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WORKING PAPER

AN EXPLORATIVE STUDY OF THE INTERNATIONAL CONSISTENCY OF AUDITOR SPECIALIZATION

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Introduction

Industry specialization can be seen as a differentiation strategy of the auditor. Previous research demonstrates the advantages of such a strategy (e.g., DeFond et al., 2000; Balsam et al., 2003; Dunn and Mayhew, 2004). The literature uses two constructs to measure specialization, the market share of an auditor in a specific market, and a portfolio approach focusing on the major industries in the portfolio of clients of the auditor (e.g., Hogan and Jeter, 1999; Balsam et al., 2003; Neal and Riley, 2004).

The objective of this paper is to investigate whether auditor specialization is consistent across countries. Compared to competing auditors, an industry specialized auditor must have unique assets that result in clients in that specific industry systematically choosing the specialist auditor. Logically, this specialist knowledge can translate into an audit methodology that is specifically suited for this industry. Large audit firms make significant investments in developing tools to assist auditors in applying this methodology. As the specialized knowledge of auditors can be transferred from one country to another, we can expect that industry specialization is consistent across countries for international audit firms. If an audit approach, specifically designed for an industry, is transferred through manuals to another country, one can expect that the audit firm has the same competitive advantage in that other country. This would result in consistent patterns in international auditor specialization. If this can not be observed, it might mean that the audit firm does not have an audit methodology that results in competitive advantage or that this methodology is not transferred from one country to another.

We use data on 55 235 European companies to analyze auditor specialization and find a relative degree of consistency across countries. The paper starts with a review of the relevant literature, describes our data and presents the results of our analysis.

Review of the literature

Industry specialization is linked with industry-specific knowledge and expertise. Its objective is to obtain a competitive advantage over non-specialized auditors (Casterella et al., 2004) and to receive economic rents (Mayhew and Wilkins, 2003). Industry specialization results in both cost leadership and product differentation

(Mayhew and Wilkins, 2003). Large audit firms use their industry specific knowledge in marketing campaigns to benefit from this (Casterella et al., 2004).

Specialized auditors can work more efficiently, resulting in cost savings that can result in lower audit fees. Alternatively, specialization could also lead to more specialized services, resulting in higher fees due to a differentiation premium. This strategy can only work if clients indeed observe and value specialized services (Casterella et al., 2004).

Cairney and Young (2006) provide evidence that specialized auditors work more efficiently. If more companies within an industry have the same operational characteristics, it becomes more interesting for auditors to specialize in specific knowledge on the industry. These auditors will be more efficient and can obtain a dominant market share in the industry. The cost of obtaining specialized knowledge can be spread over more clients, resulting in a cost-based advantage. Craswell et al. (1995) investigated fee premiums and found that specialized auditors earned significant premiums over non-specialized auditors. Although average costs of specialists might be lower than those of non-specialists, average specialist fees were higher. DeFond et al. (2000) show the interaction between audit fees, specialization and auditor brand name. Specialization leads to different results for large international audit firms and local firms. Specialized local firms demonstrate production economies and the capture of market share through lower fees for a clientele seeking low-priced audits. Large firm international brand-name reputation is necessary to obtain higher priced quality-differentiated audits based on industry specialization. Casterella et al. (2004) noted that differentiation premiums are mainly paid by clients with limited bargaining power. Also Mayhew and Wilkins (2003) relate fee premiums to relative bargaining power of auditors and clients.
A disadvantage of auditor specialization is the consequent concentration of risk (Piot, 2005). A specialized auditor is more sensitive to the economic situation in a specific industry.

Auditor specialization has also advantages for the client and related stakeholders. Balsam et al. (2003) saw a positive effect of auditor specialization on quality of earnings and on market perceptions of quality of earnings. Kwon et al. (2007) came to similar conclusions in an international context and noted a stronger effect in weaker institutional environments. Dunn and Mayhew (2004) concluded that auditor specialization results in higher perceived quality of disclosure in non-regulated industries. There also is a negative relation between auditor specialization and financial frauds (Carcello and Nagy, 2002). On the other hand, clients might dislike specialized auditors because of the increased risk of information transfer across clients in the same industry (Dunn and Mayhew, 2004; Piot, 2005).

Table 1 summarizes motivating and demotivating factors for auditor specialization.

