreased as the economy moved out of recession – however, this was not reflected by audit reporting. This suggests that auditors might need to give greater consideration to macroeconomic and industry events when forming audit opinions. Secondly, lagged audit reports were important determinants of audit reporting but did not help to identify failing companies – therefore, strong persistence in reporting also reduced the accuracy of audit reports. Persistency in audit reporting is consistent with evidence that auditors often suffer client losses and litigation when they change their audit opinions. Therefore, policies may be needed to reduce auditors' incentives to repeat the same audit opinions.

NOTES

1 When a UK company issues its annual report, the auditor is required to state whether the financial statements give a 'true and fair' view. If the auditor believes that there is a significant possibility that the company will cease to trade in the 'foreseeable future', the auditor is required to give a 'going concern qualification'. The Auditing Guideline on Going Concern (August 1985) states, 'The going concern concept identified in Statement of Standard Accounting Practice (SSAP) No. 2 is ''that the enterprise will continue in operational existence for the foreseeable future''. This means in particular that the profit and loss account and the balance sheet assume no intention or necessity to liquidate or curtail significantly the scale of operation'. There is a presumption in both law and accounting standards that the financial statements are prepared on a going concern basis ... The foreseeable future ... should normally extend to a minimum of six months following the date of the audit report or one year after the balance sheet date whichever period ends on the later date. It will also be necessary to take

account of significant events which will or are likely to occur later. Since the audit report may signal useful information to investors, a qualified report may increase the probability of bankruptcy. In this sense, it has been argued that a qualified report could become a self-fulfilling prophecy (Asare, 1990). However, this should not form a germane consideration for the auditor when deciding whether to issue a qualified report. The Auditing Guideline states, 'The auditor should not refrain from qualifying his report if it is otherwise appropriate, merely on the grounds that it may lead to the appointment of a receiver or liquidator.' Moreover, the auditor is required to ensure that shareholders are warned about impending bankruptcy, even if the reported value of the company corresponds to its liquidation value. The Auditing Guideline states, 'Where there is significant uncertainty about the enterprise's ability to continue in business, this fact should be stated in the financial statements even where there is no likely impact on the carrying value and classification of assets and liabilities.'

2 Examples include Polly Peck and the Bank of Commerce and Credit International.

3 Numerous studies have evaluated the information content of audit reports by examining how the stock market reacts to audit qualifications. In these studies, the null hypothesis is that audit reports do not signal valuable information; the alternative hypothesis is that the stock market reacts favourably to unqualified reports and unfavourably to qualified reports. Some studies have found that share prices fall following qualified reports which suggests that audit reports do signal useful information to investors (Firth, 1978; Chow and Rice, 1982; Banks and Kinney, 1982; Fleak and Wilson, 1994; Chen and Church, 1996; and Jones, 1996). In contrast, other studies have found no relationship between the content of the audit report and share prices (Ball et al., 1979; Davis, 1982; Elliott, 1982; Dodd et al., 1984; and Levitan and Knoblett, 1985). A fundamental problem with the event study approach is that it is very difficult to identify the information signalled by the audit report separately from other information contained in the financial statements. Although earnings are typically announced prior to the release of the annual (and audit) report(s), the earnings announcement only contains summary financial information. Additional information contained in the detailed financial statements is likely to be less favourable for companies that receive qualified audit reports. Therefore, event studies are likely to reject too often the null hypothesis that audit reports are uninformative.

4 These are located in the corporate information library at Warwick University.

5 In moving from the initial sample to the final sample, 10% of all types of company were lost, whilst 27% of failing companies were lost. This reflects the fact that it is difficult to obtain data on failing companies from Datastream. Due to the small number of failing companies, every effort was made to obtain data through requests to Datastream.

6 To examine whether the presence of missing data causes sample selection problems, the reported probit results were also compared to those using logit estimation. Andersen (1972) has shown that for non-random samples, the logit model has consistent coefficient estimates for all variables except the constant – the results for logit and probit models were found to be very similar which suggests that there do not appear to be sample selection problems (Lennox, 1999).

7 The average lag between a failing company issuing its final report and its entry into bankruptcy was found to be 14 months. In the UK, there are three types of re-organisation procedure – these are liquidation, receivership or administration (Franks and Torous, 1992). In a liquidation, the company's assets are sold to meet the claims of creditors; in a receivership, the receiver decides whether it is in the creditors' interests to see the company's assets or to keep the company as a going concern. The possibility of administration was introduced by the 1986 Insolvency Act in an attempt to reduce the number of inefficient liquidations. However, since the Act, very few administrators have been appointed compared to the numbers of companies entering receivership or liquidation. The results of this paper are not sensitive to different forms of exit.

8 This model was originally used to evaluate probit, logit and discriminant methods in bankruptcy prediction (Lennox, 1999).

9 Similarly, the superior accuracy of Koh's bankruptcy model was not statistically significant.

10 In this case, a type I error occurs when a company is predicted to survive but fails within two reporting periods; a type II error occurs when a company is predicted to fail but does not fail within two reporting periods.

11 Data on lagged audit reports were unavailable for 1987 and so the sample size is reduced from 6,416 to 5,569 observations.

12 To verify whether this is the case, one would need to estimate models 3–5 using the data of HMM.

13 The homoscedastic probit model and log-likelihood function are given by equations (1) and (2) respectively:

$$\begin{aligned} & Y_{it}^{*} = \beta_1 X_{it} + u_{it} \\ \text{where:} \quad & Y_{it} = 1 \quad \textit{iff} \quad Y_{it}^{*} \geq 0 \\ & Y_{it} = 0 \quad \text{otherwise} \\ \text{and} \quad & u_{it} \sim \text{IN}(0, \sigma^2). \end{aligned} \tag{1}$$

$$\ln(L) = \Sigma_i Y_{it} \Phi(-\beta_1 X_{it}) + \Sigma_i (1 - Y_{it})(1 - \Phi(-\beta_1 X_{it})) \tag{2}$$

where $\Phi(.)$ is the cumulative normal distribution.

In the heteroscedastic probit model the u_{it} are normally distributed with non-constant variance. For example, when the variance of u_{it} is a linear function of X_{it}, the heteroscedastic probit model and log-likelihood function are given by equations (3) and (4):

$$Y_{it}^{*} = \beta_1 X_{it} + u_{it} \qquad u_{it} \sim \text{IN}(0,\ \exp(2\beta_2 X_{it})) \tag{3}$$

$$\ln(L) = \Sigma_i Y_{it} \Phi(\beta_1 X_{it} \exp(-\beta_2 X_{it})) + \Sigma_i (1 - Y_{it})(1 - \Phi(\beta_1 X_{it} \exp(-\beta_2 X_{it}))). \tag{4}$$

Clearly, the heteroscedastic probit model collapses to the homoscedastic probit model when $\beta_2 = 0$.

14 A dummy variable was also included in the audit reporting models to test whether a structural break occurred in 1990 – the coefficient on the dummy was found to be positive but insignificant and is therefore omitted. Variables capturing auditor size, audit fees, and non-audit fees were also included in the audit reporting model but were not found to be significant.

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