



# Pay Gaps among Auditors, Diversification, and the Performance of Partnership Audit Firms in Taiwan

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*Abstract: A few studies look at partnership audit firms, and examine how they use the pay gaps to enhance their performance. In this paper, we argue that promotion-to-partner tournament with a large pay gap is pervasive in public accounting industry, provoking feelings of inequality and being undervalued for auditors. The audit manger, can simultaneously be an agent and a potential owner, affects the relationship between auditor pay gaps and partnership CPA firm performance. That relationship is contingent on the organizational complexity (i.e., CPA firms diversify their services into auditing, tax advice, and other advice). This study uses pooled cross-sectional research designs and partnership CPA firm data for the year 2004-2007. We find that large differences in pay between the lower-level employee and partner compensation are detrimental to partnership CPA firm performance. We find that increasing in pay gaps will deliver partnership audit firm's performance when coupled with more audit managers to coordinate. However, diversification influences the strength of that relationship.*

**Keywords :** Partnership CPA Firm, Auditor Compensation, Diversification

## 1. Introduction

In order to become a partner in a CPA firm, an auditor must first be promoted from junior staff to senior supervisor, and then to audit manager. Competition for promotions and bonuses is a means to elicit strong efforts from employees who are otherwise prone to shirking and free riding. However, inter-rank pay gaps may cause lower-level auditors to feel deprived, thereby leading to adverse reactions such as deteriorating cooperation. There has been minimal research examining the consequences of pay differentials on auditor performance. This paper seeks to address this shortcoming using data from the Census Report of Accounting Firms in Taiwan.

This paper suggests that the incentive effects of tournaments (that is, pay gaps) depend on supplementary coordination mechanisms. In partnership CPA firms, an auditor is unable to complete an audit engagement without *intergroup communication*, as engagements require joint production. As a consequence, dove-style firms achieve a performance advantage when their pay gaps take into account the effectiveness of coordination.

In this paper, we propose three hypotheses to address how the link between auditor pay gaps and partnership affects CPA firm performance. First, we predict that large differences in pay between lower-level employees and partners provoke feelings of inequality and under appreciation resulting in reduced employee effort and cooperation, which is detrimental to partnership-based CPA firm performance. Second, we hypothesize that the performance consequences of tournament incentive schemes relate to some degree of coordination by audit managers (from different engagements) within CPA firms. Survey-based literature that examines mentors, such as a



more senior auditor (e.g., audit manager) who sponsors a subordinate, shows that mentoring functions account for significant variance in job satisfaction, organizational commitment, and job burnout (Siegel and Omer, 1995; Siegel, Reinstein, and Miller, 2001). Nevertheless, the literature does not examine the roles of auditor managers in the design of tournament pay differences.

Finally, we expect that organizational complexity influences the *strength* of the relationship described above. While diversifying an audit firm's services into auditing, tax advice, and other advice may increase opportunities and the flexibility to cope with intense competition (Greenwood, Hinings and Suddaby, 2002; Greenwood, Li, Prakash and Deephouse, 2005; Liu and Simunic, 2005; Døving and Gooderham, 2008), diversification deepens communication and cooperation difficulties (Liu and Simunic, 2005); it thereby negatively impacts the performance-enhancing effect of pay gaps and coordination needs in a partnership CPA firm. In the US, CPA firms could no longer provide audit services and non-audit services to the same client-firm after enactment of the Sarbanes-Oxley Act in 2002. In Taiwan, the Big 4 CPA firms are in compliance with auditing standards, as are their parent companies in the US. However, non-audit services are not prohibited in non-Big 4 CPA firms in Taiwan. Regulations prohibiting non-audit services for client firms have not been promulgated by regulatory authorities in Taiwan. We take advantage of this natural setting to investigate whether unaffected (non-Big 4) audit firms should voluntarily constrain their services to improve audit effectiveness in terms of improving *partnership* CPA firm performance. Most accounting research on diversification has been conducted using data sets from more developed Western economies (Simunic, 1984; Antle and Demski, 1991 Morgan and Stocken, 1998; Wu and Stein, 2006; Joe and Vandervelde, 2007). The present study complements and extends this line of research through examination of the voluntary setting described above.

Furthermore, most studies focus on performance implications of the tournament pay mechanism (Wageman and Baker, 1997; Eriksson, 1999; and Main, O'Reilly and Wade, 1993) and the moderator role of diversification, where diversification influences the *form* of the relationship between pay gap and firm performance. For instance, Henderson and Fredrickson (2001) document a negative relationship between top executive coordination needs and gaps between CEO and top management team (TMT) member pay. Bloom and Michael (2002) provide mixed evidence on the relationships between diversification strategy and pay gaps. This paper argues that one of the reasons that existing theories appear to lack a sufficient explanation for these inconsistent findings is the inability to identify the contextual variable that affects the *strength* of the relationship between independent and dependent variables. The reasoning behind this argument is that minimal work has been done to examine the correlation between diversification, pay gaps, coordination needs, and firm performance. The present study endeavors to bridge this gap in the literature.



## 2. Literature Review and Hypothesis Development

### Characteristics of partnership CPA firms

The specific setting that the partnership CPA firm provides has several distinctive features that enhance our ability to study the various issues that arise from the viewpoint of the promotion-to-partner tournament. First, *internal promotion* is the primary channel for employee progression in an accounting firm. Meanwhile, CPA firms have *clear hierarchies*, which typically consist of partners, managers, supervisors, and staff. In addition, financial payment is the main method of remuneration for auditors in public accounting firms. Compensation contracts in CPA firms tend to be relatively simple combinations of fixed salary and annual cash bonuses. The implicit assumption of tournament theory is that *money* is the sole motivator for the pursuit of higher paying jobs.

Second, *monitoring* is very difficult because of the tediousness and complexity of the tasks in the audit review process. Research shows that firms making transaction-specific investments in client relationships and attempting to lend shareable human capital will tend toward an internal organization that favors “promotion-to-partner tournament” as their form of governance (Alchian and Demsetz, 1972; Galanter and Palay, 1990; Morrison and Wilhelm, 2004; Huddart and Liang, 2005; Levin and Tadelis, 2005; Liu and Simunic, 2005). A large pay difference in the hierarchical structure substitutes, on the one hand, for monitoring activities in human capital intensive industries where product quality is difficult to observe. On the other hand, due to the desire for individual promotion, auditors may have an incentive to shade their efforts away from information sharing activities toward activities that further their own personal benefit. This may be one reason why CPA firms typically employ a greater number of managers to better coordinate their business activities, in spite of increasing costs (Chandler, 1962; and Lawrence and Lorsch, 1967).