Table 1: Motivating and demotivating factors for auditor specialization

	Motivating factors	**Demotivating factors**
Auditor	• Cost savings • Higher expertise • Fee premiums	• Concentrated risk
Client and stakeholders	• Quality of earnings • Quality of disclosure • Signalling effect to stakeholders • Lower financial fraud	• Transfer of information

Most of the literature studies auditor specialization in only one country: Australia (Craswell et al., 1995; Ferguson et al., 2003; Ferguson and Stokes, 2002), Hong Kong (DeFond et al., 2000) and the United States (O'Keefe et al, 1994; Mayhew and Wilkins, 2003; Cullinan, 1998). Only a few studies look at specialization from an international perspective, including De Beelde (1997) and Kwon et al. (2007). De Beelde (1997) looked at both auditor concentration and specialization. His measure of specialization was based on effective versus expected market share. He did not find evidence of a global (world-wide) pattern of auditor specialization. Kwon et al. (2007) concluded that the quality of the regulatory environment has an impact on the interaction between auditor specialization and earnings quality.

The objective of this paper to find out whether auditor specialization shows patterns across countries. If international audit firms develop specific methodologies that are adapted to industry characteristics, these methodologies should result in competitive advantages in more than one country. Hence it can be expected that the impact of specialization can be observed in more than one country.

Research method

There is no consensus on how auditor specialization should be measured. Neal and Riley (2004) concluded that this lack of consensus leads to inconsistent results. Different constructs were used in measuring auditor concentration. Most are based on auditor market share. More recently, the portfolio approach leads to new results.

Most constructs of auditor specialization are based on the market share of the auditor in a specific industry. Specific knowledge is obtained by doing more audits within one industry and a large market share is an indicator of specialist knowledge (Balsam et al., 2003). Market share can be calculated in different ways. A first approach is based on the number of clients within an industry. A problem with this approach is that it is unclear whether advantages of specialization are linked with having large clients in an industry or with having a large number of small clients. Having a number of large clients can result in a relatively low number of clients but can nevertheless indicate industry specialization (Craswell et al., 1995; Balsam et al., 2003; Casterella et al., 2004; Piot, 2005). Alternatively, we could take total sales of auditor clients related to total sales in the industry (Craswell et al., 1995; Dunn & Mayhew, 2004; Piot, 2005; Kwon et al., 2007) or total assets of auditor clients related to total assets of all companies in the industry (Hogan and Jeter, 1999; Mayhew and Wilkins, 2003). Whatever base is taken, a decision must be made concerning the threshold from which an auditor is considered a specialist. Craswell et al. (1995) consider auditors to be specialists if their clients represent more than ten percent of the total sales in the industry or more than ten percent of the total number of companies in the industry. Piot (2005) also uses the ten percent cutoff rule. Dunn and Mayhew (2004) increase the cut off threshold to 20 percent to make sure that not all (at the time) Big Six firms are considered to be specialists. Kwon et al. (2007) look at six types of measures, all based on the market share approach. As they look at an international

sample, they consider a firm to be a specialist if it has the largest market share in the US, another individual country and the individual country and the US combined. In addition, they consider an audit firm to be a specialist if it has more than 20% market share between 1993 and 1997, more than 24% between 1998 and 2001, and more than 30 % between 2002 and 2003.
The portfolio approach looks at the distribution of auditor fees across industries (Neal and Riley, 2004). Industries that are more strongly represented in the total fee distribution of an audit firm are considered to be those in which the auditor is specialized. The major weakness of this approach is that industry size has a big impact on this variable. A combination of both approaches results in a weighted market share. Using this method, both percentage market share and weight of the industry in the auditor's client portfolio are included in the calculation.

This paper looks at auditor specialization using different methods. A first approach is based on market share. We calculate market share using three different variables: the number of clients in an industry, the total assets of the clients within an industry and the total sales of the clients. As Craswell et al. (1995) and Piot (2005), we consider a ten percent threshold to identify specialist auditors. We also use the portfolio approach. However, due to a lack of data on auditor fees, we base our calculation on the number of clients within an industry, compared to the total number of clients of an auditor. Industries are identified on the basis of their two-digit SIC-codes. As our research question relates to consistency of patterns of specialization across countries, we focus on the Big 4 (Deloitte, Ernst & Young, KPMG and PricewaterhouseCoopers) and BDO and Grant Thornton. Smaller, local audit firms are considered to be one category, to be able to calculate market share and take into account to which extent the audit industry in a specific country is concentrated.

