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COMPETITION, MARKET SEGMENTATION AND FINANCIAL
PERFORMANCE: EVIDENCE FROM TAIWANESE
AUDITING INDUSTRY

This study examines the effects of market concentration on financial performance of audit firms under market segmentation in Taiwanese auditing industry. Total audit firms are divided into 4 subsamples, including international, national, regional, and local firms. We document that international firms situate in the least concentrated market and have the highest competition level but achieve the best financial performance. According to the resource-based view of a firm, this study ascribes better performance of international firms to their superior human capital with which to render higher quality services.

Keywords: audit market; market concentration; market segmentation; financial performance; audit firms; Taiwan.

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КОНКУРЕНЦІЯ, СЕГМЕНТАЦІЯ ТА ФІНАНСОВІ ПОКАЗНИКИ
НА ТАЙВАНСЬКОМУ РИНКУ АУДИТОРСЬКИХ ПОСЛУГ

У статті досліджено вплив ринкової концентрації та фінансову успішність фірм-аудиторів на сегментацію ринку на Тайвані. Усі аудиторські компанії поділено на 4 групи: міжнародні, загальнонаціональні, регіональні та місцеві. Ніша міжнародних ринків є найменш концентрованою, але при цьому в ній найвища конкуренція та найбільш значні прибутки. Причина успіху міжнародних аудиторів на Тайвані багато в чому визначається тим, що саме ці фірми мають у наявності найкращий людський капітал, що дозволяє їм надавати послуги найвищої якості.

Ключові слова: ринок аудиту; концентрація ринку; сегментація ринку; фінансові показники; аудиторські компанії; Тайвань.

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КОНКУРЕНЦИЯ, СЕГМЕНТАЦИЯ И ФИНАНСОВЫЕ
ПОКАЗАТЕЛИ НА ТАЙВАНСКОМ РЫНКЕ
АУДИТОРСКИХ УСЛУГ

В статье исследовано влияние рыночной концентрации и финансовой успешности фирм-аудиторов на сегментацию рынка на Тайване. Все аудиторские компании поделены на 4 группы: международные, общенациональные, региональные и местные. Ниша международных рынков наименее концентрирована, но при этом там самая высокая конкуренция и самые значительные прибыли. Причина успехов именно международных аудиторов на Тайване во многом связана с тем, что данные фирмы обладают наилучшим человеческим капиталом, что позволяет им оказывать услуги наивысшего качества.

Ключевые слова: рынок аудита; концентрация рынка; сегментация рынка; финансовые показатели; аудиторские компании; Тайвань.

1. Introduction. Audit firms are a professional service organization and a knowledge-intensive entity. Regulatory agencies are concerned about their market concentration (Government Accountability Office, 2008). Audit market concentration increases after merger of audit firms, and regulatory agencies closely monitor any

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mergers between them (McMeeking et al., 2007; Yang et al., 2012). In theory, high market concentration levels denote low competition at a market (Besanko et al., 2000). Economic theory suggests that price-cost margins (profits) should be higher at more concentrated markets (Besanko et al., 2000; Lee, 2012). This study extends Yang et al. (2012) research examining the relation between market concentration and financial performance of audit firms, which constitutes our purpose.

Market segmentation exists in the auditing industry due to government regulation or the size of clients served (DeFond et al., 2000; Ghosh and Lustgarten, 2006; Yang et al., 2012; Lee, 2010, 2012). Audit firms are often grouped in terms of size, region or services offered. Segmentation leads to varied market concentrations in different audit firm groups. Following prior studies and aiming at better reflection of market attributes, this study divides the total of audit firms into 4 subsamples, including international, national, regional and local firms. Empirical results document that international firms situate at the most competitive markets but achieve the best financial performance among the 4 subsamples.

With its results, this study contributes to related academic literature in the following way. First, this study finds that audit firms in less concentrated markets financially outperform those at more concentrated markets. The findings above result from high quality services rendered by audit firms at the more competitive audit market. That is, service quality moderates the relation between market competition and financial performance. Second, this study reports that international firms possess superior human capital to render higher quality services and result in better financial performance. The findings confirm the resource-based view of firm and add knowledge to the service industry literature.

The remainder of this study proceeds as follows. Section 2 reviews the previous studies, followed by the description of empirical data and sample classification in Section 3. Section 4 presents the measurement of audit market structure. This study displays the financial performance effects of concentration levels in Section 5. Section 6 demonstrates the implications of the empirical results. And we conclude in Section 7.

