Ownership, Competition, and Financial Disclosure

Birt, Jacqueline L.; Bilson, Chris M.; Smith, Tom; Whaley, Robert E.

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J.L. BIRT*
C.M. BILSON**
T. SMITH**
R.E. WHALEY***

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Abstract

A firm's incentive to disclose has been linked empirically to a range of variables including information asymmetry, agency costs, political costs, and proprietary costs. While the intuition underlying each of the variables seems plausible, Verrecchia (2001) argues that disclosure models can be characterized as an eclectic mingling of highly idiosyncratic economic-based models and challenges researchers to take the first steps to unification. First, we investigate the role of ownership and competition variables in explaining voluntary segment disclosures in Australian firms and find support for both these variables. Second, drawing on theory supported by the corporate governance, strategic management and industrial organization literatures we introduce a new economic variable that unifies both ownership and competition variables. We find that the unifying variable performs better than our model focusing on ownership and competition variables alone. We conduct a series of robustness tests on the model and find that its significance is not affected by the inclusion of disclosure control variables identified in prior literature, the change in standard, and acquisitions and disposals of physical assets.

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*School of Accounting and Business Information Systems, Australian National University, ** School of Finance and Applied Statistics, Australian National University, and ***Owen Graduate School of Management, Vanderbilt University. Comments and suggestions by Mike Bradbury, Peter Clarkson, Robert Faff, Bruce Grundy, John Handley, Paul de Lange, Gordon Richardson, two anonymous referees, as well as seminar participants at Monash University, the University of Melbourne Finance Seminar Series, UNITEC seminar series, the 2003 AGSM Accounting and Finance Research Camp in Sydney and the 2003 AFAANZ conference in Brisbane are gratefully acknowledged. Petra Fleischer provided valuable assistance in data collection.

OWNERSHIP, COMPETITION, AND FINANCIAL DISCLOSURE

1. Introduction

Verrecchia (2001) categorizes disclosure research into three broad groups—association-based, discretionary-based, and efficiency-based. Association-based research investigates the relation between exogenous disclosure and change in investors' individual actions. Discretionary-based research investigates how firms use their discretion regarding information that does not require mandatory disclosure. Efficiency-based research examines unconditional disclosure choices characterized by endogenous consumers.

The focus of this paper is on the discretionary-based research which models the firm's incentives or disincentives to disclose as a function of a range of variables including information asymmetry, agency costs, political costs, and proprietary costs.[1] Verrecchia (2001) argues that this disclosure literature can best be characterized as an eclectic mingling of highly idiosyncratic economic based models and challenges researchers to take the first steps at unification. First, we investigate the role of ownership and competition variables in explaining voluntary segment disclosures in Australian firms. Second, we introduce a new economic variable *"OC"* that unifies both the ownership and competition variables.

Previous disclosure studies have found significant results for variables originating from agency, political cost, information asymmetry and proprietary cost theories. Agency theory suggests that as a means of mitigating divergent interests between principals and agents, firms may use different methods which include bonus share plans, performance-based contracts and voluntary disclosures. Further, corporate governance literature suggests that large shareholders (eg. institutional investors) play an active role in the monitoring and control of firms and have an implicit obligation to other shareholders in ensuring that firms are run in the best interests of all shareholders. The large shareholders have a greater willingness to discipline poorly performing management and more incentive to intervene and exercise 'voice' (Mayer, 1997). Thus, large shareholders have the ability to mitigate the agency problems inherent in a firm by influencing the voluntary disclosures made by the firm. We acknowledge these findings and construct a disclosure model testing our ownership variable *O*.

[1] See Botosan (1997), Deegan and Gordon (1996) and Kelly (1994).

Theories that explain a firm's decision not to disclose, such as proprietary cost theory; consider costs that arise when the disclosure of private information may harm the firm's competitive position. Firms operating in a low competition environment have less incentive to disclose private information as it has more potential to harm their competitive position. Conversely, firms operating in a highly competitive environment may have greater incentive to disclose as there is potentially less risk to their competitive position and in fact, the release of additional information could benefit the firm by reducing information asymmetries between management and the shareholders (Hayes and Lundholm, 1996, Harris, 1998, Botosan and Stanford, 2005). This release of additional information provides shareholders and other users with information to better validate the results of the firm. We acknowledge these findings and construct a disclosure model testing our competition variable *C*.

After examining the roles of ownership and competition variables on disclosure we then examine the role of a new variable which unifies both ownership and competition. Our *OC* variable draws upon the corporate governance, strategic management and industrial organization literatures. Corporate governance suggests an interaction between ownership and competition as the impact of corporate governance mechanisms may be influenced by the degree of market competition (Mayer, 1997, Januszewki et. al 2001, Aoki, 1994, Aghion and Howitt, 1996). Further, shareholders are more able to monitor the actions of management when firms operate in a competitive environment. (Nickell, 1996, Nickell et. al 1997).

The strategic management and industrial organization literatures also suggest an interaction between ownership and competition. This literature refers to the success of a firm depending on the internal environment such as ownership structure and incentive schemes and the external environment in which the firm operates such as competition. Porter (1981) argues that a successful firm must match its internal competencies and values to its external environment and Saloner (1991) adds that internal issues and external issues are important inputs to a firm's decision-making approach.

Our unifying variable *OC* is measured as the product of ownership and competition. We use the percentage of shares held by the top 20 shareholders to proxy for ownership, and we measure the level of industry competition as 1 minus the Herfindahl index of industry concentration. We test whether this new variable, enhances our ability to explain voluntary

disclosure decisions. To test our hypothesis, we focus on voluntary segment disclosures because they have been found to be value relevant in forecasting sales and profits.[2] Our empirical analyses use firm's segment disclosures for 2001 under the original Australian Accounting Standards Board (AASB) standard and for 2002/2003 under the revised standard. This unique regulatory background featuring a change in segment reporting standard provides us with an additional test of robustness for the model featuring our *OC* variable. Our results demonstrate that both the *O* and *C* variables individually are statistically significant in explaining voluntary disclosures. Further, we find strong results that the *OC* variable does in fact enhance the ability of the model to explain voluntary disclosure. We conduct a series of robustness tests on our *OC* variable and find that the *OC* variable is robust to the inclusion of variables measuring the change in standard and acquisitions and disposals of other firms.

A greater understanding of the incentives to disclose financial information is timely as jurisdictions worldwide are currently undergoing international harmonization projects with accounting standards which will result in changes to disclosure practices. On January 1 2005, Australian equivalents were adopted of the International Financial Reporting Standards (IFRS), and the Financial Accounting Standards Board (FASB) is currently committed to a project with the IASB to harmonize their standards.

The remainder of the paper is organized as follows. Section 2 outlines the institutional setting of AASB 1005 *Segment Reporting.* Section 3 summarizes the main hypotheses regarding discretionary disclosures. Section 4 outlines our methodology and empirical measures, and Section 5 provides the descriptive statistics. Section 6 reports the results of our empirical tests. Section 7 contains a discussion of the robustness tests, and Section 8 describes the main conclusions and suggests avenues for future research.