The pyramid staffing structure means that audit managers typically have incentives to progress up the organizational hierarchy toward making partner by demonstrating their coordination capabilities. There has been a disproportionate research focus on top-level partners and lower-level staff (Carcello, Hermanson, and Huss, 2000; Zeff, 2003) at that expense of issues relating to middle-level staff, such as audit managers. For example, utilizing 64 of Accounting Today’s top 100 accounting firms in the U.S., Banker, Chang, and Cunningham (2003) develop evidence that partners contribute nine times more toward revenue generation than other professionals (i.e., aggregate junior staff, senior supervisor, audit manager). Although we agree with the finding that partners make the greatest contribution toward revenue generation, the question of how audit managers who are potential partners influence CPA firm performance has remained largely unexplored.

Finally, diversification reduces the risk of returns to partners (Holmes and Zimmer, 1995, 1998), while intense competition results in CPA firms diversifying into multiple markets, which can impose significant operational and informational complexity. Even though the



accounting literature contributes to enhancement of our understanding of the effects of simultaneous provision of audit and non-audit services (Simunic, 1984; Antle and Demski, 1991; O'Keefe et al., 1994; Morgan and Stocken, 1998; King and Schwartz, 1999; Blokdijk, Driehuisen, Simunic and Stein, 2003; Dopuch, Gupta, Simunic and Stein, 2003; Low, 2004; Wu and Stein, 2006; Joe and Vandervelde, 2007), few, if any, works examine the performance implications of diversification and auditor compensation. For instance, using experimental methods, Joe and Vandervelde (2007) documented that knowledge transfer between audit services and non-audit services occurs only when the same auditor performs both tasks, and that knowledge transfer does not occur when the audit and non-audit tasks are performed by different auditors. Extending this argument, coordination among auditors performing different services imposes some costs, and consequently large pay gaps may be ineffective. Hence, we examined the performance implications of pay gaps and coordination needs in partnership CPA firms.

#### **Relationships among performance, pay gaps, and coordination needs**

Compensation schemes play a role in affecting the behavior and work of auditors in practice. Research on profit-sharing rules and tournament theory finds that a large pay gap across hierarchical levels attracts talented auditors to compete in the managerial tournament (Alchian and Demsetz, 1972; Galanter and Palay, 1990; Gaynor and Gertler, 1995; Morrison and Wilhelm, 2004; Huddart and Liang, 2005; Levin and Tadelis, 2005; Liu and Simunic, 2005). Deferred compensation (the promise of possible partnership) enables CPA firms to train and develop auditors' professional competence in client relations and other areas commensurate with partnership status (Galanter and Palay, 1990). The large pay differential provides extra incentives to exert effort, leading to increased effort and, thus, improved CPA firm performance.

However, this superior performance is not always an automatic consequence of large discrepancies in remuneration. Criticisms of tournament schemes revolve around sabotage reactions amongst contestants (Lazear and Rosen, 1981; and Lazear, 1989), and fairness perceptions involving the allocation of organizational rewards (Parker and Kohlmeyer III, 2005). In rank-order tournament models, lower-ranking auditors are paid much less for services rendered; and higher-ranking auditors are paid much more for the services they provide. Such significant ex ante variations in auditor compensation may induce disruptive rivalry, creating pervasive sabotage and deteriorating cooperation. Furthermore, using survey distributed to three large public accounting firms (Big5 firms) in a major metropolitan area in Canada, Parker and Kohlmeyer III (2005) document that the perceived unfairness of the allocation of pay schemes leads to a number of negative consequences, such as low job satisfaction, low organizational commitment, and high turnover. Extending this argument, the ex post pay differences in an accounting firm hierarchy may weaken the performance–pay relation, which could cause



lower motivation and thus poor (job and firm) performance. Excessive competition for promotion within an accounting firm therefore may result in dysfunctional staff behavior and hinder CPA firm performance (Brierley and Gwilliam, 2003). These discussions lead to the following hypothesis:

**H<sub>1</sub>:** There is a negative relationship between partnership CPA firm performance and auditor pay gaps.

In this study, we argue that, given the widespread prevalence of tournament compensation systems, superior performance by an audit firm rests on an appropriate level of coordination among audit managers attached to different engagements or offices within a CPA firm. The complexity of the audit review process imposes considerable task-interdependence on an audit team, requiring auditors within and across hierarchies to interact frequently, cooperate, collaborate, and coordinate with respect to mutually relevant information. The staff and supervisors in audit firms prepare audit files for managerial review according to specific procedures so that the file is sufficiently comprehensive to support the partners' issuance of the firm's audit opinion. The process of file preparation thus involves actions and information flow both up and down the firm's hierarchy of staff, supervisors, managers, and partners (Gibbins and Trotman, 2002). Audit managers need to monitor audit progress, effectively manage cases, know what is happening in the moment (not months down the road), and be able to readily identify cases that require their involvement.

In *partnership* CPA firms, the audit manager can simultaneously be an agent and a potential owner. *Partnership* CPA firms evaluate their managers' final standing in the tournament, measured subjectively and relying on both quality of engagement work and their own human capital. Competition for a limited number of partnership positions provides a solution to the shirking problem by offering a large reward to the most promising candidates, and avoids excessively diluting profit-per-partner. The qualifications necessary to become a partner motivate audit managers to exert additional effort. Audit managers thus apply more facilitative techniques in managing teams, as their roles switch from supervising subordinates one-on-one to managing networks of interdependent employees working in team environments (Siegel, Rutledge and Hagan, 1997; Siegel et al., 2001). Provided that the managers responsible for business integration communicate with each other frequently, a collaborative norm amongst peers may be enforced (Henderson and Fredrickson, 2001). Large pay gaps may be effective in CPA firms with many audit managers, because they promote efforts to foster goal congruency, and facilitate collaboration and coordination among diverse teams or individuals. Further, the literature, which considers a mentor an audit manager who sponsors her subordinate, shows that positive mentoring relationships can reduce pressure and increase job satisfaction for auditors (Siegel and Omer, 1995; Siegel et al., 2001). In sum, because coordination needs are greater in CPA firms with larger pay gaps, the combination of higher coordination needs and a widespread between pay levels enhances firm performance. These discussions lead to the following hypothesis:

**H<sub>2</sub>:** The performance of partnership CPA firms will be positively correlated with the interaction between pay gaps and the number of managers.

