**Exploring the situation which auditors compromise their independence**

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**Abstract**

The main objective of this paper is to explore the situation which auditors compromise their independence by using Cubist regression tree model. Compare with prior studies used logist regression model, the cubist regression tree model can explore the situation which auditors compromise their independence. Using discretionary accruals to proxy for auditors’ independence, cubist regression model find a positive association between discretionary accruals and client importance in the specified situation.

**Keywords:** *Auditor independence, client importance, cubist regression tree model, discretionary accruals.*

# Introduction

The Enron scandal in 2001 caused 24,000 employees to lose their jobs and more than 2 billion USD worth of pensions, and shareholders lost 60 billion USD in investment. Enron was the second largest client of Andersen accounting firm, which was responsible for the auditing. The total audit fee in the year before the bankruptcy of Enron amounted to 52,000,000 USD, giving rise to the public’s concern of whether the financial dependence of accountants on their clients will weaken their independence. In 2002, the U.S. government passed the Sarbanes-Oxley (SOX) Act in remedy. In the following year, the U.S. Securities and Exchange Commission (SEC) regulated that accounting firms cannot concurrently provide auditing service and some non-auditing services to the same client in an attempt to lower the financial dependence of accountants on their major clients.

On the other hand, as Pratt and Stice ([1994](#_ENREF_27)) point out that, the occupational negligence insurance fee of the top 5 accounting firms has increased by 300%, as compared with 1985, according to the American Institute of Certified Public Accountant (AICPA). As the litigation convenience arising from the class action system implemented in the U.S. has resulted in litigation flooding coupled with astronomical punitive compensations, accountants are facing high risks of litigation. Although litigation risks in Taiwan are lower than those in the U.S., the license of the CPA in the 2004 Procomp case was suspended for two years by the Financial Supervisory Commission. Afterwards, accountants responsible for the subsequent scandals involving Infodisc and Hightech were punished for fraudulent audit opinion, enhancing the litigation risks of accountants and their motivations to keep independence.

The key to audit independence is whether the accountant can request the audited company to replace improperly presented financial statements and adopt appropriate accounting rules. Taiwan’s Professional Ethics Committee announced in May 2003 the No. 10 Bulletin on Professional Ethics entitled “Honesty, Justice, Objectivity and Independence”, clearing pointing out that accountants should keep the spirit of independence in business practice. However, since paid by the audited company, the accountant may be fired and lose the future economic quasi-rent if keeping auditing quality when the client selectively discloses the financial information. On the other hand, to maintain important clients, the accountant may have to bear the litigation risk and reputation damage due to auditing failure. Therefore, whether reporting the major misstatement of client financial information is a balance between financial dependence and reputation maintenance.

Since the litigation liability rests on all partners of the accounting firm in the U.S. and auditing failure will affect the audit fee and reputation of the accounting firm, most of previous studies have employed accounting firm as the basis for assuming client importance to auditor independence ([Ashbaugh, LaFond, & Mayhew, 2003](#_ENREF_1); [Chung & Kallapur, 2003](#_ENREF_4)). However, in Taiwan, Fang, Chen & Wu ([2007](#_ENREF_36)) point out that distribution of earnings in Taiwan takes the profit-centered mechanism on the basis of the contributions of auditing groups headed by accountant partners. As a result, accountants of the same group are more closely related as compared with the correlation with the accounting firm ([Li & Chen, 2004](#_ENREF_33)). However, Chi, Douthett & Lei ([2010](#_ENREF_3)) argue that the partners of accounting firm are the decision makers responsible for management auditing and presentation of auditing opinions. Therefore individual partners depend more on clients of economic importance than the accounting firm as whole. In particular, maintaining a major client can increase job security, promotion opportunity and the internal influence in the accounting firm. In addition, the legal penalties in Taiwan are targeted at individual accountants rather than accounting firms. As a result, using accountant partners as the basis for the analysis of client importance is better than using the accounting firm or group basis.

Previous studies on the relationship between client importance and auditor independence mainly use the traditional measurement analysis methods. For example, Yang & Guan ([2006](#_ENREF_41)) employ the Logist regression model to explore the effects of client importance on auditor independence before and after the Enron case. The empirical results suggest that accountants can better tolerant upward earnings management before Enron case due to financial dependence. However, after the breakout of Enron case, the auditing environment became relatively unfavorable, the accountants exercised restraints in upward earnings management. This paper argues that the different characteristic situations caused by changing auditing environment before and after the Enron case will have different effects on the professional judgment of accountants regarding the client characteristic variables. When sample data are characterized by such features, the Cubist regression tree model that can present individual difference should be used, because the traditional measurement models cannot distinguish the non-linear relationships caused by different client characteristics. The Cubist regression tree with advantages of high fitness and easiness to interpret may solve the issue.