2. Institutional setting

Segment reporting refers to the disclosure of results from operating in markets with different rates of profit, different degrees of risk, and different opportunities for growth. Segment reporting disclosures are useful for investment decision-making. Disaggregated industry and geographic segment data can provide analysts and investors with important, incremental

[2] See Kochanek (1974) and Aitken *et al* (1994).

information about the different markets within which the company operates.[3] Local and international standards require the disclosure of information regarding business and geographic segments. The Australian Accounting Standards Board (AASB) has released two standards on segment reporting: AASB 1005 *Financial Reporting by Segments* and the revised AASB 1005 *Segment Reporting*[4]. The current U.S. standard is SFAS 131 *Reporting Disaggregated Information about a Business Enterprise*, and the current international standard is IAS 14 *Segment Reporting.*

2.1 Segment reporting standards in Australia

Australia's original segment standard AASB 1005 *Financial Reporting by Segments* was released in 1986 and required firms to disclose segment revenue, segment result, and the carrying amount of segment assets for both industry and geographical segments. In August 2000, the AASB issued the revised standard AASB 1005 *Segment Reporting* whereby firms are required to identify their segments in line with their internal organizational structure and internal reporting system. This approach, known as the "management approach,"[5] differs markedly from the original "industry approach". The revised standard also allows firms to choose whether line of business (LOB) or geographic area (GEO) will be a primary or a secondary segment disclosure.[6] The required disclosures for primary segments are much more extensive than for secondary segments. The standard stipulates that firms' must disclose segment revenue, segment profit, segment assets, segment liabilities, acquisition of segment assets, depreciation and amortization of segment assets, other non-cash segment expenses, segment share of the net profit/result of associates or other investees and segment carrying amount of investments in the associates. The revised standard also encourages voluntary disclosure of additional information such as segment cash flows and segment inventory write-downs. For secondary segments, the standard requires disclosure of segment revenues, the carrying amount of assets, and the cost of property, plant and equipment, and

[3] See, for example, Kochanek (1974) and Aitken, Czernkowski and Hooper (1994).
[4] As part of the Australian adoption of IFRS, AASB 1005 Segment Reporting has now been reissued as AASB 114 Segment Reporting.
[5] The "management approach" has been adopted from the U.S. standard SFAS 131 and the international standard IAS 14R.
[6] A geographic segment is classified as primary if the entity's risks and returns are affected predominantly by the fact that it operates in different countries or other geographical areas. A business segment would be primary if the entity's risks and returns are affected predominantly by the differences in the products and services it provides.

intangible assets acquired during the period. A segment's profit is not a required disclosure for secondary segments, under the revised AASB 1005.

2.3 International harmonization of segment standards

In recent years, there has been a trend towards increasing global comparability in financial reports. In 2005, Australian companies preparing financial reports under the Corporations Act 2001 must comply with the Australian equivalents to the IFRS of the IASB for financial years beginning on or after January 1, 2005. While the U.S. is not adopting IFRS, it is an important partner to the IASB and is working on projects to reduce the differences in FASB and IASB standards. The implementation of IFRS and the harmonization of standards internationally will have repercussions for companies in the preparation and presentation of financial reports.

3. Theoretical framework

Positive accounting theory deals with management's motives in making accounting choices. Within this framework, disclosure research focuses on the role of capital market incentives in the firm's disclosure decisions. Verrecchia (2001) categorizes disclosure research into three broad groups. The first, association-based research, investigates the relation between exogenous disclosure and the change in investors' individual actions. The second, discretionary-based research, investigates how firms use their discretion in revealing information when reporting is not mandated. The third, efficiency-based research, examines unconditional disclosure choices characterized by endogenous consumers.

Discretionary-based disclosure research, the focus of this study, considers the incentives and disincentives for disclosing additional financial information in a capital market setting. Incentives to disclose include (a) mitigating the affects of information asymmetry, (b) decreasing potential political costs, and (c) monitoring agents to reduce agency costs. The primary disincentive for disclosing additional financial information is potential proprietary costs. Table 1 summarizes past research in terms of hypotheses tested and test results. While these studies have found significant results for a number of variables, to our knowledge no study has yet tested the significance of a variable unifying different theories of discretionary disclosure.

3.1 Information asymmetry hypothesis

Informational asymmetry impedes the efficient allocation of resources. It arises when markets do not perfectly aggregate private information, and can lead to higher transaction costs, lower liquidity, and, ultimately, mis-pricing of the firm's shares. The effects of information asymmetry can be mitigated in a number of ways, including contracting, regulation through information intermediaries. Accounting disclosures are also a means of disseminating information to less informed parties. Several studies have examined the role of information asymmetry proxies and the presence of voluntary disclosure. Botosan (1997), for example, uses analyst following to proxy for information asymmetry and finds that firms with lower analyst following have a propensity for higher disclosure, and, consequently, experience a reduction in their costs of capital. For firms with higher analyst following, she finds no significant relation. Past studies also find that size is related to the level of information asymmetry. Atiase (1985), Bamber (1987), and Diamond and Verrecchia (1991) find information is incorporated in stock price more quickly for large firms than small firms. In the same spirit, King et.al (1990) argue that the incentives for disclosure are greater for larger firms. Studies also investigate the relation between ownership and information asymmetry. Healy et.al (1999) find a link between increased disclosure and higher percentages of institutional ownership. Jiambalvo et.al (2002) find that current earnings are more likely to reflect future earnings when firms' have high percentages of institutional ownership. These findings are further corroborated by evidence regarding the relation between disclosure and diffused ownership. Mitchell et. al (1995) and Aitken et. al (1997), for example, conclude that voluntary disclosures vary directly with the percentage of significant owners.

3.2 Political costs

Political costs may also explain voluntary disclosure decisions. Belkaoui and Karpik (1989) find that firms employ a number of devices (including voluntary disclosures) to avoid the attention of external parties such as government regulators, suppliers, and unions.[7] Deegan and Gordon (1996) find that firms with high political visibility in the marketplace increase disclosures as a means of mitigating potential political costs. Distinguishing between the political cost hypothesis and other disclosure theories is often difficult, however. Political costs are usually measured using firm size, which, as noted earlier, is often used as a proxy for information asymmetry.

3.3 Agency costs

[7] See Belkaoui and Karpik (1989).

Agency costs arise when principals and agents have conflicting incentives.[8] As a means of mitigating divergent interests, principals may use different incentives to monitor their agents. The possibilities include performance-based contracts, bonus share plans, debt covenants, audit committees, as well as increased disclosure. Bradbury (1991) and Chow and Wong-Boren (1987) document that firm characteristics such as firm size, leverage and fixed assets in place affect voluntary disclosures by influencing the degree of agency and contracting costs experienced by the firm. Holthausen and Leftwich (1983) find support for firm-size and leverage variables.

Several segment disclosure choice studies provide evidence consistent with the Holthausen and Leftwich findings. Foster (1986), for example, notes that firm size is the most commonly-used control variable in disclosure studies, see for example McKinnon and Dalimunthe (1993), Bradbury (1992), and Berger and Hann (2002). Studies also report a positive relation between disclosure and being audited by an international auditing firm. Street and Gray (2001) argue that a "big four or five" auditor encourages firms to be forthcoming in their disclosures as part of the monitoring process associated with reducing agency costs. Past research also suggests that the proportion of fixed assets in place and voluntary disclosure are related. Bradbury (1992) and Chow and Wong-Boren (1987) argue that firms with large proportions of fixed assets in place are expected to experience lower agency costs, and, consequently, will have less incentive for voluntary disclosures.

