

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

International Review of Economics and Finance

journal homepage: www.elsevier.com/locate/iref

The effect of diversification on auditor selection in business groups: A case from Taiwan

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ARTICLE INFO

JEL classification:
M42

Keywords:
Auditor selection
Industry specialist
Business group
Related diversification
Unrelated diversification

ABSTRACT

This study examines effects of group diversification on the number of industry-specialist auditor selections in business groups. Using 2003–2010 Taiwanese business groups as the sample, our results show that unrelated diversification is significantly positively associated with the number of industry-specialist auditor selections in business groups, including audit firms and audit partners. Related diversification is significantly negatively associated with the number of industry-specialist audit partner selections in business groups. Overall, group member firms select different industry-specialist audit firms because of industry diversity and the same industry-specialist audit partners because of industry similarity.

1. Introduction

This study investigated the effects of group diversification strategies on the number of high-quality specialist auditor selections within business groups. Business groups have become one of the most crucial types of organizations worldwide, especially in emerging economies, where they play a critical role in economic development. They are defined as a set of legally independent companies in which ultimate majority shareholders control the group's management. As a legal entity, each member firm of a business group prepares its own financial statements, which are attested by an auditor. Therefore, our study explored what factors drive group member firms to select either different or the same auditors within business groups. Similar to studies on multidivisional organizations, it is important not only to investigate the behaviors or performance of member firms but to examine the group effects of managing different member firms under one business group umbrella. Despite the importance of auditor selection to corporate governance, auditor selections at the business group level have limited evidence in the literature.

For example, the Lian Family Group (LFG) had six public member firms in 2010. Fig. 1 shows detailed information about these six firms. Four of them prepared their own consolidated financial statements, while the other two did not. No public member firm was an accounting entity in the consolidated statements of the other public member firms. The six public member firms were also in three different industries and were audited by three different audit firms. Does industry diversification influence the six public member firms to choose auditors in this way?

Most business groups are diversified (Khanna & Palepu, 1997, 2000b) and follow different diversification strategies. An unrelated diversification strategy involves making investments in various unrelated industries to achieve risk reduction, whereas a related diversification strategy involves adopting horizontal or vertical integration of related industries for economies of scale and scope or

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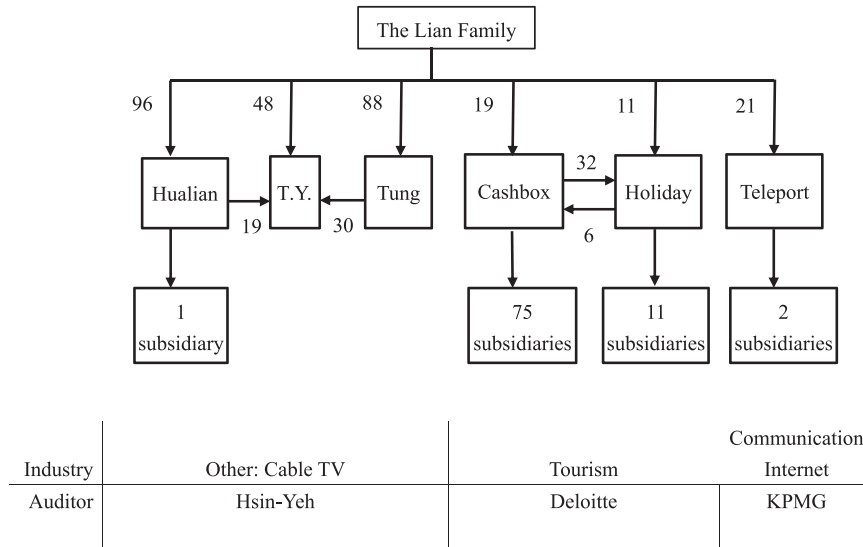


Fig. 1. Shareholdings, industries, and audit firms of six public member firms of the Lian Family Group in 2010. Note: Numbers near to arrow symbol indicate the percentage of shareholding. For example, the Lian Family owns 96% of Hualien. Hualien = Hualien Cable TV Company T.Y. = T.Y. Cable TV Co., Ltd. Tung = Tung Tai Cable TV Cashbox = Cashbox Partyworld Co., Ltd. Holiday = Holiday Entertainment Co., Ltd. Teleport = Teleport Access Services, Inc. Hsin-Yeh = Hsin-Yeh CPAs & Attorneys Deloitte = Taiwan member firm of Deloitte KPMG = Taiwan member firm of KPMG.

for the reduction of market transaction costs. We expected that related and unrelated diversifications would each have a distinct influence on the number of high-quality specialist auditor selections in business groups. Many studies have shown that specialist auditors provide a higher audit quality (e.g., Balsam, Krishnan, & Yang, 2003; Reichelt & Wang, 2010; Romanus, Maher, & Fleming, 2008).

Business and industry between related diversified member firms are similar. The specialized knowledge of the business and industry that a specialist auditor obtains and accumulates from a member firm can easily spill over to the audits of other member firms when the auditor attests multiple member firms in a business group. The same auditor will also be a specialist for each of the member firms in related industries, and the same specialist can audit all of them. Consequently, we expected that in order to seize the benefits of such a knowledge spillover, group member firms in related industries would be more likely to concentrate their selections on the same industry-specialist auditors, resulting in a lower number of industry-specialist auditor selections in these groups.

By contrast, unrelated diversification increases industry diversity, reducing auditors' knowledge-spillover effects. Business groups involved in multiple unrelated industries must also delegate additional power to member firms in response to industry diversity. Nor is an auditor necessarily specialized in each industry in which a business group with unrelated diversification is involved. Because diverse industries contain distinct specialist auditors, we predicted that group member firms in unrelated industries would be more likely to diffuse their selections of different industry-specialist auditors, resulting in a higher number of industry-specialist auditors selected in these groups.

Although audit firms can be categorized as industry specialists, not all audit partners in these firms are industry specialists. By contrast, although audit firms can be recognized as nonspecialists, individual audit partners in those firms may be industry specialists. We examined specialist auditor selections in business groups at both the audit firm and audit partner levels. Combining the two analyses provided an understanding of whether member firms tended to select the same audit firms and audit partners, the same audit firms but different audit partners, or different audit firms and audit partners in business groups.

Based on the availability of data on audit partners and the vital role that business groups play in Taiwan's economy, for our sample we obtained data on Taiwanese business groups from the period 2003–2010. The results show that unrelated diversification is significantly positively associated with both the numbers of industry-specialist audit firms and of audit partners selected in business groups. By contrast, related diversification is significantly negatively associated with the number of industry-specialist audit partner selections in business groups. In summary, group member firms tend to select different industry-specialist audit firms when the industries in which the groups are involved are diverse, and they select the same industry-specialist audit partners when similarities exist among those industries.

Our contributions are as follows. In the literature on business groups, previous research provides evidence on performance (Chang, 2003; Joh, 2003; Khanna & Palepu, 2000a), dividend policy (Manos, Murinde, & Green 2012), earnings management (Kim & Yi, 2006), and earnings informativeness (Jung & Kwon, 2002). We add empirical evidence to this research stream by investigating auditor selections in business groups. Business group-level auditor selections are a crucial topic related to business group governance, but they have limited empirical evidence (Chang & Chen, 2015; Yang, Kang, Lin, & Ronen, 2016). Our study is less related to Yang

et al. (2016) and more related to of Chang and Chen (2015). Yang et al. (2016) explored whether group member firms engage the same auditor as their core firm,¹ whereas we examined the number of auditor selections in business groups. Differing from Chang and Chen (2015), who examined the effect of the deviation of voting rights from cash flow rights on the number of audit firm selections in business groups, we examined the effects of the homogeneity of member firms in business groups. We also contribute to the literature on diversification. Previous research provided evidence of the influence of diversification on firm performance (Berger & Ofek, 1995; Chakrabarti, Singh, & Mahmood, 2007; Denis, Denis, & Yost, 2002; George & Kabir, 2012; Singh, Nejadmalayeri, & Mathu, 2007), financial disclosure (Bens & Monahan, 2004; Cahan, Rahman, & Perera, 2005), and earnings management (Jiraporn, Kim, & Mathur, 2005). By contrast, we provide evidence of the effects of diversification on auditor selections. Specifically, we document that a member firm in a more diversified business group is more likely to use a specialist audit firm. Finally, DeFond and Francis (2005) and Francis (2011) called for more research at the audit partner level, because individuals, not firms, perform audit tasks. In response to their call, we extended the investigation of auditor selection from the audit firm level to the audit partner level.