The auditing opinions contain the professional judgment of the accountant. However, if the enterprise is believed by the general public as being in financial crisis in a short time, no accountant should present qualified opinions without reservations to avoid auditing failure. If the finances of the enterprise are in a fuzzy and unclear state, it will increase fuzzy areas for professional judgment. This paper attempts to identify the relationships between client importance and auditor independence in case of different characteristic situations.

# Literature Review

## Auditor Independence

The key to the audit credibility lies in auditor independence ([Firth, 2002](#_ENREF_12)). “Independence” is the pillar of the professionalism of accountants providing audit opinions. It can be further divided into real independence and formal independence. The former means that the accountant should keep objective, just, ethical ideals when performing business. The latter means that, the relationship between the accountant and the client is believed by third parties that as fair and just. In comparison, the real independence involves the accountant’s autonomy of senses and is hard to judge. As a result, the formal independence is often the basis for the judgment of auditor independence.

As independence is an abstract concept of the psychological judgment of accountants and auditors, no data can be obtained from the real situations. Most of previous literature use proxy variables to measure independence. When the accountants partially lose independence, relatively more earnings management room will be given to the client. Hence, the discretionary accruals will change more considerably, thus, the management can manage the earnings by adjusting discretionary accruals ([Ashbaugh, et al., 2003](#_ENREF_1" \o "Ashbaugh, 2003 #8); [Chi, et al., 2010](#_ENREF_3); [Chung & Kallapur, 2003](#_ENREF_4); [Frankel, Johnson, & Nelson, 2002](#_ENREF_13)). In some cases, the management will manage earnings by real activities. Roychowdhury ([2006](#_ENREF_30)) suggests that the management would increase sales and mass production to lower sales costs and reduce discretionary accruals, in order to improve marginal profits. Cohen, Dey & Lys ([2008](#_ENREF_5)) find that companies tend to manage earnings by real activities after the implementation of the Sarbanes-Oxley (SOX) Act. As how the management manages earnings cannot be actually known, this study selects discretionary accruals as the proxy variable of auditor independence according to the sample period of this study and previous literature.

Although literature on earnings management has suggested, the management does not necessarily use discretionary accruals for earnings management, related party transactions and non-operating items can also be employed as tools for manipulation. However, it is explicitly provided in Taiwan that, proper disclosure of the event should be made as long as evidence exists. Thus, it is relatively easier to detect. Hsueh ([2008](#_ENREF_43)) finds that the management has seldom employed non-operating gains and losses to manipulate earnings. The final financial statement is determined by the accountant and the management after consultation. Using audit opinions can more directly analyze auditor independence than using the variable of earnings management. Hence, some scholars use audit opinions as the proxy variable ([Firth, 2002](#_ENREF_12); [Kinney, Palmrose, & Scholz, 2004](#_ENREF_22); [Li, 2009](#_ENREF_25)). Moreover, due to limitations of the Cubist regression tree model, it is not adopted because discrete variable cannot be the dependent variable.

## Client Importance and Auditor Independence

There are many proxy variables to measure client importance. Most foreign literature uses the ratio of audit fee and non-audit fee in the total fee for measurement ([Chung & Kallapur, 2003](#_ENREF_4); [Frankel, et al., 2002](#_ENREF_13" \o "Frankel, 2002 #6); [Ghosh, Kallapur, & Moon, 2009](#_ENREF_16)). Ashbaugh et al. ([2003](#_ENREF_1)) suggest that, as FEE RATIO is subject to the amount of total fee, it cannot accurately reflect the economic effects of the client. Hence, fee is used to measure the client importance. Fee amount disclosure is not compulsory in Taiwan, however, in the following cases (1) replacing accounting firm and audit fee being lower than the previous year (2) audit fee being lower than the previous year by more than 15%, the company should disclose non-audit fee. Reynolds and Francis ([2001](#_ENREF_29)) use the logarithm of the ratio of individual client’s sales income to the sales income of all the publicly listed companies audited by the accountant for measurement. Before 2001, audit fee was not disclosed in China and the fee rate is subject to company assets. Hence, the ratio of the natural logarithm of individual client’s total assets divided by all clients’ is used as the standard ([Chen, Sun, & Wu, 2010](#_ENREF_2)).

