

# Aufsichtsräte deutscher Aktiengesellschaften Zusammensetzung, Interventionsaktivitäten, Performance

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Karin Carola Vetter  
aus Stuttgart

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Dekan:	Prof. Dr. Josef Schmid
Erstberichterstatter:	Prof. Dr. Kerstin Pull
Zweitberichterstatter:	Prof. Dr. Werner Neus
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# Überblick

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# 1

## Einleitung

Durch zahlreiche Aufsehen erregende Insolvenzen sowie die Finanzkrise sind Aufsichtsräte in den letzten Jahren vermehrt kritisiert worden, sie würden ihren Kontrollauftrag nur unzureichend erfüllen (vgl. KÖHLER 2010). Experten fordern daher unter anderem eine Verbesserung der Aufsichtsratsstrukturen. So soll der Gesetzgeber höhere Anforderungen an die Qualifikation und Erfahrung von Aufsichtsräten stellen und die Zahl der ausgeübten Aufsichtsratsmandate begrenzen (vgl. u.a. KÖHLER 2010).

Diesen Forderungen kommt der Gesetzgeber schrittweise nach. Im Jahr 2002 wurde der Deutsche Corporate Governance Kodex (DCGK) ins Leben gerufen, der durch das Transparenz- und Publizitätsgesetz mit dem Aktiengesetz verknüpft ist. Ziel dieses seitdem jährlich überarbeiteten und erweiterten Kodex ist es, die in Deutschland geltenden Regeln für Unternehmensleitung und -überwachung transparenter zu gestalten. Empfehlungen zur Zusammensetzung und Arbeitsweise des Aufsichtsrats sind ein wichtiger Bestandteil dieses Kodex (vgl. DCGK 2010). Auch aktuell in Kraft getretene Gesetze widmen sich der Besetzung des Aufsichtsrats. So betonen sowohl das Bilanzrechtsmodernisierungsgesetz (BilMoG) als auch das Gesetz zur Stärkung der Finanzmarkt- und Versicherungsaufsicht (FMVAStärkG) die Bedeutung der fachlichen Qualifikation der Aufsichtsratsmitglieder. Während das BilMoG *ein* Mitglied mit Sachverstand auf den Gebieten der Rechnungslegung oder Abschlussprüfung für Aufsichtsräte kapitalmarktorientierter Unternehmen fordert, regelt das FMVAStärkG, dass *alle* Aufsichtsratsmitglieder der Unternehmen im Finanzsektor zuverlässig und hinreichend sachkundig sein müssen. Mit dem FMVAStärkG richtet der Gesetzgeber zudem für den Finanzsektor eine öffentlich-rechtlich verankerte Enforcement-Stelle für die Besetzung des Aufsichtsrats mit qualifizierten Personen ein, indem er zum ersten Mal einer Behörde, der Bundesanstalt für Finanzdienstleis-

tungsaufsicht (BaFin), das Recht einräumt, Aufsichtsratsmitglieder mit ungenügender Sachkunde ihres Amtes zu entheben. (Vgl. KÄMPFER 2009.)

Der DCGK thematisiert in der Fassung aus dem Jahr 2009 zum ersten Mal und wiederholt in der Fassung aus dem Jahr 2010 aber nicht nur die Qualifikation einzelner Aufsichtsratsmitglieder, sondern betrachtet auch die Zusammensetzung des Gremiums. So heißt es in Abschnitt 5.4.1: „Bei Vorschlägen zur Wahl von Aufsichtsratsmitgliedern soll darauf geachtet werden, dass dem Aufsichtsrat jederzeit Mitglieder angehören, die über die zur ordnungsgemäßen Wahrnehmung der Aufgaben *erforderlichen Kenntnisse, Fähigkeiten* und *fachliche Erfahrung* verfügen. Dabei soll auch auf [...] eine festzulegende *Altersgrenze* für Aufsichtsratsmitglieder sowie auf *Vielfalt (Diversity)* geachtet werden.“<sup>1</sup> Demnach soll nicht nur den Kompetenzen einzelner Aufsichtsratsmitglieder, sondern auch einer diversen<sup>2</sup> Zusammensetzung der Aufsichtsratsgremien Aufmerksamkeit geschenkt werden.

Die genannten Empfehlungen und Regelungen sollen zu einer Verbesserung der Unternehmensüberwachung führen (vgl. KÄMPFER 2009; PELTZER 2003: 224). Der Gesetzgeber kann sich bei den bisherigen Reformen im deutschen Corporate Governance System allerdings nicht auf eine Fülle an wissenschaftlichen Untersuchungen in diesem Bereich stützen. Während vor allem monistische Boards im US-amerikanischen Corporate Governance System vielfältig untersucht wurden, existieren für deutsche Aufsichtsräte kaum vergleichbare Studien. So ist die *Zusammensetzung* deutscher Aufsichtsräte, deren *Ursachen* sowie deren *Wirkung* auf die Unternehmensperformance bislang kaum untersucht. Die Arbeiten, die sich mit den Effekten der Zusammensetzung von Aufsichtsräten befassen, untersuchen darüber hinaus lediglich den Einfluss einzelner Typen von Aufsichtsratsmitgliedern, wie den Einfluss von Arbeitnehmervertretern (vgl. u.a. FAUVER/FUERST 2006) oder Bankenvertretern (vgl. u.a. DITTMANN/MAUG/SCHNEIDER 2010). Zudem werden sowohl national als auch international nur Effekte der Aufsichtsrats- bzw. Boardzusammensetzung auf die Unternehmensperformance und nicht auf die Aufsichtsrats- bzw. Boardperformance untersucht. Die wenigen wissenschaftlichen Untersuchungen zu den *Aktivitäten* deutscher Aufsichtsratsgremien liegen zeitlich sehr weit zurück bzw.

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<sup>1</sup> Kursive Hervorhebungen durch die Autorin.

<sup>2</sup> Die Begriffe *Diversität* und *Heterogenität* werden in der vorliegenden Arbeit synonym verwendet.

arbeiten nur mit einer kleinen Datenbasis. Diese Arbeiten analysieren des Weiteren nicht die Effekte der Aufsichtsratsaktivitäten auf die Unternehmensperformance.

Als Konsequenz können lediglich für das monistische Corporate Governance System Reformüberlegungen auf Grundlage wissenschaftlicher Forschungsarbeiten formuliert werden, die auf die Besonderheiten des deutschen Systems nicht eingehen.

Diese Forschungslücke möchte die vorliegende Arbeit verringern, indem sie deutsche Aufsichtsräte auf unterschiedliche Weise beleuchtet. Dabei nimmt sie u.a. Bezug auf die aktuell im DCGK empfohlene Diversity.

Die vorliegende Arbeit ist wie folgt strukturiert: Kapitel 2 präsentiert auf Grundlage eines selbst erhobenen Datensatzes eine systematische Bestandsaufnahme der fachlichen und demographischen Aufsichtsratszusammensetzung von 151 in HDAX und SDAX gelisteten Unternehmen deutscher Rechtsform des Jahres 2005. Die fachliche Zusammensetzung wird hinsichtlich der beruflichen Qualifikation der Aufsichtsratsmitglieder, der haupt- bzw. nebenberuflichen Aufsichtsratsstätigkeit der Gremienmitglieder und der Anzahl der wahrgenommenen Aufsichtsratsmandate analysiert. Die demographische Zusammensetzung wird in Bezug auf das Geschlecht, die Nationalität und das Alter der Aufsichtsratsmitglieder untersucht. Die zum Teil erheblichen Unterschiede in der fachlichen und demographischen Zusammensetzung der untersuchten Aufsichtsräte lassen sich zumindest partiell auf die Indexzugehörigkeit sowie auf die jeweils zugrunde liegenden Mitbestimmungsregelungen zurückführen.

Aufbauend auf dem Befund aus Kapitel 2, dass sich die Aufsichtsräte in ihrer Zusammensetzung zum Teil erheblich unterscheiden, sucht Kapitel 3 die *Ursachen* der Aufsichtsratsheterogenität zu ergründen. Anhand eines selbst erhobenen Datensatzes zu 151 Unternehmen deutscher Rechtsform des HDAX und SDAX des Jahres 2005 wird untersucht, inwiefern die Unternehmensgröße Einfluss auf die heterogene Zusammensetzung des Aufsichtsrats in Bezug auf die Hauptbeschäftigung sowie die Nationalität hat. In diesem Beitrag kann ein linearer Zusammenhang zwischen der Unternehmensgröße und der Aufsichtsratsheterogenität hinsichtlich der Hauptbeschäftigung sowie ein konkaver Zusammenhang zwischen der Unternehmensgröße und der heterogenen Zusammensetzung des Aufsichtsrats bezüglich der Nationalität der Aufsichtsratsmitglieder festgestellt werden.

Welche *Effekte* eine heterogene Zusammensetzung des Aufsichtsrats auf dessen Performance sowie die Unternehmensperformance hat, ist Kern von Kapitel 4. Anhand einer selbst erhobenen Datenbasis zu den Aufsichtsräten von 151 Unternehmen deut-

scher Rechtsform des HDAX und SDAX der Jahre 2000 bis 2005 wird eine heterogene Zusammensetzung des Aufsichtsrats in Bezug auf die Hauptbeschäftigung, die Gremienzugehörigkeitsdauer, die Mandatszähl sowie das Geschlecht, die Nationalität und das Alter der Aufsichtsratsmitglieder betrachtet. Die Performance des Unternehmens wird durch in der Literatur etablierte Maße gemessen. Darüber hinaus werden erstmals zwei innovative Maße zur Messung der Performance des Aufsichtsrats eingesetzt: Diese sind die Anzahl der Interventionen, die als Maß für die Kontrollaktivität des Aufsichtsrats verwendet wird, und die Position des Unternehmens im Corporate Governance Ranking. Schließlich enthält der Datensatz Angaben zur Internationalität und Innovativität der Unternehmen – zwei Variablen, von denen erwartet wird, dass sie einen moderierenden Effekt auf den Zusammenhang zwischen Heterogenität und Performance haben. Es kann gezeigt werden, dass die heterogene Zusammensetzung des Aufsichtsrats einen signifikanten Einfluss auf die Aufsichtsratsperformance sowie die Unternehmensperformance hat. Dieser Einfluss differiert je nach Heterogenitätsart und Performancemaß. Darüber hinaus kann für einen Teil der Heterogenitätsarten und Performancemaße ein signifikanter Einfluss der moderierenden Variablen auf den Zusammenhang zwischen Aufsichtsratsheterogenität und Performance festgestellt werden. Aus diesem Kapitel sollen zur Veröffentlichung verschiedene Beiträge entstehen, die in referierten Fachzeitschriften publiziert werden. Kapitel 5 hat die Interventionsaktivitäten von Aufsichtsräten, eines der verwendeten Performancemaße in Kapitel 4, zum Gegenstand. Auf Basis eines selbst erhobenen Datensatzes zu den Kontrollaktivitäten von 151 Aufsichtsräten des HDAX und SDAX der Jahre 2000 bis 2006 wird untersucht, welche praktische Bedeutung den gesetzlichen Interventionsmöglichkeiten der Aufsichtsräte zugeschrieben werden kann und in welchen inhaltlichen Kontexten sie eingesetzt werden. Zudem wird durch einen Abgleich der durch die Deutsche Prüfstelle für Rechnungslegung (DPR)<sup>3</sup> und die BaFin als fehlerhaft ausgewiesenen Jahres- bzw. Konzernabschlüsse mit den festgestellten Interventionsmaßnahmen untersucht, ob es in diesem Bereich zu Kontrollversäumnissen der Aufsichtsratsgremien kommt. Schließlich soll in diesem Kapitel geprüft wer-

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<sup>3</sup> Die DPR prüft seit dem 01.07.2005 die Rechnungslegung von Unternehmen, die am regulierten Markt in Deutschland vertreten sind, stichprobenartig, bei konkreten Anhaltspunkten für einen Verstoß gegen Rechnungslegungsvorschriften oder auf Verlangen der BaFin. Wirkt das Unternehmen nicht freiwillig an der Prüfung der DPR mit, ist es mit dem Ergebnis der Prüfung nicht einverstanden oder bestehen an der Richtigkeit des Prüfungsergebnisses oder an der ordnungsgemäßen Durchführung der Prüfung durch die Prüfstelle erhebliche Zweifel, prüft auf zweiter Stufe die BaFin (vgl. BAFIN 2009).

den, ob sich bestimmte Trends bezüglich des Einsatzes der unterschiedlichen Maßnahmen über den Untersuchungszeitraum hinweg erkennen lassen. Die Ergebnisse der Analyse weisen darauf hin, dass die Aufsichtsratsgremien nicht alle zur Verfügung stehende Eingriffsrechte nutzen und von bestimmten Interventionsarten häufiger Gebrauch machen als von anderen. Außerdem zeigt sich, dass in verschiedenen inhaltlichen Kontexten mittels unterschiedlicher Eingriffsmöglichkeiten interveniert wird. Für den inhaltlichen Teilbereich der *Feststellung des Jahres- bzw. Konzernabschlusses* können Nachlässigkeiten einzelner Kontrollgremien beobachtet werden. Schließlich ist über den Zeitraum der Untersuchung der Trend zu einem häufigeren Eingreifen der Aufsichtsratsgremien zu erkennen.

Welchen *Effekt* die in Kapitel 5 analysierten Aufsichtsratsinterventionen auf den Marktwert der öffentlich gehandelten Unternehmen haben, untersucht Kapitel 6 auf Basis eines selbst erhobenen Datensatzes und mithilfe einer Event-Study. Die Analyse dieses Kapitels testet und stützt als eine der ersten Analysen überhaupt zwei von HERMALIN/WEISBACH (1998) theoretisch hergeleitete Hypothesen, die eine negative Aktienkursreaktion vorhersagen, wenn der Aufsichtsrat aufgrund privater Informationen interveniert, und eine positive, wenn der Aufsichtsrat aufgrund öffentlicher Informationen interveniert, empirisch. Dieser Test wird durch die Verwendung der Medienberichterstattung als Maß dafür, inwieweit Informationen öffentlich oder privat sind, ermöglicht. Zudem kann erstmals gezeigt werden, wie der Unternehmenswert von verschiedenen Interventionsarten beeinflusst wird. Dabei findet nicht wie in bisherigen Studien eine Konzentration auf Vorstandsentlassungen statt, sondern es werden alle empirisch beobachtbaren Arten der gesetzlich eingeräumten Interventionen analysiert. Die Arbeit schließt mit einer Zusammenfassung in Kapitel 7.



# 2

## Die Zusammensetzung deutscher Aufsichtsräte: Eine empirische Bestandsaufnahme

(Erschienen als: Arnegger, Martin; Christian Hofmann; Kerstin Pull; Karin Vetter (2010): Unterschiede in der fachlichen und demographischen Zusammensetzung deutscher Aufsichtsräte: Eine empirische Bestandsaufnahme für HDAX- und SDAX-Unternehmen. *Die Betriebswirtschaft* 70(2010)3: 239-257.)

### 2.1 Motivation und Stand der Forschung

Im Jahr 2002 wurde die Erstfassung des Deutschen Corporate Governance Kodex (DCGK) mit dem Ziel veröffentlicht, die in Deutschland geltenden Regeln für Unternehmensleitung und -überwachung transparenter zu gestalten. Ein zentraler Bestandteil dieses Kodex sind Empfehlungen zur Zusammensetzung und Arbeitsweise des Aufsichtsrats (vgl. DCGK 2009, Abschnitte 3 und 5). Anders als die Zusammensetzung monistischer Boards (vgl. WELBOURNE/CYCYOTA/FERRANTE 2007; CERTO et al. 2006; RICHARD 2000; SIMONS/PELLED/SMITH 1999; HAMBRICK/MASON 1984) ist die Zusammensetzung des dualistischen deutschen mitbestimmten Aufsichtsrats bislang allerdings kaum untersucht. Vorliegende Arbeiten befassen sich weit überwiegend nur mit einzelnen Typen von Aufsichtsratsmitgliedern, und zwar primär mit den Arbeitnehmervertretern (vgl. LINDENTHAL 2001; BAUMS/FRICK 1998; SCHMID/SEGER 1998; GURDON/RAI 1990) bzw. den Bankenvertretern (vgl. aktuell DITTMANN/MAUG/SCHNEIDER 2010). Mit unserem Beitrag liefern wir eine erste systematische Bestandsaufnahme der Zusammensetzung deutscher Aufsichtsräte im Hinblick auf ein umfangreiches Set an Variablen, welches – in Anlehnung an US-amerikanische Studien – neben Indikatoren zur *fachlichen Qualifikation* der Aufsichtsratsmitglieder auch eine Reihe *demographischer Variablen* umfasst. In einem zweiten Schritt prüfen wir, ob systematische Unterschiede bei der Zusammensetzung der Aufsichtsräte beobachtbar sind und inwiefern diese an der Indexzugehörigkeit

beziehungsweise dem Umfang der gesetzlich geregelten Mitbestimmung festgemacht werden können.

Die vorliegende Studie basiert auf einer neu erhobenen Datengrundlage. Diese enthält sämtliche Unternehmen deutscher Rechtsform, die am 31.12.2005 in HDAX und SDAX gelistet sind. Die Tatsache, dass wir in unserer Untersuchung auch jüngere und kleinere Unternehmen mit einbeziehen, erfüllt dabei ein in der Literatur wiederholt postuliertes Desiderat (vgl. HERMALIN/WEISBACH 2003).

Die systematische Untersuchung der Zusammensetzung deutscher Aufsichtsräte auf Gremienebene hinsichtlich fachlicher Qualifikationen und demographischer Merkmale stellt einen Beitrag zur Schließung einer Forschungslücke für das deutsche Corporate Governance System dar. Während auf internationaler Ebene – vor allem für das US-amerikanische Corporate Governance System – bereits in umfangreicher Zahl Forschungsarbeiten zur Zusammensetzung von Corporate Boards existieren, liegen für das deutsche Corporate Governance System, insbesondere auf empirischer Basis, bislang vergleichsweise wenige Forschungsbeiträge vor, die sich nicht primär mit der Wirkung der Unternehmensmitbestimmung beschäftigen (vgl. GERUM 2007). In der Folge werden für das monistische Corporate Governance System zahlreiche Kommentare zu Reformüberlegungen bezüglich der Besetzung von Corporate Boards formuliert (vgl. etwa LINCK/NETTER/YANG 2008; YERMACK 2006; HERMALIN/WEISBACH 2003; BAYSINGER/BUTLER 1985), während für die Besonderheiten des deutschen Systems nur wenige Erkenntnisse zur Gremienbesetzung existieren, auf deren Basis Überlegungen zur Weiterentwicklung der hierfür relevanten Abschnitte des Deutschen Corporate Governance Kodex abgeleitet werden könnten. Mit unserem Beitrag leisten wir einen ersten wichtigen Schritt in diese Richtung, indem wir eine umfassende empirische Bestandsaufnahme der Zusammensetzung deutscher Aufsichtsräte in HDAX- und SDAX-Unternehmen vorlegen. In Anlehnung an die US-amerikanische Literatur erheben wir dabei sowohl die Gremienzusammensetzung in Bezug auf die fachliche Qualifikation der Aufsichtsratsmitglieder als auch in Bezug auf deren demographische Eigenschaften. Um den Besonderheiten mitbestimmter Aufsichtsräte Rechnung zu tragen, stellen wir unsere Befunde zur Gremienzusammensetzung jeweils nicht nur für das gesamte Gremium vor, sondern erheben diese zusätzlich getrennt für die Vertreter der Kapitaleigner und der Arbeitnehmer. Unser Beitrag ist wie folgt aufgebaut: Kapitel 2.2 stellt den Datensatz, die erhobenen Variablen und verwendeten Heterogenitätsmaße vor. In Kapitel 2.3 werden erste de-

skriptive Befunde präsentiert. Kapitel 2.4 diskutiert Unterschiede der Zusammensetzung deutscher Aufsichtsräte zwischen den verschiedenen Indizes (Abschnitt 2.4.1) und zwischen Unternehmen, die unterschiedlichen Mitbestimmungsregelungen unterworfen sind (Abschnitt 2.4.2). Der Beitrag schließt in Kapitel 2.5 mit einer Zusammenfassung.

## 2.2 Datensatz, Variablen und Heterogenitätsmaße

### 2.2.1 Datensatz

Basis unserer Untersuchung sind die Unternehmen deutscher Rechtsform der Börsenindizes DAX, MDAX, SDAX und TecDAX. Exemplarisch betrachten wir den Stichtag 31.12.2005. Insgesamt ergibt sich hieraus eine Untersuchungsgesamtheit von 151 Unternehmen (genaue Auflistung siehe Anhang 1), von denen zum Stichtag 30 Unternehmen dem DAX, jeweils 48 Unternehmen dem MDAX und SDAX sowie 25 Unternehmen dem TecDAX entstammen.

Hinsichtlich der geltenden Mitbestimmungsregelungen (siehe Anhang 2), fallen 52 Prozent der betrachteten Unternehmen unter das Mitbestimmungsgesetz (MitbestG), welches eine paritätische Besetzung der Aufsichtsräte mit Vertretern der Kapitaleigner und der Arbeitnehmer vorsieht; 17 Prozent fallen unter das Drittelbeteiligungsgesetz (DrittelbG), welches die Besetzung der Aufsichtsräte zu einem Drittel mit Arbeitnehmervertretern vorsieht; lediglich ein Unternehmen unseres Samples (die Salzgitter AG) fällt unter das Montanmitbestimmungsgesetz (MontanMitbestG), welches – analog zum Mitbestimmungsgesetz – eine paritätische Besetzung der Aufsichtsratspositionen mit Kapitaleigner- und Arbeitnehmervertretern festlegt. Insgesamt 30 Prozent der Unternehmen in unserem Datensatz sind, was die Vertretung von Arbeitnehmerinteressen im Aufsichtsrat anbelangt, nicht mitbestimmungspflichtig (oMitbestPflicht).

Zum Stichtag wurden die relevanten Informationen zu 1.720 Mandatsträgern aus den Geschäftsberichten des Jahres 2005<sup>4</sup>, durch Kontaktaufnahme mit den Ansprechpartnern für Investor Relations-Belange der Unternehmen sowie aus Internetquellen erhoben.

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<sup>4</sup> Das Geschäftsjahr 2005 endete i.d.R. am 31.12.2005. In davon abweichenden Fällen (z.B. *Infineon*, *Siemens* und *ThyssenKrupp*) wurde dasjenige Geschäftsjahr betrachtet, welches im Kalenderjahr 2005 abgeschlossen wurde.

### 2.2.2 Variablen und Operationalisierung

Im Kontext der Resource Dependence Theory bestellen Anteilseigner und Arbeitnehmer die sie vertretenden Mitglieder von Aufsichtsräten auf Basis der unterschiedlichen Ressourcen, die diese Personen mitbringen bzw. zu denen diese Personen Zugang haben (vgl. PFEFFER/SALANCIK 2003). Eine besondere Rolle spielt dabei das *spezifische Wissen*, das diese Personen in den Aufsichtsrat einbringen (vgl. HILLMANN/CANELLA/PAETZOLD 2000). Zur Erfassung unterschiedlicher Formen des spezifischen Wissens betrachten wir sowohl Variablen zur fachlichen Qualifikation der Aufsichtsratsmitglieder als auch demographische Merkmale.

#### **Fachliche Qualifikation**

Bei den Variablen, die die fachliche Qualifikation der Mandatsträger abbilden, untersuchen wir zunächst mit dem Wissensträgertyp, über welches inhaltliche Wissen die Mandatsträger verfügen. Des Weiteren fragen wir, ob es sich bei den Mandatsträgern im Hinblick auf ihre Hauptbeschäftigung um „Aktive“ oder „Ehemalige“ handelt, und schließlich erheben wir die Gesamtzahl der von einem Mandatsträger jeweils in Aufsichtsräten gehaltenen Mandate. Die beiden letzt genannten Variablen erlauben einen Rückschluss auf die Erfahrung eines Aufsichtsratsmitglieds.

Bei der Variable *Wissensträgertyp* handelt es sich um eine im Hinblick auf die fachliche Qualifikation der Aufsichtsratsmitglieder zentrale Größe. Sie gibt wieder, inwiefern die Aufsichtsratsmitglieder über unterschiedliche inhaltliche Arten von Wissen verfügen. In Anlehnung an die Kategorisierungen bei HILLMAN/CANELLA/PAETZOLD (2000), BAYSINGER/ZARDKOOHI (1986) und BAYSINGER/BUTLER (1985) wurde dabei eine Kategorisierung erarbeitet, die in der Unterscheidung von vier Typen von *Wissensträgern* resultiert: Insider, Business Experts, Support Specialists und Community Influentials. Mit dieser Unterscheidung lehnen wir uns – trotz der erheblichen Unterschiede zwischen den Systemen – bewusst an die ursprünglich für die Beschreibung der Wissensträgertypen in monistischen Boards entwickelten Kategorien an, um einen Vergleich unserer Analyse mit vorliegenden Untersuchungen US-amerikanischer Boards zu ermöglichen. Zudem erlaubt uns die Kategorisierung der Aufsichtsratsmitglieder in nur vier Wissensträgertypen,

auf erwartbar substantielle Unterschiede in der Art des jeweils gehaltenen Wissens zu fokussieren.

- 1 „Insider“ haben spezifisches Wissen über das Unternehmen oder seine Prozesse. Auf Anteilseignerseite zählen hierzu ehemalige Vorstandsvorsitzende und Vorstandsmitglieder.
- 2 „Business Experts“ zeichnen sich durch ihr spezifisches Wissen über Entscheidungsprozesse in Unternehmen oder das Markt- bzw. Wettbewerbsumfeld aus. In dieser Kategorie sind Führungskräfte und ehemalige Führungskräfte von Unternehmen, die nicht dem Banken- oder Versicherungssektor zugerechnet werden, enthalten.
- 3 „Support Specialists“ umfassen Personen, die sich durch spezifisches Wissen über spezielle Unternehmensfunktionen auszeichnen. Hierzu zählen wir Führungskräfte und ehemalige Führungskräfte von Banken und Versicherungen sowie Experten (zum Beispiel Rechtsanwälte, Steuerberater, Wirtschaftsprüfer, Public Relations-Experten, Unternehmensberater).
- 4 „Community Influentials“ zeichnen sich schließlich durch ihre Expertise über die Unternehmensumwelt jenseits des Produkt-Markt-Wettbewerbs aus. Hierzu zählen Wissen aus dem nicht-wirtschaftlichen Bereich oder Kenntnisse über den Umgang mit unternehmensexternen Interessengruppen. Hier sind vor allem Politiker und Wissenschaftler einzuordnen.

Die Arbeitnehmervertreter lassen sich in Bezug auf ihre Wissensbestände lediglich in die Kategorien „Insider“ beziehungsweise „Community Influentials“ sortieren: Angestellte oder Betriebsräte des Unternehmens haben spezifisches Wissen über das Unternehmen, während Gewerkschaftsvertreter als unternehmensexterne Arbeitnehmervertreter auch nicht-unternehmensbezogenes Wissen mit einbringen.

Mit der Variable „Aktive/Ehemalige“ messen wir, inwiefern die Aufsichtsratsmitglieder hauptberuflich anderweitig aktiv sind („Aktive“) beziehungsweise inwiefern sie hauptberuflich keiner anderen Tätigkeit mehr nachgehen („Ehemalige“). Sämtliche Arbeitnehmervertreter werden als „Aktive“ klassifiziert, da sie als Gewerkschaftsmitglieder, Betriebsräte oder auch als nicht-freigestellte Beschäftigte des Unternehmens weiterhin hauptberuflich aktiv sind.

Schließlich bildet auch die Variable *Gesamtmandatszahl*, die wir als Summe der gehaltenen Mandate in konzernexternen gesetzlich zu bildenden Aufsichtsräten sowie in vergleichbaren in- und ausländischen Kontrollgremien von Wirtschaftsunternehmen operationalisieren, einen Aspekt der fachlichen Qualifikation der Gremienmitglieder ab.<sup>5,6</sup>

### **Demographische Merkmale**

Bei den demographischen Merkmalen der Mandatsträger erfassen wir in Anlehnung an die US-amerikanische Literatur das *Alter*, das *Geschlecht* und die *Nationalität* der Mandatsträger (deutsch vs. nicht-deutsch).<sup>7</sup> Das Alter eines Aufsichtsratsmitglieds erlaubt einen Rückschluss auf seine Erfahrung. Neuere Studien stellen die Bedeutung geschlechtsabhängigen Wissens heraus (vgl. HILLMAN/SHROPSHIRE/CANNELLA 2007). Mit der Nationalität lassen sich schließlich Unterschiede im länderspezifischen Wissen abgreifen.

### 2.2.3 Heterogenitätsmaße

Um die Aufsichtsratsgremien hinsichtlich ihrer Zusammensetzung zu charakterisieren, ziehen wir neben den jeweiligen Anteilswerten der einzelnen Vertreter-Typen (Durchschnitte, Minimal- und Maximalausprägungen) auch so genannte Heterogenitätsmaße heran, die Aussagen zur Heterogenität der Gremienzusammensetzung bezüglich der im Einzelnen betrachteten Merkmale ermöglichen. Die zur Verfügung stehenden Heterogenitätsmaße unterscheiden sich danach, ob es sich bei der zu untersuchenden Variable um eine kategoriale oder metrische Variable handelt.

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<sup>5</sup> Im weit überwiegenden Teil der Fälle haben wir unsere Angaben bezüglich der Hauptbeschäftigung und der Mandatszähl der Mandatsträger den Geschäftsberichten der Unternehmen entnommen. Bei Vorlage eindeutiger Informationen haben wir diese verwendet und lediglich Zweifelsfälle durch weitere Quellen, wie Kontaktaufnahmen mit Ansprechpartnern für Investor Relations-Fragen bzw. Internetrecherchen, überprüft.