The remainder of this paper is organized as follows: Section 2 describes the institutional background and develops our hypotheses; Section 3 presents the sample and data; Section 4 provides the research method; Section 5 discusses the empirical findings; and Section 6 offers conclusions.

2. Institutional background, business groups, and hypotheses development

2.1. Institutional background

In Taiwan, audit partners, who are regulated under the Certified Public Accountant (CPA) Act, assume professional and legal liabilities by signing audit reports. Since audit reports in Taiwan display both audit firm and audit partner names, clients may choose an auditor based on the prestige of audit partners in addition to the brand name of an audit firm (Lin, 2000).

In Taiwan, the appointment, dismissal, and compensation for an auditor are determined by a board of directors. Amendments to the Taiwanese Securities and Exchange Act in 2006 state that public companies shall establish either an audit committee or a supervisor. If established, the committee decides on the appointment, dismissal, and compensation of an auditor. An audit committee should consist of at least three independent directors, and one of them should have accounting or financial expertise. The Financial Supervisory Commission, the competent authority for CPAs in Taiwan, promotes a mandatory establishment of audit committees in stages. In 2013, IPO companies in the financial industry and listed nonfinancial companies with a paid-in capital of NT\$50 billion or more were required to have audit committees. Listed companies with a paid-in capital of NT\$10 billion or more were to establish audit committees beginning in 2015, and the capital amount changed to NT\$2 billion in 2017.

Audit partner rotation is not mandatory in Taiwan. However, inspired by the US Sarbanes-Oxley Act of 2002, the Taiwan Stock Exchange and the Taipei Exchange stated that financial statements are subject to a stock exchange's substantive review procedure if a signing partner audits the same client for five consecutive years. This statement was announced in 2003 and became fully effective in 2004. Substantive reviews on audit documentation increase the likelihood of regulators discovering audit deficiencies and thus increase the risk of audit partner sanctions. In order to reduce the risk of being sanctioned, the substantive review mechanism, in effect, mandates a rotation for audit partners (Chi, Huang, Liao, & Xie, 2009).

2.2. Business groups

Business groups prevail in numerous developed and developing countries, such as India, Israel, Chile, Japan, Korea, China, Sweden, Spain, Italy, Russia, France, Belgium, and Taiwan (Bianco & Casavola, 1999; Buyschaert, Deloof, & Jegers, 2004; Collin, 1998; Faccio & Lang, 2002; Keister, 2000; Khanna & Palepu, 2000a, 2000b; Khanna & Rivkin, 2001; Maman, 2002; Perotti & Gelfer, 2001). Member firms within business groups are set up with strategic considerations and are accustomed to engaging in coordinated actions (Khanna & Rivkin, 2001). Various member firms operate and develop through vertical or horizontal integration, ensuring that groups have a competitive advantage in raw material supply or product marketing in the industry. Member firms may also be established in unrelated industries to reduce operating risks in their business groups.

Business groups are associated with benefits and costs (Claessens, Fan, & Lang, 2006). When the external capital market is not sufficiently developed and has imperfections, an internal capital market within business groups provides benefits by allocating capital more efficiently (Stein, 1997). This cross-subsidization may occur because of economic motives, such as taking funds away from more profitable firms in the groups and propping up firms with a real need to make new investments, maintaining the solidarity within the business groups to keep struggling firms afloat, or receiving tax shields by transferring profits to member firms located in less developed regions (George & Kabir, 2008).

Business groups also perform an adverse function, particularly in developing countries with weak shareholder protection. The interests of minority shareholders of member firms can be expropriated by controlling shareholders who are more interested in receiving private benefits. Managers of member firms may also shirk their responsibilities because they know that other member firms will assist them when they experience difficulties (Khanna & Rivkin, 2001).

¹ Yang et al. (2016) documented that a member firm is more likely to engage the same auditor as its core firm when (1) the core firm engages a Big N auditor, (2) the core firm's auditor is an industry specialist for both the core firm and its member firm, (3) the degree of vertical relatedness increases, or (4) the controlling shareholders' deviation of voting rights from cash flow rights increases.

2.3. Diversification and auditor selections in business groups

Controlling shareholders maximize the wealth of business groups (Jung & Kwon 2002). They have substantial discretionary power to transfer capital and managerial resources among member firms in business groups (Bae, Cheon, & Kang, 2008). In Taiwan, the engagement of an auditor occurs when more than half the directors of a firm attend the meeting and more than half of the seat votes of the attending directors are cast for that auditor. Through the largest shareholdings, the groups' ultimate controlling shareholders can dominate the election of directors in shareholder meetings. Thus, by holding the highest number of director seats, controlling shareholders control the board of directors for each member firm and therefore dominate auditor selections in these business groups.

Business groups with related diversification share common critical resources among member firms (Rumelt, 1982; Wan, Hoskisson, Short, & Yiu, 2011), such as distribution channels, advertising campaigns, related sales and technological information, manufacturing equipment, and transferred technology. Therefore, the operational differences among group member firms in related industries are relatively insignificant. A specialist auditor who audits multiple group member firms in related industries can easily spill over the knowledge of the business and industry of one group member firm to the audits of other group member firms; this can assist the auditor in implementing audit work efficiently, assessing audit risks effectively, and detecting accounting errors or irregularities successfully. Yang et al. (2016) suggest that the economies of scale and audit efficiency that result from engaging the same auditor increase when the degree of vertical relatedness between a group's core and member firms is higher. Chen, Chang, Chen, and Kim (2014) documented that an audit firm with more supply chain knowledge charges lower audit fees to its clients when the firm also audits its clients' major buyers. The same auditor will also be a specialist for each of the member firms in related industries, and the same specialist can audit all of them. Consequently, member firms in related industries of business groups tend to select the same industry-specialist auditors, resulting in a lower number of industry-specialist auditors for the groups. Accordingly, we proposed the following hypothesis:

H1: *Related diversification is negatively associated with the number of industry-specialist auditor selections in business groups.*

In Taiwan, audit partners solicit clients with their professional competence and interpersonal relationships. Lin's (2000) survey evidence showed that clients choose auditors based on the prestige of audit partners in addition to the brand names of audit firms. Accordingly, we divided H1 into specialist audit firm and audit partner selections and established our H1a and H1b as follows:

H1a. *Related diversification is negatively associated with the number of industry-specialist audit firm selections in business groups.*

H1b. *Related diversification is negatively associated with the number of industry-specialist audit partner selections in business groups.*

By contrast, the operations of unrelated industries show considerable differences, such as distinct production techniques, various product development models, differing management models, dissimilar laws and regulations, and even diverse accounting techniques, all of which make it difficult for auditors to generate the knowledge spillover effect between the different industries. In addition, business groups with unrelated diversification encounter increased management complexity in the coordination of internal resource sharing and capability development (Denis et al., 2002). In response, the groups' ultimate controlling shareholders may empower member firms with increased autonomy to select auditors. Nor is it necessarily the case that the same auditor will be a specialist in auditing multiple industries. Therefore, member firms of business groups characterized by higher unrelated diversification tend to select different industry-specialist auditors, resulting in a higher number of industry-specialist auditors for the groups. Accordingly, we proposed a Hypothesis 2 series as follows:

H2. *Unrelated diversification is positively associated with the number of industry-specialist auditor selections in business groups.*

H2a. *Unrelated diversification is positively associated with the number of industry-specialist audit firm selections in business groups.*

H2b. *Unrelated diversification is positively associated with the number of industry-specialist audit partner selections in business groups.*

3. Data and sample

3.1. Data

We used data on Taiwanese business groups for the period from 2003 to 2010. We chose 2003 as the starting year, because after the collapse of Andersen LLP in 2002, Andersen's member firm in Taiwan merged with Deloitte's Taiwanese counterpart in June 2003, which began the era of the Big 4 auditors in Taiwan. All data were retrieved from the databases of the Taiwan Economic

Table 1
Sample selection.