When the accountant has noticed the trouble in the sustainable operation of the business and given unqualified opinions, it may result in falling share prices, borrowing debts or increasing the opportunities of operational failure. Therefore, companies in financial crisis are motivated to require accountants to compromise independence. Geiger & Rama ([2003](#_ENREF_15)) discuss whether audit fee would affect the professional judgment of the companies in financial crisis. The empirical results suggest that accountants are more likely to present qualified opinions about the companies in financial trouble if the audit fees are higher. However, the effects of non-audit fees are not confirmed. Basioudis, Papakonstantinou & Geiger ([2008](#_ENREF_14)) analyze the audit fee of British companies, and find the same results as Geiger and Rama ([2003](#_ENREF_15)). However, it is found that companies of higher level of non-audit fee are more unlikely to receive qualified opinions.

In addition, major events may affect the attitude of accountants as suggested by Li ([2009](#_ENREF_25)), who used the SOX Act, and Chen et al. ([2010](#_ENREF_2)), who used the YinGuangXia case (Chinese version of Enron). The different characteristics of research samples in different countries may result in divergent research findings. For example, the study by Hay, Knechel and Li ([2006](#_ENREF_18)) on New Zealand companies cannot confirm that client importance would affect auditor independence, while the study by Ferguson, Seow and Young ([2004](#_ENREF_11)) with Britain as the subject has confirmed the existence of the financial dependence effects.

Regarding research in Taiwan, in case of accounting firm, Li & Chen ([2004](#_ENREF_33)) analyze the effects of client class importance on the professional judgment of accountants. Li, Hsu & Chen ([2003](#_ENREF_32)) discuss the possible negative effects of providing audit and non-audit services by the accountants on independence. The empirical results suggest that the flexibility for earnings management in case of major clients is relatively larger. However, the study by Yang & Guan ([2006](#_ENREF_41)) on the publicly listed and OTC companies audited by top five accounting firms, and the study by Guan & Guo ([2011](#_ENREF_34)) on companies of potential financial difficulties, both find that accountants pay more attention to reputation. Chi et al. ([2010](#_ENREF_3)) analyze companies of public offering without finding the relationship of financial dependence on major clients.

## Application of Cubist Regression Tree

Cubist regression tree model has been frequently used as the research method in discussion of many topics with samples in different situations, and possible different linear relationship of dependent variable and independent variable. In the real estate field, Chen, Guo & Tsao ([2007](#_ENREF_40)) argue that the real estate prices are determined by the characteristics of real estate. However, under different conditions, the relationship between housing price and real estate characteristics may differ. For example, the road width and housing price are positively correlated; however, the surroundings of the house also affect the effects of road width on housing price, and the metropolitan area has a higher level of influence as compared with countryside area in general. Meanwhile, with or without parking space in the suburbs may have no direct correlation with housing price. However, houses with parking space in the metropolitan area are generally more expensive. The traditional econometric approaches have no capabilities to reflect such characteristics; therefore, Cubist regression tree model is more suitable than the traditional econometric approaches for the discussion of real estate issues.

Different environmental factors in different regions result in differences in causes affecting the soil properties. Cubist regression tree model is widely applied in soil geology to identify environmental factors that affect the soil properties in various regions ([Hendersona, Bui, Moranb, & Simon, 2005](#_ENREF_19); [Minasny & McBratney, 2008](#_ENREF_26)). In recent years, many studies have argued that there is a complex and uncertain non-linear relationship between corporate governance and corporate value. Kao ([2009](#_ENREF_37)) uses Artificial Neural Network (ANN) and Cubist regression tree model to establish the global non-linear relationship, and analyze the corporate governance factors affecting corporate values in four groups of characteristics by using the Cubist regression tree model.

This paper argues that it is too arbitrary to use a same measurement model for all situations facing the accountant as previous studies have suggested. In fact, the accountant has professional judgment when giving the client the room for earnings management. Decisions should vary in different situations. For example, the client in a good financial state should be given more room of earnings management as the risk of major misstatement is relatively lower. If the client is on the verge of financial crisis, to avoid future audit failure, the accountant may be stricter in giving room of earnings management. In this case, literature on traditional measurement methods may lead to inference error in some cases, leaving auditor independence-related research issues undecided.

Hence, this paper uses the Cubist regression tree model to discuss situations that have been neglected in previous literature. According the concepts derived from the decision tree, Quinlan ([1996](#_ENREF_28)) establishes the Cubist regression tree model. It is a type of piecewise linear regression model. In the model, the sample data are classified into different rules, which contain the characteristics of regression equation subsets each. The global model is planned by using all these rules. At present, the Cubist regression tree has been applied in different fields. This paper proposes that the accountant will consider different situation, give clients different levels of room of earnings management, and the factors affecting auditor independence will vary due to situations. Hence, the Cubist regression tree is more suitable for topics relating to auditor independence.