<sup>6</sup> Die Mandatszähl wurde in Anlehnung an die Vorschriften in Handels- und Aktiengesetz sowie den Empfehlungen im Deutschen Corporate Governance Kodex erfasst. Demnach wurden sämtliche Mandate berücksichtigt, die ein Aufsichtsratsmandatsträger zum Stichtag 31.12.2005 in gesetzlich zu bildenden Aufsichtsräten sowie in vergleichbaren in- und ausländischen Kontrollgremien wahrgenommen hat. Konzerninterne Mandate wurden bei der Erfassung nicht berücksichtigt.

<sup>7</sup> Bei den Variablen Alter und Nationalität der Mandatsträger konnten die Ausprägungen der einzelnen Mandatsträger teilweise nicht eindeutig durch die Angaben in den Geschäftsberichten der Unternehmen oder durch andere Recherchequellen identifiziert werden. Daher wurden bei der Auswertung dieser Variablen auf Gremienebene nur solche Gremien in die Analyse einbezogen, bei denen die Ausprägungen aller Gremienmitglieder jeweils bekannt waren.

Zu den *kategorialen* Variablen in unserem Datensatz zählen die Variablen *Wissenssträgertyp*, *Aktive/Ehemalige*, *Nationalität* und *Geschlecht*. Für kategoriale Variablen werden in der Literatur unterschiedliche Indizes als Heterogenitätsmaße herangezogen. Wir verwenden den weit verbreiteten (vgl. u.a. WEBBER/DONAHUE 2001; HAMBRICK/CHO/CHEN 1996; MAGJUKA/BALDWIN 1991) Index von BLAU (1977), der neben der Anzahl der in einem Aufsichtsrat vertretenen Teilgruppen (bezüglich Wissenssträgertypen, Aktive/Ehemalige, Nationalität, Geschlecht) auch den Grad der (Un-)Gleichverteilung zwischen den verschiedenen Teilgruppen berücksichtigt. In unserer Analyse verwenden wir die normierte Version des BLAU-Index, welcher bei völliger Homogenität den Wert null und bei maximaler Heterogenität, das heißt wenn alle Teilgruppen in gleichem Maße vertreten sind, den Wert eins annimmt (vgl. ALEXANDER et al. 1995).

Zu den *metrischen* Variablen in unserem Datensatz zählen die *Gesamtmandatszahl* der Mitglieder sowie deren *Alter*. Als Maße zur Erfassung der Heterogenität bezüglich metrischer Variablen sind in der Literatur der Variationskoeffizient, der THEIL-Index, der GINI-Koeffizient, die relative Abweichung vom Durchschnitt nach SCHUTZ (1951) und die Standardabweichung des natürlichen Logarithmus der Variable zu finden. Wir setzen als das mit Abstand am häufigsten verwendete Maß den Variationskoeffizienten ein, da dieser Veränderungen der Variablen in allen Wertebereichen gleich gewichtet. Bei Normierung des Variationskoeffizienten nach ALLISON (1978) erreicht der normierte Wert bei völliger Homogenität der Aufsichtsratsmitglieder auch hier den Wert null und bei völliger Heterogenität die Obergrenze des Maßes mit dem Wert eins.

### 2.3 Deskriptive Befunde

Tabelle 1 gibt einen Überblick über die fachliche und demographische Zusammensetzung der Aufsichtsräte in unserem Sample. Für sämtliche Variablen werden der gesamte Aufsichtsrat sowie Anteilseigner- und Arbeitnehmervertreter getrennt betrachtet. Aufschluss über die Zusammensetzung der Gremien geben die Anteilswerte der einzelnen Merkmalsausprägungen (Durchschnitte, Minimal- und Maximalausprägungen) sowie die zu jeder Variable wiedergegebene Ausprägung des Heterogenitätsmaßes.

**Tabelle 1: Fachliche Qualifikation und demographische Eigenschaften deutscher Aufsichtsräte**

		Panel A: Gesamter Aufsichtsrat			Panel B: Anteilseignervertreter			Panel C: Arbeitnehmervertreter		
		Ø	Min	Max	Ø	Min	Max	Ø	Min	Max
<b>Fachliche Qualifikation der Aufsichtsräte</b>										
<b>Wissens- trägertypen</b>	Insider	0,30	0,00	0,67	0,08	0,00	0,67	0,78	0,40	1,00
	Business Experts	0,29	0,00	0,83	0,44	0,00	1,00			
	Support Specialists	0,25	0,00	1,00	0,35	0,00	1,00			
	Community Influentials	0,16	0,00	0,67	0,13	0,00	0,80	0,22	0,00	0,60
	Blau-Index normiert	0,81	0,00	1,00	0,66	0,00	1,00	0,61	0,00	0,96
<b>Aktiv/ ehemalig</b>	Anteil Ehemaliger	0,23	0,00	1,00	0,35	0,00	1,00			
	Blau-Index normiert	0,56	0,00	1,00	0,69	0,00	1,00			
<b>Mandatszahl</b>	Mittlere Mandatszahl je Gremium	3,16	1,00	7,83	4,09	1,00	9,75	1,43	1,00	3,00
	Variationskoeffizient normiert	0,40	0,00	0,58	0,34	0,00	0,55	0,24	0,00	0,49
<b>Demographische Merkmale der Aufsichtsräte</b>										
<b>Geschlecht</b>	Anteil männlicher AR	0,91	0,50	1,00	0,97	0,67	1,00	0,78	0,00	1,00
	Blau-Index normiert	0,28	0,00	1,00	0,09	0,00	0,89	0,51	0,00	1,00
<b>Nationalität</b>	Anteil deutscher AR	0,87	0,33	1,00	0,83	0,25	1,00	0,98	0,67	1,00
	Blau-Index normiert	0,35	0,00	1,00	0,41	0,00	1,00	0,05	0,00	0,89
<b>Alter</b>	Mittleres Gremienalter	56,10	45,67	66,67	58,68	45,67	66,75	50,37	41,00	57,30
	Variationskoeffizient normiert	0,12	0,03	0,18	0,10	0,03	0,21	0,10	0,00	0,15

Tabelle 1 gibt einen Überblick über die Zusammensetzung der Aufsichtsräte. Die Konstitution der Aufsichtsräte wird sowohl im Hinblick auf die fachliche Qualifikation der Aufsichtsratsmitglieder als auch hinsichtlich demographischer Merkmale analysiert. Als Ausprägungen fachlicher Qualifikation werden die Variablen „Wissensträgertyp“ sowie „aktiv/ehemalig“ und die Gesamtmandatszahl erfasst. Bei der Variablen „aktiv/ehemalig“ wird für die Arbeitnehmervertreter keine separate Analyse durchgeführt, da diese ausschließlich als „Aktive“ klassifiziert werden. Demographische Merkmale werden durch die Variablen *Geschlecht*, *Nationalität* und *Alter* abgebildet. Panel A betrachtet den gesamten Aufsichtsrat, Panel B und Panel C untersuchen getrennt Anteilseigner- und Arbeitnehmervertreter. Bei den Variablen erfassen wir Anteilswerte und die Heterogenität. Für beide sind der Mittelwert sowie Minimum und Maximum angegeben. Die Heterogenität wird bei kategorialen Variablen mit dem normierten Index nach BLAU und bei metrischen Variablen mit dem normierten Variationskoeffizienten gemessen.

Quelle: Eigene Berechnung.

Bezüglich der fachlichen Zusammensetzung der Gremien zeigt die Analyse der Verteilung der *Wissensträgertypen* in den Aufsichtsräten, dass durchschnittlich (nur) acht Prozent der Anteilseignervertreter Insider sind. Die relativ hohen 30 Prozent bei Betrachtung des gesamten Gremiums sind durch die Arbeitnehmervertreter beeinflusst, die durchschnittlich zu 78 Prozent Insider sind. Durchschnittlich 44 Prozent der Anteilseignervertreter sind Business Experts (aktive und ehemalige Führungskräfte anderer Unternehmen, die nicht dem Banken- oder Versicherungssektor zugeordnet werden) und durchschnittlich 35 Prozent der Anteilseignervertreter sind Support Specialists (aktive und ehemalige Führungskräfte von Banken oder Versicherungen, Wirtschaftsprüfer, Steuerberater, Rechtsanwälte oder Unternehmensberater, die Expertise in ihrem jeweiligen Bereich vorweisen). Beide Gruppen decken jeweils in manchen Gremien alle Anteilseignerposten oder – in Fällen nicht mitbestimmter Unternehmen – sogar alle Mandate des gesamten Gremiums ab. Community Influen-



tials sind mit durchschnittlich 16 Prozent in den Aufsichtsräten der in der Untersuchungsgesamtheit enthaltenen Unternehmen vertreten. Im Durchschnitt sind die Community Influentials auf der Arbeitnehmerseite gegenüber der Anteilseignerseite mit 22 Prozent zu 13 Prozent stärker repräsentiert, allerdings liegt das Maximum des Anteils an Community Influentials auf Anteilseignerseite mit 80 Prozent gegenüber 60 Prozent auf Arbeitnehmerseite höher.

Die Aufsichtsräte sind ebenfalls unterschiedlich im Hinblick auf die Variable *Aktive/Ehemalige*: Durchschnittlich 23 Prozent der Mandate sind durch Ehemalige besetzt. Bemerkenswert ist die Existenz von Gremien, die sich nur aus Ehemaligen beziehungsweise nur aus Aktiven zusammensetzen. Die Quote der Ehemaligen wird dabei von den Anteilseignervertretern beeinflusst, da die Vertreter der Arbeitnehmer als Angestellte oder Gewerkschaftsvertreter definitionsgemäß als Aktive ihrer Aufsichtsratsstätigkeit nachgehen. Der durchschnittliche Anteil Ehemaliger ist daher auf Anteilseignerseite mit 35 Prozent höher als bei Betrachtung der gesamten Gremien mit 23 Prozent.

Bezüglich der *Gesamtmandatsanzahl* der Aufsichtsräte lässt sich zunächst festhalten, dass in unserem Sample die durchschnittliche Mandatszahl pro Person in den Gremien bei 3,16 Mandaten liegt. Dabei variiert die Zahl zwischen einem Mandat und 7,83 Mandaten. Bei getrennter Betrachtung der Anteilseigner- und Arbeitnehmerseite lässt sich erkennen, dass die Anteilseignervertreter die weitaus größere Anzahl an Mandaten einbringen. Der durchschnittliche Anteilseignervertreter hält 4,09 Mandate und im Maximum nehmen die Anteilseignervertreter eines Gremiums durchschnittlich 9,75 Mandate wahr.

Im zweiten Teil der Tabelle sind die demographischen Eigenschaften der untersuchten Aufsichtsräte abgebildet. Was die Zusammensetzung der Gremien bezüglich des *Geschlechts* der Mandatsträger anbelangt, so zeigt sich, dass im Durchschnitt 91 Prozent der Mandatsträger männlich sind. Der Anteil der Frauen wird dabei klar von den Arbeitnehmervertretern beeinflusst. Hier beobachten wir durchschnittlich 78 Prozent Männer, wobei der Anteil von null Prozent bis 100 Prozent reicht.

Bezüglich der *Nationalität* der Aufsichtsratsgremien weisen deutsche Mandatsträger einen durchschnittlichen Anteil von 87 Prozent auf. Die Anteilsspanne reicht hierbei von 33 Prozent bis 100 Prozent. Dabei wird der Anteil der internationalen Mandatsträger durchweg durch die Anteilseignervertreter gehoben. So sind im Durchschnitt

83 Prozent der Anteilseignervertreter deutsch, wobei der Anteil internationaler Mandatsträger bei bis zu 75 Prozent der Anteilseignervertreter liegen kann.

Das mittlere *Alter* der Aufsichtsratsmitglieder liegt bei Betrachtung des gesamten Gremiums bei 56,1 Jahren. Während die Anteilseignervertreter im Durchschnitt 58,7 Jahre alt sind und ihr durchschnittliches Alter zwischen 45,6 und 66,7 Jahren schwankt, variiert das durchschnittliche Alter der Arbeitnehmervertreter zwischen 41 und 57,3 Jahren.

Tabelle 1 berichtet in den verschiedenen Dimensionen über die Heterogenität der Gremienzusammensetzung in den Unternehmen der Untersuchungsgesamtheit. Die beachtlichen Unterschiede *zwischen den Unternehmen*, die anhand des teilweise vollständig eingenommenen Wertebereichs zwischen minimaler und maximaler Ausprägung der Anteilswerte der Variablen festgestellt werden können, werden durch die dargestellten Heterogenitätsmaße weiter spezifiziert.

So zeigen die Heterogenitätsmaße (der normierte Index von BLAU sowie der normierte Variationskoeffizient) beträchtliche Schwankungen in der Zusammensetzung *einzelner Gremien*. Die dargestellten Werte liefern insbesondere bei Variablen, bei denen mehr als zwei Ausprägungen möglich sind, eine genauere Information über die Gremienzusammensetzung. Beispielsweise deutet der durchschnittliche BLAU-Index von 0,81 für die Wissensträgertypen auf eine relativ heterogene Zusammensetzung der vier möglichen Ausprägungen hin. Die minimalen und maximalen Ausprägungen zeigen zudem an, dass im Datensatz auch völlig homogene sowie extrem diverse Gremien enthalten sind. Genauso lassen die Heterogenitätsmaße der weiteren Variablen für die fachliche Qualifikation sowie für die demographischen Merkmale auf beachtliche Unterschiede in der Zusammensetzung der Gremien schließen.

## 2.4 Unterschiede in der Zusammensetzung deutscher Aufsichtsräte nach Indexzugehörigkeit und Mitbestimmungsform

### 2.4.1 Indexzugehörigkeit

#### 2.4.1.1 Indexbezogene Unterschiede in der fachlichen Zusammensetzung

##### **Wissensträgertypen**

Tabelle 2 zeigt die durchschnittlichen Anteile der Wissensträgertypen (Insider, Business Experts, Support Specialists, Community Influentials) für die vier Börsenindizes, die Unterschiede der Mittelwerte sowie deren Signifikanz für das gesamte Gremium und jeweils getrennt nach Anteilseigner- beziehungsweise Arbeitnehmerseite. Während beispielsweise bei DAX-Unternehmen auf Ebene des gesamten Gremiums durchschnittlich 41 Prozent der Aufsichtsräte Insider sind, handelt es sich lediglich bei im Durchschnitt zehn Prozent der Anteilseignervertreter um Insider. Ein geringer Insider-Anteil unter den Anteilseignervertretern ist konform zu den Erkenntnissen von BHAGAT/BLACK (1999) für US-amerikanische Unternehmen, die auf positive Aspekte einer gewissen Insider-Repräsentanz, wie Informationsvorteile bezüglich des Unternehmens, hinweisen. Für die deutschen Unternehmen des HDAX und SDAX ist festzuhalten, dass die in den letzten Jahren stattfindende Diskussion über die angeblich (zu) große Anzahl ehemaliger Vorstandsmitglieder in den Aufsichtsräten, die als Insider von der operativen in die kontrollierende Managementtätigkeit im gleichen Unternehmen wechseln, von unserem Sample so nicht bestätigt wird.

**Tabelle 2: Unterschiede im Anteil der Wissensträgertypen an den Aufsichtsräten zwischen den Börsenindizes**

		Panel A: Gesamter Aufsichtsrat				Panel B: Anteilseignervertreter				Panel C: Arbeitnehmervertreter			
		Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX
<b>Insider</b>	DAX	0,41	0,08 ***	0,13 ***	0,20 ***	0,10	0,06 ***	0,00	0,01	0,76	-0,01	-0,04	-0,05
	MDAX	0,32		0,05	0,11 ***	0,04		-0,06 *	-0,05	0,77		-0,03	-0,04
	SDAX	0,27			0,06	0,10			0,01	0,81			-0,00
	TecDAX	0,21				0,09				0,81			
	KWH-Test	***				**							
<b>Business Experts</b>	DAX	0,25	-0,04	-0,00	-0,15 ***	0,47	-0,02	0,13 **	-0,01				
	MDAX	0,29		0,04	-0,11 *	0,49		0,14 **	0,00				
	SDAX	0,25			-0,15 **	0,35			-0,14 **				
	TecDAX	0,40				0,48							
	KWH-Test	**				**							
<b>Support Specialists</b>	DAX	0,15	-0,07	-0,19 ***	-0,13 *	0,26	-0,08	-0,18 ***	-0,08				
	MDAX	0,22		-0,12 **	-0,06	0,34		-0,09 **	0,01				
	SDAX	0,34			0,06	0,43			0,10 *				
	TecDAX	0,28				0,33							
	KWH-Test	***				**							
<b>Community Influentials</b>	DAX	0,19	0,02	0,06 **	0,08 **	0,17	0,04	0,05	0,08	0,24	0,01	0,04	0,05
	MDAX	0,17		0,03	0,06	0,13		0,01	0,04	0,23		0,03	0,04
	SDAX	0,14			0,02	0,12			0,03	0,19			0,00
	TecDAX	0,11				0,09				0,19			
	KWH-Test	*											
<b>Blau-Index (normiert)</b>	DAX	0,89	0,06	0,11 **	0,15 ***	0,77	0,19 ***	0,11 **	0,13 **	0,69	0,06	0,16	0,17
	MDAX	0,83		0,05	0,09	0,58		-0,08	-0,06	0,62		0,09	0,10
	SDAX	0,78			0,04	0,66			0,01	0,53			0,01
	TecDAX	0,74				0,65				0,52			
	KWH-Test	**				***							

In Tabelle 2 sind die durchschnittlichen Anteile der vier *Wissensträgertypen* Insider, Business Experts, Support Specialists sowie Community Influentials für die Börsenindizes DAX, MDAX, SDAX und TecDAX angegeben. Die durchschnittlichen Anteile werden jeweils für das gesamte Gremium sowie separiert nach Anteilseigner- und Arbeitnehmervertretern analysiert. Bei diesen drei Gruppen ist jeweils in der ersten Spalte der durchschnittliche Anteil des Wissensträgertyps im jeweiligen Börsenindex angegeben. In den drei folgenden Spalten sind Mittelwertdifferenzen zwischen den Indizes erfasst. Bei den Arbeitnehmervertretern gibt es definitionsgemäß nur Insider und Community Influentials als Wissensträgertyp.

Je Wissensträgertyp ist für den Vergleich der Ergebnisse zwischen sämtlichen Indizes das Resultat des KRUSKAL-WALLIS-H-Tests (KWH-Test) unterhalb der Anteilswerte angegeben. Bei dieser Prüfung der Unterschiede zwischen den Börsenindizes differenzieren wir zwischen einer Signifikanz auf dem 1%-Niveau (\*\*\*) dem 5%-Niveau (\*\*) und dem 10%-Niveau (\*) sowie nicht-signifikanten Unterschieden. Bei einem signifikanten Ergebnis des KRUSKAL-WALLIS-H-Tests werden anschließend innerhalb einer Stichprobengesamtheit paarweise Indexvergleiche mit dem MANN-WHITNEY-U-Test durchgeführt. Die Signifikanz der paarweisen Vergleiche ist hinter der Mittelwertdifferenz angegeben. Es wird wiederum zwischen signifikanten Differenzen auf dem 1%-Niveau (\*\*\*) dem 5%-Niveau (\*\*) und dem 10%-Niveau (\*) sowie nicht-signifikanten Abweichungen unterschieden.

Da die Wissensträgertypen über eine kategoriale Variable erfasst werden, messen wir die Heterogenität der Aufsichtsräte mit dem normierten Index nach BLAU. Für die drei Gruppen „Gesamter Aufsichtsrat“, „Anteilseignervertreter“ sowie „Arbeitnehmervertreter“ ist für alle vier Börsenindizes jeweils in der ersten Spalte die mittlere Heterogenität der Gremien vermerkt. Die weitere Vorgehensweise und Darstellung der Ergebnisse entspricht der Analyse der Mittelwertdifferenzen.

Quelle: Eigene Berechnung.

Für das gesamte Gremium bestehen, wie in Panel A dargestellt, zwischen den Börsenindizes signifikante Unterschiede in der Zusammensetzung der Aufsichtsräte. Während beispielsweise Business Experts anteilmäßig am stärksten bei TecDAX-Unternehmen vertreten sind, weisen SDAX-Unternehmen im Durchschnitt den höchsten Anteil an Support Specialists auf. Entsprechend Panel B lassen sich (mit Ausnahme der Community Influentials) auch bei der Zusammensetzung der Anteilseignervertreter signifikante Unterschiede zwischen den Börsenindizes feststellen. Da in Panel C kein Zusammenhang zwischen der Zusammensetzung der Arbeitnehmervertreter und der Indexzugehörigkeit zu erkennen ist, kann man die Unterschiede in der Zusammensetzung des gesamten Gremiums in erster Linie über die Zusammensetzung der Anteilseignervertreter erklären. Mit der Berücksichtigung der Arbeitnehmervertreter im Gesamtgremium ist jedoch ein Größeneffekt verbunden; während beispielsweise beim durchschnittlichen DAX-, MDAX- und TecDAX-Unternehmen Business Experts knapp 50 Prozent der Anteilseignervertreter ausmachen, sind für das gesamte Gremium Business Experts anteilmäßig nur bei TecDAX-Unternehmen am stärksten vertreten. Dieser abweichende Befund ist auf die deutlich geringere Repräsentanz von Arbeitnehmervertretern bei TecDAX-Unternehmen zurückzuführen.

Festzuhalten bleibt, dass die durchschnittliche Zusammensetzung mit den vier Wissensträgertypen stark mit der Indexzugehörigkeit variiert. Diese Variation ist primär über die von Anteilseignerseite in den Aufsichtsrat entsandten Mitglieder sowie über die Größe des Gremiums erklärbar. Damit kann man insbesondere nicht davon ausgehen, dass es bezüglich des inhaltlichen Wissens der Aufsichtsratsmitglieder *den* Aufsichtsrat mit einer relativ einheitlichen Zusammensetzung gibt. Vielmehr kommt dieser Form des spezifischen Wissens scheinbar eine unterschiedliche, vom Index abhängige Bedeutung zu. Dieses Ergebnis steht im Einklang mit dem empirischen Befund von BAYSINGER/BUTLER (1985), wonach das spezifische Wissen in Corporate Boards unternehmensspezifischen Einflüssen unterliegt.

Die Unterschiede in der Zusammensetzung des Aufsichtsrats zeigen sich auch bei Betrachtung des Heterogenitätsmaßes. Nach Panel A sind die Aufsichtsräte von DAX-Unternehmen (signifikant) heterogener zusammengesetzt als die Aufsichtsräte von MDAX-, SDAX- und TecDAX-Unternehmen. Während bei DAX-Unternehmen die vier Wissensträgertypen damit tendenziell gleichmäßiger repräsentiert sind, dominiert bei den anderen Unternehmen mindestens einer der vier Typen. Wie der Ver-

gleich mit Panel B und Panel C andeutet, ist wohl primär die ausgewogenere Wahl von Anteilseignervertretern bei DAX-Unternehmen für diesen Befund verantwortlich. Vergleichbar mit den Befunden der relativen Anteile der vier Wissensträgertypen kann man somit auch für die Heterogenitätsmaße festhalten, dass die Heterogenität des spezifischen Wissens von Aufsichtsräten als weitere Kennzahl über die Zusammensetzung der Aufsichtsräte mit der Indexzugehörigkeit sowie der Gremiengröße variiert.

### **Aktive/Ehemalige und Gesamtmandatszahl**

Tabelle 3 gibt einen Überblick über Unterschiede in der Gremienzusammensetzung im Hinblick auf die Kategorisierung der Aufsichtsratsmitglieder als Aktive resp. als Ehemalige sowie im Hinblick auf die Gesamtmandatsanzahl zwischen den Börsenindizes. Nach Panel B ist der Anteil Ehemaliger bei den Anteilseignervertretern von DAX-Unternehmen signifikant größer als bei den drei weiteren Börsenindizes. Wie Panel A andeutet, wird dieser Unterschied durch die durchweg als „Aktive“ kategorisierten Arbeitnehmervertreter verwässert, so dass im gesamten Gremium durchschnittlich mehr als 25 Prozent Ehemalige bei DAX- und SDAX-Unternehmen tätig sind. Im Ergebnis lässt sich schlussfolgern, dass Unterschiede hinsichtlich der Gremienzusammensetzung bezüglich der Kategorisierung in Aktive und Ehemalige nicht nur infolge der Bestellung durch die Anteilseigner, sondern auch durch Größenunterschiede beziehungsweise Unterschiede in der Arbeitnehmer-Repräsentanz in den Unternehmen beeinflusst werden.

**Tabelle 3: Unterschiede bezüglich der Variable „aktiv/ehemalig“ sowie bezüglich der Gesamtmandatszahl zwischen den Börsenindizes**

		Panel A: Gesamter Aufsichtsrat				Panel B: Anteilseignervertreter				Panel C: Arbeitnehmervertreter			
		Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX
<b>Anteil</b>	DAX	0,26	0,08 ***	-0,02	0,02	0,46	0,16 ***	0,09 **	0,17 ***				
<b>Ehemaliger</b>	MDAX	0,17		-0,10 ***	-0,06	0,29		-0,08 *	0,00				
	SDAX	0,28			0,04	0,37			0,08				
	TecDAX	0,23				0,29							
	KWH-Test	**				***							
<b>Mittlere</b>	DAX	3,25	-0,19	0,56 ***	-0,23	4,63	-0,11	1,42 ***	0,68 **	1,63	0,25 **	0,31 ***	0,37 **
<b>Mandatszahl</b>	MDAX	3,43		0,74 ***	-0,04	4,74		1,53 ***	0,79 *	1,39		0,07	0,13
<b>je Gremium</b>	SDAX	2,69			-0,78 ***	3,21			-0,74 **	1,32			0,06
	TecDAX	3,48				3,95				1,26			
	KWH-Test	***				***				***			
<b>Variationskoeffizient</b>	DAX	0,42	-0,01	0,06 **	0,05 **	0,34	-0,02	0,02	-0,01	0,34	0,09 **	0,18 ***	0,16 **
<b>(normiert)</b>	MDAX	0,43		0,08 ***	0,06 ***	0,36		0,04	0,01	0,24		0,09 **	0,06
<b>für Mandatszahl</b>	SDAX	0,36			-0,02	0,32			-0,02	0,15			-0,03
	TecDAX	0,38				0,34				0,18			
	KWH-Test	***								***			

Wir messen die Variable „aktiv/ehemalig“ über den Anteil Ehemaliger unter den Aufsichtsräten. Eine separate Analyse für die Arbeitnehmervertreter erfolgt nicht, da diese ausschließlich als aktive Mandatsträger klassifiziert werden. Für die metrische Variable *Mandatszahl* wird neben der mittleren Mandatszahl der normierte Variationskoeffizient als Heterogenitätsmaß berechnet. Das methodische Vorgehen bei der Analyse der Mittelwertdifferenzen zwischen den Indizes entspricht der Verfahrensweise zur Untersuchung der Verteilung des spezifischen Wissens in Tabelle 2.

Quelle: Eigene Berechnung.

Was Unterschiede bei der Zusammensetzung im Hinblick auf die Gesamtmandatsanzahl anbelangt, so verdeutlicht Panel A, dass TecDAX-Unternehmen im Durchschnitt mit 3,48 die höchste mittlere Mandatszahl je Aufsichtsratsgremium aufweisen. Aufsichtsräte von SDAX-Unternehmen verfügen demgegenüber mit einem durchschnittlichen Wert von 2,69 über eine signifikant niedrigere mittlere Gesamtmandatszahl als die Aufsichtsräte der anderen drei Indizes. Auf Anteilseignerseite ist bei der mittleren Mandatszahl eine signifikante Abstufung zwischen DAX-/MDAX-, TecDAX- sowie SDAX-Unternehmen feststellbar, wobei die niedrigste Mandatszahl bei SDAX-Unternehmen vorliegt. Demgegenüber haben Arbeitnehmervertreter von DAX-Unternehmen eine signifikant höhere mittlere Mandatszahl als die Vertreter bei den weiteren drei Indizes. Dieses Ergebnis dürfte auf den im ersten Fall relativ höheren Anteil an Gewerkschaftsvertretern zurückzuführen sein.

Hinsichtlich der Mandatszahl sind die Aufsichtsräte von DAX- und MDAX-Unternehmen zudem signifikant heterogener zusammengesetzt als die von SDAX- und TecDAX-Unternehmen. Der Vergleich der normierten Variationskoeffizienten zeigt, dass in der ersten Gruppe die Gesamtmandatszahl der Aufsichtsratsmitglieder stärker schwankt als in der zweiten Gruppe. Interessanterweise sind diese Heterogenitätsunterschiede nicht auf die Anteilseignervertreter, sondern auf die Arbeitnehmervertreter zurückführbar. Bei letzteren sind die Vertreter in DAX-Aufsichtsräten signifikant heterogener zusammengesetzt als in den weiteren drei Indizes. Erneut dürfte dieser Unterschied maßgeblich durch den höheren Anteil externer Arbeitnehmervertreter in DAX-Gremien im Vergleich zu den anderen Indizes verursacht sein.