Studies also examine the relation between ownership structure and disclosure using explanatory variables such as directors' shareholdings and CEO remuneration. Jensen and Meckling (1976) argue that agency costs increase with the proportion of outside capital. Nagar et. al (2003) find a positive relation between disclosure and the level of CEO share ownership. In firm performance studies, ownership structure plays an important, albeit empirically ambiguous, role. Berle and Means (1932) find an inverse correlation between ownership and firm performance. Demsetz (1983), on the other hand, argues there should be no relation between variation in ownership and firm performance because the ownership structure of a firm is a multidimensional variable and should be seen as an endogenous outcome of decisions that reflect the influence of shareholders. In the burgeoning corporate governance literature, studies have shown that the large investors (eg. the top 20 shareholders) play an active role in the

[8] See Healy and Palepu (2001).

monitoring and control of firms. These shareholders have greater willingness to discipline poorly performing management and more incentive to intervene and exercise voice (Mayer, 1997).

3.4 Proprietary costs

The discretionary disclosure literature also considers theories that explain a firm's decision not to disclose. Dye (2001) posits that, if disclosure is discretionary, firms will choose to disclose favorable information and not to disclose unfavorable information.[9] Related to this are proprietary costs. Proprietary costs arise when private information, if released, may harm the firm's competitive position. Verrecchia (2001) examines the role of proprietary costs in explaining a firm's decision to withhold the release of additional information.

Segment information is important to users of financial reports. Firm operations can vary significantly across line of business and geographic segments, and firm segments can vary according to the rates of profit, levels of risk, and opportunities for growth. Segment disclosures contain value relevant information that may help investors and analysts predict future profits and revenues. At the same time, segment disclosure information may be useful to external, and potentially adversarial, parties such as suppliers, employees, unions and competitors. Consequently, management must exercise discretion, taking into consideration the impact of the market release of potentially harmful information.

In determining an appropriate level of disclosure, firms must, therefore, consider factors such as the competitiveness of the industry in which they operate. Hayes and Lundholm (1996) predict that managers alleviate competitive costs through non-disclosure. The empirical evidence regarding the relation between competition and disclosure is mixed. Verrecchia (1983) and Wagenhofer (1990), on one hand, find that firms in more competitive industries provide less informative disclosures. On the other, Harris (1998) and Botosan and Stanford (2005) find that operations in less competitive industries are less likely to be reported as industry segments. This suggests that managers attempt to conceal information that may allow rival firms to capture these profits. Hayes and Lundholm (1996) find that a firm disaggregates consolidated information into segment information in a highly competitive environment in order to reduce information asymmetries.

[9] See also, Hayes and Lundholm (1996) and Ronen and Livnat (1981).

Firm performance is another determinant in the decision to disclose. The empirical studies on the relation between firm performance and disclosure are mixed. Lev and Penman (1990) suggest that firms tend to be more forthcoming when the firm is experiencing favorable earnings results. Lang and Lundholm (1993) show otherwise. Prencipe (2004) shows that the competitive costs associated with segment disclosures, however, tend to increase as the profitability of the reporting entity increases. Berger and Hann (2002) also find that firms aggregate segment information when there are large variances in segment profits in order to protect abnormal profits.

On balance, the literature appears to support the position that firms with low competition have higher proprietary costs (and greater potential to make abnormal profits), and, consequently, have less incentive to disclose proprietary information to rivals. Firms in more competitive industries, however, have greater incentive to disclose information in order to reduce information asymmetries.

4. Effect of ownership and industry competition

This paper first investigates the role of ownership and competition variables in explaining voluntary segment disclosures in Australian firms. Second, in the spirit of Verrecchia (2001), we attempt to improve existing economic models of voluntary disclosure by introducing our *OC* variable that unifies both ownership and competition variables.

Support for our ownership variable is found in the agency and corporate governance literature. Agency theory suggests that as a means of mitigating divergent interests, principals may use different incentives to monitor their agents which include bonus share plans, performance-based contracts and increased disclosures. Studies have examined the relation between ownership structure and agency costs (Jensen and Meckling, 1976), and ownership structure and voluntary disclosures (Nagar et.al, 2003) and found a positive relationship between disclosure and the level of CEO share ownership. Further, corporate governance literature suggests that large shareholders (eg. institutional investors) play an active role in the monitoring and control of firms and have an implicit obligation to other shareholders in ensuring that firms are run in the best interests of all shareholders. The large shareholders have a greater willingness to discipline poorly performing management and more incentive to intervene and exercise ‘voice’ (Mayer, 1997). Thus, large shareholders have the ability to mitigate the agency problems inherent in a firm by influencing the

voluntary disclosures made by the firm. We acknowledge these findings and construct a disclosure model testing our ownership variable *O*.

Support for our competition variable is found in the proprietary cost literature. Studies have found that firms with low competition have higher proprietary costs (and greater potential to make abnormal profits), and, consequently, have less incentive to disclose proprietary information to rivals. Additionally, the literature suggests that firms in more competitive industries have greater incentive to disclose to reduce information asymmetries between management and the shareholders (Harris, 1998, Botosan and Stanford, 2005). This release of additional information provides shareholders and other users with information to better validate the results of the firm. We acknowledge these findings and construct a disclosure model testing our competition variable *C*.

Our study also introduces a new economic variable *OC* which unifies both ownership and competition variables. This unified variable is implied through the corporate governance literature which suggests a possible interaction between ownership and competition. Mayer (1997) argues that the effectiveness of difference types of governance systems (eg. ownership structure of the firm) may be influenced by the degree of product market competition. This interaction is also echoed in the industrial organisation literature where Nickell (1996) and Nickell et. al (1997) suggest that shareholders are more able to monitor the actions of management when firms operate in a competitive environment. Further support for our *OC* variable is suggested in the strategic management literature where Porter (1981) argues that a successful firm must match both its internal and external environments. This interaction is also suggested in the industrial organization literature where Tirole (1990) and Schmalensee and Willig (1989) describe how decisions concerning ownership structure can impact on the firm's competitive position in the marketplace.[10] Further, Saloner (1991) adds that external factors such as competition, combined with internal factors such as incentive schemes, are important inputs to a firm's decision-making approach.

Thus, we propose that a management's decision to voluntarily disclose segment information depends on the ownership structure of the firm and the competition environment in which the firm operates. Further we propose that the decision can depend jointly on these two factors. We measure the firm's large shareholders using the percentage of shares owned by the top 20 shareholders *O*.

[10] In the early 1990s, a special issue of the Strategic Management Journal (Vol, 12, 1991) examines the relation between strategic management and economics and indicates areas for future research using the linkage between the two disciplines.