# Research Design

* 1. **Model Architecture -Cubist Regression Tree Evaluation Model**

The decision tree is conceptualized to assign different routes corresponding to different decision models according to characteristics of things. The concept of Cubist regression tree is the same, and the difference is that end node is a regression rather data category. This study uses the Cubist regression tree as the model to cut the data into many blocks, and identify the independent variables relating to independence in blocks to establish characteristic equations. The Cubist regression tree is, however, converted to a series of rules, each with an associated linear model, to facilitate ease of interpretation. Each Cubist rule is then of the form.

**if** {conditions} **then** linear model

For example,

if

CACL<= a

Growth<= b

Loss=c

then



Where a and b are numerical values and c denote net profit after tax is positive or negative; ,  and  are coefficients of the linear model.

Cubist regression tree cuts the samples into z linear regression models to approximate global non-linear models. Thus, there are z rules. The conditions of model may include continuous or discrete variables, while the regression equation may include continuous variables only and requires proxy variables for discrete data. The threshold values of various variables under different rules can be learnt by conditional equations. When the variables appear more frequently in regression equations, it means that the variables are more related to auditor independence. The number of samples contained in every class of rule may vary, depending on the number of similar data as selected by the model. In addition, more categories of rule classification represent more blocks of data classification and the model is more complex.

* 1. **Definition of Variables**

With a higher level of independence, the credibility of financial statements audited by the accountant will be higher. Most literature uses discretionary accruals as the proxy variable. Dechow, Sloan & Sweeney ([1995](#_ENREF_9)) find that modified-Jones model has the best capability to measure discretionary accruals. Nevertheless, Kothari, Leone & Wasley ([2005](#_ENREF_23)) suggest that performance is correlated to discretionary accruals in extreme cases, and propose the performance-adjusted modified-Jones model. Referring to the recent literature, this paper uses the performance-adjusted modified-Jones model proposed by Kothari et al. ([2005](#_ENREF_23)) to measure discretionary accruals.

We estimate the following model:



Where:  is total accruals for firm *i* in industry *j* for year t;  is total assets for firm *i* in industry *j* for year t-1; is change in sales for firm *i* in industry *j* for year t; is change in account receivables for firm *i* in industry *j* for year t; is gross property, plant and equipment value for firm *i* in industry *j* for year t;  is return on assets for firm *i* in industry *j* for year t; is the residual, which represents discretionary accruals.

The variable of client importance is subject to the limitation of audit fee disclosure in Taiwan because it is difficult to acquire the information on audit fee. Craswell, Francis and Taylor ([1995](#_ENREF_6)) find that the logarithm of sales income are highly correlated to audit fee. Therefore, Reynolds and Francis ([2001](#_ENREF_29)) use the ratio of the sales income of a single client against all thee listed clients of the accounting firm to replace audit fee for measuring the client importance. Referring to Chi et al.([2010](#_ENREF_3)), this study uses the logarithm of the sales income of a single client of two auditing accountants against the sales income of all publicly listed companies for measurement by using the maximum value.

Cubist regression tree model can deal with thousands of variables if necessary, and here are listed the definition of significant variables. ARIN is the sum of inventories and accounts receivables divided by total assets; CACL is current assets divided by current liabilities; OCF is cash flow from operations scaled by lagged total assets; Growth is growth rate of net sales over the previous year; LaDA is performance-adjusted discretionary accruals in the previous year; Size is log of total assets; Lev is total liabilities divided by total assets; Loss is 1 if the firm reports loss in the current year, and 0 otherwise.

* 1. **Sources of Data**

The data of this study are sourced from TEJ (Taiwan Economic Journal) database. As TEJ database started to establish auditing module data in 1983 and some variables are established based on the previous period data, the subject of this study includes all publicly listed companies in general industries in Taiwan from 1984 to 2009. After deleting observations of unreasonable data in financial statements, the total number of observations is 18,685.

Table 1 describes the industrial distribution of sample data. The industrial data are classified by the TEJ industrial classifications. According to Panel 1 of Table 1, most of the observations in this study concentrate on the electronics industry, accounting for 49.5% in a total of 9,247, followed by the chemical and biomedical industry, the textile industry, the electrometrical industry and building materials and construction. Panel 2 illustrates that most of the sample companies select top accounting firms for auditing services, while only 20.5% companies select other accounting firms. This is possibly because the top accounting firms are more sufficient in manpower to deal with business of listed companies.