Die Ergebnisse verdeutlichen, dass die durchschnittlichen Aufsichtsräte – abhängig vom Börsenindex – signifikante Unterschiede aufweisen. Insbesondere bei DAX-Unternehmen sind im Vergleich zu den anderen Indizes die Aufsichtsräte heterogener zusammengesetzt, bestellen die Anteilseigner in größerem Ausmaß Ehemalige und wählen Anteilseigner sowie Arbeitnehmer Aufsichtsräte mit zahlreichen weiteren Mandaten aus, so dass sich hinsichtlich der Mandatszahl eine deutlich diversere Zusammensetzung ergibt. Unsere Befunde bezüglich der fachlichen Qualifikation stimmen mit PFEFFER/SALANCIK (2003) überein. Der *Resource Dependence Theory* folgend, argumentieren sie, dass die Interaktion eines Unternehmens mit seiner Umwelt mit Umfang, Diversifikation und Internationalisierung der Geschäftstätigkeit zunimmt beziehungsweise komplexer wird. Im Einklang mit unseren Ergebnissen sollten Aufsichtsräte größerer Unternehmen deshalb heterogener und mit Personen



mit einer größeren Anzahl an Mandaten besetzt sein, als die Kontrollgremien kleinerer Unternehmen. Unsere Befunde legen zudem nahe, dass die betrachteten Unternehmen die Vorschrift des Deutschen Corporate Governance Kodex zur fachlichen Qualifikation der Mandatsträger (DCGK 2009: 5.4.1.) *differenziert* umsetzen, so dass die fachliche Qualifikation der Aufsichtsratsgremien zwischen den verschiedenen Indizes signifikante Unterschiede aufweist.

### 2.4.1.2 Indexbezogene Unterschiede in der demographischen Zusammensetzung

#### **Geschlecht**

Tabelle 4 veranschaulicht, dass zwischen den Börsenindizes kaum Unterschiede hinsichtlich des Anteils männlicher Aufsichtsräte bestehen. Interessanterweise haben DAX-Unternehmen nach Panel A den größten Anteil weiblicher Aufsichtsräte; dieses Ergebnis ist allerdings nur im Vergleich zu SDAX- sowie TecDAX-Unternehmen signifikant. Der nach Panel C vergleichsweise hohe Anteil weiblicher Aufsichtsratsmitglieder der Arbeitnehmer ist bemerkenswert, da nach dem Drittelbeteiligungsgesetz „Frauen und Männer entsprechend ihrem zahlenmäßigen Verhältnis im Unternehmen vertreten sein“ sollen (§ 4 Abs. 4 DrittelbG), die diesem Gesetz unterliegenden Unternehmen aber stärker im SDAX und TecDAX als im DAX vertreten sind. Gemäß Panel B sind Frauen unter den Anteilseignervertretern hingegen kaum repräsentiert. Unsere Ergebnisse sind vergleichbar zu AGRAWAL/KNOEBER (2001), welche für US-amerikanische Unternehmen feststellen, dass Frauen bei der Besetzung der Corporate Boards kein besonderer Status beigemessen wird.

**Tabelle 4: Unterschiede in der demographischen Zusammensetzung der Aufsichtsräte zwischen den Börsenindizes**

		Panel A: Gesamter Aufsichtsrat				Panel B: Anteilseignervertreter				Panel C: Arbeitnehmervertreter			
		Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX	Ø	MDAX	SDAX	TecDAX
<b>Anteil männlicher Aufsichtsräte</b>	DAX	0,89	-0,03	-0,04 **	-0,04 *	0,96	-0,03	-0,02	-0,01	0,80	0,00	0,03	0,10
	MDAX	0,91		-0,01	-0,01	0,98		0,01	0,02	0,79		0,03	0,09
	SDAX	0,92			-0,00	0,98			0,01	0,76			0,06
	TecDAX	0,93				0,97				0,70			
	KWH-Test	*											
<b>Anteil deutscher Aufsichtsräte</b>	DAX	0,87	-0,09 ***	-0,04 **	0,10	0,78	-0,17 ***	-0,12 ***	0,04	0,98	0,02	-0,01	0,00
	MDAX	0,95		0,04	0,19 ***	0,95		0,05 **	0,21 ***	0,97		-0,03	-0,02
	SDAX	0,91			0,15 ***	0,89			0,16 ***	0,99			0,01
	TecDAX	0,76				0,74				0,98			
	KWH-Test	***				***							
<b>Durchschnittliches Gremialalter</b>	DAX	57,67	1,80	2,84	0,60	62,08	3,71 ***	4,91 ***	4,71 **	51,25	0,40	1,62	3,08
	MDAX	55,88		1,05	-1,20	58,37		1,21	1,00	50,85		1,21	2,68
	SDAX	54,82			-2,25	57,17			-0,20	49,63			1,47
	TecDAX	57,07				57,37				48,17			
	KWH-Test					**							
<b>Variationskoeffizient (normiert) für Gremialalter</b>	DAX	0,13	0,01	0,00	0,02	0,09	-0,01	-0,01	-0,01	0,11	0,03 *	0,01	0,05 **
	MDAX	0,12		-0,00	0,01	0,10		-0,00	0,00	0,09		-0,02	0,03
	SDAX	0,12			0,01	0,10			0,00	0,10			0,04
	TecDAX	0,11				0,10				0,06			
	KWH-Test									*			

In Tabelle 4 werden bei den Variablen *Geschlecht* und *Nationalität* jeweils die durchschnittlichen Anteile männlicher beziehungsweise deutscher Aufsichtsräte angegeben. Bei der Variable *Alter* messen wir das durchschnittliche Gremialalter innerhalb eines Index. Für diese metrische Variable wird die Heterogenität mit dem normierten Variationskoeffizienten berechnet.

Das methodische Vorgehen bei der Analyse der demographischen Unterschiede zwischen den Indizes entspricht der Verfahrensweise zur Untersuchung der Verteilung des spezifischen Wissens in Tabelle 2. Dies gilt sowohl für die Erfassung der absoluten Differenzen als auch für die Messung der Heterogenität über den normierten Variationskoeffizienten.

Quelle: Eigene Berechnung.

### **Nationalität**

Für den gesamten Aufsichtsrat hebt sich nach Panel A der Grad der Internationalisierung des Aufsichtsrats von DAX- und TecDAX-Unternehmen, gemessen über den Anteil deutscher Aufsichtsräte, signifikant von den Unternehmen ab, die im MDAX oder SDAX gelistet sind. Dies ist nach Panel B primär auf die Aufsichtsratsmitglieder der Anteilseigner zurückzuführen, da gemäß Panel C die Arbeitnehmer im Wesentlichen deutsche Mitglieder entsenden. Ein Grund für die geringe Repräsentanz ausländischer Mandatsträger auf Seiten der Arbeitnehmer dürfte darin liegen, dass bei der Wahl dieser Vertreter nur die Mitarbeiter deutscher Standorte wahlberechtigt sind.<sup>8</sup> Insgesamt scheinen damit am ehesten DAX- und TecDAX-Unternehmen die Vorgabe des Deutschen Corporate Governance Kodex zu berücksichtigen, sich bei der Besetzung des Aufsichtsrats an der internationalen Tätigkeit des Unternehmens zu orientieren (vgl. DCGK 2009: 5.4.1).

### **Alter**

Für das Alter der Aufsichtsräte lassen sich ebenfalls signifikante Unterschiede in Abhängigkeit der Indexzugehörigkeit feststellen. Auffallend ist, dass nach Panel B die Aufsichtsratsmitglieder der Anteilseigner in DAX-Unternehmen ein signifikant höheres Durchschnittsalter aufweisen als bei den weiteren Unternehmen. Diese Beobachtung geht einher mit dem signifikant höheren Anteil an Ehemaligen bei den Anteilseignervertretern in DAX-Unternehmen, da eine alleinige Aufsichtsratsstätigkeit im typischen Erwerbssalter im deutschen Corporate Governance System bislang kaum etabliert ist. Auch die Aufsichtsratsmitglieder der Arbeitnehmer haben in DAX-Unternehmen tendenziell das höchste Durchschnittsalter (Panel C). Diese gruppenspezifischen Unterschiede verwischen sich jedoch auf der Ebene des gesamten Aufsichtsrats (Panel A); hier sind keine signifikanten Unterschiede im mittleren Gremienalter beobachtbar. Der Vergleich der normierten Variationskoeffizienten liefert abschließend keine systematischen Unterschiede hinsichtlich der Heterogenität des Gremienalters.

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<sup>8</sup> Vgl. hierzu ULMER/HABERSACK/HENSSLER (2006: § 1 MitBestG Rdn. 6, § 5 MitBestG Rdn. 55f. und § 10 MitBestG Rdn. 19); sowie VON WERDER (2004: 235-238).

## 2.4.2 Mitbestimmungsform

### 2.4.2.1 Mitbestimmungsbezogene Unterschiede in der fachlichen Zusammensetzung

#### **Wissensträgertypen**

In Abhängigkeit der Mitbestimmungsform bestehen nach Tabelle 5 signifikante Unterschiede in der Zusammensetzung der Aufsichtsräte aus den vier Wissensträgertypen. Beispielsweise unterscheiden sich nach Panel A die Aufsichtsräte nicht-mitbestimmungspflichtiger Unternehmen von den Aufsichtsräten der dem Mitbestimmungsgesetz unterliegenden Unternehmen dadurch, dass sie insgesamt über einen signifikant kleineren Anteil an Insidern sowie Community Influentials verfügen und bei ihnen verstärkt Business Experts und Support Specialists vertreten sind. Unterschiede bei den Aufsichtsratsmitgliedern der Anteilseigner lassen sich gemäß Panel B jedoch nur für Support Specialists sowie Community Influentials festmachen.

Dem Mitbestimmungsgesetz unterliegende Unternehmen sind tendenziell größer und werden stärker reguliert als Unternehmen des Drittelbeteiligungsgesetzes oder nicht-mitbestimmungspflichtige Unternehmen. Der größere Anteil an Community Influentials bei diesen Unternehmen steht im Einklang mit den theoretischen Erkenntnissen zur Bedeutung von Größe und Regulierung (vgl. PFEFFER/SALANCIK 2003) sowie den empirischen Befunden zum Einfluss von Unternehmensgröße (vgl. AGRAWAL/KNOEBER 2001) beziehungsweise Regulierung (vgl. BAYSINGER/ZARDKOOHI 1986). Die signifikant andersartige Zusammensetzung der Aufsichtsräte kann man nach Tabelle 5 sowohl auf die unterschiedliche Bestellung durch die Anteilseigner als auch auf die Existenz von Aufsichtsratsmitgliedern der Arbeitnehmer bei den mitbestimmungspflichtigen Unternehmen zurückführen.

Die Bedeutung der Mitbestimmungsform zeigt sich auch an der heterogenen Zusammensetzung der Aufsichtsräte. Demnach weisen mitbestimmungspflichtige Unternehmen einen signifikant höheren normierten BLAU-Index auf als die nicht-mitbestimmungspflichtigen Unternehmen bei Betrachtung der gesamten Gremien. Interessanterweise geht ein Anstieg des Ausmaßes gesetzlicher Regelung somit nicht mit einer homogeneren Zusammensetzung des Aufsichtsrats einher. Nach Panel B und C ist dieser Befund auf die unterschiedliche Auswahl von Aufsichtsräten durch Anteilseigner und Arbeitnehmer erklärbar.

**Tabelle 5: Unterschiede im Anteil der Wissensträgertypen an den Aufsichtsräten zwischen den Mitbestimmungsformen**

		Panel A: Gesamter Aufsichtsrat			Panel B: Anteilseignervertreter			Panel C: Arbeitnehmervertreter		
		Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht
<b>Insider</b>	MitbestG	0,41	0,03 ***	0,31 ***	0,08	0,02	0,00	0,73	-0,23	-0,27 ***
	DrittelbG	0,37		0,28 ***	0,07		-0,02	0,96		-0,04 ***
	oMitbestPflicht	0,09			0,08			1,00		
	KWH-Test	***						***		
<b>Business Experts</b>	MitbestG	0,24	-0,04	-0,14 ***	0,48	0,06	0,10			
	DrittelbG	0,28		-0,10	0,42		0,04			
	oMitbestPflicht	0,38			0,38					
	KWH-Test	***								
<b>Support Specialists</b>	MitbestG	0,14	-0,14 ***	-0,31 ***	0,27	-0,15 *	-0,18 ***			
	DrittelbG	0,28		-0,17 **	0,42		-0,03			
	oMitbestPflicht	0,44			0,45					
	KWH-Test	***			***					
<b>Community Influentials</b>	MitbestG	0,22	0,14 ***	0,14 ***	0,17	0,08 *	0,08 ***	0,27	0,23 ***	0,27 *
	DrittelbG	0,08		-0,01	0,09		0,00	0,04		0,04
	oMitbestPflicht	0,08			0,09			0,00		
	KWH-Test	***			**			***		
<b>Blau-Index (normiert)</b>	MitbestG	0,90	0,09 ***	0,25 ***	0,70	0,16 ***	0,05	0,77	0,66 ***	0,77 *
	DrittelbG	0,81		0,16 ***	0,54		-0,10 *	0,12		0,12
	oMitbestPflicht	0,65			0,65			0,00		
	KWH-Test	***			**			***		

In Tabelle 5 sind die durchschnittlichen Anteile der vier *Wissensträgertypen* Insider, Business Experts, Support Specialists sowie Community Influentials in den Mitbestimmungsformen „Mitbestimmungsgesetz“ (MitbestG), „Drittelbeteiligungsgesetz“ (DrittelbG) sowie „ohne Mitbestimmungspflicht“ (oMitbestPflicht) angegeben. Definitionsgemäß gibt es bei den Arbeitnehmervertretern nur Insider und Community Influentials als Ausprägungen des spezifischen Wissens. Die Angaben für die Kategorie „oMitbestPflicht“ resultieren bei den Arbeitnehmervertretern aus einem Einzelfall, der bei den weiteren Analysen nicht weiter berücksichtigt wird. Das im SDAX notierte Unternehmen Curanum hat einen mitbestimmten Aufsichtsrat, obwohl es gesetzlich keiner Mitbestimmungspflicht unterliegt. Wissensträgertypen werden mit einer kategorialen Variablen erfasst. Dementsprechend messen wir die Heterogenität der Aufsichtsräte mit dem normierten Index nach BLAU. Das methodische Vorgehen bei der Analyse der Unterschiede im Anteil der Wissensträgertypen an den Aufsichtsräten zwischen den Mitbestimmungsformen entspricht der Verfahrensweise zur Untersuchung der Verteilung der Wissensträgertypen in Tabelle 2. Dies gilt sowohl für die Erfassung der absoluten Differenzen als auch für die Messung der Heterogenität.

Quelle: Eigene Berechnung.

### **Aktive/Ehemalige**

Bemerkenswerterweise sind nach Panel A in Tabelle 6 Ehemalige signifikant stärker in nicht-mitbestimmungspflichtigen Unternehmen als in mitbestimmungspflichtigen Unternehmen vertreten. Der Vergleich mit Panel B zeigt allerdings, dass dieser Befund nicht auf die Bestellung durch die Anteilseigner zurückzuführen ist, sondern aus einem Größeneffekt resultiert und auf der Existenz der durchgängig als aktiv kategorisierten Arbeitnehmervertreter beruht.

### **Gesamtmandatszahl**

Für den gesamten Aufsichtsrat haben zudem die Aufsichtsräte nicht-mitbestimmungspflichtiger Unternehmen eine signifikant höhere durchschnittliche Mandatszahl als die Aufsichtsräte mitbestimmungspflichtiger Unternehmen (Panel A). Allerdings kehrt sich diese Beziehung bei Betrachtung der Aufsichtsratsmitglieder der Anteilseigner um (Panel B). Der Befund für das gesamte Gremium ist somit erneut über die Existenz der Arbeitnehmervertreter erklärbar, da diese alle hauptberuflich einer anderen Tätigkeit nachgehen. Über den Vergleich der normierten Variationskoeffizienten ist letztlich festzuhalten, dass die Aufsichtsräte der mitbestimmungspflichtigen Unternehmen signifikant heterogener hinsichtlich der einzelnen Mandatszähl sind als die Aufsichtsräte der unter das Drittelbeteiligungsgesetz fallenden Unternehmen, welche wiederum signifikant heterogener hinsichtlich der Mandatszähl der Aufsichtsräte sind als die nicht-mitbestimmungspflichtigen Unternehmen.

Im Ergebnis zeigt sich, dass abhängig von der Mitbestimmungsform signifikante Unterschiede in der Zusammensetzung der Aufsichtsräte bestehen. Diese betreffen die fachliche Qualifikation, d.h. das spezielle inhaltliche Wissen der Aufsichtsräte, die Frage, inwieweit die Mandatsträger hauptberuflich einer anderen Tätigkeit nachgehen, sowie die Gesamtmandatszähl der Aufsichtsräte.

**Tabelle 6: Unterschiede bezüglich der Variable „aktiv/ehemalig“ sowie bezüglich der Gesamtmandatszahl zwischen den Mitbestimmungsformen**

		Panel A: Gesamter Aufsichtsrat			Panel B: Anteilseignervertreter			Panel C: Arbeitnehmervertreter		
		Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht
<b>Anteil Ehemaliger</b>	MitbestG	0,18	-0,03	-0,15 ***	0,36	0,03	0,03			
	DrittelbG	0,21		-0,12	0,33		-0,00			
	oMitbestPflicht	0,33			0,33					
	KWH-Test	**								
<b>Mittlere Mandatszahl je Gremium</b>	MitbestG	2,97	-0,05	-0,59 **	4,42	0,41	0,86 ***	1,52	0,40 ***	0,52
	DrittelbG	3,02		-0,54	4,01		0,45	1,12		12,00
	oMitbestPflicht	3,57			3,57			1,00		
	KWH-Test	*			***			***		
<b>Variationskoeffizient (normiert) für Mandatszahl</b>	MitbestG	0,44	0,03 ***	0,13 ***	0,35	-0,00	0,04	0,29	0,20 ***	0,29
	DrittelbG	0,41		0,10 ***	0,35		0,04	0,09		0,09
	oMitbestPflicht	0,31			0,31			0,00		
	KWH-Test	***						***		

In Tabelle 6 werden die Unterschiede bezüglich der Variablen „aktiv/ehemalig“ und der Mandatszahl zwischen den Mitbestimmungsformen dargestellt. Bei erstere differenzieren wir zwischen Aktiven und Ehemaligen (jeweils in Bezug auf ihre Hauptbeschäftigung). In Tabelle 6 wird jeweils der durchschnittliche Anteil Ehemaliger im gesamten Aufsichtsrat beziehungsweise unter den Anteilseignervertretern angegeben. Auf eine separate Analyse der Arbeitnehmervertreter wird verzichtet, da diese definitionsgemäß ausschließlich als „Aktive“ klassifiziert werden. Was die *Gesamtmandatszahl* anbelangt, so wird sowohl für den gesamten Aufsichtsrat als auch für die Anteilseigner- und Arbeitnehmervertreter getrennt die mittlere Mandatszahl je Gremium für die drei Mitbestimmungsformen angegeben. Die Heterogenität wird für diese metrische Variable mit dem normierten Variationskoeffizienten berechnet.

Das methodische Vorgehen bei der Analyse der Variablen Aktive/Ehemalige und Mandatszahl zwischen den Mitbestimmungsformen entspricht der Verfahrensweise zur Untersuchung der Verteilung des spezifischen Wissens in Tabelle 2. Dies gilt sowohl für die Erfassung der absoluten Differenzen als auch für die Messung der Heterogenität.

Quelle: Eigene Berechnung.

### 2.4.2.2 Mitbestimmungsbezogene Unterschiede in der demographischen Zusammensetzung

Die Mitbestimmungsformen unterscheiden sich gemäß Tabelle 7 auch hinsichtlich der demographischen Zusammensetzung der Aufsichtsräte.

#### **Geschlecht**

Unternehmen des Mitbestimmungsgesetzes beziehungsweise des Drittelbeteiligungsgesetzes haben einen signifikant größeren Anteil weiblicher Aufsichtsräte als die Unternehmen ohne Mitbestimmungspflicht (Panel A). Der Vergleich mit Panel B und C verdeutlicht, dass dieses Ergebnis auf die Aufsichtsratsmitglieder der Arbeitnehmer zurückzuführen ist.

#### **Nationalität**

Interessanterweise haben Unternehmen des Mitbestimmungsgesetzes einen signifikant größeren Anteil deutscher Aufsichtsräte als Unternehmen, die nicht mitbestimmungspflichtig sind (Panel A). Der Vergleich mit Panel B verdeutlicht, dass dieser Unterschied jedoch nicht auf die Auswahl der Aufsichtsräte durch die Anteilseigner zurückzuführen ist. Vielmehr sind die Arbeitnehmervertreter im Aufsichtsrat als ursächlich für diesen Befund anzusehen.

#### **Alter**

Für das durchschnittliche Gremialalter sowie dessen Variation lassen sich lediglich bei den Aufsichtsratsmitgliedern der Arbeitnehmer (Panel C) schwach signifikante Unterschiede zwischen den Mitbestimmungsformen feststellen. Demgegenüber ermitteln wir bei dieser Variablen für den gesamten Aufsichtsrat (Panel A) und die Aufsichtsratsmitglieder der Anteilseigner (Panel B) keine systematischen Differenzen.



**Tabelle 7: Unterschiede in der demographischen Zusammensetzung der Aufsichtsräte zwischen den Mitbestimmungsformen**

		Panel A: Gesamter Aufsichtsrat			Panel B: Anteilseignervertreter			Panel C: Arbeitnehmervertreter		
		Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht	Ø	DrittelbG	oMitbestPflicht
<b>Anteil männlicher Aufsichtsräte</b>	MitbestG	0,89	-0,01	-0,07 **	0,97	-0,01	0,01	0,80	0,07	0,80 *
	DrittelbG	0,90		-0,06 **	0,98		0,01	0,73		0,73 *
	oMitbestPflicht	0,96			0,97			0,00		
	KWH-Test	***						*		
<b>Anteil deutscher Aufsichtsräte</b>	MitbestG	0,92	0,04	0,13 **	0,86	0,04	0,07	0,98	-0,01	-0,02
	DrittelbG	0,88		0,09	0,83		0,04	0,99		-0,01
	oMitbestPflicht	0,79			0,79			1,00		
	KWH-Test	*								
<b>Durchschnittliches Gremialalter</b>	MitbestG	55,74	0,67	-1,11	60,15	2,49	2,88	51,08	2,52	10,08 *
	DrittelbG	55,07		-1,77	57,67		0,39	48,56		7,56
	oMitbestPflicht	56,84			57,27			41,00		
	KWH-Test							*		
<b>Variationskoeffizient (normiert) für Gremialalter</b>	MitbestG	0,13	0,01	0,02 **	0,10	0,00	-0,01	0,11	0,04 **	-0,02
	DrittelbG	0,12		0,02	0,10		-0,01	0,07		-0,06
	oMitbestPflicht	0,11			0,11			0,13		
	KWH-Test	*						*		

In Tabelle 7 werden bei den Variablen *Geschlecht* und *Nationalität* jeweils die durchschnittlichen Anteile männlicher beziehungsweise deutscher Aufsichtsräte angegeben. Bei den Arbeitnehmervertretern resultieren die Angaben für die Kategorie „oMitbestPflicht“ aus einem Einzelfall, der bei den weiteren Analysen nicht weiter berücksichtigt wird. Das im SDAX notierte Unternehmen Curanum hat einen mitbestimmten Aufsichtsrat, obwohl es gesetzlich nicht unter die Mitbestimmungspflicht fällt. Bei der Variable Alter wird das durchschnittliche Gremialalter innerhalb einer Mitbestimmungsform gemessen. Für diese metrische Variable wird die Heterogenität mit dem normierten Variationskoeffizienten berechnet.

Das methodische Vorgehen bei der Analyse der demographischen Unterschiede zwischen den Mitbestimmungsformen entspricht der Verfahrensweise zur Untersuchung der Verteilung des spezifischen Wissens in Tabelle 2. Dies gilt sowohl für die Erfassung der absoluten Differenzen als auch für die Messung der Heterogenität.

Quelle: Eigene Berechnung.

## 2.5 Zusammenfassung

Im vorliegenden Beitrag haben wir uns der Frage gewidmet, wie deutsche Aufsichtsräte hinsichtlich ihrer fachlichen Qualifikation und ihrer demographischen Merkmale zusammengesetzt sind. Dabei wurde analysiert, welche systematischen Unterschiede bei der Zusammensetzung der Aufsichtsräte bestehen. Schließlich haben wir untersucht, ob diese systematischen Unterschiede an der Indexzugehörigkeit beziehungsweise dem Umfang der gesetzlich geregelten Mitbestimmung festgemacht werden können.

Zunächst ergibt unsere Analyse deutliche Unterschiede in der durchschnittlichen Besetzung der Gremien, so dass man im deutschen Corporate Governance System letztlich nicht von *dem* Aufsichtsrat sprechen kann. Unsere Ergebnisse zeigen zudem, dass die Zusammensetzung der Aufsichtsräte häufig mit der Zugehörigkeit zu unterschiedlichen Indizes und mit der Mitbestimmungsform differiert. So korrelieren Unterschiede in der durchschnittlichen Zusammensetzung der Aufsichtsräte mit den vier Wissensträgertypen Insider, Business Experts, Support Specialists und Community Influentials stark mit der Indexzugehörigkeit. Dabei weisen insbesondere die Gremien von DAX-Unternehmen einige Besonderheiten auf: Die Aufsichtsräte der DAX-Unternehmen sind bezüglich der Wissensträgertypen signifikant heterogener zusammengesetzt, die Arbeitnehmervertreter verfügen im Durchschnitt über signifikant mehr Gremienerfahrung (im Sinne gehaltener Mandate) und der durchschnittliche Anteil Ehemaliger ist in DAX-Unternehmen signifikant größer. Zugleich sind die Anteilseignervertreter in diesen Unternehmen im Durchschnitt signifikant älter als in den restlichen Unternehmen.

Hinsichtlich der Unterschiede in der Gremienzusammensetzung in Bezug auf die unterschiedlichen Formen der Mitbestimmung stellen wir fest, dass in Aufsichtsräten mitbestimmungspflichtiger Unternehmen die Verteilung der Wissensträgertypen signifikant heterogener ausfällt als in Aufsichtsräten nicht-mitbestimmungspflichtiger Unternehmen. Konform zur Resource Dependence Theorie finden wir zudem heraus, dass Community Influentials in Unternehmen, die das Mitbestimmungsgesetz befolgen müssen, unter den Anteilseignervertretern signifikant stärker vertreten sind als in den übrigen Unternehmen (vgl. PFEFFER/SALANCIK 2003). Schließlich zeigen unsere Analysen für die Unternehmen des DAX, MDAX, SDAX und TecDAX, dass die in

den Medien häufig geführte Diskussion über einen zu hohen Anteil ehemaliger Vorstände im Aufsichtsrat überzeichnet ist.

Der vorliegende Beitrag schließt durch seine umfassende Untersuchung der Zusammensetzung deutscher Aufsichtsräte auf Gremienebene hinsichtlich fachlicher Qualifikationen und demographischer Merkmale eine Forschungslücke. So wird das insbesondere im empirischen Bereich bestehende Ungleichgewicht zwischen den umfangreichen Forschungsarbeiten zur Zusammensetzung von Corporate Boards im US-amerikanischen Corporate Governance System und den bisher wenig vorhandenen Arbeiten zum dualistischen deutschen Corporate Governance System reduziert.

Die Ergebnisse unseres Beitrags bieten Anhaltspunkte dafür, dass die Aufsichtsratsgremien in den untersuchten Unternehmen anhand unterschiedlicher Kriterien zusammengestellt werden. Auf Grundlage der vorliegenden Erkenntnisse lassen sich Ansatzpunkte für weitere Untersuchungen und damit eine eventuell einhergehende Weiterentwicklung der Vorschriften des Deutschen Corporate Governance Kodex identifizieren. So mangelt es dem Kodex bisher an konkreten Empfehlungen zur fachlichen Qualifikation der Aufsichtsräte. Zugleich könnte die Aufnahme weiterer Empfehlungen zur demographischen Zusammensetzung der Aufsichtsratsgremien durch weitere Analysen angestoßen werden. Dies betrifft zum einen die Repräsentanz von Frauen, zum anderen eine Präzisierung hinsichtlich der Internationalität der Gremien. Schließlich liefert der ermittelte hohe Anteil nicht anderweitig aktiver Mandatsträger eine Basis, eine Debatte über die Etablierung der Aufsichtsrats Tätigkeit als eigenständiges Berufsbild zu führen. Die vorliegenden Erkenntnisse, die für eine große Anzahl an Unternehmen Muster der Gremienzusammensetzung aufzeigen, bieten somit einige Anhaltspunkte für weitere Forschungsarbeiten. So könnten weiterführende Untersuchungen die Vorteilhaftigkeit der verschiedenen Zusammensetzungen in Bezug auf die fachliche Qualifikation und die demographischen Merkmale analysieren und konkrete Hinweise für die Entwicklung weiterer Regelungen im Deutschen Corporate Governance Kodex geben.

# 3

## Firm Size and Board Diversity

### 3.1 Introduction

Corporate governance research is increasingly addressing board composition with respect to directors' backgrounds and characteristics. Whereas early work on board composition focuses on directors' occupational and educational background (see HILLMAN/CANELLA/PAETZOLD 2000; BOYD 1990), more recent studies also consider demographic characteristics such as nationality, age, or gender (see RUIGROK/PECK/TACHEVA 2007; HILLMAN/CANELLA/HARRIS 2002). Studies on the composition of German supervisory boards typically concentrate on the role of either employee representatives (see, e.g., FAUVER/FUERST 2006) or bank representatives (see, e.g., DITTMANN/MAUG/SCHNEIDER 2010); more recently, gender issues have gained prominence (see, e.g., OEHMICHEN/RAPP/WOLFF 2010). The relevance of other kinds of diversity of supervisory boards in dualistic systems has been largely disregarded up to now.

