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AUDIT REPORT USING THE BELIEF REVISION MODEL**

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LOAN BANKERS' DECISIONS AND SENSITIVITY TO THE AUDIT REPORT USING THE BELIEF REVISION MODEL

Summary This paper deals with the risk analysts' behavior in dynamic scenarios, through a simulation of the changes in the decisions taken when they consider a chain of elements of additional information relevant for the evaluation of the firm' conditions face to the loan rating decision. Among those elements play a main role the audit report, which is mixed with other financial information seeking to isolate the order and sign bias effects. Some hypotheses from the psychological literature on belief updating applied to financial decisions are tested in turn. The results, after an experimental design with analysts from mayor financial Spanish institutions, are consistent with the hypothesis that the audit report is only relevant when contains some contradiction with other financial news received from the client. The recency effect (more weight to the new evidence that to the old one) is only tested in case of qualified audit reports. Besides, the behavior observed among risk analysts could be described as "skeptical", because they give more preeminence to any information that could make them to deny the loan concession or change to worse the financial conditions give for the client.

Keywords: loan bankers; audit report; decision-making under uncertainty; recency effect; professional skepticism; information asymmetry

Data Availability: Contact the authors.

1. Introduction

The auditing profession has been subjected to much diverse criticism following the recent resounding financial scandals that have come to light, both internationally and in the particular case of Spain. This situation has generated a profound debate and notable feeling of distrust regarding the social function that the auditing profession should fulfil. In this context, loan bankers as a professional group can be considered among the principal users of financial information who are most affected by the credibility of audit reports, since the interpretation of these reports is a key factor in the correct allocation of credit (Ruiz 1997).

However, it is evident that the decision-making process of these agents is influenced not only by the economic and social situation of the prospective parties to any credit agreement, but also by other factors that are inherent in the way analysts themselves as individuals form their opinion or judgment (Rodgers 1991). On this latter point, the psychological approach based on the Theory of Belief Revision (Hogarth and Einhorn 1992) can assist in understanding the complexity of the decision-making process carried out by loan officers by means of experimental designs. Our proposal is to provide an alternative to the

classic laboratory experiments that have sought to infer the information content of the audit report (Estes and Reimer 1977; Houghton 1983; Libby 1979; Firth 1979; LaSalle and Anandarajan 1997; Bamber and Stratton 1997); unlike these, our experiment places the loan bankers in a dynamic situation characterised by decisional uncertainty.

The predictions and implications of the Belief Revision model of Hogarth and Einhorn (1992) allow us to analyse the behaviour displayed by these subjects in three fundamental aspects: first, the detection of decisional asymmetry due to the temporality of the information; second, the utility of the audit report as a possible “red flag”; and third, the study of the attitude shown by analysts depending on whether the evidence that they process is positive or negative (i.e. depending on its sign).

The empirical literature on the behaviour of the loan bankers when they face to credit decisions is wide, and the experimental designs based in the influence of main financial variables has been well developed in the last years (see for instance Catusus and Grojer, 2003). However, the experiments carried in a dynamic context are, till now, the exception. This paper deal with the results of an experiment developed in steps, in order to test the psychological changes in the judgement of the loan bankers when they receive controversial pieces of evidence on a previous situation already judged.

This paper, addressed to test the utility of the audit reports in a particular situation (i.e.: the probable failure in meet the going concern hypothesis by the company), is structured in six parts. After this introduction, the next part aims to justify the need to develop new approaches to the study of the information content of the audit report. The third part proposes an adaptation of the general model of Belief Revision and its implications, to the particular case of loan bankers. The fourth part describes the laboratory experiment conducted and the various hypotheses put forward, and the results obtained are analysed in the fifth part. Finally, the sixth part presents the principal conclusions and possible limitations of this study.

2. Antecedents in Research on the Information Content of the Audit Report in Credit Granting Processes.

Empirical research on the role played by the audit report in the processes of granting credit can be regarded as scarce, considering the limited number of studies that have appeared to date. Most of these studies deal with the analysis of the presumed information content of the audit report using classic laboratory experiments; in these experiments the information

content is determined by the observation of the decisions taken by loan bankers faced with the static simulation of requests for financing.

They can be divided into three different lines of research: the first aims to determine the effect that the degree of verification of the accounting information has on the decisions of the loan officers (Johnson et al. 1983; Baker and Cunningham 1990; Bandyopadhyay and Francis 1995; Wright and Davidson 2000; Miller and Smith 2000); the second line of research examines whether the format in which the audit report is presented may be the cause of divergences in the credit granting process (Geiger 1992, 1994; Pany and Johnson 1985; Miller et al. 1993); and there is a third line studying the relevance of the auditors' opinion by comparing clean and qualified reports (Estes and Reimer 1977; Houghton 1983; Libby 1979; Firth 1979; Gul 1987; LaSalle and Anandarajan 1997; Bamber and Stratton 1997).

The main studies in this last line of research show inconclusive results regarding the utility of the auditors' opinion in the assessment of loan requests. The studies of Houghton (1983), Estes and Reimer (1977) and Libby (1979) suggest that the auditor behaves with indifference to the sign taken by the audit report, whereas those of Gul (1987), Firth (1979) and Bamber and Stratton (1997), LaSalle and Anandarajan (1997) show how the sign of the report appears to affect the financial conditions imposed by the lender. There could be several possible reasons for this lack of consensus on the utility of the auditors' opinion in such operations, including the following:

1. It is possible that the analysts encounter difficulties in understanding the audit report, due to the terminology employed or to the way it has been written.
2. The audit report may be redundant in the analyst's decisions, either because these decisions already anticipate the view taken by the auditor, or because the analyst may doubt the auditor's independence and competence.
3. It is also possible that there are methodological weaknesses in the experiments due to the design of the credit assessment procedure being excessively artificial.

Given that the results of the studies by Geiger (1992, 1994), Pany and Johnson (1985) and Miller et al. (1993) seem to invalidate the first of these arguments, we set out to devise a more rigorous and realistic experimental design that would overcome the excessive methodological passivity of the classic studies. To this end, we accept the hypothesis that, due to the complexity inherent in the task of credit assessment, the decisional procedure comprises a sequential process of searching for and evaluating evidence. On the basis of this view, the

choice of the Belief Revision Theory of Hogarth and Einhorn (1992) as the model for our experimentation is directed towards three fundamental objectives: first, to consider whether the order of processing information may produce asymmetry in the decisions of the analysts; second, to determine the role played by the audit report in credit assessment procedures; and third, to determine if their behaviour is based on professional skepticism when presented with positive or negative evidence.