Another issue commonly overlooked by prior research on the effectiveness of coordination has been the repercussions of diversifying the auditing service into a wide range of non-auditing services. While partnership CPA firms may benefit from competition in multiple business areas (Holmes and Zimmer, 1995, 1998; Greenwood et al., 2005), they also confront more complex operational and informational environments resulting from employing a diversification strategy. Servicing a large client company probably requires more auditor collaboration than servicing a small client company, especially when simultaneously providing audit and non-audit services



(Morris and Empson, 1998; Greenwood et al., 2002; Liu and Simunic, 2005; Døving and Gooderham, 2008). Organizational complexity imposes on CPA firms the issue of effective communication and the difficulty of cooperation. For example, different segments (business lines) can have conflicting operational styles. The audit of a complex client company requires different amounts of auditor collaboration than does the audit of a less complex client company (Liu and Simunic, 2005). Experimental study indicates that it is difficult to transfer knowledge between audit services and non-audit services when the audit and non-audit tasks are performed by different auditors (Joe and Vandervelde, 2007). Audit managers suffer severely from substantial problems associated with sabotaging behavior and resource allocation; therefore, performance-enhancing effects resulting from pay gaps are hampered by an extremely diversified environment. Using the argument that vice-presidents serve as coordinators, Henderson and Fredrickson (2001) document that gaps between CEO and TMT member pay are lowest when top-executive coordination needs are very high. That is, diversifying into several business lines negatively influences the *form* of the relationship between pay gaps and firm performance; but these authors do not consider the *strength* of the relationship between independent and dependent variables.

Both pay gaps and an extremely diversified environment burden partnership CPA firms, even though their audit managers promote efforts to foster goal congruency, and to facilitate collaboration and coordination among diverse teams or individuals. Therefore, we predict that the positive relationship between performance at a partnership CPA firm and the interaction of pay gaps and the number of managers is stronger in firms with a narrower business focus than in more complex environments. Consequently, we proposed the following hypothesis:

**H<sub>3</sub>:** The positive relationship between the performance of a partnership CPA firm and the interaction between pay gaps and number of managers will be stronger in a moderately than in an extremely diversified situation.

### 3. Research Design

#### Sample and data

We used a data source that provides compensation and financial data on accounting firms in Taiwan. Specifically, we obtained data from the Census Report of Accounting Firms in Taiwan for 2004–2007. The database was constructed from the firms' annual responses to the Financial Supervisory Commission, Executive Yuan (FSCEY), Taiwan, ROC, which sent surveys to all registered CPA firms in Taiwan. The survey, which was conducted each year from the beginning of July to the end of December, requested information from the preceding year; results were reported around April of the following year.<sup>1</sup> To the end of identifying a reference base for the development of government policies, the Taiwanese FSCEY mandated that all registered CPA firms complete the survey. Unlike US

<sup>1</sup> For example, the 2008 survey was sent to all registered CPA firms in Taiwan and addressed the situation in 2007; results were reported in 2009. We obtained all available data.



SEC filings, reporting in Taiwan is mandatory. US SEC filings involve only audit fee data and do not include information about the accounting firm's costs and auditor compensation. However, compensation information about all levels of auditors within a CPA firm is crucial for testing propositions about how partnership CPA firms use pay disparities to enhance performance. No such data have been available to Taiwan researchers until 2004.<sup>2</sup>

Our initial sample included data from the 953 registered partnership CPA firms in Taiwan. A partnership CPA firm must have complete financial data (such as on different types of revenue) and detailed information on auditor compensation. We deleted the data from 524 firms with incomplete data on variables of interest (either compensation data for partners, managers, supervisors, and staff or financial data). We excluded data from 204 CPA firms with only one level. This restriction was imposed because a minimum of two auditors is necessary for monitoring and collaboration. Thus, we included 225 observations in the sample used for analysis. Table 1 presents the process used for sample selection and the distribution of the responding firms by year.

(Refer Table 1 at the bottom of this article)

Although we used a relatively new data source to investigate the connection between increases in pay gaps and the performance of partnership CPA firms, we also faced challenges. First, this research may have had a self-selection bias because the sample was not large. To examine the data for self-selection bias, *t*-tests were conducted between in-sample firms and out-of-sample firms according to age and size of firm and number of licenses held. The untabulated results demonstrate that the *t*-tests for firm age and number of licenses are not significant (0.5842 with  $p > 0.10$ ; 0.931 with  $p > 0.10$ , respectively); however, *t*-tests for firm size are significant (0.3238 with  $p < 0.01$ ), indicating that our sample involves the large partnership CPA firms.<sup>3</sup> Overall, this potential self-selection bias between in-sample and out-of-sample firms may not be a serious issue. Second, due to the potential inclusion in our formal empirical analysis of 4 years' of same-firm observations, the findings reported in this paper may suffer from a fixed effect related to firm. However, it was difficult to identify each accounting firm in the different survey years. Furthermore, the small number of observations per year (around 51–62) afforded limited degrees of freedom. We adopted two methods to mitigate the potential effects of including same-firm observations for the 4 years. First, we used data for both 2004 and 2005 to recalculate the empirical model. Second, given the degrees-of-freedom constraint, we used a single-year sample but excluded several control variables (*BIG4*, *AGE*, *MANAGE*, *NATIONAL*, and *EXPERIENCE*). The untabulated results remained qualitatively unchanged. Thus, we feel that our findings were not driven by the fixed effect of firm.

<sup>2</sup> Previous research (e.g., Cheng, Wang, and Weng, 2000) used the same survey without the detailed compensation data on accounting firms in Taiwan. Indeed, 2004 was the first year for which the compensation data on partners, managers, supervisors, and staff were available.

<sup>3</sup> A plausible explanation is that small-partnership CPA firms do not like to disclose their auditor compensation information due to taxation concerns.