Data

Data are collected using the Amadeus database. This is a pan–European database that includes financial data on both public and private companies. We excluded banks and insurance companies, because in most countries, their regulation requires a specific recognition of the auditor, resulting in automatic auditor specialization.

The sample was limited to companies in the Netherlands, Portugal, France, Germany, Italy, Spain, the UK and Belgium. The original population consisted of 6 771 917 companies. Not all of these companies have to be audited. European regulation includes size criteria and we eliminated those companies that do not have a general obligation to be audited (sales should be at least 7 300 000 €, total assets 3 650 000 € and number of employees 50). It results in a sample of 79 183 companies. Missing values (missing industry code, sales or asset figures, auditor name) resulted in a final sample of 55 235 companies. The final sample did not include German or Italian companies due to missing auditor names. It included 3 338 Dutch, 369 Portuguese, 15 030 French, 11 290 Spanish, 21 666 British and 3 542 Belgian companies. Table 2 summarizes the number of audit clients for each audit firm in the five largest industries in each country. We eliminated Portuguese companies from the further analysis because the audit market in Portugal turned out to be very different from other countries, with only a very limited number of companies being audited by an international audit firm. Because the importance of industries across the countries is very divergent, we limit the further analysis to the four industries that are most frequently among the five most important industries in each country. These are Building and Construction – General contractors (SIC15), Food and kindred products manufacturers (SIC20), Wholesale trade – durable goods (SIC50) and Wholesale trade – nondurable goods (SIC51).

<u>Table 2:</u> Number of clients for audit firms, five largest industries per country

	sic-code	BDO	Deloitte	Ernst & Young	Grant Thornton	KPMG	PWC	rest	Total
The Netherlands	**15**	20	59	42	1	54	63	74	313
	20	4	24	38	0	28	43	30	167
	50	9	37	42	4	35	55	54	236
	51	28	88	112	5	92	121	101	547
	73	13	46	61	3	63	74	48	308
Portugal	**15**	1	1	0	0	0	0	39	41
	20	0	0	0	0	0	0	20	20
	50	0	0	0	0	0	0	38	38
	67	0	1	0	0	1	1	34	37
	80	0	0	0	0	0	0	21	21

France	**20**	0	14	16	1	21	21	634	707
	34	3	30	22	6	22	28	626	737
	50	1	62	33	7	90	92	1561	1846
	51	2	37	24	3	40	49	566	721
	73	3	79	39	5	41	51	717	935
Spain	**15**	4	67	18	0	12	29	675	805
	20	19	75	31	0	51	70	410	656
	28	8	74	49	2	67	79	151	430
	50	35	101	86	9	100	130	888	1349
	51	20	79	51	1	56	68	507	782
U.K.	**15**	36	82	39	74	130	92	498	951
	50	83	159	168	200	286	282	915	2093
	51	37	67	63	36	118	110	346	777
	67	56	144	127	70	174	216	405	1192
	73	173	449	352	185	443	484	752	2838
Belgium	**15**	3	16	10	3	2	0	123	157
	20	9	29	22	6	0	30	129	225
	50	14	38	42	3	1	66	180	344
	51	5	26	22	5	0	45	98	201
	73	4	33	38	3	0	38	114	230

Results

Market share approach

The percentage market share was calculated as number of clients of an individual auditor divided by total clients in that industry. The overall results show strong differences from one country to another, with the Big 4 being specialized in almost all industries in The Netherlands.

Table 3 summarizes the market share of audit firms for the 4 major industries in the countries that are included in the sample.