We theorize that, with high levels of *O*, the large shareholders will influence a firm's voluntary disclosure choices. To proxy for the competition of the firm, we use the degree of industry competition faced by the firm, as measured by 1 minus the Herfindahl index, (1-*HI)*.[11] The *HI* for each industry is calculated for 36 industries using the top 500 firms on the Australian Stock Exchange. The Herfindahl index for industry *j* is

$$HI_j = \sum_{i=1}^{n_j} \left(\frac{R_{ij}}{R_j} \right)^2 , \qquad (1)$$

where R_{ij} is the revenue of firm *i* in industry *j* (as defined by the 4-digit SIC code), n_j is the number of firms in industry *j*, and $R_j \equiv \sum_{i=1}^{n_j} R_{ij}$ is the total of revenue for all firms in industry *j*. Firms operating in more competitive industries (*1- HI*) are expected to have more incentive to disclose.

Combining elements, we hypothesize that the product of large shareholders and high competition, *OC*, is positively related to the amount of segment disclosure. This model can be expressed as;

$$VD = f(OC) \qquad (2)$$

Where *VD* is voluntary disclosure and *OC* represents the product of the ownership variable *O* and the competition variable *C*. In model (2), the change in disclosure is modelled as the interaction of both ownership and competition.

The appropriateness of this specification can be determined by comparison with the following models;

$$VD = f(O) \qquad (3)$$

$$VD = f(C) \qquad (4)$$

[11] Other proxies for competition have been used in segment studies including the four firm concentration ratio and the speed of abnormal profit adjustment. See, for example, Leuz (1999) and Harris (1998). We choose the Herfindahl index as it is widely used in research and practice including the U.S. Department of Justice in its antitrust investigations.

$$VD = f(O, C) \tag{5}$$

These models present the alternative views that voluntary disclosure is determined solely by either ownership *O* (as in the case of model 2) or competition *C* (as in the case of model 3), or by a combination of the independent influences of ownership and competition (model 5).

Finally, we include both the ownership *O* and competition *C* variables and our interaction variable *OC* to the model. Thus,

$$VD = f(OC, O, C) \tag{6}$$

If our hypothesis is correct, that it is the interaction of ownership and competition which determines voluntary disclosure, then model (2) should dominate models (3), (4), (5) and (6).

Next, we explicitly consider the voluntary disclosure work of past investigators. Section 3 and table 1 indicate that firm size, leverage, fixed assets in place and cross listing are the variables that most frequently are found to be associated with voluntary disclosures. We also include auditor and profitability which have also been found to be significant. Therefore we propose the following model based on the current state of the literature:

$$VD = f(RETURN, FAIP, AUDITOR, LEV, LOGTA, CROSS) \tag{7}$$

where *VD* is voluntary disclosure, *RETURN* is stock return, *FAIP* is fixed assets in place, *AUDITOR* is an indicator variable for the prestige of the firm's auditor, *LEV* is the firm's debt ratio, *LOGTA* is the natural logarithm of total assets and *CROSS* indicates whether a firm is cross-listed.

We hypothesise that our *O* variable has explanatory power in explaining voluntary segment disclosures. We also hypothesise that our *C* variables has significant explanatory power. We then turn to our unifying, interaction variable *OC* and hypothesis that *OC* will provide significant incremental explanatory power. Our measures of the explanatory variables are as follows: (a) stock return, *RETURN*, is the annualized logarithmic stock return including dividends and price appreciation, (b) fixed assets in place, *FAIP*, is measured as the book value

of fixed assets relative to total assets, (d) *AUDITOR* is a dummy variable set equal to 1 if the firm's auditor was a "big five" firm in 2001 or a "big four" firm in 2002 or 2003, and 0 otherwise, (d) leverage, *LEV*, is the book value of debt divided by market value of equity and the book value of debt, (e) *LOGTA* is the natural logarithm of total assets and (f) *CROSS* is an indicator variable which takes a value of 1 if a firm is cross-listed and zero otherwise.

Therefore, to test our hypothesis we consider the following model,

$$VD = f(OC, RETURN, FAIP, AUDITOR, LEV, LOGTA, CROSS) \quad (8)$$

We also test both the ownership *O* and competition *C* variables individually in this model. Thus,

$$VD = f(O, C, RETURN, FAIP, AUDITOR, LEV, LOGTA, CROSS) \quad (9)$$

Finally we test our *OC* interaction variable and the *O* and *C* variables individually alongside the previously tested variables. Thus,

$$VD = f(OC, O, C, RETURN, FAIP, AUDITOR, LEV, LOGTA, CROSS) \quad (10)$$

5. Empirical measures, sample selection and descriptive statistics

5.1 Data

To examine firms' segment reporting practices, we use the *Connect 4* database to access financial reports for the Top 500 Australian companies for the years 2001 through 2003. Segment reporting information, if disclosed, is located in the notes of the financial reports. Of the Top 500 reports examined for the year 2001, 263 disclosed segment information. Under the revised standard in 2002 and 2003, 276 and 286 firms disclosed segment information, respectively, bringing the total to 825 for the entire sample.

As noted earlier, we measure competition using the Herfindahl index. The index is based on the industry groups of the entire sample of Top 500 Australian firms. We categorize the Top 500 Australian firms according to the 36 Global Industry Classification Scheme (GICS) four-

digit industry group from the Centre for Research in Finance (CRIF). Table 2 provides a breakdown of the sample and their relevant industries for 2001 through 2003. In no year does a single industry dominate in our assignment of the dependent variable.

5.2 Voluntary segment disclosure variables

The dependent variable used in our model, *VD*, is a dichotomous variable. Its value is set equal to 1 in 2001 if the firm reported other disclosures aside from the required revenue, result and segment assets. All other firms are coded 0. For the years, 2002 and 2003, *VD* reflects disclosures that are in addition to the required nine primary items and three secondary items as outlined in section 2.1. Firms making such disclosures are coded 1. All others are coded 0.

5.3 Descriptive statistics

Table 2 also provides statistics for the voluntary disclosure variable, *VD*. In 2001, 107 of 263 or 41 percent of firms provided voluntary segment disclosures. In 2002 and 2003, the percentages were 51 and 67[12], respectively. Voluntary segment disclosures include items such as: additional segment revenue, amortization of goodwill, write-down of inventory, income tax, significant items, segment bad debts, and segment cash flow from operating activities. Table 3 presents the descriptive statistics of the independent variables for the pooled sample, 2001 through 2003. The mean percentage of shares held by the top 20 shareholders variable is 62.59 percent across the observations in the sample. The competition variable as measured by 1 minus the Herfindahl index for each industry is 66.53 percent, and the mean of the product of ownership and competition *OC*, is 41.66 percent. More than 82 percent of the firms had a big 4/big 5 auditor. The average debt ratio is 44.85 percent, and the average fixed assets in place variable is 59.86 percent. Approximately 13.21 percent of firms in the sample were cross-listed and the mean annualized stock return is about -4 percent.