Table 1 Sample distribution

|  |
| --- |
| Panel 1：Sample distribution across industries |
| Industry | *N* | Percentage |
| Cement | 266 | 1.4% |
| Food | 486 | 2.6% |
| Plastic | 577 | 3.1% |
| Textile | 1,292 | 6.9% |
| Electrometrical | 1,168 | 6.3% |
| Electrical machinery and cable | 227 | 1.2% |
| Chemical and biomedical | 1,303 | 7.0% |
| Glass and porcelain | 153 | 0.8% |
| Paper | 169 | 0.9% |
| Iron and steel | 869 | 4.7% |
| Rubber | 230 | 1.2% |
| Automobile | 101 | 0.5% |
| Electronics | 9,247 | 49.5% |
| Building materials and construction | 904 | 4.8% |
| Shipping | 439 | 2.3% |
| Tourism | 244 | 1.3% |
| Department stores | 300 | 1.6% |
| Other | 710 | 3.8% |
| Total | 18,685 | 100% |
| Panel 2：Sample distribution across auditors |
|  | *N* | Percentage |
| Big N accounting firms | 14,860 | 79.5% |
| Non-Big N accounting firms | 3,825 | 20.5% |
| Total | 18,685 | 100% |

# Empirical Results

* 1. **Descriptive Statistics**

Table 2 illustrates the descriptive statistics of significant variables including the discrete and continuous variables. As variables cover the aspects of financial conditions and corporate governance, and the accountant pays significantly more attention to financial conditions than corporate governance variables, as suggested by the findings of this paper, the significant variables are all financial variables. The average number of client importance (CICPA) is 0.1387, which is higher than that of the sample data used by Chi et al.([2010](#_ENREF_3)). This is possibly because the one of higher client importance of the two CPAs is used as the proxy variable in this paper. However, Chi et al.([2010](#_ENREF_3)) uses the average number, and thus is different from this paper on listed companies only. The minimum value at 0 should be caused by the approximation of logarithm of client business income. Moreover, 25 observations of revenue growth have been missing and the average value is used in empirical analysis.

Table 2 Descriptive statistics

|  |
| --- |
| Panel 1: continuous variables |
| variables | Mean | Standard Deviation | Lower Quartile | Median | Upper Quartile | Min | Max |
| DA | -0.0067 | 0.1581 | -0.0771 | -0.0205 | 0.0434 | -3.7625 | 4.5369 |
| CICPA | 0.1387 | 0.1748 | 0.0544 | 0.0784 | 0.1365 | 0 | 1 |
| ARIN | 0.3145 | 0.1867 | 0.1741 | 0.2898 | 0.4238 | 0.0001 | 0.9668 |
| CACL | 2.2406 | 2.8832 | 1.1994 | 1.6450 | 2.4538 | 0.0076 | 161.0917 |
| OCF | 0.0652 | 0.1891 | 0.0068 | 0.0653 | 0.1338 | -9.5318 | 3.7381 |
| Growth | 0.3909 | 5.6646 | -0.0585 | 0.0828 | 0.2740 | -1.9740 | 366.4153 |
| LaDA | -0.0026 | 0.1950 | -0.0778 | -0.0186 | 0.0497 | -4.0571 | 4.6331 |
| Size | 6.4136 | 0.5776 | 5.9996 | 6.3464 | 6.7493 | 3.9460 | 8.9209 |
| Lev | 0.4006 | 0.1710 | 0.2746 | 0.3955 | 0.5140 | 0.0127 | 1.8871 |
| Panel 2: discrete variable |
| Loss | No. | Percentage |
| the current year net profit after tax is negative | 3,825 | 20.5% |
| the current year net profit after tax is positive | 14,860 | 79.5% |
| Total | 18,685 | 100% |
| DA：performance-adjusted discretionary accruals calculated following Kothari et al. (2005); CICPA：client importance, the logarithm of the sales income of a single client of two auditing accountants against the sales income of all publicly listed companies for measurement by using the maximum value; ARIN: the sum of inventories and accounts receivables divided by total assets; CACL: current assets divided by current liabilities; OCF: cash flow from operations scaled by lagged total assets; Growth: growth rate of net sales over the previous year; LaDA: performance-adjusted discretionary accruals in the previous year; Size: log of total assets; Lev: total liabilities divided by total assets; Loss: 1 if the firm reports loss in the current year, and 0 otherwise. |