	Firm-Year	Group-Year
2003–2010 public member firms in business groups	8848	2383
Less: foreign firms	(31)	
firms with missing data	(873)	
groups with only one member firm left	(209)	
Final sample	7735	2158

Table 2
Sample distribution.

Panel A: Distribution by Year						
Year	Firm-Year sample	%		Group-Year sample	%	
2003	1088	14.07		293	13.58	
2004	985	12.73		270	12.51	
2005	952	12.31		258	11.96	
2006	917	11.86		251	11.63	
2007	929	12.01		259	12.00	
2008	930	12.02		267	12.37	
2009	968	12.51		279	12.93	
2010	966	12.49		281	13.02	
Total	7,735	100.00		2,158	100.00	

Panel B: Distribution by Industry						
Industry	Firm-Year sample				Number of specialists	
	N	%	<i>IMSD_AF</i> = 1	<i>IMSD_CPA</i> = 1	Audit firm	Audit partner
Cement and Ceramic	60	0.78	22	33	2	22
Food	122	1.58	42	53	1	28
Plastic	207	2.68	119	89	3	32
Textile	235	3.04	109	97	1	49
Electrical and Machinery	197	2.55	68	78	1	45
Chemical and Biotechnology	412	5.33	51	128	1	44
Paper and Pulp	76	0.98	44	56	2	27
Iron and Steel	186	2.40	79	104	1	36
Rubber	28	0.36	6	28	1	22
Automobile	192	2.48	101	109	2	48
Semiconductor	702	9.08	246	391	1	53
Computer and Peripheral Equipment	370	4.78	202	153	2	42
Optoelectronic	571	7.38	248	222	3	61
Communications and Internet	366	4.73	178	150	2	50
Electronic Parts and Components	766	9.90	446	197	2	44
Electronic Product Distribution	240	3.10	84	100	3	33
Information Service	197	2.55	79	97	1	53
Other Electronic	208	2.69	72	97	3	48
Construction	305	3.94	116	149	2	45
Shipping and Transportation	178	2.30	108	56	2	29
Tourism	132	1.71	85	88	3	39
Finance and Insurance	1,152	14.89	473	643	3	45
Trading and Consumer Goods	96	1.24	60	60	2	25
Oil, Gas, and Electricity	168	2.17	89	46	1	21
Other	569	7.36	219	152	1	26
Total	7,735	100.00	3,346	3,376	–	–

Journal (TEJ). We confirmed the TEJ's data accuracy by referring to the studies on Taiwan's business groups published by the China Credit Information Service as well as the prospectuses or annual reports for public companies.

3.2. Sample

Table 1 shows the process of sample selection. The initial sample of business groups comprised 8848 firm-year observations (2383 group-year observations). We deleted 31 observations of foreign firms and 873 observations with missing data. We also deleted business groups with only one member firm left in the sample, because the focus of this study is on the number of auditor selections. The final sample comprised 7735 firm-years (1451 firms) and 2158 group-years (416 groups). The member firm-level data was used to confirm the maintained hypothesis of this study: Diversification increases the likelihood of member firms selecting industry-specialist auditors (audit firms or partners). The group-level data was used to test our research hypothesis: Diversification is associated with the number of industry-specialist auditor (audit firm or partner) selections in business groups.

Table 2 lists the sample distribution by year (Panel A) and by industry (Panel B). Overall, no clustering of samples occurs by year or by industry in this study.

4. Research method

4.1. The empirical model

We developed the empirical model shown in Eq. (1) as follows:

$$NSPAFS \text{ (or } NSPCPAS) = \beta_0 + \beta_1 GDR + \beta_2 GDU + Controls + \varepsilon \tag{1}$$

where

<i>NSPAFS</i> =	the number of industry-specialist audit firm selections in a business group;
<i>NSPCPAS</i> =	the number of industry-specialist audit partner selections in a business group;
<i>GDR</i> =	the degree of related diversification in a business group;
<i>GDU</i> =	the degree of unrelated diversification in a business group; and
<i>Controls</i> =	the control variable vector.

According to H1, the coefficient of *GDR* was expected to be significantly negative. By contrast, the coefficient of *GDU* was expected to be significantly positive, based on H2.

4.2. Variable measurements

4.2.1. Dependent variable: the number of industry-specialist auditor selections in a business group (*NSPAFS*, *NSPCPAS*)

An industry specialist is an auditor with extensive experience in auditing a specific industry (Velury, Reisch, & O'Reilly, 2003). Following previous studies (e.g., Neal & Riley, 2004; Reichelt & Wang, 2010), we defined an audit firm as an industry specialists, and *IMSD_AF* were set to 1 if an audit firm's industry market share was greater than 1.2 times the reciprocal of the number of the Big 4 auditors; it was set to 0 otherwise. As for specialist audit partners, *IMSD_CPA* were set to 1 if an audit partner's industry market share was greater than 1.2 times the reciprocal of the average number of audit partners per industry; it was set to 0 otherwise. *NAFS* and *NCPAS*, respectively, refer to the number of audit firm and partner selections in a business group. Similarly, *NSPAFS* and *NSPCPAS*, respectively, stand for the number of industry-specialist audit firm and partner selections in a business group.

4.2.2. Research variable: diversification of a business group (*GDR*, *GDU*)

Consider a business group active in *n* 4-digit industries. Those *n* 4-digit industries in turn aggregate into *s* 2-digit industries ($n \geq s$). Following Jacquemin and Berry (1979) and Palepu (1985), we defined group diversification with an entropy measure *GDT* (total diversification) as follows:

$$GDT = GDR + GDU = \sum_{s=1}^s P_s \left(\sum_{i \in s} \frac{P_i}{P_s} \ln \frac{P_s}{P_i} \right) + \left(\sum_{s=1}^s P_s \ln \frac{1}{P_s} \right) \tag{2}$$

where P_s is the proportion of the business group's total sales within the *s*th 2-digit industry, and $P_s = \sum_{i \in s} P_i$. *GDR* (related diversification) is a weighted average of the business group's 4-digit diversification within each 2-digit industry, with each 2-digit industry weighted by its relative importance (P_s). *GDU* (unrelated diversification) is the diversification of the business group across 2-digit industries. Thus, the total diversification is a weighted average of the business group's diversification within 2-digit industries plus the group's diversification across those 2-digit industries.

We identified 88 industries and 167 subindustries based on TEJ classification. The TEJ categorizes industries and subindustries mainly according to the major products reported in the annual reports.

4.2.3. Control variables

We set the control variables by referring to Chang and Chen (2015). The control variables were size (*GSIZE*), complexity (*GEXPORT*), leverage (*GLEV*), ownership (*GTYPEA*, *GTYPEF*, *GTYPEG*, and *GTYPEM*), equity issuing (*GNISSUE*), growth (*G GROWTH*), profitability (*GGROA*), concentration (*GHHI*), and year fixed effects. The sample unit in Model (1) was business groups. This study conducted variable measurement in two steps. We estimated the variables of individual member firms and either weight-averaged them by the total assets of member firms as the percentages of the total assets of the business groups (for monetary variables) or simply averaged them by the number of member firms in the business groups (for nonmonetary variables). We provide details of the variable definitions in the Appendix.