### Empirical model and measures

We assumed that the effects of coordination needs, pay gaps, and their interaction would affect our performance measure in a linear way.<sup>4</sup> We then estimated the following pooled-data regression model:

$$\begin{aligned} \text{PERFORMANCE}_{it} = & \gamma_0 + \gamma_1 \text{COORD}_{it} + \gamma_2 \text{PAY\_GAP}_{it} + \gamma_3 \text{COORD}_{it} \times \text{PAY\_GAP}_{it} \\ & + \gamma_4 \text{PAY(AVG)}_{it} + \gamma_5 \text{BIG4}_{it} + \gamma_6 \text{HFD}_{it} + \gamma_7 \text{AGE}_{it} + \gamma_8 \text{SIZE}_{it} \\ & + \gamma_9 \text{MANAGE}_{it} + \gamma_{10} \text{NATIONAL}_{it} + \gamma_{11} \text{EXPERIENCE}_{it} \\ & + \gamma_{12} \text{LICENSE}_{it} + \sum \gamma_{13-15} \text{YEAR}_{it} + \xi_i \end{aligned} \quad (1)$$

where the subscript *i* indicates the firm, *t* indicates the year.

Because audit firms are not publicly traded, they are not required to report profits in the US. Due to data limitations, prior accounting researchers have measured the performance of audit firms by revenue (e.g., Banker et al. 2003). However, it is more reasonable to include expenses when attempting to ascertain the actual profitability of CPA firms. As a performance measure (*PERFORMANCE*), we thus used the ratio of the CPA firm's profit to their total employees and applied a natural logarithmic transformation to control for the degree of skew in the performance of CPA firms (Eriksson, 1999). Profit per employee reflects the audit firm's average profitability by employee. Additionally, we found similar results (untabulated) even when we substituted revenue for total employees as the scale variable (i.e., performance was measured as profit per unit of revenue). This result also remained unchanged when we did not use a natural logarithmic transformation.

Following prior studies (Eriksson, 1999; Main et al., 1993; Conyon, Peck, and Sadler, 2001; Henderson and Fredrickson, 2001), *PAY\_GAP (CPA- AVG)* equals the log difference in the average pay of partners and that of all employees. Because hypothesis 1 predicted that pay gaps are likely to induce disruptive rivalry rather than collegiality characterized by collaborative assistance, we predicted that pay gaps would have a negative impact on the performance of audit firms.

We assessed coordination needs by calculating the ratio of audit managers to the sum of partners, audit managers, and supervisors [*COORD(M)*]. Although the studies conducted by Wageman and Baker (1997) and Henderson and Fredrickson (2001) reported potential performance advantages of pay gaps, these benefits are not automatic. Audit managers communicate with other lower-rank auditors, collaborate with one another, coordinate their efforts to complete the audit task, and report related issues to the partners. Thus, the number of audit managers reflects the coordination needs, which are essential to the performance effect of the pay-dispersion policies of CPA firms. We predicted that the interaction term between pay gaps and coordination needs would contribute to profit per auditor.

An accounting firm with a diversification strategy compensates its auditors more because the auditors need to take an active role in resolving issues related to the complexity that arises from the diversification strategy and in leveraging core competencies across service areas. We used the Herfindahl index (*HFD*) to represent the inverse of the diversification of an accounting firm's portfolio. An audit firm generates income from each of the three lines of service: 1) auditing and accounting, (2) tax advising, and (3) management consulting and other services. Previous studies using a moderator variable (Sharma, Durand, and Gur-Arie, 1981; Le, Walters, and Kroll,

<sup>4</sup> We also add the square term of pay gaps, but find an insignificant coefficient.



2006) have suggested that if the moderator variable (diversification) were *unrelated* to the independent or dependent variable but *related* to the error term of Equation (1) or if the size of the error term of Equation (1) were a function of the moderator variable, we may find evidence that diversification can affect the *strength* of the relationship between independent and dependent variables by dividing the sample into homogeneous subgroups on the basis of the moderator variable. To assess hypothesis 3, we calculated the median of the *HFD* and divided the sample based on the median cutoff. To perform a robustness check, we calculated diversification using an entropy measure (*EPTD*) widely used in academic research (Palepu, 1985). The untabulated results remained qualitatively unchanged when this method was used.

We controlled for several variables that might affect an accounting firm's performance (*EXPERIENCE*, *LICENSE*, *AGE*, *SIZE*, *BIG4*, *NATIONAL*, *MANAGE*, *PAY(AVG)*, and yearly idiosyncratic effects) by entering a dummy year (*Y2004*). *EXPERIENCE* and *LICENSE* are proxy variables for human capital. We controlled the average cumulative number of years of experience of all auditors (*EXPERIENCE*) when using the average number of CPA licenses (possessed by audit managers, supervisors, and staff; *LICENSE*) as a proxy for the ability of auditors within a CPA firm. *AGE* and *SIZE* were used as controls for organizational structure. Researchers typically take the log of the number of years that an accounting firm has been practicing to control for the age effect (*AGE*), and include the total assets (in logs) to control the size effect. We used three dummy variables (*BIG4*, *NATIONAL*, and *MANAGE*) to address the modes of operation of audit firms. To account for performance difference between Big 4 and non-Big 4 firms, an indicator variable (*BIG4*) was set to 1 (0) when a firm was (was not) a Big 4 accounting firm.<sup>5</sup> We controlled for geographical effect in terms of whether the firm's business area was located in Taipei City, in Kaohsiung City, in the Kim-Ma region, or Taiwan Province. *NATIONAL* was used as a dummy variable that reflected if a firm operated in two or more business areas; businesses operating in two or more areas were given a value of 1, and others were given a value of 0. To address the effects of providing of management consulting services on performance we used the control *MANAGE*, with a value of 1 (0) assigned when the CPA firm did (did not) provide these services.

CPA firms in the US cannot provide audit and non-audit services to the same client firm. In Taiwan, the Big 4 CPA firms comply with the auditing standards followed by their US offices. However, non-Big 4 CPA firms are not prohibited from providing non-audit services in Taiwan. Thus, we controlled for potential regulatory effects. A pay gap may be unremarkable when *all* auditors earn a high salary. We thus controlled for the average wage of auditors, *PAY(AVG)*, which is the log of the average compensation of all employees in an accounting firm. Finally, we controlled for any time effect by using three dummy year variables (*Y2004*, *Y2005*, and *Y2006*).

All statistical coefficients in this study were estimated by QML (Huber/White) standard errors and covariance to mitigate the effects of any unobservable heteroscedasticity problems.

