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The disclosure effectiveness of financial disclosure regulations to individual investors: evidence from the laboratory

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Abstract: Nine treatments of a laboratory experiment are used to examine the disclosure effectiveness of financial risk regulation on investors' purchase decisions. The effectiveness of financial risk disclosures on investor purchase decisions is defined in terms of the observed strength of the interaction between news favourableness and information load. Information load is conditioned on whether financial risk information is presented as financial ratios, abbreviated financial reports or detailed financial statements. Disclosure effectiveness is examined both within-subject (news favourableness) and between-subject (information load). Individual investors' purchase decisions are found to be sensitive to both news favourableness and information load, especially where financial risk information is disclosed as financial ratios.

Keywords: disclosure effectiveness; financial risk; purchase decisions.

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Biographical notes: Paul J.M. Klumpes is a Professor of Accounting at the Tanaka Business School of the Imperial College, London. His fields of specialisation include financial reporting and performance measurement related to pensions and insurance in various markets. He has published more than 30 refereed journal articles on these and related topics. His recent publications on these topics include the application of performance benchmarking on financial services in the *Journal of Business*, *Geneva Papers on Risk and Insurance* and the *Journal of Banking and Finance*. He is a Special Issue Editor of the *Journal of Banking and Finance* on a conference scheduled for 4–5 July 2008 in London on the application of efficient frontier technologies to the financial sector, which will feature presentations by eminent scholars in this field from around the world. He is also a Consultant to Charles River Associates and Gerson Lehrman Group. He is a qualified Australian CPA and is a member of the American Accounting Association.

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1 Introduction

The regulation of the form and content of financial disclosures made by corporations in offering public securities is often justified on the grounds that the disclosures should communicate useful information to investors in making resource allocation decisions. However following several recent well-publicised corporate abuses affecting the credibility of corporate financial reports, in March 2003 the International Organisation of Securities Commissions (IOSCO) developed global guidelines to improve the quality of information provided by corporations to securities' investors. This action closely followed efforts made by regulators in the USA, the UK and several other countries to require enhanced financial disclosures and impose more stringent codes of behaviour on preparers. For example, the European Union Markets in Financial Instruments Directive – came into effect on 1 November 2007. The UK Financial Services Authority interpreted the Mifid as implying that existing detailed disclosure rules regarding financial promotion and other communications, should be entirely replaced with a more 'general principles' based approach. Similar requirements are being advocated for the European Union proposed directive Undertakings for Collective Investments in Unit Trusts. A number of European governments have proposed greater public awareness of and participation in schemes for collective and/or individual retirement where the risk disclosure is standardised.

However, the increasing complexity of mandated financial disclosures raises questions over the disclosure effectiveness of financial reporting, defined as the trade-off between the value relevance of the information provided to the investor and its costs of provision in terms of either (a) direct and indirect costs involved in preparing, printing and distributing financial statements containing regulated financial disclosures; or (b) information overload to users induced by inclusion of regulated financial or non-financial disclosures (FASB, 1995). The ICAEW (2005) proposes that public policy information requirements should take more account of individuals' limited information processing abilities.

The disclosure effectiveness of financial regulation should be of concern to investors or their professional advisers who base their decisions to purchase retail investment products on representations made in financial reports. Some products offer returns that are capital guaranteed by pension funds, mutual funds, insurance firms and other financial intermediaries. Such products may be more appealing to some retail investors than direct investment in more speculative corporate securities. However for some (capital guaranteed) retail investment products, information may be difficult to obtain. As

argued by Brennan (1995) and Hirschleifer (2001), individual investors are unlikely to completely understand the process of determining asset prices or the operation of financial markets.

This study investigates the effectiveness of prescribed disclosures about retail products to individual investors. Disclosure effectiveness is defined in terms of both information load (*i.e.*, financial solvency disclosures in the form of financial statements, abbreviated financial reports or financial ratios) and news favourableness. Table 1 shows the variables studied in this research. The independent variable is information about solvency. Five conditions are studied:

- 1 abbreviated financial reports alone
- 2 abbreviated financial reports plus ratios
- 3 detailed financial statements alone
- 4 detailed financial statements plus ratios
- 5 abbreviated financial reports plus detailed financial statements plus ratios.

The effects of this information variable on three intervening variables are measured:

- 1 information load
- 2 news favourableness
- 3 environment complexity.

Table 1 Hypothesised relationships

| <i>Independent variable</i> | <i>Intervening variable</i> | <i>Dependent variable</i> |
|---------------------------------------------------------------------------|-----------------------------|------------------------------------------------|
| <i>Panel A Australian retail investments</i> | | |
| Information condition | 1 News favourableness | Probability of purchase decision |
| Five levels: | 2 Information load | |
| 1 Abbreviated financial reports | 3 Environmental complexity | |
| 2 Abbreviated financial reports + ratios | | |
| 3 Detailed financial statements | | |
| 4 Detailed financial statements + ratios | | |
| 5 Abbreviated financial reports + detailed financial statements + ratios. | | |
| <i>Panel B UK occupational pension schemes</i> | | |
| Information condition | 1 News favourableness | Probability of investment decision related to: |
| Four levels: | 2 Information load | |
| 1 Abbreviated financial reports | 3 Environmental complexity | |
| 2 Abbreviated financial reports + funding ratios | | |
| 3 Detailed financial statements | | 1 Investment risk |
| 4 Detailed financial statements + funding ratios | | 2 Funding risk |
| | | 3 Overall safety and security |

Table 2 Regulatory views on financial disclosures to retail investors in Australia and the UK

| <i>Specified form of financial disclosure</i> | <i>Regulator/Rule</i> | <i>Retail</i> |
|----------------------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------|
| (i) Retail financial products | | |
| Long form prospectuses to contain detailed financial statements | National Companies and Securities Commission ^a | New issues in debenture securities and investment funds |
| Short form prospectuses to contain limited, specified items and financial ratios | National Companies and Securities Commission ^b | New issues in debenture securities |
| Short form prospectuses and financial ratios | Australian Securities Commission ^c | New issues in debenture securities and investment funds |
| None | Insurance and Superannuation Commission ^d | Investment-related life insurance policies |
| Short form promotional brochures and financial ratios | Insurance and Superannuation Commission ^e | Risk and investment related life insurance policies |
| None | Australian Prudential Regulatory Authority | New issues in retail securities |
| (ii) Occupational pension schemes | | |
| Fund Statement and Statement of changes in net assets | PRAG: Insurance and Superannuation Commission | Pension schemes |
| Statement of net assets | PRAG | Additional voluntary contribution schemes |

Sources: ^a National Companies and Securities Commission (1984)

^b National Companies and Securities Commission (1987)

^c Australian Securities Commission (1992)

^d Insurance and Superannuation Commission (1989)

^e Insurance and Superannuation Commission (1993)

The significance of financial risks is generally a function of its nature, likelihood, magnitude and its imminence. It is therefore a perception of human judgement, since it is a function of how, by whom and under what circumstances it is perceived (Rescher, 1983; Boritz, 1990). Moreover, since many financially intermediated products are not directly tradeable, reliable information about their financial risk information is relatively costly to obtain (OECD, 1992). Consequently, most purchase decisions faced by individual investors ultimately rely on their subjective judgements (Pines, 1983). Since very little is known about how individual investors form mental models of the operation of capital markets, this suggests that the key to modelling their limited rationality is to understand their perceptions of financial risk disclosures, not postulating a 'boundedly rational' choice procedure (Lipman, 1991).

Although the regulation of financial ratios, financial statements and detailed financial statements is pervasive, very little is known how individual investors assimilate such disclosures into their purchase decisions. Financial theory often assumes that the primary decision-makers of interest are professional investors or decision-makers, who typically

have some experience in reviewing financial documents, adopt relatively focused and well-defined decision-making strategies, and typically use a limited number of information cues. By contrast, investors in retail investment securities are likely to be financially unsophisticated, make purchase decisions in unstructured environments, and must cope with vast amount of financial information and non-financial risk disclosures that are provided directly by product offerors. Moreover, the regulatory disclosure environment facing those attempting to promote various types of conceptually similar products can differ considerably.

Research into the effects of various presentational and measurement properties of financial risk on human decision-making behaviour has generally documented that human judgements are sensitive to relatively minor contextual differences in task structure and content (Einhorn and Hogarth, 1981; Payne, 1982). Judgement research studies of investor decision-making examine how human judgements can be sensitive to data aggregation, information overload, order preferencing and presentational effects, and are mitigated by limitations in their ability to process accounting information (Dyckman *et al.*, 1978; 1987). Studies examine the effects of:

- preferences for disaggregated versus aggregated forms of reporting (Lev, 1969; Ronen, 1971; Abdel-Khalik, 1973)
- excessive information sources or ‘information overload’ (Casey, 1980; Shields, 1980; Snowball, 1980)
- the order in which financial solvency data is presented (Biggs, 1984; Enis, 1986; Bouwman *et al.*, 1987)
- graphical versus other presentation formats (Blocher *et al.*, 1986; Taylor and Anderson, 1986; Sullivan, 1988; Kaplan, 1988; DeSanctis and Jarvenpaa, 1989)
- comprehensive versus aggregated forms of income statement.

However none of the studies examine how retail investors try to filter out data load that typically crowd out more ‘concrete’ financial risk disclosures.

This research typically uses stylised research instruments which are based on standardised decision tasks for use in laboratory conditions. It has not examined the disclosure effectiveness of specified forms of financial risk presentations, in the presence of other non-financial disclosures. Thus, prior research designs do not seek to provide empirical results that are applicable to specific and realistic decision settings (List, 2006). Iselin (1993) and Gadenne and Iselin (2000) argue that ‘data complexity’ studied in prior experimental research confounds three variables; information load (the load of relevant information required for the judgement), data load (the number of cues that are irrelevant for the judgement) and uncertainty experienced in making the judgement. However this assumes that information and data can be defined as two separate and distinct sets. An alternative definition, adopted here, regards information as merely a subset of data, where data are all cues and information are the cues that are likely to be most relevant to a purchase decision. This alternative definition allows for the possibility that retail investors are likely to confound data and information together in realistic task settings. It also allows for the possibility that investors will not make a purchase decision (Corbin, 1980). Consequently uncertainty is measured in terms of the investor’s confidence level or likelihood of making a purchase decision.