5.4 Correlation matrix

Table 4 contains the pair-wise correlation coefficients between the model variables using the full sample period, 2001 through 2003. Naturally, the interactive variable *OC* and its components, *O* and *C*, are highly positively correlated with correlations of .793 and .587

[12] The percentage of voluntary disclosures has obviously increased over the 2001-2003 period. This increase is possibly due to the revised standard explicitly stating examples of voluntary disclosures that a firm may choose to disclose.

respectively. The *LOGTA* variable is highly correlated with *LEV* (.529). The correlation with *FAIP* is .302, and with the product variable, *OC*, is $-.115$. Apart from *LOGTA*, the *OC* variable is relatively weakly correlated with the other variables. The lack of correlation between *OC* and the other independent variables in model (3) mitigates possible concerns about the effects of multi-collinearity in model estimation.

6. Empirical tests and results

The focus now turns to examining the role of ownership and competition variables and the incremental contribution of our measure of the interaction variable of the firm, *OC*, in explaining voluntary segment disclosures, *VD*. We begin by examining the relation between *VD* and *O* and *C*. We then turn to identifying the contribution of the *OC* variable.

6.1 Examining the role of ownership, competition and the interaction OC variable

Our first test involves regressing voluntary segment disclosures *VD* on the ownership variable *O* using a pooled time-series, cross-sectional probit model for the three years of data. The results of the probit regression are reported in Table 5 and are significant in a statistical sense (*t*-ratio $=1.97$). This evidence suggests that firms having high levels of shares owned by top 20 shareholders are more likely to disclose voluntary segment items. Our second test involves regressing voluntary segment disclosures *VD* on the competition variable *C* for the three years of data. The results of the probit regression are also reported in Table 5 and show that *VD* and the *C* are positively related and significant in a statistical sense (*t*-ratio $=2.86$). Our third test involves including both the *O* and *C* variables and the results show that these variables are both significant (*t*-ratio $=1.97$) and (*t*-ratio $=2.86$) respectively. Fourth we identify the contribution of our interaction variable *OC* alone and as predicted, *VD* and the interaction variable *OC* are positively related, and highly significant in a statistical sense (*t*-ratio $=3.30$). We also conduct a fifth test which involves regressing *VD* on each of the variables i.e. *O, C* and *OC* and we find that *O* and *C* fail to add anything to *OC* by itself. This can be seen in the results of the likelihood ratio test statistic (*LR*) which is calculated as:

$$LR=-2(RLLF-ULLF)$$

and is distributed as a χ^2_k under the null, where *k* is the number of coefficients being restricted, and *RLLF* (*ULLF*) is the restricted (unrestricted) log likelihood function. Therefore:

$$LR = -2(-564.25+563.59) = 1.32,$$

which follows a chi-squared distribution with 2 degrees of freedom (i.e. the difference number of parameters in models 5 and 6). The result is reported at the bottom of table 5 (*p*-value = 0.52). Finally, the Bayesian Information Criterion (BIC) confirms model 5 to be the best model (1141.93).

6.2 Testing the significance of previously tested variables and the OC and O and C variable

A probit regression is used to test the significance of the variables of models (7) through to (10). We use a pooled time-series, cross-sectional probit model with all three years of data, 2001 through 2003. Table 6 contains the results. Column 2 of table 6 shows the results of model (4) where voluntary disclosure is regressed on previously-tested disclosure variables. The results reported in the table suggest that voluntary disclosure is significantly related to stock return *RETURN* (*t*-ratio = -2.59) and cross-listing (*t*-ratio = 2.03). These results are consistent with past studies.

The third column of Table 6 contains the probit analysis results when our interaction variable, *OC*, is included as a regressor alongside commonly tested disclosure variables (see model (8)). The results are as hypothesized. We find that the *OC* variable is significant and has the predicted sign (*t*-ratio = 3.96). Firms with high levels of shares owned by top 20 shareholders and high competition appear to be more likely to voluntarily disclose segment data. The results for the other six explanatory variables are similar to those reported for model (7) in the second column. Specifically, we find a significant relation between voluntary segment disclosures and each of *RETURN* (*t*-ratio = -2.56), *LOGTA* (*t*-ratio = 2.23), and CROSS ((*t*-ratio = 2.17), Again, these results are consistent with the past empirical literature. In summary, our results not only support the voluntary disclosure variables, *RETURN* and *LOGTA*, but also justify, both economically and statistically, the inclusion of the *OC* variable representing the joint effects of the internal and external environments within which the firm operates.

The fourth column of table 6 contains the probit analysis results when both the *O* and *C* variable are included alongside commonly tested disclosure variables. The results in column 4 show that both *O* (*t*-ratio = 2.46), and *C* (*t*-ratio = 3.23), are significantly positive when added to the other six explanatory variables. This indicates that these variables are robust to the inclusion of variables previously identified in the literature. The fifth column and last column of table 6 contains the probit analysis results when all three variables i.e. *O*, *C* and *OC* are included alongside commonly tested disclosure variables. The results indicate that adding *O* and *C* fails to add anything to the model when *OC* and the control variables are included. This is also supported by the *LR* test statistic of 1.34 (*p*-value = 0.51). Consistent with the results from table 5, the best model is the model with the interaction variable *OC* and the control variables. The Bayesian Information Criterion (BIC) of 1146.5 also confirms model 8 to be the preferred model.

7. Robustness tests

In the last section, we demonstrated that our measure of the internal/external environment of the firm, *OC*, has significant explanatory power in determining voluntary segment disclosures. In this section, we examine the robustness of this result with respect to (a) the change in reporting standard and (b) acquisitions and disposals of other firms.

7.1 Change in standard

The revised segment reporting standard AASB 1005 *Segment Reporting* changed segment reporting practices of Australian firms. (Recall that details of the change in the reporting standard were provided in Section 2.) To test whether the change affected the structural relation between voluntary disclosure and its determinants, we use a dummy variable approach. Specifically, we create a dummy variable *D* whose value is 1 in the period after the change in standard and 0 before. The dummy variable is then inserted into model (8) in a manner that tests whether the intercept and slope coefficients changed significantly as a result of the new standard, that is,

$$VD = \beta_0 + \beta_1 OC + \beta_2 RETURN + \beta_3 FAIP + \beta_4 AUDITOR + \beta_5 LEV + \beta_6 LOGTA + \beta_7 CROSS + \beta_8 D + \beta_9 (D * OC) + \beta_{10} (D * RETURN) + \beta_{11} (D * FAIP) + \beta_{12} (D * AUDITOR) + \beta_{13} (D * LEV) + \beta_{14} (D * LOGTA) + \beta_{15} (D * CROSS) \quad (11)$$

In order to identify whether there is a structural break associated with the change in standard, model (11) can be compared with model (8). The *LR* test statistic is 36.12 (*p*-value = 0.00) indicating that the null hypothesis that the changes in the intercept/slope coefficients are jointly equal to zero (i.e., the same before and after the change in standard) is rejected. The rejection, however, does not distinguish between a change in the relevance of the explanatory variables of the model or an increase in *VD* (i.e., the intercept) generally.