Different to the literature that concentrates on potential *effects* of board composition, e.g., the impact of board composition on firm performance, we address the *determinants* of board composition. Specifically, our study concentrates on *firm size* as a potential determinant of board composition. Anecdotal evidence suggests that large firms have a more diverse board of directors than small firms. Frequently, boards of large firms include current and former executives from banks, insurances or non-financial firms but also experts from different fields, scientists or politicians. In contrast, it can be observed that the boards of smaller companies often consist of less heterogeneous board members.<sup>9</sup> Specifically, we focus on two characteristics of

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<sup>9</sup> For example, relating to the supervisory boards of German companies, shareholders of large firms such as Bayer (Ernst-Ludwig Winnacker, then president of the largest German research founding organization, DFG), Altana (Wolfgang A. Herrmann, president of the Technical University of Munich), and ThyssenKrupp (Gang Wan, president of the Tongji University) have appointed scientists from non-profit universities as board members. To the contrary, the predominantly smaller

board members that are frequently highlighted in the business press<sup>10</sup>: directors' occupational and international background.<sup>11</sup>

Theoretically, we rely on resource dependence theory proposing that corporate boards are a means to managing external dependencies (see PFEFFER/SALANCIK 2003). In this regard, directors can bring resources such as expertise, perspectives, ties to other firms, and legitimacy to boards. As external dependencies become more complex, we argue, firms are more likely to rely on diverse boards. Taking firm size as a measure of complexity, we hence expect board diversity to generally increase with firm size. However, there are also countervailing effects resulting in a potentially non-linear relation between firm size and board diversity: While board diversity might generally enhance board performance through widening the knowledge base and fostering innovativeness and creativity, when driven to its extreme, it might as well negatively affect board performance by reducing decision speed and increasing the potential for misunderstandings and conflicts (see WILLIAMS/O'REILLY 1998). These potentially adverse effects of increasing board diversity might well result in an effective upper bound for the level of board diversity chosen by firms. At the same time, larger firms dispose of additional means to secure the resources that directors bring to the board (e.g., by establishing separate policy units), serving their needs to cope with an increasing level of complexity, such that the relation between firm size and board diversity might in the end be inversely U-shaped.

While the literature has shown the potentially adverse effects of diversity to exist for all types of diversity, they seem to be particularly strong for demographic types of diversity as opposed to functional types of diversity (see WILLIAMS/O'REILLY 1998; MILLIKEN/MARTINS 1996). To account for this, in our study, we distinguish two types of board diversity: (i) occupational background diversity reflecting directors' functional diversity and (b) diversity with respect to directors' international background representing one aspect of directors' demographic diversity. Concerning the potentially differing impact of firm size on the chosen degree of occupational background diversity and international background diversity, we expect the non-linear

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firms Comdirect and IVG have only current and former executives from banks and insurances as members in their boards. Likewise, the boards of IWKA and Schwarz Pharma only hold current and former executives from non-financial firms as members.

<sup>10</sup> For example, „demanding tasks and the complexity of today's business make professionalism increasingly necessary” [own translation] (HANDELSBLATT 2010). Also, HANDELSBLATT (2008) claims, „German boards need to become more international.”

<sup>11</sup> BÖCKING/DUTZI (2004), VON WERDER/WIECZOREK (2007), and THEISEN (2010), among others, discuss qualification requirements for supervisory board members.

part of the relation between firm size and diversity to be stronger in the case of international background diversity than in the case of occupational background diversity. For our empirical analysis, we collected data on the characteristics of supervisory board members of 151 German firms listed in one of the German stock exchange indices DAX, MDAX, SDAX and TecDAX on December, 31<sup>st</sup> 2005, comprising data on the personal characteristics of 1,720 board members. In order to grasp the degree of occupational background diversity, we classify each director's occupational background according to a classification based on HILLMAN/CANNELLA/PAETZOLD (2000), BAYSINGER/ZARDKOOHI (1986), and BAYSINGER/BUTLER (1985). Regarding international background diversity, we distinguish German citizens on supervisory boards from non-Germans (for reasons of data availability we are not able to further discriminate between different non-German nationalities). For each firm, then, we calculate diversity indices with respect to directors' occupational and international background. After providing descriptive statistics, we, separately, regress the diversity indices on firm size.

As a result of our study, we find a positive linear relation between firm size and occupational background diversity. On the contrary, the relation between firm size and international background diversity is concave. Both findings are consistent with our theoretical assumptions. Our results suggest that larger firms have a more diverse board with respect to occupational background. With respect to international background diversity, an increase in firm size will result in a higher degree of international background diversity until a maximum degree of international background diversity is reached. Therefore, our results put forward that board diversity is a multi-dimensional construct.

Our paper proceeds as follows. We first introduce the theoretical perspective we have chosen for our analysis (resource dependence theory as opposed to agency theory) and derive our hypotheses on the relation between firm size and board diversity. Next, we describe our sample, variables, and measures and subsequently report our empirical findings. Finally, we discuss our results and conclude with theoretical and practical implications.

## 3.2 Theoretical perspective and hypotheses

Resource dependence theory regards firms and organizations as being dependent on their environment and argues that a firm's success will crucially depend on its capacity to secure resources from its external environment (see PFEFFER/SALANCIK 2003; PFEFFER 1972). As boards of directors represent an important link connecting a firm with sources of external dependency by appointing appropriate board members, a firm can reduce environmental uncertainty (see PFEFFER 1972), lower transaction costs related to external exchange (see WILLIAMSON 1984), and, ultimately, improve survival (see SINGH/HOUSE/TUCKER 1986) and performance (see HILLMAN 2005).

To the contrary, agency theory suggests a role of the board of directors that is distinctly different from their supervisory role highlighted by resource dependence theory. Agency theory emphasizes the separation of ownership and control in public corporations, arguing that the board's role is to monitor and ratify management decisions in order to mitigate the conflict of interest between managers and shareholders (see FAMA/JENSEN 1983; JENSEN/MECKLING 1976). In this context, the independence of a director from management is regarded as a key characteristic. Independent directors are asserted to be more objective in their assessment of management decisions and, therefore, more likely to protect the interests of shareholders. Along these lines, directors are classified into insiders – when they are current or past employees of the firm – and outsiders. Refinements of this characterization of directors address the ties with management resulting from business with the company or family relationships (see WEISBACH 1988; BAYSINGER/BUTLER 1985) and the extent to which an incumbent CEO was involved in the appointment of members of the board of directors (see DAILY/DALTON 1994).

While directors might perform both roles, assigned by resource dependence theory and by agency theory, simultaneously (see JOHNSON/DAILY/ELLSTRAND 1996), resource dependence theory emphasizes director characteristics that are distinctly different from directors' independence central to the agency perspective. Specifically, resource dependence theory points to resources such as expertise, communication channels, support from external organizations, and legitimacy that directors might bring to boards (see PFEFFER/SALANCIK 2003). HILLMAN/DALZIEL (2003) categorize the sources of benefits accruing from the appointment of directors as being represented by (a) directors' human capital (i.e., knowledge, skills, expertise) and (b) di-

rectors' relational capital (i.e., resources available through directors' network relationships). As a director's human capital will typically vary with his or her occupational background, resource dependence theory would suggest that shareholders select a rather heterogeneous board in terms of the occupational backgrounds represented by its members, gaining access to a multitude of different resources of knowledge, skills, and expertise. Likewise, given that a director's relational capital most likely varies with his or her nationality, resource dependence theory would suggest that shareholders appoint foreign directors in addition to national ones to increase the number of linkages to critical external contingencies.

While shareholders might thus have an incentive to generally appoint directors with diverse occupational backgrounds and also to appoint foreign directors in addition to national ones, this incentive should – according to the inherent logic of resource dependence theory – be stronger in more complex environments where boards have to perform an increasingly non-routine and challenging task: The higher the degree of complexity, the more relevant it becomes for the firm to gain access to different kinds of expertise and different communication channels to secure support from various external organizations, and to gain legitimacy in various fields. As the degree of complexity will typically increase with firm size (see, e.g., HAGE et al. 1971), we hypothesize that an increasing firm size will, in general, imply a higher level of occupational and international background diversity in the boardroom.<sup>12</sup>

However, whereas resource dependence theory emphasizes the potential gains of diversity, there is clear evidence that increasing diversity can also have adverse effects – particularly when taken to the extreme. In the sociological and psychological literature, the similarity attraction paradigm (see BYRNE 1971) and social categorization theory (see, e.g., TAJFEL 1974) highlight the potential drawbacks of dissimilarity, i.e., a lower level of identification and a higher potential for emotional, non-productive conflicts resulting in increased costs of communication.

While there will generally be both, positive as well as negative diversity effects, irrespective of the type of diversity, it has been frequently argued in the literature that in the case of functional diversity, the positive effects will tend to outweigh the negative effects and in the case of demographic, surface-level diversity there will be net negative effects (see WILLIAMS/O'REILLY 1998; MILLIKEN/MARTINS 1996). Because

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<sup>12</sup> For a similar argumentation concerning gender diversity see HILLMAN/SHROPSHIRE/CANNELLA (2007).



nationality is such a demographic, surface-level type of diversity, we argue for the existence of an effective upper bound for the degree of international background diversity in the boardroom. For example, non-German board members are most likely less familiar with the German two-tier system and, particularly, might struggle when dealing with employee representatives in the supervisory board. Consequently, the degree of international background diversity will not linearly increase with firm size but rather exhibit a concave relation to firm size. Further, as larger firms increasingly are in a position to secure their access to valued resources outside of the supervisory board (e.g., by establishing separate organizational units), the potentially adverse effects of an ever increased international background diversity in a more complex firm environment might eventually even lead to a negative relation between firm size and board diversity.

Overall, this leads us to the following hypotheses:

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Hypothesis 1: Occupational background diversity in the board increases with firm size.

Hypothesis 2: The relation between firm size and international background diversity in the board is inversely U-shaped.

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## 3.3 Method

### 3.3.1 Sample

Our initial sample consists of all 160 companies listed in one of the German stock exchange indices DAX, MDAX, SDAX, and TecDAX on December, 31<sup>st</sup> 2005. The DAX reflects the segment of blue chips admitted to the Prime Standard segment and comprises the 30 largest and most actively traded companies that are listed at the Frankfurt Stock Exchange. The index portfolio of the MDAX comprises 50 mid-cap issues from traditional sectors which, in terms of market capitalization and trading volume, rank below the DAX. These companies are selected from the continuously traded companies in the Prime Standard segment. The SDAX comprises the next 50 issues from the traditional sectors within the Prime Standard segment that are ranked

below the MDAX. The TecDAX tracks the 30 largest issues, in terms of market capitalization and trading volume, from the various technology sectors of the Prime Standard segment beneath the DAX. We excluded nine companies that were not of German legal form in order to make sure that all companies in the sample were subject to the same regulatory environment. Hence, our final sample consists of 151 companies.

German supervisory boards comprise directors elected by shareholders and, for a sufficient number of employees, also by employee representatives. Our dataset comprises information on 1,720 supervisory board members. We exclude employee representatives from our study and focus on the diversity of directors elected by shareholders because both, the number and composition of employee representatives on German boards are highly regulated.<sup>13</sup> To reflect potential differences in the interaction of shareholder and employee representatives, we control in our analyses for the codetermination regulation, i.e., whether shareholders appoint all supervisory board members (no codetermination), whether they appoint two thirds of all supervisory board members (*Drittelbeteiligungsgesetz*) or whether they appoint half of all supervisory board members (*Mitbestimmungsgesetz*, *Montanmitbestimmungsgesetz*). As a result of only regarding supervisory board members appointed by shareholders, our dataset comprises 1,007 observations of supervisory board members.

#### 3.3.2 Variables and Measures

##### **Dependent variables: Occupational and international background diversity**

Regarding *occupational background diversity*, we developed a categorization classifying board of directors' occupational background, relying heavily on BAYSINGER/BUTLER (1985), BAYSINGER/ZARDKOOHI (1986), and HILLMAN/CANNELLA/PAETZOLD (2000). We distinguish four types of occupational background: Insiders, Business Experts, Support Specialists, and Community Influentials.

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<sup>13</sup> *First*, the number and fraction of employee representatives are highly regulated. While smaller companies with less than 500 employees are not required to have employee representatives on the supervisory board, companies with an intermediate size of 500 to 2,000 employees have one third of its directors as employee representatives (*Drittelbeteiligungsgesetz*). In companies with more than 2,000 employees half of the board consists of employee representatives (*Mitbestimmungsgesetz*). *Secondly*, the composition of employee representatives on the supervisory board, i.e., the number of union representatives that can serve as employee representatives, is highly regulated.

“Insiders” comprise former CEOs and former members of the executive board of the company under study. Insiders are supposed to provide firm-specific information to the board (see FAMA/JENSEN 1983). Executive managers and former executive managers of other companies that are not part of the banking and insurance industry are categorized as “Business Experts.” Among others, they provide expertise on market competition, on firm decision making and problem solving, and they open channels of communication between the firm and its suppliers and customers (see JOHNSON/DAILY/ELLSTRAND 1996). The third category, “Support Specialists”, contains executive managers and former executive managers from banks and insurance companies as well as other persons with a specific business expertise such as lawyers, consultants or auditors. The fourth category is called “Community Influentials” and contains politicians as well as scientists. These directors provide non-business perspectives on key issues to the firm and represent interests outside of competitive product or supply markets (see BARON 1995).

With regard to *international background diversity*, we distinguished German from non-German board members as – for reasons of data availability – we were not in a position to further discriminate between different nationalities on the part of the non-Germans.

The data on board members’ occupational and international background were hand-collected from the firms’ annual reports for the business year 2005, from company websites and from investor relations departments of the respective firms. All directors were separately classified by at least two of the authors. Classification was straightforward and followed the rules described in the previous paragraph. All authors resolved the small number of differences in coding by discussion.

For both diversity dimensions, we calculated the BLAU index of heterogeneity (see BLAU 1977) representing the most widely used index of heterogeneity in the diversity literature. Following BLAU (1977), the diversity of a group is given by

$$H = 1 - \sum_{c=1}^k s_c^2,$$

where  $k$  stands for the number of categories (i.e.,  $k = 4$  for the occupational background variable and  $k = 2$  for the nationality variable) and  $s_c$  is the fraction of supervisory board members with characteristic  $c$ . In addition to the number of subgroups  $k$  in a supervisory board, the BLAU index also takes account of the (in)equality of dis-

tribution among the different sub-groups. Following ALEXANDER et al. (1995), we standardized the index such that  $H = 0$  signifies complete homogeneity with respect to a given diversity dimension (i.e., all board members have the same type of occupational background, or, respectively, all of them are either German or non-German) and  $H = 1$  indicates complete heterogeneity (i.e., each type of occupational background is represented by one fourth of all board members or, respectively, one half of all board members is German and the other half is non-German).

#### **Explanatory Variable**

Our main explanatory variable is *firm size*. As a measure of firm size we use the company's market value. As a robustness check we also use the number of employees and total assets as alternative measures of firm size (see, e.g., ANDRES/THEISSEN 2008; GONCHAROV/WERNER/ZIMMERMANN 2006; LEHMANN/Weigand 2000). All data on firm size were taken from Thomson Financial Datastream.

#### **Control Variables**

On the company side, we use the *share of foreign sales to total sales* (in percent) as a measure of the degree of internationalization. Regarding the international background diversity in the board, the relative importance of foreign sales would seem to be an obvious control variable. Further, it might also affect the complexity of firm affairs and hence also influence occupational background diversity. The respective data are taken from Worldscope.

Furthermore, a firm's ownership structure might influence supervisory board diversity, especially when it comes to the board members appointed by shareholders. For example, dispersed ownership creates free rider problems, thus reducing shareholder influence on the selection of new board members. On the other hand, large shareholders might acquire important resources outside the board room. In order to control for a potential effect of ownership on board diversity we include the *free float* (in percent) in our analysis. The data are taken from Thomson Financial Datastream.

Following the claim by diversity researchers to simultaneously consider multiple diversity dimensions (see, e.g., ASHKANASY/HÄRTEL/DAUS 2002; JACKSON/JOSHI 2001) and in light of the ongoing discussion on gender mainstreaming, we further include *gender diversity* as another measure of board composition in our analysis.

While the idea clearly is not that gender diversity is regarded as a determinant of occupational or international background diversity, controlling for gender diversity accounts for the fact that the various diversity dimensions are potentially interrelated (see, e.g., JACKSON/JOSHI/ERHARDT 2003). For the very same reason, we include occupational background diversity in our estimation of international background diversity and vice versa as a further robustness check. Again, the data on gender was hand-collected from company annual reports for the business year 2005, company websites, and the investor relations departments of the respective firms. We used the names of the directors to identify female directors and researched the few controversial cases.

Further, we incorporate the *number of board memberships per director* as a measure of directors' experience. The data on board memberships, too, was hand-collected from company annual reports for the business year 2005, company websites, and the investor relations departments of the respective firms.

In order to account for the fact that regulation on codetermination affects the number and fraction of employee representatives on the supervisory board, we also included two codetermination dummies into our analysis. Specifically, the board members assigned by shareholders might either represent *all* board members (no codetermination, reference case), *two thirds* of board members (firms falling under the *Drittelbeteiligungsgesetz*; codetermination dummy 1 = 1), or only *half* of board members (firms falling under the *Mitbestimmungsgesetz* or the *Montanmitbestimmungsgesetz*<sup>14</sup>; codetermination dummy 2 = 1).<sup>15</sup>

Finally, we controlled for the industry in order to proxy for the environmental uncertainty and the external dependencies of the firms. We used the industry classification ("*Supersektoren*") of the *Deutsche Börse Group*.

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<sup>14</sup> One company falls under the "*Montanmitbestimmungsgesetz*". In the supervisory board of this company, shareholder representatives occupy ten of the overall 21 seats. Since supervisory board members are roughly assigned equally by shareholders and employees and to simplify the analysis, we classify this company as being characterized by parity of shareholders and employee representatives.

<sup>15</sup> A company's *board size* follows from the number of employees and the extent of codetermination. Thus, including board size as a control variable would result in a multi-collinearity problem. To rule out a potential bias of our parameter estimation, we opted to not include board size as a control variable.

### 3.3.3 Data Analysis

In order to investigate if and to what extent firm size affects board diversity with respect to directors' occupational background, we ran OLS regressions and tested for a linear relation. For the case of international background diversity, we tested for a non-linear relation with firm size and ran TOBIT regressions accounting for the fact that for a considerably large share of boards (45 percent) the degree of heterogeneity with respect to their international background was equal to zero, i.e., the respective boards consisted of only Germans.

## 3.4 Results

The supervisory boards in our sample have between three and 21 members with an average size of 11.46 members. Between three and 15 board members are appointed by shareholders. Table 8 reports the descriptive statistics for the director and firm characteristics entering our analysis.

Concerning directors' *occupational background*, on average eight percent of directors appointed by shareholders are "Insiders" according to the above given definition, i.e., they are former CEOs and former members of the executive board of the very same firm. 44 percent are classified as "Business Experts" (i.e., executive managers and former executive managers from companies outside banking and insurance), and a further 35 percent are "Support Specialists" (i.e., executive managers and former executive managers from banking and insurance as well as other experts such as lawyers, consultants, or auditors). 13 percent belong to the group of "Community Influentials" (i.e., politicians, or scientists). For comparison, HILLMAN/CANNELLA/HARRIS (2002) identify 24 percent insiders, 47 percent business experts, 17 percent support specialists, and ten percent community influentials in their analysis of the US interstate passenger airline industry. Roughly, our sample of German supervisory board members is comparable to the boards studied by HILLMAN/CANNELLA/HARRIS (2002) but comprises fewer insiders and more support specialists. The average normalized BLAU index of occupational background heterogeneity is 0.66; it varies between zero and one, i.e., we have at least one board in our sample where all members elected by shareholders fall into the same occupational background category as well as at least one board where the members appointed by

shareholders are evenly distributed among the four occupational background categories.

**Table 8: Descriptive statistics of director and firm characteristic variables**

	N	Mean	Sd	Min	Max
<b>A Occupational background</b>					
Share of insiders (in percent)	148	8.0404	12.2190	0.0000	66.6667
Share of business experts (in percent)	148	43.8601	26.0500	0.0000	100.0000
Share of support specialists (in percent)	148	35.1510	25.2714	0.0000	100.0000
Share of community influentials (in percent)	148	12.9508	17.4489	0.0000	80.0000
Occupational background diversity (normalized Blau index)	148	0.6561	0.2269	0.0000	1.0000
<b>B International background</b>					
Share of foreign directors (in percent)	110	16.6201	18.7951	0.0000	75.0000
Intern. background diversity (normalized Blau index)	110	0.4143	0.4044	0.0000	1.0000
<b>C Central explanatory variable</b>					
Market value (in billion)	151	5.7600	12.2126	0.0602	64.4878
<b>D Controls</b>					
Share of foreign sales to total sales (in percent)	131	47.2922	27.2999	0.0000	93.8460
Free float (in percent)	147	63.8367	25.3704	7.0000	100.0000
Gender diversity (normalized Blau index)	151	0.0851	0.1998	0.0000	0.8889
Number of board memberships per director	148	4.0896	1.5102	1.0000	9.7500
Codetermination dummy 1:					
1/3 employee representatives	151	0.1722			
Codetermination dummy 2:					
1/2 employee representatives	151	0.5232			

Source: Own compilation.

Concerning directors' *international background*, the average share of foreign directors appointed by shareholders in our sample is 17 percent. The average normalized BLAU index of international background diversity is 0.41; it varies between zero and one, i.e., we have at least one board in our sample where all members elected by shareholders are German (there is no board with only non-German directors) and at least one board where exactly half of the members appointed by shareholders are foreign directors.

Concerning *firm size*, the average market value is 5.76 billion Euro with a minimum of 60 million Euro and a maximum of over 64 billion Euro.

Concerning our further controls, the *share of foreign sales to total sales* is on average 47 percent with a minimum of zero and a maximum of 94 percent. *Free float* is on average 64 percent with a minimum value of seven and a maximum value of 100 percent. The BLAU index for *gender diversity* varies between zero (only male supervisory board members) and 0.8 (one third female supervisory board members); the average value is 0.08, i.e., close to zero. The *average number of board memberships*

*per director* is four; it varies between one and 9.75. The last two rows in Table 8 show that 17 percent of firms are subject to codetermination regulated by the *Dritt-beteiligungsgesetz*. 52 percent of the firms in our sample fall under regulations of the *Mitbestimmungsgesetz* (or the *Montanmitbestimmungsgesetz*, respectively; the latter applies to only one firm in our sample). 31 percent of firms in our sample fall in the reference category, i.e., in these firms the supervisory board only consists of members appointed by shareholders.

Table 9 shows the correlation coefficients between the different director and firm variables. Strikingly, there is only a significant correlation between firm size and occupational background diversity but not between firm size and international background diversity. While the latter might already hint at the relation between firm size and international background diversity, if any, to be non-linear, it might still be the case that a linear relation will manifest itself once we control for possibly intervening factors in a multivariate analysis.

As can be seen, most of the correlation coefficients are statistically insignificant and – in case they reach statistical significance – they are of small value.

Hypothesis 1 states that we expect to observe a linear and positively sloped relation between firm size and occupational background diversity. Table 10 gives the results of an OLS regression with occupational background diversity of shareholder representatives in the supervisory board as the dependent variable (Model 1a). As a result of missing data on several of the director and firm characteristics (see Table 8 for the details),  $n$  reduces from 151 cases to 122.<sup>16</sup> To address the possibility that firm size might be endogenous in Model 1b, we include the firm size variable of the preceding year (i.e., for 2004).

Model 1a is highly statistically significant ( $p < .01$ ), and the coefficient for our measure of firm size hints at a linear and positive relation between firm size and occupational background diversity ( $p < .01$ ). These results are robust to including the one-year lagged variable in Model 1b. Hence, we find evidence in support of hypothesis 1.

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<sup>16</sup> We did not observe significant differences in the characteristics of the 122 companies relative to our sample of 151 companies.



**Table 9: Correlations of director and firm characteristic variables**

Variable	1	2	3	4	5	6	7	8	9
1 Occupational background diversity (normalized Blau index)	1.0000								
2 International background diversity (normalized Blau index)	0.0005 (0.9963)	1.0000							
3 Market value (in billion)	<b>0.2001</b> <b>(0.0148)</b>	0.1426 (0.1371)	1.0000						
4 Share of foreign sales to total sales	-0.0739 (0.4072)	<b>-0.1830</b> <b>(0.0743)</b>	0.1145 (0.1928)	1.0000					
5 Free float (in percent)	0.0301 (0.7203)	<b>0.1611</b> <b>(0.0973)</b>	<b>0.2168</b> <b>(0.0084)</b>	0.0897 (0.3157)	1.0000				
6 Gender diversity (normalized Blau index)	0.0803 (0.3320)	-0.0023 (0.9813)	0.0019 (0.9819)	-0.0441 (0.6170)	0.0279 (0.7368)	1.0000			
7 Number of board memberships per director	-0.0212 (0.8005)	-0.0056 (0.9538)	<b>0.1461</b> <b>(0.0764)</b>	0.0790 (0.3734)	0.0868 (0.3009)	-0.0354 (0.6691)	1.0000		
8 Codetermination dummy 1: 1/3 employee representatives	<b>-0.1967</b> <b>(0.0166)</b>	0.0328 (0.7337)	<b>-0.1605</b> <b>(0.0490)</b>	0.0775 (0.3792)	<b>-0.1828</b> <b>(0.0267)</b>	-0.0310 (0.7053)	-0.0562 (0.4973)	1.0000	
9 Codetermination dummy 2: 1/2 employee representatives	<b>0.1989</b> <b>(0.0154)</b>	-0.1116 (0.2456)	<b>0.3708</b> <b>(0.0000)</b>	<b>0.3174</b> <b>(0.0002)</b>	<b>0.1458</b> <b>(0.0781)</b>	0.0400 (0.6254)	<b>0.2342</b> <b>(0.0042)</b>	-	1.0000

Note: Values in parenthesis indicate significance of a two-tailed test for each Pearson correlation coefficient. Bold matrix elements signal significance at least at the 10%-level.

Source: Own compilation.

Concerning the control variables, only the degree of gender diversity seems to have a significant relation with the degree of occupational background diversity with respect to shareholder representatives in supervisory boards. These results indicate a positive interrelation between gender diversity and occupational background diversity.

**Table 10: Testing for the determinants of occupational background diversity (OLS)**

Dependent variable: Occupational background diversity	Model 1a	Model 1b
Constant	0.8026 *** (0.1000)	0.8142 *** (0.1020)
Market value	0.0039 *** (0.0014)	
Market value <sub>(t-1)</sub>		0.0041 ** (0.0017)
Share of foreign sales to total sales	-0.0012 (0.0008)	-0.0011 (0.0008)
Free float	-0.0002 (0.0008)	-0.0001 (0.0008)
Gender diversity	0.1458 * (0.0771)	0.1434 * (0.0786)
Number of board memberships per director	-0.0079 (0.0146)	-0.0061 (0.0148)
Codetermination dummy 1: 1/3 employee representatives	-0.0926 (0.0684)	-0.0958 (0.0689)
Codetermination dummy 2: 1/2 employee representatives	0.0059 (0.0524)	0.0064 (0.0530)
Industry dummies	yes	yes
n	122	117
F value	8.7600 ***	5.7000 ***
R <sup>2</sup>	0.1899	0.1817

Robust standard errors in parentheses. \*\*\* indicates statistical significance at the 1%-level, \*\* at the 5%-level, and \* at the 10%-level.

Source: Own compilation.

Hypothesis 2 states that we expect to observe an inversely U-shaped relation between firm size and international background diversity. Table 11 gives the results of a TOBIT regression with international background diversity of shareholder representatives in supervisory boards as the dependent variable. As a result of missing variables, the number of cases now drops from 151 to 93.<sup>17</sup> Consistent with our hypothesis, our estimation model allows for a non-linear relation between firm size and the diversity measure. While Model 1a uses contemporaneous variables, Model 1b con-

<sup>17</sup> Again, we do not find significant differences between the 93 companies relative to the 151 companies of our sample.

siders a one-year lagged variable for firm size (i.e., for 2004). Model 1a is highly statistically significant ( $p < .01$ ), and in fact hints at an inversely U-shaped relation between firm size and international background diversity of shareholder representatives in supervisory boards with the coefficient for firm size being strictly positive ( $p < .01$ ) and the coefficient for firm size<sup>2</sup> being strictly negative ( $p < .01$ ). These results are robust to including a one-year lagged variable for firm size in Model 1b.

**Table 11: Testing for the determinants of nationality diversity (TOBIT)**

Dependent variable: International background diversity	Model 1a	Model 1b
Constant	-0.4553 (0.5530)	-0.6911 (0.5024)
Market value	0.0839 *** (0.0169)	
Market value <sup>2</sup>	-0.0012 *** (0.0003)	
Market value <sub>(t-1)</sub>		0.0955 *** (0.0176)
Market value <sub>(t-1)</sub> <sup>2</sup>		-0.0016 *** (0.0004)
Share of foreign sales to total sales	-0.0068 ** (0.0027)	-0.0069 *** (0.0025)
Free float	0.0054 ** (0.0025)	0.0067 *** (0.0024)
Gender diversity	0.1057 (0.2839)	-0.0090 (0.2681)
Number of board memberships per director	-0.0356 (0.0472)	-0.0159 (0.0438)
Codetermination dummy 1: 1/3 employee representatives	0.0759 (0.2140)	0.0814 (0.2006)
Codetermination dummy 2: 1/2 employee representatives	-0.5271 (0.1782)	-0.5230 *** (0.1688)
Industry dummies	yes	yes
n	93	89
LR Chi <sup>2</sup>	43.0800 ***	50.4600 ***
Pseudo R <sup>2</sup>	0.2529	0.3096

Standard errors in parentheses. \*\*\* indicates statistical significance at the 1%-level, \*\* at the 5%-level, and \* at the 10%-level.