3. The Belief Revision Model: A Proposal for the Field of Credit Assessment.

Hogarth and Einhorn (1992) have been able to develop a mathematical model in which the decision-taking subject is placed at the centre of the process of judgment formation, and in which the principal variables determining the sign taken by the human decisions are included. In this model, human judgment is thought of as a process of iterative evaluations of a series of items of complex evidence, by which the subject updates his or her opinion following the assimilation of each new set of information received. The mathematical representation of the Belief Revision model is summarised as follows:

$$S_k = S_{k-1} + \alpha (C) S_{k-1} s(x_k) + \beta (1-C) (1-S_{k-1}) s(x_k)$$

Where

- S_k = degree of belief after evaluating k pieces of evidence ($0 \leq S_k \leq 1$);
- S_{k-1} = prior degree of belief;
- $s(x_k)$ = subjective evaluation of the item k of evidence;
- C = 1, if the evidence is thought to be in disagreement with the hypothesis;
- C = 0, if the evidence is thought to be favourable to the hypothesis;
- α = attitude towards the evidence in disagreement ($0 \leq \alpha \leq 1$);
- β = attitude towards the confirmatory evidence ($0 \leq \beta \leq 1$);

The current belief S_k behaves as a linear combination of three surrogates: first, of the anchoring or previous belief, S_{k-1} ; second, of the subjective evaluation of the piece of evidence that the subject processes, $s(x_k)$; and third, the reaction produced by the sign of the evidence on the opinion of the evaluator subject, α and β . However, the most interesting feature of this model lies in the predictions and implications that it incorporates. Thus, on one hand, the model predicts the presence of the *recency effect*; this means that the subject attributes greater weight to the item of evidence evaluated most recently, in the course of processing a series of

mixed positive and negative items of evidence. The prediction is based on the assumption of non-coincident behaviours displayed by subjects who analyse the same series of information but in the opposite order.

Further, the model also allows the determination of the sensitivity that subjects display towards the sign of the information processed, in other words, the reaction produced by the reception of evidence that is either confirmatory or in disagreement, by means of the estimation of the parameters α and β (figure 1). In this way, it is possible to classify the subjects in function of the attitude that they display towards the evidence that they process:

(Insert Figure1 here)

1. *Insensitive* From the null or low values of α and β these subjects can be classified as totally or partially lacking in sensitivity to evidence both in confirmation and in disagreement with the initial hypotheses.
2. *Highly sensitive*. This attitude in the subject is indicated by high values of α and β , reaching the level of maximally sensitive when $\alpha=\beta=1$. With this attribute, the subject is characterised by great sensitivity towards the evidence in general, whether confirmatory or contrary.
3. *Semi-sensitive*. Semi-sensitive subjects are understood to be those with a propensity to accept one or other type of evidence or both, by presenting values of α and β close to 0.5; in other words, they display some sensitivity to the evidence but not to an extreme degree.
4. *Apologists*. This type of subject is characterised by an extremely receptive attitude towards any evidence that confirms his/her initial hypothesis. This type is represented by values of β close to unity and at the same time by values of α tending to 0, where the most favourable possible attitude towards confirmatory evidence will be given by $\beta=1$ and $\alpha=0$.
5. *Skeptics*. Skeptical persons present the opposite attitude to that of the *apologists*, for they are characterised by displaying an extremely receptive attitude towards the evidence that appears to be in disagreement with their initial hypotheses. This type is

represented by values of α close to unity and at the same time by values of β tending to 0, where the most skeptical possible attitude towards confirmatory evidence will be given by $\beta = 0$ and $\alpha = 1$.

While the theory of Belief Revision has been very widely accepted by the research community particularly in the field of the auditing (Trotman 1996; Asare 1992; Messier 1992; Trotman and Wright 2000), to date there has been no study published in which it has been applied in the area of credit assessment. In our proposal, to adapt the model it has been necessary to analyse in depth the decisional process that the loan banker performs, in order to design an experimental simulation of this activity that is as realistic as possible (figure 2).

According to Beaulieu (1994, 1996), the procedure for the assessment of credit or loan requests that loan bankers perform can be summarised in the following four steps:

1. *Reception and preliminary study of the client's proposal.* The process begins with the study of the formal credit request submitted by the client. In this initial phase, the analyst will proceed to classify the operation in function the characteristics of the client and the intended use of the capital required. In this way, the analyst forms a preliminary view in respect of the typology and risk category of the proposed operation while waiting for additional financial information that may or may not confirm his opinion.

(Insert Figure 2 here)

2. *Information search.* Beaulieu (1994) states that the types of information sought by the analyst can be classified into five general categories, which they designate "the five C's": financial resources available (capital); capacity of the client to repay the debt (capacity); general management ability (character); characteristics of the business situation (conditions); and real assets available in support of the proposed loan (collateral).
3. *Formation of professional judgment.* The third stage involves the classification of the overall economic-financial situation of the client that the analyst will make after assessing all the evidence gathered.
4. *The decision whether or not to grant the credit.* Depending on the results of the previous stage, the analyst will reach a final decision on the acceptance, rejection or

modification of the request of the client for the credit. In the affirmative case, the analyst will determine the financial return required from the operation, that is, the risk premium reflected in the rate of interest to be imposed, and other conditions for the repayment of the amount loaned.

4. Description of Hypotheses.

There have been numerous studies aimed at verifying the process of belief revision in the auditing area, with the object of testing whether the effects of order of evidence could alter the effectiveness and efficiency of auditing. In other words, researchers have studied the ways by which this variable conditions the sequential evaluation of evidence by the auditor, particularly in respect of the possible financial qualification of the client's accounts (Trotman and Wright 2000; Messier 1992; Ashton and Ashton 1988; Monroe and Ng 2000). However, it is our intention to apply this reasoning to the activities of loan bankers engaged in credit or loan assessment, in the expectation that this order of evidence effect may also be a factor in the formation of judgment and decision taking of these agents.

Following Hogarth and Einhorn (1992), in function of the positive or negative direction of the evidence, it can be expected that the order in which information is processed should have a significant effect on the judgment formed as a result of the process. Hence, a first possibility would be that the analyst will be faced with the evaluation of a series of items of consistent evidence, that is, with a single constant sign. In this case, the belief revision model predicts the absence of order effects, whether the series of items of evidence is consistently negative or positive. This is the conclusion of the empirical literature in the auditing field, where studies such as those of Ashton and Ashton (1988) and Tubbs et al. (1990) confirm the absence of order effects in consistent series. This leads to the first hypothesis to be examined in this study:

H₁: When the loan banker receives a series of consistent evidence (positive or negative), his judgment will not be affected by the order in which that information is processed.