The purpose of this study is to investigate how alternative combinations of regulator-specified forms of financial ratios and financial statements affect information load and data load and how these variables in turn affect what salient information encourages or discourages individual investors' purchase decisions.¹ The strength of the interaction between these variables is also expected to bear upon purchase decisions made by individual investors. Information load affects how individual investors assess probabilities, judge values and combine information cues into an overall evaluation leading to a choice from among alternative investment offerings. Such judgement settings can empirically validate claims by accounting commentators that particular forms of financial solvency presentation are more 'useful' to individual investors than others (Lev, 1974; Frishkoff, 1981; Black, 1993).

Uncertainty is not modelled explicitly since it is assumed that an individual investor's purchase decision is evaluated not in terms of the calibration of probabilities but by the strength of confidence in making a purchase decision (or not). Information load is the number of relevant information cues. In addition to data load and information load, this study also posits that the favourableness of news conveyed by the prospectus also bears on the purchase decision. Prior analytical research suggests that news favourableness will also bear on investment purchase decisions (Milgrom, 1981). News favourableness is defined as whether the financial solvency of the offering corporation is sufficient to guarantee the promised return on the retail investment. This definition of news favourableness is consistent for intermediated financial products whose price is determined by a predetermined entry or exit price rather than traded in a capital market (Fama and Jensen, 1983). Data load is the number of cues provided which are not relevant to the decision to be made. It is assumed that data load comprises information cues which are uncorrelated with the purchase decision. The dependent variable is the probability of making a purchase decision.

This study investigates the inter-relationship between accounting-based information disclosures and public policy deliberations by reporting a series of laboratory-based experiments which investigate the disclosure effectiveness of investment and funding risk-based information disclosures contained in annual reports sent to pension plan members. Disclosure effectiveness is defined in terms of the extent to which investor judgements are influenced by the interaction of environmental complexity and news favourableness (*i.e.*, variations in pension funding or investment risk). Environmental complexity is in turn defined in terms of variations in either information load (*i.e.*, the extent of financial disclosures about funding risk in the form of either financial statements, abbreviated financial reports or financial ratios) or data load (*i.e.*, mix of financial versus non-financial information contained in public sector versus private sector sponsored pension plan financial reports). The study defines 'investment judgements' as those involving the evaluation of scarce resources required for retirement saving and pension planning purposes. Most individuals save either voluntarily or via occupational plan provision; in this case, we focus on the latter given the high penetration and density of occupational provision in many countries.

This paper reports the results of a number of laboratory-based experiments which investigate how positive or negative news conveyed by relevant financial disclosures can be subject to various combinations of information load, data load and news favourableness. The strength of the interaction between these variables is also expected to bear upon the 'quality' of investment judgements made by individual investors.² Such judgement settings can empirically validate claims by accounting commentators

that particular forms of financial funding risk presentation are more 'useful' to pension members than others (Lev, 1974; Frishkoff, 1981; Black, 1993). By reporting a laboratory experiment, we attempt to capture more realism of the actual setting in order to enhance the degree of generalisability by using more representative subjects, tasks, environments for conducting the research. However Abdel-Khalik and Ajinkya (1979, p.44) note that attempts to apply a naturalistic rather than scientific research method mean that the practical exigencies and limitations of the laboratory setting make it more difficult to manipulate crucial independent variables and hence our randomisation is not as thorough as in laboratory experiments. We attempt to deal with this issue by clarifying our main empirical findings with some additional observations and caveats in developing policy recommendations.

The remainder of this paper is organised as follows. Section 2 briefly overviews the institutional background and theoretical antecedents. Section 3 develops the hypotheses, Section 4 discusses the research method and Section 5 reports the results of the laboratory-based experiment. Section 6 reports supplemental qualitative analysis and provides a policy discussion. Finally Section 7 provides a conclusion.

2 Institutional setting

In this section we examine two separate institutional settings that are required to understand the context in which the research was undertaken. The first concerns Australian retail investments sold to the public; the second concerns occupational defined benefit pension schemes provided to UK workers.

2.1 Australian retail investments

The hypothesised relationships are initially tested in the setting of the Australian retail financial product market, where firms preparing sales documents offering conceptually similar retail financial products to the Australian public were required to produce promotional brochures containing various format presentations.⁸ The Australian institutional setting and study period is of interest because of the existence of a number of anomalies and inconsistencies in the regulation of apparently equivalent types of retail securities (Klumpes, 1993). These practices were subsequently investigated by the Australian Law Reform Commission (1994) which recommended, *inter alia*, greater uniformity in the disclosure of mandated forms of financial information at the point of sale.

Several of the experiments utilised an Australian setting and used Australian subjects to examine the impact of regulations prescribing financial disclosures in sales documents offering various types of financial products. This institutional setting is of interest to this study for a number of reasons.

First, there is a demand for retail financial products with which individual investors have not had much experience or have not had much opportunity to evaluate their associated financial risks. Corporations offering conceptually similar retail financial products which appear to satisfy these conditions are examined: debentures offered by Australian finance firms, capital secured investment funds offered by management firms and capital guaranteed investment contracts offered by life insurance firms. Unlike the

long-term capital growth potential offered by relatively more speculative equity markets, all these products provide the individual investor with a secure and non-volatile income stream over time. However during the study period, there was very little publicly available information about the financial aspects of these products or their offerors other than the limited and inconsistent financial disclosures made available in their offer documents (Klumpes, 1991).³

Second, there are clearly differentiable production costs and disclosure opportunities in a changing regulatory environment. In this institutional setting, regulation is endogenous with producer choices regarding preparation costs (due to regulatory-induced information production and compliance costs). During the study period, Australian firms could choose from alternative regulatory settings in which to promote conceptually similar retail financial securities. This regulatory environment differed both between products and over time, from the formal pre-registration of prospectus documents that included audited financial statements, through to the preparation of relatively unregulated sales brochures subject to no financial risk disclosure requirements. Consequently sales documents significantly differed in the extent to which they contained both financial and non-financial information disclosures.⁴

Third, the study period captures major variations in the size and complexity of financial regulations affecting documents offering retail financial products. Prospectuses offering debenture securities were subject to an extensive pre-vetting procedure which mandated specified financial risk disclosures, including the provision of full financial statements prepared by an independent investigating accountant. Finance firms offering debenture securities were required to issue prospectuses which were subject to an extensive regulatory pre-vetting procedure, mandatory audited financial statements and other specified financial disclosures. Subsequently, finance firms could issue 'short form' prospectuses that were still subject to pre-vetting but included only abbreviated financial reports or a 'key data summary'.⁵ Firms offering open-ended or closed mutual investment funds were also required to issue prospectuses, but these were only required to convey 'relevant information to investors'.⁶ By contrast, sales documents issued by life insurance firms were subject to voluntary promotional brochure guidelines which did not include any pre-vetting procedure and required only the disclosure of a 'key data summary'.⁷

UK occupational pension schemes are not required to issue prospectuses to investors or prospective members; instead, annual reports containing limited amounts of investment and/or funding risk information are provided; subsequent efforts by UK and European Union regulators to extend the scope of these financial statements have not been adopted. These variations in the financial disclosure regulation of financial product sales brochures contrast to the equivalent registration procedure and prescribed format of Forms 10K and 5500 which apply to US corporations and pension funds, respectively.

It suggests that there were clearly differentiable opportunities as to what financial risk disclosures should be contained in financial documents. These requirements differed primarily in terms of their requirements for Australian firms to disclose either:

- summary financial indicators
- abbreviated financial reports
- detailed financial statements.

Similarly the creation of a single Financial Services Authority in the UK during 2000 replaced various regulations applied by self-regulated authorities. The FSA did not prescribe any general financial information requirements on UK retail investments; instead certain forecasts or charges were disclosed on a standard basis.

By contrast, UK and Australian pension schemes offering supplementary investments to their members were not subject to any disclosures other than those contained in their annual report. In Australia, effective 1995, AAS 25 specified general purpose financial reports for dissemination to members, which included the disclosure of the net surplus or deficit of the scheme. In the UK, a Statement of Recommended Practice, entitled 'Financial Reports of Pension Schemes' (hereinafter 'SORP') was issued in July 1996 by the Pensions Research Accountants Group ('PRAG').

The SORP required full market valuation of pension scheme assets available to pay members benefits, and specified the form and content of the Accounts (including illustrative examples that incorporated a footnote showing all changes in market value of the scheme's investment portfolio). It was effective for pension scheme years ending on or after 6 April 1997, when the Pensions Act became operational. Consequently, UK pension scheme managers were effectively allowed a full financial reporting year (*i.e.*, 1996–1997) in which to decide whether or not to voluntarily adopt fair value reporting provisions of the Revised SORP prior to its implementation date.

SORPs, unlike accounting standards issued by the Accounting Standards Board, are not usually mandatory. By contrast, compliance with the revised pensions SORP is now enforced by new UK pensions legislation, which is supervised by Occupational Pensions Regulatory Authority (OPRA) (now called 'The Pension Regulator'), effective for reporting years ending after 6 April 1997. Section 41 of the *Pensions Act 1995* requires that pension fund managers provide auditor statements, actuarial valuations and audited financial statements which show a 'true and fair view'. Furthermore, non-compliance with the SORP may lead the auditor to conclude that the accounts do not show a true and fair view because of inappropriate accounting treatments or insufficient disclosure. Such qualifications impose a duty on the auditor under the *Pensions Act 1995* to notify the regulatory authority established under the Act, OPRA, who may then investigate the circumstances of the non-compliance and take the necessary action against the trustees.

Ongoing accounting rule-making affecting UK corporate sponsor pension accounting is likely to lead to further revisions of the Revised SORP and hence change the future reporting environment for pension fund managers. Following lengthy deliberations and despite extensive industry opposition, the ASB issued FRS 17 (Pension cost accounting). The standard requires UK corporations to immediately write-off actuarial gains and losses to a Statement of Realised Gains and Losses, and fully consolidate into their balance sheets both pension fund assets (at mark-to market) and liabilities (using a market-based discount rate assumption). However, the ASB delayed full implementation of FRS 17 until the International Accounting Standards Board has also finalised its own views on this issue.

