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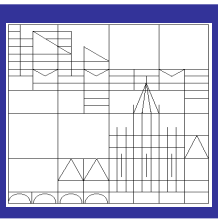

Audit Market Regulation and Supplier Concentration Around the World: Empirical Evidence

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Abstract

In the ongoing discussions on audit regulation, the key issues of auditor independence and a high level of audit market concentration have become apparent. However, there is the concern that regulations intended to improve auditor independence (i.e., restrictions regarding the joint supply of audit and non-audit services, audit firm rotation, joint audits, etc.) might further increase audit market concentration. We address this issue with an empirical analysis. Based on a cross-country study for the years 2001 – 2010, we investigate whether a country's audit regulation is connected to the combined market share of the four largest audit firms (Concentration Ratio, CR_4), the inequality in the market share distribution (*Hirschmann-Herfindahl*-Index, *HHI*), and the number of audit firms per client active in that country's audit market (Auditor-Client Ratio). Our final sample consists of 141'190 firm-year observations of listed companies with a total of 2'439 audit firms, taken from 29 countries. The results of our country-fixed-effects models indicate that regulators should take the connections between potentially conflicting goals into account: Whereas the existence of a proportionate liability system and the prohibition of the joint supply of audit and non-audit services significantly *decrease* supplier concentration, joint audits and the mandatory audit firm rotation significantly *increase* audit market concentration. Thus, this study points to the need to take into account clients' and audit firms' adaptive strategies to new regulations.

Keywords

Audit regulation, audit market concentration, empirical study, cross-country-study

JEL Classification

K22, L11, L84, M42

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AUDIT MARKET REGULATION AND SUPPLIER CONCENTRATION AROUND THE WORLD: EMPIRICAL EVIDENCE

1. Motivation

During the recent financial crisis, several important financial institutions like *Citigroup*, *Fannie Mae*, *Hypo Real Estate*, *Lehman Brothers*, *Northern Rock*, and *UBS* had severe economic problems or even went into bankruptcy. As a result, national governments were forced to spent inconceivable sums of money to support economically relevant financial institutions, to manage the consequences of the crisis, and to prevent the European Currency Union from collapsing. The fact that statutory auditors had issued unqualified opinions on the financial statements of distressed banks, immediately before severe financial difficulties became publicly evident, is particularly precarious. Moreover, audit firms did not only earn large amounts of fees for providing audit services to these clients, but in many cases, they also received a considerable sum for additionally supplied non-audit services (see *Sikka* (2009)). Although banks, central banks, bank regulators, accountants, rating agencies, and hedge funds have been severely criticized in the aftermath of the financial crises, there was also an outpouring of public criticism aimed at the audit profession. As a consequence, an intense debate on audit market regulation within the European Union has been resumed.[1] In the US, in the UK, and in Australia, there are also ongoing discussions on how to further improve audit quality.[2]

In addition to concerns regarding auditor independence, the high level of supplier concentration in national audit markets has crystallized as the most challenging problem addressed in these discussions. With regard to statutory audits of listed companies, the Big 4 audit networks (*Deloitte & Touche*, *Ernst & Young*, *PricewaterhouseCoopers*, and *KPMG*), providing audit services to more than 60% of all the companies listed, dominate the majority of national audit markets. Smaller suppliers of audit services, in contrast, face severe barriers to market entry, because the acquisition of new clients in the oligopolistic market segment of statutory audits of listed companies has proven to be difficult for them. The *Commission of the European Communities* (2010a) has thus regarded the dominant position of the Big 4 as a "systemic risk", since the collapse of one of these firms is ex-

[1] In November 2011, after the public consultation on the EU-Commission's Green Paper "Audit Policy: Lessons from the Crisis" (see *Commission of the European Communities* (2010a)), the EU Commission issued a proposal regarding regulatory reforms intended to improve the quality of audits of public-interest entities (see *Commission of the European Communities* (2011b)), as well as a proposal for a directive that attempts to expand the internal market for statutory audits by improving the conditions for small and medium-sized audit firms (see *Commission of the European Communities* (2011a)).

[2] See *United States General Accounting Office* (2003b), *United States Government Accountability Office* (2008), *United States Treasury* (2006), and *United States Treasury* (2008) (US), *Oxera Consulting Ltd.* (2006), *Oxera Consulting Ltd.* (2007), *House of Lords* (2010), *Office of Fair Trading* (2011a), and *Office of Fair Trading* (2011b) (UK), and *Treasury* (2010) and *Department of Finance and Deregulation* (2011) (Australia).

pected to have severe consequences on the availability of audits, and negative effects on the stability of the financial system. In addition to the fact that clients lack sufficient options when appointing an audit firm, there is the concern that audit quality might be low if the audit market is characterized by a low degree of dynamism and competition.[3] As a consequence, the argument has been raised that there might be a connection between the high level of audit market concentration in the financial sector and the apparently poor performance of the Big 4 accounting firms during the financial crisis (see *House of Lords* (2010)).

In the present study, the focus is not on the *consequences* of a high level of supplier concentration, but on the role national audit regulations plays in *explaining the status quo* at the country-level. In its recent reform proposal, for example, the *Commission of the European Communities* (2011b) explicitly addresses means intended to reduce audit market concentration, but at the same time intends to increase auditor independence.[4] Amongst other things, the EU-Commission discusses the adoption of more severe restrictions on the joint supply of audit and non-audit services and the implementation of caps on the total fees an audit firm is allowed to earn from a single client. In the US, the *Public Company Accounting Oversight Board* (2011) currently discusses the introduction of the mandatory audit firm rotation in order to improve auditor independence. These measures directly affect the profits of the audit firms active in the market as well as the barriers to market entry for smaller suppliers. As a consequence, new regulations could affect the distribution of market shares. The goals of improving audit quality and of mitigating audit market concentration might therefore be interdependent.

To empirically assess the validity of this argument, we do a cross-country study and examine if a country's audit market regulation has an effect on the concentration level observed for the national audit market. For our study, we hand-collected data on audit market regulation effective in various countries during the period 2001 – 2010. In addition, we took information about audit clients and their statutory auditors contained in the *ThomsonOne* database to derive different measures of supplier concentration at the country-level (i.e., the Concentration Ratio CR_4 as the combined market share of the four market leaders, the *Hirschmann-Herfindahl*-Index HHI, and the ratio between the yearly number of audit firms divided by the average number of audit clients in the market segment (AC_R)). Our final sample consists of 141'190 firm-year observations from listed companies and

[3] Investigating concentration levels for audit markets of US cities, *Kallapur et al.* (2010), however, find that absolute audit market concentration has a positive effect on audit quality; nevertheless, there is a negative impact of relative audit market concentration on audit quality. In a cross-country-study, *Francis et al.* (2012) confirm that there is a positive relation between earnings quality and the CR_4 within a country, and that Big 4 clients have larger accruals, are less likely to report losses, and exhibit less timely loss recognition if market shares are asymmetrically distributed between the Big 4. In a country-specific analysis, *Boone et al.* (2012), on the other hand, document a negative association between absolute concentration and the quality of audited financial statements.

[4] For a detailed analysis of the Green Paper, see *Humphrey et al.* (2011).

2’439 audit firms from 29 countries (Australia, Austria, Belgium, Brazil, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, the Korean Republic, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and USA). We use a country-fixed-effects model in our regression analysis to investigate the connection between supplier concentration audit regulations.

Our study makes three primary contributions: First, we give a detailed overview about the status quo of audit regulation across various countries and its development during the previous years. Second, our findings show that there is considerable heterogeneity in audit regulation and in audit market concentration. Third, the results of our regressions confirm the assertion that regulations intended to improve independence have a significant effect on audit market concentration at the country-level. In particular, our findings indicate that country-year observations with proportionate auditor liability are characterized both by a significantly lower combined market share of the four largest audit firms and a lower level of relative concentration as measured by the HHI. Moreover, country-year observations for which the joint supply of audit and non-audit services is entirely forbidden show a lower level of absolute supplier concentration, i.e., a significantly lower CR_4. Provided that a ban on non-audit services indeed strengthens auditor independence, the goals of improving audit quality and of mitigating the dominance of the market leaders are thus aligned. However, for country-year observations with mandatory audit firm rotation or mandatory joint audits, we observe a significantly higher market share of the four market leaders. In this setting, the objectives of improving auditor independence and of decreasing supplier concentration are conflicting. Our findings thus indicate that regulators should take the connections between potentially conflicting goals into account. Moreover, this study highlights the need to further investigate clients’ and audit firms’ adaptive strategies to new regulations, and to gain a better understanding of the interrelation between independence, market structure, and the quality of audited financial statements.

The remainder of the paper is organized as follows: In Section 2, we give a brief overview about the recent discussion on audit regulation and describe the current situation at the country-level, as effective for the period of our sample. In addition, we derive hypotheses regarding the effect of audit regulation on market concentration. In Section 3, we define the variables of our study and provide descriptive statistics in addition to an overview of audit market concentration for the countries of our sample. Section 4 contains our regression analysis, our key findings, and robustness checks. In Section 5, we derive conclusions regarding potential avenues for future audit market regulation.

2. Regulatory environment of statutory audits and hypotheses development

2.1. Directive on Statutory Audits (2006/43/EC)

For the EU Member States, the rules regarding statutory audits of annual and consolidated accounts are established in Directive 2006/43/EC of the *European Parliament and European Council* (2006a), amended by Directive 2008/30/EC of the *European Parliament and European Council* (2008). All Member States were expected to comply with the Statutory Audit Directive before June 29th, 2008. Whereas some EU Member States were able to comply with the Statutory Audit Directive within the given time frame, others implemented the necessary rules and institutions step by step. Spain and Ireland, for example, fully transposed the Statutory Audit Directive only in 2010.

The main attempt of the Statutory Audit Directive was to harmonize the audit process across EU Member States and to establish a single market for audit services. Thus, the Statutory Audit Directive possibly made it easier for smaller audit firms to acquire clients across national boundaries. If this was the case, we should observe a negative (positive) correlation between the adoption of the Statutory Audit Directive and supplier concentration (the number of audit firms active in the market) at the country-level. However, Directive 2006/43/EC also contained elements with the potential to create new barriers to market entry for smaller audit firms. Among other measures, EU Member States were expected to organize an effective system of public oversight for statutory auditors, and to make sure that audit firms implement an internal quality control system. Moreover, the Statutory Audit Directive contains provisions for the internal auditor rotation. If, due to capacity constraints, smaller audit firms are not capable of implementing these rules, we should observe a positive (negative) relation between the adoption of the Statutory Audit Directive and supplier concentration (the number of audit firms) within a country. However, the Statutory Audit Directive leaves Member States some areas of discretion regarding the implementation of certain elements, and, as a result, auditing is not yet fully harmonized. The effects of the implementation of the Statutory Audit Directive we find might therefore be affected by effects caused by the adoption of more specific rules.

2.2. International Standards on Auditing

The International Standards on Auditing (ISAs) issued by the International Auditing and Assurance Standards Board (IAASB) contain a set of standards on audit procedures, audit quality, and auditor independence. The ISAs, effective for audits of financial statements for periods beginning on or after December 15th, 2009, however, do not regulate topics such as mandatory audit firm rotation, audit consortia, or the joint provision of audit and non-audit services.

Article 26 of the Statutory Audit Directive allows the European Commission to adopt the ISAs through a binding legal instrument. However, the national application of the ISAs is currently voluntary. Although some Member States have started harmonizing their national standards on auditing with the ISAs, national standards are still in place. In its recently published proposal, the *Commission of the European Communities* (2011a) thus proposes that Member States should ensure that statutory auditors and audit firms comply with the ISAs when carrying out statutory audits (Art. 26). All EU Member States have declared their intent to adopt the ISAs, and they "are in a quite advanced stage of adoption" (*Le Vourc'h and Morand* (2011), p. 55). Moreover, a study conducted by the *University of Duisburg-Essen* (2009) revealed strong support for the formal endorsement of the ISAs, and the fact that auditing standard-setters in Europe are prepared to further adopt or transpose the ISAs even if the European Commission does not adopt them.

The implementation of the ISAs in the EU Member States is predicted to foster the convergence of audit standards applied. Since smaller audit firms do not have the capacities to develop expertise on the audit standards applied in other Member States, the adoption of the ISAs should alleviate gaining clients located in a different Member State, and thus decrease audit market concentration.

2.3. Auditor liability

In its recommendation concerning the limitation of the civil liability of statutory auditors and audit firms, the *Commission of the European Communities* (2008) notes that statutory auditors face increasing liability risks. To minimize risk, audit firms thus have implemented internal risk management processes to monitor their audit processes and the riskiness of their clients (see *Ewert and London Economics* (2006), p. 91). Access to insurance coverage against these risks, however, has become increasingly difficult, and middle-tier audit firms name this fact as a serious issue (see *Ewert and London Economics* (2006), p. 46).[5] As a consequence, unlimited joint and several liability can restrain audit firms from entering the international audit market for listed companies. In order to ensure sufficient audit capacities and a competitive market for audit services, the EU Commission therefore recommends limiting the liability of statutory auditors of listed companies arising from a breach of their professional duties. In particular, the Member States are able to choose the method of limitation which they consider to be the most suitable for their civil liability system. First, the Member States can determine under national law a liability cap that can take on the form of a maximum financial amount or of a formula allowing for the calculation of such an amount. Second, the Member States alternatively can establish a system of proportionate liability, i.e., a system according to which statutory auditors are not liable beyond their actual contribution to the

[5] In line with this argument, *Choi et al.* (2008) show that audit fees increase in the strength or strictness of a country's legal liability regime.

claimant's loss. Under proportionate liability, the auditor is not jointly and severally liable with other parties. Third, the Member States can allow for provisions allowing statutory auditors and clients to agree on a limitation of liability.

According to the EU Commission's explanatory statement, limited auditor liability should decrease supplier concentration. Thus, we expect to observe a negative (positive) correlation between the presence of limited liability and the largest firms' market share as well as the inequality in the market share distribution (the number of audit firms active in the market).

2.4. The joint supply of audit and non-audit services

In 2002, the *Commission of the European Communities* (2002) published a recommendation regarding auditor independence, pointing to the fact that national rules on auditor independence differ largely across the Member States, in particular with respect to the scope of non-audit services the auditor is allowed to provide to audit clients. The EU Commission worried that it might be difficult to provide external addressees with an EU-wide uniform level of assurance that statutory auditors perform their work independently. Consequently, with a restriction on the provision of non-audit services to audit clients, the EU Commission intended to increase auditor independence. In its recommendation, the EU Commission required that "a statutory auditor should not carry out a statutory audit if there are any financial, business, employment or other relationships between the statutory auditor and his client (including certain non-audit services provided to the audit client) that a reasonable and informed third party would conclude compromise the statutory auditor's independence" (*Commission of the European Communities* (2002), p. 24). Following a principles-based approach, the Commission required that auditors should neither take any decision nor take part in any decision-making on behalf of the audit client while providing non-audit services. In addition, the *Commission of the European Communities* (2005) recommended that the audit committee should keep the nature and extent of non-audit services under review and apply a formal policy specifying the types of non-audit services which are (a) excluded, (b) permissible after review by the audit committee, and (c) permissible without referral to the committee.

Directive 2006/43/EC continued to apply the principles-based approach, stating that "Member States shall ensure that a statutory auditor or an audit firm shall not carry out a statutory audit if there is any direct or indirect financial, business, employment or other relationship – including the provision of additional non-audit services – between the statutory auditor, audit firm or network and the audited entity from which an objective, reasonable and informed third party would conclude that the statutory auditor's or audit firm's independence is compromised" (Art. 22). Particular types of non-audit services are still not prohibited. However, Directive 2006/43/EC requires disclosure of audit and non-audit fees in the notes to the annual accounts and the consolidated accounts.

To date, there is no direct EU-wide ban strictly preventing auditors from offering non-audit services to audit clients. As a consequence, Art. 22 of Directive 2006/43/EC has so far been implemented in a very divergent manner across the EU. Although all Member States have adopted limitations regarding the scope of services a statutory auditor is allowed to provide to audit clients, legislation differs widely between Member States. Whereas Belgium, France, and Hungary impose a tight restriction on the provision of non-audit services, other Member States are far less restrictive.

In its recently published proposal, the *Commission of the European Communities* (2011b) proposes to restrict the joint provision of audit and non-audit services, even to the extent of creating pure audit firms. More precisely, the Commission proposes that statutory auditors should be strictly prevented from providing their audit clients with non-audit services that are assessed as incompatible with the independent public-interest function of auditing.[6] For non-audit services that are not fundamentally incompatible with the audit function, the EU Commission suggests that the audit committee be empowered to assess whether or not the auditor should provide these services to the audited entity.[7] Audit-related financial services, however, could still be provided.[8] When the statutory auditor supplies the financial audit services mentioned in Art. 10.2, the respective non-audit fees shall be limited to 10% of the fees paid for the statutory audit (see *Commission of the European Communities* (2011b), Art. 9.2). Moreover, the EU Commission argues that large audit firms should not be allowed to supply any non-audit services to any public-interest entity and ought not to belong to a network that provides non-audit services within the European Union.[9] The reasoning behind this proposal is that the clients' set of audit firms is already restricted in a concentrated market.

The EU Commission's recommendations go far beyond the regulations effective in the US, where the scope of non-audit services the auditor is allowed to provide to audit clients is also restricted. More precisely, Title II, Sec. 201 (g) of the Sarbanes-Oxley Act of 2002 prohibits regis-

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6 See *Commission of the European Communities* (2011b), Art. 10.3.a. These services include expert services unrelated to the audit; tax consultancy; general management and other advisory services; bookkeeping and preparation of accounting records and financial statements; designing and implementing internal control or risk management; procedures related to the preparation and/or control of financial information included in financial statements and advice on risk; valuation services; providing fairness opinions or contribution-in-kind reports; actuarial and legal services; designing and implementing financial information technology systems for public-interest entities; participating in the client's internal audit and the provision of services related to the internal audit function; and broker or dealer, investment adviser, or investment banking services.

7 See *Commission of the European Communities* (2011b), Art. 10.3.b., which addresses the provision of human resources services (including recruiting senior management) and providing comfort letters for investors in the context of the issuance of an undertaking's securities.

8 These services include auditing or reviewing of interim financial statements, providing assurance on corporate governance statements or on corporate social responsibility matters, providing assurance on or attestation of regulatory reporting to regulators of financial institutions beyond the scope of the statutory audit, providing certification of compliance with tax requirements where such attestation is required by national law, and any other statutory duty related to audit work imposed by European Union legislation on the statutory auditor or audit firm (see *Commission of the European Communities* (2011b), Art. 10.2).

9 See *Commission of the European Communities* (2011b), Art. 10.5. A large audit firm is one that generates more than one-third of its annual audit revenues from large public-interest entities *and* belongs to a network with combined annual audit revenues within the European Union of more than € 1'500'000'000.

tered audit firms from providing to public companies bookkeeping, financial information system design or implementation, appraisal and valuation services, actuarial services, internal audit outsourcing, management and human resources functions, investment advising services, legal services, and expert services. Sec. 202 allows statutory auditors to supply some kinds of non-audit services if the audit committee has approved this course of action.