However, the principal contribution of the model of Hogarth and Einhorn (1992) lies in the prediction of the recency effect, by which greater weight is attributed to the item of evidence evaluated later in the process, when subjects are evaluating a series of mixed items

of evidence. Although the studies published in the field of auditing seem to support this effect (Arnold et al. 2000; Tubbs et al. 1990; Ashton and Ashton 1988; Asare 1992; Messier 1992; Messier and Tubbs 1994), in the case of the loan bankers, the role that the audit report plays as an instrument for reducing the risk involved in granting credit must be taken into account. Considering the skepticism inherent in this activity and the inconclusive results in the empirical literature regarding the information content of the auditor's opinion, we propose the limitation of the recency effect to the case in which the analyst receives a qualified audit report that runs counter to other financial information obtained by the analyst that is favourable to the concession of loan requested. Thus the negative nature of the audit report should reinforce the analyst's distrust, when it come to assessing the impact of the financial information that is "a priori" favourable, by causing a "surprise" effect (Ruiz 1997; Geiger 1992). This reasoning leads us to propose the second and third hypotheses:

- H₂: An unqualified audit report will be reflected in the absence of the so-called recency effect when the analyst has received unfavourable financial information, because the report does not provide relevant information content.
- H₃: A qualified audit report will not be redundant in loan bankers' decisions when favourable financial evidence has previously been assessed, and therefore will produce the recency effect.

The second group of hypotheses is intended to re-examine the results derived from previous studies on the capacity of the audit report to provide additional information for the process of credit concession. Thus, although the studies of Estes and Reimer (1977), Houghton (1983) and Libby (1979) did not find evidence of differences in the decisions of loan bankers between clean and qualified reports, those of Geiger (1992), Bamber and Stratton (1997), Gul (1987) and Firth (1979, 1980) did find that the reports provided information content. Nevertheless, it is necessary to make a distinction in respect of the sign of the financial information, compared with the sign of the presumed information content of the opinion issued by the auditor that is being researched. Assuming that analysts tend to distrust the favourable opinion of the auditor when this contradicts the negative sign of the financial items already processed, we have decided to propose two new hypotheses:

H₄: The audit report does not provide relevant information content when negative financial information has already been processed.

H₅: The audit report does provide relevant information content when positive financial information has already been processed.

A final question is the consideration of the attitude displayed by loan bankers towards the evidence that constitutes the principal element supporting the granting of credit and fixing the financial conditions of the loan¹. The first hypothesis that we put forward in this last part refers to the general sensitivity displayed by loan bankers when faced with the various items of evidence that constitute the basis of the credit decision. On this aspect, it would be expected that these professionals would display an attitude of skepticism, attributing more importance to that information which casts doubt on the viability of the operation (Circular of the Banco de España 4/1991). This reasoning leads us to propose the following hypothesis:

H₆: Loan bankers attribute more importance to evidence that makes the granting of the credit requested inadvisable.

Finally, we wished to investigate in more depth the presumed information content that the independent auditor's opinion would provide to the credit assessment process, and its utility as an instrument of risk control in credit operations (Bamber and Stratton 1997; LaSalle and Anandarajan 1997). For this we put forward the following hypothesis:

H₇: Loan bankers attribute greater importance to the information derived from the audit report, in detriment to the rest of the financial evidence evaluated.

5. Experimental Design.

5.1. Subjects

The sample of subjects participating comprised a total of 106 loan bankers employed by three important Spanish financial institutions, specifically two large commercial banks and one savings bank. Subjects were told that their responses and firm affiliations would remain

¹ The only relevant study is that of Bamber et al. (1997). These authors found that the auditors studied displayed an attitude of "semi-sensitivity" towards any evidence that tended to confirm the reliability of the accounting information prepared by the client.

anonymous². The average age of the subjects was around 35 years old, with average experience of 13.4 years in general banking and 7.5 years in risk analysis³.

(Insert Table 1 here)

The data capture procedure was different in each of the three credit institutions. In the savings bank “C”, the sample was obtained by the presencial method, that is, in the Head Office of institution by means of three brief sessions with an average duration of 25 minutes. The number of valid responses received was 32 out of a total of 60 analysts employed by the institution, which represents a response rate of 53%. In respect of the collaborating commercial banks, the sampling procedure could not be carried out by the presencial method. In the first bank, “B1”, the management of the area of risk analysis opted to distribute the questionnaires directly to the individual analysts of the institution, with a covering letter explaining the experiment. A total of 40 questionnaires were distributed and 18 valid responses were obtained (45% response rate). To secure the collaboration of bank “B2”, a preliminary interview was held with the executive responsible for the area of training in risks, who in turn reported to the General Directorate of the institution regarding the nature and utility of the proposed study. Once the bank’s collaboration had been approved, a total of 250 questionnaires were distributed through the bank’s internal mail. Finally, 56 completed cases were received, representing a response rate of 22.4% for this institution.

5.2. Experimental Design.

Our first task was to design the simulated case of a request for credit proposed by a fictitious client company⁴. For this, a questionnaire was drafted in which, after the preliminary identification of the subjects in function of their institution, qualification and experience, the analyst was asked to assess a request for credit made by a client company classified to the food manufacturing sector.

²Table 1 gives the breakdown of subject data, including age, type of educational qualification and length of experience, according to the type of questionnaire completed. Under certain assumptions, the size of the sub-samples would be small to generalize the findings, as it is point out in the conclusions.

³ The first commercial bank (B1) specialises in the industrial sector and has successfully overcome a difficult financial-economic situation in the recent past. The second of the banks (B2) is differentiated from the first by its relatively larger size, the consequence of several mergers, and by its strong international presence, particularly in Latin America. The savings bank (C) is notable for having a large branch network throughout the whole of Spain, having achieved very considerable growth in recent years.

⁴To ensure the validity of the experiment, interviews were held with acknowledged professionals in the risk analysis sector from several other financial entities; these experts confirmed that the simulated case corresponded to current reality.

The information given to the analysts was referred to the 2000 and 2001 financial years. The company reached in these periods an average size in terms of total assets of about 27,850,000 \$.

The prospective borrower requested a loan of 10,220,000 \$ from the financial institution, for the purpose of increasing its productive capacity. It was made clear that the risk already assumed by the lending financial institution amounted to some 30% of the total external financing of this client, i.e. an existing exposure of 5,830,000 \$ before counting the possible concession of the new loan. The basic financial information presented to the analyst consisted of the Balance sheet and the Profit and loss account of the company for the accounting period to 31 December 2001, together with the comparable data corresponding to the accounting period of 2000. The company presents a negative working capital for the 2001 accounting period. The decrease of the financial returns, a worsening of the rate of interest, together with increased external indebtedness are other notable features. Furthermore, the profits reported for the 2001 accounting period were obtained by non-operating activities involving disinvestment and the generation of non-recurring extraordinary income.

In the first instance, the loan request was received and considered in a branch office of the financial institution, and the Branch Manager automatically passed the request to the Head Office risk department, in the form of the corresponding documentation. For the purposes of providing the analyst with an initial anchoring or base-line position, it was indicated in an attached document that the Branch Manager recommended granting 60% of the amount requested, with a risk premium set at the EURIBOR plus 2 percentage points. It was thus obtained that all the analysts participating in the experiment initially had the same financial information at their disposal.