## 4. Empirical Analysis

### Descriptive statistics and correlations

Table 2 summarizes the descriptive statistics. Consistent with tournament theory, a partner earns NT.\$ 1,171,905, higher than a manager (NT.\$ 736,292), and the reward for a supervisor (NT.\$ 492,651) is higher than that of staff auditors (NT.\$ 374,246), indicating a large increase in pay at the very top of the hierarchy. On average, the sample observation contains information on 11 partners, 31 managers, 29 supervisors, and 97 staff auditors, indicating that partnership CPA firms in the sample employ a greater number of

<sup>5</sup> We obtained data from four Big 4 firms in each year studied.



managers. On average, total revenue is NT.\$ 266,000 (thousands), while total expense is NT.\$ 226,000 (thousands). Profit per employee (in logs) is 4.443, suggesting that the average audit firm's profitability created by all employees is positive. The inverse measure of diversification is 0.45, indicating that some accounting firms diversify their business lines. The CPA firm age in the sample is, on average, 17 years, while average cumulative years of experience by auditors is 9. On average, the number of CPA licenses (audit managers, supervisors, and staff) held in each partnership CPA firm is 15.

(Refer Table 2 at the bottom of this article)

Table 3 provides a correlation matrix. A correlation coefficient between the pay gap and a CPA firm's performance is negative (-0.218 with  $p < 0.01$ ), lending support for  $H_1$ . Performance is negatively related to the proportion of audit managers, suggesting that employing audit managers is costly (correlation coefficient = -0.11 with  $p < 0.10$ ). The CPA pay gap is positively correlated with the size of partnership accounting firms (correlation coefficient = 0.644 with  $p < 0.00$ ). Notably, an inverse measure of diversification is not related to pay gaps, the proportion of audit managers, or CPA firm performance, indicating it may affect the *strength* of the relationship between independent and dependent variables. The independence assumption is respected and inspection of the correlations and variance inflation factors (VIFs) attributed to each variable finds that the value is well below the threshold of 10 for problematic multicollinearity (Kennedy, 1992). The testing results show that multicollinearity is not a serious threat to power.

(Refer Table 3 at the bottom of this article)

### **Empirical results**

Table 4 provides regression analyses of the performance results of coordination needs and pay gaps in hierarchies within a CPA firm. R-squares range from 87.72% to 88.79%. Column (1) includes only control variables, and we add the pay gap in column (2). In column (1), we find that larger average salaries do generate higher performance ( $p < 0.00$ ), that Big 4 firms enjoy better performance ( $p < 0.00$ ), and that older and smaller partnership CPA firms realize performance advantages, respectively ( $p < 0.00$ ;  $p < 0.00$ ). In columns (1) and (2) of Table 4, we confirm  $H_1$ . An F-test of difference in R-square between the two models proves to be significant ( $F = 4.8778$  with  $p < 0.00$ ). In column (2), the coefficient for pay gap [ $PAY\_GAP (CPA - AVG)$ ] is statistically significant and negative for audit firm performance ( $p < 0.05$ ). This study thus finds strong evidence in favor of  $H_1$ , implying that pay dispersion has definite costs for a CPA firm.

In column (3), we include the coordination needs and the interaction term between coordination needs and pay gap.  $H_2$  predicts that increases in pay gaps will deliver partnership audit firm performance when coupled with a greater number of audit managers to coordinate. An F-test of difference in R-square between the second column and third column proves to be significant ( $F = 7.3977$  with



$p < 0.00$ ). Both the variables of coordination needs [ $COORD(M)$ ] and pay gap [ $PAY\_GAP (CPA - AVG)$ ] exhibit a negative association with accounting firm performance ( $p < 0.00$ ;  $p < 0.00$ ). The former indicates that employing more audit managers is costly, which is consistent with the findings of Henderson and Fredrickson (2001), who demonstrate a negative relationship between the number of vice presidents and firm performance. More importantly, we do find support for  $H_2$  due to the significant coefficient of their interaction term: the coefficient of  $COORD(M) \times PAY\_GAP (CPA - AVG)$  is positive and significant ( $p < 0.00$ ). The above results indicate that the incentive-inducing effects of high pay variation per se do not deliver improved performance at a CPA firm, but such effects, if accompanied by coordination needs, do enhance performance.

As a further test of the relationship among pay gaps, coordination needs, and CPA firm performance, we re-estimate Equation (1) by using two variables of pay gaps: (1) the log difference in pay between partners and supervisors, and (2) the log difference in pay between partners and staff. The high pay variation may not only induce tournament auditors, but also create pervasive sabotage at each level. We test whether audit managers restrain auditors from the negative effect of wider pay variation through actions of communication and coordination, and deliver the CPA firm's performance. From results not presented in the table, adjusted R-squares range from 83.35% to 89.06%. All interaction terms are significantly positive (0.7621 with  $p < 0.01$ ; 0.5190 with  $p < 0.05$ ) through pay gaps from the higher position to the lower one, suggesting that audit managers who have some responsibility can use their authority to ensure that all business affairs are on track, thus reducing the scope for noncooperation by auditors.

Considering that audit managers may coordinate more with auditors adjacent to their position than other employees, we employ  $COORD(M)$  in the formal empirical analysis. For the sensitivity analysis, re-estimating Equation (1), we conduct two additional analyses by considering the role of coordinators within a CPA firm: (1) replacing audit managers with supervisors, and (2) treating as coordinators supervisors together with audit managers. The untabulated results using both measures provide no evidence to support  $H_2$ : the coefficients of the interaction term between pay gaps and both supervisor measures are negative and insignificant. The lack of significance may be due to the limited authority of supervisors. This lack of authority limits the supervisor's ability to communicate efficiently and to coordinate effectively between interrelated groups, despite clear evidence with a positive coefficient on supervisors, showing that employing a supervisor contributes to the performance of audit firms. Another plausible explanation is that qualification of a candidate for making partner provides managers more incentive to interact, collaborate, and coordinate mutually relevant information with supervisors in the partnership CPA firm. Accordingly, we confirm the existence of compelling evidence in favor of  $H_2$ : large pay dispersion is effective in CPA firms with a greater number of managers.

(Refer Table 4 at the bottom of this article)



For H<sub>3</sub>, we argue that diversification can affect the strength of the relationship between independent and dependent variables. The correlation matrix (in Table 3) shows that an inverse measure of diversification is not related to either pay gaps, the proportion of audit managers or CPA firm performance. Moreover, the inverse measure of diversification is insignificant for audit firm performance in Table 4. In this case, if we *subdivide* the sample into two homogeneous groups on the basis of the moderator (diversification), diversification will affect the level of significance and magnitude of the relationship between independent and dependent variables through influencing the error terms of Equation (1). In CPA firms with a tighter business focus, we expect to report a stronger positive and significant coefficient for the two-way interaction terms between pay gaps and audit managers than in CPA firms with an extremely diversified environment.