In fact, empirical evidence regarding the relation between the supply of non-audit services and auditor independence is mixed (see *Quick* (2012)). Using qualified or going concern audit opinions, the degree of earnings management, restatements, and litigation as surrogates for "*auditor independence in fact*", archival studies did not find clear-cut evidence on the question whether non-audit services indeed threaten independence.[10] The majority of studies investigating the interrelation between non-audit services and "*independence in appearance*", however, found a negative effect.[11]

The effects of a prohibition of the joint supply of audit and non-audit services on audit market concentration are even more undetermined. There are reasons for the prediction that a prohibition would increase concentration: For example, audit firms would lose profits if restrictions on their scope of services would be implemented. Given a certain amount of fixed costs and *Bertrand*-equilibrium behavior, some suppliers would exit the market because of the zero-profit constraint, at least in the long run (see *Bleibtreu and Stefani* (2012a) and *Bleibtreu and Stefani* (2012b)). In addition, a restriction or even a ban on non-audit services could boost audit fees (see *Cosgrove and Niederjohn* (2008) and *Asthana et al.* (2009)) and increase audit market concentration, either because audit services cannot be used as a "loss leader" anymore, or because knowledge-spillovers between non-audit and audit services would be eliminated (see *Knechel and Sharma* (2008)).[12] There are, however, also arguments in favor of a negative relation between the prohibition of non-audit services and supplier concentration: If audit clients value non-audit services more than audit services, but are not allowed to buy non-audit services from their statutory auditor, clients will hire another, possibly smaller audit firm. Moreover, the joint supply of both services could be regarded as a barrier to market entry, because due to capacity constraints, nationally active audit firms are not

[10] *Frankel et al.* (2002), *Ferguson et al.* (2004), *Antle et al.* (2006), *Srinidhi and Gul* (2007), *Basioudis et al.* (2008), and *Hoitash et al.* (2008) find a negative association between non-audit fees and measures for audit quality, whereas *Defond et al.* (2002), *Ashbaugh et al.* (2003), *Chung and Kallapur* (2003), *Larcker and Richardson* (2004), *Reynolds et al.* (2004), and *Ruddock et al.* (2006) do not find evidence supporting the notion that non-audit services severely harm audit quality.

[11] See *Raghunandan* (2003) and *Quick and Warming-Rasmussen* (2009); *Ghosh et al.* (2009) provide contrary evidence.

[12] Most of the studies using a single-equation model with audit fees (non-audit fees) as a dependent (independent) variable document a significantly positive effect of non-audit fees on audit fees (see *Simunic* (1984), *Simon* (1985), *Bell and Tabor* (1991), *Deberg et al.* (1991), *Butterworth and Houghton* (1995), *Craswell and Francis* (1999), and *Ezzamel et al.* (1996); *Palmrose* (1986) found evidence contradicting the argument for knowledge spillovers). Using audit effort instead of audit fees, *O'keefe et al.* (1994) and *Davis et al.* (1993) also do not support the existence of audit production efficiencies arising from knowledge spillovers. Applying simultaneous-equations specifications for audit and non-audit fees, *Whisenant et al.* (2003) also did not find evidence for knowledge spillovers.

able to provide consulting services to larger listed companies. Thus, a ban on non-audit services would eventually enable smaller audit firms to acquire clients in the segment of listed companies. The prohibition might also have no effect at all, for example if the dominating audit firms maintain their audit-specialization investments and stop providing non-audit services.

2.5. Audit fee caps

If the level of fees received from one client exceeds some critical threshold, there is the concern that auditor independence might be threatened.[13] The reason is that the auditor has a strong economic interest not to lose a client whose fees represent a large proportion of the total fees of the audit firm issuing the audit opinion (*economic bonding*). Thus, the *Commission of the European Communities* (2011b) proposes to establish a specific procedure to ensure that the quality of the statutory audit is secured in cases where the audit fees from a single public-interest entity are significant. More precisely, the auditor should inform the audit committee about the fact that total fees received from one client represent either more than 20% (or more than 15% for two consecutive years) of the total annual fees received by the statutory auditor (Art. 9(3)). Based on this information, the audit committee should consider whether the audit engagement should be subject to a quality control review by another auditor prior to the issuance of the audit report. Moreover, the auditor should inform the competent authority referred to in Art. 35(1) if the total fees received from a public-interest entity subject to the statutory audit represent, for two consecutive years, 15% or more of the auditor's total annual fees (Art. 9(3)). The competent authority then should decide about the continuation of the audit engagement, which should not exceed two additional years.

Even if the implementation of fee caps would improve auditor independence, there might be adverse effects on supplier concentration. More precisely, smaller audit firms might be excluded from providing audit services to listed clients, because the proportion of fees received from a larger client might easily exceed the critical threshold. For countries in which fee caps are effective, the number of audit firms active in the market should thus be lower (e.g., if some smaller audit firms are effectively crowded out), and inequality of market shares should be higher (e.g., if smaller audit firms loose larger clients to larger competitors). Consequently, the combined market share of the dominating audit firms should be unaffected or even be higher for countries restricting fees per client.

2.6. Joint audits

Joint audits are defined as audits in which two or more auditors simultaneously carry out the audit, i.e., issue a single audit report and share responsibility for the audit. At the EU-level, there are

[13] Previous findings regarding the relationship between audit fees and *independence in mind* are mixed, but there is evidence of a negative association between client importance and *independence in appearance*. For an overview, see *Quick* (2012).

currently no specific regulations regarding joint audits or audit consortia. Since in Denmark joint audits have been disestablished in 2005, today France is the only Member State requiring by law joint audits for statutory audits of listed companies that publish consolidated accounts. Since in France there are no regulations regarding the size of the audit firms taking part in the audit consortium, the most frequent case is that two larger audit firms (but not necessarily the Big 4) conjointly perform the audit.[14] In Germany, in contrast, joint audits are not mandatory, but allowed (see *Idw Institut Der Wirtschaftsprüfer in Deutschland E. V.* (1999)). There are also no requirements regarding the size of the audit firm that can be hired as a second auditor. However, the fee caps as a reason for exclusion as a statutory auditor listed in § 319 Abs. 3 Nr. 5 and § 319a Abs. 1 Nr. 1 HGB have to be obeyed (e.g., the fees an auditor earns from one specific public-interest entity are restricted to 15% of the audit firms' total fees).

There are several reasons to assume that – if joint audits are performed – two rather large audit firms are hired. First, within an audit consortium, each auditor has to accept the overall responsibility for the entire audit, and both auditors are jointly liable. Thus, both audit firms have to possess sufficient capacities to plan and conduct the audit in a way that they can gain reasonable assurance regarding the appropriateness of an adequate part of the total audit in order to be able to come to an informed overall assessment. Second, the presence of two auditors increases coordination costs (e.g., for defining the terms of engagement, for discussing professional issues, and for summarizing the results of audit procedures) (see *Bédard et al.* (2012)). Coordination costs might be particularly high in a consortium of a larger and a smaller audit firm.[15] In addition, audit fees are expected to be higher for a joint audit than for a single audit.[16] Clients, however, will expect additional value from the extra fees paid,[17] and therefore will tend to hire two large audit firms.[18] Third, it could be argued

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[14] *André et al.* (2011) show that in France, 18.1% of the 273 companies in the sample had two Big 4 audit firms, whereas 58.6% had hired one Big 4. *Francis et al.* (2009) confirms that the majority of French companies are audited by at least one Big 4 auditor.

[15] *Gonthier-Besacier and Schatt* (2007) and *Thinggaard and Kiertzner* (2008) observed significantly lower fees paid for a joint audit performed by two Big 4 auditors than for joint audits done by a combination of a Big 4 and a non-Big 4 or by two non-Big 4 auditors.

[16] See *André et al.* (2011), who report that audit fees of major French companies audited by two Big 4 audit firms are significantly higher than Big 4 fees in the UK. For Denmark, *Holm and Thinggaard* (2010) observed audit fee discounts in companies changing from joint audits to single audits. For Sweden, *Haapamäki et al.* (2011) found that firms opting to engage joint auditors pay significantly higher audit fees than other firms. *Francis et al.* (2009), in contrast, did not find evidence that French audit fees are higher under a joint audit approach than audit fees observed in other European countries, and *Lesage et al.* (2011), investigating data from Denmark, France, and Germany, did not find evidence that joint audits increase audit fees.

[17] For Sweden, *Haapamäki et al.* (2011) report that companies voluntarily hiring joint auditors have a higher degree of earnings conservatism and are less likely to have income-increasing discretionary accruals than other firms. *Holm and Thinggaard* (2010), in contrast, did not find differences in the auditors' ability to constrain earnings management between joint and single audits, and the study of *Lesage et al.* (2011) does also not support the notion that joint audits increase audit quality. Recent empirical research highlights higher earnings management in France than in the UK and countries with better investor protection (*Leuz et al.* (2003) and *Burgstahler et al.* (2006)).

[18] For empirical evidence on the connection between client characteristics and auditor choice, see *Francis et al.* (2009).

that audit quality should be larger if two international audit firms are hired.[19] In addition, the supposition that a joint audit performed by two Big 4 auditors increases audit quality as perceived by external addressees might stand to reason.[20]

In its Green Paper, however, the *Commission of the European Communities* (2010a) had proposed joint audits with a non-systemic firm hired as the second auditor. In addition to increasing auditor independence and audit quality, the idea behind the introduction of joint audits is to enhance market entry of small and mid-tier audit firms, i.e., to decrease audit market concentration and to foster the growth of non-Big 4 audit firms.[21] In the currently discussed proposal, the *Commission of the European Communities* (2011b) does not require joint audits anymore, but proposes to extent the maximum duration of the audit engagement for joint audits to nine years.

Note for the country-year observations within our sample, there was no requirement to hire a smaller audit firm. Since there are economic incentives to form audit consortia of two larger audit firms, we expect to observe a positive correlation between mandatory joint audits and the combined market share of the dominant audit firms. In situations where smaller audit firms are not seen as an adequate joint audit partner, implementing joint audits could even increase market share inequality and reduce the number of audit firms active in the market.

2.7. Audit partner rotation

For audits of public-interest entities, Art. 42 of the Statutory Audit Directive (see *European Parliament and European Council* (2006a)) prescribes the rotation of key audit partners after seven years (internal auditor rotation). In addition, Art. 42 of the 8th Directive requires a cooling-off period of two years. For public-interest companies, these regulations are binding. In the recently published proposal, the *Commission of the European Communities* (2011b) suggests to extend the cooling-off period of key audit partners to three years (Art. 33, par. 4). Table 1 shows that all EU Member States in the meantime have implemented the internal auditor rotation, but the point in time when this regulation became effective differs across countries. In addition, there are also differences regarding the maximum audit partner tenure. In the US, audit partner rotation after 5 consecutive years has been implemented with the Sarbanes-Oxley Act of 2002.

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[19] Empirical evidence regarding earnings quality is mixed: For a sample of companies listed in France, *Francis et al.* (2009) found that the amount of income-increasing discretionary accruals decreases in the number of Big 4 auditors taking part in the joint audit. *Bédard et al.* (2012) also argue that earnings quality as measured by accruals is lower for a combination of one Big 4 and a local audit firm. *Marmousez* (2006), in contrast, found that reporting quality is lower for a combination of two Big 4 audit firms than for a joint audit by one Big 4 and one non-Big 4 audit firm.

[20] For Finland, *Karjalainen* (2009) finds supporting evidence that perceived audit quality is higher for companies hiring more than one responsible auditor.

[21] The results of *Piot* (2007) indicate that joint audits indeed can preserve market competition by reducing the domination of the large audit firms.

Since audit firms capable of auditing listed clients should have enough audit partners available to fulfill the requirement of the internal auditor rotation, we do not expect to observe any effects of this rule on audit market concentration. However, the internal auditor rotation could be a barrier to market entry for smaller audit firms.

2.8. Audit firm rotation

Although Art. 42 (2) of the 8th Directive on statutory audits prescribes the internal rotation of key audit partners, audit firm rotation is optional. Today, Italy is the only EU Member State requiring the audit firm rotation for all companies. Since 2003, Poland also prescribes the external rotation, but only for insurance companies (Act on insurance mediation of May 22nd, 2003). In addition, Turkey as a candidate for full EU membership introduced audit firm rotation for all companies in 2003. Some countries outside the EU also have the external rotation.[22] Spain, in contrast, had a mandatory audit firm rotation until 1995, and Austria introduced a six-year rotation before 2004, but repealed it before the effective date in favor of the upcoming Company Law Directive (see *Cameran et al.* (2005) and *Harris and Whisenant* (2012)). Canada also has abolished the audit firm rotation.

Since audit firm tenure is not restricted, however, the Commission apprehends that auditor independence might be threatened despite the fact that key audit partners have to rotate within audit firms. Therefore, the external rotation is seen as a measure to increase auditor independence[23] and to improve audit quality.[24] Moreover, the Commission expects that the external rotation also increases the dynamism of the audit market, increases competition for audit mandates, and decreases supplier concentration.[25] In its recently published proposal, the *Commission of the European*

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[22] In Brazil, since 2001 audit firm rotation with a rotation period of five years is mandatory for banks. This rule was introduced with CVM instruction 308 for listed companies in 1999. Since 2003, there is a rotation period of six years for companies listed on the Korean Stock Exchange or registered with the Korean Securities Dealers Automated Quotations ("KOSDAQ") in South Korea. In Singapore, a rotation period of five years was enforced in 2002 for banks incorporated in Singapore. In India, there is a four-year rotation period for banks, private insurance companies, and governmental companies (see *Cameran et al.* (2005), *Le Vourc'h and Morand* (2011), and *Harris and Whisenant* (2012)).

[23] The results of *Mansi et al.* (2004) and *Ghosh and Moon* (2005), however, indicate that *perceived* audit quality increases with auditor tenure.

[24] The evidence of empirical studies investigating the interrelation between auditor tenure and audit quality, as measured by the frequency of qualified audit opinions or going concern opinions, litigation and results of SEC surveillance, results of external quality controls, or earnings management, shows that audit quality is lower at the beginning of the auditor-client relationship (see *Geiger and Raghunandan* (2002), *Johnson et al.* (2002), *Carcello and Nagy* (2004), and *Davis et al.* (2009) (pre-SOX). For an overview, see *Quick* (2012)). However, conclusions drawn from studies conducted in a regulatory environment without mandatory rotation cannot be transferred to evaluate the efficiency of audit firm rotation. For a period in which the external rotation was mandatory in Spain, *Gómez-Aguilar and Ruiz-Barbadillo* (2003) did not find a significant relationship between going concern decisions and auditor tenure. For Italy, where audit firm rotation is mandatory, *Cameran et al.* (2010) documents that the external rotation does not improve audit quality. *Kwon et al.* (2010) find similar results for Korea. *Harris and Whisenant* (2012) show that audit quality is lower in the first years after an auditor change, but that audit quality is higher after the audit firm rotation rule has been implemented.

[25] *Cameran et al.* (2005) provide contrary evidence, i.e., supplier concentration in Italy has increased due to the implementation of the audit firm rotation rule.

Communities (2011b) thus suggests a mandatory audit firm rotation for statutory auditors of public-interest entities after six years, at the maximum (Art. 33, par. 1). If two statutory auditors or audit firms have been appointed throughout a continuous engagement of 6 years, the maximum duration can be extended to nine years. In addition, the Commission requires a cooling-off period of four years (Art. 33, par. 2). The Commission suggests that key audit partners are also replaced, i.e., partners changing clients due to the external rotation rule are to be prevented from taking along their clients, thus circumventing audit firm rotation.

In the US, the Sarbanes-Oxley Act of 2002 did not introduce a mandatory audit firm rotation, but required the *United States General Accounting Office* to conduct a study on the effects of the external rotation (Sec. 207 of the Sarbanes-Oxley Act of 2002). In 2003, the *United States General Accounting Office* (2003b) stated that audit firm rotation causes additional costs and may thus not be the most efficient way to improve auditor independence. Thus, it did not recommend implementing the external rotation. After eight years of experience with the Sarbanes-Oxley Act and the assessment of its effects, however, the *Public Company Accounting Oversight Board* (2011) issued a concept release on auditor independence, again directing the discussion on audit firm rotation.

Since clients frequently tend to choose one of the Big 4 audit firms in the case of a voluntary auditor change, we predict that a mandatory audit firm rotation would increase the frequency of auditor changes from smaller to larger audit firms, thereby increasing supplier concentration.[26] In the long run, smaller audit firms would exit the market, i.e., the number of audit firms active in the market is predicted to decrease.

2.9. Disclosure of auditor fees

According to recital 33 of Directive 2006/43/EC, "Directives 78/660/EEC and 83/349/EEC should be amended so as to require disclosure of the audit fee and the fee paid for non-audit services in the notes to the annual accounts and the consolidated accounts." Disclosure of auditor fees is intended to enhance transparency regarding the auditor-client relationship and to strengthen auditor independence. Turkey being the only exception, disclosure of auditor fees is mandatory in all of the countries we analyze, but it became effective in different points in time.[27]

To predict the effects of auditor fee disclosure on market concentration, we would have to make assumptions regarding the signaling function of the fee level. More precisely, the effect depends on whether a high level of audit fees is regarded as an indicator for a high effort level (i.e., high audit fees are "good news") or as a signal for disagreements between audit firm and client (i.e., high audit

[26] *Comunale and Sexton* (2005) show that audit firm rotation can have substantial effects on the long-term market share distribution.

[27] In Germany, for example, also audit firms have to publish the fees they earn for statutory audits in their annual transparency reports (§ 55c WPO).

fees are "bad news"). In addition, an effect on audit market concentration would only occur if the interpretation of the fee level is dependent on audit firm size. Since there are also substantial switching costs that would have to outweigh the potential benefits derived from the signal, and the demand for non-audit services has also to be taken into account, we refrain from making any predictions regarding the effect of auditor fee disclosures on supplier concentration.

2.10. Overview of country-specific audit regulations

Information about audit regulations effective in the countries of our sample (the joint provision of audit and non-audit services, joint audits, audit partner rotation, audit firm rotation, disclosure of auditor fees, and the maximum ex-ante agreed-upon duration of the mandate) was collected via questionnaires sent out to the national audit oversight boards. For non-responding countries, we retrieved the information directly from the national laws and related amendments. In addition, we took information provided in *Quick et al.* (2008). Table 1 gives an overview of audit regulations in different countries.

Insert Table 1 about here

To sum up, we observe that national audit markets are quite different with regard to the regulatory and legislative environment of financial reporting and auditing (see also *Le Vourc'h and Morand* (2011)). In particular, there are huge differences in auditor liability and the timing of the introduction of regulations discussed during the last decade.

3. Supplier concentration in national audit markets

3.1. Sampling

To examine the effect of a country's audit regulation on its market concentration, we focus on the segment of statutory audits of all companies listed in the respective country. In addition to data availability, the reason for constraining our analysis to a subset of the whole national audit market is that in the majority of cases, the regulations we consider aim at ensuring high quality of audits in particular of listed companies. The regulations contained in the EU Directive 2006/43/EC and in the recent proposal made by the *Commission of the European Communities* (2011b), for example, apply to auditors that carry out statutory audits of "public-interest entities", i.e., "entities governed by the law of a Member State whose transferable securities are admitted to trading on a regulated market of any Member State within the meaning of point 14 of Art. 4 (1) of Directive 2004/39/EC" (*European Parliament and European Council* (2006a)). The regulations introduced with the Sar-

banes-Oxley Act of 2002 apply to "issuers" as defined in section 3 of the Securities Exchange Act of 1934. Thus, it seems appropriate to restrict our analysis to companies listed within a country.[28]

We started sampling with data from 34 countries (all the 28 European countries available in *ThomsonOne* as well as Australia, Brazil, Canada, Japan, the Korean Republic, and the US) over the period 2001 to 2010. For each country and each year, we collected data from all publicly traded companies that were listed on August 2nd, 2010. From the resulting 24'797 firms and the corresponding 247'970 firm-year observations, we excluded all 7'670 firm-years for which either a *Thomson* identification code or information on the company's home country was missing. For the remaining firm-years, we collected information about the company's industry, the accounting standard applied, the statutory auditor, and total assets. Since financial companies (i.e., banks, insurance companies, financial service companies, and real estate investment companies) have specific characteristics with regard to financial reporting, and, in many countries, are subject to special audit regulations,[29] we excluded 58'830 firm-years from this industry class (ICB Industry 8000). We lost additional 40'164 firm-years due to missing information on the audit firm or on total assets. Finally, we excluded observations from Bulgaria, Iceland, Liechtenstein, Lithuania, and Slovakia, since these countries had, on average, information on less than 10 firm-years and on less than 75% of the original firm-years from that country. For Iceland and Liechtenstein, we were also not able to gather all information on audit regulation. Our final sample consists of 141'190 firm-year observations taken from 29 countries with a total of 2'439 audit firms. Based on this data, we constructed a sample with one observation per country and year, ending up with 290 country-year observations.