Once the analysts had received the initial information, and supposing they were the responsible in the Head Office risk department, they were asked for their recommendation on this credit request. They were offered three alternatives for this recommendation: to grant the loan, either in full or in part, or to deny it. If the analyst decided to grant the request, they were then asked to state the amount to be granted, the risk premium to be applied, and their assessment of the financial viability of this operation.⁵ The variables reflecting the amount to

⁵ Although all the similar studies published to date include controls in their experimental designs with decisional variables, none of the studies have introduced a variable with the object of studying the formation of the analyst's judgment of the financial viability attributable to the loan operation. This is the case of the studies of LaSalle and Anandarajan (1997), Johnson et al. (1983) and Bamber and Stratton (1997), in which the subject was only asked to decide on the amount to be granted and the risk premium imputable to the operation.

grant and the assessed operational viability were framed in set intervals ranging from 0% to 100%, where 100 signified the concession of full amount of loan requested, and total confidence in the financial viability of the loan operation, respectively. However, the risk premium to be applied was left open to the judgment of the analyst, but always with obligatory reference to the EURIBOR index.

However, in a pilot phase of pre-analysis it was found that the majority of loan bankers tended to deny the loan, due to the rather extreme nature of the simulated case presented to them. In such a situation, the assessment of the viability would be the only variable to be analysed in the process, given that the determination of the risk premium would not make sense. Faced with this situation, there were three alternatives considered for overcoming this weakness in the methodology. The first consisted in moderating the negative aspects of the financial situation reflected in the annual accounts of the company to be reviewed, by which it should theoretically be possible to increase the percentage of decisions favourable to the loan concession, and the corresponding setting of the risk premium considered appropriate by the analyst. The second, which was proposed by Belkaoui (1992), Geiger (1992) and Libby (1979) in their studies, would require the analyst, in the event of deciding to deny the loan, to assess the risk premium that would be imposed by another financial institution that agreed to grant the loan to this company. However, we considered that this hypothetical situation would be very difficult for the analyst to quantify, and would imply the need to take an excessively subjective decision. Lastly, we were left with the option of obliging the analyst to grant a minimum proportion of the total amount requested, on which the appropriate risk premium would have to be assessed. The last of these three options was chosen, arguing in the context of the simulated case that the management of the financial institution was putting pressure on the analyst to grant at least 30% of the amount of loan requested; this was thus included in the case as a minimum condition.

With this imposition in mind, that force to the loan officers to grant the loan in any case, the subjects responsible for the final decision on the loan were presented with four separate items of financial information sequentially. After receiving each of these items, they were required to re-assess their opinion on the viability of the operation, and thus to revise their decision on the amount to grant and the risk premium to apply. Immediately on completion of the questionnaire, the analysts were asked to categorise each item processed as negative or positive financial information in respect of the concession of the loan, together

with an evaluation of its relevance⁶. Both the sequence and the sign of the financial information that the analysts received were combined, to create eight alternative versions of the case (table 2).

(Insert Table 2 here)

Thus, the analysts were divided into 8 groups; groups 1 and 2 were given a series of consistently negative evidence to analyse, but group 1 in reverse order to group 2; groups 7 and 8 received a series of items of information consistently favourable to the concession of the loan. In the designs presented to groups 3 to 6, two changes were made: these groups were faced not only with financial evidence and audit reports of opposing signs, but also with variation of the sequence in which these were made available⁷.

The structure of the groups cases in Table 2 can help to understand the relevance of the experiment carried with the loan bankers. In the Table, IA means an audit report, that can provide positive (POS) or negative (NEG) new evidence, and could arrive in before (IA1) or after (IA2). The same role is played by the new financial information (IF) that provide with favourable or unfavourable news, related to the financial condition of the company, to the decision makers. The content of the audit reports and the financial information are the same under each class of event, but the order in which the participants accessed to the information is different, according to the series depicted in Table 2. For a more detailed description of each piece of evidence, either positive or negative, contained in the audit report and in the financial information, see the Annex to this paper.

5.3. Dependent and Independent Variables

Table 3 gives the average initial, intermediate and final assessments in function of the experimental case analysed by each group of analysts; in other words, the judgments formed after processing the preliminary information (S0), the first two items of evidence (S2), and the complete set of evidence (S4). We take the particular group to which the analyst was allocated (i.e. the particular case analysed) as the independent variable, and the dependent variables are

⁶For this a Likert scale of 11 points was employed, where 0 = totally irrelevant, and 10 = very relevant.

⁷ These pieces of evidence that the analysts were asked to process are set out in detail in the Annex.

the analyst's overall belief revisions (S4-S0) on the risk premium and the estimation of the viability of the loan operation⁸.

(Insert Table 3 here)

6. RESULTS.

6.1. Order Effects.

The designs analysed by groups 1 and 2 involved the assumption that order effects are not present when the subjects process a series of items of evidence in which the negative sign of the information is consistent (see table 4). The series that these subjects receive comprises four items of evidence in which the negative sign of both the auditor's opinion and the rest of the financial information advises against the concession of the loan. To analyse the absence of Order Effects in these series, we decided to make a comparison between the belief revisions observed in groups 1 and 2. The results of the Kolmogorov-Smirnov test support the hypothesis proposed, since the form of processing the information did not affect the revision of beliefs in respect of the variables of viability ($z = 1.056$; $p = 0.21$) and of risk premium ($z = 0.514$; $p = 0.95$)⁹. However, the results show that the analysts who received the qualified audit report last in the sequence (group 1) presented more skepticism in the capacity of the client to repay the debt, compared with those who processed this information first in the sequence (group 2).

(Insert Table 4 here)

Another way of examining this first hypothesis would be to compare groups 7 and 8, where we used the case designs to place the analyst in a situation favourable to the assessment of the credit request. In these groups, the subjects received a series of consistently positive evidence comprising an unqualified audit report and favourable financial information. The differences between the belief revisions for groups 7 and 8 were not significant for the estimation of viability ($z = 0.872$; $p = 0.43$), nor for the determination of the risk premium ($z = 0.675$; $p = 0.75$). In short, our results appear to support the absence of order effects when the analysts process series of consistent items of evidence (H_1), whether the series as a whole is favourable or unfavourable to the proposed credit operation.

⁸ Since a minimum percentage of the loan to be granted was fixed as a case condition, it was decided to exclude from the analysis the variable of the principal granted.

⁹ The reduced size of the groups making up our total sample for this experiment makes it necessary to employ non-parametric statistical tests.

We next consider how the analysts react when presented with items of evidence of different sign. A first approach to this hypothesis is found in groups 3 and 4, where the analysts received a series of items of evidence in which a unqualified audit report is contradicted by unfavourable financial information, but in different order for each group. The differences between the belief revisions for groups 3 and 4 were not significant for the variables studied, viability ($z = 0.735$; $p = 0.65$) and risk premium ($z = 0.653$; $p = 0.78$)¹⁰. These results appear to support the hypothesis of absence of recency effect (H_2).