Source: Own compilation.

While the results in Table 11 generally hint at an inversely U-shaped relation between firm size and international background diversity, for the range of firm sizes in our sample only a concave relation between firm size and international background diversity may exist. For alternative values of firm size, Table 12 includes the marginal effects (dy/dx) of the change of international background diversity for varying

firm size. These results reveal that there is in fact an inversely U-shaped relation between firm size and international background diversity. However, a negative marginal effect is only observed at the 99<sup>th</sup> percentile. Therefore, the results rather suggest that with an increasing firm size, international background diversity of shareholder representatives in supervisory boards increases at a decreasing rate, i.e., the marginal effects reveal a concave relation between firm size and international background diversity. Hence, we find weak evidence in support of hypothesis 2.

**Table 12: Marginal effects of the function testing for the determinants of international background diversity for different values of firm size measured by market value (in billion)**

Percentiles	Firm Size	dy/dx
1%	0.1130	0.0837 *** (0.0169)
5%	0.1618	0.0835 *** (0.0168)
10%	0.2122	0.0834 *** (0.0168)
25%	0.3975	0.0830 *** (0.0167)
50%	1.1045	0.0812 *** (0.0163)
75%	4.3095	0.0734 *** (0.0146)
90%	14.3138	0.0488 *** (0.0093)
95%	33.2957	0.0021 (0.0059)
99%	60.5223	-0.0647 *** (0.0196)

Standard errors in parentheses. \*\*\* indicates statistical significance at the 1%-level, \*\* at the 5%-level, and \* at the 10%-level.

Source: Own compilation.

Apparently, the potentially negative relation between firm size and international background diversity for very large firms manifests itself in our data only for a small number of firms. One explanation for this result is that only very few firms in our sample are large enough to warrant separate organizational units to acquire the expertise outside the boardroom. Furthermore, the cost of international background diversity in the boardroom might be smaller in relation to the cost of acquiring the expertise via alternative means.

Concerning the effects of our control variables, interestingly, we find a significant negative relation between the share of foreign sales to total sales and international background diversity of shareholder representatives in supervisory boards. While this result is counter-intuitive, it might be explained by firms with a high share of foreign sales to total sales preferring other ways to secure their access to the relevant resources outside the supervisory board. For example, firms with a high share of foreign sales to total sales might wish to hire local consultants in order to acquire the relevant expertise and knowledge, shift production sites to the foreign country in order to reduce the uncertainty of exchange rate fluctuations, and establish independent subsidiaries in order to reduce the dependency on local suppliers and customers. Also, a positive relation between free float and international background diversity can be observed. Thus, companies with a higher percentage of shares in free float seem to reduce uncertainty by having more international shareholder representatives in their supervisory boards.

Furthermore, there is evidence that firms which fall under the *Mitbestimmungsgesetz* (or the *Montanmitbestimmungsgesetz*, respectively, codetermination dummy 2 = 1) choose a lower degree of international background diversity on the part of shareholder representatives than those firms that are not subject to codetermination (= reference category), i.e., where all members of the supervisory board are appointed by shareholders. This observation is in fact well in line with the above arguments on communication costs: In a situation where half of the board members are appointed by employees, communication costs among board members will already be considerably high (see VON WERDER 2004). Then, appointing foreign directors on the part of shareholders might adversely contribute to the communicative potential in the supervisory board. Moreover, foreign directors are arguably less familiar with codetermination and hence might not be up to the task of dealing with employee representatives.

#### **Robustness checks**

Our first robustness checks concern our main explanatory variable, i.e., *firm size*. Instead of using market value as an indicator of firm size, in two alternative regressions for both, occupational background diversity and international background diversity, we included either the number of employees (see Model 2 in Table 13 and Table 14) or total assets (see Model 3 in Table 13 and Table 14) as alternative indica-

tors. When considering the determinants of occupational background diversity in Table 13, we find that the coefficient of total assets is significantly positive supporting our hypothesis that occupational background diversity in the board increases with firm size.

**Table 13: Testing for the determinants of occupational background diversity (OLS) with firm size measured by number of employees or total assets**

Dependent variable: Occupational background diversity	Model 2	Model 3
Constant	0.8883 *** (0.1138)	0.8915 *** (0.1123)
Number of employees (in thousand)	0.0002 (0.0002)	
Total assets (in billion)		0.0002 * (0.0001)
Share of foreign sales to total sales	-0.0011 (0.0007)	-0.0010 (0.0007)
Free float	-0.0000 (0.0008)	-0.0001 (0.0008)
Gender diversity	0.1209 (0.0789)	0.1141 (0.0771)
Number of board memberships per director	-0.0098 (0.0148)	-0.0079 (0.0145)
Codetermination dummy 1: 1/3 employee representatives	-0.0851 (0.0681)	-0.0900 (0.0681)
Codetermination dummy 2: 1/2 employee representatives	0.0349 (0.0504)	0.0334 (0.0504)
Industry dummies	yes	yes
n	122	122
F value	4.7100 ***	4.6400 ***
R <sup>2</sup>	0.1588	0.1593

Robust standard errors in parentheses. \*\*\* indicates statistical significance at the 1%-level, \*\* at the 5%-level, and \* at the 10%-level.

Source: Own compilation.

In Table 14, for both alternative measures of firm size, the linear and the quadratic term are significant and show the predicted signs. Hence, we find evidence in support of hypothesis 2.

Secondly, we undertook robustness checks with reference to occupational background diversity and international background diversity being potentially inter-related. The preceding separate analyses of the relation between firm size and board of directors' diversity implicitly assumed that the level of occupational background diversity is independent of international background diversity and vice versa. While this assumption is well supported by the correlation analysis (see Table 9), we still

decided to control for any potential influence on our multivariate analyses and repeated our regressions including the level of diversity of the other type of board diversity as a further explanatory variable. Again, inclusion of these variables does not change the inferences drawn from our regressions.

**Table 14: Testing for the determinants of international background diversity (TOBIT) with firm size measured by number of employees or total assets**

Dependent variable: International background diversity	Model 2	Model 3
Constant	0.0763 (0.5495)	0.0173 (0.5797)
Number of employees (in thousand)	0.0079 *** (0.0025)	
Number of employees <sup>2</sup>	-0.0000 ** (0.0000)	
Total assets (in billion)		0.0047 ** (0.0018)
Total assets <sup>2</sup>		-0.0000 ** (0.0000)
Share of foreign sales to total sales	-0.0072 ** (0.0029)	-0.0055 * (0.0029)
Free float	0.0043 (0.0026)	0.0036 (0.0027)
Gender diversity	0.0421 (0.3035)	0.1510 (0.3240)
Number of board memberships per director	-0.0444 (0.0501)	-0.0285 (0.0520)
Codetermination dummy 1: 1/3 employee representatives	0.1130 (0.5495)	-0.0703 (0.2407)
Codetermination dummy 2: 1/2 employee representatives	-0.3521 * (0.1818)	-0.3021 (0.1874)
Industry dummies	yes	yes
n	93	93
LR Chi <sup>2</sup>	28.9400 **	23.5500 *
Pseudo R <sup>2</sup>	0.1699	0.1382

Standard errors in parentheses. \*\*\* indicates statistical significance at the 1%-level, \*\* at the 5%-level, and \* at the 10%-level.

Source: Own compilation.

Moreover, our results are robust to further variations in explanatory and dependent variables. For example, we obtain qualitatively similar results when including board members' average *age* as a control variable. As including board members' average

age as a control variable yields a substantial loss in the number of observations<sup>18</sup>, we refrained from including board members' average age in the regressions depicted in Table 10 and Table 11. Also, a director's status as a retired former manager can be regarded as another indicator of the director's experience. Including the variable *percent of operationally non-active directors on the board* as a control variable (in exchange for our experience variable, *number of board memberships per director*) did not qualitatively change our results. The same is true if we use *percent of females directors* instead of the BLAU index for gender diversity. Further, we obtained similar results as in Table 11 when we used *percent of foreign board members* instead of *international background diversity* as our dependent variable.

Concerning variations in statistical procedures, reproducing Table 11 with OLS instead of TOBIT yielded similar results. Finally, using OLS without robust standard errors instead of OLS with robust standard errors did not qualitatively affect our results in Table 10.

## 3.5 Discussion

Our investigation on firm size as a determinant of board diversity was motivated by anecdotal evidence that shareholders of large firms seemingly select a different composition of the board of directors than shareholders of smaller firms. In an attempt to better understand the relation between firm size and board diversity we regressed different measures of board diversity on firm size plus controls. As an example for functional diversity, we regarded occupational background diversity and as an example of demographic diversity we focused on international background diversity. Following PFEFFER/SALANCIK (2003), boards of directors are a mechanism for managing external dependencies, thereby reducing environmental uncertainty and lowering transaction costs. To that end, directors provide the board with different expertise, perspectives, networks, and legitimacy. While numerous empirical studies support the resource dependence role of boards of directors (see, e.g., RUIGROK/PECK/TACHEVA 2007; HILLMAN 2005; HILLMAN/CANNELLA/HARRIS 2002;

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<sup>18</sup> Due to "data privacy reasons," information on age of supervisory board members is not available for board members of many companies. In the case of occupational background diversity, the number drops from 122 to 54 observations, whereas in the case of nationality diversity the number drops from 93 to 48 observations.



HILLMAN/CANNELLA/PAETZOLD 2000), studies which analyze firm-specific determinants of board diversity are few and far between.

We find support for a significant relation between firm size and board diversity. Specifically, we identify a positive linear relation between firm size and occupational background diversity, suggesting that larger firms have a more diverse board with respect to the occupational background of board members. Concerning international background diversity, we find support for a concave relation between firm size and international background diversity. Thus, our results suggest that while an increase in firm size will generally result in a higher degree of international background diversity, international background diversity increases at a decreasing rate.

Our results have important implications for both theory and practice. First, our results suggest that board diversity is a multi-dimensional construct. Specifically, the results of our study support the distinction between functional and demographic diversity. For our sample of firms, diversity with respect to directors' occupational background is distinctly different from diversity with respect to directors' international background. Hence, we contribute to the literature that addresses the resources provided by directors to the board (see, e.g., HILLMAN 2005; PFEFFER/SALANCIK 2003; HILLMAN/CANNELLA/HARRIS 2002). In particular, our results suggest that studies on board diversity related to the different resources provided by supervisory board members need to be tailored to the specific resources under study. While we follow JACKSON/JOSHI/ERHARDT (2003) by considering multiple diversity dimensions simultaneously, our results do not change if we include one diversity variable (e.g., occupational background diversity) as an explanatory variable in our regression for the other diversity variable (i.e., international background diversity).

Second, our study indicates that potential key determinants of board diversity can differ in their influence – depending on the type of diversity studied: Occupational background diversity and international background diversity are differentially influenced by firm size. Specifically, our results indicate that while for occupational background diversity a positive relation with firm size dominates, for international background diversity the relation with firm size depends on firm size.

Third, our study sheds light on the countervailing effects of a key determinant (i.e., firm size) of board diversity. More generally, our results suggest that there is a cost to board diversity. Thus, our study provides evidence consistent with the claim by RUIGROK/PECK/TACHEVA (2007) that board diversity might increase complexity in

board member interactions. In accordance with the literature, the resulting potentially adverse effects of increasing board diversity are more pronounced when it comes to diversity with respect to demographic variables as when it comes to functional diversity. In this regard, our study contributes to resource dependence theory and its implications for the composition of boards of directors by illustrating that board diversity can detrimentally affect the level of identification, bears the potential for emotional, non-productive conflicts and hence can increase communication costs. Specifically, we link resource dependence theory with similarity attraction and social categorization theory and take the potentially detrimental consequences of dissimilarity between board members into account. The detected non-linearities are consistent with board diversity having positive as well as adverse effects. In this regard, the results of our study are consistent with similarity attraction and social categorization theory, i.e., our results suggest that the cost of heterogeneous board members has a significant influence on the composition of board of directors.

While one might argue that the German two-tier system with a supervisory and a management board differs fundamentally from, e.g., the U.S. one-tier system with a board of directors, our theoretical arguments should also apply to board composition within a one-tier system. Namely, the detrimental consequences of dissimilarity between board members should also limit the diversity of directors appointed to a monistic board. Thus, the benefits of diverse directors bringing different resources to the board need to be traded off against the potential cost of communication and the potential for emotional, non-productive conflicts. Future work in this area might wish to investigate whether the potential drawbacks of dissimilarity also influence the composition of the board of directors in firms incorporating in countries with a one-tier system.

# 4

## Heterogeneity and Performance of Supervisory Boards

### 4.1 Introduction

In 2002, a Government Commission adopted the first edition of the German Corporate Governance Code (GCGC). Main contents of this code are recommendations concerning the composition and functioning of the supervisory board. This code has been revised every year. In the version of the year 2009, the code does not only advise to pay attention to the qualifications of each supervisory board member as the versions before but it, furthermore, emphasizes for the first time to care about a *diverse composition* of the supervisory board (see GCGK 2009). This recommendation can also be found in the newest version of the GCGC (see GCGK 2010).

While supervisory boards have received considerable attention by regulation in the last years, research on supervisory boards in Germany is rather scarce. Studies on the composition of German supervisory boards and compositional effects typically concentrate on the role of either employee representatives (see, e.g., FAUVER/FUERST 2006) or bank representatives (see, e.g., DITTMANN/MAUG/SCHNEIDER 2010). The relevance of other kinds of heterogeneity of supervisory boards in dualistic systems has been disregarded up to now (see, e.g., GERUM 2007: 417 et seq.). In other systems of corporate governance, heterogeneity of boards appears to affect performance (see, e.g., WELBOURNE/CYCYOTA/FERRANTE 2007; CERTO et al. 2006). However, even these international studies only focus on selected variables of heterogeneity. This study helps to close the research gap by examining the following questions: How does a heterogeneous composition of the supervisory board affect the board's performance or the performance of the company? How do certain moderating variables influence the relation between board heterogeneity and board performance or company performance?

The results of this study show that the heterogeneous composition of supervisory boards has significant effects on supervisory board performance and company performance. This effect, however, depends on the heterogeneity type and the performance variable considered. Furthermore, the findings reveal that the integrated moderating variables can have an influence on the relation between supervisory board heterogeneity and supervisory board performance or company performance.

The results are based on a newly collected dataset which includes 151 German companies of the indices DAX, MDAX, SDAX and TecDAX<sup>19</sup> between the years 2000 and 2005. The analysis considers heterogeneity with respect to occupational background, supervisory board tenure, the number of memberships in supervisory boards, gender, nationality and age. Company performance is measured by variables which are proposed by the literature such as the accounting ratios return on assets (ROA) and return on equity (ROE) and ratios based on capital market data such as price to book value (PTBV) and Tobin's Q. In addition to the mentioned measures of *company* performance, innovative performance variables are used as direct measures of *supervisory board* performance for the first time: The performance of the supervisory board is measured by the intervention activities of the supervisory board and the company's position in the corporate governance ranking. The internationalization and the innovativeness of the company are included as moderating variables.

The article is structured as follows: Section 4.2 takes a closer look at the theoretical and empirical literature concerning the composition of German supervisory boards, boards of directors and teams in general. Then, section 4.3 analyzes the relation between board composition and performance from a theory perspective before section 4.4 presents the empirical analysis of this study. Section 4.5 concludes.

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<sup>19</sup> The DAX reflects the segment of blue chips admitted to the Prime Standard Segment and comprises the 30 largest and most actively traded companies that are listed at the FWB® Frankfurter Wertpapierbörse (the Frankfurt Stock Exchange). The index portfolio of the MDAX comprises 50 mid-cap issues from traditional sectors which, in terms of size and turnover, rank below the DAX. These companies are also selected from the continuously traded companies in the Prime Standard Segment. The SDAX comprises the next 50 issues from the traditional sectors within the Prime Standard Segment that are ranked below the MDAX. The TecDAX tracks the 30 largest and most liquid issues from the various technology sectors of the Prime Standard Segment beneath the DAX. (See DEUTSCHE BÖRSE 2009).

## 4.2 Literature review

### 4.2.1 The composition of supervisory boards in the German dualistic corporate governance system

The vast majority of existing *theoretical studies* on the composition of German supervisory boards concentrate on *the special role of employee representatives* and their effects on the performance of the company.

Proponents of property rights theory argue that the participation of employees in the supervisory board leads to an inefficient diminution of property rights in addition to direct costs of codetermined supervisory boards (see GURDON/RAI 1990: 290; FURUBOTN 1988: 178). In contrast, supporters of codetermination argue that employees are also investors and that letting them participate in the decision and control committee of the company could help protect their specific investments (see SADOWSKI/JUNKES/LINDENTHAL 2001: 116 et seq.; JUNKES/SADOWSKI 1999: 58). FURUBOTN (1988) points out that the efficiency of supervisory board decisions could be increased if the ratio of employee control rights to capital control rights was the same as the ratio of employee specific investments to capital specific investments (see similar OSTERLOH/FREY 2006).

Other arguments in favour of a codetermined supervisory board tie in with the voice function (see FREEMAN/MEDOFF 1984: 7-9; HIRSCHMAN 1970) and the ear function (DILGER 2002; FREEMAN/LAZEAR 1996: 28) of the employee representatives.

The strongest argument *against* codetermined supervisory boards arises from empirical analyses: According to JENSEN/MECKLING (1979: 474), the capital providers themselves should have an interest in introducing rights of codetermination, if these actually increased the efficiency of supervisory board decisions. However, it can barely be observed that – beyond certain sectors such as consulting and legal advice (see FURUBOTN 1988: 179) – companies allow their employees more than the legally required amount of rights of codetermination (see SCHMID/SEGER 1998: 456).

Yet, supporters of the transaction cost theory emphasize that these arguments hold only as long as the costs of individual negotiation about the rights of codetermination are not considered (see, e.g., GERUM/WAGNER 1998: 344 et sqq. or MONISEN/WENGER 1989: 92).

LEVINE/TYSON (1990) expound the problem of possible adverse selection of employees when the introduction of codetermination is a result of a free decision by the employer. The authors show that employers will not voluntarily introduce codetermination because of the resulting prisoner's dilemma situation – even if all companies would benefit from the simultaneous introduction of codetermination.

However, the noteworthy resistance of employers against the introduction of the Codetermination Act in 1976 (see BAUMS/FRICK 1998) shows that companies did not expect a Pareto improvement. FREEMAN/LAZEAR (1996) argue that these resistances arose because codetermination could have – along with possible positive allocative effects – negative distributive effects: While the introduction of codetermination could possibly enlarge the “pie” to be distributed, it will also raise the bargaining power of the employees which could result in a situation in which the capital providers despite higher productivity receive less than without codetermination.

Another argument in this context is the credibility of voluntarily introduced institutions of codetermination. An overview of the different arguments can be found in DILGER/FRICK/SPECKBACHER (1999) and SADOWSKI/JUNKES/LINDENTHAL (2001). LINDENTHAL (2001) uses game theory to analyze the different abilities and incentives of employee and capital representatives in supervisory boards to fulfil their controlling duties diligently. The result of her “reputation game” is that a collective assignment of capital and employee representatives can be more effective than the assignment of two typical capital representatives. FAUVER/FUERST (2006) argue that codetermined supervisory boards have an advantage over not codetermined supervisory boards because of the different stocks of knowledge of inside employee representatives.

In addition to employee representatives, the literature on German supervisory boards also focuses on *bank representatives*. BAUMS/FRICK (1998) consider the role of bank representatives in the German corporate governance system to be stronger than the role of employee representatives. Bank representatives in the German system of corporate governance appear frequently in a double role: as outside creditor on the one hand and as investor (shareholding, control of funds and execution of proxy voting rights) on the other. This double role of bank representatives in the supervisory boards should influence the possibilities of control and disciplinary action as well as the incentives to control.

Finally, attention has also been paid to the *composition of German supervisory boards* in combination with the analysis of personal linkages between large German corporations (see, e.g., WINDOLF/NOLLERT 2001). However, these studies do not analyze systematically the composition of German supervisory boards with respect to different variables of heterogeneity and their effects on performance.

Similar to the theoretical literature on the topic, *empirical studies* on the composition of German supervisory boards concentrate on the effects of codetermination: GORTON/SCHMID (2004), SCHMID/SEGER (1998) and FITZROY/KRAFT (1993) find a *negative* relation between the company performance and the existence as well as the number of employee representatives in the supervisory board. However, FITZROY/KRAFT (2005) observe a *positive* relation, and FAUVER/FUERST (2006) find evidence for a *hump-shaped* link. STRØM (2007), KRAFT/UGARKOVIC (2006), VITOLS (2006), KRAFT/STANK (2004) and BAUMS/FRICK (1998, 1999) find *no* evidence for any relation.

The studies differ considerably in the methods applied: Cross section analyses (see, e.g., FAUVER/FUERST 2006; GORTON/SCHMID 2004; SCHMID/SEGER 1998 and FITZROY/KRAFT 1993) compare codetermined companies to companies without or with less codetermination. Because the degree of codetermination depends on company size, these studies compare companies of different sizes. Therefore, either the difference in company size or codetermination may cause the observed effect. Panel studies (see KRAFT/UGARKOVIC 2006; FITZROY/KRAFT 2005; KRAFT/STANK 2004; BAUMS/FRICK 1998, 1999) avoid this problem by comparing accounting ratios and capital market data of the companies before and after relevant events concerning the degree of codetermination (such as the introduction of the Co-determination Act in 1976). However, observation numbers in these studies are very small, and to some extent the existence of anticipation effects cannot entirely be ruled out.

DITTMANN/MAUG/SCHNEIDER (2010) examine the special role of *bank representatives* in German supervisory boards by using an innovative panel dataset for their empirical analysis. They discover that bank representatives in supervisory boards do not pursue the general interests of the shareholders but their own interests: The authors find that bank representatives use their supervisory board activity neither to protect their interests as shareholders or outside creditor nor to bring their specific knowledge into the board to overcome financial shortages. However, the presence of

bank representatives in supervisory boards leads to a larger use of their services in the field of investment banking and to the bank lending larger amounts of money to other companies within the same sector. As a result, the presence of bank representatives in the supervisory boards of companies operating in a non-financial sector correlates with a lower company value.

Apart from the previously mentioned studies, only very little research deals with the effects of different compositions of supervisory boards on their own performance or the company's performance. One of the few exceptions is the empirical study by STEGER (2006), in which he analyzes the link between the international composition of the supervisory board and company performance. He finds a positive link between the internationality of the supervisory board and company performance.

### 4.2.2 The composition of boards of directors and top management teams

In contrast to the composition of dualistic codetermined supervisory boards, the composition of monistic boards has been analyzed more comprehensively.

Studies on the *effects of the composition* of monistic boards or top management teams in general are mainly based on upper echelons theory (see HAMBRICK/MASON 1984) or the theory of strategic leadership (see FINKELSTEIN/HAMBRICK 1996; HAMBRICK 1989). HAMBRICK (2007: 334) comes to the conclusion that a positive relation between a heterogeneous board composition and board performance exists in an unstable business situation and a negative relation in a stable business situation. Relying on resource dependence theory, BAYSINGER/BUTLER (1985: 110, 121) argue that „extreme“ compositions of the board can have a negative effect on the company performance and that the ideal board composition must contain different types of board members. According to HERMALIN/WEISBACH (2003: 13), the ideal composition can vary from company to company. For instance, companies with a higher degree of debt financing should have more bank representatives on their board than other companies (see BOOTH/DELI 1999: 230).

Studies analyzing the effects of the composition of monistic boards on company performance concentrate on the *independence of the board members*. While HERMALIN/WEISBACH (1991) can find no link between the number of external (i.e., inde-



pendent) board members and company performance, BHAGAT/BLACK (2002) and AGRAWAL/KNOEBER (1996) find a negative relation. BAYSINGER/BUTLER (1985: 120) discover a positive relation between the heterogeneity regarding the independence of the board members and company performance and come to the following conclusion: “It appears that a mix of insiders and outsiders, plus a component of instrumental directors, provides an appropriate board structure for most corporations; however, the precise value of this compositional mix can be contingent upon organizational and environmental factors which vary from industry to industry and from firm to firm“ (BAYSINGER/BUTLER 1985: 121).

There is also empirical evidence for effects of other kinds of heterogeneity on performance: CERTO et al. (2006) find in a meta-analysis of 27 studies that a company’s performance depends positively on a heterogeneous composition of top management teams concerning *function*, *experience* and *tenure*. SIMONS/PELLED/SMITH (1999) observe no effect of heterogeneity in terms of *age* in top management teams on performance. Studies analyzing the influence of *gender* heterogeneity in top management teams regularly find a positive effect of the presence of women in boards on the company’s performance (see, e.g., WELBOURNE/CYCYOTA/FERRANTE 2007; SMITH/SMITH/VERNER 2006; KRISHNAN/PARK 2005: 1719; CARTER/SIMKINS/SIMPSON 2003: 40; CATALYST 2003: 9; FENWICK/NEAL 2001: 210; SINGH/VINNICOMBE/JOHNSON 2001: 209). With respect to the *international composition* of top management teams, RICHARD (2000: 164) can find no relation between cultural diversity of the board members and company performance. REUBER/FISCHER (1997: 820 et seq.), however, find a positive relation between the *international experience* of the board members and the performance of international companies. Regarding the relation between the *number of memberships in other boards* of each board member and company performance, FERRIS/JAGANNATHAN/PRITCHARD (2003) and KAPLAN/REISHUS (1990) observe a positive relation; in contrast, FICH/SHIVDASANI (2006: 721) find that companies with a majority of board members with three or more board memberships have a significantly lower market to book value.

### 4.2.3 The composition of teams in general

Although theories on the relation between team composition in general and performance lack the specific context of supervisory boards, they may still be applied to this specific context. A great number of approaches on team composition exist in the fields of psychology, sociology and behavioural science. These are amongst others (1) the group process theory, (2) the group productivity theory (see STEINER 1972), (3) input-process-output models (see GLADSTEIN 1984; MCGRATH 1984; HACKMAN/MORRIS 1975), (4) the antecedent-outcome paradigm (see CAMPION/PAPPER/MEDSKER 1996; SHEA/GUZZO 1987), (5) the information and decision-making approach (see GRUENFELD et al. 1996; WITTENBAUM/STASSER 1996), (6) the similarity attraction paradigm, and (7) social categorization theory (see TAJFEL/TURNER 1986; TZINER 1985; BYRNE 1971; BYRNE/CLORE/WORCHEL 1966). While group process theory and group productivity theory, input-process-output models and the antecedent-outcome paradigm reach no conclusion on the sign of the relation between team heterogeneity and performance, the similarity attraction paradigm and the social categorization approach suggest a *negative* relation between team heterogeneity and performance. However, the information and decision-making approach gives reason to expect a *positive* relation between heterogeneity and performance.

Not only theoretical predictions but also empirical results on team heterogeneity and performance are ambiguous (see for an overview STOCK 2004): A positive relation between heterogeneity and performance is observed by BAKER/HUNT (2003: 113) and HAMILTON/NICKERSON/OWAN (2003: 493). KELLER (2001: 549), MILLIKEN/MARTINS (1996: 425) and TSUI/EGAN/O'REILLY (1992: 575) find negative effects. STOCK (2005) discovers a hump-shaped relation regarding functional heterogeneity and performance in marketing teams. There is evidence that the relation between heterogeneity and performance depends on the kind of heterogeneity: In a meta-analysis, HORWITZ/HORWITZ (2007: 1005) find a positive effect of functional diversity on team performance and no effect of demographic diversity on performance. KLEIN/HARRISON (2007: 1199) declare disaffected: „Cumulative findings about the consequences of within-unit differences have been weak, inconsistent or both“.

## 4.3 Theoretical analysis

### 4.3.1 Effects of board heterogeneity on performance

This study uses the theory of multicultural teams by LAZEAR (1999) as a framework for analyzing the effects of supervisory board composition on company performance. LAZEAR (1999) analyzes the conditions for the success of multicultural work teams. He argues that the potential benefits of heterogeneity, which consist of the accessibility of disjunct and relevant knowledge as well as the availability of complementarities, are accompanied by the costs of a more difficult communication.<sup>20</sup> In his model, the costs of communication arise from the different languages the members speak. While a comparatively homogeneous team has low communication costs, it can barely profit from different abilities of its members. In contrast, a comparatively heterogeneous team has a great potential from using the different and complementary abilities of the members, but it suffers from high communication costs.

#### 4.3.1.1 Benefits of board heterogeneity

According to LAZEAR (1999), the benefits of team heterogeneity are that heterogeneous teams can rely on a wider range of knowledge than homogenous teams. Furthermore, different abilities can lead to advantageous complementarities between team members. These benefits of team heterogeneity are the greater the more disjunct and more relevant the knowledge of the heterogenous team members are for the team task.

LAZEAR's argument on the potential advantages of heterogeneity is supported by the information and decision making approach (see GRUENFELD et al. 1996) and the resource dependence theory (see, e.g., BAYSINGER/BUTLER 1985: 110).