For each country in our sample, Table 2 shows the number of companies included in the analysis, the percentage of companies from that country taken into account after excluding all companies with missing information, the number of audit firms, total assets audited (in Mio. US-$), and the natural logarithm of total assets (means and standard deviations across all years). The last row shows the values resulting if all EU Member States in our sample are regarded as one economic area. Table 2 also illustrates that there are some countries with only few observations, which is partially due to the size or the level of development of these countries' capital markets. In 2012, for example, in total still only 26 companies were listed on the Slovenian stock exchange. In addition, both the publication of accounting information in general and the availability of this information in *ThomsonOne* are more restricted for some small countries than for countries with a well-developed

[28] Although there are large differences across the EU Member States regarding the size of companies that are subject to statutory audits (Directive 2006/46/EC of the *European Parliament and European Council* (2006b) and 4th Directive of the *Council of the European Communities* (1978)), for listed companies, auditing is mandatory in every EU Member State (see *Le Vourc'h and Morand* (2011)). The remaining countries included in our sample also prescribe statutory audits for listed companies. Thus, we do not have to consider differing regulations regarding statutory audits depending on the legal form of private companies or on company size.

[29] In Poland, for example, mandatory audit firm rotation is mandatory only for insurance companies (Act on Insurance Mediation of May 22nd, 2003).

capital market. Interestingly, the US and the EU are rather similar regarding the mean number of companies and the mean total assets audited. However, the mean number of audit firms in the EU is 69% higher than in the US. This finding could be interpreted as an indication that the differences between the EU countries play an important role in shaping the structure of the audit market. Furthermore, there are huge differences across countries regarding the size of the listed companies. In Australia, for example, on average 1'154 companies were listed, but the mean of total assets audited is only 433'297 Mio. US-$. Germany and France, in contrast, both have less than 600 listed companies, on average, but the mean of total assets audited exceeds 2'000'000 Mio. US-$.

Insert Table 2 about here

We calculated various measures for audit market concentration for each country and each year between 2001 and 2010. The fact that some large countries (e.g., Australia, Canada, Japan, Korean Republic, UK, and US) are overrepresented in the sense of firm-year-observations naturally leads to a more precise value for these countries' concentration measures. However, by construction all countries have the same weight in the regression analysis we provide in Section 4.

3.2. Dependent variables measuring audit market concentration

In a market with N suppliers i $(i = 1, ..., n, ..., N)$, the Concentration Ratio CR_n as a measure for *absolute* supplier concentration is defined as the sum of the n largest suppliers' market shares x_i, i.e., $CR_n = \sum_{i=1}^{n} x_i$. Whereas the Concentration Ratio only gives the punctual information about the combined market share of the n *largest* suppliers, the *Hirschmann-Herfindahl*-Index (HHI) takes into account the distribution of market shares of *all* suppliers (*relative* concentration). The HHI is calculated by summing up the squared market share of each supplier active in the market, i.e., $HHI = \sum_{i=1}^{N} x_i^2$. The HHI measures equality of market shares and is therefore interpreted as an indication for the level of competition within an industry or market. Both measures are frequently used in the academic literature on audit market concentration, and the *OECD* uses both measures to determine whether a supplier has a market-dominating position and to evaluate mergers and acquisitions.[30] Moreover, the industrial organizations literature suggests that equality of market shares among the dominating firms, in addition to absolute market concentration, can affect competition (see *Schmalensee* (1989) and *Willis and Rogers* (1998)). There is also empirical evidence suggesting that large differences in the market shares of dominating firms and the next largest firm lead to

[30] See *Organisation for Economic Co-Operation and Development* (1993). The German Federal Cartel Office (see §§ 19 (3) and 36 (1) of the German Act Against Restraints of Competition (Gesetz gegen Wettbewerbsbeschränkungen)) relies more on the Concentration Ratio, whereas in the US, the *HHI* is usually taken as a basis (see *U.S. Department of Justice and the Federal Trade Commission* (2010), 5.3).

price premiums (see *Mayhew and Wilkins* (2003)), and that a high degree of relative concentration might be more problematic for audit quality than a high market share of the Big 4 (see *Kallapur et al.* (2010) and *Francis et al.* (2012)). We thus calculated both the CR_4 and the HHI for each year between 2001 and 2010 and each of the 29 national audit markets in our sample.

Since audit fees are not available for all countries over the entire time period we investigate, we use the number of audit clients M to determine the market share of audit firm i, i.e., $x_i^M = M_i / \sum_{i=1}^{N} M_i$. However, concentration measures based on the number of audit clients are likely to underestimate a country's audit market concentration, since the market leaders frequently audit large companies, which are given the same weight as small clients. Thus, we additionally use the natural logarithm of the total assets of an audit firms' clients as a basis for determining a second market share measure, i.e., $x_i^{TA} = ln(TA)_i / \sum_{i=1}^{N} ln(TA)_i$. The literature on audit pricing has documented that $ln(TA)$ explains about 70% of the variation in audit fees across clients (see *Hay et al.* (2006)), and therefore concentration measures based on $ln(TA)$ can serve as a proxy for concentration measures based on (frequently unobservable) audit fees.

New regulations often cause an increase in audit firms' direct and indirect audit costs and/or in audit firms' profits per client, and thus can lead to a crowding out of (in particular small) audit firms. Therefore, we also investigate the number of audit firms active in the segment we consider, and use the Auditor-Client Ratio (AC_R) as a characteristic of a national audit market. To control for random fluctuations in the number of audit clients due to data availability, AC_R is defined as the number of audit firms providing audit services in year t, divided by the mean number of clients M within a country's market segment of listed companies' audits over all years, i.e., $AC\_R = N_t / \left(0.1 \cdot \sum_{t=2001}^{t=2010} M_t \right)$.

The HHI is sensitive to the number of audit firms, i.e., it should increase if the number of suppliers decreases. Therefore, we check for correlations between our concentration metrics. Table 3 shows the correlation coefficients between $CR_4(M)$, $CR_4(ln(TA))$, $HHI(M)$, $HHI(ln(TA))$, and AC_R according to *Spearman* and *Pearson*. The values indicate that there are substantial (positive) correlations between $CR_4(M)$, $CR_4(ln(TA))$, $HHI(M)$, and $HHI(ln(TA))$, respectively, but that AC_R is rather uncorrelated to these four metrics. Thus, a low number of audit firms active in the market does not necessarily indicate that the four largest suppliers have a higher market share or that market shares are highly asymmetrically distributed (and *vice versa*).

Insert Table 3 about here

An overview of average measures of supplier concentration at the country-level is given in Table 4, which displays the country-specific means and the standard deviations of the Concentration Ratios $CR_{4,t}$, the *Hirschmann-Herfindahl*-Indices (HHI_t), and the Auditor-Client Ratios AC_R_t (averages across the years $t = 2001, ..., 2010$). In order to correctly interpret whether the values obtained for $CR_{4,t}$ are indeed an indicator for a high level of absolute supplier concentration, i.e., whether the four largest suppliers together have an over-proportionately high market share, the number of suppliers actually active in the respective market segment have to be taken into account. Thus, we applied the test proposed by *Parker* (1991) to the country-specific values obtained for $CR_{4,t}$. Columns *, **, and *** of Table 4 denote the number of years for which $CR_{4,t}$ is significant at the 10%, 5%, and 1% level. Columns + and ++ contain the number of years for which, according to the benchmarks provided for in the EU legislation (see Table 5, last column), the country-specific values obtained for HHI_t are regarded as an indicator for a moderately concentrated market (i.e., $0.10 \leq HHI_t \leq 0.20$) and a highly concentrated market (i.e., $HHI_t > 0.20$), respectively. The last two columns of Table 4 show the results for the Auditor-Client Ratios.

Insert Table 4 about here

Insert Table 5 about here

Table 4 confirms that nearly half of the countries in our sample are characterized by a dominating position of the four biggest audit firms or networks.[31] For Australia, Brazil, Canada, Finland, France, Germany, Japan, the Korean Republic, Poland, Sweden, the UK, and the US, all 10 year-observations for $CR_{n,t}(ln(TA))$ and even for $CR_{n,t}(M)$ are highly significant. For the Czech Republic, Hungary, Ireland, Luxembourg, and Slovenia, in contrast, the test of *Parker* (1991) does not point to a significant level of absolute supplier concentration in even one of the 10 years. Moreover, countries like Ireland, Slovenia, Spain, and Switzerland are characterized by highly asymmetrical distributions of audit firms' market shares. For these countries, all 10 values derived for $HHI_t(M)$ and for $HHI_t(ln(TA))$ are above the critical threshold defining a highly concentrated market. In Australia, France, Germany, and Poland, in contrast, relative supplier concentration seems comparably low. 100 clients hire, on average, fewer than 10 audit firms in Australia, Canada, Greece, Italy, Japan, the Korean Republic, the Netherlands, Norway, Sweden, Switzerland, the UK, and in the

[31] Note that the Big 4 audit networks are not necessarily the market leaders within in each country. In some countries, *BDO* is the number four (Australia and Belgium) or even the number one (Poland). *Grand Thornton* is on rank four in some countries (Denmark, UK). Furthermore, there are countries in which national audit networks have large market shares (Greece, Portugal). Nevertheless, except from Greece and Poland, one of the Big 4 audit networks is the number one in the market, and the remaining Big 4 still play a major role.

US, whereas in the Czech Republic, Estonia, Hungary, Luxembourg, and Portugal, 100 clients hire more than 40 audit firms, on average.

Taken together, the overall assessment of supplier concentration within a country depends on the concentration measure applied as well as on the basis used to determine audit firms' market shares. Based on our results, the national audit markets of Finland, Italy, Spain, Sweden, and Switzerland seem to be particularly concentrated, whereas the markets of the Czech Republic, Hungary, Luxembourg, and Slovenia reveal a rather low degree of supplier concentration. Although the four largest audit firms have a considerable market share in France, there is a comparatively low level of relative concentration, and the mean Auditor-Client Ratio is rather high.[32]

The sample period and the definition of the relevant market, however, aggravate the comparison of our results with those provided in the literature.[33] Nevertheless, *Le Vourc'h and Morand* (2011) found similar values of $CR_{4,2009}(M)$ and $HHI_{2009}(M)$ for Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. The values of $CR_{4,2009}(M)$ and $HHI_{2009}(M)$ for the Czech Republic, Hungary, Poland, Slovenia, Sweden, and the UK reported in *Le Vourc'h and Morand* (2011) are slightly different from ours, and their $HHI_{2009}(M)$ for Greece is lower.

The existence of substantial country-differences regarding the level of audit market concentration is one key finding of our analysis. These differences could be partially due to the economic development of a country. In the Czech Republic, for example, consolidation activity over 1998-2011 was low, which could explain the comparatively low concentration level (see *Le Vourc'h and Morand* (2011)). In Slovenia, statutory audits have been introduced only in 1994/1995, and there are still only few certified public accountants. Thus, the absolute concentration is not significant if the number of audit firms is taken into account, but nevertheless all the values for the HHI_t indicate a highly concentrated market. Another reason for the country-differences we observe could be seen in traditional aspects. In Switzerland, for example, audit firms developed primarily from the banking sector, so concentration is rather high. For France, the lower level of relative supplier concentra-

[32] This result is in line with *Oxera Consulting Ltd.* (2007) (showing that compared to other countries within the EU, concentration is low in France), but in contrast to *Piot* (2007) and *Bédard et al.* (2012) (documenting that concentration is lower in France than in the UK).

[33] *Huber* (2011) also gives an overview about country-specific levels of concentration, but focuses on audits of listed companies with FTSE 350 equivalent market cap and of listed companies with market cap exceeding 100 Mio. £. Thus, the numbers of companies taken into account (the values for the Concentration Ratio) are lower (considerably higher) than in our study. Moreover, there is no indication which basis is used to determine market shares. The sample of *Francis et al.* (2012) drawn from *Global Vantage* contains 55'408 firm-year observations from 42 countries for the time period 1999-2007. Since the database contains the larger listed companies, the results are not comparable to ours. In addition, *Francis et al.* (2012) use fewer observations per country. Since *Ewert and London Economics* (2006) use either only companies from the main index of a country's main national stock exchange, and in another overview for some countries a different sample composition (only FTSE 350 for UK), their results are only partially comparable to ours. For the country samples matching ours, their results are qualitatively similar.

tion could be explained by the strong performance of the *Mazars Group*. In the present paper, however, the focus is on differences in legislation and audit regulation as an explanation for country-differences in concentration. For example, joint audits in France and limited auditors' liability in Belgium and in Germany have been regarded as factors decreasing the concentration levels in these countries (see *Le Vourc'h and Morand* (2011)). However, Greece and Slovenia also have a limited auditor liability, but a considerably higher concentration than Belgium and Germany. Therefore, a detailed analysis of each rule and of possibly existing interdependencies between audit regulations is needed to shed more light on the effects of various regulations.

3.3. Explanatory variables measuring audit regulation and country-level controls

To address the question whether there is a connection between audit market regulations and different measures of supplier concentration, we focus on the information on a wide set of regulations contained in Table 1. More precisely, we use country-specific dummy variables for each year between 2001 and 2010 which indicate whether a certain regulation has been effective:

EU_Dir_06 takes on the value of 1 if the Directive on Statutory Audits (2006/43/EC) had been fully adopted by a country at the beginning of year *t*. We took the information needed to construct *EU_Dir_06* from the reports provided by the *Commission of the European Communities* (2010b). For those 12 EU Member States that had already fully completed the implementation process before the first Scoreboard Letter had been published on July 31st, 2008, we assumed that the Directive had been fully adopted in 2008. *Liab_Cap* and *Liab_Reg* both refer to statutory auditors' legal liability. *Liab_Cap* is coded 1 if a law providing for an upper limit of the auditor's liability was effective within a country in year *t*. Examples for such a "liability cap" are that liability is restricted to a multiple of the audit fees earned from a client, or to a fixed amount of money. *Liab_Reg*, in contrast, takes on the value of 1 if the proportionate liability rule was effective in the country in year *t*. Information about the liability regime was mainly taken from *Ewert and London Economics* (2006) and updated if changes in a country's law were made before 2006 or by the end of 2010. The variables *NAS_const* and *NAS_forb* both describe a country's regulation regarding the joint provision of audit and non-audit services. *NAS_const* is coded 1 if the scope of non-audit services statutory auditors are allowed to provide to their clients was restricted in year *t*. Non-audit-services were assumed to be constraint when a regulation was effective that exceeded the provisions contained in the Statutory Audit Directive (Art. 22 and Art. 24) or in the International Standards on Auditing (ISA 220 Para. 11, ISA 260 Para. 17, ISA 260 Para. A. 21 and A. 22). We define services such as bookkeeping as being subject to a self-review-threat, and consequently do not classify their prohibition as an

explicit constraint.[34] *NAS_forb* is 1 if the joint supply of audit and non-audit services was entirely forbidden in year *t*, i.e., if according to the independence requirements laid down in the specific law, statutory auditors were not allowed to provide services other than the audit to their audit clients. In addition, we use the dummy variable *Fee_Cap* to take into account whether the country's law contains an explicit constraint regarding the total fees the statutory auditor is allowed to earn from a single client.[35] Rules stating that a client's fees should not exceed a critical threshold in order to avoid independence concerns were not treated as a fee cap. *Joint_man* takes on the value of 1 if joint audits (i.e., audits performed by two different audit firms sharing the audit work and jointly signing the audit report) were mandatory in the country in year *t.* The variables *Part_Rot* and *Firm_Rot* both refer to the rules regarding auditor rotation effective in a country in year *t*. *Part_Rot* (*Firm_Rot*) is coded 1 if a rotation of the key audit partner (a rotation of the audit firm) after a certain time span was mandatory in year *t.* We coded these dummy variables as 1 at the point in time when the respective law became effective, not only when the first mandatory changes occurred. *Fee_Disc* is coded 1 if in year *t* companies had to publicly disclose their fees for audit and non-audit services in their annual reports (due to the law, the corporate governance codex or the stock exchange rules effective in a country).

We include additional metrics as controls. First, we consider two measures of financial market development because there seems to be an association with earnings quality (see *Leuz et al.* (2003)), and therefore also a possible connection to a client's propensity to choose a large audit firm. We measure a country's yearly level of financial market development with *Market_Cap* taken from *World Bank*, i.e., the country's market capitalization in percent of its *GDP*, where the market capitalization is the share price of the domestically incorporated companies listed on the country's stock exchanges at the end of the year times the number of shares outstanding.[36] *FDI* is a yearly metric also taken from *World Bank*. It measures the foreign direct investment of a country, i.e., the net inflows of investment (new investment inflows less disinvestment) to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments, divided by *GDP*.[37] Because of the global structure of the international audit networks and the corresponding scale economics, the complexity

[34] For example, we did not define Finland's restrictions on the provision of non-audit services as a constraint. Section 25 (1) 2) "Disqualification of an auditor" of the Auditing Act from 2007 defines "The auditor is responsible for the preparation of the accounting records or for the management of assets or for the supervision of either activity in the corporation or foundation" as a reason for exclusion.

[35] As an example, the German Commercial Code (Handelsgesetzbuch) (§ 319 Abs. 3 Nr. 5 HGB) states that auditors are not allowed to perform the statutory audit for a company from which they have earned more than 30% of their total revenues during the last five years, and if this is expected to be the case also for the current fiscal year.

[36] See http://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS.

[37] See http://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS.

of the accounting rules applied within a country and the audit firms' capability to react to a change of the accounting standards might also affect the market share of the largest audit firms. We therefore include the variable *IFRS_Share*, which measures the percentage of firms within a country that prepared financial statements on the basis of IAS/IFRS in year *t*. *Gov_Eff* is the measure "Government Effectiveness" taken from *Kaufmann et al.* (2012) and is updated for every year of our sample. It "captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies". *Gov_Eff* ranges from -2.5 to 2.5, with higher values corresponding to better governance.[38] We include this variable since the role of accounting and the choice of the audit firm might be connected to the strength of the legal environment. In weak legal environments, the audit firm can serve as a partial substitute for legal protection of outside shareholders and increase the demand for high quality audits (see *Choi and Wong* (2007)). On the other hand, a weak legal system may fail to credibly impose sanctions in case of failures, and thus decrease the demand for high quality audits (see *Francis et al.* (2003)).

Table 6 gives an overview of the definitions of our dependent variables measuring supplier concentration, our explanatory variables for audit market regulation, and our country-specific controls.

Insert Table 6 about here

For 15.52% of our 290 country-year observations, the Directive on Statutory Audits was implemented. 16.21% of our observations had a liability cap, and 17.24% had the proportionate liability system. Thus, for 66.55% country-year observations, there was no restriction regarding auditors' liability. In 58.28% of the cases, there was no constraint regarding the scope of services statutory auditors are allowed to provide to their audit clients. For 28.62% observations, the supply of certain non-audit services was forbidden, and for 13.10%, the joint provision of audit and non-audit services was entirely forbidden. 17.24% observations are characterized by a restriction regarding the total fees audit firms are allowed to earn from one single client. Joint audits were mandatory for only 4.83% of our observations (4 from Denmark and 10 from France). Audit partner rotation (audit firm rotation) was mandatory for 57.93% (11.38%) of our country-years. For 59.66% of our observations, disclosure of audit fees was mandatory.