To analyse the prediction of recency effect in series of mixed evidence, the sequences programmed for groups 5 and 6 are compared. These two groups processed sequentially financial information favourable to the granting of the loan request, together with a qualified audit report. Although the results demonstrate a more negative interpretation on the part of the analysts of group 6, who received the qualified report last in the sequence, the differences in belief revision between the two groups were only significant for the variable viability ($z = 1.543$; $p < 0.05$)¹¹. In contrast to what we observe when comparing groups 3 and 4, where a clean report does not provide significant information content, in the case of groups 5 and 6 a qualified audit report is seen to act as a point of inflection, after which the analyst revises his/her perception of the advisability of the credit operation. If we compare the intermediate revisions (S_2-S_0) of group 6, it is observed that, after evaluating the favourable financial evidence, the analysts increase their estimation of the viability by 5.42%. However, the revision (S_4-S_2) made by the subjects in group 5 after the reception of the positive financial information, shows not just the indifference of the analysts, but rather their distrust, with this positive evidence being doubted, as indicated by their revised judgment of the viability¹². These results suggest behaviour on the part of the analysts based on professional skepticism; this leads them to question the validity of favourable financial information, particularly when the qualified audit report is received in first in the sequence. In the light of these arguments, our experimentation supports the hypothesis that a qualified audit report is not redundant in the decision-making process of loan bankers (H_3).

¹⁰ However, it can be seen in table 3 that the analysts of group 3 who processed the clean audit report first in the sequence, showed greater propensity to revise their beliefs downwards, in comparison with those of group 4 who processed the report last.

¹¹ The Kolmogorov-Smirnov test gave a z value of 0.799 (with $p = 0.54$) for the risk premium. However, applying the Mann-Whitney U parametric test, which is equivalent to the sum of ranges test of Wilcoxon and to the test of Kruskal-Wallis for two independent groups, a value of 0.39 (with $p = 0.1$) was obtained.

¹² Not only did the subjects not attribute any value to this evidence, but they interpreted it negatively, by a reduction of 0.01%.

6.2. Utility of the Audit Report.

Having studied the principal predictions of the model of Hogarth and Einhorn (1992), the second objective of this research is to consider in more detail the role played by the audit report in the decisions of the analysts. In this respect, initial observations can be made of the situation resulting from the first four case designs in our experiment, that is, the assessments of groups 1, 2, 3 and 4, in which the common element is the presence of unfavourable financial information in all four cases. Since our objective is to analyse the impact of the auditor's qualification in the face of negative financial information, a comparison must first be made between groups 1 and 3, where the explanatory variable is the sign of the audit report that analysts process first in the sequence, against the unfavourable financial evidence processed last in the sequence. The comparison of the belief revisions (S4-S0) observed between the two groups was not found significant for the estimation of viability ($z = 0.677$; $p = 0.75$) nor for the risk premium ($z = 0.63$; $p = 0.81$).

Another approach to the hypothesis of absence of information content of the audit report is through the study of group 2 versus group 4; these groups processed the same items of evidence as groups 1 and 3, but in different order; in other words, they processed the unfavourable financial information first in the sequence. Again, and despite the greater rigidity displayed by group 2, the belief revisions (S4-S0) of these groups did not show significant differences¹³. Therefore the analysis of the behaviour of the analysts demonstrates that, independently of the audit report's place in the sequence of information processing, it is incapable of adding relevant information to the procedures of granting credit, when the financial expectations are not favourable. This finding would thus support H_4 .

In order to study the hypothesis of the utility of the audit report when other positive evidence has been received, the results for groups 5, 6, 7 and 8 must be considered. The first case to observe would be the comparison of the results of experimental designs 5 and 7, in which the subjects processed favourable financial evidence after having first received the corresponding audit report. The differences diverge in function of the sign of the audit report, demonstrating an attitude of professional skepticism on the part of group 5 that results in discounting the credibility of the favourable financial evidence. However, this behaviour is shown to be statistically significant only in the case of the viability ($z = 1.331$; $p = 0.05$).

¹³ For the variables of viability and risk premium, the z statistic of Kolmogorov-Smirnov took values of 0.98 ($p = 0.29$) and 0.898 ($p = 0.39$), respectively.

The second comparison is that provided by studying groups 6 and 8, whose analysts received favourable financial evidence that contradicted the interpretation of the audit report. In this case, both groups are characterised by the analysts issuing their interim judgments (S2) after processing the positive financial information. The comparison of the belief revisions (S4-S0) observed between the two groups was found very significant for the estimation of viability ($z = 2.119$; $p = 0.00$) but less so for the risk premium ($z = 1.391$; $p = 0.04$). This evidence seems to confirm the utility of the audit report in the process of credit concession, to the extent that the analyst modifies the interpretation already made of the favourable financial information when the opinion of the auditor raises doubts on the veracity of the financial statements; this argument appears to support H_5 . In addition, these results contribute to limiting the recency effect to the case when evidence favourable to the loan operation is received (H_3).

6.3. Sensitivity of the Analysts.

The final question we put forward concerns the determination of the attitude displayed by these subjects towards the evidence that they are processing. We refer to the model of Hogarth and Einhorn (1992) to obtain the analytical expression of the revision of beliefs displayed by the loan bankers' estimation of the viability of the operation in our experiment, to estimate the parameters indicative of their sensitivity to the sign of the evidence (α and β):

$$S_k = S_{k-1} + \alpha (C) S_{k-1}[s(x_k)] + \beta (1-C) (1-S_{k-1})[s(x_k)]$$

However, to obtain a better explanation of the behaviour presented by the loan officers, we adapt the previous model, inserting for this the variable "type of evidence" (TYPE), such that:

$$\begin{aligned} S_k - S_{k-1} = & \delta + \alpha_1 (D) S_{k-1}[s(x_k)] + \\ & \beta_1 (1-D) (1-S_{k-1})[s(x_k)] + \\ & \alpha_2 (TYPE)(D) S_{k-1}[s(x_k)] + \\ & \beta_2 (TYPE)(1-D) (1-S_{k-1})[s(x_k)] \end{aligned}$$

Where: (TYPE) = 0 if the evidence processed is an audit report; (TYPE) = 1 in the case of reception of the other financial evidence. The estimation of the attitude towards the

evidence, α and β , is carried out by the regression of the belief revisions corresponding to the 106 participating subjects. To calculate the analysts' revisions of beliefs, the viability assessed for the credit operation after processing each item of evidence was taken; this generated a total of 318 observations.

(Insert Table 5 here)

The statistic R^2 shows a goodness of fit for the model proposed, of 40.8%, all the parameters being significant except in the case of confirmatory evidence, β_1 ¹⁴. Table 7 summarises the values estimated for the sensitivity displayed by the loan bankers.