To identify the cause of the structural break, we conduct an additional regression and likelihood ratio test on the restriction that the change in the slope coefficients are jointly zero. To accomplish this, we estimate the following model;

$$VD = \beta_0 + \beta_1 OC + \beta_2 RETURN + \beta_3 FAIP + \beta_4 AUDITOR + \beta_5 LEV + \beta_6 LOGTA + \beta_7 CROSS + \beta_8 D \quad (12)$$

As with the previous model, *D* takes a value of 1 in the period after the change in standard and 0 before. The likelihood ratio test statistic is 8.82, which follows a chi-square distribution with 7 degrees of freedom (i.e., the difference between the number of parameters in models (11) and (12)). The *p*-value is 0.27, which means that the null hypothesis that the slope coefficients are unchanged as a result of the standard cannot be rejected. Further, a comparison of model (12) with model (8) permits a direct test of the null hypothesis that the change in the intercept term (β_8) is zero. The likelihood ratio for this test is 43.18, with a *p*-value of 0.00. This indicates that the structural break is due to a change in the intercept. The results are reported in the second column of Table 7. Of note, the coefficient on the intercept dummy variable is positive and significant (*t-ratio* = 5.20). Apparently, the change in standard resulted in an overall increase in underlying/natural disclosure. The insignificance of the coefficients on the slope dummy variables in model (11) suggests that the effect of the models explanatory variables remains constant in the pre- and post-period.

The significant increase in voluntary disclosures in the post standard period is not surprising as the revised segment standard explicitly refers to voluntary disclosures and provides

examples of these disclosures such as segment cash flows and any other relevant items.[13] Thus, a firm merely following the standard's suggestions would be disclosing more than the mandated requirements and would be making voluntary disclosures.

In summary, the economic model featuring *OC*, *RETURN*, *FAIP*, *AUDITOR*, *LEV*, *LOGTA* and *CROSS* is robust to the change in standard, and continues to apply with the same strength on each variable. However, the level of voluntary disclosure was found to increase following the standard change. In light of these findings, Model (12) featuring the intercept dummy will be used as a benchmark model against which all subsequent robustness tests will be performed.

7.2 Acquisition and disposal dummies and voluntary disclosures

We further test the robustness of the model by taking into consideration acquisition and disposal activities of the firms. Such activities can affect the number of segments reported and this could also flow on to voluntary segment disclosures.[14] We construct acquisition and disposal dummies for the pooled sample. The acquisition dummy variable is coded 1 if the firm makes a physical asset acquisition during the year, and 0 otherwise, and the disposal dummy is coded 1 if the firm disposes of physical assets during the year, and 0 otherwise. We then include the dummy variable from Model (12) and test whether the acquisition or disposal variables influence voluntary segment disclosure. The results are reported in the third column of Table 7. As the table shows, the variables *OC* (*t-ratio* = 3.95), *RETURN* (*t-ratio* = -2.94), *LOGTA (t-ratio* = 1.96) and *CROSS (t-ratio* = 2.00) remain significant. The firm size variable, *LOGTA,* is less significant than in the previous regressions. One possible explanation for this result is multicollinearity—large firms are more likely to be involved in acquisition/disposal activity. To test the joint impact of the *ACQ* and *DISP* variables, we use a likelihood ratio test. The result, reported at the bottom of the third column, is that the restriction that the variables *ACQ* and *DISP* are jointly zero is not rejected (*p*-value = 0.57).

8. Conclusions

[13] See Sections 6.1.3 and 6.1.4 of the standard.
[14] We thank Gordon Richardson for suggesting the acquisition and disposal dummy as a robustness check.

A firm's incentive to disclose has been linked empirically to a range of variables including information asymmetry, agency costs, political costs and proprietary costs. First, this paper investigates the role of ownership and competition variables in explaining voluntary segment disclosures in Australian firms. Agency theory suggests that large shareholders have the ability to mitigate the agency problems inherent in a firm by influencing the voluntary disclosures made by the firm. Proprietary cost theory suggests that firms operating in a highly competitive environment may have greater incentive to disclose as there is potentially less risk to their competitive position.

Second, this paper introduces a new economic variable *OC* that unifies both ownership and competition variables. Mayer (1997) argues that variables such as the ownership structure of the firm may be influenced by the degree of product market competition. Further, the strategic management and industrial organisation literatures suggest that competition, combined with internal factors of the firm eg. ownership structure are important inputs into a firm's decision making approach. Using 1 minus the Herfindahl index, to measure competition *C*, and the percent of shares held by the top 20 shareholders *O* to measure ownership, we hypothesize that the inclusion of the *OC* variable to the voluntary disclosure model enhances its explanatory power.

The results of the empirical tests strongly support our hypothesis. Our first test involves regressing voluntary segment disclosures *VD* on the ownership variable *O* and we find that firms having high levels of shares owned by top 20 shareholders are more likely to disclose voluntary segment items. Our second test involves regressing *VD* on the competition variable *C* and the results show that results show that voluntary disclosures and firms in highly competitive industries are positively related and statistically significant. We then test the contribution of our interaction variable *OC* alone and as predicted, *VD* and the interaction variable *OC* are positively related, and highly significant. Next we explicitly test the disclosure variables of past investigators and the contribution of our interaction variable *OC*. The results of this regression show that all variables, including *OC*, enter the regression significantly with their expected signs. In other words, the *OC* variable enhances the model's ability to explain voluntary segment disclosures. Our findings are robust to changes in the Australian segment reporting standard and capital market changes of acquisitions and disposals of physical assets.

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TABLE 1. Summary of estimation results in studies of corporate disclosure. Sign and significance (at the five percent probability level) of variables are: ++ significantly positive, + positive but insignificant, - negative but insignificant, and -- significantly negative.

Market legend: **N = NYSE** **A =ASX** **NZ = NEW ZEALAND** **G = GERMANY**		**Bradbury (1992)**	**Aitken, Hooper, Pickering (1994)**	**Leuz (1999)**	**McKinnon and Dalimunthe (1993)**	**Harris (1998)**	**Mitchell, Chia and Loh (1995)**	**Berger and Hann (2002)**
Market		NZ	A	G	A	N	A	N
No. of firms		29	65	109	65	929	129	1207
Agency variables	***Variable definition***							
Firm size	Log of total assets	++	++	++	++		++	--
Leverage	Book value of debt to sum of book value of debt and market value of equity	++	++	-	+		++	
Assets in place	Book value of fixed assets to total assets	+	+	++			+	
Ownership diffusion	Percent of ordinary shares not owned by top 20 shareholders		+		++		++	
Profitability	Net profit to total assets			--				
Minority interest	1-% of subs not held by Top 20 shareholders		+		++		++	
Free float	Percent of voting shares held for free trading			++				
Number of shareholders	Natural logarithm of number of shareholders		++					
Number of subsidiaries			++					
Market-to-book	Ratio of market/book equity							+
Proprietary Cost Variables	***Variable definition***							
Competition – 4 firm concentration ratio	4 firm ratio					--		+
Competition – speed of profit adjustment	Speed of profit adjustment					--		++
Abnormal profit	Industry adjusted ROA and ROE							+
Herfindahl index	Industry concentration							+
Industry diversification	Dummy variable of high/low diversity		+	+	+			
Segment Diversification	Number of SIC codes across segments to number of segments							--
Heterogeneity	Heterogeneity in earnings persistence					-		+
Other variables	***Variable definition***							
Overseas association	Overseas listing	+	+	+			++	
Earnings volatility	Five-year coeff of variation	-	-				-	
Trading volume	Share turnover			+				
Number of segments	Number of segments							++
Number of industries	Number of industries					--		
Scale of operations/Firm size	Industry sales/Firm sales					++		
Foreign sales	% of sales outside domicile			+				
Big “5” or “6” auditor	Big “5” or “6” auditor			+				
Industry membership	Mining and oil classification		++		++		++	

TABLE 2. Summary of sample firms by year and industry category. The voluntary disclosure variable, *VD*, is the number of firms within each industry that disclosed information in addition to that required by the standard, and *TOTAL* is the number of firms in each industry. *COUNT* shows the totals across all industries. *O* is the median of the ownership variable (expressed as a percentage) in each industry, and *C* is the concentration level within each industry (expressed as a percentage) as measured by 1 minus the Herfindahl index for each industry using the top 500 firms on the Australian Stock Exchange.