These latest developments affecting FRS 17 also highlighted the apparent discrepancy between FRS 17 and the Revised SORP; most notably, the recognition of accrued obligations for members benefits, hence revealing pension scheme 'surpluses or deficits' in employer sponsor accounts, but not by the pension scheme to its members. This situation is the exact opposite of the current position in Australia (AAS 25, 'Financial Reporting by Superannuation Plans'). Recently PRAG reissued its Revised SORP

(updating reference to relevant UK GAAP), and issued a 'discussion paper' to its members about the costs and benefits of various measures of pension scheme liabilities to members. However it has not reached any conclusion on the issue.

The 'PRAG' was recognised in 1996 by the Accounting Standards Board (hereinafter 'ASB') as the appropriate organisation to issue the 'SORP' for pension schemes. The SORP requires that pension scheme trustees prepare a Statement of Net Assets available to pay pension benefits, and a statement of changes in net assets, including holding gains or losses on investments, but excluding recognition of pension benefits payable to existing members. Assets are measured at mark to market. Unlike accounting standards issued by the Accounting Standards Board, in general, SORPs are not usually mandatory. However the SORP 'Financial Reports of Pension Schemes' is unique because compliance is effectively enforced by recent UK pensions legislation, which is supervised by the OPRA. PRAG is also responsible to the ASB to reflect updated UK GAAP. Consequently observed variations in reporting practice could reflect issues concerning both apparent failures in enforcement, and/or reporting variations between UK GAAP, legislation and the SORP. Furthermore, pension scheme trustees are not required to disseminate their annual accounts to members, so have considerable discretion over reports or communications sent to members.

In summary, neither UK occupational pension providers promoting supplementary investments to their members, nor UK and Australian insurance firms offering investment-related insurance contracts to the public need provide general financial information to retail investors. By contrast, Australian retail investment providers must reveal financial statements, showing the financial condition and performance of the sponsoring entity.

3 Development of hypothesis

Where an investor must select a set of financial information cues from a larger information set in order to make a choice between competing options, a truncated cue selection process can be undertaken – thus leading to satisfying behaviour where available information is processed (Shaklee and Fischhoff, 1982). The decision-maker can also rely on information that confirms the rule to be tested, thus ignoring potentially disconfirmatory information (Klayman and Ha, 1987).

Both truncated cue selection and confirmatory bias may inhibit rational investment decision-making. There are a number of factors that may affect information cue selection, including the decision-maker, information cue characteristics and task or environmental characteristics (Simnett, 2005). In order to test these effects on individual investors, the hypotheses are presented in terms of the interaction of news favourableness, information (data) load or both on the likelihood of making purchase decision, under a given information condition. News favourableness is defined in terms of financial solvency of the financial institutions offering financially-intermediated products to individual investors. Such institutions will typically have a range of underlying financial conditions no matter what level of information load or data load is present in the prospectus. In the absence of explicit price competition which differentiates product quality, Brennan (1995) argues that an individual investors' purchase decision is primarily determined by the financial strength of the institution offering retail securities. In this study, it is assumed that the disclosure of regulated financial solvency presentations contained in

documents selling retail financial products is primarily intended to facilitate investors to distinguish between those conveying 'good news' and 'bad news' solvency information (e.g., high gearing ratio) (Milgrom, 1981).⁹

Financial institutions that offer retail investments but which face relatively severe liquidity problems and/or are affected by poor financial strength will consequently convey relatively 'bad news' concerning the underlying financial solvency supporting the guarantee, relative to other firms with stronger financial strength. It is likely that the likelihood of making a purchase decision is posited to be positively influenced by the degree of news favourableness.

The news favourableness hypothesis states that:

H1 Ceteris paribus, an increased degree of news favourableness conveyed by financial risk disclosures will result in a higher probability of making a purchase decision.

Prior experimental-based empirical research has demonstrated that judgements may be sensitive to the format in which financial risk disclosures are presented. Where financial risk information conveys relevant information to the investor's purchase decision and is in the form of summary financial indicators or abbreviated financial reports, it is reasonable to suppose that individual investors incorporate these signals into their judgements. Prior research has demonstrated that a limited number of financial ratios are able to predict insolvency (Beaver, 1966; Altman and McGough, 1974).¹⁰ Alternatively, an increase in information load, due to the presence of redundant information cues that are embedded within detailed financial statements (e.g., where relevant cues are inconspicuously reported as footnotes), will cause individual investors to overlook these disclosures and thus reduce their confidence level. The information load hypothesis states that:

H2 Ceteris paribus, higher information load in ratios and statements will result in a lower probability of making a purchase decision.

News favourableness and information load may interact to increase the complexity of the decision environment facing individual investors in making a purchase decision. Iselin (1989; 1990) has studied how complexity can affect managerial decision-making. It is likely that information load and the degree of news favourableness may interact to increase uncertainty through an increase in environmental complexity. A increase in information load for a given degree of news favourableness will increase uncertainty. A decrease in news favourableness for a given level of information load will also increase uncertainty. Higher uncertainty in turn makes it more difficult for investors to make purchase decisions and the probability of making a purchase decision will reduce as a result. The stronger the association between these factors, the stronger will be the impact of disclosure effectiveness on the probability of making a purchase. The environmental complexity hypothesis states that:

H3 Ceteris paribus, the higher uncertainty associated with an increased level of association between the degree of news favourableness and information load will result in a lower probability of making a purchase decision.

4 Method

4.1 Research design

The effects of the intervening variables on the dependent variable (purchase decision) is studied in a three by two way ANOVA factorial design where participants are randomly allocated to three levels of financial risk information (financial ratios, abbreviated reports and detailed financial statements), and to two levels of the intervening variable news favourableness (good news or bad news). It is assumed that variation in the interaction of these independent variables (financial risk information and news favourableness) directly affects information load. The effect of significant variation in those variables on the dependent variable (purchase decision) is then examined by varying a given information load.

Environmental complexity is defined as the interaction of nine laboratory-based experiment task settings where participants are randomly allocated to either:

- complex or simplistic financial statements
- news favourableness (either good news or bad news)
- information load.

For each laboratory-based experiment, within-subject effects of intervening variables is measured for news favourableness (good news or bad news in terms of 'net deficit' or 'net surplus') and information load.

The interaction of these intervening variables is assumed to be conditioned by the extent of environmental complexity. The dependent variable (investment judgement) is studied in a two way ANOVA factorial design. It is assumed that variation in the interaction of these independent variables (the strength of interaction between variations in news favourableness and environmental complexity) directly affects disclosure effectiveness. The effect of significant variation in those variables on the dependent variable (strength of investment judgement) is then examined by varying a given level of either data load or information load between subjects. All variables are not predefined by the authors, but arise from variations in disclosure level, complexity and news favourableness.

4.2 Experimental task

This section discusses in turn:

- the general nature of the experimental task
- the manner in which the variables were operationalised
- subject selection procedures
- the experimental procedure.

4.2.1 *General nature of the task*

The task involves the use of research instruments featuring sales documents which offer various types of retail financial products to individual investors, and which vary in information condition depending upon the presentation as specified by the applicable product-based financial regulation. The overall experimental design comprised both 'within subject' and 'between subject' comparisons. 'Within subject' comparisons relate to the news favourableness hypothesis H1. 'Between subject' comparisons relate to the information load hypothesis H2. These involved evaluations by treatment and control subject groups of financial documents which differed in both the format (within experiment) and extent (between experiment) of financial risk disclosure. Finally, the environment complexity hypothesis H3 examines the interaction of 'between subject' and 'within subject' comparisons of news favourableness and information load for each task setting.

The experimental design involved two steps. First, subjects' purchase decisions association with information load was examined through variation in promotional brochures which exist across various types of financial product offerings. Second, subjects matching these requirements were then randomly allocated to two evenly sized groups to examine the association of investment intention with news favourableness. Thus, the news favourableness hypothesis H1 was examined within subjects and the information load hypothesis H2 was examined between subjects.

The financial disclosure variations contained within each experimental treatment are described in more detail below:

- *Laboratory-based experiment 1* documents comprised either detailed financial statements only or detailed financial statements with abbreviated financial reports, which are subject to extensive pre-vetting by the regulatory authority.
- *Laboratory-based experiment 2* documents comprised either (1) detailed financial statements and abbreviated financial reports; (2) detailed financial statements, abbreviated financial reports and summary indicators or; (3) as per (2) but with summary indicators shown in a prominent manner, which are specified by the regulatory authority but not subject to extensive pre-vetting.
- *Laboratory-based experiment 3* documents comprised either abbreviated financial reports and summary indicators, but one also contained detailed financial statements, as required by the regulator but with little or no regulatory pre-vetting.
- *Laboratory-based experiment 4* documents comprised either abbreviated financial reports only or detailed financial statements and summary indicators with no regulatory pre-vetting.
- *Laboratory-based experiment 5* documents comprised both summary indicators in combination with either detailed financial statements or abbreviated financial reports, with no regulatory pre-vetting.

For laboratory experiments 6 to 9, the hypothesised relationships are tested in the setting of the defined benefit UK occupational pension plan market, where pension plan sponsors offer additional voluntary contribution plans which supplement the defined benefit formula with a defined contribution top up arrangement which is conceptually

similar to the UK stakeholder pensions products. The UK institutional setting and study period is of interest because of the existence of a number of anomalies and inconsistencies in the regulation of apparently equivalent types of retail securities (Klumpes, 1993).

The task involves the use of research instruments featuring annual reports which offer various types of pension plan available to members, and which vary in information condition depending upon the presentation as specified by the applicable product-based financial regulation.