As shown in Table 5, adjusted R-square is 88.36% for the CPA firm sample with a tighter business focus, while adjusted R-square is 35.68% for the CPA firm sample with a higher degree of diversification. The relationship among pay gaps, coordination needs, and CPA firm performance proves to be statistically and significantly positive for the subsample (113 observations) consisting of firms with above-median inverse diversification (business focus): the coefficient of interaction between pay gaps and coordination needs is positive and significant ( $p < 0.00$ ). For partnership CPA firms with low levels of business focus (112 observations), the performance links are found to be insignificant: the coefficient of interaction between pay gaps and coordination needs is positive but insignificant ( $p > 0.10$ ). A Chow test of difference in R-square between the two models (F-statistics = 2.8206) proves to be significant. To test the robustness of the median cutoff, we divide the sample into two parts: top 33% sample and bottom 33% sample. The untabulated results of the test using the top 33% sample versus the bottom 33% sample are consistent with those using median measures. Thus, this study finds strong evidence in favor of H<sub>3</sub>.

In Table 5, while we confirm that smaller firms and higher average salaries are positively associated with partnership CPA firms, we do find a difference between subgroups. The coefficient for BIG4 is positive and statistically significant ( $p < 0.00$ ), and the coefficients on SIZE, COORD(M) and PAY\_GAP (CPA-AVG) are negative and significant ( $p < 0.10$ ;  $p < 0.00$ ;  $p < 0.05$ , respectively) in the partnership audit firm with business focus. The coefficients for HFD, MANAGE and LICENSE are positive and statistically significant ( $p < 0.15$ ;  $p < 0.10$ ;  $p < 0.05$ , respectively) in the CPA firm with low levels of business focus (higher degree of diversification). Some studies document a promising performance impact of diversification strategy for the accounting firm (Holmes and Zimmer, 1995, 1998; Greenwood et al., 2005). The present study does provide evidence that a higher degree of diversification contributes to CPA firm performance, albeit on a very limited basis due to the marginal significance level. However, audit firm diversification is not necessary to enhance audit firm performance, and organizational complexity deepens communication and cooperation difficulties, thereby



detrimentally affecting the performance-enhancing effect of pay gaps and coordination needs.

(Refer Table 5 at the bottom of this article)

## 5. Conclusions and Suggestions

Why is auditor pay differentials associated with the performance of partnership CPA firms? The existing body of evidence on this topic is rather limited because data on the compensation of auditing staff are not readily available in the public domain. We took advantage of the first time such data were available in Taiwan and used a pooled cross-sectional research design to analyze data on CPA firms for 2004–2007. Our results show that large differences in pay between lower-level employees and partners were associated with feelings of inequality and being undervalued, resulting in reduced employee effort and cooperation, phenomena that were detrimental to the performance of partnership CPA firms. This indicates that decreasing pay gaps may foster collaboration in accounting firms and ultimately increase firm performance.

We find that increasing pay gaps deliver audit firm performance only when coupled with more audit managers to coordinate. However, diversification influences the *strength* of that relationship. We find that organizational complexity deepens the communication and cooperation difficulty, and thereby detrimentally affects the performance-enhancing effect of pay gaps and coordination needs.

This study makes three major contributions to the literatures on tournament strategies, organizational structure, and the accounting industry. First, the results of this study provide evidence on the applicability of tournament considerations for compensation design in a cleaner setting than is used in many other studies. Second, most of the business compensation literature using tournament theory examines executive pay in large corporations. This study extends the limited empirical studies on compensation plan design to partnership firms, where an audit manager can simultaneously be an agent and a potential owner. In so doing, we provide empirical tests of predictions from rank-order tournament models for *partnership* firms. Compared to executives in large corporations, audit managers are more likely to have incentives to mitigate agency problems, along with issues of sabotage behavior and unfairness perceptions amongst subordinates, given the incentive of promotion to partnership signifying joint ownership status and a claim to firm assets. Audit managers, the candidate group for the partner position in the tournament, then, have responsibility for ensuring that the rules are enforced, and that auditors in their teams are performing according to schedule. Nevertheless, some doubt the ability of office politics and competition to impede collaboration and CPA firm performance. Audit managers play an interrelated role. Our results demonstrate that accounting firm (dove-style) should promote more audit managers if it utilizes pay differential mechanisms to give lower-level contenders strong incentives to increase their efforts. It seems that the incidence of manager politicking decreases with the number of audit managers.



Finally, this study identifies the *contextual factor* that affects the validity of tournament theory. We provide insight into published empirical results, which have implications in practice when public accounting firms pursue a diversification strategy. Our study shows a clear positive association between CPA firm performance and the interaction of pay gaps and the number of managers for partnership CPA firms with limited service provisions. This result implies that the coordination value of audit managers, together with the promotion-to-partner tournament mechanism is likely to be more significant in the presence of a *moderate* degree of diversification. Given the promotion-to-partner tournament as an important mechanism, a partnership CPA firm voluntarily tailors its diversification structure to its coordination needs. Partnership CPA firms should deliberate on whether to diversify given that financial performance is hampered by considerable organizational complexity together with tournament pay difference design.

Our study also has a number of limitations. First, limiting our analysis to partnership CPA firms allows us to test tournament model predictions specific only to these organizations. Given the significant results of the present study, future research could explore the hypotheses of this study in similar contexts with internal promotion concerns (such as law firms) to enrich our understanding of tournament theory. Moreover, we lack detailed information on compensation for diverse types of auditors. Due to unavailability of data, we cannot distinguish between the compensation of auditing staff (i.e., those primarily employed in auditing and assurance services and undertaking financial statement audits) and that of employees of auditing firms that provide a wide range of non-auditing services. Future studies should take into account the contribution of non-auditing staff to audit firm performance. Finally, one fruitful avenue of future research would be to analyze time-series panel data to investigate dynamic tournament implications.