2. Background and literature review.

2.1. Taiwanese audit market. The Financial Supervisory Commission (FSC) in Taiwan has administered audit firm survey since two decades ago to collect business information on the auditing industry for macro-economic analyses and policy formation. The FSC publishes the Survey Report of Audit Firms in Taiwan annually. According to the authoritative source of information on Taiwanese audit market, the number of audit firms was 532 in 1992 and climbed to 913 in 2008, and the number of practicing Certified Public Accountants (CPAs), owners of audit firms, was 1,066 in 1992 and 1,910 in 2008.

Auditing industrial cooperation between Taiwan and the US has lasted for 4 decades, creating a similar audit market structure in both countries (Yang et al., 2012). Some Taiwanese audit firms internationalize and become affiliates or members of the US international audit firms, the so-called Big 4. In addition to the international firm affiliations, many local firms are associated with other US audit firms, such as BDO, Grant Thornton, and Baker Tilly International. For international firm affiliations, the Taiwanese Big Six included Arthur Andersen, KPMG, Peat Marwick

& Price Waterhouse, Ernst & Young (EY), Deloitte & Touche, and Coopers & Lybrand before 1999. The loss of Arthur Andersen leaves the Big Four international audit firm in Taiwan after 2003, including KPMG, PwC, EY, and Deloitte Touche Tohmatsu (DTT).

For the past two decades, some major regulations occurred in Taiwanese auditing industry. Beginning in 1988, Taiwanese authorities have raised the passing rate of CPAs uniform examination, resulting in substantial increases in the number of qualified CPAs and in market competition. The authorities abolished the long-standing audit fee standards to ensure fair audit market competition in 1998. Cancelling the audit fee standard adversely impacts traditional auditing practice market. Since then, a rumor of price-cutting strategy for client solicitation has prevailed in the industry and has led to enhanced market competition. Furthermore, the tax authorities established a tax agent system and legalized the provision of corporate registration and accounting practices by tax agents to small and medium-sized enterprises (SMEs) in 2003. By the end of 2012, the cumulative number of qualified tax agents eligible for practicing services was 12,172, much more than the number of practicing CPAs. Proprietorship audit firms have provided the same services as tax agents to the SMEs for years. Tax agent legalization particularly influences proprietorship audit firms because of the competitive advantages tax agents possess for a relatively lower service fees and easy service access by the clients.

2.2. Market segmentation. The concept of market segmentation originates from the incomplete competition market theory suggested by economic scholars in the 1930's. Theorists assume that at a market, consumers are heterogeneous and have different preferences. Firms seek consumers with homogeneous preferences and group them into a smaller unit with which to market their products. The concept of market segmentation thus comes from the demand side of market. When consumers are too numerous and diverse in their buying requirements, a single product mix offered by firms is unable to satisfy all consumers (Kotler, 2003). As a result, marketing strategies evolve from mass marketing to product-variety marketing, and finally to target marketing. By market segmentation, firms point to the target market and adjust their products and marketing activities to meet consumer (user) needs (Smith, 1956; Wendell, 1956). In sum, market segmentation refers to a group of consumers within a broader market who possess a set of common characteristics, including demographic factors, geography, industry, and size of a firm (Besanko et al., 2000).

Regarding market segmentation in auditing, A. Ghosh and S. Lustgarten (2006) hypothesize and confirm that there are separate segments within the industry in which different levels of rivalry and fee-setting practices prevail. Y.S. Chen et al. (2008) categorize audit firms into big-, medium-, and small-sized firms in terms of market segments. Y.F. Yang et al. (2012) classify audit firms into big, large, medium, and small firms to examine the competition level and mergers in Taiwanese auditing industry. M.L. Defond et al. (2000) investigate auditor industry specialization and market segmentation. They document the existence of market segment in Hong Kong auditing industry.

3. Data and sample classification. This study obtained the empirical data from 1992 to 2008 Survey Report of Audit Firms in Taiwan, published by the FSC. In terms of market segmentation, the total sample is partitioned into 4 categories: internatio-

nal, national, regional, and local audit firms. International firms refer to the affiliates and members of the Big 4 audit firms in the US during the sample period. National firms are non-Big partnership audit firms that audit financial statements of public companies, while non-Big partnership firms that do not offer this service are regional firms. Local firms represent proprietorship audit firms.