Because of one-to-one mapping from clients to auditors, it was necessary to control the effects of the number of member firms (*NCOS*) on the number of auditor selections (*NAFS* or *NCPAS*) in a business group. Similarly, we needed to control the number of member firms selecting specialist audit firms (*NCOS_SSPAF*) in the regression of the number of specialist audit firm selections (*NSPAFS*). The same rule applied to the industry-specialist audit partner analyses. In addition, we added several variables related to auditor characteristics. *NINDS_SPAF* (*NINDS_SPCPA*) denotes the total numbers of specialized industries of the selected industry-specialist audit firms (partners) divided by the number of industry-specialist audit firm (partner) selections in a business group. When auditors specialize in more industries, group member firms in various industries are more likely to select the same industry-specialist auditors. Therefore, we expected the coefficient on *NINDS_SPAF* (*NINDS_SPCPA*) to be negative. Finally, because audit partners

Table 3
Descriptive statistics.

Panel A: Firm-Year Sample								
Variable	N	Mean	Std. dev.	Minimum	25%	Median	75%	Maximum
<i>IMSD_AF</i>	7735	0.43	0.50	0.00	0.00	0.00	1.00	1.00
<i>IMSD_CPA</i>	7735	0.44	0.50	0.00	0.00	0.00	1.00	1.00
<i>SIZE</i>	7735	15.62	1.99	10.34	14.12	15.32	16.74	22.27
<i>EXPORT</i>	7735	0.35	0.37	0.00	0.00	0.19	0.71	1.00
<i>LEV</i>	7735	0.48	0.23	0.00	0.30	0.46	0.63	1.07
<i>NISSUE</i>	7735	0.17	0.37	0.00	0.00	0.00	0.00	1.00
<i>GROWTH</i>	7735	0.12	0.36	-0.79	-0.04	0.05	0.17	2.31
<i>ROA</i>	7735	0.04	0.10	-1.07	0.00	0.04	0.08	0.78
<i>HHI</i>	7735	0.10	0.10	0.02	0.05	0.08	0.13	0.70

Panel B: Group-Year Sample								
Variable	N	Mean	Std. dev.	Minimum	25%	Median	75%	Maximum
<i>GDR</i>	2158	0.11	0.27	0.00	0.00	0.00	0.00	1.42
<i>GDU</i>	2158	0.33	0.35	0.00	0.00	0.26	0.60	1.67
<i>GSIZE</i>	2158	15.92	1.66	12.09	14.69	15.61	16.92	21.32
<i>GEXPORT</i>	2158	0.39	0.35	0.00	0.02	0.35	0.72	1.00
<i>GLEV</i>	2158	0.51	0.21	0.02	0.37	0.49	0.62	1.07
<i>GTYPEA</i>	2158	0.16	0.36	0.00	0.00	0.00	0.00	1.00
<i>GTYPEG</i>	2158	0.04	0.19	0.00	0.00	0.00	0.00	1.00
<i>GTYPEM</i>	2158	0.21	0.41	0.00	0.00	0.00	0.00	1.00
<i>GNISSUE</i>	2158	0.18	0.26	0.00	0.00	0.00	0.33	1.00
<i>GGROWTH</i>	2158	0.11	0.26	-0.54	-0.01	0.07	0.18	2.31
<i>GROA</i>	2158	0.04	0.08	-0.76	0.00	0.04	0.08	0.32
<i>GHHI</i>	2158	0.61	0.20	0.08	0.49	0.60	0.78	1.00
<i>NCOS</i>	2158	3.58	2.99	2.00	2.00	2.00	4.00	23.00
<i>NCOS_SSPAF</i>	2158	1.55	2.12	0.00	0.00	1.00	2.00	21.00
<i>NCOS_SSPCPA</i>	2158	1.56	2.20	0.00	0.00	1.00	2.00	18.00
<i>NINDS_SPAF</i>	2158	8.45	5.49	0.00	4.00	8.00	12.00	19.00
<i>NINDS_SPCPA</i>	2158	1.69	0.96	0.00	1.00	1.65	2.25	7.33
<i>OCLIENT_CPA</i>	2158	2.62	0.42	0.00	2.47	2.69	2.89	3.48
<i>NAFS</i>	2158	1.70	0.82	1.00	1.00	2.00	2.00	7.00
<i>NSPAFS</i>	2158	0.76	0.67	0.00	0.00	1.00	1.00	4.00
<i>NCPAS</i>	2,158	5.10	3.47	2.00	3.00	4.00	6.00	28.00
<i>NSPCPAS</i>	2,158	1.72	2.15	0.00	0.00	1.00	2.00	19.00
<i>SPAF_CLI</i>	1378	0.70	0.31	0.07	0.50	0.67	1.00	1.00
<i>SPCPA_CLI</i>	1313	1.27	0.50	0.08	1.00	1.00	2.00	2.00

See [Appendix](#) for variable definitions.

possess limited resources (e.g., time, energy, and ability), business groups may have to increase the number of audit partner selections when audit partners have many clients. *OCLIENT_CPA* is the natural logarithm of the division of the sum of the selected audit partners' total numbers of clients, excluding the group clients themselves, by the number of audit partners selected in the business group. The coefficient on *OCLIENT_CPA* was expected to be positive.

5. Results

5.1. Descriptive statistics

Table 3 lists the descriptive statistics, with Panel A displaying firm-level variables and Panel B displaying group-level variables. In Panel A, the mean of *IMSD_AF* is 0.43, suggesting that 43% of the firm-year observations are audited by industry-specialist audit firms. By contrast, *IMSD_CPA* is 0.44, suggesting that 44% of the firm-year observations are audited by industry-specialist partners. In Panel B of **Table 3**, the averages of *GDR* and *GDU* are 0.11 and 0.33, respectively, suggesting that the degree of unrelated diversification is greater than that of related diversification for an average business group. The average number of member firms in a business group (*NCOS*) is 3.58, and the maximum is 23. The mean of *NINDS_SPAF* is 8.45, indicating that groups' audit firms specialize in 8.45 industries on average. Similarly, 1.69 in the mean of *NINDS_SPCPA* indicates that on average, groups' audit partners specialize in 1.69 industries. The mean of *OCLIENT_CPA* is 2.62, indicating that groups' audit partners audit 14.85 clients, other than the group clients themselves, on average.

The mean values of *NAFS* and *NSPAFS* are 1.70 and 0.76, respectively. These indicate that a group hires 1.70 audit firms, of which 0.76 are industry-specialist audit firms. As to audit partner level, the minimal value of *NCPAS* is 2, because an audit report is signed

Table 4
Correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) <i>GDU</i>														
(2) <i>GDR</i>	0.12*													
(3) <i>GSI</i>	0.22*	0.51*												
(4) <i>GEXPORT</i>	0.10*	-0.37*	-0.15*											
(5) <i>GLEV</i>	0.07*	0.41*	0.55*	-0.35*										
(6) <i>GTYPEA</i>	-0.05*	-0.11*	-0.16*	-0.05*	-0.11*									
(7) <i>GTYPEB</i>	0.06*	0.17*	0.23*	-0.27*	0.10*	-0.10*								
(8) <i>GTYPEM</i>	-0.17*	-0.23*	-0.10*	0.29*	-0.17*	-0.20*	-0.14*							
(9) <i>GNISSUE</i>	0.07*	-0.02	0.13*	0.20*	0.04*	-0.05*	-0.11*	0.08*						
(10) <i>GGROWTH</i>	-0.03*	0.03*	0.13*	0.07*	0.07*	-0.01	-0.05*	0.08*	0.22*					
(11) <i>GROA</i>	-0.09*	-0.26*	-0.19*	0.20*	-0.44*	0.01	-0.07*	0.25*	-0.01	0.39*				
(12) <i>GHHI</i>	-0.44*	-0.48*	-0.25*	0.32*	-0.19*	0.07*	-0.12*	0.13*	0.02	0.02	0.10*			
(13) <i>NCOS</i>	0.46*	0.53*	0.54*	-0.17*	0.26*	-0.15*	0.19*	0.00	0.08*	0.05*	-0.06*	-0.75*		
(14) <i>NINDS_SPAF</i>	0.04*	-0.04*	0.08*	0.08*	-0.03	0.04*	0.00	0.03*	0.04*	0.01	0.05*	-0.06*	0.08*	

a. * indicates significance at the 0.01 level or better, two-tailed.

b. Sample size: 2158 group-years, 416 groups.

c. The upper right half is Pearson correlations; the lower left half is Spearman correlations.

d. See Appendix for variable definitions.