For all countries in the sample, Table 7 shows the mean and the standard deviation (over the years 2001 – 2010) for our yearly country-specific control variables.

Insert Table 7 about here

The values of our country-level control variables vary widely. Financial market development as measured by *Market_Cap* has a mean value of 74.30 and ranges from a country-specific mean of

[38] Note that the values for *Gov_Eff* were missing for the year 2001. We approximated the country-values for 2001 by taking the average of the years 2000 and 2002.

24.36 in Hungary to 237.45 in Switzerland. *FDI* can be positive or negative and has an overall mean value of 15.56. Japan has the lowest mean value for *FDI* (0.18), whereas Luxembourg has the highest (346.09). *IFRS_Share* ranges from a country-specific mean of 0% in the US, Canada, and Japan, to 89% in Estonia. The overall mean of *IFRS_Share* is 0.483. *Gov_Eff*, which is defined in the range between -2.5 to + 2.5, has a mean value of 1.38. With 0.01, Brazil has the lowest mean, whereas Denmark, Finland, and Switzerland have the highest mean values of 2.20, 2.17, and 2.00.

We do not find significant correlations between our explanatory and control variables. There are week positive correlations between *EU_Dir_06*, *Part_Rot*, and *IFRS_Share*, between *Liab_Cap* and *Fee_Cap*, between *NAS_Const* and *Fee_Cap*, between *NAS_forb* and *Joint_man*, and between *Market_Cap* and *Gov_Eff*, as well as a negative correlation between *Firm_Rot* and *Gov_Eff*. However, the values of the respective correlation coefficients (*Spearman*, *Pearson*) do not exceed 0.56.

4. Regression analysis

4.1. Regression model

To isolate the effects of single audit regulations on supplier concentration, we regress our explanatory variables *EU_Dir_06*, *Liab_Cap*, *Liab_Reg*, *NAS_const*, *NAS_forb*, *Fee_Cap*, *Joint_man*, *Part_Rot*, *Firm_Rot*, and *Fee_Disc* as defined above on the concentration metrics $CR_4(M)$, $CR_4(\ln(TA))$, $HHI(M)$, $HHI(\ln(TA))$, and AC_R, respectively. In order to control for country-specific factors and to mitigate an omitted variable bias, we also include the control variables *Market_Cap*, *FDI*, *IFRS_Share*, and *Gov_Eff* in the regressions. We also add indicators for each year to capture the temporal development of supplier concentration.

Apart from audit regulations and the controls included in our regressions, the countries within our sample differ in a lot of unobserved factors, which are likely to be correlated both with the dependent and the independent variables in our regressions. As an example, results of several cross-country studies show that the quality of accounting information is higher in countries with a larger degree of legal protection of shareholders.[39] A *Hausman* test shows that the differences in the coefficients are indeed systematic (p-value = 0.000). Furthermore, we can reject the hypothesis that all fixed-effects are zero (p-value = 0.000). Therefore, we apply a country-fixed-effects model to our data. By including country-fixed effects, we provide a strong control for omitted country-level variables. To the extent that unobserved factors are time-invariant, the coefficients on the country-fixed effects control for systematic cross-country differences and their effects on our concentration measures. Both a pooled OLS-regression and a random-effects-model would yield to inconsistent

[39] See *Ball et al.* (2000), *Leuz et al.* (2003), *Burgstahler et al.* (2006), *Bushman and Piotroski* (2006), and *Defond et al.* (2007). *Coffee Jr.* (2007) found that law enforcement is rather different, even between countries from the same legal origin.

estimates in this case (see *Cameron and Trivedi* (2006)). Since only the effects of time-variant variables can be identified in a fixed-effects model, we cannot include in the regressions some country-specific variables (e.g., a country's legal origin as defined in *La Porta et al.* (1998)) and variables that do not change during the observation period (e.g., the maximum period the audit contract can be signed for). For similar reasons, we are unable to include the adoption of the International Standards on Auditing (ISA) as a variable, because reliable information starts only from 2008.

Our estimated model has the general form

$$C_{kt} = \alpha + \alpha_k + \sum_{r=1}^{R} \beta_r \cdot regulation_{rkt} + \sum_{s=1}^{S} \beta_s \cdot control_{skt} + \sum_{t=02}^{T=10} Year_t + \varepsilon_{kt}.$$

In this model, C_{kt} are our concentration metrics computed for each country k and each year t. α is the intercept. ε_{kt} are assumed to be independent random variables identically distributed over country k and year t, and α_k are unobserved random variables for each country k that capture unobserved heterogeneity. *regulation* (*control*) denote the time-variant explanatory variables for audit regulation (controls). $Year_t$ are indicators that take on the value of 1 if the observation is from the respective year (2002 – 2010). Note that we focus only on the estimated coefficients β_r and β_s, because a consistent estimation of the country-specific variables α_k is only possible if $T \to \infty$.

Based on the discussion in Section 2, we predict the coefficients on *Fee_Cap*, *Joint_man*, and *Firm_Rot* to be positive (negative) in the regressions on CR_4 and HHI (AC_R). The coefficients on *Liab_Cap* and *Liab_Reg*, in contrast, are predicted to be negative (positive) in the regressions on CR_4 and HHI (AC_R). Since we are unable to predict, a priori, which effect is likely to dominate, we leave the predictions for *EU_Dir_06*, *NAS_const*, and *NAS_forb* unsigned. Moreover, we predict that *Part_Rot* and *Fee_Disc* do not have any consequences on our concentration metrics.

4.2. Results of the regression analysis

Table 8 shows the main findings of our regression models. First, the adoption of the Directive on Statutory Audits (2006/43/EC) indeed does not seem to affect any of our concentration measures. Since there is a negative coefficient on *Liab_Cap*, the existence of restrictions regarding auditors' liability tends to decrease supplier concentration, but the coefficient is borderline significant only in the regression for $CR_4(\ln TA)$. As predicted, the existence of a proportionate liability system, however, has a highly significant (significant) negative effect on a country's CR_4 (HHI), i.e., the dominating audit firms have fewer and/or smaller clients. This result is in contrast to the findings presented in *Dunn et al.* (2011), who found that high-litigation industries have more equality of market shares than other industries. Since the number of auditors per client is not affected, unrestricted lia-

bility does not seem to crowd out smaller suppliers, but to make it easier for second-tier audit firms to gain market shares. Restrictions regarding the scope of services do not significantly affect concentration. As predicted, countries in which the joint supply of audit and non-audit services is entirely forbidden indeed have a highly significantly lower CR_4 and more auditors per client, i.e., smaller audit firms successfully enter the market segment we consider. The reason could be that the advantage of the big audit firms to be able to provide a broad scope of services is lost in this setting. In contrast to our predictions, the existence of a cap on total fees significantly decreases (increases) a country's HHI (the AC_R), but does not affect the market share of the leading audit firms. Thus, fee caps seem to favor smaller audit firms. One argument for this finding might be that clients of market leading audit firms paying a comparatively high (low) amount of non-audit (audit) fees switch to a smaller audit firm, but retain the big audit firm for providing non-audit services. In line with our prediction, the coefficient on *Joint_man* is positive and highly significant in our regressions on CR_4 and HHI. This result suggests that clients favor choosing two big audit firms as members of the audit consortium if there is no legal requirement to hire a second-tier audit firm, and thus smaller firms have a disadvantage if joint audits are implemented. This reasoning is confirmed by our finding of a significantly negative effect of *Joint_man* on AC_R. Whereas the internal auditor rotation indeed does not affect our concentration measures, the coefficient on *Firm_Rot* is positive and highly significant in the regressions on CR_4. This finding is in line with our prediction and the findings in *Cameran et al.* (2005), who documents that supplier concentration in Italy has increased due to the implementation of the external rotation. The reason could be that if an auditor change is required, clients tend to choose one of the market leaders as a successor. The necessity to make audit fees publicly available does not affect our concentration measures.

Insert Table 8 about here

Among our control variables, only *FDI* has a highly significant negative effect on CR_4 and a significant negative effect on HHI. Since the effect of *FDI* is, compared to the effect of the remaining variables, economically not significant, interpreting this result is difficult.

The literature on supplier concentration and audit pricing documents an increase in market concentration resulting from the Big 4 consolidation.[40] Since 2003, however, major mergers between audit firms have not occurred. Thus, we do not expect an effect on our concentration metrics resulting from mergers. Among the year dummies, only $Year_{02}$ has a highly significant positive coefficient in the regressions on $CR_4(M)$, $CR_4(\ln(TA))$, $HHI(M)$, and $HHI(\ln(TA))$; in the regression

[40] See *United States General Accounting Office* (2008) (US), *Beattie et al.* (2003) *Abidin et al.* (2008), and *Abidin et al.* (2010) (UK), *Ballas and Fafaliou* (2008) (EU), and *Hamilton et al.* (2008) (Australia).

on $CR_4(\ln(TA))$, also $Year_{03}$ is significantly positive. In the regression on AC_R, we observe significantly positive coefficients for $Year_{03}$, $Year_{04}$, and $Year_{05}$. Note that there is no visible effect in the years of the financial crisis. The highly significant positive coefficient on $Year_{02}$ (and the significant effect of $Year_{03}$, $Year_{04}$, and $Year_{05}$ on AC_R) might partly be due to the demise of *Arthur Andersen* in 2002. Another reason could be that there is an issue with data availability for 2001, where information especially for clients with small audit firms is missing. To rule out any bias in the results, we exclude the year 2001 as a robustness check, but our results are not affected.

Overall, the model fit as indicated by the R^2 of 30.0% (31.9%) in the regression on $CR_4(M)$ ($CR_4(\ln(TA))$ is not overwhelmingly high, but shows that at least some part of the Concentration Ratio can be explained by our model. The explanatory power of our model for the *Hirschmann-Herfindahl*-Index, in contrast, seems to be slightly lower. With values for R^2 of 18.6% for the $HHI(M)$ and 18.8% for the $HHI(\ln(TA))$, however, it still provides reasonable insights. With 25.7%, the fit of the regression on the Auditor-Client Ratio lies between the other two models. In addition, note that the presented R^2 shows the model fit after deduction of the country-fixed-effects. Furthermore, the *F*-Statistic shows that all models indeed explain the context.

4.3. Robustness checks

We run several robustness checks to ensure that our main results are not driven by other factors such as the choice of our explanatory variables (checks 1 and 2), the choice of the countries in the sample (checks 3 to 5), and the observed period (checks 6 and 7). For all robustness checks, we use a panel-fixed-effects model and robust standard errors.

In check 1, we include the variable "rule of law" (*Rule_Law*) from *Kaufmann et al.* (2012), capturing peoples' perceptions' regarding the quality of contract enforcement and property rights, instead of "government effectiveness" (*Gov_Eff*). *Rule_Law* has been used in prior cross-country studies on accounting topics (see *Daske et al.* (2008)) and could be an important factor influencing the choice of the audit firm. *Francis et al.* (2003), for example, show that the combined market share of the five largest audit firms is higher in countries with stronger legal systems, and *Francis and Wang* (2010) document that earnings quality is jointly affected by the investor protection environment and the choice of a Big 4 audit firm. Due to the high correlation between *Rule_Law* and *Gov_Eff* (95.3%), however, it is not possible to include both metrics in our regression.

In check 2, we exclude the indicator variable for the full adoption of the European Directive on Statutory Audits 2006/43/EC. The reasoning for exclusion of *EU_Dir_06* is as follows: The Statutory Auditor Directive contains a large number of regulations, and some countries had already im-

plemented some of them already before the Directive was published, i.e., *EU_Dir_06* is somehow imprecise. Furthermore, we include audit partner rotation (Art. 42 of the Directive) and the disclosure of auditor fees (recital 33of the Directive) as separate explanatory variables in our main model. Thus, we included these variables actually twice. On the other hand, our main model does not consider some elements of the Directive as separate variables (e.g., the establishment of an audit oversight board (Art. 32 of the Directive) or the need to have an audit committee (Art. 41 of the Directive)), but these regulations were also partly covered by the audit laws in non-EU countries.

In addition, we vary the sample countries used in the regressions. For check 3, we exclude all former socialist countries, because these countries are special with respect to their history and their development. Whereas there was free market entry for all firms in the remaining countries, this was not (or only partly) the case for the former socialist countries. Market entry, however, could have influenced the current audit market structure (e.g., a non-Big 4 audit firm is the market leader in Poland). In check 4, we exclude all countries with at least one country-year observation with a Concentration Ratio equal to 1. We drop these countries because the extreme values observed for our dependent variable and the low number of audit firms in the market could possibly lead to misleading results. In check 5, we use only EU countries for our analysis to investigate the effects of audit regulations in an economic area with a similar political environment. Moreover, within each of the EU countries, legislation is uniformly implemented for the entire country. In Canada, in contrast, all states follow the same main audit regulations, but each federal state can set its own regulation. The resulting differences between the states can eventually aggravate country-comparisons. However, one drawback of check 5 is that we are unable to include the variables *NAS_forb* and *Firm_Rot* into the regressions, because both variables did not change during the observed period.

Checks 6 and 7 constrain the observed period. We observe somewhat lower concentration measures for the year 2001 and a visible increase in 2002 (in 2001, the mean CR_4 is about 4% lower and the HHI is 0.019 lower than in 2002). There are two reasons for this finding: First, data availability is limited for the year 2001, compared to all other years. In addition, the demise of *Arthur Andersen*, one of the major audit firms, occurred in 2002. Moreover, we also observe a comparatively larger change of the concentration measures from 2009 to 2010 (in 2010, the mean CR_4 is about 2.8% higher and the HHI is 0.007 higher than in 2009). In contrast to 2001, however, we do not observe an outlying number of available firm information for 2010. To rule out any biased results, we exclude all country-year observations from 2001 in check 6, and all country-year observations from the years 2001 and 2010 in check 7.

For the regressions on CR_4 (see Table 9), we observe nearly the same results as in our main regression. Proportionate liability (*Liab_Reg*), the prohibition of non-audit services (*NAS_forb*), man-

datory joint audits (*Joint_man*), and a mandatory audit firm rotation (*Firm_Rot*) are still highly significant with the same signs of the coefficients. In addition, the coefficients of the control variables *Market_Cap* and *FDI* have the same signs as in the main regressions, and are significant at the same or at even lower significance levels. Only in check 5 (EU countries only), *Market_Cap* is not significant. When we investigate the EU countries only, those countries with a liability cap (*Liab_Cap*) have significantly lower Concentration Ratios. In contrast to our main results, higher values for *Gov_Eff* significantly increase the Concentration Ratios if we exclude the former socialist countries.

Insert Table 9 about here

The results of the regressions on HHI (see Table 10) deviate slightly more from the main model. Although the coefficients of the variables *Liab_Reg* and *Joint_man* have the same signs and similar significance levels, the variable *NAS_forb* is significant in the regressions on $HHI(M)$ in which we use *Rule_Law* instead of *Gov_Eff*, or exclude *EU_Dir_06*. Furthermore, *NAS_forb* is also significant for both HHI measures in the regressions without the year 2001 or the years 2001 and 2010. When we exclude former socialist countries or $CR_4 = 1$ countries, *Fee_Cap* is not significant anymore. The control variables show the same results in all HHI regressions.

Insert Table 10 about here

In the regressions on AC_R (see Table 11), we observe results similar to the main findings for checks 1, 2, 6, and 7. In check 3 (regression without former socialist countries), the variable *Fee_Cap* is not significant anymore. *EU_Dir_06*, however, is negative and weakly significant, and *Liab_Cap* is positive and significant. In the sample without the $CR_4 = 1$ countries, except some year dummies, only *Fee_Cap* is significant, which casts doubts on this check. When using only EU countries, only the variables capturing limited liability and some year dummies are significant.

Insert Table 11 about here

The R^2 is rather constant across all regressions and lies between 28.4% and 33.5% (CR_4), between 17.5% and 21.5% (HHI), and between 25.7% and 40.1% (AC_R). Overall, the robustness checks support our findings from the main analysis.

5. Conclusion

We study the effect of audit regulation on supplier concentration for three reasons. First, policy setters around the world expressed specific concern about the high level of audit market concentration. The United States Congress, for example, committed the General Accounting Office to conduct a study on supplier concentration and competition as part of the Sarbanes-Oxley Act of 2002 (see *United States General Accounting Office* (2003a) and *United States General Accounting Office* (2008)). Similarly, in the aftermath of the financial crisis, the Commission of the European Union

has proposed measures to decrease the "systemic risk" arising from the existence of only a handful of audit firms capable of providing statutory audits to large financial institutions (see *Commission of the European Communities* (2011b)). The topic thus is of particular importance to regulators. Second, the majority of studies describe the development of supplier concentration over time. Other studies focus on the consequences of a high level of concentration on competition in the audit market and on audit quality. If the reasons for the actual level of supplier concentration are examined, the aspect of supply-side mergers is given prominence. To the best of our knowledge, this study is the first that investigates additional explanations for the status quo of supplier concentration. Third, in emphasizing the interrelations between auditors' and clients' decision-making (micro-level) and the regulatory environment (macro-level), we contribute to the ongoing discussion on the relative advantageousness of regulatory means.

To examine the connection between national audit regulations and concentration at the country-level, we conducted a cross-country study for the years 2001 – 2010. Our final sample consists of 141'190 firm-year observations of listed companies with a total of 2'439 audit firms, taken from 29 countries. The results of our country-fixed-effects models indicate that the existence of a proportionate liability system and the prohibition of the joint supply of audit and non-audit services significantly decrease supplier concentration, whereas joint audits and the mandatory audit firm rotation significantly increase audit market concentration. Thus, our study confirms that measures intended to increase audit quality indeed can have (sometimes adverse) effects on supplier concentration.

Our study also has some limitations. First, our variables measuring audit regulation take on the value of 1 at the point in time when the respective regulation became effective. Thus, we neglect the possibility of a lagged influence of regulation on supplier concentration. Second, our hand-collected data on audit regulation might be sensitive to measurement bias. Third, our data set is limited, since – by definition – we have only one observation per country and year.