* 1. **Cubist Regression Analysis**

The research findings suggest that the Cubist regression tree model contains 19 rules, in other words, the estimated characteristic equation contains 19 regression sub-models. One rule displays the correlation between client importance and auditor independence, and the overall sample data mean error is 0.0764, and the relative error is 0.81 with correlation coefficient at 0.63. The Cubist regression tree model uses “if” to define client characteristics as the conditional equation, and “then” to describe the relationships between auditor independence and other relevant variables. Table 3 illustrates the significant variables and relative importance degrees. The conditional field refers to the percentage of significant variables that have the conditional field, indicating the contribution to the model. The regression field refers to the percentage of the significant variables that have the regression model. The variables not presented in Table 3 means that the data coverage rate in all rules is below 1%.

Table 3 Coverage rate of variables in Cubist regression tree

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables | CICPA | CACL | Growth | OCF | Loss |
| Conditions |  | 100% | 90% | 41% | 82% |
| Model | 13% | 83% | 80% | 97% |  |
| Variables | ARIN | LaDA | Size | Lev |  |
| Conditions | 47% | 40% |  |  |  |
| Model | 79% | 94% | 33% | 75% |  |

1. Characteristic situations of financial dependence

Rule 1 points out the characteristics of the audited client including liquidity ratio below 2.4059, negative current net profit after tax and revenue growth lower than 0.3891. In case of higher client importance, the accountant gives a small upward earnings management. Rule 1 situations are consistent with the hypothesis of financial dependence. Since the liquidity flow ratio and revenue growth have contained more than 75% observations, the key to the professional judgment of the accountant is the current year net profit after tax. This paper argues that earnings management of net profit after tax will result in relatively low risk of material misstatement for the accountant. As a result, the accountant is willing to give the audited client small room for earnings management.

Rule 1:

if

 CACL <= 2.4059

 Loss = 1

 Growth <= 0.3891

then

 

Table 4 Summary of Rule 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rule | *N* | Average | Range of DA | Estimation error |
| 1 | 2,516 | -0.0733 | [-0.9056, 0.7234] | 0.0704 |

1. Characteristic situations when client importance does not affect independence

The Cubist regression tree model finds 18 rules as client importance having no effects on independence. This paper lists 5 rules of 1,000 observations in Table 5. Table 6 illustrates the basic information from Rule 2 to Rule 6. It can be found by observing the conditional equations from Rule 2 to Rule 6 that, except for Rule 5, all the rules contain the variable of Loss=0. The net profit after tax is positive in financial statement, posing relatively higher risk of material misstatement to the accountant to weaken the financial dependence. Therefore, client importance will not affect independence. All the rules have considered the variable of liquidity ratio, indicating that the short-term solvency of audited client is an important factor of consideration to the accountant in making professional judgment.

Rule 2 contains 7,634 observations accounting for nearly 40.86% of the total. It can be found by observing this characteristic situation that the liquidity ratio is lower than 2.4059, revenue growth is lower than 0.3891, and the ratio of receivables and inventory against the total assets is higher than 0.1261. However, when the current year net profit after tax is positive and the previous accrual ratio is higher than -0.2974, the accountant will never consider client importance in making audit decisions. Rule 2 and Rule 1 mainly differ in the current year net profit after tax. To the accountants, when the annual net profit after tax is positive, the risk of material misstatement is higher than it is negative. Hence, the current year net profit after tax is an important variable affecting the relationship between client importance and auditor independence. To confirm that the current year net profit after tax will affect the professional judgment of the accountant, this paper distinguishes two sub-samples of Loss=1 and Loss=0 by using Logist regression model for discussion. The results are discussed in Section 3.

The observation of overall situation, the average discretionary accruals of Rule 3 and Rule 6 are found positive. The comparison of rules that client importance does not affect independence in case of Rule 3 and Rule 6 has suggested that liquidity ratio is the most important factor for giving the room of earnings management by the accountant. In addition, Rule 3 and Rule 6 both suggest that the accountant is generally more willing to give loose room of earnings management to companies with excellent short term solvency. As the liquidity ratio of other rules is poor, the accountant is more unwilling to compromise independence.