Table 5
Regression results for audit firm selection(s).

Panel A: Firm-level analysis			Panel B: Group-level analysis					
		(1) <i>IMSD_AF</i>			(2) <i>NAFS</i>	(3) <i>NSPAFS</i>	(4) <i>NSPAFS</i>	(5) <i>NSPAFS</i>
Intercept	?	−2.53 (−8.10***)	Intercept	?	0.79 (7.00***)	−1.76 (−7.90***)	−1.76 (−7.90***)	0.33 (2.37**)
<i>GDR</i>	+	0.09 (0.95)	<i>GDR</i>	−	0.05 (0.98)	−0.11 (−1.19)	0.03 (0.58)	0.04 (0.62)
<i>GDU</i>	+	0.26 (4.20***)	<i>GDU</i>	+	0.21 (6.12***)	0.37 (5.53***)	0.14 (4.45***)	0.21 (5.31***)
<i>SIZE</i>	+	0.12 (7.77***)	<i>GSIZE</i>	?	−0.02 (−2.31**)	0.02 (1.01)	0.00 (0.41)	−0.01 (−0.79)
<i>EXPORT</i>	+	0.13 (1.34)	<i>GEXPORT</i>	?	0.07 (2.60***)	0.35 (6.50***)	0.09 (3.16***)	0.08 (1.94**)
<i>LEV</i>	+	0.43 (3.06***)	<i>GLEV</i>	?	0.17 (2.82***)	0.52 (4.91***)	0.08 (1.52)	0.03 (0.39)
<i>GTYPEA</i>	?	0.04 (0.45)	<i>GTYPEA</i>	?	0.06 (2.58***)	0.16 (3.70***)	0.08 (3.46***)	0.10 (2.79***)
<i>GTYPEG</i>	?	0.33 (3.07***)	<i>GTYPEG</i>	?	0.23 (4.02***)	0.26 (2.93***)	0.24 (4.52***)	0.23 (4.52***)
<i>GTYPEM</i>	?	0.17 (2.55**)	<i>GTYPEM</i>	?	0.01 (0.39)	0.06 (1.49)	0.03 (1.17)	0.02 (0.63)
<i>NISSUE</i>	+	0.13 (1.89*)	<i>GNISSUE</i>	?	0.09 (2.64***)	0.04 (0.65)	0.08 (2.22**)	0.09 (1.67*)
<i>GROWTH</i>	+	0.12 (1.62)	<i>GGROWTH</i>	?	−0.06 (−1.71*)	−0.04 (−0.51)	−0.05 (−1.75*)	−0.06 (−1.22)
<i>ROA</i>	+	0.99 (3.29***)	<i>GROA</i>	?	0.01 (0.05)	0.45 (1.79*)	−0.05 (−0.45)	−0.44 (−2.15**)
<i>HHI</i>	−	−3.37 (−2.50**)	<i>GHHI</i>	−	−0.27 (−4.03***)	−0.09 (−0.75)	−0.13 (−2.02**)	−0.07 (−0.72)
			<i>NCOS</i>	+	0.04 (8.95***)			
			<i>NCOS_SSPAF</i>	+		0.10 (9.65***)	0.03 (6.50***)	0.01 (1.22)
Industries	Yes		<i>NINDS_SPAF</i>	−	−0.02 (−10.77***)	0.05 (15.56***)	−0.00 (−3.03***)	−0.02 (−6.84***)
Years	Yes		Years	Yes		Yes	Yes	Yes
Pseudo R ²		6.75%	Pseudo R ²		3.52%	10.38%	1.09%	1.39%
Wald χ^2		627***	Wald χ^2		663***	667***	255***	254***
Observations		7735	Observations		2158	2158	1378	812

a. *, **, *** indicate significance at p-values < 0.10, 0.05, and 0.01, respectively. (All tests are two-tailed.)

b. z-values in parentheses.

c. See Appendix for variable definitions.

by two audit partners in Taiwan. The mean values of *NCPAS* and *NSPCPAS* are 5.10 and 1.72, respectively, indicating that a group hires 5.10 audit partners, of which 1.72 are industry-specialist audit partners.

Table 4 lists the correlation coefficients with a range from −0.75 to 0.60. We computed variance inflation factors to check on multicollinearity. All these factors are below 2.5, less than the threshold value of 10 (Kennedy, 1992), suggesting that no serious collinearity problem occurred among the independent variables.

5.2. Audit firm selection analysis

Table 5 lists the regression results of audit firm selection(s), in which the z statistics are based on robust standard errors and covariance. Column (1) shows the logistic regression results of industry-specialist audit firm selection at the member firm level (*IMSD_AF*). The coefficient on *GDR* does not reach a level of significance. By contrast, the coefficient on *GDU* is significantly positive, indicating that unrelated diversification increases the likelihood of member firms selecting industry-specialist audit firms. Operation

Table 6
Regression Results for Audit Partner Selection(s).

Panel A: Firm-level analysis			Panel B: Group-level analysis					
		(1) <i>IMSD_CPA</i>		(2) <i>NCPAS</i>	(3) <i>NSPCPAS</i>	(4) <i>NSPCPAS</i>	(5) <i>NSPCPAS</i>	
Intercept	?	-9.39 (-25.18***)	Intercept	?	0.26 (2.16**)	-5.18 (-16.58***)	-5.18 (-16.58***)	-1.68 (-6.73***)
<i>GDR</i>	+	0.29 (2.75***)	<i>GDR</i>	-	0.01 (0.17)	-0.48 (-5.66***)	-0.28 (-4.44***)	-0.19 (-2.99***)
<i>GDU</i>	+	0.16 (2.32**)	<i>GDU</i>	+	0.32 (9.56***)	0.29 (4.13***)	0.28 (5.44***)	0.39 (7.46***)
<i>SIZE</i>	+	0.59 (29.43***)	<i>GSIZE</i>	?	0.05 (5.27***)	0.27 (11.63***)	0.16 (10.09***)	0.15 (8.68***)
<i>EXPORT</i>	+	0.19 (1.96**)	<i>GEXPORT</i>	?	0.12 (5.20***)	-0.10 (-1.78*)	-0.14 (-3.87***)	-0.22 (-5.48***)
<i>LEV</i>	+	0.43 (2.74***)	<i>GLEV</i>	?	-0.11 (-1.70*)	-0.11 (-0.77)	-0.36 (-3.35***)	-0.56 (-4.24***)
<i>GTYPEA</i>	?	-0.21 (-2.44**)	<i>GTYPEA</i>	?	0.11 (5.57***)	0.12 (2.42**)	0.05 (1.34)	0.04 (0.89)
<i>GTYPEG</i>	?	0.38 (3.17***)	<i>GTYPEG</i>	?	0.27 (6.59***)	-0.27 (-4.70***)	-0.09 (-1.96**)	-0.04 (-0.68)
<i>GTYPEM</i>	?	0.45 (6.05***)	<i>GTYPEM</i>	?	0.00 (0.24)	-0.02 (-0.36)	-0.06 (-2.18**)	-0.08 (-2.64***)
<i>NISSUE</i>	+	-0.14 (-1.77*)	<i>GNISSUE</i>	?	-0.01 (-0.27)	-0.10 (-1.33)	0.02 (0.35)	0.02 (0.44)
<i>GROWTH</i>	+	0.02 (0.21)	<i>GGROWTH</i>	?	-0.06 (-1.67*)	-0.04 (-0.58)	-0.06 (-1.19)	-0.04 (-0.61)
<i>ROA</i>	+	1.12 (3.17***)	<i>GROA</i>	?	-0.06 (-0.57)	0.55 (1.90*)	0.04 (0.20)	-0.07 (-0.23)
<i>HHI</i>	-	-3.49 (-2.40**)	<i>GHHI</i>	-	-0.09 (-1.40)	0.07 (0.48)	-0.02 (-0.20)	0.15 (1.37)
			<i>NCOS</i>	+	0.09 (17.98***)			
			<i>NCOS_SSPCPA</i>	+		0.18 (14.28***)	0.13 (13.01***)	0.10 (11.18***)
			<i>NINDS_SPCPA</i>	-	-0.07 (-7.31***)	0.20 (9.71***)	0.06 (4.26***)	0.01 (0.68)
Industries	Yes		<i>OCLIENT_CPA</i>	+	0.08 (4.31***)	0.18 (3.16***)	0.03 (0.77)	0.08 (1.58)
Years	Yes		Years	Yes		Yes	Yes	Yes
Pseudo R ²		20.28%	Pseudo R ²		25.07%	36.48%	22.01%	19.72%
Wald χ^2		7239***	Wald χ^2		4277***	3909***	2797***	1633***
Observations		7735	Observations		2158	2158	1313	789

a. *, **, *** indicate significance at p-values < 0.10, 0.05, and 0.01, respectively. (All tests are two-tailed.)