CRIF Class Name	Energy	Chemicals	Construction Materials	Diversified metals and mining	Gold	Precious metals and minerals	Steel and aluminium	Paper and forest products and packaging	Building products	Construction and engineering	Machinery	Conglomerates and other capital goods	Commercial services and supplies	Transportation	Automobile and components	Consumer durables and apparel	Hotels restaurants and leisure	Media	Retailing	Food and drug retailing	Beverages	Food and other products and tobacco	Health care equipment and supplies	Health care providers and services	Pharmaceuticals and biotechnology	Banks	Diversified financials	Insurance	Real estate investment trusts	Real estate management and development	Internet software and services	It consulting and services	Software	Technology hardware and equipment	Telecommunications	Utilities	Count
CRIF Class No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
2001 sample																																					
VD	3	4	2	7	3	1	1	1	1	2	1	2	5	0	3	0	4	4	7	1	4	8	2	3	4	5	5	1	2	3	1	1	6	5	3	2	107
TOTAL	11	6	5	16	13	2	3	8	2	10	5	8	14	2	5	3	7	14	10	4	8	14	4	4	8	6	13	4	9	6	2	2	13	7	9	6	263
O (%)	40	41	64	59	75	81	46	66	69	68	69	66	62	78	57	80	86	76	82	55	74	60	56	59	45	41	71	57	64	50	48	66	69	53	75	69	
C (%)	51	68	54	59	81	42	58	55	64	71	34	56	69	40	62	76	78	48	88	64	78	79	36	49	66	77	84	53	91	35	58	65	82	82	55	42	
2002 sample																																					
VD	6	4	2	4	3	2	2	6	3	5	1	2	9	3	2	2	3	4	8	1	6	10	6	3	7	7	2	2	4	2	3	1	7	5	3	2	142
TOTAL	9	6	4	9	14	2	4	9	3	8	4	6	20	4	4	6	6	15	12	3	10	14	11	6	12	8	16	4	7	9	3	5	9	7	3	4	276
O (%)	48	56	60	59	70	84	56	60	88	68	66	61	67	69	62	70	53	80	78	52	63	70	56	61	56	45	67	73	62	80	57	66	74	57	82	59	
C (%)	50	69	57	54	84	49	57	52	66	64	40	38	71	48	69	73	77	45	90	64	64	77	49	50	68	78	75	44	89	30	55	68	75	83	61	37	
2003 sample																																					
VD	8	4	3	8	6	2	6	6	1	6	3	3	12	1	4	4	6	11	9	3	5	9	7	2	8	6	7	4	8	4	1	2	8	8	5	3	193
TOTAL	10	5	6	13	14	2	6	6	1	7	5	6	15	6	5	5	14	16	11	4	7	11	10	4	12	6	17	5	11	8	3	5	10	8	6	6	286
O (%)	53	50	67	62	69	60	62	63	52	66	64	51	67	63	58	74	63	78	72	58	61	44	63	66	46	42	44	51	69	83	52	64	70	61	83	59	
C (%)	63	56	63	57	88	63	67	49	57	68	39	42	76	57	78	82	83	51	90	66	70	87	63	53	70	78	72	74	89	49	69	67	83	85	58	41	
Full Sample																																					
VD	17	12	7	19	12	5	9	13	5	13	5	7	26	4	9	6	13	19	24	5	15	27	15	8	19	18	14	7	14	9	5	4	21	18	11	7	442
TOTAL	30	17	15	38	41	6	13	23	6	25	14	20	49	12	14	14	27	45	33	11	25	39	25	14	32	20	46	13	27	23	8	12	32	22	18	16	825
O (%)	48	50	62	60	71	68	56	64	70	68	67	62	66	66	57	74	66	79	78	52	66	59	56	61	51	41	57	69	67	80	51	65	70	58	80	67	
C (%)	51	68	57	57	84	49	58	52	65	68	39	42	71	57	69	76	83	48	90	64	70	79	49	50	68	78	75	53	89	35	58	67	82	83	57	41	

TABLE 3. Summary statistics of the regression variables. The sample consists of the Top 500 Australian companies for the years 2001 through 2003. The notation is as follows: *O* is the percentage of total shares outstanding not held directly or indirectly by the directors of the company, *C* is 1 minus the level of Herfindahl index based on firm revenue within the industry, *OC* is the product of *O* and *C*, *RETURN* is the log stock return over the year, *FAIP* is the fixed assets in place, *AUDITOR* is an indicator variable set equal to 1 if the firm is audited by a big 5 (2001) or big 4 auditor (2002 and 2003) and 0 otherwise, *LEV* is the book value of debt divided by total assets, *LOGTA* is the natural logarithm of total assets and *CROSS* is an indicator variable which takes a value of 1 if a firm is cross-listed and zero otherwise.

Variable	No. of obs.	Mean	Std Dev	Min	25%	Median	75%	Max
O	825	0.6259	0.2023	0.0200	0.4900	0.6470	0.7800	1.0000
C	825	0.6653	0.1526	0.2976	0.5487	0.6833	0.7811	0.9115
OC	825	0.4166	0.1710	0.0110	0.2887	0.4035	0.5311	0.9022
RETURN	825	-0.0419	0.6015	-2.0424	-0.2541	0.0366	0.2685	2.3786
FAIP	825	0.5986	0.2420	0	0.4257	0.6212	0.8005	1
AUDITOR	825	0.8230	0.3819	0	1	1	1	1
LEV	825	0.4485	0.2247	0.0068	0.2898	0.4599	0.5949	0.9837
LOGTA	825	12.7371	2.0823	8.2779	11.2248	12.4284	14.0398	19.8006
CROSS	825	0.1321	0.3388	0	0	0	0	1

TABLE 4. Pair-wise correlation coefficients among regression variables. The sample consists of the Top 500 Australian companies for the years 2001 through 2003. The notation is as follows: *O* is the percentage of total shares outstanding not held directly or indirectly by the directors of the company, *C* is 1 minus the level of Herfindahl index based on firm revenue within the industry, *OC* is the product of *O* and C, *RETURN* is the log stock return over the year, *FAIP* is the fixed assets in place, *AUDITOR* is an indicator variable set equal to 1 if the firm is audited by a big 5 (2001) or big 4 auditor (2002 and 2003) and 0 otherwise, *LEV* is the book value of debt divided by total assets, *LOGTA* is the natural logarithm of total assets and *CROSS* is an indicator variable which takes a value of 1 if a firm is cross-listed and zero otherwise.