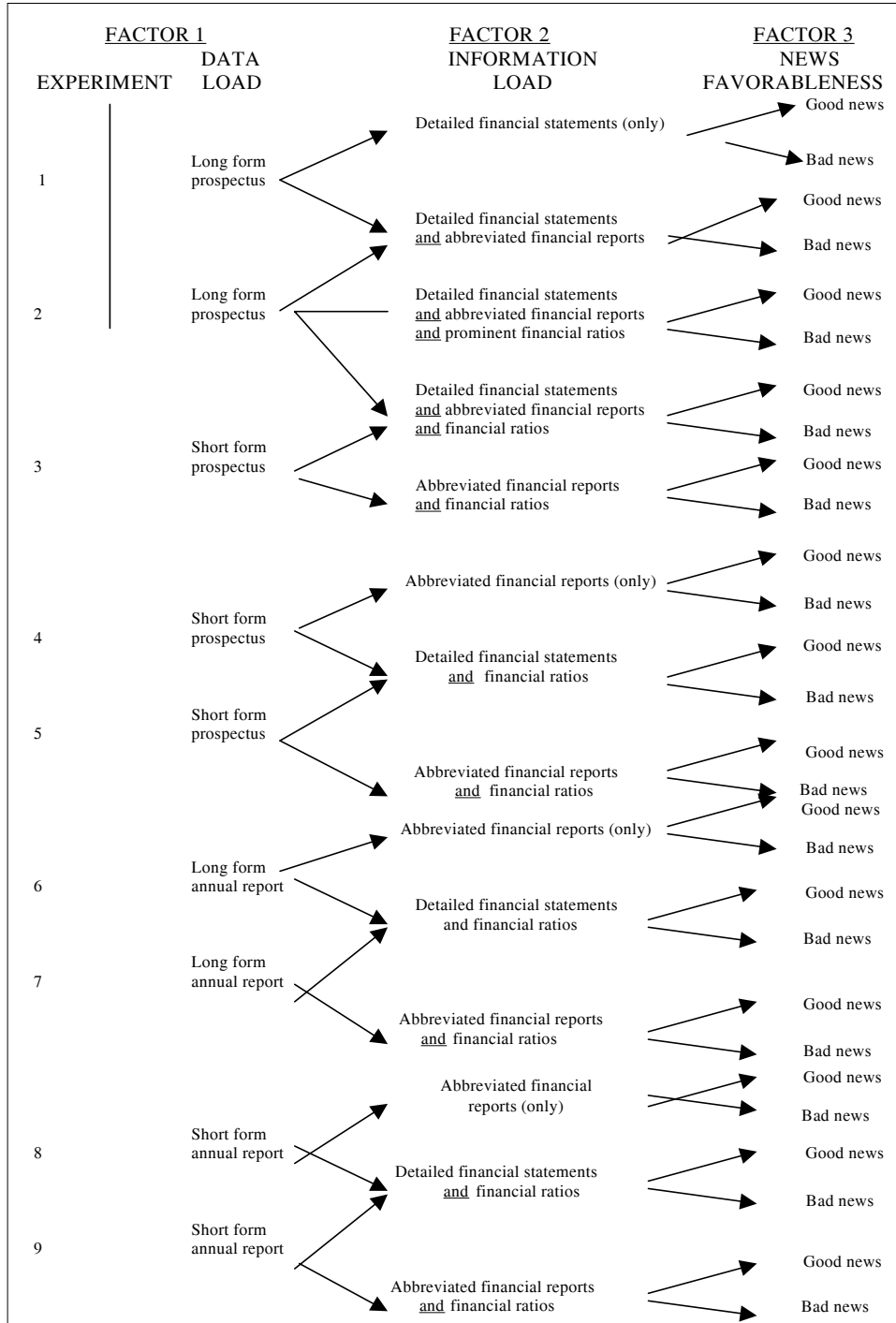
Variations in environmental complexity concerning the scope and nature of financial disclosure in each laboratory-based experiment are described in more detail below:

- *Laboratory-based experiment 6* annual report of a public sector plan in deficit, showing (a) a poor investment performance, a diversified asset mix and reporting formats in accordance with the revised SORP; (b) in addition to (a), a balance sheet showing a deficit per FRS 17.
- *Laboratory-based experiment 7* annual report of a public sector plan in surplus, showing (a) a poor investment performance, a diversified asset mix and reporting formats in accord with the revised SORP; (b) in addition to (a), a balance sheet showing a deficit per FRS 17.
- *Laboratory-based experiment 8* annual report of a private sector plan in deficit, showing (a) a good investment performance, diversified asset mix and reporting formats in accord with the Revised SORP; (b) in addition to (a), a balance sheet showing a deficit per FRS 17.
- *Laboratory-based experiment 9* an annual report of a private sector plan in surplus, showing (a) a poor investment performance, diversified asset mix and reporting formats in accord with the Revised SORP; (b) in addition to (a), a balance sheet showing a surplus as per FRS 17.

Experimental treatments 1, 2 and 3 reflected variations in the amount of regulated financial information disclosures included in prospectuses issued by finance firms offering debenture securities, while experimental treatments 4 and 5 reflected variations in the type of regulatory disclosure regime affecting investment funds and guaranteed investment contracts. Laboratory-based experiments 6 and 7 reflected variations in the amount of regulated financial information disclosures included in annual reports prepared by public sector plans, while laboratory-based experiments 8 and 9 reflected variations in the type of disclosure by private sector pension plans.

Each experimental treatment comprised two documents containing various combinations of detailed financial statements, abbreviated financial reports and summary indicators (discussed in more detail below). Figure 1 is a schematic of the experimental design.

Figure 1 Experimental design



4.2.2 Operationalisation of variables

News favourableness was proxied by comparing investor evaluations of documents conveying 'good news' information about financial position and performance of a retail financial product with their evaluations of an alternative document which conveyed 'bad news' information about another comparable retail security. In all cases it is assumed that an increase in news favourableness will increase the probability of purchasing the security. Australian retail financial products during the study period were collected and used to represent equivalent retail investment opportunities provided by 'poor' and 'good' quality financial institutions. The nature and level of financial risk disclosures contained in these documents was manipulated so that one conveyed relatively 'good news' information and the other relatively 'bad news' information about the financial risk of the retail financial product provider over a five year trend period (in terms of nearness to insolvency, past performance trends and two key financial risk or insolvency ratios identified by prior research as being reliable predictors of financial distress: total liabilities/total assets and current ratio). The decision to restrict the number of alternative products was based on the assumption that the costs of investigation and search are relatively high for individual investors. Steps were taken to manipulate the financial documents so as to disguise the identities of these firms and to ensure that, relative to the 'good news' case, documents containing 'bad news' was consistent with finance/management/life insurance firms exhibiting either financial distress or failure.

Information load is operationalised by varying the level of financial risk between subjects. A number of manipulations were made to the prospectuses in order to desensitise the subjects as to the actual identities of the firms issuing the prospectus, and to reduce the possibility of alternative explanations for the results other than the 'main effects' of the intervening variables. Consequently, financial statements of both firms were shown for the holding company only; group results and cross-guarantees between related corporations were excluded. Prospectuses were also adjusted to make them appear consistent in terms of the retail securities on offer, references to names and places were substituted with initials or non-specific terms. Consequently the only significant variation between the two prospectuses under review concerned either the news favourableness of the relevant information condition and the information load as operationalised by increasing the quantity of redundant cues contained in financial ratios, abbreviated financial reports and detailed financial statements.

4.2.3 Subject selection procedure

In experimental treatments 1 to 3, the subjects were existing investors in debenture securities. Subjects were randomly selected from the debenture register of a major Australian financial services company from an identified subgroup of investors who had:

- a record of having previously invested in prior debenture security offerings
- invested A\$5,000 in such offers.

These criteria were imposed to avoid the potentially confounding effects of the lack of experience and/or materiality of investments in the experimental judgements.

In experimental treatment 4, the subjects were a broader class of Australian households who were potential investors in retail (pension or superannuation) investment products. Unlike debenture securities, which were marketed to those specifically

seeking exposure to a particular risk class, these investments were marketed as unit trusts that invested in a range of investments, to those with tax-deductible or rollover pension lump sum amounts (*e.g.*, arising from a change in employment). A similar subject selection procedure was followed to select a random sample of investors in investment trusts offered by two Australian financial institutions. In experimental treatment 5, subjects were drawn from Australian households. Access to the randomly selected potential subjects was obtained conditional upon:

- initial standardised letters asking whether they would be prepared to participate in the study
- the individual test results of those who agreed to participate would remain anonymous.

The data relating to address and contact details of these investors was considered to be highly proprietary by the individuals and relevant financial intermediaries who cooperated in this study. For experimental treatments 1 to 4, access to the randomly selected potential subjects was permitted only on the grounds that:

- potential subjects be sent standardised letters from the relevant financial intermediary asking whether they would be prepared to participate in the study
- the results of individual investors who agreed to participate in the study would be anonymised.

This procedure, while enabling access to a much more realistic task setting than is typically used by other experimental accounting studies of human judgement (which often rely on student cooperation), severely limits the ability to control the response rate via the follow-up of non-respondents, and thus is subject to potential respondent self-selection bias (Campbell and Stanley, 1963).

Variation in investment experience across subjects for the Australian retail investment proposals was measured by reference to the self-appraised expertise of the subject in terms of investment experience and education. However, such cross-sectional variations are less likely in occupational pension schemes. Since one of the schemes whose annual reports were screened was the multi-sector university scheme (USS), an appropriate mix of academics were selected who were also likely to be members of that scheme. In laboratory-based experiment 6, the subjects were British accounting academics who are existing members of the relevant underfunded public pension scheme. Subjects were randomly selected from the British Accounting Association Register 2004 and formed an identified subgroup of academics with a:

- full-time permanent post in an accounting department of a UK university
- continuous record of employment with that institution for at least three years.

These criteria were imposed to avoid the potentially confounding effects of the lack of experience and/or materiality of investments in the laboratory-based experimental judgements.

In laboratory-based experiments 7 to 9, subjects were randomly drawn from UK households. Access to the randomly selected potential subjects was obtained conditional upon:

- initial standardised letters asking whether they would be prepared to participate in the study
- the individual test results of those who agreed to participate would remain anonymous.