(Insert Table 6 here)

The propensity displayed by the analysts to accept the unfavourable financial evidence was found to be superior to their sensitivity towards the evidence that supported the viability of the credit operation. In quantitative terms, the difference reached 0.371 (0.426-0.055), which seems to indicate an attitude of distrust regarding the capacity of the client to repay the debt. With the object of studying this assertion in more depth, we introduced in the model the following parametric restriction, whereby the attitudes shown by the analysts when faced with confirmatory and unfavourable evidence, in average terms, are compared:

$$[\alpha_1 + (\alpha_1 + \alpha_2)]/2 = [\beta_1 + (\beta_1 + \beta_2)]/2$$

The test of Wald suggests an attitude of greater sensitivity towards the evidence contrary to the viability of the credit operation ($\chi^2=30.152$, $p=0.00$); these findings contribute to supporting H_6 .

Finally, to test H_7 , we compare the sensitivity of the analysts towards the type of information processed, calculated as the difference between the coefficients α and β for each type of evidence. It is found that the net sensitivity towards the information content that incorporates the opinion of the auditor reaches -0.327, whereas the response towards the rest

¹⁴ The test of White discounts the presence of heteroscedasticity in the residuals generated by the regression (F=1.91, p= 0.22).

of the financial evidence is placed at -0.415. With the object of examining the presumed greater relevance attributed to the audit report, the following restriction was proposed in the coefficients of unfavourable and confirmatory attitude corresponding to the audit report and to the financial evidence:

$$[\alpha_1 - (\alpha_1 + \alpha_2)]/2 = [-\beta_1 + (\beta_1 + \beta_2)]/2$$

The statistical test of Wald was found to be significant ($\chi^2 = 8.446$, $p = 0.00$); thus the hypothesis put forward is rejected, since the analysts attribute greater weight to the financial evidence, rather than allow the opinion of the auditor to influence them in the credit assessment process. The rejection of this hypothesis is seen to be consonant with the results obtained previously on the limitation of information content of the audit report; the report is found to be of utility only when the sign of the report is negative.

7. Conclusions and Limitations.

This paper shows the results of a research focused in the utility of the audit report, as it is used by the loan banker's officers when assessing the concessions of credits, in a context where they have a prior belief and receive further information about the financial situation of the company evaluated. So, this research can help to understand the role of the audit report in such a context, as well as other research has done with the function this document plays in other context (for instance, in the formation of the share prices for listed companies).

From our experimentation in simulating the procedures followed by a sample of loan bankers in major financial institutions, we have been able to reflect on three principal questions. Firstly, our findings confirm the valuable economic and social function fulfilled by the audit report in the procedures of credit concession to companies, in respect of which the loan bankers display behaviour that can be characterised as the degree of skepticism proper to this profession. This is shown in two aspects of their attitude to financial evidence: on one hand, they distrust or attribute no importance to a unqualified audit report if they receive other financial information that is unfavourable towards the client requesting credit; and on the other, they are prepared to change a previously favourable attitude when faced with adverse opinions expressed by the auditors of the company's accounts. Thus, although in the first of these examples, the judgment of the auditor does not add relevant information content, in the second, the evidence provided by the auditing is shown to be one of the cornerstones on

which the analyst builds his own opinion and consequent decision. In this way, the audit report acts as a “red flag” that only alerts the analyst to be more critical and severe in the conditions imposed on a loan, when it contradicts the a priori favourable attitude that the analyst had formed. In cases where the financial disequilibrium of the client is clear, the audit report remains of no significance to the analyst. On this point, the redundancy of the unqualified audit report found in our study may be associated with the many recent financial scandals not detected by the auditors of large companies’ accounts; these accounting failures would justify the lack of relevance attached to a favourable auditor’s opinion.

The second reflection that we put forward refers to the importance of the way in which loan bankers process the evidence in the assessment of credit requests. The results of our experiment confirm the absence of order effects when the series analysed shows a consistent a sign, all pointing in either a negative or positive direction. In this case, the analysts generally display an attitude that confirms their initial opinion, and from this it can be concluded that the audit report does not incorporate appreciable information content. The situation is different when analysts are faced with an audit report of opposite sign to that of the financial evidence; in such cases, the so-called recency is observed. However, the recency effect has been found to be confined to the case of qualified reports; in such cases, the value of the independent auditor’s opinion is appreciated. It may thus be deduced that the absence of order effects when the analyst is given a favourable audit opinion tends to confirm the lack of information content that would be implied by a non-qualified audit report.

Thirdly, our findings reveal that the predominant attitude displayed by analysts in their risk assessment procedures is one of professional skepticism. The basis for this claim is that the analysts in these banks seem to attribute greater importance to information that is negative, i.e. unfavourable to the concession of the credit request, and particularly to negative financial evidence. Thus, the estimation of analysts’ sensitivity leads us again to recognise the utility of the audit report for risk analysis only when the report raises doubts about the reliability of other evidence that might favour the concession of the credit requested.

Having presented these findings, certain limitations must be admitted in respect of this study. The first reservation concerns the size of the sample; although the number of responses obtained can in aggregate be considered representative of our estimated total population of loan bankers in Spanish banks, their grouping according to the different experimental designs does reduce the effective number of observations. Another possible limitation that can be attributed to this study is that it did not include several other important psychological

variables that might give a more complete picture of the factors influencing the risk assessment process. Some examples of the factors that have not been designed into our experiment are: the time pressure under which analysts usually would have to work (Otley and Pearce 1996); the practice of forming opinions and reaching decisions by consensus (Johnson 1995); and the effects of cognitive style (Chan 1995). Beyond the scope of psychology, three other limitations could be attributed to our experimentation. The first of these is the classification of the audit reports presented to the analysts into only two categories, clean and qualified, without considering other categories that could have been used, including reports with reservations for limitation in scope, the detection of accounting fraud and uncertainties for either going concern or fiscal contingencies. Second, the experimental design could be criticised as excessively hermetic, given that subjects were not allowed the opportunity to seek complementary information themselves (Kida 1984). Last, the limited comparability of our results with those provided in other classic studies means that such comparison can only be made with extreme caution. Two notable differences are that: the fictitious company presented to analysts is not financially healthy and its situation is one of considerable uncertainty; and there have been no previous studies that have examined the credit assessment process within the framework of a sequential process of opinion formation and decision-taking.