b. z-values in parentheses.

c. See Appendix for variable definitions.

complexity, information asymmetry, and discretion in financial reporting increase with diversification, worsening agency conflicts between shareholders and management (Bushman, Chen, Engel, & Smith, 2004; Denis et al., 2002; Gilson, Healy, Noe, & Palepu, 2001; Herrmann, Hope & Thomas, 2008). Based on the agency hypothesis of audit quality demand (Watts & Zimmerman, 1986), a member firm in a business group with a higher degree of unrelated diversification selects an industry-specialist audit firm to mitigate agency conflicts.

After the establishment of the demand for an industry-specialist audit firm at the member firm level, column (2) in Table 5 presents the results of the number of audit firm selections at the business group level (*NAFS*). The dependent variable *NAFS* is a count-type datum; therefore, we employed a Poisson regression analysis. The coefficient on *GDR* does not reach a level of significance, which is consistent with the member firm-level results shown in column (1). By contrast, the coefficient on *GDU* is significantly positive, indicating that unrelated diversification increases the number of audit firm selections in business groups. In other words, when business groups diversify in unrelated industries, member firms tend to select different audit firms.

The control variables of *GEXPORT*, *GLEV*, *GTYPEA*, *GTYPEG*, *GNISSUE*, and *NCOS* are significantly positive in column (2) of Table 5, suggesting that business groups that are complex, have higher leverage, are controlled by multiple families or the government, have high capital demands, or contain substantial member firms diffuse their different audit firm selections. *GSIZE*, *G GROWTH*, and *GHHI* are significantly negative in column (2), suggesting that business groups characterized by larger size, higher growth, or higher concentration concentrate on the same audit firm selections. The coefficient on *NINDS_SPAF* is significantly negative in column (2), suggesting that business groups are more likely to concentrate on selecting the same audit firms who specialize in more industries.

Column (3) in Table 5 shows the Poisson regression results of *NSPAFS* (the number of industry-specialist audit firm selections in business groups). The coefficients on *GDU* are significantly positive, as expected. Unrelated diversification increases industry diversity, reducing auditors' knowledge-spillover effects. Business groups involved in multiple unrelated industries must also delegate additional power to member firms in freely selecting auditors. Moreover, industry-specialist auditors differ among industries. Consequently, member firms in various industries select different industry-specialist audit firms, resulting in a higher number of industry-specialist audit firms in business groups. Hypotheses 2 and 2a are supported.

Table 3 shows that both the minimum and the lower quartile of *NSPAFS* are zero, indicating that some business groups do not select industry-specialist audit firms at all. These groups may have no demand for an industry-specialist audit firm. To avoid the contamination of our results by the low demand for industry-specialist auditors, we deleted 780 group-year observations in which industry-specialist audit firms were not selected (i.e., *NCOS_SSPAF* = 0). The results are shown in column (4) of Table 5. In addition, if only one member firm in a business group is audited by an industry specialist, that firm's selection of the industry specialist is not equivalent to the same industry-specialist selections among member firms in other groups. Therefore, column (5) of Table 5 shows the results for the sample containing at least two member firms audited by an industry-specialist audit firm (i.e., *NCOS_SSPAF* > = 2). The results of columns (4) and (5) are similar to those of column (3) in Table 5.

5.3. Audit partner selection analysis

Table 6 shows the regression results of audit partner selection(s), in which the z statistics are based on robust standard errors and covariance. Column (1) in Table 6 presents the results of industry-specialist audit partner selection at the member firm level (*IMSD_CPA*). The coefficient on *GDR* is significantly positive, as expected, indicating that the degree of related diversification increases the likelihood of group member firms selecting industry-specialist audit partners.

Column (2) in Table 6 shows the Poisson regression results of the number of audit partner selections in business groups (*NCPAS*). The coefficient on *GDU* is significantly positive, indicating that unrelated diversification increases the number of audit partner selections in business groups. Combined with the results of column (2) in Table 5, unrelated diversification increases the number of audit firm selections in business groups, and the number of audit partner selections increases accordingly.

Columns (3)–(5) in Table 6 display the Poisson regression results for the number of industry-specialist audit partner selections in business groups (*NSPCPAS*). Column (3) shows the results for the full sample. Columns (4) and (5) show the results for the reduced sample, with Column (4) excluding groups with no member firms selecting an industry-specialist audit partner and Column (5) excluding groups selecting only one. The coefficients on *GDR* are significantly negative. These findings indicate that related diversification reduces industry diversity and increases specialist auditors' knowledge-spillover effects. The same auditors will also be industry-specialist auditors in related industries. Therefore, member firms in similar industries select the same industry-specialist audit partners, resulting in a lower number of industry-specialist audit partners in business groups. Hypotheses 1 and 1b are supported.

5.4. Sensitivity analyses

In addition to the raw number of specialist auditors, we computed the ratio of the number of industry-specialist audit firms or partners to the number of member firms selecting an industry-specialist audit firm or partner in a business group, indexed as *SPAF_CLI* or *SPCPA_CLI*. Lower *SPAF_CLI* or *SPCPA_CLI*, respectively, indicate that the member firms of a business group are clustered into a small number of specialist audit firms or partners. Table 3 shows that the mean value of *SPAF_CLI* is 0.70, indicating that an industry-specialist audit firm serves 1.40 clients on average across business groups. Table 7 shows the regression results of *SPAF_CLI* and *SPCPA_CLI*. They are similar to those reported in Tables 5 and 6.

In order to ensure that our results were not driven by the specification of the variables used in this study, we performed several

Table 7

Results for the ratio of the number of specialist auditors to the number of clients selecting specialist auditors.

		(1) <i>SPAF_CLI</i>	(2) <i>SPAF_CLI</i>	(3) <i>SPCPA_CLI</i>	(4) <i>SPCPA_CLI</i>
Intercept	?	1.68 (20.70***)	1.20 (14.53***)	0.62 (2.92***)	-0.17 (-0.71)
<i>GDR</i>	-	-0.14 (-3.62***)	-0.03 (-0.97)	-0.39 (-6.82***)	-0.42 (-7.10***)
<i>GDU</i>	+	0.05 (1.73*)	0.07 (2.61***)	0.25 (5.30***)	0.32 (6.19***)
<i>GSIZE</i>	?	-0.06 (-11.47***)	-0.06 (-9.55***)	0.02 (1.82*)	0.05 (3.67***)
<i>GEXPORT</i>	?	-0.03 (-1.31)	0.02 (0.60)	-0.14 (-3.15***)	-0.27 (-5.55***)
<i>GLEV</i>	?	0.04 (0.91)	0.13 (2.57***)	0.02 (0.25)	0.10 (0.93)
<i>GTYPEA</i>	?	0.02 (1.00)	0.08 (3.64***)	0.00 (0.10)	0.08 (1.63*)
<i>GTYPEG</i>	?	-0.03 (-0.78)	0.08 (2.41**)	-0.02 (-0.33)	-0.12 (-2.16**)
<i>GTYPEM</i>	?	-0.05 (-2.58***)	-0.02 (-0.77)	-0.16 (-4.64***)	-0.12 (-3.44***)
<i>GNISSUE</i>	?	0.03 (1.22)	0.08 (2.37**)	-0.08 (-1.42)	0.02 (0.28)
<i>GGROWTH</i>	?	-0.05 (-1.57)	-0.08 (-2.83***)	-0.08 (-1.34)	-0.14 (-2.26**)
<i>GROA</i>	?	-0.23 (-2.20**)	-0.14 (-1.12)	0.67 (2.88***)	0.90 (3.26***)
<i>GHHI</i>	?	0.45 (9.12***)	0.36 (6.30***)	0.80 (9.21***)	0.60 (6.20***)
<i>NINDS_SPAF</i>	-	-0.02 (-16.30***)	-0.01 (-7.17***)		
<i>NINDS_SPCPA</i>	-			0.00 (0.26)	0.00 (0.16)
<i>OCLIENT_CPA</i>	+			-0.04 (-0.81)	0.05 (1.16)
Years		Yes	Yes	Yes	Yes
Adjusted R ²		35.29%	24.59%	20.38%	28.11%
F-value		52***	15***	21***	15***
Observations		1378	812	1313	789