4.2.4 Procedure

For experiments 1 to 5, the regulation of financial risk disclosures by Australian firms offering retail financial products was intended to affect the judgements of potential investors who were legally required to receive these documents prior to making any purchase decision. To keep the task setting realistic, in all five experimental treatments, investors who agreed to participate were mailed a research instrument comprising alternative hypothetical offerings of retail financial products in the same format that they might expect to receive if they were potential investors. This comprised the following materials:

- a covering letter which invited participation in an experiment to review materials describing two hypothetical finance/management/life insurance firms both offering retail financial products at the current rate of interest
- a package of four questions (see Appendix 1). All intervening variables were measured subjectively. Subjects asked whether they would consider investing in each proposal if they had money available by circling a position on a likert scale. The choice of an 11-point scale was consistent with the results of prior research which suggest the use of categorical value scales that permit decision-makers sufficient scope to make fine distinctions between alternatives (Von Winterfeldt and Edwards, 1986, pp.249–251). After completing the experimental task, subjects were asked an open-ended question as to reasons for their choice and finally were asked to rate their level of education and/or experience in reviewing financial documents or financial analysis. This was intended to verify prior judgement-based research findings that experienced financial analysts are likely to adopt a more directed search pattern than novices (Bouwman *et al.*, 1987)
- two alternative financial product proposals based on financial documents issued by two Australian financial services firms. One proposal was manipulated so as to provide ‘good news’ information about its financial position and performance, and was labelled ‘Y Company Ltd’. The other was manipulated so as to provide ‘bad news’ information, and labelled ‘X Company Ltd’.

For experiments 6 to 9, the regulation of financial disclosures of UK pension plans was intended to affect the judgements of potential investors who were legally required to receive annual reports prior to making any investment judgement. To keep the task setting realistic, in all four laboratory-based experiments, investors who agreed to participate were mailed a research instrument comprising alternative hypothetical offerings of pension plans in the same format that they might expect to receive if they were potential investors. This comprised the following materials:

- a covering letter which invited participation in an laboratory-based experiment to review materials describing a pension plan offering additional voluntary contribution arrangements to their supplement existing group-based defined benefit pension plan

- a package of questions (see Appendix 2). Questions 1 through 4 asked about various aspects of the investment that are subject to analysis. All intervening variables were measured subjectively. For the UK occupational pension scheme reports, subjects were asked to evaluate the performance of the fund and the safety of the investments. As indicated earlier the choice of an 11-point scale was consistent with the results of prior research which suggest the use of categorical value scales that permit judgement makers sufficient scope to make fine distinctions between alternatives (Von Winterfeldt and Edwards, 1986, pp.249–251). After completing the laboratory-based experimental task, subjects were asked a fifth question about their gender, age, their level of education and/or experience in reviewing financial documents or financial analysis. This was intended to verify prior judgement-based research findings that experienced financial analysts are more likely to a more adopt directed search pattern than novices (Bouwman *et al.*, 1987)
- one of two types of pension fund annual report (either under-funded or over-funded public sector; or overfunded or underfunded private sector). Type I included a balance sheet as per the requirements of the Revised SORP (*i.e.*, only including a statement of assets less current (non-pension benefit) liabilities, measured at mark to market, available to pay benefits to employees). Type II included a balance sheet as per the requirements of FRS 17 (*i.e.*, as above, but additionally including an actuarial estimate of pension benefits payable to existing employees, and showing a net pension fund deficit or surplus).¹⁵

5 Empirical tests

5.1 Overall ANOVA results

For Australian retail investment products, the subject response rates were similar across all four experiments, ranging from 19% in experimental treatment 1 (out of 200 potential respondents) and 19.5% in experimental treatment 2 (out of 200) through to 21.6% (out of 250) in experimental treatment 3 and 24.25% in experimental treatment 4 (out of 400) and 17.27% (out of 1100) in experimental treatment 5.¹¹ Although low, these response rates are similar to those obtained by other experimental treatments of this type which rely on mail-outs.¹² All of the investors who initially agreed to participate in the study subsequently completed and returned the questionnaire.¹³

Table 3 shows the cell means and standard deviations of these responses to the Australian prospectuses. The ANOVA summary is presented in Table 4.¹⁴

Hypothesis H1 proposes that investment intentions based on sales documents are positively associated with news favourableness, while hypothesis H2 proposes a negative association with information load. This requires a significant two-way variation for both factors within investors. For experimental treatments 1, 2, 3 and 4, these variations are significant at the 10% level. However neither variations are statistically significant in experimental treatment 5. Hypotheses H1 and H2 are supported in experimental treatments 1 to 4.

Table 3 Cell means and standard deviations – purchase decisions

| <i>Panel A Australian retail investments</i> | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------|-------------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|--------------------|------------------|
| <i>Form of presentation</i> | <i>Experimental treatment</i> | | | | | | | | | |
| | <i>1 (n = 38)</i> | | <i>2 (n = 39)</i> | | <i>3 (n = 54)</i> | | <i>4 (n = 97)</i> | | <i>5 (n = 190)</i> | |
| | <i>Bad news</i> | <i>Good news</i> | <i>Bad news</i> | <i>Good news</i> | <i>Bad news</i> | <i>Good news</i> | <i>Bad news</i> | <i>Good news</i> | <i>Bad news</i> | <i>Good news</i> |
| Detailed financial statements (only) | 5.1 (2.60) | 5.7 (2.28) | | | | | | | | |
| Abbreviated financial reports (only) | | | | | | | 2.9 (2.32) | 7.5 (2.47) | | |
| Financial ratios and abbreviated financial reports | | | | | 3.8 (2.43) | 5.9 (2.31) | | | | |
| Detailed financial statements and abbreviated financial reports | 5.4 (2.63) | 6.7 (2.91) | 3.8 (3.10) | 5.5 (2.86) | | | | | | |
| Detailed financial statements and financial ratios | | | | | | | 3.8 (3.10) | 5.5 (2.86) | 5.6 (2.56) | 5.7 (2.61) |
| Abbreviated financial reports and financial ratios | | | | | | | | | 4.9 (2.49) | 5.4 (2.56) |
| Detailed financial statements and abbreviated financial reports and financial ratios | | | 5.5 (2.30) | 7.0 (2.31) | 5.3 (2.81) | 4.8 (3.13) | | | | |
| Detailed financial statements and abbreviated financial reports and financial ratios (shown prominently) | | | 2.4 (1.76) | 7.9 (3.15) | | | | | | |

| <i>Panel B UK occupational pension schemes</i> | | | | | | | | |
|------------------------------------------------|----------------------------|------------------|--------------------------------|-----------------------|---------------------------------|------------------|------------------|-----------------|
| <i>Type of risk</i> | <i>News favourableness</i> | | <i>Information (data) load</i> | | <i>Environmental complexity</i> | | <i>Expertise</i> | |
| | <i>Good news</i> | <i>Bad news</i> | <i>Public sector</i> | <i>Private sector</i> | <i>High</i> | <i>Low</i> | <i>High</i> | <i>Low</i> |
| | <i>(n = 72)</i> | <i>(n = 64)</i> | <i>(n = 73)</i> | <i>(n = 63)</i> | <i>(n = 70)</i> | <i>(n = 66)</i> | <i>(n = 73)</i> | <i>(n = 63)</i> |
| Investment risk (Question 2) | 6.71 (2.41) | 7.42 (2.53)** | 7.47 (2.28) | 6.56 (2.28) | 7.67 (2.38) | 6.38 (2.42)** | 7.40 (2.43) | 6.63 (2.50)* |
| Funding risk (Question 3) | 6.29 (2.76) | 6.73 (2.89) | 6.74 (2.65) | 6.22 (3.00)* | 7.04 (2.61) | 5.92 (2.94)** | 6.57 (2.77) | 6.44 (2.88) |
| Safety and security (Question 4) | 6.36 (2.47) | 6.59 (2.52) | 6.84 (2.30) | 6.05 (2.64)* | 6.69 (2.38) | 6.24 (2.59) | 6.44 (2.52) | 6.49 (2.47) |

Note: Likert scale: from 1 ('definitely will not invest') to 11 ('definitely will invest').

* 5% significance; ** 1% significance.

Table 4 Analysis of variance summary

| Source | Df | Mean square | F | Significance |
|------------------------------------------------------|-----|-------------|-------|--------------|
| <i>Panel A Australian retail investment products</i> | | | | |
| <i>Experimental treatment 1</i> | | | | |
| <i>Variations between investors</i> | | | | |
| Information load | 1 | 4.56 | 0.08 | 0.781 |
| Residual | 36 | 10.03 | 2.01 | |
| <i>Variations within investors</i> | | | | |
| News favourableness | 1 | 17.61 | 3.17 | 0.080 |
| Information load | 1 | 24.64 | 3.44 | 0.009 |
| Residual | | | | |
| <i>Experimental treatment 2</i> | | | | |
| <i>Variations between investors</i> | | | | |
| Information load | 2 | 9.01 | 0.65 | 0.528 |
| Residual | 36 | 13.85 | 4.80 | |
| <i>Variations within investors</i> | | | | |
| News favourableness | 1 | 90.46 | 31.36 | <0.001 |
| Information load | 2 | 62.35 | 21.61 | <0.001 |
| Residual | 36 | 3.88 | | |
| <i>Experimental treatment 3</i> | | | | |
| <i>Variations between investors</i> | | | | |
| Information load | 1 | 0.75 | 0.08 | 0.781 |
| Residual | 52 | 9.62 | 1.98 | |
| <i>Variations within investors</i> | | | | |
| News favourableness | 1 | 17.12 | 3.53 | 0.066 |
| Information load | 1 | 44.08 | 9.09 | 0.004 |
| Residual | 52 | 4.85 | | |
| <i>Experimental treatment 4</i> | | | | |
| <i>Variations between investors</i> | | | | |
| Information load | 1 | 8.20 | 1.25 | 0.267 |
| Residual | 95 | 6.57 | 0.79 | |
| <i>Variations within investors</i> | | | | |
| News favourableness | 1 | 492.17 | 58.78 | <0.001 |
| Information load | 1 | 85.83 | 10.25 | 0.002 |
| Residual | 95 | 8.37 | | |
| <i>Experimental treatment 5</i> | | | | |
| <i>Variations between investors</i> | | | | |
| Information load | 1 | 9.64 | 1.31 | 0.254 |
| Residual | 188 | 7.36 | 1.30 | |
| <i>Variations within investors</i> | | | | |
| News favourableness | 1 | 5.81 | 1.02 | 0.313 |
| Information load | 1 | 6.71 | 1.18 | 0.271 |
| Residual | 188 | 5.67 | | |
| <i>Panel B UK occupational pension schemes</i> | | | | |
| <i>Investment risk</i> | | | | |
| Environmental complexity | 1 | 16.30 | 3.39 | 0.07 |
| News favourableness | 1 | 10.07 | 2.85 | 0.09 |
| Residual | 136 | 7580 | | |
| <i>Funding risk</i> | | | | |
| Environmental complexity | 1 | 0.031 | 0.06 | 0.94 |
| News favourableness | 1 | 0.72 | 0.14 | 0.70 |
| Residual | 135 | 1074 | | |
| <i>Overall safety and security</i> | | | | |
| Information load * news favourableness | 1 | 8.67 | 1.73 | 0.19 |
| Investment risk | 1 | 28.16 | 7.33 | 0.01 |
| Funding risk | 1 | 46.47 | 12.10 | 0.002 |
| Residual | 135 | 833.88 | | |

Note: Dependent variable: likelihood of purchase (11-point scale).