<u>Table 3</u>: Market share (%), based on number of clients

		BDO	Deloitte	Ernst & Young	Grant Thornton	KPMG	PWC
SIC 15	**The Netherlands**	6,39	18,85[(a)]	13,42[(a)]	0,32	17,25[(a)]	20,13[(a)]
	France	0	8,28	2,02	0,2	2,42	4,44
	Spain	0,5	8,32	2,24	0	1,49	3,6
	U.K.	3,79	8,62	4,1	7,78	13,67[(a)]	9,67
	Belgium	1,91	10,19[(a)]	6,37	1,91	1,27	0
SIC 20	**The Netherlands**	2,4	14,37[(a)]	22,75[(a)]	0	16,77[(a)]	25,75[(a)]
	France	0	1,98	2,26	0,14	2,97	2,97
	Spain	2,9	11,43[(a)]	4,73	0	7,77	10,67[(a)]
	U.K.	2,11	9,05	11,92[(a)]	7,54	18,7[(a)]	18,25[(a)]
	Belgium	4	12,89[(a)]	9,78	2,67	0	13,33[(a)]
SIC 50	**The Netherlands**	3,81	15,68[(a)]	17,8[(a)]	1,69	14,83[(a)]	23,31[(a)]
	France	0,05	3,36	1,79	0,38	4,88	4,98
	Spain	2,59	7,49	6,38	0,67	7,41	9,64
	U.K.	3,97	7,6	8,03	9,56	13,66[(a)]	13,47[(a)]
	Belgium	4,07	11,05[(a)]	12,21[(a)]	0,87	0,29	19,19[(a)]
SIC 51	**The Netherlands**	5,12	16,09[(a)]	20,48[(a)]	0,91	16,82[(a)]	22,12[(a)]
	France	0,28	5,13	3,33	0,42	5,55	6,8
	Spain	2,56	10,1[(a)]	6,52	0,13	7,16	8,7
	U.K.	4,76	8,62	8,11	4,63	15,19[(a)]	14,16[(a)]
	Belgium	2,49	12,94[(a)]	10,95[(a)]	2,49	0	22,39[(a)]

(a) Specialized auditors, cut off 10%

Based on a cut off percentage of 10%, we can see that only the Big 4 qualify as specialists. In The Netherlands, the Big 4 are all specialized in all four industries with market shares that are relatively proportionate: none of them has an extremely dominant position in any industry. PWC seems rather consistently specialized in food manufacturers. They do not meet the 10% threshold in France, but are still the largest auditor in this industry. In wholesale trading PWC is a specialist in three countries, whereas Deloitte is specialized in two industries in three countries. The results are rather consistent, if we consider that the firms that meet the 10% threshold in some countries often show strong market positions in the remaining countries. The lowest consistence of industry specialization is found for Ernst & Young and KPMG. KPMG is highly specialized in The Netherlands and the UK, but not in the other countries.

To calculate market share based on total assets of clients, the same method was used as in Hogan and Jeter (1999). Each accounting firm's market share was calculated as the sum of the square root of assets of all firms it audited in the industry divided by the sum of the square root of assets across all companies in the industry. The results are given in table 4. Using a 10% cut-off, only the Big 4 can be considered specialist auditors.

Table 4: Market share (%), based on client assets

		BDO	Deloitte	Ernst & Young	Grant Thornton	KPMG	PWC
SIC 15	**The Netherlands**	4,49	15,47[(a)]	12,43[(a)]	0,08	30,28[(a)]	21,88[(a)]
	France	0	7,59	10,26[(a)]	0,09	3,55	5,55
	Spain	1,63	21,41[(a)]	3,71	0	1,88	6,57
	U.K.	2,68	16,08[(a)]	4,96	5,83	24,82[(a)]	16,46[(a)]
	Belgium	1,53	10,91[(a)]	7,74	1,57	1,66	0
SIC 20	**The Netherlands**	3,74	10,7[(a)]	17,44[(a)]	0	25,15[(a)]	34,54[(a)]
	France	0	2,66	4,73	0,07	2,91	3,87

	Spain	2,43	17,08[a]	6,79	0	11,13[a]	14,92[a]
	U.K.	1,41	9,28	17,57[a]	5,08	24,84[a]	23,68[a]
	Belgium	2,12	12,27[a]	11,24[a]	2,43	0	21,02[a]
SIC 50	**The Netherlands**	3,25	14,39[a]	29,29[a]	1,56	17,33[a]	19,06[a]
	France	0,05	4,9	3,48	0,31	6,59	7,46
	Spain	2,71	12[a]	8,63	0,59	9,49	14,35[a]
	U.K.	3,63	11,75[a]	10,58[a]	6,8	17,7[a]	19,98[a]
	Belgium	3,33	12,32[a]	13,19[a]	0,59	0,17	19,28[a]
SIC 51	**The Netherlands**	3,28	14,68[a]	22,59[a]	0,45	21,51[a]	25,43[a]
	France	0,15	6,8	3,67	0,27	4,65	10,11[a]
	Spain	4,05	16,19[a]	7,42	0,18	10,97[a]	12,59[a]
	U.K.	4,12	11,57[a]	11,03[a]	3,6	19,54[a]	19,5[a]
	Belgium	1,58	16,1[a]	10,32[a]	1,98	0	26,81[a]

(a) Specialized auditors, cut off 10%

Deloitte now seems quite specialized in building and construction. Deloitte is also specialized in wholesale trading in four out of five countries. Ernst & Young is specialized in three industries (SIC 20, 50 and 51) in The Netherlands, UK and Belgium. PWC is consistently specialized in SIC 51 and in four countries in SIC 20 en 50. KPMG apparently is less consistently specialized. Food manufacturing and Wholesale trade of nondurable goods are the industries with the most consistent specialization.