a. *, **, *** indicate significance at p-values < 0.10, 0.05, and 0.01, respectively. (All tests are two-tailed.)

b. t-values in parentheses.

c. See Appendix for variable definitions.

sensitivity analyses. First, we used various cutoff values (auditors with the largest or top two industry market shares) to identify industry specialists. Our results are robust for these alternative definitions of industry specialists. Second, the results do not change substantially whether or not we winsorize continuous variables at 99%. Third, we obtain robust results when we measure *OCLIENT_CPA* based on client sales.

We also limited our sample to member firms audited by the Big 4 auditors. The number of firm-year and group-year observations decreased to 6444 and 1742, respectively. The empirical results experience no major change if we retain only Big 4 auditee observations in the sample.

Due to the dual-signature system in Taiwan, we set the order variable at *IMSORDER_CPA* = 2 if the two signing audit partners were

industry specialists, at *IMSORDER_CPA* = 1 if only one of them was an industry specialist, and at *IMSORDER_CPA* = 0 if none of them were industry specialists. The regression results for *IMSORDER_CPA* are similar to those of *IMSD_CPA*.

6. Conclusions

This study aimed to examine the association between group diversification and the number of industry-specialist auditor selections in business groups. By using sample data on business groups in Taiwan from 2003 to 2010, we analyzed auditor selections at both the audit firm and audit partner levels. The results show that unrelated diversification by members of business groups is significantly positively associated with the number of industry-specialist auditor selections (including both audit firms and audit partners) in those business groups. By contrast, related diversification among members of business groups is significantly negatively associated with the number of industry-specialist audit partner selections in the business groups. In summary, heterogeneous and homogeneous features among member firms, particularly industry diversity and similarity, affect the diffused and concentrated auditor selections in business groups.

Audit committees are responsible for the appointment and dismissal of auditors in some countries. Future research can examine the association between interlocking members of audit committees and the number of auditor selections. In addition, future research can adopt a change approach to examine the change in industry specialist auditors within a business group in situations of merger and acquisition. Finally, we merely provide evidence from a single country, which affects the generalizability of our study. Future research may revisit the themes of this paper in other countries' prevailing business groups.

Acknowledgements

We gratefully acknowledge the comments and suggestions of Fei Kang, Magdy Farag (both at California State Polytechnic University, Pomona), and Siew Chan (Nova Southeastern University). We also thank workshop participants at the 2015 GEIM Conference and Providence University (Taiwan) for their valuable comments. Finally, we are grateful to the financial support from the Ministry of Science and Technology, Taiwan [NSC 100-2410-H-018 -006].

Appendix

Variable definitions

Panel A: Firm-level variable	
Variable name	Definition
<i>IMSD_FIRM</i>	1 if an audit firm's industry market share was greater than 1.2 times the reciprocal of the number of the Big 4 auditors, and 0 otherwise.
<i>IMSD_CPA</i>	1 if an audit partner's industry market share was greater than 1.2 times the average number of audit partners per industry, and 0 otherwise.
<i>SIZE</i>	Natural logarithm of total assets.
<i>EXPORT</i>	Foreign sales divided by net sales.
<i>LEV</i>	Total liability divided by total assets.
<i>NISSUE</i>	1 if a firm issues new shares, and 0 otherwise.
<i>GROWTH</i>	Change in total assets divided by beginning total assets.
<i>ROA</i>	Net income from continuing operations divided by average total assets.
<i>HHI</i>	Herfindahl index for firm concentration in an industry.
<i>Industries</i>	Industry fixed effects.
<i>Years</i>	Year fixed effects.

Panel B: Group-level variable	
Variable name	Definition
<i>NAFS</i>	Number of audit firm selections in a business group.
<i>NSPAFS</i>	Number of industry-specialist audit firm selections in a business group.
<i>SPAF_CLI</i>	Number of industry-specialist audit firm selections divided by the number of member firms audited by a specialist audit firm in a business group.
<i>NCPAS</i>	Number of audit partner selections in a business group.
<i>NSPCPAS</i>	Number of industry-specialist audit partner selections in a business group.

<i>SPCPA_CLI</i>	Number of industry-specialist audit partner selections divided by the number of member firms audited by a specialist audit partner in a business group.
<i>GDR</i>	Degree of group-related diversification, measured by the entropy method (Jacquemin & Berry, 1979).
<i>GDU</i>	Degree of group-unrelated diversification, measured by the entropy method (Jacquemin & Berry, 1979).
<i>GSIZE</i>	Natural logarithm of the division of the sum of total assets of member firms in a business group by the number of member firms in the group.
<i>GEXPORT</i>	Weighted average of <i>EXPORT</i> by the percentages of total assets of member firms over the sum of total assets in a business group.
<i>GLEV</i>	Weighted average of <i>LEV</i> by the percentages of total assets of member firms over the sum of total assets in a business group.
<i>GTYPEA</i>	1 if a business group is controlled by multiple families, and 0 otherwise.
<i>GTYPEF</i>	1 if a business group is controlled by a single family, and 0 otherwise.
<i>GTYPEG</i>	1 if a business group is controlled by the government, and 0 otherwise.
<i>GTYPEM</i>	1 if a business group is controlled by professional managers, and 0 otherwise.
<i>GNISSUE</i>	Number of member firms with new issuance of shares divided by the number of member firms in a business group.
<i>GGROWTH</i>	Weighted average of <i>GROWTH</i> by the percentages of total assets of member firms over the sum of total assets in a business group.
<i>GROA</i>	Weighted average of <i>ROA</i> by the percentages of total assets of member firms over the sum of total assets in a business group.
<i>GHHI</i>	Herfindahl index for firm concentration in a business group.
<i>NCOS</i>	Number of member firms in a business group.
<i>NCOS_SSPAF</i>	Number of member firms audited by an industry specialist audit firm in a business group.
<i>NCOS_SSPCPA</i>	Number of member firms audited by an industry specialist audit partner in a business group.
<i>NINDS_SPAF</i>	Total numbers of specialized industries of the selected industry-specialist audit firms divided by the number of industry-specialist audit firm selections in a business group.
<i>NINDS_SPCPA</i>	Total numbers of specialized industries of the selected industry-specialist audit partners divided by the number of industry-specialist audit partner selections in a business group.
<i>OCLIENT_CPA</i>	Natural logarithm of the division of the sum of the numbers of clients (excluding the group clients themselves) of the selected audit partners by the number of audit partner selections in a business group.