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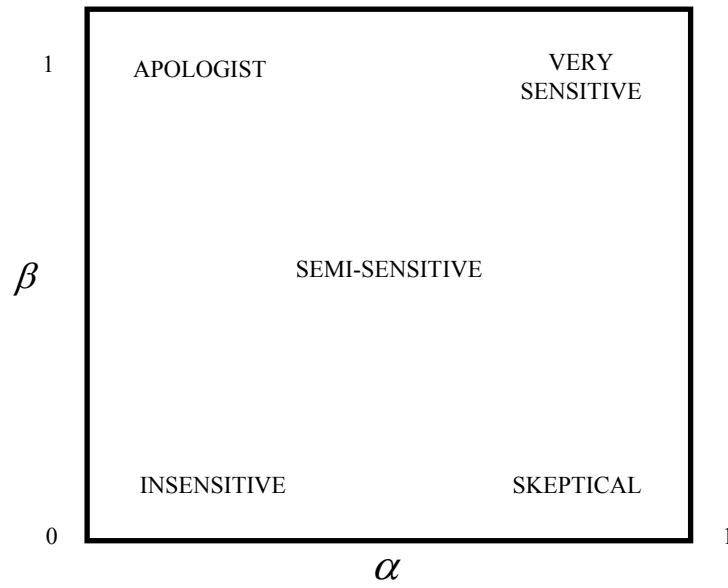
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FIGURE 1
Subject Attitude towards the Evidence



Hogarth y Einhorn (1992, 41)

FIGURE 2

The Belief Revision Model Adaptation to the Loan Bankers Decision Making

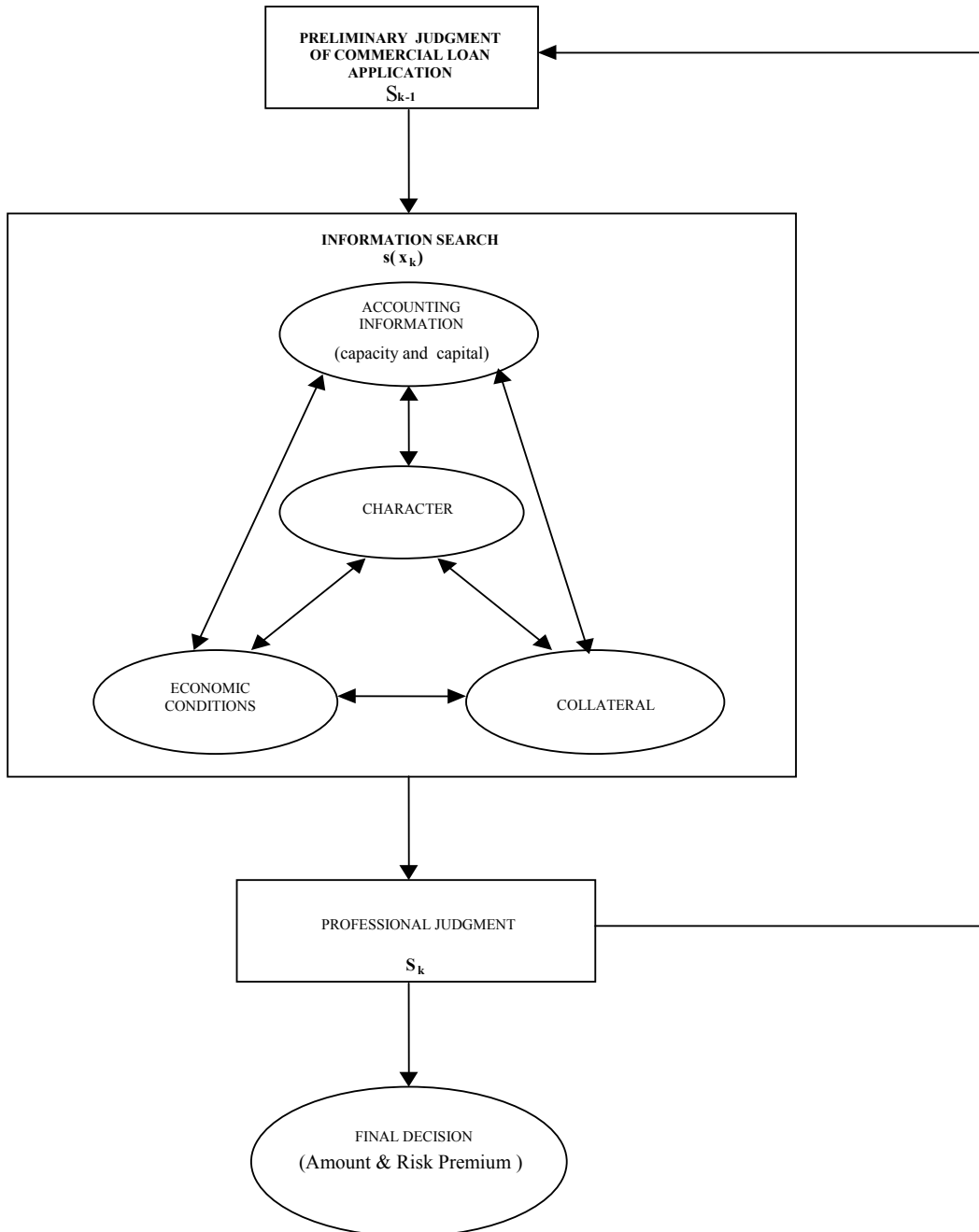


TABLE 1
Descriptive Statistics by Groups

	Total	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
n	106	13	15	15	10	11	12	13	17
Age*	35.7 (7.29)	34.1 (4.27)	37.3 (8.87)	36.6 (7.73)	35.3 (5.31)	34.81 (7.56)	35.0 (8.21)	35.79 (6.71)	36.35 (8.68)
Degree:									
Economics	74	8	10	10	8	8	6	10	14
Law	9	1	1	1	1	2	2	1	0
Others	23	4	4	4	1	1	4	2	3
General Banking Experience (years)*	13.4 (8.86)	11.4 (6.15)	14.1 (10.5)	15.8 (9.56)	11.8 (5.67)	12.9 (9.78)	12.75 (10.0)	12.76 (8.22)	14.23 (9.93)
Experience in Risk Analysis (years)*	7.5 (6.11)	5.7 (2.92)	9.9 (7.86)	6.9 (5.52)	5.8 (4.07)	6.18 (8.5)	7.5 (5.64)	6.69 (4.02)	9.7 (7.12)

* Mean and Standard Deviation.

TABLE 2
Overview of the Experimental Design*

Group	S1	S2	S3	S4
1	IA1-NEG	IA2-NEG	IF1-NEG	IF2-NEG
2	IF1-NEG	IF2-NEG	IA1-NEG	IA2-NEG
3	IA1-POS	IA2-POS	IF1-NEG	IF2-NEG
4	IF1-NEG	IF2-NEG	IA1-POS	IA2-POS
5	IA1-NEG	IA2-NEG	IF1-POS	IF2-POS
6	IF1-POS	IF2-POS	IA1-NEG	IA2-NEG
7	IA1-POS	IA2-POS	IF1-POS	IF2-POS
8	IF1-POS	IF2-POS	IA1-POS	IA2-POS

* IA1-NEG = First qualified audit report processed; IA2-NEG = Second qualified audit report processed; IA1-POS = First unqualified audit report processed; IA2-POS = Second unqualified audit report processed; IF1-NEG = First negative financial item received; IF2-NEG = Second negative financial item received; IF1-POS = First positive financial item received; IF2-POS = Second positive financial item received.