Finally, the same calculations were made with sales as the measure of size of the client. Due to lacking sales data for UK companies, the analysis excludes that country. Table 5 summarizes the results for the four largest industries.

Table 5: Market share (%) based on client sales

		BDO	**Deloitte**	**Ernst & Young**	**Grant Thornton**	**KPMG**	**PWC**
SIC 15	**The Netherlands**	4,67	16,17[a]	12,95[a]	0,12	27,95[a]	21,63[a]
	France	0	7,47	9,33	0,11	3,48	5,9
	Spain	1,51	20,22[a]	3,43	0	1,85	6,61
	Belgium	1,84	11,56[a]	7,77	1,53	1,68	0

SIC 20	**The Netherlands**	4,54	11,3(a)	19,31(a)	0	23,58(a)	31,99(a)
	France	0	2,35	4,05	0,07	3,01	3,52
	Spain	2,71	15,42(a)	6,08	0	11,34(a)	14,68(a)
	Belgium	2,53	13,67(a)	10,79(a)	2,77	0	17,98(a)
SIC 50	**The Netherlands**	4,15	15,67(a)	28,04(a)	0,91	17,03(a)	17,75(a)
	France	0,04	4,88	3,2	0,3	6,3	7,26
	Spain	2,56	13,69(a)	8,76	0,51	9,35(a)	14,43(a)
	Belgium	3,71	12,96(a)	12,57(a)	0,48	0,14	21,42(a)
SIC 51	**The Netherlands**	3,52	15,02(a)	23,7(a)	0,47	21,13(a)	22,86(a)
	France	0,18	6,07	3,5	0,32	4,81	8,51
	Spain	3,68	16,24(a)	7,37	0,18	10,94(a)	12,1(a)
	Belgium	1,85	14,06(a)	10,97(a)	1,72	0	25,13(a)

(a) Specialized auditors, cut off 10%

Measuring auditor specialization using client sales as the measure to calculate market share reduces consistency across countries. Although PWC continues to have the largest market share in SIC 51 in France, its percentage drops below 10%; it remains a specialist in the other countries. In those same countries, PWC is a specialist in both SIC 20 and 50. Deloitte can be considered a specialist in all industries in three countries. Ernst & Young and KPMG are less consistent.

Portfolio approach

Using the portfolio approach, we investigate the relative weight of different industries in the total portfolio of auditor clients. Because the database does not include fee data, we investigate the number of clients. The main disadvantage of this approach is that we can not distinguish large and small clients. Table 6 shows the largest and second largest industries in the portfolio of each of the six international audit firms. It also shows the relative position of these industries in the portfolio of the other audit firms.

Table 6: Industries with the largest and second largest portfolio share

	SIC code	BDO	Deloitte	Ernst & Young	Grant Thornton	KPMG	PWC

The Nether lands	**15**	13,46[b]	10,4[b]	5,96	3,45	8,70	7,65
	26	1,28	1,91	1,13	13,79[b]	1,09	0,97
	50	6,41	6,41	5,96	13,79[b]	5,59	6,80
	51	17,95[a]	15,42[a]	16,45[a]	17,24[a]	14,44[a]	14,82[a]
	73	8,33	8,15	8,94[b]	10,34	10,09[b]	9,23[b]
France	**50**	3,57	7,78[b]	6,61[b]	11,11[a]	14,20[a]	11,44[a]
	73	10,71[a]	9,91[a]	7,82[a]	7,94[b]	6,47[b]	6,34
	87	10,71[a]	6,02	5,61	4,76	2,84	3,11
	34	10,71[a]	3,76	4,41	9,52[b]	3,47	3,48
Spain	**28**	3,39	5,00	6,04	4,44	7,66[b]	6,85
	50	14,83[a]	6,82[a]	10,60[a]	20,00[a]	11,43[a]	11,27[a]
	51	8,47[b]	5,34	6,29	2,22	6,40	5,89
	73	7,20	6,76[b]	7,40[b]	6,67[b]	6,74	7,80[b]
U.K.	**73**	18,58[a]	16,96[a]	15,38[a]	13,74[b]	13,12[a]	13,35[a]
	50	8,92[b]	6,01[b]	7,34[b]	14,86[a]	8,47[b]	7,78[b]
Belgium	**73**	2,92	7,22[b]	9,20[b]	3,85	0,00	8,44[b]
	50	10,22[a]	8,32[a]	10,17[a]	3,85	5,00	14,67[a]
	42	7,30[b]	2,63	4,84	5,13	10,00	3,78
	34	5,11	2,84	3,39	7,69[a]	0,00	1,78
	35	4,38	1,97	3,39	7,69[a]	0,00	3,11
	16	2,19	1,31	1,21	0,00	25,00[a]	0,00
	20	6,57	6,35	5,33	7,69[a]	0,00	6,67