Tables

	Is Directive 2006/ 43/EC adopted?[1]	Are the ISAs adopted?[2]	Are there auditor liability caps?	Is the joint supply of audit and non-audit services forbidden?	Are joint audits required?	Max. time span of individual audit contracts[3]	Is audit firm rotation mandatory?	Is audit partner rotation mandatory?	Do audit fees have to be published?	Are audit fees per client restricted?
Australia	no	yes (national standards are based on ISAs)	until 2003: no; since 2004: proportionate liability[4]	no[5]	no (but permitted)[6]	1 year[7]	no	until 2002: no; since 2003: yes (7 years)[8], since 2006: 5 years[9]	yes[10]	no[11]
Austria	2009	no	yes[12]	partially (some services are forbidden)[13]	no (but permitted)[14]	1 year	no[15]	until 2004: no; since 2005: yes (5 years)[16]	until 2007: no; since 2008: yes[17]	yes[18]
Belgium	2009	no	until 2005: no; since 2006: yes (12 Mio. €)[19]	yes, entirely[20]	no (but permitted)[21]	3 years[22]	no	until 2007: no; since 2008: yes (6 years)[23]	until 2006: no; since 2007: yes[24]	until 2007: no; since 2008: yes[25]
Brazil	no	no (but national standards are close to ISAs)	no[26]	until 2004: no; since 2005: partially (some services are forbidden)[27]	no	since 1999: 5 years[28]; since 2012: 10 years[29]	since 1999: yes[30] (5 years): since 2011: 10 years[31]	until 2010: no; since 2011: partially[32]	until 2002: no; since 2003: yes[33]	until 2002: no since 2003: yes[34]
Canada[35]	no	until 2009: no since 2010: yes	until 2000: no; since 2001: proportionate liability with exceptions[36]	until 2003: no since 2004: partially (some services are forbidden)[37]	no	1 year[38]	no	until 2002: no since 2003: yes (5 years)[39]; since 2010 (7 years)[40]	until 2003: no since 2004: yes[41]	no
Czech Republic	2009	yes (since 2004; before 2004, national standards were based on ISAs)	proportionate liability[42]	no[43]	no[44]	none	no	until 2008: no; since 2009: yes (7 years)[45]	until 2008: no; since 2009: yes[46]	no[47]
Denmark	2008	yes (national standards are based on ISAs)	no[48]	no[49]	1930 - 2004: yes;[50] since 2005: no (but permitted)[51]	1 year	no	until 2002: no; since 2003: yes (7 years)[52]	until 2001: no; since 2002: yes[53]	until 2008: no; since 2009: yes[54]
Estonia	2010	yes (national standards are basically in line with ISAs)	proportionate liability[55]	no[56]	no (but permitted)[57]	none	no	until 2009: no; since 2010: yes (7 years)[58]	until 2009: no; since 2010: yes[59]	no

Tables

	Is Directive 2006/43/EC adopted?	Are the ISAs adopted?	Are there auditor liability caps?	Is the joint supply of audit and non-audit services forbidden?	Are joint audits required?	Max. time span of individual audit contracts	Is audit firm rotation mandatory?	Is audit partner rotation mandatory?	Do audit fees have to be published?	Are audit fees per client restricted?
Finland	2008	yes	no	no[60]	no (but permitted)[61]	none	no	until 2007: no; since 2008: yes (7 years)[62]	until 2002: no; since 2003: yes[63]	no
France	2008	yes (national standards are based on ISAs)	no	yes, entirely[64]	yes (for companies that publish consolidated accounts)[65]	6 years[66]	no	until 2003: no; since 2004: yes (6 years)[67]	until 2002: no; since 2003: yes[68]	no
Germany	2009	yes (national standards are based on ISAs)	since 1998: yes (4 Mio. €)[69]	until 2004: no; since 2005: partially (some services are forbidden)[70]	no (but permitted)[71]	1 year	no	yes (7 years)[72]	until 2004: no; since 2005: yes[73]	yes[74]
Greece	2009	no (national standards are based on ISAs of 2004)	yes[75]	no[76]	no (but permitted)[77]	1 year	no[78]	until 2008: no; since 2009: yes (7 years)[79]	until 2008: no; since 2009: yes[80]	no
Hungary	2008	yes	until 2007: no; since 2008: proportionate liability[81]	yes, entirely[82]	no (even forbidden)[83]	5 years[84]	no	until 2007: no; since 2008: yes (5 years)[85]	until 2007: no; since 2008: yes[86]	no
Ireland[87]	2010	until 2009: no (national standards were based on ISAs of 2004); since 2010: yes[88]	no	until 2004: no; since 2005: partially (some services are forbidden)[89]	no (but permitted)[90]	1 year[91]	no	until 2004: no; since 2005: yes (7 years)[92]	yes[93]	until 2004: no; since 2005: yes[94]
Italy	2009	yes (national standards are based on ISAs)	no	until 2005: no; since 2006: partially (some services are forbidden)[95]	no (even forbidden)[96]	3 years	since 1974: yes (9 years)[97]	until 2006: no; since 2007: yes[98]	until 2005: no; since 2006: yes[99]	no

Tables

	Is Directive 2006/ 43/EC adopted?	Are the ISAs adopted?	Are there auditor liability caps?	Is the joint supply of audit and non-audit services forbidden?	Are joint audits required?	Max. time span of individual audit contracts	Is audit firm rotation mandatory?	Is audit partner rotation mandatory?	Do audit fees have to be published?	Are audit fees per client restricted?
Japan	no	yes (national standards are based on ISAs)	no[100]	until 2003: no since 2004: partially (some services are forbidden)[101]	no	4 years[102]	no	until 2003: no since 2004: yes (5 or 7 years)[103]	until 2002: no; since 2003: yes[104]	no
Korean Republic	no	until 2009: no (but close to ISAs); since 2010: yes	no[105]	until 2002: no; since 2003: partially (some services are forbidden)[106]	no	3 years[107]	until 2002: no[108]; since 2003: yes[109] (6 years)	until: 2000: no; since 2001: yes (3 years)[110]	until 2000: no; since 2001: yes[111]	no
Luxembourg	2009	yes (national standards are based on ISAs)	no[112]	no[113]	no (but permitted)[114]	1 year	no	until 2009: no; since 2010: yes (7 years)[115]	until 2009: no; since 2010: yes[116]	no
Netherlands	2008	yes (national standards are based on ISAs)	no[117]	no[118]	no (even forbidden)[119]	1 year	no[120]	until 2006: no; since 2007: yes (7 years)[121]	until 2007: no; since 2008: yes[122]	no
Norway	no	yes (national standards are based on ISAs)	no	partially (some services are forbidden)[123]	no (even forbidden)[124]	1 year	no	until 2008: no; since 2009: yes[125]	yes[126]	no[127]
Poland	2009	yes (national standards are based on ISAs)	until 2008: no; since 2009: yes[128]	no[129]	no (but permitted)[130]	1 year	no	until 2008: no; since 2009: yes (5 years)[131]	until 2008: no; since 2009: yes[132]	until 2008: no; since 2009: yes[133]
Portugal	2008	yes (national standards are based on ISAs)	no	until 2008: no; since 2009: partially (some services are forbidden)[134]	no (even forbidden)[135]	4 years[136]	no	until 2008: no; since 2009: yes (7 years)[137]	until 2008: no; since 2009: yes[138]	no[139]
Slovenia	2008	yes (regulation refers to IAASB pronouncements)	yes[140]	until 2008: no; since 2009: partially (some services are forbidden)[141]	no (even forbidden)[142]	1 year	no	until 2008: no; since 2009: yes (7 years)[143]	until 2006: no; since 2007: yes[144]	no

Tables

	Is Directive 2006/43/EC adopted?	Are the ISAs adopted?	Are there auditor liability caps?	Is the joint supply of audit and non-audit services forbidden?	Are joint audits required?	Max. time span of individual audit contracts	Is audit firm rotation mandatory?	Is audit partner rotation mandatory?	Do audit fees have to be published?	Are audit fees per client restricted?
Spain	2010	no (only modified ISAs are adopted)	no[145]	no[146]	no (but permitted)[147]	3 years[148]	between 1989 and 1995: yes (9 years); since 1995: no[149]	until 2002: no; since 2003: yes (7 years)[150]	until 2002: no; since 2003: yes[151]	no
Sweden	2009	yes (national standards are based on the ISAs)	no	no[152]	no (but permitted)[153]	5 years[154]	no	until 2008: no; since 2009: yes (7 years)[155]	yes[156]	no
Switzerland	no	no (national standards were based on the ISAs of 2003)	no	no[157]	no (but permitted)	1 year	no	until 2007: no; since 2008: yes (7 years)[158]	until 2001: no; since 2002: yes[159]	until 2007: no; since 2008: yes[160]
Turkey	no[161]	no (ISAs will be adopted with the introduction of a new Commercial Code (enforcement July 2012)[162]	no	until 2002: no; since 2003: the provision of non-audit services is entirely forbidden[163]	no (but permitted)[164]	since 2003: 7 years[165]	until 2002: no; since 2003: yes[166]	no	no	no
United Kingdom	2008	until 2009: no (national standards were based on the ISAs of 2004); since 2010: yes[167]	no[168]	until 2004: no; since 2005: partially (some services are forbidden)[169]	no (but permitted)[170]	1 year	no	until 2004: no; since 2005: yes (5 years)[171]	yes[172]	until 2004: no; since 2005: yes[173]
US	no	no (but minor differences to ISAs)	proportionate liability[174]	until 2002: no; since 2003: partially (some services are forbidden)[175]	no (but permitted)[176]	1 year	no	until 2002: no; since 2003: yes (5 years)[177]	yes[178]	no

Table 1: Audit regulation in various countries.

Remarks on Table 1

[1] See *Commission of the European Communities* (2010b).
[2] See *International Federation of Accountants* (2010). Information is partly taken from *Le Vourc'h and Morand* (2011), p. 53f.
[3] If nothing else is specified, information is taken from *Le Vourc'h and Morand* (2011), p. 53f.
[4] Proportionate liability has been introduced in 2004 with the Audit Reform and Corporate Disclosure Act No. 103.
[5] Requirements regarding non-audit services are laid down in § 290.158 of the Accounting Professional & Ethical Standards (APES) 110: Code of Ethics for Professional Accountants from 2006, which is based on the International Federation of Accountants (IFAC) Code.
[6] This information was provided by the Australian Financial Reporting Council.
[7] See Div. 6, Subdiv. A of the Australian Corporations Act.
[8] A partner rotation after 7 years and a cooling-off period of 2 years has been introduced with the Professional Statement F1: Professional Independence (F1 2002) (31.12.2003).
[9] The maximum auditor tenure was shortened to 5 years with the Corporate Law Economic Reform Program 9 from 07/2004 (effective 2006). However, the Australian Securities and Investments Commission can extend this period for certain audit firms up to 7 years (see *Financial Reporting Council (Frc)* (2006).
[10] See § Aus 126.1 and Aus 126.2 of the Australian Accounting Standard Board (AASB) document 101, Presentation of Financial Statements. Since 2004, this regulation is also included in Sec. 300 of the Australian Corporations Act.
[11] This information was provided by the Australian Financial Reporting Council.
[12] According to §272 (2) UGB (Unternehmensgesetzbuch), the upper cap depends on the client's size and is between 2 and 12 Mio. €.
[13] Regulation regarding the supply of non-audit services can be found in §§ 271, 271a and 271b UGB (Unternehmensgesetzbuch).
[14] Information on regulation regarding joint audits was provided by the Austrian Ministry of Justice (Bundesministerium für Justiz).
[15] A mandatory audit firm rotation after six year was introduced in 2004, but abandoned before the effective date of the law (*Parlament Der Republik Österreich* (2005), p. 3: „Vor dem Hintergrund einer Harmonisierung der europäischen Bestimmungen der Rechnungslegung und verwandter Rechtsgebiete und einer Globalisierung der Finanzmärkte erscheint es sachgerecht, die österreichische Rechtslage diesen Entwicklungen anzupassen. Dies führt im Ergebnis ausnahmsweise dazu, dass § 271 Abs. 2 Z 9 und Abs. 4 Z 2 HGB noch vor ihrem Wirksamwerden zu ändern sind.")
[16] § 271a Abs. 1 Z 4 UGB (Unternehmensgesetzbuch) (effective 2005) requires the rotation of audit partners after 5 years.
[17] Disclosure of auditor fees is specified in § 266 Abs. 11 UGB (Unternehmensgesetzbuch) (effective 2008).
[18] The rules on fee caps can be found in §§ 271 Abs. 2 Nr. 7, 271a Abs. 1 Nr. 1 UGB (Unternehmensgesetzbuch).
[19] See *Commission of the European Communities* (2007). Belgium has a proportional liability system. However, the Belgian audit market is characterized by a low litigation risk (see *Knechel and Vanstraelen* (2007)).
[20] Independence requirements are laid down in the Royal Decree of January 10th, 1994, in Sections 133 and 134 of the Belgian Companies Code, and in Art. 183 to 186 of the Royal Decree of January 30th, 2001 (see *Pricewaterhousecoopers* (2009)). Independent issues are also described in the standards of the Belgian Institute of Registered Auditors (see *Institut Des Réviseurs D'entreprises (Ibr-Ire)* (2007)). See also *Vanstraelen and Willekens* (2008).
[21] If a joint audit is performed, a joint audit report must be issued (see *Commission of the European Communities* (2001b)).
[22] The maximum time span of audit contracts is specified in the Belgian Company Law, Section III, Art. 13. The auditor's term can be renewed without limitation for additional three-year periods (see *Knechel and Vanstraelen* (2007)).
[23] See *Institut Des Réviseurs D'entreprises (Ibr-Ire)* (2007), Standard 6.
[24] See *Van Caneghem* (2010).

[25] See *Institut Des Réviseurs D'entreprises (Ibr-Ire)* (2007), Standard 5.2. For calculating the critical fee threshold (20% of the audit firm network's total revenues within three years), the two years preceding the effective date of June 29th, 2008 are taken into account.
[26] See *Worldbank* (2005).
[27] See CVM Instruction 308 of 05/1999, Art. 23.
[28] An independent audit firm may not provide services for the same client for a period of more than five consecutive years. A minimum interval of three years before being re-contracted is required (see CVM Instruction 308 of 05/1999, Art. 31).
[29] Since 2012, companies that have an Audit Committee can hire an audit firm for up to 10 consecutive years (see CVM Instruction 509 of 11/2011).
[30] An independent audit firm may not provide services for the same client for a period of more than five consecutive years (see CVM Instruction 308 of 05/1999, Art. 31). From 2008 to 2011, due to the introduction of the IFRS this rule was postponed to 2011 (see *International Forum of Independent Audit Regulators* (2012)).
[31] Since 2012, companies with an Audit Committee can hire an audit firm for up to 10 consecutive years (see CVM Instruction 509 of 11/2011).
[32] According to information provided by the Brazil Audit Oversight (Comissao de Valores Mobiliarios (CVM)), for firms which extended their rotation period to 10 years, since 2011 the CVM requires rotation for key members of the engagement team after five years.
[33] See CVM Instruction 381 of 01/2003.
[34] The revenues an auditor can derive from a single client are restricted to 25% of the auditor's total revenues (see *Worldbank* (2005)).
[35] In 1985, the parliament enacted the Business Corporations Act, but the provinces and territories are still responsible for securities and accounting regulation. They are organized under the country-wide voluntary umbrella organizations Canadian Securities Administrators (CSA) and the Canadian Public Accountability Board (CPAB).
[36] See amendment to the Canadian Business Corporation Act from 2001. There is a proportionate liability for the respective share of judgment. If, however, the other defendants in the lawsuit are not able to pay, the auditor is liable for payments of up to 50% of his own liability.
[37] This rule has been introduced in 2004 by the Rules of Professional Conduct, Rule 204 of the Institute of Chartered Accountants of Alberta (ICAA) and its counterparts in the other provinces. The aggregate amount of all non-audit services may not exceed 5% of the total amount of fees paid to the external auditor during the fiscal year (see instrument Audit Committees MI 52-110, 2.4).
[38] See Canadian Business Corporation Act, Chapter 57, Part 7, Division 2.
[39] Disclosure of audit fees has been introduced in 2003 by the ICAA (Rules of Professional Conduct, Rule 204.4 (20)) and its counterparts in the other provinces.
[40] See ICAA Rules of Professional Conduct, Rule 204.4 (20) from 2010.
[41] This rule has been introduced in 2004 by the Ontario Securities Commission (OSC) with instrument Audit Committees MI 52-110 and part of an initiative by the members of the CSA.
[42] Auditors are held liable in proportion to their share of professional judgment.
[43] General independence issues are laid down in the Czech Corporate Governance Code (2004) (see *Czech Securities Commission* (2004)) and in Section 14 of the Czech Act on Auditors (2009) (effective March 26th, 2009).
[44] Information on regulation regarding joint audits was provided by the Czech Audit Public Oversight Council.
[45] Mandatory partner rotation has been implemented with Section 45 (3) of the Czech Act on Auditors (2009).
[46] The disclosure of auditor fees was introduced with the Czech Act on Auditors (2009), Section 43 (1ci).
[47] According to the Czech Audit Public Oversight Council, the amount of fees paid to the audit firm should not threaten auditor independence.
[48] Contractual limitations of auditors' liability are possible.
[49] The last change regarding the regulation on the joint provision of audit and non-audit services was made with the Executive Order No. 663 of June 26th, 2008, p. 2f.
[50] The Danish Companies Act had prescribed joint audits already in 1930; the regulation is laid down in the Danish Act on Commercial Enterprises' Presentation of Financial Statements, Chapter 25, 165 (6).

[51] For financial statements of fiscal years starting from 2005, joint audits have been disestablished in 2001 (see *André et al.* (2011) and *Lesage et al.* (2011)). According to information provided by the Danish Commerce and Companies Agency, joint audits are still permitted (see also *Holm and Thinggaard* (2010)). The responses to the Green paper indicate that 16 of Denmark's 64 largest public companies still voluntarily use a joint audit (see *Commission of the European Communities* (2011c), p. 27).

[52] Internal auditor rotation is laid down in the Danish Act on Approved Auditors and Audit Firms, Part 4, p. 25.

[53] Disclosure of auditor fees is specified in the Danish Act on Commercial Enterprises' Presentation of Financial Statements (June 7th, 2001), Section 96 (2).

[54] Restrictions regarding maximum fees per client have been implemented with the Danish Act on Approved Auditors and Audit Firms (2008), Part 4, p. 26. Thus, audit firms are not allowed to earn more than 20% of their turnover with the same client for five consecutive years.

[55] Auditors are held liable in proportion to their share of professional judgment.

[56] The joint supply of audit and non-audit services is regulated in the Estonian Accountant Act (January 27th, 2010), § 47 and § 59 (3) 3, (effective March 8th, 2010).

[57] Information on joint audits was provided by the Estonian Auditors Activities Oversight Council.

[58] Mandatory partner rotation has been implemented with the Estonian Accountant Act (January 27th, 2010), § 59 (1) 3 (effective March 8th, 2010).

[59] The disclosure of auditor fees has been implemented with the Estonian Accountant Act (January 27th, 2010), § 59 (1) 2 (effective March 8th, 2010).

[60] The joint provision of audit and non-audit services is regulated in the Finnish Auditing Act (459/2007), Sections 24 and 25 (effective July 1st, 2007).

[61] See *Karjalainen* (2009). According to information provided by the Auditing Board of the Central Chamber of Commerce (Tilintarkastuslautakunta (TILA)), joint audits are allowed, but not obligatory. If a joint audit is performed, a joint audit report must be issued (see *Commission of the European Communities* (2001b)).

[62] The requirement of internal auditor rotation has been established with the Finnish Auditing Act (459/2007), Section 27 (effective July 1st, 2007).

[63] The disclosure of auditor fees has been implemented with the Corporate Governance Recommendation for Listed Companies, Recommendation 54 (effective July 1st, 2004) (see *Corporate Governance Working Group* (2004)).

[64] The prohibition of the joint supply of audit and non-audit services was accepted in the Code de Commerce, Chapter II, Art. L822-11 II in 2004. Prior to 2004, similar regulations were included in the French Code of Ethics (see also *Gonthier-Besacier and Schatt* (2007), *Francis et al.* (2009), *André et al.* (2011), *Baker et al.* (2008), and *Mikol and Standish* (1998)).

[65] Joint audits are regulated in the Code de Commerce, Chapter II, Art. L 823-2 (effective already in 1966) (see also *Francis et al.* (2009), p. 59f, and *Lesage et al.* (2011), p. 3).

[66] The maximum time span of an audit contract is specified in the Code de Commerce, Chapter I, Art. L821-1 (4) (see also *André et al.* (2011)).

[67] The requirement of audit partner rotation is laid down in the Code de Commerce, L822-14 (effective 2004).

[68] Rules regarding the disclosure of auditor fees can be found in the Loi de Sécurité Financière (2003). Separate information has to be given on audit fees and on non-audit fees paid to each of the two auditors (see also *André et al.* (2011)).