The *information and decision making approach* argues that persons with different characteristics have different abilities, perspectives and contacts (see, e.g., JACKSON 1992; HAMBRICK/MASON 1984). Therefore, heterogeneous groups will develop better solutions to group tasks (see, e.g., WIERSEMA/BANTEL 1993) and have access to a greater variety of new and different cooperation partners (ZENGER/LAWRENCE 1989: 372). The advantage from heterogeneity is the greater the more complex the group

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<sup>20</sup> It should be noted that LAZEAR (1999) only refers to different kinds and not to different levels of knowledge and expertise. Hence, the theoretical arguments of this study focus on the different kinds of knowledge heterogeneous members bring into the supervisory board.

task because the discussion of different perspectives and solution concepts is beneficial when innovative solutions and flexible reactions to changes are needed (see, e.g., ZENGER/LAWRENCE 1989). This is especially the case when the group task is complex and the team acts in a constantly changing environment (see, e.g., JACKSON 1992).

The task of supervisory boards can be characterized as complex. The assignment of supervisory boards is to control (see sec. 111 subs. 1 AktG) and to consult the executive board (see GUTENBERG 1970: 5). The consulting function implies an active participation of the supervisory board in the decision processes of the company (see GUTENBERG 1970: 5). According to VOGEL (1980), in many companies the supervisory board is seen as actually having the leading role within the company (see VOGEL 1980: 271 et seq.). Furthermore, the environment of supervisory boards is constantly changing (see BLEICHER/PAUL 1986: 284). Given the complex task and the constantly changing environment, heterogeneous abilities, skills and knowledge bases should be very useful for supervisory boards.

The *resource dependence theory*, which is often used in the context of supervisory boards, expands the argument of the information and decision making approach. It states that heterogeneous members of the supervisory board do not only offer the company access to different kinds of knowledge, perspectives and contacts (see BURT 1983) but also offer legitimacy (see GALES/KESNER 1994) and external ties to key constituents (such as suppliers, buyers, public policy makers). The external ties enable the company to monitor the environment and see trends early in time (see, e.g., GERUM/STIEGLITZ 2005; GERUM 1995). This way the uncertainty of the environment can be reduced, securing the existence of the company (SINGH/HOUSE/TUCKER 1986).

### 4.3.1.2 Costs of board heterogeneity

The different knowledge in heterogeneous teams only contributes to the team output when the team members communicate and cooperate with each other (see LAZEAR 1999: C20). However, communication and cooperation cause costs (see LAZEAR 1999: C18). While LAZEAR (1999) – because of his focus on multicultural teams – sees the costs of communication mainly in the costs to overcome different languages, he argues that special languages of different functional backgrounds can also lead to higher costs of communication (see LAZEAR 1999: C35).

Yet, not only language differences can lead to losses in the production process, internal problems of the group or a missing common goal can also handicap collective action (see STOCK 2004), and slow down the decision process of the group (see CANNELLA/PARK/LEE 2008: 770; HARRISON et al. 2002). Psychological, behavioural science and sociological approaches such as the similarity attraction paradigm and the social categorization approach examine these costs which emerge during the working process of heterogeneous teams. Although LAZEAR (1999) does not explicitly include process costs, they can be interpreted as part of LAZEAR's costs of communication.

The *similarity attraction paradigm* (see BYRNE 1971) argues that individuals with similar characteristics are attracted to each other. The similarity between individuals leads to positive emotions because of similar values and morals (see WAGNER/PFEFFER/O'REILLY 1984: 78), to more frequent communication (see ZENGER/LAWRENCE 1989; PFEFFER 1985: 70), to friendships (see LINCOLN/MILLER 1979), and to social integration (O'REILLY/CALDWELL/BARNETT 1989: 22). In contrast, heterogeneity causes less solidarity, barriers of communication and frustration (see, e.g., PELLÉD/EISENHARDT/XIN 1999: 2).

The *social categorization approach* (see TAJFEL 1981, 1974; TURNER 1987, 1975) argues that individuals define their social identity by belonging to certain groups. Through a sorting process, each person classifies himself and others into social categories and at the same time distances himself from individuals in other categories. This leads to less interaction, dissatisfaction and emotional conflicts between dissimilar individuals. Emotional conflicts, which are personal differences that are not task related, lead to animosity and offences between group members (see JEHN/CHADWICK/THATCHER 1997: 288). Consequently, in heterogeneous teams, group cohesion, communication, and cooperation suffer, and more conflicts emerge (see, e.g., WILLIAMS/O'REILLY 1998: 83 et seq.; SMITH et al. 1994: 420; WIERSEMA/BANTEL 1992: 96).

As a result, LAZEAR's communications costs, which arise because of different languages used in heterogeneous teams, can be extended to include process costs which also emerge in heterogeneous teams. The magnitude of these process costs is influenced by the characteristics "task-relation" and "visibility" (see PELLÉD 1996: 617). A rather task related heterogeneity type leads to more discussion and longer decision making processes; however, it also leads to more creativity and innovative ability

and thus facilitates the completion of the task (see WIERSEMA/BANTEL 1992: 95 et seq.); in contrast, a rather visible heterogeneity type leads to stronger social categorizations and to more emotional conflicts (see PELLED 1996: 622).

### 4.3.1.3 Net effect of board heterogeneity

According to LAZEAR (1999), the benefits of heterogeneity exceed the costs of heterogeneity if the abilities and the knowledge of the team members are disjunct and relevant and if the costs of communication between the team members are not prohibitively high. Consequently, a positive or a negative net effect of heterogeneity on performance can result.<sup>21</sup> To predict the net effect of board heterogeneity on performance an analysis of the specific types of heterogeneity in the supervisory board is necessary.

### 4.3.2 Specific types of heterogeneity

While diversity can have positive and negative effects on board performance, it may be hypothesized that the relationship between heterogeneity and performance differs depending on the specific type of diversity. This section presents arguments for the net effect of specific types of functional and demographic diversity on performance.

#### 4.3.2.1 Functional characteristics

Functional characteristics of individuals are formed by personal experience, knowledge and abilities and are necessary for the handling of the task (see PELLED 1996: 619). In this study, functional characteristics of board members are occupational background, tenure and number of memberships in supervisory boards. These characteristics are task-related and invisible at first sight. Hence, they lead to less social categorization and emotional conflict but cause more task oriented conflicts compared to rather visible characteristics (see PELLED/EISENHARDT/XIN 1999; ANCONA/CALDWELL 1992). In the context of supervisory boards, task related conflicts are controversies about important company decisions, solutions to tasks (see PELLED

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<sup>21</sup> Not only linear shapes of the net effect function but also curvilinear shapes seem plausible. For example, the benefit function could be concave (which implies that an increase in heterogeneity results in a decreasing marginal benefit) and the cost function could be convex (which means that with increasing heterogeneity the associated marginal costs rise exponentially). As a consequence, the net effect of team heterogeneity on the team's performance could be concave.

1996: 620 in the context of work teams) or disagreements about the allocation of resources or the choice of company policy (see DE DREU/WEINGART 2003: 741 in the context of work teams). At the same time, heterogeneity regarding functional characteristics leads to more creativity and innovative ability, facilitating the completion of the task (see WIERSEMA/BANTEL 1992: 95 et seq.).

### **Occupational background**

Relying on resource dependence theory, it can be assumed that the more heterogeneous the occupational background of the members, the broader is the range of knowledge within the supervisory board. However, even though different professional backgrounds contribute to the supervisory board's ability to work, the fact that different occupational backgrounds are represented can lead to higher communication costs because of diverse terminologies (see LAZEAR 1999: C35). Also, during the working process of the team additional costs of communication can arise. Because occupational background is a task related and rather invisible characteristic, the quantity of emotional conflicts should be small. Yet, the amount of task related conflicts should be high leading to creative team results (see PELLED 1996: 619; WIERSEMA/BANTEL 1992: 95 et seq.).

Given that heterogeneity regarding the occupational background has both positive and negative effects on performance, how should the net effect be according to the presented arguments? The invisibility of professional background which discourages emotional conflicts while professional background promotes task-related conflicts suggests the conclusion that the advantages of heterogeneity could be higher than the costs leading to a positive net effect of heterogeneity regarding occupational background:

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Hypothesis 1: Occupational background heterogeneity has a positive effect on performance.

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### **Tenure**

The experience and knowledge of a board member regarding the company and its environment increases with the duration of the membership within a specific supervisory board. Moreover, the longer a person's tenure in a supervisory board, the more this person can go along with the long term development and implementation of the company strategy (see VAPEAS 2003: 1044). Furthermore, BUCHANAN (1974: 545) states that the long term membership in a supervisory board enhances the corporate commitment and the disposition to stand up for the objectives of the company.

In contrast, KATZ (1982: 81) observes that longer team tenures reduce communication within teams and cause its members to be increasingly isolated from key information from inside as well as outside the company. Thus, it seems that tenure influences the costs of communication. Apart from communication costs, process costs can arise. PELLED/EISENHARDT/XIN (1999: 22) argue that tenure is a task related characteristic which leads to better results because learning effects influence the handling of the task positively after a while of constant team work.

The theoretical arguments speak in favour of a positive net effect of tenure heterogeneity on performance leading to:

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Hypothesis 2: Heterogeneity regarding tenure has a positive effect on performance.

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### **Number of memberships in supervisory boards**

The more supervisory board memberships a member holds, the more experience he has in his function as supervisory board member.<sup>22</sup> Thus, he can assess and evaluate function related facts faster and better (see FERRIS/JAGANNATHAN/PRITCHARD 2003: 1109; KAPLAN/REISHUS 1990: 409; FAMA/JENSEN 1983: 17 et seq.). Moreover, a supervisory board member with memberships in several boards is exposed to less pressure of conformity in each board because of a smaller amount of integration. This way he can express criticism more easily (see PFEFFER/SALANCIK 2003: 164). While the knowledge increases with the number of memberships, so does the time

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<sup>22</sup> As mentioned before, LAZEAR (1999) only argues about different kinds of knowledge and not about different levels of knowledge. However, the variable number of supervisory board memberships implies in addition to different kinds of knowledge also different levels of knowledge.



pressure which, in turn, should raise the costs of communication. DEMMER (1991), for instance, points out that German supervisory boards meet too rarely. This could be attributed to a high number of memberships in supervisory boards. Also, this lack of time could lead to a quality defect (see LINDENTHAL 2001: 143-150). LINDENTHAL (2001: 143-150) argues that although board members with only few or no memberships in other supervisory boards have only little experience, they have more time allowing them to dedicate themselves to their function as supervisor board member and to prepare better. Because the number of memberships in other supervisory boards is an important source of information and experience, it can be seen as a strongly task related characteristic. Furthermore, it is an invisible characteristic. Thus, it should cause mostly task related conflicts and only little emotional conflicts in the team process. This speaks in favour of a positive net relationship between heterogeneity regarding the number of memberships in supervisory boards and performance:

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Hypothesis 3: Heterogeneity regarding the number of supervisory board memberships has a positive effect on performance.

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### 4.3.2.2 Demographic characteristics

Demographic characteristics such as gender, nationality and age are visible characteristics meaning that they can easily be recognized by other members of the board (see PELLED 1996: 619; TSUI/EGAN/O'REILLY 1992: 557). This leads to social categorizations, the formation of subgroups and in the consequence to more emotional conflicts (see PELLED 1996: 622).

#### **Gender**

Up to now, the corporate governance literature has looked only scarcely into the effect of gender heterogeneity on company performance.

However, in the sociological literature a multitude of arguments can be found which can be applied to this study: As individuals within a society are socialized according to their gender (see FENWICK/NEAL 2001: 205), men and women differ in a number of business relevant abilities and skills (see, e.g., KRELL/MÜCKENBERGER/TONDORF

2004: 76; FENWICK/NEAL 2001: 205; CLAES 1999: 432), for instance in their readiness to invest (see for example CHARNES/GNEEZY 2007: 14 et seq.) or their risk tolerance (see for example NIEDERLE/VESTERLUND 2007: 1097-1099). These different abilities can be exploited in heterogeneous teams: a heterogeneous team regarding gender should calculate investments' profits and risks more intensely and for this reason should make better investments. Also, BIGGINS (1999: 2) argues that heterogeneous boards regarding gender are better representatives for the likewise heterogeneous shareholders and stakeholders.

Yet, gender heterogeneity of teams also impacts communication costs. Existing studies regularly discover that men and women differ considerably in the way they speak, how they use language and how they communicate nonverbally (see CLAES 1999: 434; TANNEN 1995: 140-145; LAABS 1994: 83; HENLEY 1993: 113 et seq.; ROSENER 1990: 123; EAGLY 1987: 103 et seq.; KOLLOCK/BLUMSTEIN/SCHWARTZ 1985: 42; DONNELL/HALL 1980). In addition, men and women not only differ in the way they send messages but also how they receive them (see TANNEN 1991: 330). These communication difficulties can lead to discouragements of men and women in supervisory boards (see COLWILL/TOWNSEND 1999: 209 et seq.) and can compensate the possible positive effects.

Furthermore, gender is an easily observable characteristic. This can lead to emotional conflicts due to categorizations and increase the communication costs during the working process of the team (see PELLED 1996: 619).

The negative effects of gender heterogeneity could lead to a negative net effect of gender heterogeneity on performance. Hence:

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Hypothesis 4: Gender heterogeneity has a negative effect on performance.

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### **Nationality**

LAZEAR (1999: C15 et seq., C22) argues that different cultures provide different distributions of skills and knowledge. Thus, the correlation of skills of two individuals drawn from the same country is likely to be larger than the correlation between two individuals drawn from different countries. As a consequence, the probability that one supervisory board member knows the "best practice" solution to a problem should be larger in an international team than in a purely nationally assigned team.

This should also apply for supervisory boards: The greater the national heterogeneity of a supervisory board the more access a supervisory board has to knowledge on different national company practices and foreign markets.

At the same time, an international composition of supervisory boards is accompanied by different languages, cultures and backgrounds (see LAZEAR 1999: C25 for teams). This could result in higher communication costs in form of misunderstandings, longer decision-making processes and higher coordination costs (see TREICHLER 1995: 199).

Moreover, because of different behavioural patterns and mother tongues, nationality is an observable characteristic. This can lead to categorizations within teams which cause emotional conflicts and increase communication costs (see BARKEMA/SHVYRKOV 2007: 665; PELLER/EISENHARDT/XIN 1999: 2 et seq.; HAMBRICK et al. 1998: 186). These negative effects could be larger than the positive effects of nationality heterogeneity.

The net effect of nationality heterogeneity is not evident from the theoretical arguments. The literature with reference to the resource dependence theory repeatedly predicts a positive effect of international board compositions (see, e.g., COX 1993). However, resource dependence theory does not take into account the costs of communication. According to the theoretical arguments, it seems possible that the communication and process costs turn out to be larger than the benefits from nationality heterogeneity leading to a negative net effect of nationality heterogeneity. This yields:

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Hypothesis 5: National heterogeneity has a negative effect on performance.

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### **Age**

Age influences the abilities of an individual. Younger persons are said to be able to work under more pressure and to absorb as well as process information faster. In contrast, older persons are more cooperative and have more experience (see BRANDENBURG/DOMSCHKE 2007: 83). Age can also be used as a proxy for business experience. While younger persons have more new ideas, older persons have more knowledge about relevant markets and networks (see GRUND/WESTERGARD-NIELSEN

2008). Therefore, heterogeneity regarding age leads to a diverse set of abilities and can affect performance positively.

At the same time, heterogeneity concerning age can lead to costs of communication and process costs which have negative effects on the effectiveness of control. Communication costs could arise because of differences in language and vocabulary use. Process costs could develop because age is an observable characteristic which can lead to categorizations within teams. Consequently, subgroups could be formed resulting in emotional conflicts (see BARKEMA/SHVYRKOV 2007: 665; PELLED/EISENHARDT/XIN 1999: 2 et seq.; PELLED 1996: 619).

From a theoretical perspective, it is not obvious which net effect of age heterogeneity should result. Yet, because of the high visibility of age as characteristic, it could be argued that the costs of age heterogeneity throughout the process are rather large. Thus, the negative effects of age heterogeneity could level out the positive effects and, furthermore, lead to a negative net effect:

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Hypothesis 6: Age heterogeneity has a negative effect on performance.

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### 4.3.3 Moderating variables

While diversity with respect to functional and demographic characteristics may affect board performance in and by itself, it may well be hypothesized that the respective effects are moderated by variables characterizing the task of supervisory boards. Following the arguments by LAZEAR (1999), the potential advantage of heterogeneity not only depends on how disjunct but also on how relevant the knowledge of the team members is for the team task. Two potential moderating variables which have an influence on the task of supervisory boards are presented in this section: the degree of company internationalization and the degree of company innovativeness.

#### 4.3.3.1 Degree of internationalization

Internationalization in comparison to a purely national business provides companies with opportunities and benefits. Among these opportunities and benefits are: gaining access to a larger customer base, acquiring low-cost factors of production, and achieving global economies of scale (see HITT/HOSKISSON/KIM 1997). But compa-

nies which are operating in international environments also face greater uncertainty and volatility in the form of different laws, exchange rate fluctuations, differences in consumer preferences, heterogeneous cultures, and new competitors (see BARTLETT/GHOSHAL 1998). Thus, internationalization confronts companies with a very complex managerial decision-making environment (see PRAHALAD 1990). Because of the complexity accompanying internationalization, companies need the capability to collect and process a variety of information from different sources for an effective coordination and integration of operations dispersed worldwide (see SANDERS/CARPENTER 1998). Furthermore, the larger size and complexity of internationally operating companies increases the control requirements for the supervisory board (see TIHANYI et al. 2000). The supervisory board should therefore possess knowledge in different fields and heterogeneity of any kind should be beneficial in an international company context.

Internationalization should, therefore, lead to larger benefits of supervisory board heterogeneity. In contrast, the communication costs of team heterogeneity should not be influenced by the characteristics of the task. Hence, the moderating effect of internationalization on the relation between heterogeneity and performance should be positive. This yields:

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Hypothesis 7.1: The moderating effect of internationalization on the relation between occupational background heterogeneity and performance should be positive.

Hypothesis 7.2: The moderating effect of internationalization on the relation between tenure heterogeneity and performance should be positive.

Hypothesis 7.3: The moderating effect of internationalization on the relation between heterogeneity regarding the number of supervisory board memberships and performance should be positive.

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A rising degree of internationalization should, therefore, intensify the in hypotheses 1 to 3 predicted positive effect of heterogeneity on performance (i.e., for occupational background heterogeneity, tenure heterogeneity and heterogeneity regarding the number of supervisory board memberships).

Hypothesis 7.4: The moderating effect of internationalization on the relation between gender heterogeneity and performance should be positive.

Hypothesis 7.5: The moderating effect of internationalization on the relation between nationality heterogeneity and performance should be positive.

Hypothesis 7.6: The moderating effect of internationalization on the relation between age heterogeneity and performance should be positive.

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Hence, with an increasing degree of internationalization, the in hypotheses 4 to 6 stated negative effect of heterogeneity on performance should decrease (i.e., for gender heterogeneity, nationality heterogeneity and age heterogeneity).

### 4.3.3.2 Degree of innovativeness

Innovative companies engage in new ideas and creative processes which can lead to new products, services or technologies that are better than their predecessors (see RICHARD/SHELOR 2002: 963, TITMAN/WESSELS 1988: 5). In a rapidly changing world, innovations offer companies the possibility to generate comparative advantages over competitors in the future (see DAELLENBACH/MCCARTHY/SCHOENECKER 1999: 199). However, the success of innovations depends on how well it meets the needs of the consumers. Consequently, for the development of innovations, both, internal and external factors have to be considered. For instance, the development of new products asks for an effective combination of technology and market opportunities and, therefore, knowledge about both areas is necessary (see DOUGHERTY 1992). As a result, the cooperation of people with different knowledge is essential for an innovative company. This should also be the case for the supervisory board in an innovative company because it controls and consults the management.

As described in chapter 4.3.2, any kind of heterogeneity in the supervisory board leads to different ideas, perspectives and the consideration of different alternatives. Furthermore, diversity activates discussions (see BANTEL/JACKSON 1989: 110) and a critical analysis of problems which both lead to better decisions (see RICHARD/SHELOR 2002: 963). These effects of heterogeneity are particularly useful for

supervisory boards in an innovative company context. Therefore, a (of any kind) heterogeneous supervisory board should be especially beneficial in this context.

According to these arguments, innovativeness should lead to larger benefits of supervisory board heterogeneity. However, it should not influence the costs of communication. Hence, the moderating effect of innovativeness on the relation between heterogeneity and performance should be positive. This yields:

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Hypothesis 8.1: The moderating effect of innovativeness on the relation between occupational background heterogeneity and performance should be positive.

Hypothesis 8.2: The moderating effect of innovativeness on the relation between tenure heterogeneity and performance should be positive.

Hypothesis 8.3: The moderating effect of innovativeness on the relation between heterogeneity regarding the number of supervisory board memberships and performance should be positive.

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With an increasing degree of innovativeness, the in hypotheses 1 to 3 stated positive effect of heterogeneity on performance should thus intensify (i.e., for occupational background heterogeneity, tenure heterogeneity and heterogeneity regarding the number of supervisory board memberships).

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Hypothesis 8.4: The moderating effect of innovativeness on the relation between gender heterogeneity and performance should be positive.

Hypothesis 8.5: The moderating effect of innovativeness on the relation between nationality heterogeneity and performance should be positive.

Hypothesis 8.6: The moderating effect of innovativeness on the relation between age heterogeneity and performance should be positive.

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Consequently, a rising degree of innovativeness should decrease the in hypotheses 4 to 6 predicted negative effect of heterogeneity on performance (i.e., for gender heterogeneity, nationality heterogeneity and age heterogeneity).

## 4.4 Empirical analysis

### 4.4.1 Data description

#### 4.4.1.1 Data set

Basis for the empirical analysis is a panel data set on 151 German companies of the indices DAX, MDAX, SDAX and TecDAX. The dataset contains data on the performance, the supervisory boards and other variables of these companies. Data on the supervisory boards includes information about approximately 3,000 supervisory board members from January 1<sup>st</sup>, 2000 to December 31<sup>st</sup>, 2005. The date for which the board composition is identified in every year is December 31<sup>st</sup>. The performance and other variables are collected, if available, for the time period between January 1<sup>st</sup>, 2000 and December 31<sup>st</sup>, 2006 to allow for time lags in the empirical analysis.

#### 4.4.1.2 Variables

##### 4.4.1.2.1 Dependent variables

The dependent variables are different measures of performance.

The existing literature makes no clear proposition as to which measure represents best the performance of a supervisory board. Therefore, regularly more than one measure is used (see, e.g., STRØM 2007, GORTON/SCHMID 2004). In this study four of the established measures for performance will be applied: *return on assets (ROA)*, *return on equity (ROE)*, *price to book value (PTBV)* and *Tobin's Q*.

However, these performance measures are not direct indicators of supervisory board performance. They rather represent the performance of the executive board which is controlled by the supervisory board. Therefore, two additional innovative performance measures are included which allow a more direct measurement of the activities of the supervisory board:

- (1) The *number of interventions* of each supervisory board against the executive board. These interventions are collected from ad hoc announcements, corporate news and news of one of Germany's major newspapers, the Frankfurter Allgemeine Zeitung (FAZ), and vary from expressions of opinion by statement over refusals of acceptance of certain business transactions and assignments of a special audit to dismissals of members of the management. Because it is not clear in



which cases an intervention was or would have been necessary, this measure can only be used as a proxy for the controlling activity of the supervisory boards. Furthermore, this indicator should be interpreted carefully as an intervention could also be a sign of a prior bad control.

- (2) The *corporate governance ranking* by BASSEN, Hoppenstedt and Deutsche Vereinigung für Finanzanalyse und Asset Management (DVFA) (see BASSEN 2005) for the year 2005 for the companies that are included in the sample. This ranking is used as an indicator for the implementation of the guidelines of good corporate governance, a signal of transparency and an active practice as supervisory board. For the later interpretation, it is important to know that this ranking is an inverse measure of performance.

### 4.4.1.2.2 Explanatory variables

The explanatory variables are the heterogeneity variables which measure the composition of the supervisory boards. The variables studied are the *occupational background*, the *tenure*, the *number of supervisory board memberships*, the *gender*, the *nationality* and the *age*.

The information on the composition of the supervisory boards is predominantly taken from the annual reports of the companies for the respective years. Only in cases when there is no or ambiguous information available in the annual reports, additional sources are used. These are the homepages of the respective companies, the form 20-F which has to be completed and published by companies that are listed at the New York Stock Exchange (NYSE), the database by LexisNexis as well as the investor relation departments of the companies and information from additional internet investigations.

### **Functional characteristics**

Functional characteristics of the supervisory board members are the *occupational background*, the *tenure* and the *number of supervisory board memberships*.

The variable *occupational background* reflects the different knowledge the members of the supervisory board can bring into the board. The corporate governance literature discusses in detail how different and relevant the abilities and skills of different occupational groups are for the tasks of a supervisory board (see, e.g., LINDENTHAL 2001: 142; HILLMAN/CANELLA/PAETZOLD 2000; BAYSINGER/ZARDKOOHI 1986;

BAYSINGER/BUTLER 1985). At first sight, it seems plausible to differentiate between shareholder representatives and employee representatives because of their different professional abilities and knowledge bases (see, e.g., LINDENTHAL 2001). While employee representatives can have systematic deficits of knowledge in some areas (for example in the area of financial literacy, see HOPT/LEYENS 2004), it can be argued that in other areas they can revert to knowledge that shareholder representatives typically lack (see, e.g., FAUVER/FUERST 2006 about the different knowledge supplies of internal employee representatives). However, a categorization in only shareholder representatives and employee representatives generally seems too imprecise – particularly due to the differences between external and internal employee representatives. Hence, following HILLMAN/CANELLA/PAETZOLD (2000), BAYSINGER/ZARDKOOHI (1986) and BAYSINGER/BUTLER (1985), ARNEGGER et al. (2010) developed a categorization that classifies the members of supervisory boards into four different categories referencing their main occupation and the relevant knowledge they bring into the supervisory board.

Relevant knowledge for the work of the supervisory board is detailed information from inside the company concerning, e.g., the strategy of the company. These are provided by inside board members (see HILLMAN/CANELLA/PAETZOLD 2000; FAMA/JENSEN 1983). In the context of this study, not only former executives or shareholders are classified as *Insiders* but also employees and members of the work council of the company. The employees and members of the work council additionally offer channels of communication to the employees of the company (see HILLMAN/CANELLA/PAETZOLD 2000).

Current and former senior officers as well as members of the supervisory board of other companies excluding banks and insurers mainly offer expertise on markets, competition, decision making and problem solving for companies in general and serve as channels of communication between firms (see HILLMAN/CANELLA/PAETZOLD 2000). They are classified as *Business experts*.

Current and former senior officers as well as members of the supervisory board of banks and insurances are categorized as *Support specialists*. Also, lawyers and public relations experts are in this category. They offer specialized expertise on banking, law and public relations. Furthermore, they provide channels of communication to large and powerful suppliers of government agencies and ease access to vital re-

sources such as financial capital and legal support (see HILLMAN/CANELLA/PAETZOLD 2000).

The fourth group is called *Community influentials*. This category comprises political leaders, university faculty, leaders of social or community organizations and trade union members. These board members mainly offer non-business perspectives on problems, issues and ideas and bring in expertise about and influence with powerful groups in the community (see HILLMAN/CANELLA/PAETZOLD 2000).

All four groups augment the legitimacy of the board because of their knowledge and their status in organizations and society (see HILLMAN/CANELLA/PAETZOLD 2000).

The *tenure* of each member in a specific supervisory board is measured by the number of days which the member belongs to the supervisory board since his individual appointment day until the respective reference date.

For the variable *number of memberships* in supervisory boards, all mandates in supervisory boards of German and international companies are counted that are no group mandate in the sense of the German Corporation Law (see sec. 18, 100 AktG). Also included are the mandates in the analyzed companies and memberships in comparable controlling bodies of international companies.

### **Demographic characteristics**

Demographic characteristics of the supervisory board members are the *gender*, the *nationality* and the *age*.

*Gender* is categorized on the basis of the first name of each board member. In the case of the variable *nationality* it is only differentiated between the categories “German” and “other”, so as to maintain sufficiently large categories. *Age* is measured in years.

### **Measures of heterogeneity**

The degree of heterogeneity of a supervisory board with regards to a specific characteristic can be scaled by using measures of heterogeneity. These measures differ for categorical and metric variables.

In this study, categorical variables are *occupational background*, *nationality* and *gender*. In the literature, two indices are used as measures of heterogeneity for categorical variables: the index by BLAU (1977) and the index by TEACHMAN (1980). The more commonly used index is the index by BLAU (1977) which can be found in a

great number of studies (see, e.g., WEBBER/DONAHUE 2001: 150; HAMBRICK/CHO/CHEN 1996: 672; MAGJUKA/BALDWIN 1991: 801 et seq.).

The index by BLAU considers not only the number of categories in one supervisory board (with respect to occupational background, nationality and gender) but also the degree of (un)equal distribution between the different categories. When the individual values are standardized according to the procedure by ALEXANDER et al. (1995: 1466), the index results in the value of zero given complete homogeneity and in the value of one for maximal heterogeneity. The latter means that all categories are represented with an equal share.

An alternative for measuring heterogeneity of categorical variables is the index by TEACHMAN (1980). However, this index is not defined for variables where one of the categories is unrepresented. Therefore, this study relies on the index by BLAU (1977). The metric variables in this study are *tenure*, *number of memberships in supervisory boards* and *age*. Different measures of heterogeneity for metric variables can be found in the literature: the coefficient of variation, the index by Theil (1969), the coefficient by GINI (1921), the relative difference from the mean by SCHUTZ (1951) and the standard deviation of the natural logarithm of the variable. In this study the coefficient of variation is used which is the by far most frequently used measure in the literature because it evaluates changes equally in the whole range of values. After standardization (see ALLISON 1978: 869), the coefficient of variation has the value of zero for complete homogeneity and the value of one for complete heterogeneity.