For experiments 6 to 9, subject response rates were similar across all experiments, ranging from 19% in laboratory-based experiment 6 and 19.5% in laboratory-based experiment 7 through to 21.6% (out of 250) in laboratory-based experiment 8 and 24% in laboratory-based experiment 9. Although low, these response rates are similar to those obtained by other laboratory-based experiments of this type which rely on mail-outs. All of the investors who initially agreed to participate in the study subsequently completed and returned the questionnaire. Incomplete replies or incorrect addresses were not included in the sample response rates.

Table 3 shows the cell means and standard deviations of these responses (Panel A shows overall judgement responses by instrument; panel B breaks this down by type of condition). The ANOVA summary is presented in Table 4, Panel B.

Consistent with our disclosure hypothesis, investment intentions based on annual reports interact positively with news favourableness. We also find a two-way interaction or variation between both news favourableness and environmental complexity. All tests controlled for other explanatory variables and were robust to specification changes.

5.2 Interaction of within and between subject variations

To gain some insight into the interaction effects of the strength of association between the main effects variables on investment intention as required by the environmental complexity hypothesis H3, the LSD (least significance distance), between 'good news' and 'bad news' judgements was separately calculated, for each experiment, from the standard errors of differences of means derived from Table 3 (Rosenthal, 1987). Plots of the interaction of significant effects, using the overall F-tests reported in Table 4, are presented in Figure 2 for each experiment 1 to 5.

An understanding of the sensitivity of judgements to variations in the level of financial risk disclosures can be obtained through interpreting the range of significant effects between experimental treatments 1 and 3. Figure 2, Panel A (i) suggests that there is little interaction evident when comparing subject assessments based on detailed financial statements only with those based on detailed financial statements and abbreviated financial reports (experiment 1). The plot failed to indicate any significant direction of this interaction, except that the good news case assessment slightly increases where abbreviated financial reports are introduced. Thus, hypothesis H3 was not supported in experimental treatment 1.

However, for experiments 2 and 3 involving debenture investors, hypothesis H3 was supported. Figure 2, Panel A (ii) shows that there is a much more significant interaction of effects where financial ratios are added to a combination of detailed financial statements and abbreviated financial reports (experiment 2). The least squared difference (hereinafter 'LSD') of 0.666 required to derive statistically significant comparisons between news favourableness is exceeded for each level of disclosure. The LSD is most significant where the financial ratio is displayed in a prominent fashion and is indexed to the rest of the financial document. Finally, Figure 2, Panel A (iii) indicates a significant interaction of effects where disclosing detailed financial statements of the type examined in both experiments 1 and 2 is compared with disclosing only an abbreviated financial report and summary indicators (experiment 3). In this case the statistically significant LSD of 0.589 was exceeded only for the disclosure of summary indicators. Note that the combination case does not involve prominent disclosure of the summary indicator, unlike experimental treatment 2.

Hypothesis H3 was also supported for judgements of investment fund investors, examined in experiments 4 and 5. Figure 2, Panel A (iv) indicates that, compared to combination disclosures of detailed financial statements and financial ratios, documents containing abbreviated financial reports only more clearly distinguish subject assessments of good news and bad news cases (experimental treatment 4). In both cases, the LSD of 0.599 required for statistical significance of differences in news favourableness at each disclosure level was easily exceeded (Figure, Panel A 2(v)). However only when summary indicators are added to the abbreviated financial reports (experimental treatment 5), is the LSD of 0.346 required for comparison of news favourableness assessments exceeded. More significantly perhaps, both good news and bad news cases are more pessimistic at this disclosure level than the bad news assessment with the disclosure of detailed financial statements and summary indicator.¹⁴

For the pension fund disclosures, plots of the interaction of significant effects, using the overall F-tests reported in Table 4 Panel b, are presented in Figure 2, Panel B for each experiment variation effect 6 to 9.

An understanding of the sensitivity of judgements to variations in the level of financial risk disclosures can be obtained through interpreting the range of significant effects. Figure 2, Panel B (i) suggests that there is little interaction evident when comparing subject assessments based on variations purely in terms of investment risk (experimental variation 1). The plot failed to indicate any significant direction of this interaction, except that the good news case assessment slightly increases for investment performance. Thus the hypothesis was not supported in this experimental variation.

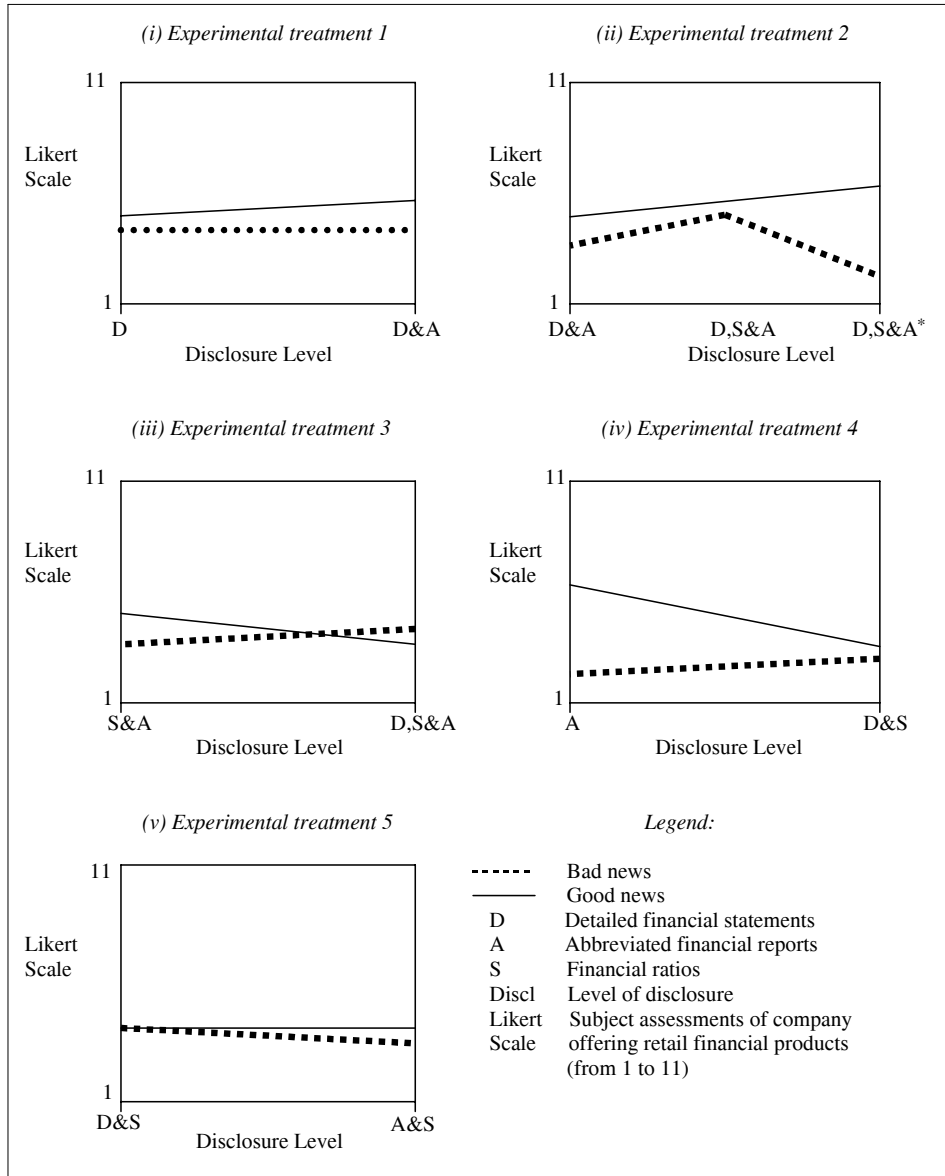
Figure 2 (ii) shows that there is a much more significant interaction of effects where overall analysis are added to funding risk (experimental variation 2). The least squared difference of 0.666 required to derive statistically significant comparisons between news favourableness is exceeded for each level of disclosure. Figure 2, Panel B (iii) indicates a non-significant interaction of effects where data load (in this case operationalised by public versus private pension scheme) is compared. In this case the statistically significant LSD of 0.589 was not exceeded. Note that the combination case does not involve prominent disclosure variation in risk, unlike variation 2.

The news favourableness hypothesis was also supported for variation in information load, examined in experiment 9. Figure 2, Panel B (iv) indicates that subjects can clearly distinguish subject assessments of good news and bad news cases (survey 9). The LSD of 0.599 required for statistical significance of differences in news favourableness at each disclosure level was easily exceeded. Finally Figure 2, Panel B (v) reports the extent of experimental variation in judgement quality in response to changes in fund risk. In this case, the LSD of 0.346 required for comparison of differing levels of funding risk is exceeded. This suggests that subject assessments are significantly affected by funding risk, independent of the variations with other factors.

Comments provided by a number of participants in support of their judgements included serious misgivings over the regulation, rationale and accountability of regulations governing pension schemes. Many of these comments appeared to express an overall sense of alienation and marginalisation with the existing governance and regulatory framework governing pension schemes. However it is not possible to gauge how these judgements affected the overall quantitative analysis, since there was no statistical correlation between the incidence of these comments and the recorded likert-type rating of the 'safety and security' of pension schemes.