[69] A liability cap exists already since 1931. With the Gesetz zur Kontrolle und Transparenz im Unternehmensbereich (KonTraG), the last change of the upper cap was made in 1998. Currently, the upper cap is 4 Mio. € for audits of listed companies (§ 323 (2) HGB (Handelsgesetzbuch)).

[70] Details on restrictions regarding the provision of non-audit services can be found in § 319, Abs. 3, Nr. 3 HGB (Handelsgesetzbuch), which was introduced with the "Bilanzrechtsreformgesetz (BilReG)" 2004 (effective 2005).

[71] For details on the regulation regarding joint audits, see *Idw Institut Der Wirtschaftsprüfer in Deutschland E. V.* (1999). Although joint audits are permitted, they are used very seldom: In 2011, for example, none of the DAX 30 companies had a joint audit.

[72] The internal auditor rotation with a cooling-off-period of 2 years is specified in § 319a, Abs. 1, Nr. 4 HGB (Handelsgesetzbuch).

[73] § 285, Satz 1, Nr. 17, and § 314, Abs. 1, Nr. 9 HGB (Handelsgesetzbuch). For fiscal years starting after December 31st, 2004, regulations of the BilReG (Bilanzrechtsreformgesetz) (2001), which was effective 2005, required disclosure of the *expenses* for audit and non-audit services in the client's notes to the financial statements. The BilMoG (Gesetz zur Modernisierung des Bilanzrechts), however, prescribes disclosure of the total *fees* charged by the audit firm. In addition, since 2007, audit firms providing audit services to public interest entities are obliged to publish a transparency report that also contains the total of audit and non-audit fees charged (§ 55c WPO (Wirtschaftsprüferordnung), introduced with the BARefG (Berufsaufsichtsreformgesetz)).

[74] See § 319, Abs. 3, Nr. 5 HGB (Handelsgesetzbuch). An auditor is not allowed to perform the audit for a company from which he/she has earned more than 30% of his/her total revenues during the last 5 years, and if this is expected to be the case also for the current fiscal year.

[75] According to *Commission of the European Communities* (2001a), p. 8, the upper cap is five times the total of the annual emoluments of the President of the Supreme Court or the total of the fees of the liable certified auditor in the previous financial year, provided that the latter exceeded the former limit.

[76] The last reform of the rules regarding the joint provision of audit and non-audit services was introduced with Law 3693/2008, Chapter IV, Art. 20 (2) and 23 (effective 2008).

[77] If a joint audit is performed, a joint audit report must be issued (see *Commission of the European Communities* (2001b)).

[78] External rotation of audit firms was formerly mandatory, but the requirement was removed in 1994 (see *Ruiz-Barbadillo et al.* (2009), Fn. 3).

[79] The rotation of audit partners was introduced with Law 3693/2008, Chapter X, Art. 38, 2A (effective 2008).

[80] Disclosure of auditor fees was introduced with Law 3693/2008, Chapter X, Art. 1 (i) (effective 2008).

[81] Auditors are held liable in proportion to their share of professional judgment.

[82] Information on the regulation of non-audit services was provided by the Chamber of Hungarian Auditors. The rules were revised by Act LXXV (2007); the relevant articles can be found in sections 53 and 63.

[83] Information on joint audits was provided by the Chamber of Hungarian Auditors.

[84] A similar regulation already existed before the introduction of Act LXXV (2007), Section 58 (1) (see *Worldbank* (2004)).

[85] The internal rotation has been implemented with the Act LXXV (2007), Section 58 (2) (effective 2008).

[86] Mandatory disclosure of auditor fees has been implemented with the Act LXXV (2007), Section 55 (i) (effective 2008).

[87] All statutory auditors in Ireland are also bound to the standards of the Auditing Practices Board (APB), which is part of the UK Financial Reporting Council (FRC).

[88] See *Auditing Practices Board* (2009b).

[89] Detailed requirements regarding the joint supply of non-audit services were introduced in 2004 with Ethical Standard 5, and revised in 2008 and 2010 (see *Auditing Practices Board* (2011)). Information on the Ethical Standards can also be found in *Beattie et al.* (2011).

[90] See section “Appointment of Auditors” - S160 of the Companies Act (1963) and section “Auditors Report” - S193 of the Companies Act (1990). A joint report, however, is not required (see *Commission of the European Communities* (2001b)).

[91] The duration of the audit contract is described in the S160 (1) of the Irish Companies Act (1963).

[92] Key partner rotation was introduced with Auditing Practices Board Ethical Standard 3 in 2004, and revised in 2008 and 2009 (see *Auditing Practices Board* (2009a)).

[93] Since 1963, audit fees have to be disclosed in the notes to the profit and loss account, however not separated into different categories (Companies Act of 1963, Sixth Schedual, Part I, 13). With Regulation 120 of Statutory Instrument 220 of 2010, the requirement for a detailed presentation of the fees has been inserted into Section 161D of the Companies Act for fiscal years ending on or after August 20th, 2010.

[94] See *Turley* (2008).

[95] The joint provision of audit and non-audit services is specified in the Decreto Legislativo (February 24th, 1998), n. 58, Art. 160 (modified December 23rd, 2005).

[96] According to information provided by the Italian audit oversight Commissione Nazionale per le Società e la Borsa (CONSOB), joint audits of two or more audit firms are forbidden (also see Commission of the European Communities (2001)).

[97] Decreto Legislativo (February 24th, 1998), n. 58, Art. 159 (4) prescribes the audit firm rotation. The cooling-off period is 3 years (see also *Cameran* (2008), p. 160).

[98] See Decreto Legislativo (February 24th, 1998), n. 58, Art. 160 (modified December 25th, 2006).

[99] See *Cameran* (2008).

[100] See Audit Special Exceptions Law of the Commercial Code.

[101] Restrictions have been introduced with Art. 24-2 and 34-11-2 of the Certified Public Accountant Act from 2003. Tax consulting had been already forbidden before 2004 (see Art. 52 Licensed Tax Accounting Law).

[102] See Japanese Company Law Article 336 (1).

[103] The 7 year partner rotation with a 2-year cooling-off period has been introduced with Art. 24-3 and 34-11-3 of the Certified Public Accountant Act from 2003. According to Art. 34-11-4 of the Certified Public Accountant Act from 2007, audit firms with 100 or more listed clients have to follow a 5-year rotation rule with a 5-year cooling-off period.

[104] Fee disclosure has been introduced in 2003 with the corporate disclosure system reform.

[105] See Art. 17 of the Korean Act on External Audit of Stock Companies from 12/1980.

[106] This regulation was implemented with Art. 21 (2) of Act No. 6994 from 12/2003 amending the Certified Public Accountant Act.

[107] See Art. 4-2 of the Act on External Audit of Stock Companies from 12/1980: Any stock-listed corporation shall appoint an auditor every 3 business years.

[108] From 1991 to 2002, Korea had a selective auditor rotation where the regulatory authority could designate an audit firm to clients with a high potential for financial manipulations (see *Kim and Yi* (2009)).

[109] Audit firm rotation has been introduced with Art. 4-2 (4) of Act No. 6991 of 12/2003 amending the Act on External Audit of Stock Companies.

[110] Audit partner rotation is mandatory due to Art. 3(5) and (6) from Act No. 6427 of 03/2001 amending the Act on External Audit of Stock Companies.

[111] Since 2001, audit hours and audit fees have to be published (see *Behn and Lee* (2009)).

[112] Contractual limitations of auditor liability are possible.

[113] Independence issues are described in the Luxembourg Law on the Audit Profession (December 18th, 2009), Chapter 3, Art. 19 (2).

[114] If a joint audit is performed, a joint audit report must be issued (see *Commission of the European Communities* (2001b)).

[115] Internal auditor rotation has been implemented with the Luxembourg Law on the Audit Profession (December 18th, 2009), Chapter 9, Art. 75 (2).

[116] The disclosure of auditor fees has been adopted with the Luxembourg Law on the Audit Profession (December 18th, 2009), Chapter 9, Art. 73 (i).

[117] Contractual limitations of auditor liability are possible.

[118] Further details on the scope of services can be found in the Dutch Audit Firms Supervision Act (January 19th, 2006), Art. 23 (b). On February 14th, 2012, however, the Dutch Parliament approved a bill that prohibits the provision of non-audit services to the company for which the auditor provides the statutory audit of the financial statements.

[119] According to information provided by the Netherlands Institute of Chartered Accountants (Nederlandse Beroepsorganisatie van Accountants (NBA)), it is permitted to hire two or more auditors. But according to the law, only one auditor is responsible for the audit report, and shared liability is not allowed.

[120] On February 14th, 2012, the Dutch Parliament approved a bill that requires external rotation after 8 years and a cooling-off period of 2 years. It is expected that mandatory audit firm rotation will be applicable as of January 2014.

[121] For the regulation on audit partner rotation, see the Dutch Audit Firms Supervision Act (19.01.2006), Art. 24 (1).

[122] Disclosure of auditor fees is laid down in the Dutch Audit Firms Supervision Act (19.01.2006), Art. 2:382a BW (enforced 2008).

[123] For details regarding the scope of services, see the Act on Auditing and Auditors (effective 1999), Sections 4-5 and 4-6; in 2005 amended by the Regulations on Auditing and Auditors, Sections 4-3, 4-4, and 4-5.

[124] Regulation regarding shared audits is contained in the Act on Auditing and Auditors (1999), Section 2-2; see also regulations contained in the Auditors Act (1964). According to information provided by the Department for Accounting and Auditing Supervision, an entity may elect more than one auditor, but in the last decades, this had not happened in practice. Moreover, if two or more auditors were to be elected, they would have to submit their own audit report (and not a single report), i.e., joint audits are prohibited (at least since 1999).

[125] For the regulation on partner rotation, see the Act on Auditing and Auditors (1999), Section 5a-4, revised in 2009 due to the Statutory Audit Directive (effective July 1st, 2009).

[126] The disclosure of auditor fees is mandatory since 1990 (see *Firth* (1997)).

[127] Fees from one client should not constitute such a large proportion of the auditor's total fees that they might influence auditor's independence (see Act on Auditing and Auditors (1999), Section 4-6).

[128] Liability caps have been introduced with the Act on Statutory Auditors, Their Self-Governing Organisation, Entities Authorised to Audit Financial Statements and on Public Oversight (7 May 2009), Art. 51.

[129] Non-audit services are described in the Act on Statutory Auditors, Their Self-Governing Organisation, Entities Authorised to Audit Financial Statements and on Public Oversight (7 May 2009), Art. 48 (2). Independence issues are described in Art. 56 (3).

[130] According to information provided by the Polish Ministry of Finance, joint audits are neither required nor prohibited by law.

[131] Independence issues are specified in the Act on Statutory Auditors, Their Self-Governing Organisation, Entities Authorised to Audit Financial Statements and on Public Oversight (7 May 2009), Art. 89 (1).

[132] The mandatory disclosure of auditor fees has been established with the Act on Statutory Auditors, Their Self-Governing Organisation, Entities Authorised to Audit Financial Statements and on Public Oversight (7 May 2009). This information was provided by the Polish Ministry of Finance.

[133] Restrictions regarding maximum fees per client have been established with the Act on Statutory Auditors, Their Self-Governing Organisation, Entities Authorised to Audit Financial Statements and on Public Oversight (7 May 2009). This information was provided by the Polish Ministry of Finance.

[134] The corresponding restriction on non-audit services has been introduced by the Decreto-Lei nº 224/2008 (Order of Chartered Accountants) (November 20th, 2008), Title 2, Section 5, Art. 68 (7-12).

[135] According to information provided by the Portuguese Institute of Statutory Auditors (Ordem dos Revisores Oficiais de Contas (OROC)), due to the Portuguese Commercial Companies Code and the Portuguese Commercial Registry Code, only one auditor can be appointed and be responsible for signing the audit report.

[136] See Decreto-Lei Nr. 487/99 (November 16th, 1999), Title II, Chapter I, Section II, Art. 54.

[137] Internal auditor rotation is specified in the Decreto-Lei nº 224/2008 (November 20th, 2008), Art. 54 (2).

[138] Disclosure of auditor fees is regulated in the Decreto-Lei nº 224/2008 (November 20th, 2008), Art. 62, 1 (i).

[139] Restrictions regarding maximum fees per client are contained in the Decreto-Lei nº 224/2008 (November 20th, 2008), Art. 68 (6): The risk of personal interest exists especially when the independence of the auditor may be endangered (…) by virtue of a direct or indirect financial contribution by the client or a reliance on the fees payable by the customer for audit or other services.

[140] See *Commission of the European Communities* (2001a), p. 9.

[141] Restrictions regarding the provision of non-audit services have been established with the Slovenian Auditing Act (ZRev-2) (June 30th, 2008), Art. 45 (1) (effective 2009).

[142] According to information provided by the Slovenian Agency for Public Oversight of Auditing, the possibility to perform joint audits is not set out in the Slovenian legislation.

[143] Audit partner rotation has been introduced with the Slovenian Auditing Act (ZRev-2) (June 30th, 2008), Art. 45 (2) (effective 2009).

[144] The mandatory disclosure of audit fees has been introduced with the Slovenian Companies Act (2006) (effective 2007).

[145] Contractual limitations of auditor liability are possible.

[146] Further details on the scope of services can be found in the Spanish Act on Auditing, approved by Royal Legislative Decree 1/2011 (July 1st, 2011), Art. 13.

[147] Joint audits are described in the By-Law Royal Decree 1636/1990 (December 29th, 1990), Art. 12.2.

[148] See Real Decreto Legislativo 1/2011 (July 1st, 2011), Chapter III, Art. 19 (1).

[149] Mandatory audit firm rotation has been introduced with the Spanish Audit Law, Art. 8.4 (enacted in 1988 in response to the Company Law Directives of the European Economic Union), and abandoned in 1995 (see *Ruiz-Barbadillo et al.* (2009)).

[150] Audit partner rotation has been introduced with the Spanish Act on Auditing (2002), which has been modified by the Act on Auditing approved by Royal Legislative Decree 1/2011 (July 1st, 2011), Art. 19.2.

[151] The disclosure of auditor fees has been implemented with the Spanish Financial System Reform Act (2002).

[152] Non-audit services are described in the Swedish Auditors Act (2001:883), Section 21 (effective January 1st, 2002).

[153] Swedish firms can voluntarily engage more than one audit firm to perform the audit (see also *Haapamäki et al.* (2011)). Although a joint audit report is not required, it is current practice if a joint audit is performed (see *Commission of the European Communities* (2001b)). According to information provided by the Swedish Supervisory Board of

Public Accountants (Revisorsnämnden), this regulation is effective at least since the Swedish Companies Act of 1975 (1975:103), which has been revised with the Companies Act of 2005 (2005:551).

[154] See Swedish Auditors Act (2001:883), Section 18: "The period of validity for approval, authorization and registration is five years."

[155] Audit partner rotation has been introduced with the Swedish Companies Act (2005:551), Chapter 9, Section 21 (effective July 1st, 2009).

[156] Disclosure of auditor fees was adopted with the Swedish Annual Accounts Act (1995:1554), Chapter 5 § 21.

[157] Non-audit services are described in Art. 729 of the Obligationenrecht. However, audit firms have to follow the "Independence Guidelines" of the Swiss Federal Audit Oversight Authority (Richtlinien zur Unabhängigkeit, December 6th, 2010). Thus, the auditor is not allowed to provide corporate finance, management consulting or IT services related to accounting, or to take over any management responsibility.

[158] The corresponding Art. 730a (2) has been added to the Obligationenrecht in 2005 (effective January 1st, 2008). The cooling-off period is three years.

[159] The disclosure of auditor fees has been introduced with the Corporate Governance-Richtlinie in 2002 (see *Swx Swiss Exchange* (2008)).

[160] See Revisionsaufsichtsgesetz (2005), Art. 11 (a) (effective January 1st, 2008): Fees earned from providing audit and non-audit services to a single entity are restricted to 10% of the audit firms' total fees.

[161] Some parts of Directive 2006/43/EC have been adopted (e.g., the liability requirements).

[162] See *Worldbank* (2007).

[163] A restriction on the provision of non-audit services has been introduced in 2002 (see *Capital Markets Board of Turkey* (2002a)).

[164] Under certain conditions, joint audits are allowed (see *Worldbank* (2007)).

[165] See *Capital Markets Board of Turkey* (2002b).

[166] A mandatory rotation of audit firms has been introduced in 2002 (see *Capital Markets Board of Turkey* (2002b)); listed companies and financial institutions have to change their audit firms after a continued auditor-client contractual relationship of 7 years, at the maximum. The first mandatory audit firm changes thus took place in 2010.

[167] See *Auditing Practices Board* (2009b).

[168] Contractual limitations of auditor liability are possible.

[169] Detailed requirements on non-audit services have been introduced with Ethical Standard 5 in 2004 and revised in 2008 and 2010 (see *Auditing Practices Board* (2011).

[170] If a joint audit is performed, a joint audit report must be issued (see *Commission of the European Communities* (2001b)).

[171] Key partner rotation has been implemented with Auditing Practices Board Ethical Standard 3 in 2004 and revised in 2008 and 2009 (see *Auditing Practices Board* (2009a)).

[172] The disclosure of auditor fees has been implemented already in 1991 and has been revised in Statutory Instrument (2005), No. 2417, Nr. 4.

[173] See *Turley* (2008).

[174] Auditors are held liable in proportion to their share of professional judgment (a detailed discussion of the US liability rules can be found in *Hemraj* (2002).

[175] The Sarbanes-Oxley Act of 2002, Title II, Sec. 201 (g) prohibits any registered audit firm from providing to public companies bookkeeping, financial information system design or implementation, appraisal and valuation services, actuarial services, internal audit outsourcing, management and human resources functions, investment advising services, legal services, and expert services. Sec. 202 clarifies that the statutory auditor can supply some kinds of non-audit services, but only if the audit committee approves this course of action.

[176] Information was provided by the United States Securities and Exchange Commission (SEC).

[177] Audit partner rotation has been implemented with the Sarbanes-Oxley Act of 2002, Title II, Sec. 203 (j). The cooling-off period for key audit partners is 2 years.

[178] The disclosure of auditor fees was introduced in 2000 (see *Securities and Exchange Commission* (2000); see also *Choi et al.* (2008), p. 68).