The final sample consists of 12,264 firm-year observations after the exclusion of observations (1) newly established in the survey year, (2) with dependent variables having value more or less than 3 standard deviations from their means, and (3) with no revenues or expenditures. We have 86 international, 972 national, 2,795 regional, and 8,411 local audit firms. Additionally, this study deflates all monetary variables by the yearly consumer price index to account for inflation.

4. Measurement of market structure. Prior researches most closely related to this study are Y.F. Yang et al. (2012). They calculate the standardized Herfindahl-Hirschman index (HHI) for big, large, medium, and small firms, an equivalency of our international, national, regional and local firms. As shown in Table 1 and Figure 1, they document that international firms have the least mean standardized HHIs (0.10) followed by national firms (0.78), local firms (0.79) and regional firms (0.95). This indicates that international firms have the least concentrated market structure and thus situate at the most competitive market among the 4 subsamples.

Table 1. Standardized HHIs

Year	International firms (n = 86) (A)	National firms (n = 972) (B)	Regional firms (n = 2,795) (C)	Local firms (n = 8,411) (D)
1992	0.10	0.59	0.60	1.04
1993	0.13	0.60	1.11	0.91
1994	0.09	0.64	1.19	0.95
1995	0.10	0.82	1.21	0.86
1996	0.11	0.90	0.63	0.81
1997	0.08	0.80	0.97	0.71
1998	0.07	0.92	0.75	0.79
1999	0.05	0.91	0.53	0.68
2000	0.06	0.96	0.57	0.72
2001	0.07	0.71	0.53	0.68
2002	0.05	0.87	0.78	0.79
2003	0.14	0.77	0.89	0.67
2004	0.11	0.52	2.34	0.64
2005	0.10	0.80	1.21	0.71
2006	0.13	0.82	0.88	0.67
2007	0.15	0.82	1.03	0.72
2008	0.17	0.90	0.99	1.07
Mean	0.10	0.78	0.95	0.79

5. Financial performance effects of audit market concentration. Economic theory suggests that profits should be higher at more concentrated markets. However, profits may vary across the market for other reasons, such as accounting practices, regulation, product differentiation, the nature of sales transactions, and the concentration of buyers (Besanko et al., 2000). Product differentiations exist at the audit market (Craswell et al., 1995). Taiwanese international firms offer services to large public companies and charge higher audit fees compared to other categories of audit firms. In contrast, both regional and local firms provide services to small and medi-

um-sized enterprises with lower fees. Further, regulations over different categories of audit firms vary. Hence, this study does not expect the relationship between audit market concentration and financial performance, and establishes the following non-directional hypothesis.

H1: *The association between market concentration levels and financial performance of audit firms is indeterminate.*

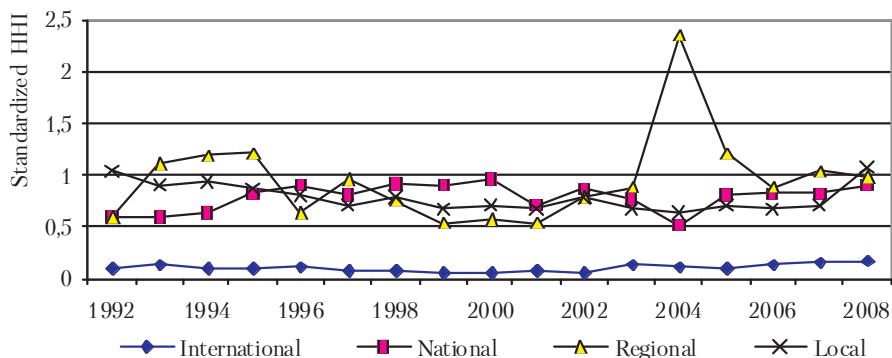


Figure 1. **Tendency of standardized HHIs for each subsample, authors'**

Prior studies suggest that large audit firms tend to provide higher quality audit services than other audit firms (Teoh and Wong, 1993). Large audit firms invest more resources in the creation of a brand and reputation which is a costly endeavor and firms might recoup this investment through a fee premium. Several prior studies document the existence of audit fee premium in international audit firms (Craswell et al., 1995), an evidence of product differentiation at the audit market. Furthermore, this study argues that audit firms with audit fee premium result in better financial performance compared to those without audit fee premium. Accordingly, we expect that financial performance of international firms is better than that of national, regional, and local firms and suggest the following hypothesis.