### 4.4.1.2.3 Moderating variables

The moderating variables in this study are the *internationalization* and the *innovativeness* of the companies.

The variable *internationalization* is measured by the share of foreign sales to total sales (in percent). The respective data are taken from Worldscope.

The *innovativeness* of the companies is measured by the share of intangibles to total assets (in percent) and is calculated with data from Worldscope.

### 4.4.1.2.4 Controls

The included control variables in this study are *year*, *industry*, *German accounting standard*, *market capitalization*, *board size* and *free float*.

By including dummy variables for the *year*, it is possible to control for external shocks that influence all companies in the sample at a certain moment. The variable is measured as calendar year.

External shocks that have an influence on companies of a certain industry are controlled for by *industry* dummy variables. The industry dummies are built according to the supersectors of the Deutsche Börse (2010). These are: Basic Materials, Consumer Goods, Consumer Services, Financials, Industrials, Information Technology, Pharma & Healthcare, Telecommunication and Utilities.

The applied accounting standard has an effect on how some of the performance measures (ROA, ROE, PTBV and Tobin's Q) in this study are calculated. Because not all companies in the sample use the *German accounting standard*, this is a necessary control variable to make the performance measures comparable. The control variable is included in all analyses when the performance is measured by ROA, ROE, PTBV or Tobin's Q. Furthermore, the applied accounting standard could have an influence on the position in the corporate governance ranking. Therefore, this control variable is also included in the analyses using corporate governance ranking as dependent variable. The variable stems from Thomson Financial Datastream.

The *market capitalization* is used as a measure of company size. The company size can have different effects on performance. For instance, the number of observable interventions may vary due to the media coverage the companies receive. The larger the company, the more media coverage it receives, the more intervention activities can be observed. This is especially important in the context of this study because the performance variable number of interventions includes all observable intervention activities by the supervisory boards. The variable market value is measured in millions and stems from Thomson Financial Datastream.

The *size of the supervisory board* may have an influence on the effectiveness of the board. The larger the board the more difficult are the board processes and the longer is the duration of the decision making of the supervisory board (see YERMACK 1996; JENSEN 1993). The variable is collected from the annual reports of the companies.

The ratio of *free float* is included because the larger the free float the more influence and legitimacy the supervisory board has. The smaller the free float, the greater is the probability of large block holders that control directly without including the supervisory board in the process. The variable is measured in percent and is collected from Thomson Financial Datastream. Because of missing observations in different years, including free float as control variable reduces the number of observations by a third in the panel estimations. Therefore, in these estimations free float is not integrated.

### 4.4.2 Method

The relation between the different variables of heterogeneity and the performance measures *ROE*, *ROA*, *PTBV* and *Tobin's Q* are at first analyzed using an *Ordinary Least Squares (OLS)* estimator with robust standard errors and firm clusters. Yet, in the presence of unobserved confounding factors applying OLS leads to biased estimates. Using the Breusch and Pagan Lagrangian multiplier test for random effects, it can be tested whether the OLS estimator is valid or not. The Breusch and Pagan Lagrangian multiplier test for random effects analyzes if there is autocorrelation between the error terms  $u_{it}$  and  $u_{is}$  with  $t \neq s$ ,  $i$  standing for a company of the sample and  $t$  and  $s$  standing for different years within the time frame analyzed. When OLS is invalid, the error structure  $u_{it} = u_i + e_{it}$  is imposed where  $u_i$  is a time constant component of the error term for each company  $i$  and  $e_{it}$  is the error term which varies over time for every company. With this error structure a *random* or a *fixed effects estimator* is applied depending on the result of the Hausman test. The Hausman test is used to test if only the fixed or also the random effects estimator is consistent. If both, the random and the fixed effects estimators, are consistent, the random effects estimator is more efficient because the use of the random effects estimator requires the stricter assumptions.

A major challenge of this study is to identify the direction of causality. At first, I address the endogeneity problem by lagging the independent variables in the regressions (see for similar approach, e.g., DITTMANN/MAUG/SCHNEIDER 2010). Then, as suggested by WOOLDRIDGE (2001: 285), I test whether the possibly endogenous variable is exogenous by including the lead of this variable and testing for significance (see for this approach also FELBERMAYR/JUNG 2009: 73). The possibly endogenous variable is exogenous when the null – that the lead of this variable has no significant

effect on the dependent variable – cannot be rejected. Is the possibly endogenous variable in fact endogenous, I apply the method introduced by ANDERSON/Hsiao (1982). This is an instrumental variables estimator which includes the lagged dependent variable as explanatory variable and analyzes if the explanatory variables have explanatory power for the dependent variable  $y_t$  exceeding the explanatory power of the lagged dependent variable  $y_{t-1}$ . The lagged dependent variable filters out the effect of missing variables that have an impact on  $y_t$  and  $y_{t-1}$ .<sup>23</sup> Hence, this approach allows distinguishing between mere correlations and causality.

For analyzing the relation between heterogeneity and the performance measure *position in the corporate governance ranking* an *ordered probit* model should be used. This method should be applied because ranking position is an ordinal scaled dependent variable (see Ashford 1959; Aitchison/Silvey 1957). However, probit and logit models use maximum likelihood estimation techniques which require a certain amount of observations per characteristic of the dependent variable. According to Backhaus (2003: 470) this observation number should be no smaller than 25. Because every position in the corporate governance ranking is assigned only once (to one company), this assumption is not fulfilled. As a result, it can be difficult or even impossible to estimate an ordered probit model. Therefore, OLS is used instead and ranking position is assumed to be quasi-metric.

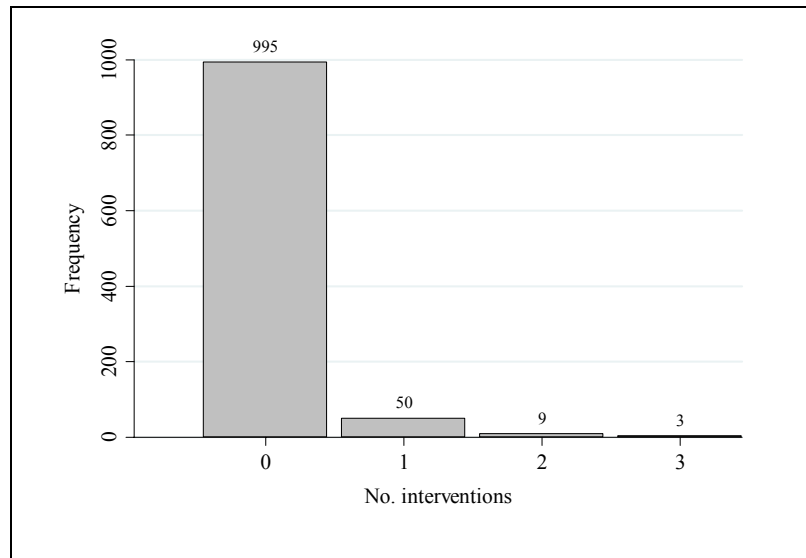
The link between heterogeneity and *number of interventions* is analyzed using a *zero-inflated Poisson estimator*. This method is applied when (1) the dependent variable is a count variable, (2) the variance of the dependent variable is in size relatively close to the mean and (3) the number of zeroes (i.e., no interventions) is excessive. These assumptions are fulfilled for the variable number of interventions as can be seen in Figure 1 and Table 15. Another assumption of the zero-inflated Poisson estimator is that the excessive number of zeros is the result of different processes that lead to a response variable with the value of zero. In this study, the two processes which may lead to the value of zero for the dependent variable *number of interventions* could be the following: (1) a supervisory board that did not intervene might not have had a reason to intervene or (2) a supervisory board that did not intervene might have had a reason to intervene but chose not to, e.g., to avoid bad publicity. Thus, the supervisory boards that did not intervene cannot necessarily be explained in the same

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<sup>23</sup> This method is also known as causality test according to Granger (1969).

manner as the supervisory boards that did. The first group of resulted zeros – when the supervisory board did not intervene because it had no reason to intervene – will be referred to as *certain zeros*.

**Figure 1: Frequency of the performance variable *number of interventions***



Source: Own compilation.

The zero-inflated Poisson regression generates two separate models and then combines them. First, a *logit model* is generated predicting whether a zero is a *certain zero* or not. In this logit model, either only an intercept or an intercept and other regressors or only other regressors can be included. If only an intercept is integrated into the logit model, it is assumed that all zeros have the same probability of belonging to the group of *certain zeros* or the group of *non-certain zeros*. Because there is no variable which explains why an observation with the value of zero belongs to the group of *certain zeros* or the group of *non-certain zeros* in this study, only an intercept is integrated in the logit model. Then, a *Poisson model* is estimated for all cases of *non-certain zeros*.

All explanatory variables except *German standard*, *market value* and *industry* are integrated into the estimations with a time lag of one year. This time lag is chosen because of (1) possible endogeneity, (2) the past orientation of some of the performance variables and (3) the delayed impact of actions of the supervisory board on performance.



## 4.4.3 Results

### 4.4.3.1 Descriptive results

Table 15 provides summary statistics for the dependent, explanatory, moderating and control variables at firm-year level.

**Table 15: Summary statistics for all variables at firm-year level**

	N	Mean	Median	Sd	Min	Max
<b>Dependent variables</b>						
ROA	1,031	2.0187	2.7114	11.5370	-72.8421	85.6760
ROE	1,003	7.9144	10.7000	19.6342	-98.1400	93.9700
PTBV	993	2.7551	1.9100	3.1151	0.2200	49.8700
Tobin's Q	997	1.8599	1.2440	2.5335	0.4099	51.8044
No. interventions	1,057	0.0728	0.0000	0.3189	0.0000	3.0000
Corporate governance ranking	76	41.8290	39.0000	27.7937	1.0000	96.0000
<b>Explanatory variables</b>						
Occupational background						
Insiders (%)	858	31.1565	33.3333	17.2001	0.0000	83.3333
Business experts (%)	858	24.4779	25.0000	19.1782	0.0000	100.0000
Support specialists (%)	858	29.4085	22.2222	23.7733	0.0000	100.0000
Community influentials (%)	858	14.9571	16.6667	12.9106	0.0000	66.6667
Het. occupational background	858	0.8004	0.8733	0.2225	0.0000	1.0000
Mean tenure (days)	604	1,636.6420	1,613.2560	798.7786	83.0000	4,365.0000
Het. tenure	604	0.3601	0.3979	0.1535	0.0000	0.6483
Mean memberships	795	3.3970	3.3000	1.2984	1.0000	9.2000
Het. memberships	795	0.4199	0.4362	0.0924	0.0000	0.5966
Mean male (%)	858	92.0100	95.0000	9.7000	50.0000	100.0000
Het. gender	858	0.2565	0.1900	0.2844	0.0000	1.0000
Mean German members (%)	258	89.1101	100.0000	15.2662	33.3333	100.0000
Het. nationality	258	0.2953	0.0000	0.3691	0.0000	1.0000
Mean age (years)	240	55.5237	56.0250	4.6250	37.6667	66.6667
Het. age	240	0.1292	0.1331	0.0310	0.0363	0.1895
<b>Moderating variables</b>						
Foreign sales/total sales (%)	854	46.8800	48.9075	27.1766	0.0000	95.0060
Intangibles/total assets (%)	1,018	12.8683	7.5871	14.4820	0.0000	89.4162
<b>Controls</b>						
Industry						
Consumer goods	1,057	0.1258				
Financials	1,057	0.1854				
Basic materials	1,057	0.0728				
Industrials	1,057	0.2848				
Consumer services	1,057	0.1060				
Pharma and health care	1,057	0.0927				
Information technology	1,057	0.0861				
Telecommunication	1,057	0.0199				
Utilities	1,057	0.0265				
Market value (million)	1,001	5,544.8090	788.2200	12,667.9800	0.9000	98,471.9400
German standard	1,013	0.2034				
Board size	858	11.4522	12.0000	6.0969	2.0000	21.0000
Free float (%)	704	62.1605	63.0000	25.7044	2.0000	100.0000

Source: Own compilation.

### **Dependent variables**

The performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* are available for the years 2000 to 2006.

While the accounting ratio *ROA* has a mean of 2.0187 and ranges from -72.8421 to 85.676, the average *ROE* of the companies within the sample lies at 7.9144 and the variable ranges from -98.14 to 93.970.

*PTBV* ranges from 0.22 to 49.87 and its mean lies at 2.7551. On average, *Tobin's Q* lies at 1.8599. The variable ranges from 0.4099 to 51.8044.

The mean of the variable *number of interventions* for all companies within this time frame lies at 0.0728 meaning that on average the supervisory board of every company in the sample intervenes 0.0728 times per year within the time frame analyzed. The minimum number of interventions of the supervisory boards in the sample within the years 2000 and 2006 lies at zero and the maximum at three.

The variable *corporate governance ranking* is only available for 76 companies in the year 2005. The minimum rank is one meaning one company in the sample reaches the best position in the ranking. The maximum – and therefore lowest – rank in the sample is 96.

### **Explanatory variables**

The explanatory variables are available for the years 2000 to 2005. However, the number of observations per variable varies due to missing values. Especially the information for the variables *nationality* and *age* are rather scarce with observation numbers of 258 and 240.

Taking a closer look at the explanatory variable *occupational background*, the share of supervisory board members who belong to the category *Insiders* ranges from zero percent to 83.3334 percent. On average, 31.1565 percent of the members of the supervisory boards belong to this category. Although no board in this sample consists only of insiders, on average no other category is represented more within the supervisory boards. The ratio of *Business Experts* ranges from zero percent to 100 percent and the mean lies at 24.4779 percent. On average 29.4085 percent of the members belong to the category *Support Specialists*. The share of support specialists ranges also from zero percent to 100 percent of the members of a supervisory board. Thus, there is at least one supervisory board in the sample which consists in at least one of

the analyzed years only of business experts or only of support specialists or has no members that belong to one of these two categories. Zero percent to 66.6667 percent of the members of a supervisory board in the sample within the years 2000 and 2005 belong to the last category *Community Influentials*, the mean lies at 14.9571 percent. Looking at the *occupational background heterogeneity* of the supervisory boards in this sample, the index of BLAU (1977) ranges from zero to one, it has a mean of 0.8004 and a median of 0.8733. Thus, on average, the supervisory boards in the sample have a rather heterogeneous composition regarding the occupational background of the members.

Regarding the explanatory variable *tenure*, the mean of the average supervisory board tenure lies at 1636.642 days. The average tenure of the members of the supervisory boards calculated on board level ranges from 83 days to 4365 days; this means from less than a year to almost 12 years. The *heterogeneity regarding the average tenure* of the members of the supervisory boards in the sample ranges from zero, meaning all members in a supervisory board have the same tenure (all members were appointed the same day), to 0.648. The mean of the heterogeneity regarding tenure lies at 0.36 and the median at 0.398; this equals a medium level of heterogeneity.

The members of the supervisory boards in the sample have on average one to 9.2 *memberships in supervisory boards*. The mean lies at 3.397 and the median at 3.3 memberships per member. The *heterogeneity regarding the number of memberships* ranges from zero meaning all members have the same amount of memberships to 0.5966 which implies a medium heterogeneous composition regarding this variable.

The average supervisory board in this sample has a share of 92.01 percent *male* members. The median lies at 95 percent, and the share of male members in supervisory boards in this sample ranges from 50 percent to 100 percent. The *heterogeneity regarding gender* ranges from zero to one. The mean lies at 0.2565 and the median at 0.19. This signifies a low heterogeneous composition of the boards in the sample regarding gender.

The mean share of *German* members in the supervisory boards of the sample is 89.1101 percent. The share of German members ranges from 33.3333 percent to 100 percent. The median lies at 100 percent which implies that more than half of the supervisory boards consist of only German members. The index of *nationality heterogeneity* ranges from zero to one meaning that the sample consists of very homogene-

ous and very heterogeneous supervisory boards regarding this variable. The mean lies at 0.2953, and the median at zero.

The mean *age* of the members in the supervisory boards is 55.5237 years and lies between 37.6667 and 66.6667 years. The *heterogeneity index regarding the age* of the members has a mean of 0.1292 and ranges from 0.0363 to 0.1895 implying a rather homogeneous composition of the supervisory boards regarding the age of the members.

### **Moderating variables**

The moderating variables are available for the years 2000 to 2006.

The variable *foreign sales to total sales* which measures the internationalization of the company has a mean of 46.88 percent and a median of 48.9075 percent. This signifies that on average half of the sales are made in foreign markets. The variable ranges from zero percent, meaning that at least one company in at least one of the studied periods makes all sales in the local market, to 95.006 percent, signifying that at least one company makes almost all sales in foreign markets in at least one of the periods analyzed.

The variable *intangibles to total assets* which measures the innovativeness of the company has a mean of 12.8683 percent and a median of 7.5871 percent. It ranges from zero percent, meaning that there are no intangibles recorded in the balance sheet, to 89.4162 percent, where the value of total assets mainly consists of the value of the intangibles.

### **Controls**

The control variables industry, market value and German standard are available for the years 2000 to 2006.

The companies included in the sample belong to nine different *industries* according to the classification of supersectors of the DEUTSCHE BÖRSE (2010): the largest share of company observations belongs to the industry classification *Industrials* (28.5 percent), followed by *Financials* (18.5 percent) and *Consumer Goods* (12.6 percent). These industry variables are dummy variables.

Company size is measured by the variable *market value*. It has a mean of 5,544.809 million Euro and a median of 788.220 million Euro. The minimum of this variable is 900.000 Euro, meaning that the market value of one company in the sample equals

this amount in one period. The maximum of this variable lies at 98,471.94 million Euro.

The variable *German standard* is a dummy variable that measures the application of the German accounting standard by the companies in the periods studied. The mean of this variable lies at 0.2034. This means that on average one fifth of the companies in the sample apply the German accounting standard in every period.

The variable *board size* is available for the years 2000 to 2005. It ranges from two to 21 members. Because the number of members of a supervisory board should lie between three and 21, it seems questionable that a board consists of only two members as the minimum in Table 15 indicates. However, when a supervisory board member leaves the board, it is not always possible to appoint a new member right away leaving a seat open for a couple of days or even weeks. As a result, in these instances it is possible that for a short time a board consists of fewer members than legally required. The median lies at 12 members per supervisory board.

The variable *free float* measures what percentage of company shares is available for trading. The mean of this variable lies at 62.1605 percent, meaning that on average more than half of the company shares are part of the free float in every period. The variable ranges from two percent to 100 percent.

Table 16 provides the Pearson correlation matrix of the included variables. A significant, high correlation (with a correlation coefficient  $r > 0.5$ ) between *board size* and *occupational background heterogeneity* can be observed. As a consequence, including *board size* in addition to *occupational background heterogeneity* in the multivariate analysis could lead to biased estimates because of multi-collinearity. However, it can be tested if multi-collinearity is given. This is done in section 4.4.3.2.1.

## 4 Heterogeneity and Performance of Supervisory Boards

**Table 16: Pearson correlation matrix**

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	ROA	1.0000																		
2	ROE	<b>0.8513</b> ( <b>0.0000</b> )	1.0000																	
3	PTBV	<b>0.1501</b> ( <b>0.0000</b> )	<b>0.2495</b> ( <b>0.0000</b> )	1.0000																
4	Tobin's Q	<b>0.1763</b> ( <b>0.0000</b> )	<b>0.1776</b> ( <b>0.0000</b> )	<b>0.5829</b> ( <b>0.0000</b> )	1.0000															
5	No. interventions	-0.0184 (0.5558)	0.0102 (0.7474)	0.0144 (0.6502)	-0.0493 (0.1198)	1.0000														
6	Corporate governance rank	<b>0.2525</b> ( <b>0.0278</b> )	0.1236 (0.2875)	0.1143 (0.3288)	0.1373 (0.2401)	-0.1703 (0.1412)	1.0000													
7	Het. occup. background (t-1)	<b>-0.0650</b> ( <b>0.0577</b> )	-0.0154 (0.6561)	<b>-0.1248</b> ( <b>0.0003</b> )	<b>-0.1701</b> ( <b>0.0000</b> )	0.0452 (0.1855)	<b>-0.2979</b> ( <b>0.0099</b> )	1.0000												
8	Het. tenure (t-1)	0.0235 (0.5651)	0.0038 (0.9273)	<b>-0.1492</b> ( <b>0.0002</b> )	<b>-0.2187</b> ( <b>0.0000</b> )	0.0481 (0.2379)	-0.1369 (0.3190)	<b>0.3567</b> ( <b>0.0000</b> )	1.0000											
9	Het. memberships (t-1)	0.0166 (0.6407)	0.0017 (0.9623)	<b>-0.1133</b> ( <b>0.0014</b> )	<b>-0.1381</b> ( <b>0.0001</b> )	0.0383 (0.2806)	<b>-0.2334</b> ( <b>0.0536</b> )	<b>0.2699</b> ( <b>0.0000</b> )	<b>0.2721</b> ( <b>0.0000</b> )	1.0000										
10	Het. gender (t-1)	-0.0175 (0.6102)	-0.0057 (0.8700)	0.0560 (0.1026)	0.0461 (0.1792)	0.0000 (1.0000)	-0.1379 (0.2412)	<b>0.2157</b> ( <b>0.0000</b> )	<b>0.2132</b> ( <b>0.0000</b> )	<b>0.0885</b> ( <b>0.0125</b> )	1.0000									
11	Het. nationality (t-1)	-0.0174 (0.7807)	0.0853 (0.1753)	0.0708 (0.2574)	0.0996 (0.1105)	<b>0.1350</b> ( <b>0.0302</b> )	0.0392 (0.8898)	0.0143 (0.8189)	<b>0.1376</b> ( <b>0.0464</b> )	<b>-0.1864</b> ( <b>0.0039</b> )	0.0051 (0.9355)	1.0000								
12	Het. age (t-1)	<b>0.1310</b> ( <b>0.0426</b> )	<b>0.1201</b> ( <b>0.0632</b> )	0.0911 (0.1597)	0.1001 (0.1218)	0.0540 (0.4051)	-0.3064 (0.1767)	-0.0405 (0.5325)	0.1019 (0.1381)	-0.0308 (0.6412)	<b>0.3253</b> ( <b>0.0000</b> )	<b>0.2938</b> ( <b>0.0002</b> )	1.0000							
13	Foreign sales/ total sales (t-1)	<b>0.0834</b> ( <b>0.0175</b> )	0.0264 (0.4559)	<b>-0.0887</b> ( <b>0.0123</b> )	<b>-0.0875</b> ( <b>0.0134</b> )	0.0356 (0.3115)	-0.0730 (0.5601)	<b>0.2502</b> ( <b>0.0000</b> )	<b>0.1942</b> ( <b>0.0000</b> )	<b>0.1963</b> ( <b>0.0000</b> )	<b>-0.1610</b> ( <b>0.0000</b> )	<b>-0.2189</b> ( <b>0.0010</b> )	<b>0.1301</b> ( <b>0.0604</b> )	1.0000						
14	Intangibles/ total assets (t-1)	<b>-0.1114</b> ( <b>0.0004</b> )	<b>-0.0895</b> ( <b>0.0051</b> )	-0.0180 (0.5742)	-0.0068 (0.8324)	0.0183 (0.5615)	0.0688 (0.5574)	-0.0167 (0.6277)	<b>-0.1196</b> ( <b>0.0035</b> )	<b>-0.1726</b> ( <b>0.0000</b> )	<b>-0.0638</b> ( <b>0.0641</b> )	<b>0.2129</b> ( <b>0.0007</b> )	<b>0.1438</b> ( <b>0.0279</b> )	<b>0.1260</b> ( <b>0.0003</b> )	1.0000					
15	Market value	0.0264 (0.4055)	0.0298 (0.3528)	-0.0005 (0.9862)	-0.0315 (0.3197)	<b>0.1024</b> ( <b>0.0012</b> )	<b>-0.4462</b> ( <b>0.0001</b> )	<b>0.1740</b> ( <b>0.0000</b> )	<b>0.1554</b> ( <b>0.0001</b> )	<b>0.0833</b> ( <b>0.0191</b> )	<b>0.1391</b> ( <b>0.0000</b> )	0.0896 (0.1514)	-0.0786 (0.2248)	<b>0.0727</b> ( <b>0.0401</b> )	-0.0327 (0.3072)	1.0000				
16	German standard	0.0384 (0.2226)	0.0403 (0.2063)	0.0276 (0.3893)	<b>-0.0750</b> ( <b>0.0191</b> )	<b>-0.0614</b> ( <b>0.0506</b> )	0.0613 (0.5991)	0.0473 (0.1692)	<b>0.0714</b> ( <b>0.0812</b> )	<b>0.0675</b> ( <b>0.0588</b> )	-0.0363 (0.2911)	<b>-0.1943</b> ( <b>0.0019</b> )	<b>-0.1212</b> ( <b>0.0624</b> )	-0.0230 (0.5143)	<b>-0.1105</b> ( <b>0.0005</b> )	<b>-0.0681</b> ( <b>0.0334</b> )	1.0000			
17	Board size (t-1)	-0.0120 (0.7265)	-0.0236 (0.4956)	<b>-0.2477</b> ( <b>0.0000</b> )	<b>-0.2616</b> ( <b>0.0000</b> )	<b>0.1097</b> ( <b>0.0013</b> )	<b>-0.4317</b> ( <b>0.0001</b> )	<b>0.5170</b> ( <b>0.0000</b> )	<b>0.4609</b> ( <b>0.0000</b> )	<b>0.3107</b> ( <b>0.0000</b> )	<b>0.2700</b> ( <b>0.0000</b> )	0.0032 (0.9589)	0.1060 (0.1015)	<b>0.1732</b> ( <b>0.0000</b> )	<b>-0.1547</b> ( <b>0.0000</b> )	<b>0.4833</b> ( <b>0.0000</b> )	<b>-0.0619</b> ( <b>0.0718</b> )	1.0000		
18	Free float (t-1)	<b>-0.1306</b> ( <b>0.0020</b> )	<b>-0.0873</b> ( <b>0.0415</b> )	<b>-0.1227</b> ( <b>0.0038</b> )	<b>-0.1332</b> ( <b>0.0016</b> )	<b>0.1165</b> ( <b>0.0060</b> )	<b>-0.2137</b> ( <b>0.0736</b> )	-0.0014 (0.9744)	0.0076 (0.8801)	-0.0304 (0.4856)	<b>-0.0879</b> ( <b>0.0382</b> )	<b>0.2534</b> ( <b>0.0002</b> )	0.0119 (0.8732)	0.0646 (0.1599)	-0.0062 (0.8848)	<b>0.2094</b> ( <b>0.0000</b> )	<b>-0.1469</b> ( <b>0.0005</b> )	<b>0.1138</b> ( <b>0.0072</b> )	1.0000	

Values in parenthesis indicate significance of a two-tailed test for each correlation coefficient.

Source: Own compilation.

### 4.4.3.2 Multivariate results

The following sections present the empirical results of this study with regard to the hypotheses.

First, the relation between heterogeneity and performance is analyzed. This is done for all heterogeneity types and performance variables. The first table in each section always displays the results for the relation between the specific type of heterogeneity and the dependent variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*, the second table presents the results for the relation between the specific type of heterogeneity and the dependent variables *number of interventions* and *corporate governance ranking*. All control variables are regularly included except *free float* and *German standard*. *Free float* reduces the number of observations by a third in the panel estimations. Therefore, it is left out in these estimations and is only included when the dependent variable is *corporate governance ranking*. The variable *German standard* is not included when using the dependent variable *number of interventions* because it does not seem plausible that the applied accounting standard should have an influence on the number of interventions by the supervisory board.

In addition to the proposed linear relations between heterogeneity and performance also non-linear courses of function are analyzed in this part. This is done to explore if beyond the question of the direction of the effect also the question of the optimum degree of heterogeneity can be answered.

Then, the effects of the moderating variables on the relation between heterogeneity and performance are analyzed. Here, the analyses follow the same procedure and the results are presented as described before.

#### 4.4.3.2.1 Specific types of heterogeneity

##### 4.4.3.2.1.1 Functional characteristics

###### **Occupational background**

Table 17 provides the findings of the multivariate analysis of the explanatory variable *occupational background heterogeneity* on the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

**Table 17: Relation between occupational background heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
	FE	FE	RE	RE	RE	RE	RE	FE
Constant	10.3899 *** (4.0944)	9.3601 * (5.0219)	20.2553 *** (5.8640)	19.5453 *** (6.6316)	3.5699 *** (0.6664)	3.1994 *** (0.7246)	2.2069 *** (0.3794)	1.6330 *** (0.5428)
Het. occup. background <sub>(t-1)</sub>	-11.8603 ** (5.2639)	-3.7751 (15.7256)	-10.8565 * (5.7299)	-6.0982 (17.5355)	0.3618 (0.5705)	2.7638 (1.7423)	0.0888 (0.4188)	1.5255 (1.5768)
Het. occup. background <sub>(t-1)</sub> <sup>2</sup>		-7.7774 (12.3731)		-4.6676 (14.4351)		-2.3296 * (1.4030)		-1.0347 (1.1019)
German standard	1.4886 ** (0.7636)	1.3978 * (0.7811)	3.7285 ** (1.9364)	3.6913 * (1.9574)	0.3654 (0.2772)	0.3462 (0.2729)	-0.0109 (0.1041)	0.0351 (0.1091)
Market value	-0.0000 (0.0000)	-0.0000 (0.0001)	0.0001 * (0.0001)	0.0001 * (0.0001)	0.0000 ** (0.0000)	0.0000 ** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.0963 (0.2098)	-0.0991 (0.2103)	-0.1412 (0.1980)	-0.1252 (0.1928)	-0.1121 *** (0.0300)	-0.1046 *** (0.0280)	-0.0534 *** (0.0142)	-0.0175 (0.0159)
No. observations	840	840	825	825	842	842	842	842
No. groups	151	151	151	151	151	151	151	151
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.0818	0.0837	0.0916	0.0908	0.1265	0.1403	0.1574	0.0579
Prob > F	***	***						***
Prob > chi <sup>2</sup>			***	***	***	***	***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	***	***	***	***	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	***	***	ns	ns	ns	ns	ns	***
<i>Test of strict exogeneity</i>								
Het. occup. background	ns	ns	ns	ns	ns	ns	ns	ns
Het. occup. background <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.