(a) Largest portfolio share

(b) Second largest portfolio share

It is clear that this table also reflects the relative size of an industry: larger industries include more potential clients. This is the clearest in the UK, where Business Services (SIC 73) accounts for more than 10% of the clients for all six audit firms and where Wholesale trade of durable goods comes second for all (except for Grant Thornton, where it comes first). For Deloitte, SIC 50 is consistently among the largest or second largest industries. Ernst & Young has most of its clients in SIC 73 (in all five countries) and 50 (in four countries). For KPMG, SIC 50 and 73 are also the major client industries, but they are less consistently specialized as they are only in 3 out of 5 countries among the largest industries. SIC 73 and 50 have also the largest or second largest portfolio share in PWC in 4 out of 5 countries.

Discussion

In The Netherlands all Big 4 are specialized in most of the industries analyzed in this paper. This suggests specialization on the partner level. By focusing individual partners or audit team members on specific industries, they become more familiar with industry characteristics allowing to attract more companies that operate within that industry. Large audit firms clearly have an advantage in the way that they have more partners or staff members so that they can specialize in more industries. The few industries in which Dutch Big 4 are not specialized are rather small industries. These might be less profitable due to startup costs in obtaining specialized knowledge that can be allocated to fewer audits. This reduces cost savings that might follow from more efficient procedures. Another potential explanation is that clients in an oligopolistic market can be reluctant to hire one of the Big 4 because they fear transfers of internal information.

Portugal is an extreme on the other side. Only 3.79% of all audits go to one of the six international audit firms. It is possible that Portuguese companies are not willing to pay a premium for auditor brand name. It is also possible that the international firms do not target Portugal due to the limited size of the audit market.

Almost all specialist auditors are Big 4. This could possible be explained by a refusal to pay a specialization premium without the brand name value of the Big 4 (DeFond et al., 2000). Also, BDO and Grant Thornton could be less motivated to invest in specialized knowledge in the absence of a differentiation premium.

Full consistence in specialization over all five countries is only observed once, PWC in SIC 51, and only when market share is calculated based on total assets. This suggests that the audit methodology that PWC uses in this industry might be highly specialized and applied across countries. Generally speaking, PWC is the most consistent in its specialization pattern across countries, which strengthens the idea that a common audit approach exists. Deloitte also shows a high degree of consistency. Lower levels of consistency are observed for Ernst & Young and KPMG. It might be linked with less centrally coordinated audit approaches or less integration of local firms in an international structure. SIC 15 is the least consistent industry. This might be due to higher variability within the industry.

The measure that is used to estimate market share has a strong impact on the results. Calculations based on total assets show the highest specialization and consistency. In individual cases, the results can be very different. In SIC 15 in France, e.g., Ernst & Young has a market share of 2,02% based on number of clients and 10,26% based on total assets.
Ernst & Young focuses apparently on the large players in the industry. The analysis of the part of the industries that is not audited by the international audit firms also confirms that local auditors mainly audit small clients.

The results of the analysis using the portfolio approach suffer from the impact of the size of the industry (Neal & Riley, 2004). We indeed observe that the largest industries typically have large shares in the auditor's portfolio. Typical examples are SIC 51 in The Netherlands and SIC 50 in Spain. The problem can be partly overcome by also taking into account audit fees as high fees compared to clients might indicate specialization premiums. However, these data were not available. There is consistency in industries across countries, e.g., Deloitte in SIC 50 and 73, and Ernst & Young in SIC 73.

Our analysis shows that there is a certain degree of consistency in industry specialization. PWC is most consistent, KPMG least. Full consistency is quite rare but specialization shows patterns across countries and industries. Further research is necessary to refine the constructs that can be used. Further research could also focus on the individual partner, rather than the audit firm level.

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