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**Table 1** Sample Selection Process

Year	2004	2005	2006	2007	Total
All registered partnership CPA firm observation	226	246	234	247	953
Less:					
Incomplete information on variables of interest	125	130	134	135	524
Observations with only one ladder	50	54	44	56	204
Total observations	51	62	56	56	225

**Table 2** Descriptive Statistics (n=225)

Variables	MEAN	MEDIAN	STD.DEV.
CPA's PAY	1,171,905.00	919,040.00	940,654.00
MANAGER's PAY	736,292.40	738,055.00	416,412.70
SUPERVISOR's PAY	492,651.30	511,786.80	293,135.30
JUNIOR's PAY	374,246.30	373,682.30	121,784.80
NUMBER of CPA	11.07	4.00	23.80
NUMBER of MANAGER	31.63	4.00	96.01
NUMBER of SUPERVISOR	29.11	4.00	91.04
NUMBER of JUNIOR	96.75	20.00	225.96
TOTAL EMPLOYEE	174.30	35.00	463.33
FINANCIAL REVENUE	1.61E+08	8.19E+06	5.79E+08
TAX REVENUE	6.32E+07	1.27E+07	1.58E+08
OTHER REVENUE	4.00E+07	5.55E+06	1.22E+08
TOTAL REVENUE	2.66E+08	3.04E+07	8.39E+08
TOTAL EXPENSE	2.26E+08	2.54E+07	7.15E+08
PERFORMANCE	4.43	4.18	1.19
HFD	0.45	0.41	0.12
AGE YEAR	16.94	16.00	9.59
EXPERIENCE	9.13	8.71	2.68
LICENSE	15.02	0.00	55.31

*Notes:*

CPA's PAY, MANAGER's PAY, SUPERVISOR's PAY, JUNIOR's PAY is the average compensation of a partner; manger, supervisor, junior; NUMBER of CPA, NUMBER of MANAGER, NUMBER of SUPERVISOR, NUMBER of JUNIOR is the total number of partner level, manager level, supervisor level, junior level; TOTAL EMPLOYEE = total employee of a CPA firm; FINANCIAL REVENUE =total financial service revenue of a CPA firm; TAX REVENUE= total tax service revenue of a CPA firm; OTHER REVENUE=other execute revenue except for financial revenue and tax revenue in a CPA firm; TOTAL REVENUE=total revenue of a CPA firm; TOTAL EXPENSE= total expense of a CPA firm; PERFORMANCE=ln((revenue-expense)/ total employee); HFD=a Herfindahl index which is measured by the sum of square over the proportion of each type executive revenue to total executive revenue; AGE YEAR =the number of practice year of a CPA firm; EXPERIENCE= The average year of experience by the employees; LICENSE =total CPA licenses belonged to total employee within a CPA firm.

**Table 3** Correlation

Variables	PERFORMANCE	COORD(M)	PAY_GAP	PAY(AVG)	BIG4	HFD	AGE	SIZE	MANAGE	NATIONAL	EXPERIENCE	LICENSE	Y2004	Y2005	Y2006
PERFORMANCE	1.000														
COORD(M)	-0.110 <sup>*</sup>	1.000													
PAY_GAP	-0.218 <sup>***</sup>	0.259 <sup>***</sup>	1.000												
PAY(AVG)	-0.064	0.170 <sup>***</sup>	0.626 <sup>***</sup>	1.000											
BIG4	-0.262 <sup>***</sup>	0.234 <sup>***</sup>	0.495 <sup>***</sup>	0.462 <sup>***</sup>	1.000										
HFD	-0.007	0.016	-0.141	-0.067	0.077	1.000									
AGE	-0.182 <sup>***</sup>	0.186 <sup>***</sup>	0.275 <sup>***</sup>	0.324 <sup>***</sup>	0.147 <sup>**</sup>	-0.093	1.000								
SIZE	-0.467 <sup>***</sup>	0.390 <sup>***</sup>	0.644 <sup>***</sup>	0.481 <sup>***</sup>	0.760 <sup>***</sup>	0.024	0.389 <sup>***</sup>	1.000							
MANAGE	-0.011	0.072	0.216 <sup>***</sup>	0.252 <sup>***</sup>	0.165 <sup>**</sup>	-0.331 <sup>***</sup>	0.110 <sup>*</sup>	0.241 <sup>***</sup>	1.000						
NATIONAL	-0.340 <sup>***</sup>	0.201 <sup>***</sup>	0.246 <sup>***</sup>	0.176 <sup>***</sup>	0.226 <sup>***</sup>	-0.087	0.319 <sup>***</sup>	0.524 <sup>***</sup>	0.132 <sup>**</sup>	1.000					



EXPERIENCE	0.113**	-0.201***	-0.430***	-0.078	-0.268***	-0.037	-0.295***	-0.562***	-0.193***	-0.317***	1.000				
LICENSE	-0.238***	0.200***	0.462***	0.445***	0.875***	0.128**	-0.013	0.698***	0.151**	0.210***	-0.245***	1.000			
Y2004	-0.022	0.019	-0.047	-0.037	0.015	0.000	-0.017	0.001	0.057	0.009	-0.016	0.004	1.000		
Y2005	-0.026	-0.068	-0.094	-0.102	-0.016	-0.011	-0.105	-0.043	-0.039	0.057	0.096	-0.029	-0.334***		
Y2006	0.057	-0.003	-0.011	0.093	0.001	0.052	0.002	-0.005	0.063	-0.034	0.000	0.010	-0.312***	-0.355***	1.000

*Notes:* PERFORMANCE=ln(revenue-expense)/ln(total employee); COORD(M)=the proportion of audit managers to sum of partners, audit managers, and supervisors ;PAY\_GAP= ln(partners pay - the average pay of total employee); PAY(AVG)=ln(average compensation of total employee in a CPA firm).BIG4=dummy variable =if a firm is belonged to Big4, BIG4=1, otherwise, BIG4=0; HFD=a Herfindahl index which is measured by the sum of square over the proportion of each type executive revenue to total executive revenue; AGE=ln (the number of practice year of a CPA firm); SIZE=ln(total employee); MANAGE= dummy variable =if a firm provides management advisory services, MANAGE=1, otherwise, MANAGE=0; NATIONAL=dummy variable =if a firm operates in two or above two business areas, NATIONAL=1, otherwise, NATIONAL=0; EXPERIENCE=The average year of experience by the employees ;LICENSE=ln(total CPA licenses belonged to total employee within a CPA firm.); Y2004,Y2005,Y2006=a year dummy; t value is reported in parentheses, \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, 1% levels