H2: *International firms are superior in financial performance to national, regional, and local firms.*

Finally, what are the effects of interplay between audit market concentration and international firms on financial performance? Specifically, whether the market structure of international firms contributes more financial performance than that of national, regional, and local firms? Based on H1 and H2, this study establishes the following non-directional hypothesis.

H3: *Financial performance effects of the interaction between market concentration levels and international firms are indeterminate.*

5.1. Regression model and variable definitions. Based on the prior studies on audit firms (Lee, 2010, 2012; Chen et al., 2008), this study establishes the following cross-sectional regression equation to test our hypotheses:

$$PFM = \alpha_0 + \alpha_1 HHI + \alpha_2 BIG + \alpha_3 HHI \times BIG + \alpha_4 SIZE + \alpha_5 AGE + \alpha_6 LEVER + \alpha_7 INDEX + \varepsilon \quad (1)$$

Based on Y.S. Chen et al. (2008) and Y.F. Yang et al. (2012), this study defines financial performance (*PFM*) as accounting net income plus salaries of partners and

divided by the number of partners, that is, net income per partner. Our market structures refer to market concentration levels (*HHI*), defined as the standardized HHIs in Table 1. By H1, this study does not specify a directional prediction on the relationship between market structures and financial performance. A dummy variable of audit firm category (*BIG*) is established to separate international firms from the other 3 subsamples. If audit firms are international firms, *BIG* equals 1, and 0 otherwise. According to H2, the coefficient on *BIG* is expected to be positive. Finally, to test the H3, this study establishes an interaction term between market structure and international firms, *HHI x BIG*, but does not predict its relation to financial performance. Few prior studies examine the relation between audit market concentration and financial performance of audit firms. This study includes other factors affecting audit firm performance as control variables from the related studies. These factors include audit firm size (*SIZE*) (Becker et al., 1998; Collins-Dodd et al., 2004; Chen et al., 2008), age of audit firms (*AGE*) (Fasci and Valdez, 1998; Brocheler et al., 2004; Chen et al., 2008), human capital leverage of audit firms (*LEVER*) (Hitt et al., 2001; Cheng et al., 2000; Chen et al., 2008) and economic indicator (*INDEX*), Taiwanese gross domestic product.

6. Results.

6.1. Descriptive statistics and correlation matrix. Table 2 reports descriptive statistics and correlation matrix for the variables used in the regression model. International firms are superior in financial performance (*PFM*) (7,067,357) to that of national firms (1,763,117), regional firms (916,891) and the local ones firms (727,263). The results of audit market concentration (*HHI*) are the same as standardized HHIs in Table 1. International firms, on average, have the least standardized HHIs (0.01) followed by national firms (0.78), local firms (0.79), and regional firms (0.95). Next, the correlation matrix shows the significant relation between dependent variable and some independent variables in both Pearson and Spearman correlation coefficients. Some independent variables are highly correlated. To account for the possibility of multi-collinearity among independent variables, this study assesses the variance inflation factors (VIFs) in the subsequent sections.

6.2. Regression results. The OLS regression results are displayed in Table 3. The explanatory power of regression model, adjusted R^2 is 0.505 (F value = 1,761.14), implying a good model specification. All t-statistics of variable coefficients are calculated using White (1980) robust standard errors to correct for heteroscedasticity. The standardized coefficient on audit market structure (*HHI*) is significantly negative ($t = -4.128$), implying that audit firms at a less concentrated market possess superior financial performance to those at a more concentrated market. Next, positive coefficient on dummy variable of audit firm category (*BIG*) ($t = 5.683$) indicates that financial performance of international firms is better than that of national, regional, and local firms. Consistent with expectation, H2 is supported. Coefficient of the interplay between market structure and dummy variable of audit firm category (*HHI x BIG*) is significantly positive ($t = 8.532$). This means that concentration levels of international firms enhance the positive relation between audit firm category and financial performance. Alternatively stated, concentration levels of international firms contribute more to financial performance compared to the other 3 subsamples.