Figure 2 Plots of interaction of significant effects

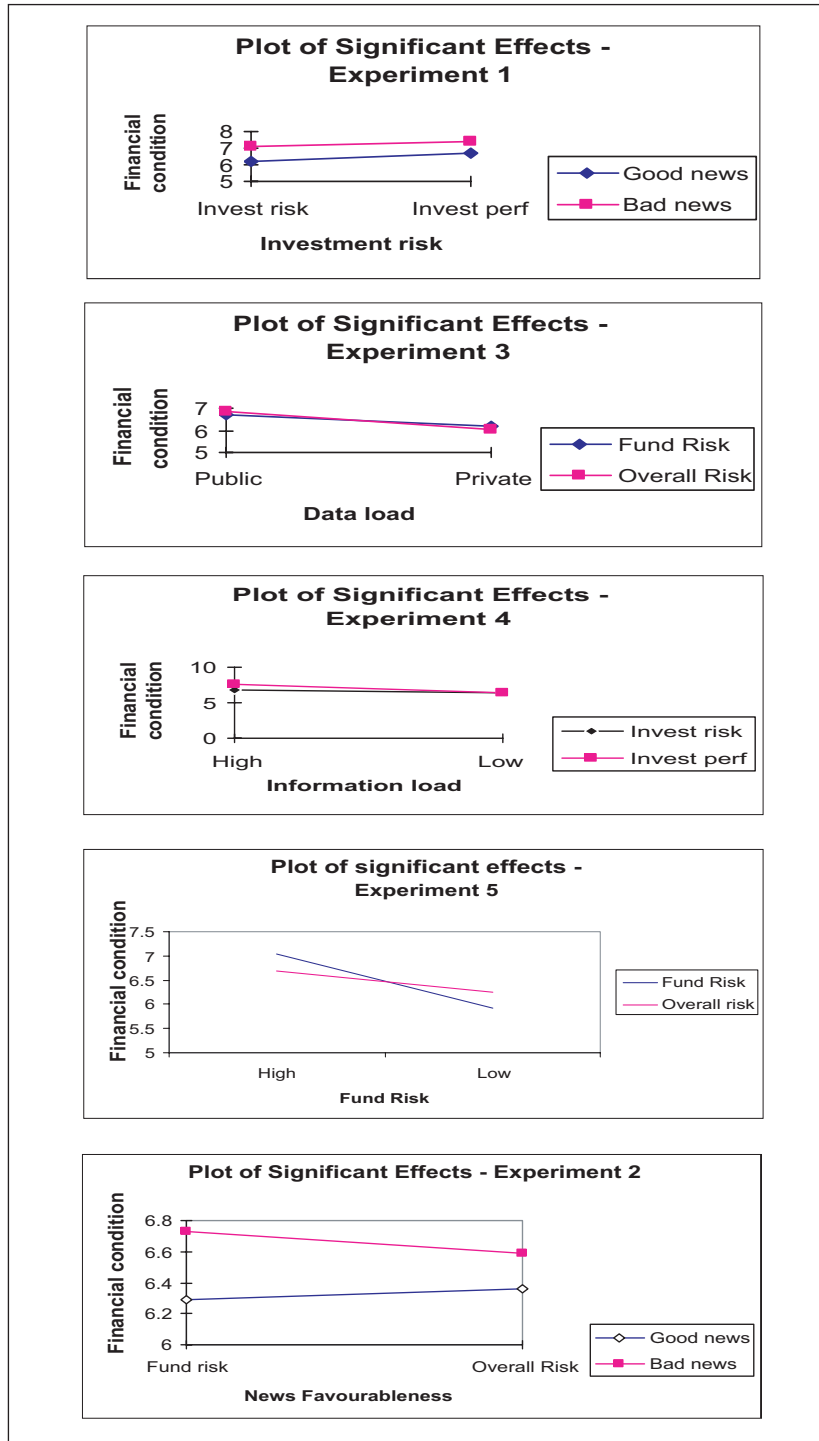
Panel A: Australian retail investments



Note: *In this case, the summary indicator was shown more prominently at the front of the prospectus.

Figure 2 Plots of interaction of significant effects (continued) (see online version for colours)

Panel B: UK Occupational pension schemes



The open-ended questions also helped determine whether the subjects followed the salient information cue(s) in reaching their judgements. This is standard practice in experiments of this type (Rosenthal, 1987).

6 Policy discussion

It is hypothesised that variations in news favourableness and information load and data load affect the probability of individual investors making a decision to invest in additional voluntary contributions on the basis of accounting information concerning the investment and funding risk of a pension scheme. These hypothesised relationships are tested in realistic task settings of varying combinations of financial risk and non-financial information contained in hypothetical pension scheme financial reports. The results are largely supportive of the hypothesised interactions between differences in news favourableness, information load and data load. However the overall results are further conditioned by variations between investors' judgements of news favourableness and both information load to only certain variations in information condition.

A number of novel research design features were developed to ensure a realistic task setting that is applicable to policy-makers. These choices necessarily exposed the study to internal validity threats, notably the assumed effects of the information condition on the intervening variables, the inability to discriminate between information load and data load as studied in previous tasks, the inability to measure the variables objectively, and the lack of verisimilitude of the research instruments and a lack of potential motivation by participating investors. Nevertheless, the empirical results are sufficiently robust to support all of the predicted relationships between these variables. Although the regulation of financial ratios, financial statements and detailed financial statements is pervasive, in general, very little is known how individuals assimilate such disclosures into their investment judgements. Judgement studies and analytical research often assumes that the primary subject of interest are professional investors, MBA students or auditors, who typically already have some experience in reviewing financial documents, adopt relatively focused and well-defined judgement making strategies, and typically use a limited number of information cues. By contrast, members of occupational pension plans are more likely to be financially unsophisticated, make investment judgements in unstructured environments, and must cope with vast amount of financial condition and non-financial risk disclosures that are provided directly by product offerors (Brennan, 1995).

The significance of pension funding risk and investment risk is generally a function of its nature, likelihood and magnitude. It is therefore a perception of human judgement, since it is function of how, by whom and under what circumstances it is perceived (Rescher, 1983; Boritz, 1990). Moreover, since many financially intermediated products are not directly tradeable, reliable information about their financial risk information is relatively costly to obtain (OECD, 1992). Consequently, most investment judgements faced by pension members to increase or reduce any additional voluntary contributions made to such schemes on the basis of the information conveyed by the pension fund annual report ultimately rely on their subjective judgements (Pines, 1983). Since very little is known about how pension members form mental models of the operation of

pension schemes, this suggests that the key to modelling their limited rationality is to understand their perceptions of financial risk disclosures, not postulating a 'boundedly rational' choice procedure (Lipman, 1991).

However, in contrast to the substantively rational judgement-making behaviour engendered by active capital market participants, where secondary sources of information are relatively costless to obtain, occupation pension schemes are featured by inelastic demand and limited rationality by pension members. Moreover, in contrast to the 'rational paradigm' assumption upon which many economic and psychology researchers often base their modelling of information processing abilities of rational judgement-makers, Brennan (1995) argues that pension members who invest in capital guaranteed, retail products are unlikely to completely understand the process of determining asset prices or the operation of financial markets.

Whereas rational investors are typically assumed by asset pricing and finance theory to know the precise probabilities linking options to outcomes, pension members must deal with ambiguity over the meaning and reliability of regulated financial reporting, together with complexity of outcome of investment judgements based thereon. In particular, many pension members face considerable ambiguity about whether to invest in additional voluntary contribution schemes, on the basis of variations in both information load and data load, and variations in news favourableness related to investment risk and funding risk.

Much of the research undertaken is based on a naturalistic approach to research, consistent with a grounded theory approach. This approach is considered to be applicable to the unstructured and unsophisticated financial knowledge of most pension scheme members. This research is conducted in the laboratory, using actual pension members and simulated realistic pension plan annual reports, rather than in a controlled laboratory-based experimental setting. This enables inferences over the strength of interaction between a pension plan's financial condition and the quality of pension investment and funding disclosures on investment judgements made by pension plan members. To the extent that the supplemental qualitative analysis of results also reveals significant alienation and marginalisation among participants concerning the system of UK regulations and corporate governance that underlies the current system of pension scheme financial reporting, the results also shed new light on an important public policy issue. However there is also correspondingly a reduced control over variable manipulations and subject randomisation, which must be inferred from the task itself, rather than pre-defined.

7 Conclusion

This paper examines the disclosure effectiveness of various disclosures with a series of laboratory-based experiments that deal with realistic investment judgement settings faced by retail investors in various retail investments and occupational pensions. It is hypothesised that the interaction of variations in both news favourableness and environmental complexity will affect the probability of pension members making a judgement concerning an additional voluntary contribution on the basis of investment and funding risk information conveyed by a pension fund annual report. This hypothesised relationship is tested in realistic task settings of varying combinations of financial risk and non-financial information contained financial documents in the form of prospectuses

and annual reports. The results are largely supportive of the hypotheses, although they are conditioned by the strength of interaction between investors' judgements of news favourableness and environmental complexity to only certain variations in information load.

Whereas rational investors are typically assumed by asset pricing and finance theory to know the precise probabilities linking options to outcomes, individual investors must deal with ambiguity over the meaning and reliability of regulated financial reporting, together with uncertainty of outcome of investment decisions based thereon. This paper examines, for a given variation in financial risk information condition (*i.e.*, a combination of ratios, abbreviated financial reports and detailed financial statements, as specified by regulation), the effect of three intervening variables:

- 1 news favourableness
- 2 information load
- 3 the interaction of (1) and (2), defined as environmental complexity, on individual investors' purchase decisions.

It is hypothesised that variations in each of the intervening variables and their interaction will affect the probability of purchase decisions. The results are largely supportive of these hypotheses, although are conditioned by the strength of interaction between investors' judgements of news favourableness and both information load to only certain variations in information condition.

These hypothesised relationships are tested in realistic task settings of varying combinations of financial risk and non-financial information in sales documents. A number of novel research design features were developed to ensure a realistic task setting that is applicable to policy-makers. These choices necessarily exposed the study to internal validity threats, notably the assumed effects of the information condition on the intervening variables, the inability to discriminate between information load and data load as studied in previous tasks, the inability to measure the variables objectively, and the lack of verisimilitude of the research instruments and a lack of potential motivation by participating investors. Nevertheless, the empirical results are sufficiently robust to support all of the predicted relationships between these variables, except for experimental treatment 5. This anomalous result is possibly due to the inability of individual investors to adequately distinguish detailed financial statements and abbreviated financial reports.