Table 5 Summary of Rule 2 ~ Rule 6

|  |  |  |
| --- | --- | --- |
| Rule | Conditions | Model |
| 2 | ARIN > 0.1261CACL <= 2.4059Loss = 0Growth <= 0.3891LaDA > -0.2974 |  |
| 3 | CACL > 2.4059Loss = 0OCF > -0.3395OCF <= 0.3151Growth <= 0.3891LaDA <= 0.0224 |  |
| 4 | ARIN <= 0.1261CACL <= 2.4059Loss = 0OCF > -0.3395 |  |
| 5 | CACL <= 1.9147OCF > -0.3395Growth > 0.3891Growth <= 1.1081 |  |
| 6 | CACL > 2.4059Loss = 0OCF <= 0.3151Growth <= 0.3891LaDA > 0.0224 |  |
| DA：performance-adjusted discretionary accruals calculated following Kothari et al. (2005); CICPA：client importance, the logarithm of the sales income of a single client of two auditing accountants against the sales income of all publicly listed companies for measurement by using the maximum value; ARIN: the sum of inventories and accounts receivables divided by total assets; CACL: current assets divided by current liabilities; OCF: cash flow from operations scaled by lagged total assets; Growth: growth rate of net sales over the previous year; LaDA: performance-adjusted discretionary accruals in the previous year; Size: log of total assets; Lev: total liabilities divided by total assets; Loss: 1 if the firm reports loss in the current year, and 0 otherwise. |

Table 6 Summary of Rule 2 ~ Rule 6

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rule | *N* | Average | Range of DA | Estimation error |
| 2 | 7,634 | -0.0157 | [-0.8789, 1.3351] | 0.0610 |
| 3 | 1,998 | 0.0099 | [-0.3669, 0.8897] | 0.0672 |
| 4 | 1,422 | -0.0445 | [-0.5605, 0.5599] | 0.0592 |
| 5 | 1,394 | -0.0032 | [-0.7910, 0.6562] | 0.0823 |
| 6 | 1,211 | 0.0265 | [-0.4317, 0.8843] | 0.0899 |

* 1. **Logist Regression Model**

Previous literature uses the Logist regression model in the discussion of topics relating to auditor independence. As the professional judgment of accountants may vary according to situations, this paper employs the Cubist regression tree model for discussion. To confirm whether the Cubist regression tree model can identify situations that have not been found in previous literature, this study uses the significant variables of the Cubist regression tree model in Table 3 as independent variables of Logist regression model with results as shown in Table 7. The empirical results suggest that the coefficient of client importance is negative, but not significant. However, the effects of financial dependence cannot be confirmed, indicating that higher client importance will not affect more unlikely affect auditor independence.

Table 7 Logist regression analysis by full sample

|  |
| --- |
|  |
| Variables | Coefficient | P-value |
| Intercept | 0.062 | 0.000 |
| Size | -0.010 | 0.000 |
| ARIN | 0.183 | 0.000 |
| CACL | 0.004 | 0.000 |
| OCF | -0.227 | 0.000 |
| Loss | -0.074 | 0.000 |
| Growth | 0.002 | 0.000 |
| Lev | -0.113 | 0.000 |
| LaDA | -0.050 | 0.000 |
| CICPA | -0.005 | 0.379 |
| Adjusted R2 | 0.174 |  |
| F-statistic | 438.853(P<0.001) |  |
| DA：performance-adjusted discretionary accruals calculated following Kothari et al. (2005); CICPA：client importance, the logarithm of the sales income of a single client of two auditing accountants against the sales income of all publicly listed companies for measurement by using the maximum value; ARIN: the sum of inventories and accounts receivables divided by total assets; CACL: current assets divided by current liabilities; OCF: cash flow from operations scaled by lagged total assets; Growth: growth rate of net sales over the previous year; LaDA: performance-adjusted discretionary accruals in the previous year; Size: log of total assets; Lev: total liabilities divided by total assets; Loss: 1 if the firm reports loss in the current year, and 0 otherwise. |

The Cubist regression tree model results suggest that the effects of client importance on auditor independence vary subject to the variable of current year net profit after tax. Hence, the variable of Loss is employed to distinguish the two sub-samples for Logist regression analysis. Table 8 illustrates the classification of sample data by negative or positive value of Loss according to current year net profit after tax for Logist regression analysis. As seen, the client importance and discretionary accruals are significantly positively correlated when the current year net profit after tax is negative, and vice versa. However, it has not reached the significance level of 5% and is consistent with the Cubist regression tree model. This paper suggests that, to the accountant; when the audited client’s net profit after tax is negative, the risk of material misstatement is lower as compared with the situation of positive net profit after tax. Hence, in case of auditing failure, if the current net profit after tax of the audited client is positive, the criticism on the failure to identify the major misstated risks will force the accountant to pay more attention to reputation.