Table 2. Descriptive statistics and correlation matrix, authors' calculations

	Mean	Std. Dev.	<i>PFM</i>	<i>HHI</i>	<i>SIZE</i>	<i>AGE</i>	<i>LEVER</i>
International firms							
<i>PFM</i>	7,067,357	761,421		0.138	0.739***	0.140	0.358**
<i>HHI</i>	0.10	0.03	0.281**		0.148	-0.103	0.028
<i>SIZE</i>	21.16	0.80	0.752***	0.185		0.186	0.159
<i>AGE</i>	29	11	-0.043	-0.110	-0.133		0.075
<i>LEVER</i>	22	4	0.343**	0.100	0.141	0.168	
National firms							
<i>PFM</i>	1,763,117	1,243,852		0.056	0.625***	0.233***	0.386***
<i>HHI</i>	0.79	0.13	0.064**		0.071**	0.047	0.014
<i>SIZE</i>	17.70	0.91	0.585***	0.075**		0.283***	0.612***
<i>AGE</i>	16	10	0.211***	0.042	0.277***		0.205***
<i>LEVER</i>	9	5	0.310***	0.026	0.543***	0.113***	
Regional firms							
<i>PFM</i>	916,891	783,665		-0.002	0.687***	0.205***	0.297**
<i>HHI</i>	0.95	0.41	0.006		-0.021	0.057**	-0.004
<i>SIZE</i>	16.33	0.94	0.611***	-0.008		0.342***	0.588***
<i>AGE</i>	11	8	0.157***	0.097***	0.297***		0.256***
<i>LEVER</i>	6	4	0.253***	-0.006	0.529***	0.140***	
Local firms							
<i>PFM</i>	727,263	881,397		-0.002	0.716***	0.166***	0.370***
<i>HHI</i>	0.79	0.13	0.008		-0.043***	-0.092***	0.042***
<i>SIZE</i>	15.11	1.08	0.585***	-0.036**		0.283***	0.768***
<i>AGE</i>	11	9	0.075***	-0.036**	0.173***		0.235***
<i>LEVER</i>	7	5	0.267***	0.072***	0.616***	0.122***	

Notes

1. Number of observations is 12,264.

2. Upper right is the Spearman's rank correlation coefficient and lower left is the Pearson correlation coefficient.

3. *, **, *** – denote the significance at the 10%, 5% and 1% levels for the two-tailed test.

4. Variable definitions: *PFM* – (total revenues – total expenditures + salaries paid to partners) / number of partners; *HHI* – standardized HHIs obtained from Table 1; *BIG* – dummy variable, set to 1 if the firm is an international audit firm, and 0 otherwise; *SIZE* – natural logarithm of the total revenues of audit firms; *AGE* – age of audit firms; *LEVER* – number of total employees / number of partners.

Table 3. Regression results of association between financial performance and concentration level, authors' calculations

$PFM = \alpha_0 + \alpha_1 HHI + \alpha_2 BIG + \alpha_3 HHI \times BIG + \alpha_4 SIZE + \alpha_5 AGE + \alpha_6 LEVER + \alpha_7 INDEX + \epsilon$			
Indep. variables	Predicted sign	Standardized coefficient	t-statistics
<i>HHI</i>	?	-0.028***	-4.128
<i>BIG</i>	+	0.116***	5.683
<i>HHI</i> × <i>BIG</i>	?	0.173***	8.532
<i>SIZE</i>	+	0.571***	70.405
<i>AGE</i>	+	0.004	0.582
<i>LEVER</i>	?	-0.024***	-3.082
<i>INDEX</i>	?	0.008	1.218
Adjusted R ²		0.505	
F-statistics		1,761.14***	
Number of observations		12,264	

Notes

1. Variable of *PFM*, net income per partner, is expressed in NT dollars. Number of observations 12,264 is the sum of numbers of international firms 86, national firms 972, regional firms 2795, and local firms 8411.

2. *, **, *** – significance at the 10%, 5% and 1% confidence levels, respectively, for two-tailed tests.

3. VIFs are less than 3.89, implying no serious multi-collinearity exists among experimental variables.

4. Variable of *INDEX* is an economic indicator. Other variables are defined in Table 2.

6.3. Discussion and additional analyses of the results. Taking empirical results in Tables 1 and 3 together, international firms have the highest competition level but produce the best financial performance among the 4 subsamples. Taiwanese international firms have internationalized and associated with the US international firms for more than 4 decades. The members of these firms share abundant resources, including professional auditing techniques and expertise, human resource development, and continuing professional education. Further, headquarters of international firms determine the services offered by their worldwide members, who often exchange valuable information. With this systematic mechanism of professional development, international firms have become a symbol of high quality auditors, and their reputation remains strong in Taiwan.