Subject to confirmation of these results in other institutional settings, these findings have important public policy-making implications for understanding conditions under which individual investor judgements about financial risk are sensitive to disclosure effectiveness. For investors in debenture securities, the results indicate that the mitigating influence of information overload causes judgements of news favourableness that are sensitive to the prominent presentation of key financial ratios, when combined with the presence of abbreviated financial reports and detailed financial statements. For investors in investment funds or guaranteed investment contracts, where financial disclosures by management firms or life insurance firms are typically less comprehensive and thus are not mitigated by information overload, the findings indicate that investor judgements are sensitive to the disclosure of abbreviated financial reports, either solely or in combination with key financial ratios.

Unlike prior research, which typically makes strong assumptions about the reliability of secondary information sources or about the judgement processes of a representative investor, this study presents evidence directly from the laboratory in assessing disclosure effectiveness of standard, well-known and mandated forms of financial risk disclosure for retail investors such as pension members. However to corroborate our findings, and in order to overcome the limitations of laboratory studies related to randomisation and manipulation of crucial independent variables, further research is needed to assess the disclosure effectiveness of non-standardised types of financial risk-based disclosures to pension members in other institutional settings.

Much of the research undertaken is based on a naturalistic approach to research, consistent with a grounded theory approach. This approach is considered to be applicable to the unstructured and unsophisticated financial knowledge of most retail investors. This research is conducted in the laboratory, using actual retail investors and simulated realistic prospectuses, rather than in a controlled laboratory-based experimental setting. This enables inferences over the strength of interaction between a promoter's financial condition and the quality of investment judgements made by investors. However there is also correspondingly reduced control over variable manipulations and subject randomisation, which must be inferred from the task itself, rather than pre-defined.

The research design developed in this study is appropriate for addressing empirical questions confronting financial rule-makers faced with designing standard forms of mandated financial risk disclosures in documents that are intended to influence the judgements of individual investors. Unlike prior research, which typically makes strong assumptions about the reliability of secondary information sources or about the judgement processes of a representative investor, this study presents evidence directly from the laboratory in assessing disclosure effectiveness of standard, well-known and mandated forms of financial risk disclosure for individual investors. Further research is needed to assess the disclosure effectiveness of non-standardised types of financial risk disclosures to individual investors in other institutional settings.

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Notes

- 1 Seminal work by Grossman (1981) and Milgrom (1981) provide an adverse selection argument for disclosure of information relevant to a buyer of a product sold by a seller of a unique product (*e.g.*, a retail financial product) not traded in secondary financial products markets, where all of the seller's statements are truthful and costlessly verifiable *ex post*.
- 2 Gadenne and Iselin (2000) argue that it is necessary to distinguish between information and data load because these two variables are processed very differently by decision-makers and McDaniel and Hand (1996) argue that experimental research of this kind can provide useful evidence on financial accounting questions relevant to accounting standard setters which has not been provided by prior accounting research.
- 3 These anomalies and inconsistencies in the regulation of apparently equivalent forms of retail security offerings were subsequently investigated by the Australian Law Reform Commission (1994) *Other Peoples' Money*, Australian Government Publishing Services, which recommended, *inter alia*, greater uniformity in disclosure laws.
- 4 The historical development of specified financial disclosure for inclusion in prospectuses in Australia and the UK can be traced to rule-maker reactions to failure of such organisations which caused investors to sustain large losses, rather than to any a priori regulatory concern about their perceived 'decision usefulness' to potential investors (Evans, 1974).
- 5 The former regulator of firm securities, the National Companies and Securities Commission and its state delegates (NCSC), was empowered under the former *Companies Codes 1981* to require the registration of 'long form' prospectuses offering securities (NCSC, 1984). Subsequently the NCSC permitted finance companies to issue 'short form' prospectuses. It also required investment funds and other forms of 'prescribed interests' to lodge a form of prospectus. However it did not undertake a rigid pre-vetting procedure as for debenture securities.
- 6 In January 1991 a new, nationally uniform firm securities regulatory regime was established under the *Corporations Law 1991*, which required, *inter alia*, that all prospectuses should contain 'all relevant information' to investors and their advisors (Section 1022). The regulatory body empowered to administer the new legislation, the Australian Securities Commission (ASC), still required the lodgement of prospectuses, but did not undertake any extensive pre-vetting procedure (ASC, 1992).
- 7 The regulator of the Australian life insurance industry under the *Life Insurance Act, 1945*, the Insurance and Superannuation Commission (ISC), introduced 'promotional brochure disclosure guidelines' for all offers of investment-linked life insurance policies in 1989.
- 8 The Australian institutional setting is not unique. Neuenschwander (1986) and Kripke (1981) describe similar inconsistencies in the regulation of documents offering various types of investment-linked retail securities in the USA during the equivalent period.
- 9 Hypotheses H1 and H2 test for the statistical significance of main effects variations in judgements about news favourableness to changes in task structure and context. Hypothesis H3 tests the extent of directional interaction between these factors in specific task settings.
- 10 The hypothesised relations recognise the results of experimental psychological research that if certain forms of disclosures in 'long form' documents can be made discriminable, novice search processes may be more effective and directed (Eriksen and Collins, 1969; Snyder, 1972).
- 11 The relatively lower sampling frames in experimental treatments 1 to 3 than for experimental treatments 4 and 5 reflects the higher research costs of (1) obtaining access to debenture register details and (2) mailing out research instruments, which on average contained significantly longer research instruments (reflecting the fact that debenture offerings involve longer hypothetical prospectuses).
- 12 The low response rate to the initial letter requesting investors to participate in the experimental treatments was partially attributable to the need to satisfy the privacy-related concerns of the financial institutions who granted access to their debenture registers. This meant that it was not possible to follow-up non-respondents to the initial letter.

- 13 Various specification checks were undertaken to validate the responses. Analysis of responses in order of receipt indicates that there was no significant difference in judgment quality, so this is unlikely to be a source of non-response bias for those investors initially asked to participate in the experiments. Self-reported times to complete the experimental task were analysed in experiment 4 and were found to be consistent with judgment. The reliability of judgments were also analysed by comparing subject preferences for each investment (questions 2 and 3) with their choice among the available alternatives (question 4).
- 14 Approximately 30% of respondents (consistent across all five experiments) indicated that they were experienced in financial statement analysis and/or held formal accounting qualifications. Based on this supplementary information, overall results were decomposed by level of subjects' financial experience.
- 15 Variation in experimental treatment of news favourableness for experiments 6 to 9 was primarily based on the funding status of the occupational-based pension scheme. Further variations by investment performance, although salient to the evaluation of retail investments, was not considered to be of sufficient relevance to pension scheme members, since performance is likely to be driven both by the trustees' discretion over the appropriate sectoral benchmark index against which performance is tracked, and the scheme's overall asset allocation strategy.

Appendix 1

Questionnaire sent to Australian retail investors

Please:

(1) Review the prospectuses of X Finance Company Ltd and Y Finance Company Ltd;

(2) Answer the following three questions by:

(a) circling a number on the scale of 1 to 11; and

(b) indicating the time you took to complete each task.

Question 1

(a) If you had some money available would you consider investing in debentures offered by X Finance Company Ltd?

| | | | | | | | | | | |
|------------|---|---|----------|---|---|----------|---|---|----|------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| definitely | | | probably | | | probably | | | | definitely |
| not | | | not | | | would | | | | would |

(b) Indicate approximately how long you took to complete your review of the X Finance Company prospectus and the above question.

The time taken was about _____ minutes

Question 2

(c) If you had some money available would you consider investing in debentures offered by Y Finance Company Ltd?

| | | | | | | | | | | |
|------------|---|---|----------|---|---|----------|---|---|----|------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| definitely | | | probably | | | probably | | | | definitely |
| not | | | not | | | would | | | | would |

(d) Indicate approximately how long you took to complete your review of the Y Finance Company prospectus and the above question.

The time taken was about _____ minutes

Question 3

(e) If you had to consider investing either in X Finance Company Ltd or Y Finance Company Ltd debentures, which would you prefer?

| | | | | | | | | | | |
|--------------|---|--------------|---|---|-------------|---|--------------|---|----|--------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| definitely | | probably | | | indifferent | | probably | | | definitely |
| would invest | | would invest | | | | | would invest | | | would invest |
| in X Finance | | in X Finance | | | | | in Y Finance | | | in Y Finance |

- (f) Indicate approximately how long you took to complete your review of the X Finance Company prospectus and the above question.

The time taken was about _____ minutes

- (g) Briefly indicate below your reasons for the preference given in part (a) of this question.

Use the space below to briefly discuss your reasons for the preference indicated in your response to Question 3(e).

Appendix 2

Questionnaire sent to members of pension schemes

Questions

Please review the annual report of X Pension Fund and answer the following four questions:

- (a) Circling a number on the scale of 1 to 11; and
- (b) Indicating the time you took to complete each task.

Question 1

- (a) **If you had some money invested would you consider the pension fund to be well invested?**

| | | | | | | | | | | |
|------|---|---|---|---|--------------|---|---|---|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Good | | | | | No firm view | | | | | Bad |

- (b) **Indicate approximately how long you took to complete your review of the Pension Fund report and the above question.**

The time taken was about.....minutes

Question 2

- (c) **If you had some money invested how would you rate the pension fund's performance?**

| | | | | | | | | | | |
|------|---|---|---|---|--------------|---|---|---|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Good | | | | | No firm view | | | | | Bad |

- (d) **Indicate approximately how long you took to complete your review of the Pension Fund report and the above question.**

The time taken was about.....minutes

Question 3

- (e) **How do you consider the pension fund's current funding position?**

| | | | | | | | | | | |
|------|---|---|---|---|--------------|---|---|---|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Good | | | | | No firm view | | | | | Bad |

- (f) **Indicate approximately how long you took to complete your review of the Pension Fund report and the above question.**

The time taken was about.....minutes

Question 4

- (g) **Based on your review, how safe and secure is the pension fund?**

1 2 3 4 5 6 7 8 9 10 11

Good

No firm view

Bad

- (h) **Indicate approximately how long you took to complete your review of the Pension Fund report and the above question.**

The time taken was about.....minutes

- (i) **Briefly indicate below your reasons for the preference given in part (a) above.**