Table 8 Logist regression analysis across Loss

|  |
| --- |
|  |
|  |  Loss=1 (N=3,825) |  Loss=0 (N=14,860) |
| Variables | Coefficient | P-value | Coefficient | P-value |
| Intercept | -0.153 | 0.000 | 0.073 | 0.000 |
| Size | 0.017 | 0.001 | -0.014 | 0.000 |
| ARIN | 0.067 | 0.000 | 0.191 | 0.000 |
| CACL | 0.001 | 0.057 | 0.009 | 0.000 |
| OCF | -0.386 | 0.000 | -0.266 | 0.000 |
| Growth | 0.000 | 0.244 | 0.004 | 0.000 |
| Lev | -0.107 | 0.999 | -0.098 | 0.000 |
| LaDA | -0.146 | 0.000 | -0.033 | 0.000 |
| CICPA | 0.031 | 0.048 | -0.011 | 0.086 |
|  | Adjusted R2 | 0.170 | Adjusted R2 | 0.200 |
|  | F-statistic | 89.212(P<0.001) | F-statistic | 477.855(P<0.001) |
| DA：performance-adjusted discretionary accruals calculated following Kothari et al. (2005); CICPA：client importance, the logarithm of the sales income of a single client of two auditing accountants against the sales income of all publicly listed companies for measurement by using the maximum value; ARIN: the sum of inventories and accounts receivables divided by total assets; CACL: current assets divided by current liabilities; OCF: cash flow from operations scaled by lagged total assets; Growth: growth rate of net sales over the previous year; LaDA: performance-adjusted discretionary accruals in the previous year; Size: log of total assets; Lev: total liabilities divided by total assets; Loss: 1 if the firm reports loss in the current year, and 0 otherwise. |

* 1. **Comparison of Cubist Regression Tree and Logist Regression Model**

The empirical results of the Cubist regression tree model suggest that, in case of Rule 1, if the client importance is higher, the accountant is more willing to give small upward room of earnings management to the audited clients. However, the logist regression analysis using the significant variables of the Cubist regression tree model suggests a positive correlation between the variable of client importance and discretionary accruals at insignificant level. Hence, the effects of financial dependence cannot be confirmed. The comparison of two models finds that there is a difference in the professional judgment of the accountant. In addition, by cutting the sample data into two sub-samples according to the current year net profit after tax (Loss), the results of the logist regression analysis suggest that Loss is negative, while the client importance and discretionary accruals are positively correlated, thus confirming the existence of financial dependence. In case of positive Loss value, the correlation is negative in insignificant level, which is consistent with the results of the Cubist regression tree model.

By model comparison, this paper recognizes the Rule 1 situation with financial dependence within the samples, and uses the Loss variable to divide the sample data into sub-samples. The results of the logist regression analysis also confirm the effects of financial dependence in case of negative current year net profit after tax. However, the logist regression discussion of all samples cannot confirm the financial dependence of the accountant on the client. Therefore, the contribution of this paper is to identify the characteristic situation affecting the professional judgment of accountant that has not been previously found.

# Conclusions

As the accountant’s audit fee is paid by the client, there may be a relationship of financial dependence that possibly forces the accountant to compromise independence; however, the damage to independence may be reflected in the value of the client’s company. Hence, the audit failure may sacrifice the financial benefits to other clients. Major financial scandals have taken place around the world, making the general public doubtful about the independence of accountants in performing service. For decades, the academia has been considerably concerned about issues relating to auditor independence, however, there is not yet a consensus.

Most previous literature uses the traditional measurement methods to discuss the financial dependence of the accountant on the audited client. This paper argues that the accountant is flexibly in professional judgment when facing clients of different types. The accountant may give them different room for earnings management, according to auditing and accounting knowledge and experience. This cannot be detected by traditional econometric approaches. Hence, this paper applies the Cubist regression tree model. The empirical results suggest that the logist regression model cannot confirm the financial dependence effects of the accountant ([Chi, et al., 2010](#_ENREF_3); [Chung & Kallapur, 2003](#_ENREF_4)). However, the Cubist regression tree model suggests that, in the characteristic situation of negative current year net profit after tax, if the client importance is at a higher level, the accountant is more willing to tolerate the upward earnings management. The analysis results of the Cubist regression tree model also confirm the financial dependence effects of the accountant when the current year net profit after tax is negative. However, in case of positive net profit after tax, client importance has no effects on auditor independence. Therefore, the results of dividing samples by current year net profit after tax coupled with the analysis of logist regression model are consistent with the results of the Cubist regression tree model. This paper believes that the auditor independence will be affected by the differences in the characteristic situations of the samples as the professional judgment of accountants varies accordingly.

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