Variable	*O*	*C*	*OC*	*RETURN*	*FAIP*	*AUDITOR*	*LEV*	*LOGTA*
C	0.006							
OC	0.793	0.587						
RETURN	-0.004	-0.031	-0.012					
FAIP	0.043	-0.036	0.002	0.093				
AUDITOR	-0.013	-0.043	-0.052	-0.006	0.044			
LEV	-0.048	-0.041	-0.065	0.033	-0.031	0.210		
LOGTA	-0.051	-0.101	-0.115	0.111	0.302	0.235	0.529	
CROSS	-0.087	-0.016	-0.079	0.007	0.087	0.078	0.099	0.344

TABLE 5. Results of the *OC* regressions. The sample consists of the Top 500 Australian companies for the years 2001 through 2003. The voluntary disclosure variable, *VD*, is the dependent variable in all regressions. The table reports the results of regressions of *VD* on various models involving the ownership variable (*O*), the competition variable (*C*), and the interaction variable (*OC).* *LLF* is the log likelihood function. The likelihood ratio test statistic (*LR*) is calculated as *LR = -2(RLLF-ULLF)* and is distributed as a χ^2_k under the null, where *k* is the number of coefficients being restricted, and *RLLF* (*ULLF*) is the restricted (unrestricted) log likelihood function. *BIC* is the Bayesian Information Criterion, which is calculated as $-2LLF + k\ln n$, where *k* is the number of parameters estimated and *n* is the sample size. T-statistics are reported in parentheses.

			Coefficient estimate (and t-ratio) for:						
Dependent variable	**No. of obs.**	**Constant**	*OC*	*O*	*C*	***LLF***	***LR***	***p-value***	***BIC***
VD	825	-0.178 (-1.25)		0.428 (1.97)		-567.78			1148.99
VD	825	-0.458 (-2.33)			0.825 (2.86)	-565.62			1144.67
VD	825	-0.726 (-3.03)		0.428 (1.97)	0.825 (2.86)	-563.67			1147.49
VD	825	-0.265 (-2.28)	0.853 (3.30)			-564.25			1141.93
VD	825	-0.463 (-0.69)	0.604 (0.42)	0.025 (0.03)	0.431 (0.44)	-563.59	1.32	0.52	1154.04

TABLE 6. Results of the *OC* regressions using control variables. The sample consists of the Top 500 Australian companies for the years 2001 through 2003. The voluntary disclosure variable, *VD*, is the dependent variable in all regressions. The independent variables are as follows: *OC, RETURN, FAIP, AUDITOR, LEV, LOGTA* and *CROSS*. The likelihood ratio test statistic (*LR*) is calculated as *LR = -2(RLLF-ULLF)* and is distributed as a χ^2_k under the null, where *k* is the number of coefficients being restricted, and *RLLF* (*ULLF*) is the restricted (unrestricted) log likelihood function. For each regression, the coefficients being restricted are presented in bold. The *RLLF* for columns 3 and 4 is the *ULLF* in column 2; for column 5 the *RLLF* is the *ULLF* in column 3. *BIC* is the Bayesian Information Criterion, which is calculated as $-2LLF + k \ln n$, where *k* is the number of parameters estimated and *n* is the sample size. T-statistics are reported in parentheses.

Independent variables	*VD*	*VD*	*VD*	*VD*
No. of obs.	825	825	825	825
Constant	-0.701	-1.263	-1.807	-1.328
	(-2.31)	(-3.74)	(-4.38)	(-1.81)
OC		**1.047**		1.163
		(3.96)		(0.77)
RETURN	-0.192	-0.193	-0.190	-0.194
	(-2.56)	(-2.56)	(-2.52)	(-2.57)
FAIP	-0.278	-0.313	-0.311	-0.305
	(-1.40)	(-1.57)	(-1.56)	(-1.53)
AUDITOR	0.042	0.059	0.055	0.062
	(0.35)	(0.49)	(0.45)	(0.51)
LEV	0.383	0.386	0.387	0.380
	(1.58)	(1.59)	(1.59)	(1.57)
LOGTA	0.056	0.066	0.066	0.068
	(1.91)	(2.23)	(2.25)	(2.30)
CROSS	0.289	0.311	0.306	0.302
	(2.03)	(2.17)	(2.13)	(2.10)
O			**0.544**	**1.163**
			(2.46)	**(0.79)**
C			**0.953**	**-0.232**
			(3.23)	**(-0.22)**
ULLF	-554.33	-546.39	-546.03	-545.72
RLLF	n/a	-554.33	-554.33	-546.39
LR	n/a	15.88	16.60	1.34
p-value	n/a	0.00	0.00	0.51
BIC	1155.67	1146.50	1152.50	1158.59

TABLE 7. Results of robustness tests. The sample consists of the Top 500 Australian companies for the years 2001 through 2003. The voluntary disclosure variable, *VD*, is the dependent variable in all regressions. The independent variables are as follows: *OC*, *RETURN*, *FAIP*, *AUDITOR*, *LEV*, *LOGTA* and *CROSS*. There are also four dummy variables used. The structural break variable, *D*, takes a value of 1 in the period after the change in standard (i.e. 2002 and 2003) and 0 otherwise. The acquisition dummy variable *ACQ* takes a value of 1 if a company makes a physical asset acquisition during the year while the disposal dummy variable *DISP* takes a value of 1 for those firms that dispose of physical assets during the year. *LLF* is the log likelihood function. The likelihood ratio test statistic (*LR*) is calculated as *LR = -2(RLLF-ULLF)* and is distributed as a χ^2_k under the null, where *k* is the number of coefficients being restricted, and *RLLF* (*ULLF*) is the restricted (unrestricted) log likelihood function. For each regression, the coefficients being restricted are presented in bold. The *RLLF* for column 3 is the *ULLF* in column 2. *BIC* is the Bayesian Information Criterion, which is calculated as $-2LLF + k\ln n$, where *k* is the number of parameters estimated and *n* is the sample size. T-statistics are reported in parentheses.

Independent variables	*VD*	*VD*
No. of obs.	825	825
Constant	-1.624	-1.568
	(-4.64)	(-4.43)
OC	1.059	1.057
	(3.96)	(3.95)
RETURN	-0.219	-0.225
	(-2.87)	(-2.94)
FAIP	-0.303	-0.296
	(-1.51)	(-1.47)
AUDITOR	0.018	0.017
	(0.14)	(0.14)
LEV	0.438	0.440
	(1.79)	(1.80)
LOGTA	0.067	0.060
	(2.26)	(1.96)
CROSS	0.297	0.291
	(2.04)	(2.00)
D	**0.503**	0.501
	(5.20)	(5.17)
ACQ		**0.079**
		(0.75)
DISP		**0.083**
		(0.63)
ULLF	-532.74	-532.18
RLLF	-554.33	-532.74
LR	43.18	1.12
p-value	0.00	0.57
BIC	1125.92	1138.23