TABLE 3*
Initial, Intermediate and Final Judgments by Groups (Mean and Standard Deviation)

	Group 1 (n=13)	Group 2 (n=15)	Group 3 (n=15)	Group 4 (n=10)	Group 5 (n=11)	Group 6 (n=12)	Group 7 (n=13)	Group 8 (n=17)
Initial Assessment (S0)								
Risk Premium	2.53 (0.72)	2.99 (0.15)	2.7 (0.1)	4.05 (1.9)	3.0 (1.1)	2.4 (0.57)	2.57 (0.95)	2.49 (0.88)
Viability	19.2 (14.8)	32.0 (24.2)	22.33 (22.2)	26.5 (13.5)	27.7 (18.4)	32.08 (19.5)	30.0 (23.8)	22.3 (16.7)
Intermed. Assessment (S2)								
Risk Premium	3.46 (0.15)	3.61 (1.6)	2.9 (1.1)	4.79 (2.1)	3.91 (1.7)	2.27 (0.51)	2.61 (0.96)	2.4 (0.19)
Viability	10.0 (14.8)	13.3 (16.7)	16.6 (20.1)	16.0 (12.2)	15.0 (14.3)	37.5 (19.3)	28.8 (24.4)	26.76 (17.2)
Final Assessment (S4)								
Risk Premium	4.09 (2.0)	4.60 (2.1)	3.63 (1.5)	4.54 (1.9)	3.16 (1.2)	3.39 (1.2)	2.34 (0.85)	2.49 (3.4)
Viability	4.61 (11.4)	10.7 (15.3)	5.0 (10.3)	20.0 (18.5)	22.27 (19.8)	12.91 (14.4)	38.8 (25.9)	24.7 (18.6)
Belief Revision (S4-S0)								
Risk Premium	1.55 (1.8)	1.6 (1.4)	0.93 (9.1)	0.49 (8.8)	0.16 (6.6)	0.99 (10.7)	-0.23 (3.8)	0 (35.3)
Viability	-14.61 (7.2)	-21.3 (17.5)	-17.3 (16.1)	-6.5 (14.3)	-5.45 (11.9)	-19.16 (9.2)	8.84 (12.6)	2.35 (11.4)

* S0 = the judgments formed after processing the preliminary information; S2= the judgments formed after processing the first two items of evidence; S4= the judgments formed after processing the complete set of evidence.

TABLE 4
Comparison of the Belief Revisions (S4-S0) of Risk Premium and Viability
Judgments by Groups

ORDER EFFECTS	Risk Premium		Viability	
	Mean	p-value	Mean	p-value
<u>Consistent Evidence</u>				
Group 1 vs Group 2	1.55 / 1.6	.95	-14.6 / -21.3	.21
Group 7 vs Group 8	-.23 / .00	.75	8.8 / 2.3	.43
<u>Mixed Evidence (Recency)</u>				
Group 3 vs Group 4	.93 / .49	.78	-17.3 / -6.5	.65
Group 5 vs Group 6	.16 / .99	.54	-5.4 / -19.2	.05
UTILITY OF THE AUDIT REPORT				
<u>Negative Financial Information</u>				
Group 1 vs Group 3	1.55 / .93	.81	-14.6 / -17.3	.75
Group 2 vs Group 4	1.6 / .49	.29	-21.3 / -6.5	.39
<u>Positive Financial Information</u>				
Group 5 vs Group 7	.16 / -.23	.10	-5.4 / 8.8	.05
Group 6 vs Group 8	.99 / .00	.04	-19.2 / 2.3	.00

TABLE 5
Regression-Based Estimates of Loan Bankers' Sensitivity to Confirming and Disconfirming
Evidence (Dependent Variable ($S_k - S_{k-1}$))

R-squared	.4079	F-statistic	53.754
Adjusted R-squared	.4004	Probability	.000
n	318		
Variables	Coefficient	Standard Error	T-Statistic
δ	-.0117	.0075	-1.5545
(D) $S_{k-1} s(x_k)$	.3395	.0731	4.6431**
(1-D)(1- S_{k-1}) $s(x_k)$	.0126	.0157	.7897
(TYPE)(D) $S_{k-1} s(x_k)$	.1748	.0862	2.0271*
(TYPE)(1-D)(1- S_{k-1}) $s(x_k)$	.0864	.0245	3.5200**

* Significant at $p < .05$.

** Significant at $p < .00$.

TABLE 6
Evidence Sensitivity Estimates

Evidence Type	Audit Report	Financial Information	Level Means
Disconfirming	$\alpha_1 = .339$	$\alpha_1 + \alpha_2 = .513$	.426
Confirming	$\beta_1 = .012$	$\beta_1 + \beta_2 = .098$	.055
Case Means	$\Sigma\beta - \Sigma\alpha = -.327$	$\Sigma\beta - \Sigma\alpha = -.415$	-

ANNEX

(ITEMS OF EVIDENCE PRESENTED TO ANALYSTS)

«The annual accounts for the accounting period corresponding to 2000 received an unfavourable opinion in the report of an international auditing firm. The accounts presented various non-compliances with accounting principles, as a result of which the profit and loss account should present a loss of 85 million pesetas (instead of a profit of 258 million pesetas)» **(IA1-NEG)**.

«In the audit report for the annual accounts corresponding to 2001, the auditors again expressed an unfavourable opinion due to non-compliances with accounting principles, in respect of both the present and previous accounting periods; after correction of these, there was a negative balance of the profit and loss account of 155 million pesetas (when according to the books the balance was a profit of 150 million pesetas). In addition, this report contains a reservation for uncertainty due to the company being involved in significant litigation, there being no information available on the outcome of this at the present date. The company had been accused of marketing a range of products that did not meet legal requirements in respect of public health standards» **(IA2-NEG)**.

«Enquiries made by the analyst's banking institution revealed that 25% of the tangible fixed assets of its client is subject to lien for tax charges» **(IF1-NEG)**.

«Furthermore, enquiries made by the financial institution to the RAI and CIRBE, respectively, demonstrate repeated non-compliances in the payment of quotas and numerous shortages, both with the financial institution itself and with other large national banks» **(IF2-NEG)**.

«The annual accounts for the accounting period corresponding to 2000 were not subject to any reservation in the audit report made by an international auditing firm» **(IA1-POS)**.

«The audit report in respect of the accounts to 31/12/2001 offered a favourable opinion, but with a reservation for lack of information in the Annual Report. The auditors stated in clarification that this non-compliance with accounting principles did not affect the data of the Balance Sheet and the Profit and Loss account» **(IA2-POS)**.

«The study of the liquidity of the client demonstrates a positive *Cash-flow* from its operations, sufficient in the short term to cover the repayments of the loan requested» **(IF1-POS)**.

«In addition, the financial institution has received a *comfort letter* from the parent company, guaranteeing its commitment of financial support to this company» **(IF2-POS)**.

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