References

- Bae, G. S., Cheon, Y. S., & Kang, J. K. (2008). Intragroup propping: Evidence from the stock-price effects of earnings announcements by Korean business groups. *The Review of Financial Studies*, 21(5), 2015–2060.
- Balsam, S., Krishnan, J., & Yang, J. S. (2003). Auditor industry specialization and earnings quality. *Auditing: A Journal of Practice and Theory*, 22(2), 71–97.
- Bens, D. A., & Monahan, S. J. (2004). Disclosure quality and the excess value of diversification. *Journal of Accounting Research*, 42(4), 691–730.
- Berger, P., & Ofek, E. (1995). Diversification's effect on firm value. *Journal of Financial Economics*, 37(1), 39–65.
- Bianco, M., & Casavola, P. (1999). Italian corporate governance: Effects of financial structure and firm performance. *European Economic Review*, 43(4–6), 1057–1069.
- Bushman, R., Chen, Q., Engel, E., & Smith, A. (2004). Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics*, 37(2), 167–201.
- Buysschaert, A., Deloof, M., & Jegers, M. (2004). Equity sales in Belgian corporate groups: Expropriation of minority shareholders? A clinical study. *Journal of Corporate Finance*, 10(1), 81–103.
- Cahan, S. F., Rahman, A., & Perera, H. (2005). Global diversification and corporate disclosure. *Journal of International Accounting Research*, 4(1), 73–93.
- Chakrabarti, A., Singh, K., & Mahmood, I. (2007). Diversification and performance: Evidence from East Asian firms. *Strategic Management Journal*, 28(2), 101–120.
- Chang, S. J. (2003). Ownership structure, expropriation, and performance of group-affiliated companies in Korea. *The Academy of Management Journal*, 46(2), 238–253.
- Chang, W., & Chen, Y. (2015). The role of external auditors in business group governance: Evidence from the number of audit firms selected in Taiwanese groups. *The International Journal of Accounting*, 50(2), 170–194.
- Chen, J., Chang, H., Chen, H., & Kim, S. (2014). The effect of supply chain knowledge spillovers on audit pricing. *Journal of Management Accounting Research*, 26(1), 83–100.
- Chi, W., Huang, H., Liao, Y., & Xie, H. (2009). Mandatory audit partner rotation, audit quality, and market perception: Evidence from Taiwan. *Contemporary Accounting Research*, 26(2), 359–391.
- Claessens, S., Fan, J. P. H., & Lang, L. H. P. (2006). The benefits and costs of group affiliation: Evidence from East Asia. *Emerging Markets Review*, 7(1), 1–26.
- Collin, S. O. (1998). Why are islands of conscious power found in the ocean of ownership? Institutional and governance hypotheses explaining the existence of business groups in Sweden. *The Journal of Management Studies*, 35(6), 719–746.
- DeFond, M. L., & Francis, J. R. (2005). Audit research after Sarbanes-Oxley. *Auditing: A Journal of Practice Theory*, 24(Supplement), 5–30.
- Denis, D. J., Denis, D. K., & Yost, K. (2002). Global diversification, industrial diversification, and firm value. *The Journal of Finance*, 57(5), 1951–1979.
- Faccio, M., & Lang, L. H. P. (2002). The ultimate ownership of Western European corporations. *Journal of Financial Economics*, 65(3), 365–395.
- Francis, J. R. (2011). A framework for understanding and researching audit quality. *Auditing: A Journal of Practice Theory*, 30(2), 125–152.
- George, R., & Kabir, R. (2008). Business groups and profit redistribution: A boon or bane for firms? *Journal of Business Research*, 61(9), 1004–1014.
- George, R., & Kabir, R. (2012). Heterogeneity in business groups and the corporate diversification-firm performance relationship. *Journal of Business Research*, 65(3), 412–420.
- Gilson, S., Healy, P., Noe, C., & Palepu, K. (2001). Analyst specialization and conglomerate breakups. *Journal of Accounting Research*, 39(3), 565–582.
- Herrmann, D. R., Hope, O. K., & Thomas, W. B. (2008). International diversification and forecast optimism: The effects of Reg. FD. *Accounting Horizons*, 22(2), 179–197.
- Jacquemin, A. P., & Berry, C. H. (1979). Entropy measure of diversification and corporate growth. *The Journal of Industrial Economics*, 27(4), 359–369.
- Jiraporn, P., Kim, Y. S., & Mathur, I. (2005). *Does corporate diversification exacerbate or mitigate management? An empirical analysis*. Working Paper, Pennsylvania State

- University, Great Valley School of Graduate Professional Studies.
- Joh, S. W. (2003). Corporate governance and firm profitability: Evidence from Korea before the economic crisis. *Journal of Financial Economics*, 68(2), 287–322.
- Jung, K., & Kwon, S. Y. (2002). Ownership structure and earnings informativeness evidence from Korea. *The International Journal of Accounting*, 37(3), 301–325.
- Keister, L. (2000). *Chinese business groups: The structure and impact of interfirm relations during economic development*. Oxford: Oxford University Press.
- Kennedy, P. (1992). *A guide to econometrics*. Cambridge, MA: MIT Press.
- Khanna, T., & Palepu, K. (1997). Why focused strategies may be wrong for emerging markets. *Harvard Business Review*, 75(4), 41–51.
- Khanna, T., & Palepu, K. (2000a). Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups. *The Journal of Finance*, 55(2), 867–891.
- Khanna, T., & Palepu, K. (2000b). The future of business groups in emerging markets: Long run evidence from Chile. *Academy of Management Journal*, 43(3), 268–285.
- Khanna, T., & Rivkin, J. W. (2001). Estimating the performance effects of business groups in emerging markets. *Strategic Management Journal*, 22(1), 45–74.
- Kim, J. B., & Yi, C. H. (2006). Ownership structure, business group affiliation, listing status, and earnings management: Evidence from Korea. *Contemporary Accounting Research*, 23(2), 427–464.
- Lin, P. (2000). Survey on clients' satisfaction with audit firms. *Tax Business Monthly Services*, 308, 29–37 (In Chinese).
- Maman, D. (2002). The emergence of business groups: Israel and South Korea compared. *Organization Studies*, 23(5), 737–758.
- Manos, R., Murinde, V., & Green, C. (2012). Dividend policy and business groups: Evidence from Indian firms. *International Review of Economics Finance*, 21(1), 42–56.
- Neal, T. L., & Riley, R. R., Jr. (2004). Auditor industry specialist research design. *Auditing: A Journal of Practice and Theory*, 23(2), 169–177.
- Palepu, K. (1985). Diversification strategy, profit performance and the entropy measure. *Strategic Management Journal*, 6(3), 239–255.
- Perotti, E., & Gelfer, S. (2001). Red barons or robber barons? Governance and investment in Russian financial-industrial groups. *European Economic Review*, 45(9), 1601–1617.
- Reichelt, K. J., & Wang, D. (2010). National and office-specific measures of auditor industry expertise and effects on audit quality. *Journal of Accounting Research*, 48(3), 647–686.
- Romanus, R. N., Maher, J. J., & Fleming, D. M. (2008). Auditor industry specialization, auditor changes, and accounting restatements. *Accounting Horizons*, 22(4), 389–413.
- Rumelt, R. P. (1982). Diversification strategy and profitability. *Strategic Management Journal*, 3(4), 359–369.
- Singh, M., Nejadmalayeri, A., & Mathu, I. (2007). Performance impact of business group affiliation: An analysis of the diversification-performance link in a developing economy. *Journal of Business Research*, 60(4), 339–347.
- Stein, J. (1997). Internal capital markets and the competition for corporate resources. *The Journal of Finance*, 52(1), 111–133.
- Velury, U., Reisch, J. T., & O'Reilly, D. M. (2003). Institutional ownership and the selection of industry specialist auditors. *Review of Quantitative Finance and Accounting*, 21(1), 35–48.
- Wan, W. P., Hoskisson, R. E., Short, J. C., & Yiu, D. W. (2011). Resource-based theory and corporate diversification: Accomplishments and opportunities. *Journal of Management*, 37(5), 1335–1368.
- Watts, R. L., & Zimmerman, J. L. (1986). *Positive accounting theory*. Englewood Cliffs, NJ: Prentice Hall.
- Yang, Y., Kang, J., Lin, R., & Ronen, J. (2016). Auditor selection within a business group: Evidence from Taiwan. *Review of Quantitative Finance and Accounting*, 46(2), 195–215.