Although international and national firms render audit services to public companies in Taiwan, the international firms account for approximately 84% of the revenues generated by audit services to public companies, while national firms account for the remaining 16%. Because the public rates each international firm with equal service quality, they compete with each other for business within the same market. As international firms provide services with homogeneous quality, they exhibit the highest relative competition level among the 4 subsamples.

Given the least concentrated and the most competitive market, international firms financially outperform national, regional, and local firms. This study argues and ascribes the best financial performance of international firms to their higher service quality compared to the other 3 subsamples.

Service quality is often referred to as audit quality in the auditing industry and can be measured by the attributes of human capital of audit firms suggested by some prior studies (Meinhardt et al., 1987; Aldhizer et al., 1995; Financial Reporting Council, 2006; Lee et al., 1999). Based on prior studies, this study establishes 4 human capital-related factors that determine audit quality: educational level of auditors, work experience of auditors, professionalism, and their continuing professional education. This study defines the educational level of auditors as the number of auditors with bachelor, master or PhD degree (EDU). Based on prior studies (Collins-Dodd et al., 2004; Brocheler et al., 2004; Fasci and Valdez, 1998; Chen et al., 2008), this study measures work experience of auditors by the number of auditors aged over 35 years (EXP). This study estimates the degree of professionalism by the number of auditors with a license (LICENSE) and defines continuing professional education (TRAIN) as total training expenses of an audit firm.

This study divides the total sample into two categories with which to compare the differences in human capital-related factors between international firms and non-international firms. As shown in Table 4, the international firms, on average, have significantly more auditors with high academic education level (EDU), with much work experience (EXP), and with a license (LICENSE). In addition, they allocate more resources on the continuing professional education of auditors (TRAIN). As a result, international firms possess higher human capital than other firms to render quality services.

The resource-based view of firm notes that performance differences across firms can be attributed to the variance in the firms' resources and capabilities (Penrose, 1959; Wernerfelt, 1984; Prahalad and Hamel, 1990; Peteraf, 1993). Our findings that

international firms possess higher human capital than other firms to render quality services and result in better financial performance confirm the resource-based view of firm.

Table 4. Test results of differences in human capital-related factors determining audit quality, authors' calculations

Variables	International firms (N = 86)	Non-international firms (N = 12,178)	Differences	t-statistics
<i>EDU</i>	18	3	15	29.978***
<i>EXP</i>	16	5	11	20.262***
<i>LICENSE</i>	7	2	5	3.836***
<i>TRAIN</i>	295,562	21,636	273,927	8.231***

Notes:

1. Variable of *TRAIN* is expressed in NT dollars. The number of observations 12,178 is the sum of variable of national firms 972, regional firms 2,795, and local firms 8,411.

2. *, **, *** – signify the 10%, 5% and 1% confidence levels, respectively, for two-tailed tests.

3. Variable definitions: *EDU* – the number of auditors with bachelor degree, master or PhD degree/number among partners; *EXP* – the number of auditors aged over 35/number of partners; *LICENSE* – the number of auditor with a CPA license/number of partners; *TRAIN* – the total training expenses of audit firms/number of partners.

7. Conclusions. This study examines the relation between market concentration and financial performance for 4 subsample firms in Taiwan. Given the least concentration level and the highest competition level, international firms have better financial performance than the other 3 subsamples. Further analyses indicate that superior financial performance of international firms ascribes to their higher human capital, resulting in better service quality compared to the other 3 subsample firms and supporting the resource-based view of firm.

The results should be interpreted in the light of some caveats. In illustrating better financial performance of international firms, this study uses 4 human capital-related factors to surrogate the service quality. This study omits some other factors influencing the service quality due to data unavailability, including culture within audit firms, the effectiveness of audit processes, and the reliability and usefulness of audit reporting (Financial Reporting Council, 2006). This study reports that international audit firms have superior financial performance as compared to other categories of audit firms. During the sample period, international audit firms experience 3 stages of mergers. We had Big Six international audit firms before 1999, Big Five before 2003, and Big Four after 2003. To examine the audit market structures in these 3 periods constitutes an intriguing and promising avenue for future studies.

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