Tables

Tables

Country	Number of companies		Percentage of companies		Number of audit firms		Total assets (*TA*) in Mio. US-$		ln(*TA*) in Mio. US-$	
	n	(std.)	%	(std.)	n	(std.)	mean	(std.)	mean	(std.)
Australia	1'154	(340.95)	74%	(0.22)	79	(7.17)	433'297	(238'509)	18'441	(5'661)
Austria	55	(9.92)	80%	(0.14)	14	(2.27)	95'033	(41'696)	1'056	(179)
Belgium	85	(13.26)	76%	(0.12)	25	(3.39)	102'379	(28'284)	1'579	(218)
Brazil	220	(37.90)	81%	(0.14)	39	(10.88)	499'065	(356'670)	4'234	(742)
Canada	960	(180.46)	78%	(0.15)	85	(12.76)	768'516	(343'158)	16'370	(3'481)
Czech Republic	14	(3.37)	86%	(0.21)	10	(1.79)	21'673	(14'964)	264	(69)
Denmark	103	(11.41)	88%	(0.10)	12	(2.88)	123'890	(52'628)	1'904	(216)
Estonia	7	(1.79)	79%	(0.20)	4	(0.85)	2'185	(1'820)	132	(38)
Finland	103	(5.22)	95%	(0.05)	12	(2.18)	187'250	(43'701)	1'983	(128)
France	520	(65.75)	79%	(0.10)	138	(31.37)	2'124'998	(642'062)	9'770	(1'222)
Germany	562	(71.65)	77%	(0.10)	129	(21.35)	2'119'535	(559'649)	10'386	(1'376)
Greece	230	(21.35)	92%	(0.09)	15	(1.42)	117'443	(41'119)	4'251	(455)
Hungary	18	(4.45)	71%	(0.17)	9	(3.47)	22'622	(8'729)	348	(78)
Ireland	41	(7.32)	72%	(0.13)	7	(0.97)	82'496	(25'604)	777	(142)
Italy	198	(29.13)	88%	(0.13)	13	(1.66)	795'263	(239'091)	3'940	(610)
Japan	3'060	(325.28)	90%	(0.10)	180	(8.20)	5'205'402	(995'837)	59'271	(6'312)
Korean Republic	997	(59.16)	93%	(0.05)	63	(14.94)	1'149'817	(411'660)	18'706	(1'348)
Luxembourg	19	(2.83)	77%	(0.11)	9	(0.79)	114'719	(73'653)	382	(57)
Netherlands	112	(12.02)	87%	(0.09)	10	(1.91)	444'956	(171'316)	2'189	(241)
Norway	119	(24.62)	78%	(0.16)	10	(1.91)	196'390	(78'671)	2'263	(508)
Poland	226	(74.17)	76%	(0.25)	61	(16.96)	62'706	(31'588)	3'964	(1'330)
Portugal	44	(2.68)	87%	(0.05)	19	(2.67)	120'674	(45'667)	863	(69)
Slovenia	11	(0.84)	96%	(0.08)	4	(0.57)	11'194	(5'090)	215	(21)
Spain	93	(8.29)	92%	(0.08)	11	(0.94)	637'026	(299'373)	1'919	(202)
Sweden	270	(60.81)	74%	(0.17)	23	(5.62)	281'450	(82'057)	4'763	(1'064)
Switzerland	160	(12.58)	90%	(0.07)	13	(1.55)	480'116	(130'928)	3'164	(261)
Turkey	172	(16.16)	91%	(0.09)	28	(4.50)	96'155	(48'673)	3'238	(380)
United Kingdom	1'004	(219.54)	77%	(0.17)	70	(14.62)	1'915'295	(552'299)	17'964	(3'960)
US	3'878	(500.13)	71%	(0.09)	261	(27.40)	10'013'496	(2'007'559)	68'472	(8'694)
***EU*[#]**	*3'726*	(*591.57*)	*80%*	(*0.13*)	*440*	(*77.63*)	*9'386'032*	(*2'871'411*)	*68'823*	(*11'168*)

Table 2: Mean of number of companies, percentages of companies from a country taken into account, number of audit firms, total assets audited, and natural logarithm of total assets (averages per country across the period 2001 – 2010);
([#]: EU-countries only).

Tables

		Spearman Correlation				
		CR_4 (M)	***CR_4 (ln(TA))***	***HHI (M)***	***HHI (ln(TA))***	***AC_R***
Pearson Correlation	***CR_4 (M)***	1	0.9956	0.9582	0.9586	-0.0831
	CR_4 (ln(TA))	0.9962	1	0.9479	0.9540	0.0820
	HHI (M)	0.9049	0.8917	1	0.9963	-0.0094
	HHI (ln(TA))	0.9090	0.9005	0.9978	1	-0.0049
	AC_R	-0.1490	-0.1440	-0.0203	-0.0241	1

Table 3: *Spearman* and *Pearson* correlation coefficients between our yearly concentration metrics *CR_4 (M)*, *CR_4 (ln(TA))*, *HHI (M)*, *HHI (ln(TA))*, *and AC_R*.

Tables

Country	N	CR_4 (M)					CR_4 (ln(TA))					HHI (M)				HHI (ln(TA))				AC_R	
	mean	value	(std.)	*	**	***	value	(std.)	*	**	***	value	(std.)	+	++	value	(std.)	+	++	value	(std.)
Australia	1'154	0.47	(0.05)	0	0	10	0.50	(0.05)	0	0	10	0.077	(0.01)	0	0	0.082	(0.01)	1	0	0.07	(0.01)
Austria	55	0.73	(0.05)	3	4	1	0.73	(0.05)	2	5	0	0.188	(0.02)	8	2	0.191	(0.02)	7	3	0.26	(0.04)
Belgium	85	0.61	(0.05)	1	0	9	0.63	(0.04)	0	2	8	0.119	(0.02)	10	0	0.124	(0.02)	10	0	0.30	(0.04)
Brazil	220	0.66	(0.05)	0	0	10	0.68	(0.05)	0	0	10	0.134	(0.02)	10	0	0.142	(0.02)	10	0	0.18	(0.05)
Canada	960	0.68	(0.03)	0	0	10	0.72	(0.03)	0	0	10	0.128	(0.01)	10	0	0.142	(0.01)	10	0	0.09	(0.01)
Czech Republic	14	0.56	(0.04)	0	0	0	0.59	(0.04)	0	0	0	0.130	(0.02)	10	0	0.135	(0.02)	10	0	0.74	(0.13)
Denmark	103	0.83	(0.05)	0	3	5	0.85	(0.05)	0	2	6	0.216	(0.03)	4	6	0.226	(0.03)	3	7	0.12	(0.03)
Estonia	7	1.00	(0.00)	-	-	-	1.00	(0.00)	-	-	-	0.373	(0.11)	10	0	0.368	(0.11)	0	10	0.49	(0.12)
Finland	103	0.91	(0.03)	0	0	10	0.91	(0.03)	0	0	10	0.278	(0.01)	10	0	0.282	(0.01)	0	10	0.12	(0.02)
France	520	0.58	(0.05)	0	0	10	0.61	(0.05)	0	0	10	0.097	(0.02)	3	0	0.104	(0.02)	3	0	0.27	(0.06)
Germany	562	0.53	(0.03)	0	0	10	0.55	(0.03)	0	0	10	0.084	(0.01)	1	0	0.091	(0.01)	1	0	0.23	(0.04)
Greece	230	0.72	(0.05)	1	3	2	0.72	(0.05)	1	2	2	0.219	(0.05)	6	4	0.213	(0.06)	6	4	0.06	(0.01)
Hungary	18	0.73	(0.12)	0	0	0	0.76	(0.11)	0	0	0	0.174	(0.05)	6	4	0.183	(0.05)	5	5	0.51	(0.19)
Ireland	41	0.91	(0.03)	0	0	0	0.91	(0.03)	0	0	0	0.257	(0.03)	0	10	0.262	(0.03)	0	10	0.16	(0.02)
Italy	198	0.86	(0.03)	0	1	9	0.87	(0.03)	0	1	9	0.209	(0.02)	3	7	0.212	(0.02)	1	9	0.07	(0.01)
Japan	3'060	0.79	(0.04)	0	0	10	0.79	(0.04)	0	0	10	0.171	(0.01)	10	0	0.172	(0.01)	10	0	0.06	(0.00)
Korean Republic	997	0.59	(0.05)	0	0	10	0.60	(0.05)	0	0	10	0.107	(0.01)	9	0	0.111	(0.01)	9	0	0.06	(0.01)
Luxembourg	19	0.72	(0.07)	0	0	0	0.75	(0.07)	0	0	0	0.168	(0.02)	9	1	0.178	(0.03)	8	2	0.46	(0.04)
Netherlands	112	0.87	(0.03)	1	2	3	0.89	(0.03)	1	0	5	0.205	(0.01)	4	6	0.213	(0.01)	0	10	0.09	(0.02)
Norway	119	0.91	(0.03)	1	1	7	0.92	(0.03)	1	1	7	0.264	(0.03)	1	9	0.267	(0.03)	1	9	0.08	(0.02)
Poland	226	0.42	(0.06)	0	0	10	0.42	(0.06)	0	0	10	0.064	(0.01)	0	0	0.066	(0.01)	0	0	0.27	(0.07)
Portugal	44	0.62	(0.12)	0	7	0	0.64	(0.11)	0	5	2	0.161	(0.06)	7	1	0.172	(0.06)	4	4	0.43	(0.06)
Slovenia	11	0.99	(0.03)	0	0	0	0.99	(0.03)	0	0	0	0.330	(0.07)	0	10	0.331	(0.07)	0	10	0.37	0.05)
Spain	93	0.89	(0.02)	0	0	10	0.90	(0.02)	0	1	9	0.257	(0.01)	0	10	0.265	(0.01)	0	10	0.12	(0.01)
Sweden	270	0.82	(0.04)	0	0	10	0.83	(0.04)	0	0	10	0.204	(0.02)	7	3	0.209	(0.02)	4	6	0.09	(0.02)
Switzerland	160	0.90	(0.01)	0	1	9	0.91	(0.01)	0	0	10	0.262	(0.01)	0	10	0.268	(0.01)	0	10	0.08	(0.01)
Turkey	172	0.59	(0.03)	0	1	8	0.59	(0.03)	0	1	8	0.115	(0.01)	10	0	0.117	(0.01)	10	0	0.16	(0.03)
United Kingdom	1'004	0.58	(0.04)	0	0	10	0.61	(0.04)	0	0	10	0.105	(0.01)	5	0	0.115	(0.01)	9	0	0.07	(0.01)
US	3'878	0.62	(0.06)	0	0	10	0.68	(0.05)	0	0	10	0.106	(0.02)	6	0	0.126	(0.02)	10	0	0.07	(0.01)
***EU*#**	3'726	0.59	(0.02)	0	0	10	0.62	(0.02)	0	0	10	0.097	(0.01)	3	0	0.105	(0.01)	8	0	0.12	(0.02)

Table 4: Mean Concentration Ratios $CR_{4,t}$, *Hirschmann-Herfindahl*-Indices HHI_t, and Auditor-Client Ratios AC_R_t. Columns *, **, and *** indicate the number of years for which $CR_{4,t}$ is significant at the 10%, 5%, and 1% level according to the test proposed by *Parker* (1991). For –, the number of auditors was insufficient for calculating significance levels. Columns + and ++ denote the number of years for which the HHI_t, due to EU-legislation, indicates a moderately concentrated market and a highly concentrated market respectively. ($^{\#}$: only EU-countries in the data).

Tables

	US	US since 2010[41]	European Legislation
Not concentrated market	HHI < 0.15	HHI < 0.10	HHI < 0.10
Moderately concentrated market	0.15 ≤ HHI ≤ 0.25	0.10 ≤ HHI ≤ 0.18	0.10 ≤ HHI ≤ 0.20
Highly concentrated market	HHI > 0.25	HHI > 0.18	HHI > 0.20

Table 5: Critical values for the *Hirschmann-Herfindahl*-Index according to legislation in the EU and in the US.

[41] See *U.S. Department of Justice and the Federal Trade Commission* (2010).

Tables

Dependent variables	*CR_4 (M)*	Combined market share (based on the number of audit clients) of the four largest audit firms in year *t* within a country.
	HHI (M)	*Hirschmann-Herfindahl*-Index for a country in year *t*, based on the number of audit clients.
	CR_4 (ln(TA))	Combined market share (based on the natural logarithm of the total assets audited) of the four largest audit firms in year *t* within a country.
	HHI (ln(TA))	*Hirschmann-Herfindahl*-Index for a country in year *t*, based on the natural logarithm of the total assets audited.
	AC_R	Number of audit firms active on the audit market of a country in year *t*, divided by the mean number of companies in a country (average across years 2001 – 2010).
Explanatory variables	*EU_Dir_06*	Dummy variable coded 1 if the Directive on Statutory Audits (2006/43/EC) was fully adopted at the beginning of year *t*, 0 otherwise
	Liab_Cap	Dummy variable coded 1 if there was an upper limit for an audit firm's liability in year *t*, 0 otherwise.
	Liab_Reg	Dummy variable coded 1 if there was proportionate liability for audit firms in year *t*, 0 otherwise.
	NAS_const	Dummy variable coded 1 if the scope of non-audit services statutory auditors are allowed to provide to their audit clients was restricted in year *t*, 0 otherwise.
	NAS_forb	Dummy variable coded 1 if the joint supply of audit and non-audit service was entirely forbidden in year *t*, 0 otherwise.
	Fee_Cap	Dummy variable coded 1 if in year *t* there was an upper limit for the total fees paid from a single client to the auditor, 0 otherwise.
	Joint_man	Dummy variable coded 1 if joint audits were mandatory in year *t*, 0 otherwise.
	Part_Rot	Dummy variable coded 1 if audit partner rotation was mandatory in year *t*, 0 otherwise.
	Firm_Rot	Dummy variable coded 1 if audit firm rotation was mandatory in year *t*, 0 otherwise
	Fee_Disc	Dummy variable coded 1 if in year *t* companies had to disclose their fees for audit and non-audit services in their annual report, 0 otherwise.
Controls	*Market_Cap*	Market capitalization of all companies listed on a country's stock exchange in percent of the country's *GDP* in year *t*.
	FDI	Net inflow (new investment inflows less disinvestment) of foreign investors in percentage of *GDP* in year *t*.
	IFRS_Share	Share of firms within a country that prepared financial statements on the basis of IFRS in year *t*.
	Gov_Eff	The yearly measure "Government Effectiveness" taken from *Kaufmann et al.* (2012).
	$Year_t$	Dummy variable coded 1 if year is $t = 2001, \ldots, 2010$; 0 otherwise.

Table 6: Dependent variables, explanatory variables, and controls of our study.

Tables

Country	*Market_Cap*		*FDI*		*IFRS_Share*		*Gov_Eff*	
	value	**std.**	**value**	**std.**	**value**	**std.**	**value**	**std.**
Australia	118.81	(26.19)	2.75	(3.05)	0.01	(0.02)	1.80	(0.09)
Austria	29.14	(18.53)	5.04	(9.61)	0.80	(0.18)	1.85	(0.10)
Belgium	65.98	(19.09)	15.02	(8.76)	0.58	(0.37)	1.73	(0.19)
Brazil	55.27	(23.08)	2.45	(0.79)	0.10	(0.28)	0.01	(0.09)
Canada	114.53	(27.43)	2.99	(2.38)	0.00	(0.00)	1.89	(0.07)
Czech Republic	26.34	(7.94)	5.21	(3.24)	0.67	(0.43)	0.95	(0.07)
Denmark	63.44	(16.21)	1.44	(2.99)	0.53	(0.40)	2.20	(0.10)
Estonia	27.06	(13.38)	9.95	(4.52)	0.89	(0.24)	1.01	(0.18)
Finland	98.64	(39.93)	2.63	(2.09)	0.63	(0.47)	2.17	(0.09)
France	80.63	(16.93)	2.72	(1.05)	0.46	(0.39)	1.61	(0.13)
Germany	45.44	(10.33)	1.35	(0.94)	0.62	(0.25)	1.62	(0.12)
Greece	51.23	(23.14)	0.83	(0.64)	0.57	(0.48)	0.69	(0.09)
Hungary	24.36	(7.78)	11.66	(23.28)	0.79	(0.13)	0.86	(0.13)
Ireland	47.07	(22.59)	5.21	(11.95)	0.52	(0.41)	1.57	(0.15)
Italy	37.70	(14.61)	1.05	(0.70)	0.60	(0.47)	0.60	(0.19)
Japan	78.28	(19.91)	0.18	(0.21)	0.00	(0.00)	1.36	(0.15)
Korean Republic	73.81	(26.34)	0.48	(0.36)	0.01	(0.01)	1.04	(0.13)
Luxembourg	164.67	(64.63)	346.09	(101.02)	0.73	(0.25)	1.80	(0.17)
Netherlands	91.24	(23.19)	5.21	(5.59)	0.54	(0.40)	1.89	(0.15)
Norway	55.99	(20.56)	1.81	(1.01)	0.58	(0.48)	1.91	(0.11)
Poland	28.58	(12.80)	3.48	(1.46)	0.49	(0.35)	0.52	(0.08)
Portugal	39.44	(8.90)	2.49	(1.80)	0.57	(0.45)	1.04	(0.13)
Slovenia	27.46	(13.57)	2.26	(2.21)	0.63	(0.44)	1.01	(0.11)
Spain	86.50	(18.64)	3.36	(1.58)	0.57	(0.45)	1.31	(0.43)
Sweden	104.27	(27.58)	4.11	(2.56)	0.49	(0.38)	1.99	(0.08)
Switzerland	237.45	(41.13)	4.43	(3.44)	0.67	(0.12)	2.00	(0.10)
Turkey	28.92	(10.17)	1.80	(1.18)	0.69	(0.41)	0.17	(0.13)
United Kingdom	128.62	(23.35)	3.99	(2.29)	0.46	(0.42)	1.72	(0.12)
US	123.71	(20.35)	1.35	(0.51)	0.00	(0.00)	1.60	(0.13)

Table 7: Descriptive statistics for the control variables. All values are calculated over the years $t = 2001, \ldots, 2010$.

Tables

$C_{kt} = const + b_1 \cdot EU\_Dir\_06 + b_2 \cdot Liab\_Cap + b_3 \cdot Liab\_Reg + b_4 \cdot NAS\_const + b_5 \cdot NAS\_forb + b_6 \cdot Fee\_Cap + b_7 \cdot Joint\_Man + b_8 \cdot Part\_Rot + b_9 \cdot Firm\_Rot + b_{10} \cdot Fee\_Disc + b_{11} \cdot Market\_Cap + b_{12} \cdot FDI + b_{13} \cdot IFRS\_Share + b_{14} \cdot Gov\_Eff + \sum b_t \cdot Year_t + \varepsilon_{kt}$

	CR_4 (M)			***CR_4 (ln(TA))***			***HHI (M)***			***HHI (ln(TA))***			***AC_R***		
EU_Dir_06	0.009	(0.014)		0.01	(0.012)		0.003	(0.008)		0.002	(0.008)		0.007	(0.019)	
Liab_Cap	-0.049	(0.031)		-0.047	(0.026)	*	-0.006	(0.015)		-0.006	(0.014)		0.021	(0.017)	
Liab_Reg	-0.150	(0.043)	***	-0.150	(0.037)	***	-0.053	(0.022)	**	-0.053	(0.02)	**	0.153	(0.103)	
NAS_const	-0.012	(0.014)		-0.012	(0.013)		-0.001	(0.014)		0.001	(0.014)		-0.007	(0.016)	
NAS_forb	-0.084	(0.025)	***	-0.080	(0.024)	***	-0.048	(0.03)		-0.045	(0.03)		0.069	(0.039)	*
Fee_Cap	-0.032	(0.021)		-0.034	(0.021)		-0.023	(0.009)	**	-0.024	(0.01)	**	0.031	(0.013)	**
Joint_man	0.090	(0.017)	***	0.088	(0.016)	***	0.067	(0.014)	***	0.066	(0.014)	***	-0.037	(0.017)	**
Part_Rot	0.004	(0.012)		0.006	(0.01)		0.001	(0.005)		0.002	(0.005)		-0.015	(0.012)	
Firm_Rot	0.036	(0.009)	***	0.033	(0.008)	***	0.011	(0.021)		0.010	(0.021)		-0.023	(0.024)	
Fee_Disc	0.009	(0.013)		0.007	(0.012)		0.004	(0.007)		0.004	(0.007)		-0.004	(0.014)	
Market_Cap	0.030	(0.015)	*	0.027	(0.014)	*	0.006	(0.014)		0.005	(0.014)		0.004	(0.019)	
FDI	-0.001	(0.000)	***	-0.001	(0.000)	***	-0.001	(0.000)	**	-0.001	(0.000)	**	0.001	(0.000)	
IFRS_Share	0.016	(0.034)		0.013	(0.032)		0.005	(0.019)		0.003	(0.019)		-0.010	(0.031)	
Gov_Eff	0.026	(0.025)		0.025	(0.023)		0.050	(0.035)		0.050	(0.035)		-0.049	(0.047)	
const	0.691	(0.043)	***	0.707	(0.039)	***	0.105	(0.049)	**	0.109	(0.047)	**	0.216	(0.066)	***
n	290			290			290			290			290		
N	29			29			29			29			29		
F-Statistic	4.428			4.847			2.358			2.401			3.585		
prob F	0.000			0.000			0.001			0.001			0.000		
R^2	0.300			0.319			0.186			0.188			0.257		

Table 8: Results of our main regressions (robust standard errors in parentheses). *, ** and *** indicate significance at the 10%, 5%, and 1% level, respectively. The R^2 shows the model fit after the country-fixed-effects are subtracted. Year dummies are included in the model, but not tabulated.