**Table 4 Regression of Pay Gap on Firm Performance**

Independent Variables	Expected sign	Dependent Variable=PERFORMANCE		
		(1)	(2)	(3)
C	?	2.2782*	1.5922	4.4014***
		(1.9649)	(1.1851)	(3.0901)
PAY_GAP(CPA- AVG)	-(H <sub>1</sub> )		-0.0930**	-0.3365***
			(-2.2085)	(-3.1620)
COORD(M) ×PAY_GAP(CPA- AVG)	+(H <sub>2</sub> )			0.7035***
				(2.7310)
COORD(M)	-			-8.9788***
				(-2.5842)
PAY(AVG)	+	0.4728***	0.6330***	0.6695***
		(4.6539)	(4.9198)	(4.8850)
BIG4	+	2.0723***	2.0438***	1.9341***
		(10.5915)	(7.7978)	(10.2041)
HFD	+	-0.0225	-0.2750	-0.3232
		(-0.0985)	(-0.9715)	(-1.2058)
AGE	?	-0.0780*	-0.0977*	-0.0875*
		(-1.7082)	(-1.9101)	(-1.9197)
SIZE	-	-1.1138***	-1.0742***	-1.1073***
		(-17.6057)	(-20.1098)	(-16.5637)
MANAGE	+	0.0944	0.0375	0.0224
		(1.1394)	(0.4782)	(0.2724)
NATIONAL	+	0.0022	-0.0257	-0.0540
		(0.0333)	(-0.3311)	(-0.7554)
EXPERIENCE	+	0.0256	0.0153	0.0065
		(1.2284)	(0.9870)	(0.3170)
LICENSE	+	0.0010	0.0009	0.0011
		(1.5483)	(0.7765)	(1.2162)
Y2004	?	-0.1647**	-0.1964**	-0.1401*
		(-2.1230)	(-2.3007)	(-1.8993)
Y2005	?	-0.0748	-0.0889	-0.0535
		(-0.9107)	(-1.0816)	(-0.6915)
Y2006	?	0.0059	-0.0159	0.0034
		(0.0671)	(-0.1910)	(0.0389)
Adj. R-square		0.8772	0.8795	0.8879
F statistics		126.0717***	116.1865***	109.3033***
F statistics of Δ Adj. R-square			4.8778***	7.3977***
Number of observations		225	225	225

*Notes:*

PERFORMANCE=ln(revenue-expense)/ln(total employee); COORD(M)=the proportion of audit managers to sum of partners, audit managers, and supervisors ;PAY\_GAP(CPA- AVG)= ln(partners pay - the average pay of total employee); PAY(AVG)=ln(average compensation of total employee in a CPA firm).BIG4=dummy variable =if a firm is belonged to Big4, BIG4=1, otherwise, BIG4=0; HFD=a Herfindahl index which is measured by the sum of square over the proportion of each type executive revenue to total executive revenue; AGE=ln (the number of practice year of a CPA firm); SIZE=ln(total employee); MANAGE= dummy variable =if a firm provides management advisory services, MANAGE=1, otherwise, MANAGE=0; NATIONAL=dummy variable =if a firm operates in two or above two business areas, NATIONAL=1, otherwise, NATIONAL=0; EXPERIENCE=The average year of experience by the employees ;LICENSE=ln(total CPA licenses belonged to total employee within a CPA firm.); Y2004,Y2005,Y2006=a year dummy; t value is reported in parentheses, \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, 1% levels.



**Table 5** Subgroup Analysis for Examination of Diversification on the Relationship between Pay Gap and Firm Performance

Independent Variables	Expected sign	Median=0.41	
		HFD ≥ 0.41	HFD < 0.41
C	?	5.2542*** (3.0050)	-8.3815* (-1.7087)
PAY_GAP(CPA-PAY_AVE)	-	-0.2776** (-2.2382)	-0.0748 (-0.3271)
COORD(M) × PAY_GAP(CPA-PAY_AVE)	+(H3)	0.7594*** (2.8421)	0.0053 (0.0091)
COORD(M)	-	-10.7433*** (-2.9311)	0.5607 (0.0727)
PAY(AVG)	+	0.4768** (2.3730)	1.5017*** (4.1372)
BIG4	+	1.8675*** (7.3752)	-0.7396 (-0.8130)
HFD	+	0.2415 (0.5676)	5.4652* (1.6639)
AGE	?	-0.1186* (-1.8023)	0.1871 (1.3710)
SIZE	-	-0.9067*** (-9.4580)	-0.4421*** (-3.4710)
MANAGE	+	-0.0763 (-0.9641)	0.5387* (1.8964)
NATIONAL	+	-0.0280 (-0.3189)	-0.0968 (-0.5005)
EXPERIENCE	+	0.0543 (1.4247)	-0.0198 (-0.4756)
LICENSE	+	-0.0008 (-0.8148)	0.0170** (2.1655)
Y2004	?	-0.2440* (-2.4413)	-0.0362 (-0.1837)
Y2005	?	-0.2562* (-2.1914)	0.1758 (0.9399)
Y2006	?	-0.1224 (-0.9528)	0.0971 (0.5143)
Adj. R-square		0.8836	0.3568
F statistics		53.6774***	4.6984
Number of observations		113	112

*Notes:*

PERFORMANCE=ln(revenue-expense)/ln(total employee); COORD(M)=the proportion of audit managers to sum of partners, audit managers, and supervisors ;PAY\_GAP(CPA- AVG)= ln(partners pay - the average pay of total employee); PAY(AVG)=ln(average compensation of total employee in a CPA firm).BIG4=dummy variable =if a firm is belonged to Big4, BIG4=1, otherwise, BIG4=0; HFD=a Herfindahl index which is measured by the sum of square over the proportion of each type executive revenue to total executive revenue; AGE=ln (the number of practice year of a CPA firm); SIZE=ln(total employee); MANAGE= dummy variable =if a firm provides management advisory services, MANAGE=1, otherwise, MANAGE=0; NATIONAL=dummy variable =if a firm operates in two or above two business areas, NATIONAL=1, otherwise, NATIONAL=0; EXPERIENCE=The average year of experience by the employees ;LICENSE=ln(total CPA licenses belonged to total employee within a CPA firm.); Y2004,Y2005,Y2006=a year dummy; t value is reported in parentheses, \*, \*\*, \*\*\* represent statistical significance at the 10%, 5%, 1% levels