Tables

$CR_{4,kt} = const + b_1 \cdot EU\_Dir\_06 + b_2 \cdot Liab\_Cap + b_3 \cdot Liab\_Reg + b_4 \cdot NAS\_const + b_5 \cdot NAS\_forb + b_6 \cdot Fee\_Cap + b_7 \cdot Joint\_Man + b_8 \cdot Part\_Rot + b_9 \cdot Firm\_Rot + b_{10} \cdot Fee\_Disc + b_{11} \cdot Market\_Cap + b_{12} \cdot FDI + b_{13} \cdot IFRS\_Share + b_{14} \cdot Gov\_Eff + \sum b_t \cdot Year_t + \varepsilon_{kt}$

	"Rule of Law"* instead of *Gov_Eff		**Without *EU_Dir _06***		**Without former socialist countries**		**Without $CR_4 = 1$ countries**		**EU countries only**		**Without year 2001**		**Without years 2001 and 2010**	
	M	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***
EU_Dir_06	0.01 (0.013)	0.011 (0.012)	- -		0.021 (0.014)	0.02 (0.013)	0.01 (0.014)	0.011 (0.013)	0.011 (0.015)	0.011 (0.015)	0.013 (0.013)	0.013 (0.012)	0.004 (0.014)	0.004 (0.013)
Liab_Cap	-0.05 (0.03)	-0.049 * (0.025)	-0.048 (0.031)	-0.047 * (0.025)	-0.026 (0.019)	-0.029 (0.019)	-0.052 (0.033)	-0.05 * (0.027)	-0.047 * (0.027)	-0.048 ** (0.021)	-0.045 (0.032)	-0.045 (0.027)	-0.04 (0.026)	-0.043 * (0.022)
Liab_Reg	-0.15 *** (0.045)	-0.149 *** (0.039)	-0.149 *** (0.042)	-0.148 *** (0.036)	-0.104 *** (0.021)	-0.111 *** (0.019)	-0.15 *** (0.044)	-0.15 *** (0.038)	-0.207 *** (0.027)	-0.198 *** (0.024)	-0.15 *** (0.04)	-0.15 *** (0.035)	-0.16 *** (0.05)	-0.161 *** (0.046)
NAS_const	-0.012 (0.015)	-0.011 (0.014)	-0.013 (0.014)	-0.012 (0.013)	-0.025 (0.015)	-0.023 (0.014)	-0.012 (0.016)	-0.012 (0.015)	-0.013 (0.019)	-0.012 (0.018)	-0.012 (0.013)	-0.014 (0.013)	-0.016 (0.014)	-0.019 (0.013)
NAS_forb	-0.082 *** (0.017)	-0.08 *** (0.016)	-0.088 *** (0.026)	-0.085 *** (0.025)	-0.099 *** (0.031)	-0.095 *** (0.03)	-0.09 *** (0.029)	-0.087 *** (0.028)	- -		-0.11 *** (0.026)	-0.102 *** (0.027)	-0.111 *** (0.024)	-0.104 *** (0.025)
Fee_Cap	-0.033 (0.022)	-0.034 (0.021)	-0.033 (0.021)	-0.034 (0.021)	-0.029 (0.024)	-0.032 (0.023)	-0.034 (0.022)	-0.035 (0.022)	-0.036 (0.023)	-0.034 (0.023)	-0.026 (0.021)	-0.026 (0.02)	-0.03 (0.022)	-0.03 (0.022)
Joint_man	0.085 *** (0.015)	0.083 *** (0.015)	0.089 *** (0.016)	0.087 *** (0.016)	0.111 *** (0.021)	0.108 *** (0.02)	0.095 *** (0.02)	0.094 *** (0.019)	0.084 *** (0.018)	0.082 *** (0.018)	0.079 *** (0.016)	0.08 *** (0.016)	0.083 *** (0.016)	0.083 *** (0.016)
Part_Rot	0.003 (0.012)	0.005 (0.01)	0.005 (0.012)	0.007 (0.011)	0 (0.012)	0.002 (0.011)	0.004 (0.013)	0.006 (0.011)	0.012 (0.014)	0.011 (0.012)	0.001 (0.011)	0.003 (0.01)	0.008 (0.013)	0.011 (0.011)
Firm_Rot	0.039 *** (0.012)	0.037 *** (0.012)	0.039 *** (0.008)	0.036 *** (0.007)	0.035 *** (0.01)	0.032 *** (0.009)	0.037 *** (0.01)	0.033 *** (0.009)	- -		0.041 *** (0.012)	0.038 *** (0.014)	0.047 *** (0.014)	0.043 ** (0.016)
Fee_Disc	0.009 (0.013)	0.007 (0.012)	0.011 (0.012)	0.01 (0.011)	0.014 (0.015)	0.01 (0.014)	0.01 (0.013)	0.008 (0.012)	0.006 (0.011)	0.006 (0.011)	0.005 (0.013)	0.006 (0.012)	0.01 (0.014)	0.011 (0.013)
Market_ Cap	0.031 * (0.016)	0.027 * (0.016)	0.03 * (0.015)	0.026 * (0.014)	0.033 * (0.019)	0.028 (0.018)	0.033 * (0.016)	0.029 * (0.015)	0.024 (0.016)	0.019 (0.015)	0.038 ** (0.015)	0.035 ** (0.015)	0.031 * (0.016)	0.03 * (0.015)
FDI	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)	-0.001 *** (0.000)
IRFS_ Share	0.013 (0.031)	0.01 (0.03)	0.019 (0.034)	0.016 (0.032)	0.019 (0.037)	0.017 (0.035)	0.023 (0.037)	0.02 (0.035)	0.034 (0.062)	0.027 (0.057)	0.009 (0.032)	0.007 (0.031)	0.003 (0.036)	0.001 (0.035)
Gov_Eff	0.018 (0.057)	0.021 (0.056)	0.027 (0.024)	0.026 (0.022)	0.044 * (0.025)	0.043 * (0.024)	0.035 (0.029)	0.035 (0.027)	0.003 (0.026)	0.001 (0.023)	0.026 (0.027)	0.026 (0.026)	0.029 (0.029)	0.03 (0.028)
const	0.705 *** (0.069)	0.715 *** (0.068)	0.689 *** (0.042)	0.705 *** (0.038)	0.622 *** (0.048)	0.644 *** (0.045)	0.647 *** (0.05)	0.664 *** (0.045)	0.742 *** (0.056)	0.759 *** (0.051)	0.727 *** (0.054)	0.746 *** (0.049)	0.709 *** (0.059)	0.725 *** (0.055)

Tables

n =	290	290	290	290	240	240	270	270	200	200	261	261	232	232
N =	29	29	29	29	24	24	27	27	20	20	29	29	29	29
F-Statistic	4.349	4.774	4.401	4.809	3.323	3.665	4.370	4.816	3.511	3.684	4.339	4.634	3.949	4.190
prob F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R^2 within	0.296	0.316	0.298	0.317	0.284	0.304	0.314	0.335	0.317	0.327	0.313	0.327	0.313	0.326

Table 9: Results of the robustness check regressions on the Concentration Ratio CR_4 (robust standard errors in parentheses below the coefficients). *, ** and *** indicate significance at the 10%, 5%, and 1% level, respectively. The R^2 shows the model fit after the country-fixed-effects are subtracted. Year dummies are included in the model, but not tabulated.

Tables

$HHI_{kt} = const + b_1 \cdot EU\_Dir\_06 + b_2 \cdot Liab\_Cap + b_3 \cdot Liab\_Reg + b_4 \cdot NAS\_const + b_5 \cdot NAS\_forb + b_6 \cdot Fee\_Cap + b_7 \cdot Joint\_Man + b_8 \cdot Part\_Rot + b_9 \cdot Firm\_Rot + b_{10} \cdot Fee\_Disc + b_{11} \cdot Market\_Cap + b_{12} \cdot FDI + b_{13} \cdot IFRS\_Share + b_{14} \cdot Gov\_Eff + \sum b_t \cdot Year_t + \varepsilon_{kt}$

	"*Rule of Law*" instead of *Gov_Eff*		**Without *EU_Dir _06***		**Without former socialist countries**		**Without $CR_4 = 1$ countries**		**EU countries only**		**Without year 2001**		**Without years 2001 and 2010**	
	M	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***	***M***	***ln(TA)***
EU_Dir_06	0.005 (0.007)	0.005 (0.007)	-	-	0.008 (0.005)	0.007 (0.005)	0.004 (0.006)	0.003 (0.006)	-0.021 (0.026)	-0.022 (0.026)	0.005 (0.007)	0.004 (0.007)	-0.005 (0.012)	-0.006 (0.012)
Liab_Cap	-0.012 (0.016)	-0.011 (0.015)	-0.006 (0.015)	-0.006 (0.014)	0.004 (0.008)	0.004 (0.008)	0.001 (0.009)	0.001 (0.009)	-0.003 (0.017)	-0.003 (0.016)	-0.004 (0.015)	-0.004 (0.014)	0.003 (0.009)	0.001 (0.008)
Liab_Reg	-0.049* (0.025)	-0.049** (0.023)	-0.053** (0.022)	-0.053** (0.021)	-0.015* (0.007)	-0.018** (0.008)	-0.043* (0.022)	-0.042** (0.019)	-0.084*** (0.015)	-0.081*** (0.016)	-0.058** (0.024)	-0.057** (0.022)	-0.054** (0.025)	-0.055** (0.023)
NAS_const	0.001 (0.014)	0.001 (0.014)	0.001 (0.014)	0.001 (0.014)	-0.003 (0.007)	-0.002 (0.007)	0.002 (0.007)	0.002 (0.007)	0.008 (0.02)	0.01 (0.021)	0.001 (0.014)	0.001 (0.015)	0.003 (0.01)	0.002 (0.01)
NAS_forb	-0.056* (0.033)	-0.054 (0.032)	-0.049* (0.029)	-0.046 (0.029)	-0.03 (0.022)	-0.029 (0.022)	-0.026 (0.02)	-0.025 (0.021)	-	-	-0.052** (0.024)	-0.048* (0.024)	-0.053** (0.026)	-0.05* (0.025)
Fee_Cap	-0.023** (0.01)	-0.024** (0.01)	-0.023** (0.009)	-0.024** (0.01)	-0.011 (0.008)	-0.012 (0.009)	-0.013 (0.008)	-0.013 (0.008)	-0.029** (0.012)	-0.03** (0.013)	-0.023** (0.01)	-0.024** (0.011)	-0.026** (0.01)	-0.026** (0.011)
Joint_man	0.057*** (0.01)	0.056*** (0.01)	0.066*** (0.014)	0.066*** (0.014)	0.058*** (0.012)	0.057*** (0.013)	0.051*** (0.011)	0.05*** (0.011)	0.067*** (0.018)	0.066*** (0.018)	0.052*** (0.01)	0.053*** (0.01)	0.054*** (0.011)	0.054*** (0.011)
Part_Rot	-0.001 (0.005)	0.001 (0.005)	0.001 (0.005)	0.003 (0.005)	-0.001 (0.005)	0.001 (0.005)	0.001 (0.005)	0.002 (0.005)	0.002 (0.008)	0.003 (0.008)	0.001 (0.005)	0.002 (0.005)	-0.001 (0.006)	0.001 (0.006)
Firm_Rot	0.022 (0.022)	0.022 (0.022)	0.012 (0.021)	0.011 (0.021)	0.012 (0.011)	0.011 (0.011)	0.011 (0.011)	0.011 (0.011)	-	-	0.02 (0.015)	0.02 (0.015)	0.022 (0.017)	0.021 (0.017)
Fee_Disc	0.006 (0.008)	0.006 (0.008)	0.005 (0.007)	0.005 (0.007)	0.001 (0.006)	-0.001 (0.006)	-0.003 (0.006)	-0.003 (0.006)	0.001 (0.008)	0.001 (0.008)	0.005 (0.009)	0.006 (0.008)	0.003 (0.008)	0.003 (0.008)
Market_ Cap	0.007 (0.013)	0.007 (0.013)	0.005 (0.014)	0.005 (0.014)	0.015 (0.011)	0.015 (0.011)	0.013 (0.009)	0.013 (0.009)	0.019 (0.015)	0.018 (0.016)	0.005 (0.014)	0.004 (0.014)	0.003 (0.013)	0.003 (0.013)
FDI	-0.001* (0.000)	-0.001* (0.000)	-0.001** (0.000)	-0.001** (0.000)	-0.001** (0.000)	-0.001** (0.000)	-0.001* (0.000)	-0.001* (0.000)	-0.001* (0.000)	-0.001* (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.001** (0.000)	-0.001** (0.000)
IRFS_ Share	0.001 (0.019)	0.000 (0.019)	0.006 (0.02)	0.004 (0.02)	0.001 (0.016)	0.001 (0.017)	0.001 (0.017)	-0.001 (0.017)	-0.011 (0.041)	-0.016 (0.042)	-0.007 (0.02)	-0.008 (0.021)	-0.001 (0.02)	-0.002 (0.021)
Gov_Eff	0.07 (0.059)	0.07 (0.06)	0.05 (0.035)	0.051 (0.034)	0.005 (0.013)	0.006 (0.012)	0.002 (0.014)	0.002 (0.013)	0.062 (0.047)	0.062 (0.046)	0.042 (0.032)	0.043 (0.032)	0.037 (0.029)	0.038 (0.029)

Tables

const	0.087 (0.072)	0.091 (0.072)	0.105** (0.048)	0.109** (0.047)	0.147*** (0.023)	0.151*** (0.021)	0.158*** (0.023)	0.162*** (0.021)	0.089 (0.076)	0.093 (0.074)	0.153*** (0.044)	0.158*** (0.045)	0.157*** (0.046)	0.161*** (0.047)
n =	290	290	290	290	240	240	270	270	200	200	261	261	232	232
N =	29	29	29	29	24	24	27	27	20	20	29	29	29	29
F-Statistic	2.187	2.227	2.355	2.397	1.919	1.912	2.617	2.626	2.370	2.381	2.184	2.214	1.932	1.899
prob F	0.002	0.002	0.001	0.001	0.010	0.010	0.000	0.000	0.001	0.001	0.002	0.002	0.011	0.013
R^2 within	0.175	0.177	0.185	0.188	0.186	0.186	0.215	0.215	0.238	0.239	0.186	0.188	0.182	0.180

Table 10: Results of the robustness check regressions on the *Hirschmann-Herfindahl*-Index *HHI* (robust standard errors in parentheses below the coefficients). *, ** and *** indicate significance at the 10%, 5%, and 1% level, respectively. The R^2 shows the model fit after the country-fixed-effects are subtracted. Year dummies are included in the model, but not tabulated.

Tables

$$AC\_R_{kt} = const + b_1 \cdot EU\_Dir\_06 + b_2 \cdot Liab\_Cap + b_3 \cdot Liab\_Reg + b_4 \cdot NAS\_const + b_5 \cdot NAS\_forb + b_6 \cdot Fee\_Cap + b_7 \cdot Joint\_Man + b_8 \cdot Part\_Rot + b_9 \cdot Firm\_Rot + b_{10} \cdot Fee\_Disc + b_{11} \cdot Market\_Cap + b_{12} \cdot FDI + b_{13} \cdot IFRS\_Share + b_{14} \cdot Gov\_Eff + \sum b_t \cdot Year_t + \varepsilon_{kt}$$

	"Rule of Law"* instead of *Gov_Eff	**Without *EU_Dir _06***	**Without former socialist countries**	**Without $CR_4 = 1$ countries**	**EU countries only**	**Without year 2001**	**Without years 2001 and 2010**
EU_Dir_06	0.004 (0.018)	-	-0.018 * (0.009)	0.003 (0.018)	0.034 (0.037)	0.001 (0.017)	0.019 (0.023)
Liab_Cap	0.029 (0.019)	0.021 (0.017)	0.028 ** (0.013)	0.016 (0.017)	0.042 * (0.023)	0.014 (0.018)	0.009 (0.018)
Liab_Reg	0.146 (0.107)	0.154 (0.105)	0.001 (0.009)	0.139 (0.105)	0.308 *** (0.033)	0.169 (0.1)	0.17 (0.119)
NAS_const	-0.007 (0.015)	-0.008 (0.016)	0.003 (0.009)	-0.014 (0.014)	-0.001 (0.019)	-0.003 (0.016)	-0.011 (0.014)
NAS_forb	0.085 * (0.043)	0.066 * (0.036)	0.07 *** (0.02)	0.054 (0.035)	-	0.074 ** (0.036)	0.076 * (0.038)
Fee_Cap	0.031 ** (0.013)	0.031 ** (0.013)	0.021 (0.017)	0.023 * (0.014)	0.024 (0.014)	0.026 ** (0.012)	0.024 * (0.012)
Joint_man	-0.028 ** (0.013)	-0.038 ** (0.018)	-0.048 *** (0.009)	-0.027 (0.017)	-0.042 (0.025)	-0.036 ** (0.013)	-0.034 ** (0.014)
Part_Rot	-0.012 (0.011)	-0.014 (0.011)	-0.001 (0.009)	-0.014 (0.013)	-0.013 (0.014)	-0.013 (0.01)	-0.011 (0.01)
Firm_Rot	-0.037 (0.026)	-0.021 (0.022)	-0.017 (0.013)	-0.022 (0.015)	-	-0.028 (0.022)	-0.031 (0.027)
Fee_Disc	-0.007 (0.014)	-0.003 (0.014)	-0.002 (0.011)	0.001 (0.015)	-0.017 (0.016)	-0.004 (0.015)	0.008 (0.014)
Market_Cap	0.003 (0.018)	0.004 (0.019)	0.003 (0.009)	-0.005 (0.015)	-0.016 (0.02)	-0.012 (0.021)	-0.018 (0.022)
FDI	0.001 (0.000)	0.001 (0.000)	0.001 *** (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 * (0.000)	0.001 (0.000)
IRFS_Share	-0.009 (0.029)	-0.008 (0.029)	-0.016 (0.017)	-0.018 (0.033)	-0.025 (0.082)	-0.004 (0.029)	-0.011 (0.032)
Gov_Eff	-0.094 (0.073)	-0.048 (0.046)	-0.002 (0.018)	-0.009 (0.037)	-0.056 (0.061)	-0.053 (0.045)	-0.046 (0.045)
const	0.267 *** (0.088)	0.215 *** (0.063)	0.134 *** (0.033)	0.154 ** (0.057)	0.283 ** (0.105)	0.221 *** (0.052)	0.232 *** (0.064)
n =	290	290	240	270	200	261	232
N =	29	29	24	27	20	29	29
F-Statistic	3.674	3.574	4.084	3.752	5.062	3.632	3.139
prob F	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R^2 within	0.262	0.257	0.283	0.266	0.401	0.276	0.266

Table 11: Results of the robustness check regressions on the Auditor-Client Ratio *AC_R* (robust standard errors in parentheses below the coefficients). *, ** and *** indicate significance at the 10%, 5%, and 1% level, respectively. The R^2 shows the model fit after the country-fixed-effects are subtracted. Year dummies are included in the model, but not tabulated.

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