In the descriptive empirical results of section 4.4.3.1 a significant, high correlation between the explanatory variable *occupational background heterogeneity* and the control variable *board size* was observed. Because of possible multi-collinearity, the inclusion of *board size* in the analysis of the effect of *occupational background heterogeneity* on performance could lead to biased estimates. However, when testing for multi-collinearity, the respective variance inflation factors indicate no multi-collinearity problem. Therefore, both variables can be included in the analysis simultaneously.

Looking at the results of Table 17, the outcomes of the Breusch and Pagan Lagrangian multiplier test for random effects are significant for all specifications of Table 17 meaning that the OLS estimator is invalid for these specifications. The outputs of the Hausman test are significant in the linear and the non-linear specification when the dependent variable is *ROA* (columns 1 and 2) and in the non-linear specification when the dependent variable is *Tobin's Q* (column 8). This means that only the fixed effects estimator provides consistent estimates in these cases. When the results of the Hausman test are insignificant, both a random and a fixed effects estimator provide consistent estimates but the random effects estimator is more efficient.

Testing for strict exogeneity by including the lead of the heterogeneity variable(s) in the equation shows that the lead(s) of this (these) variable(s) have no significant effect on performance for all specifications of Table 17. This means that the variable(s) of *occupational background heterogeneity* is (are) exogenous and no other kind of estimator is needed to control for endogeneity. Thus, the results of a fixed effects estimator are presented in columns 1, 2 and 8 and the results of a random effects estimator are provided in the remaining columns.

Controlling for *German accounting standard*, *market value* and *board size*, a linear, negative impact of *occupational background heterogeneity* on performance measured by *ROA* can be observed (columns 1 and 2). This means the larger the *occupational heterogeneity* the lower is the performance, e.g., when heterogeneity rises by 0.1, *ROA* falls by 1.18603. A non-linear relationship between *occupational background heterogeneity* and *ROA* cannot be found. The control variable *German standard* has a significant positive relation with *ROA* in the linear and the non-linear estimation. This signifies that companies which apply the *German accounting standard* in contrast to international accounting standards have a higher performance measured by *ROA*.

Similar results can be found when performance is measured by *ROE* (columns 3 and 4). *Occupational background heterogeneity* has a linear, negative impact on performance measured by *ROE*. Hence, the larger the occupational background heterogeneity the lower is the performance. As before, the control variable *German standard* has a significant positive relation with *ROE* in the linear as well as the non-linear specification. Moreover, the control variable *market value* has also a significant positive relation with *ROE*. Since *market value* is a proxy for company size, this indicates a better performance measured by *ROE*, the larger the company. Although the economic significance of the variable *market value* seems to be very small, this is due to the scaling of the variable.

When performance is measured by *PTBV* (columns 5 and 6), a non-linear relation between *occupational background heterogeneity* and *PTBV* can be observed. The function of this relation is concave down decreasing in the relevant range of values, hence, larger degrees of *occupational background heterogeneity* lead to lower values of *PTBV*. This means that the optimum degree of *occupational background heterogeneity* is no heterogeneity. The control variable *market value* has, as in the case of the dependent variable *ROE*, a positive relation with *PTBV*. Furthermore, *board size* has a negative relation with *PTBV*. This means companies with a smaller supervisory board have a better performance measured by *PTBV*.

No significant effects of *occupational background heterogeneity* on *Tobin's Q* can be found (columns 7 and 8). However, in the specification analyzing a linear relation between *occupational background heterogeneity* and *Tobin's Q*, a negative relation between *board size* and *Tobin's Q* can be found.

The results of the multivariate analysis of the effect of the explanatory variable *occupational background heterogeneity* on the performance variables *number of interventions* and *corporate governance ranking* can be seen in Table 18.

No relation between *occupational background heterogeneity* and the performance variable *number of interventions* can be found (columns 1 and 2). In contrast to the findings regarding performance measures *PTBV* and *Tobin's Q*, a significant positive relation between the control variable *board size* and the performance variable *number of interventions* can be found. This means that there are more interventions against the executive board when the company has a larger supervisory board.

**Table 18: Relation between *occupational background heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking***

Dependent variable	No. interventions		Corporate governance ranking	
Method	ZIP		OLS	
Constant	-2.5476 *** (1.0348)	-2.8132 ** (1.3296)	117.0138 *** (19.2567)	100.2974 *** (16.1561)
Het. occup. background <sub>(t-1)</sub>	-0.2140 (0.9795)	1.2011 (3.5743)	-50.6041 ** (21.6069)	20.3685 (48.4771)
Het. occup. background <sub>(t-1)</sub> <sup>2</sup>		-1.3305 (2.6752)		-61.8953 (51.6807)
German standard			7.9779 (10.5367)	9.3547 (10.7617)
Market value	0.0000 (0.0000)	0.0000 (0.0000)	-0.0007 *** (0.0002)	-0.0007 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0650 * (0.0354)	0.0698 ** (0.0334)	-0.5702 (0.9064)	-0.4003 (0.9526)
Free float <sub>(t-1)</sub>			-0.2026 (0.1442)	-0.2002 (0.1427)
<i>Inflation model</i>				
Constant	1.0678 *** (0.3648)	1.0681 *** (0.3600)		
No. observations	854	854	71	71
No. groups	151	151		
Year effects	yes	yes	no	no
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	no	no
R <sup>2</sup>	0.0770	0.0780	0.4290	0.4388
Prob > F			***	***
Prob > chi <sup>2</sup>	***	***		

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

A linear, negative relation between *occupational background heterogeneity* and *corporate governance ranking* can be found (column 3). Because *corporate governance ranking* is an inverse measure of performance, the negative coefficient implies that the more heterogeneous the supervisory board the better is the position in the *corporate governance ranking*. Furthermore, a significant, negative relation between *market value* and *corporate governance ranking* can be observed. This means that larger companies have a better position in the corporate governance ranking.<sup>24</sup>

The presented findings do not show a clear direction for the effect of *occupational background heterogeneity* on performance. Hypothesis 1 predicts a positive effect of

<sup>24</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimations analyzing the relation between *occupational background heterogeneity* and *corporate governance ranking*.

*occupational background heterogeneity* on performance. While *occupational background heterogeneity* has a negative effect on *ROA* and *ROE*, it has a positive effect on the position in the *corporate governance ranking*. No effect of *occupation background heterogeneity* on *PTBV*, *Tobin's Q* and *number of interventions* can be found. Hence, hypothesis 1, stating a positive effect of occupational background heterogeneity on performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* but cannot be rejected for the performance variable *corporate governance ranking*.

### **Tenure**

The results of the multivariate analysis of the relation between the explanatory variable *tenure heterogeneity* and performance measured by *ROA*, *ROE*, *PTBV* and *Tobin's Q* are presented in Table 19.

The outputs of the Breusch and Pagan Lagrangian multiplier test for random effects are significant for all specification of Table 19. Therefore, OLS is invalid in all cases. The result of the Hausman test is significant in the linear specification when performance is measured by *PTBV* (column 5) and in the non-linear specifications when performance is measured by *ROE* (column 4) and *Tobin's Q* (column 8). In these cases only a fixed effects estimator provides consistent estimates. In the remaining specifications of Table 19, random and fixed effects estimators both provide consistent estimates but the random effects estimator is more efficient. The test of strict exogeneity shows that the endogeneity concern has been resolved for all specifications of Table 19. Hence, the results of a fixed effects estimator are provided in columns 4, 5 and 8 and a random effects estimator is provided for the remaining specifications.

When looking at the specifications analyzing the relation between *tenure heterogeneity* and *ROA* (columns 1 and 2), no effect of *tenure heterogeneity* on performance can be found. However, the control variable *board size* has a significant negative relation with *ROA*. This means that companies with a larger supervisory board have a lower *ROA*.

#### 4 Heterogeneity and Performance of Supervisory Boards

**Table 19: Relation between *tenure heterogeneity* and the performance variables *ROA, ROE, PTBV* and *Tobin's Q***

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
	RE	RE	RE	FE	FE	RE	RE	FE
Constant	3.4087 (2.7785)	3.0327 (2.9787)	13.6029 ** (5.6083)	19.5433 *** (5.1977)	1.8576 *** (0.4516)	4.0869 *** (0.7249)	1.8650 *** (0.2775)	1.2903 *** (0.2076)
Het. tenure <sub>(t-1)</sub>	4.2178 (4.5814)	10.4131 (12.7090)	-1.0205 (5.6980)	-1.3166 (24.6034)	0.8942 (1.3109)	-3.1249 (2.6541)	-0.0583 (0.3247)	-0.2374 (0.8450)
Het. tenure <sub>(t-1)</sub> <sup>2</sup>		-10.7261 (20.8455)		8.3176 (38.8801)		6.0128 (5.3143)		0.3727 (1.2204)
German standard	1.1046 (1.0165)	1.1020 (1.0276)	1.6265 (2.4900)	0.3254 (2.5756)	0.1040 (0.2582)	0.1370 (0.2372)	0.0344 (0.1026)	0.0646 (0.1258)
Market value	0.0001 (0.0000)	0.0001 (0.0000)	0.0002 ** (0.0001)	0.0002 (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.2427 * (0.1439)	-0.2620 * (0.1434)	-0.4052 * (0.2149)	-0.7425 * (0.4538)	-0.0525 (0.0570)	-0.0837 *** (0.0288)	-0.0504 *** (0.0169)	-0.0012 (0.0164)
No. observations	595	595	586	586	596	596	596	596
No. groups	112	112	112	112	112	112	112	112
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.1431	0.1411	0.1677	0.0774	0.1058	0.1332	0.1683	0.0963
Prob > F				***	***			***
Prob > chi <sup>2</sup>	***	***	***			***	***	
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	***	***	***	***	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	ns	ns	ns	**	**	ns	ns	***
<i>Test of strict exogeneity</i>								
Het. tenure	ns	ns	ns	ns	ns	ns	ns	ns
Het. tenure <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

When performance is measured by *ROE* (columns 3 and 4), also no effect of *tenure heterogeneity* on performance can be found, neither in the linear nor in the non-linear specification of the analysis. However, *market value* has, as in Table 17, a significant positive relation with *ROE* in the linear case. Additionally, *board size* has a significant negative relation with *ROE* in the linear and the non-linear specification meaning that companies with a larger board have a lower *ROE*.

The analysis of the relation between *tenure heterogeneity* and *PTBV* is presented in columns 5 and 6 of Table 19. No relation between *tenure heterogeneity* and *PTBV* can be found. Yet, *board size* has, again, a negative relation with *PTBV* in the non-linear case.

In the last two columns of Table 19, the results of the analysis of the relation between *tenure heterogeneity* and *Tobin's Q* are displayed. No relation between *tenure heterogeneity* and *Tobin's Q* can be found. But the control variable *board size* has, as before, a negative relation with *Tobin's Q* in the linear specification.

The findings of the multivariate analysis of the relation between the explanatory variable *tenure heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking* are shown in Table 20.

No effect of the variable *tenure heterogeneity* on the performance variable *number of interventions* can be found (columns 1 and 2). Also, none of the control variables have a significant relation with the performance variable *number of interventions*.

Between *tenure heterogeneity* and *corporate governance ranking*, also no relation can be found (columns 3 and 4). However, in both specifications – the linear and the non-linear – *board size* has a significant negative relation with *corporate governance ranking*.<sup>25</sup> Because the variable *corporate governance ranking* is an inverse measure of performance, the latter means that companies with a larger board have a better position in the *corporate governance ranking*.

The presented findings do not show any relation between *tenure heterogeneity* and performance. Thus, hypothesis 2, which states a positive effect of *tenure heterogeneity* on performance, must be rejected.

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<sup>25</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimations analyzing the effect of *tenure heterogeneity* on *corporate governance ranking*.

**Table 20: Relation between *tenure heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking***

Dependent variable	No. interventions		Corporate governance ranking	
Method	ZIP		OLS	
Constant	-1.8026 ** (0.8933)	-1.4666 (0.9507)	70.6818 *** (23.4575)	77.9660 *** (27.8751)
Het. tenure <sub>(t-1)</sub>	-0.2311 (1.7874)	-4.5276 (5.2339)	15.3626 (39.3065)	-59.3726 (124.7496)
Het. tenure <sub>(t-1)</sub> <sup>2</sup>		6.9033 (8.4730)		118.8015 (170.4976)
German standard			9.8649 (16.6564)	10.5021 (16.9751)
Market value	0.0000 (0.0000)	0.0000 (0.0000)	-0.0004 (0.0003)	-0.0004 (0.0003)
Board size <sub>(t-1)</sub>	0.0492 (0.0484)	0.0586 (0.0461)	-2.6323 ** (1.1144)	-2.4292 * (1.2315)
Free float <sub>(t-1)</sub>			0.0517 (0.2274)	0.0543 (0.2251)
<i>Inflation model</i>				
Constant	0.9789 * (0.5223)	0.9345 * (0.5404)		
No. observations	603	603	52	52
No. groups	112	112		
Year effects	yes	yes	no	no
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	no	no
R <sup>2</sup>	0.0840	0.0870	0.4381	0.4437
Prob > F			na °	na °
Prob > chi <sup>2</sup>	***	***		

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). ° The missing F model statistics are due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the respective F model statistics are highly significant (Prob > F: \*\*\*).

Source: Own compilation.

## Number of supervisory board memberships

Table 21 provides the outcomes for the multivariate analysis of the relation between the explanatory variable *heterogeneity regarding the number of memberships* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

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**Table 21: Relation between *heterogeneity regarding the number of memberships* and the performance variables *ROA, ROE, PTBV* and *Tobin's Q***

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
Method	RE	RE	RE	FE	Anderson/Hsiao	RE	FE	RE
Constant	12.7913 *** (3.8194)	16.0317 ** (6.4592)	22.0444 *** (6.0943)	17.0483 *** (6.3424)	0.0456 (0.2137)	3.8281 *** (0.8184)	1.8129 *** (0.3520)	2.5036 *** (0.4549)
Dependent variable <sub>(t-1)</sub>					0.5368 *** (0.0542)			
Het. memberships <sub>(t-1)</sub>	-10.5621 (8.1613)	-34.2691 (30.6456)	-6.1383 (9.7213)	-17.7701 (24.7168)	1.4160 (1.4893)	1.1602 (3.2153)	-1.0299 (0.7330)	-0.4397 (1.5965)
Het. memberships <sub>(t-1)</sub> <sup>2</sup>		37.2729 (39.3007)		7.5140 (40.0969)		-2.4162 (5.0957)		-0.7801 (2.0567)
German standard	0.9187 (0.7707)	0.9494 (0.7698)	2.8270 (2.0637)	2.6414 (2.3087)	0.6360 (0.6387)	0.4257 (0.2853)	0.1267 (0.0894)	0.0788 (0.0818)
Market value	0.0000 (0.0000)	0.0000 (0.0000)	0.0001 * (0.0001)	0.0002 (0.0002)	0.0000 (0.0000)	0.0000 * (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.1416 (0.1006)	-0.1514 (0.1012)	-0.3589 ** (0.1658)	-0.6424 * (0.3448)	-0.0506 (0.0933)	-0.1077 *** (0.0303)	-0.0115 (0.0149)	-0.0502 *** (0.0139)
No. observations	779	779	765	765	624	780	780	780
No. groups	146	146	146	146	139	146	146	146
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.0792	0.0893	0.0838	0.0581		0.1295	0.1032	0.1663
Prob > F				***	***		***	
Prob > chi <sup>2</sup>	***	***	***			***		***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	***	***	***	***	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	ns	ns	ns	***	ns	ns	***	ns
<i>Test of strict exogeneity</i>								
Het. memberships	ns	ns	ns	ns	**	ns	ns	ns
Het. memberships <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRIKKER 2005).

Source: Own compilation.



The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 21. The outcomes of the Hausman test show that only a fixed effects estimator provides consistent estimates in the linear specification when performance is measured by *Tobin's Q* (column 7) and in the non-linear specification when performance is measured by *ROE* (column 4). Therefore, in these cases a fixed effects estimator is used. In all other specification, random and fixed effects estimators provide consistent estimates but the random effects estimator is more efficient. Hence, a random effects estimator is applied. The test of strict exogeneity shows that the explanatory variable *heterogeneity regarding the number of memberships* is not exogenous in the linear specification when performance is measured by *PTBV* (column 5). Thus, in this case, instead of a random effects estimator an estimator according to ANDERSON/HSHIAO (1982) is applied to control for endogeneity. Looking at columns 1 and 2 of Table 21, no relation between *membership heterogeneity* and *ROA* can be observed. Also, none of the control variables has a relation with *ROA*. When performance is measured by *ROE* (columns 3 and 4), no effect of heterogeneity on performance can be observed. As before, *market value* has a significant positive relation with *ROE* in the linear specification and *board size* has a significant negative relation with *ROE* in the linear and the non-linear specifications.

The effect of *membership heterogeneity* on *PTBV* is analyzed in the columns 5 and 6 of Table 21. No relation between *membership heterogeneity* and *PTBV* can be found. Yet, in the case of the non-linear specification, *market value* has – again – a positive and *board size* – also again – a negative relation with *PTBV*.

Between *membership heterogeneity* and *Tobin's Q* no relation can be found either (columns 7 and 8). Yet, *board size* has again a negative relation with *Tobin's Q* in the case of the non-linear specification.

The results of the multivariate analysis of the relation between *heterogeneity regarding the number of memberships* and the performance variables *number of interventions* and *corporate governance ranking* can be seen in Table 22.

Between *membership heterogeneity* and the performance variable *number of interventions* no relation can be found (columns 1 and 2). Also, none of the control variables have a relation with the variable *number of interventions*.

**Table 22: Relation between heterogeneity regarding the number of memberships and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions		Corporate governance ranking	
Method	ZIP		OLS	
Constant	-3.9018 *** (1.2019)	-6.8315 * (4.1408)	115.7110 *** (28.6098)	149.4027 *** (51.5132)
Het. no. memberships <sub>(t-1)</sub>	3.1544 (1.9754)	18.4309 (17.8984)	-86.0617 * (51.3873)	-262.4083 (270.7482)
Het. no. memberships <sub>(t-1)</sub> <sup>2</sup>		-18.8223 (20.4419)		211.9891 (336.6477)
German standard			4.9453 (12.0029)	4.9017 (12.0591)
Market value	-0.0000 (0.0000)	0.0000 (0.0000)	-0.0006 *** (0.0002)	-0.0006 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0590 (0.0371)	0.0536 (0.0369)	-1.2076 (0.8178)	-1.0994 (0.8869)
Free float <sub>(t-1)</sub>			-0.1439 (0.1641)	-0.1357 (0.1649)
<i>Inflation model</i>				
Constant	1.0319 *** (0.3959)	1.0429 *** (0.3957)		
No. observations	791	791	66	66
No. groups	146	146		
Year effects	yes	yes	no	no
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	no	no
R <sup>2</sup>	0.0810	0.0840	0.4023	0.4043
Prob > F			***	***
Prob > chi <sup>2</sup>	***	***		

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

The results of the analysis of the relation between *membership heterogeneity* and *corporate governance ranking* are presented in columns 3 and 4 of Table 22. Between *membership heterogeneity* and *corporate governance ranking*, a negative linear relation can be found. This means that higher degrees of *heterogeneity regarding the number of supervisory board memberships* lead to a better position in the *corporate governance ranking*. In both specifications – the linear and the non-linear – *market value* has again a significant negative relation with *corporate governance ranking*.<sup>26</sup>

<sup>26</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimations analyzing the effect of *heterogeneity regarding the number of memberships* on *corporate governance ranking*.

In accordance with the presented results, hypothesis 3, which predicts a positive effect of *heterogeneity regarding the number of supervisory board membership* on performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* but it cannot be rejected for the performance variable *corporate governance ranking*.

### 4.4.3.2.1.2 Demographic characteristics

#### **Gender**

The outcomes of the multivariate analysis of the relation between the explanatory variable *gender heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are displayed in Table 23. The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 23. The outputs of the Hausman test are significant in the specification when performance is measured by *ROA* (columns 1 and 2) but insignificant when performance is measured by *ROE* (columns 3 and 4), *PTBV* (columns 5 and 6) or *Tobin's Q* (columns 7 and 8). This means that in the specifications when the performance variable *ROA* is used only a fixed effects estimator provides consistent estimates. In the other specifications of Table 23 random and fixed effects estimators both provide consistent estimates but random effects estimators are more efficient. The test of strict exogeneity reveals that the heterogeneity variables are exogenous in all specifications. Therefore, a fixed effects estimator is applied when performance is measured by *ROA* and a random effects estimator is used when performance is measured by *ROE*, *PTBV* or *Tobin's Q*.

As shown in columns 1 and 2 of Table 23, no relation between *gender heterogeneity* and *ROA* can be found. Yet, the control variable *German standard* has – as before – a positive relation with *ROA* in both specifications.

Between *gender heterogeneity* and *ROE* a significant non-linear link can be found (columns 3 and 4). The course of the function is U-shaped with a global minimum at the heterogeneity level of approximately 0.4 and highest performance values for heterogeneity levels above 0.85. As previously, the control variables *German standard* and *market value* have a positive relation with *ROE* in both specifications and *board size* has a negative relation with *ROE* in the linear specification.

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**Table 23: Relation between *gender heterogeneity* and the performance variables *ROA, ROE, PTBV* and *Tobin's Q***

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
	FE	FE	RE	RE	RE	RE	RE	RE
Constant	3.4052 *	3.3331 *	13.7944 ***	13.5837 ***	3.7849 ***	3.7620 ***	2.2262 ***	2.2153 ***
	(1.9811)	(1.9058)	(4.4804)	(4.5014)	(0.6305)	(0.6233)	(0.2465)	(0.2471)
Het. gender <sub>(t-1)</sub>	-1.9241	-10.1324	-2.4669	-17.2222 *	0.1210	-1.1233	0.3136	-0.2021
	(2.8762)	(6.8409)	(3.1582)	(9.5097)	(0.4982)	(1.2332)	(0.2096)	(0.3616)
Het. gender <sub>(t-1)</sub> <sup>2</sup>		11.9557		20.6894 *		1.7533		0.7339
		(9.1662)		(12.0567)		(1.4069)		(0.5294)
German standard	1.2414 *	1.2856 *	3.3459 *	3.3863 *	0.3760	0.3804	-0.0085	-0.0059
	(0.7537)	(0.7600)	(1.9388)	(1.9368)	(0.2775)	(0.2776)	(0.1026)	(0.1025)
Market value	-0.0000	-0.0000	0.0001 **	0.0001 **	0.0000 **	0.0000 **	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Board size <sub>(t-1)</sub>	-0.2757	-0.2356	-0.3171 *	-0.2350	-0.1071 ***	-0.1000 ***	-0.0567 ***	-0.0538 ***
	(0.1880)	(0.1678)	(0.1673)	(0.1767)	(0.0235)	(0.0232)	(0.0138)	(0.0139)
No. observations	840	840	825	825	842	842	842	842
No. groups	151	151	151	151	151	151	151	151
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.0552	0.0593	0.0967	0.0936	0.1295	0.1262	0.1669	0.1657
Prob > F	***	***						
Prob > chi <sup>2</sup>			***	***	***	***	***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	***	***	***	***	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	***	***	ns	ns	ns	ns	ns	ns
<i>Test of strict exogeneity</i>								
Het. gender	ns	ns	ns	ns	ns	ns	ns	ns
Het. gender <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

*Gender heterogeneity* has no effect on *PTBV* (columns 5 and 6). However, as earlier discovered, the control variable *market value* has a positive and *board size* a negative relation with *PTBV* in the linear and the non-linear specification.

The effect of *gender heterogeneity* on *Tobin's Q* can be seen in the last two columns of Table 23. *Gender heterogeneity* has no effect on *Tobin's Q* but a negative relation between *board size* and *Tobin's Q* can be found again.

The results of the multivariate analysis of the relation between *gender heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking* are provided in Table 24.

Columns 1 and 2 of Table 24 present the results of the analysis of the effect of *gender heterogeneity* on the performance variable *number of interventions*. A linear negative effect of *gender heterogeneity* on *number of interventions* can be found. More precisely, when *gender heterogeneity* increases, the *number of interventions* within the time frame of analysis decreases. Looking at the results of the included control variables, as previously, a positive relation between *board size* and *number of interventions* can be observed in the linear and the non-linear specification of the analysis.

No relation between *gender heterogeneity* and *corporate governance ranking* can be found (columns 3 and 4). Yet, as in previous analyses, *market value* and *board size* have a negative relation with *corporate governance ranking* in the linear and the non-linear specification of the analysis.<sup>27</sup>

Recapitulating the presented results, *gender heterogeneity* has a U-shaped effect on *ROE* and a negative effect on the *number of interventions*. No relation between *gender heterogeneity* and the performance variables *ROA*, *PTBV*, *Tobin's Q* and *corporate governance ranking* can be found. Hence, hypothesis 4, stating a negative effect of *gender heterogeneity* on performance, must be rejected for the performance variables *ROA*, *PTBV*, *Tobin's Q* and *corporate governance ranking*. Hypothesis 4 cannot be rejected for values of *gender heterogeneity* between zero and 0.4 when performance is measured by *ROE* and it can also not be rejected when performance is measured by *number of interventions*.

However, it should be kept in mind when interpreting the results for the relation between *gender heterogeneity* and *number of interventions* that it is not clear if a large number of interventions is a sign of good performance.

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<sup>27</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimations analyzing the effect of *gender heterogeneity* on *corporate governance ranking*.

**Table 24: Relation between *gender heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking***

Dependent variable	No. interventions		Corporate governance ranking	
Method	ZIP		OLS	
Constant	-2.7603 *** (0.8197)	-2.7609 *** (0.8205)	87.1120 *** (15.7554)	86.1498 *** (16.1912)
Het. gender <sub>(t-1)</sub>	-1.1658 ** (0.4864)	-1.1972 (1.5962)	-11.5982 (12.0777)	9.7609 (33.3319)
Het. gender <sub>(t-1)</sub> <sup>2</sup>		0.0445 (2.1803)		-27.7566 (37.8624)
German standard			4.7268 (11.7729)	5.8929 (12.0039)
Market value	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0006 *** (0.0002)	-0.0006 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0806 ** (0.0338)	0.0808 ** (0.0354)	-1.3253 * (0.7339)	-1.4817 * (0.7894)
Free float <sub>(t-1)</sub>			-0.2010 (0.1499)	-0.1887 (0.1549)
<i>Inflation model</i>				
Constant	1.0032 *** (0.3918)	1.0027 *** (0.3932)		
No. observations	854	854	71	71
No. groups	151	151		
Year effects	yes	yes	no	no
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	no	no
R <sup>2</sup>	0.0870	0.0870	0.3976	0.4017
Prob > F			***	***
Prob > chi <sup>2</sup>	***	***		

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

## Nationality

Table 25 displays the results of the multivariate analysis of the relation between *nationality heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

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**Table 25: Relation between *nationality heterogeneity* and the performance variables *ROA, ROE, PTBV* and *Tobin's Q***

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
Method	RE	RE	Anderson/Hsiao	RE	RE	RE	RE	RE
Constant	3.9106 (3.4017)	3.6171 (3.5148)	5.1915 (6.1173)	2.6970 (9.2494)	3.8650 *** (1.0306)	3.9663 *** (1.0864)	1.6742 *** (0.3086)	1.7225 *** (0.3204)
Dependent variable <sub>(t-1)</sub>			0.7744 *** (0.2857)					
Het. nationality <sub>(t-1)</sub>	1.4388 (1.9240)	-2.6769 (9.8115)	-7.1277 (8.6336)	8.0142 (12.6698)	-0.1818 (0.6082)	1.2549 (2.5158)	0.0773 (0.3443)	0.7864 (1.2269)
Het. nationality <sub>(t-1)</sub> <sup>2</sup>		4.8461 (12.0899)		-3.1430 (15.2067)		-1.7127 (2.8827)		-0.8428 (1.4792)
German standard	4.8848 ** (2.3040)	4.8443 ** (2.3093)	17.5787 * (9.2349)	7.2462 * (3.7759)	1.3546 * (0.8328)	1.3505 (0.8333)	0.2573 (0.2801)	0.2568 (0.2791)
Market value	0.0002 *** (0.0000)	0.0002 *** (0.0001)	0.0006 (0.0009)	0.0003 *** (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 ** (0.0000)	0.0000 ** (0.0000)
Board size <sub>(t-1)</sub>	-0.5584 *** (0.1407)	-0.5249 *** (0.1583)	-3.0325 (3.2819)	-0.6350 ** (0.3003)	-0.1192 *** (0.0464)	-0.1315 *** (0.0524)	-0.1071 *** (0.0278)	-0.1128 *** (0.0294)
No. observations	252	252	157	249	252	252	252	252
No. groups	89	89	59	88	89	89	89	89
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.2348	0.2340		0.1849	0.1312	0.1338	0.1822	0.1835
Prob > F			ns					
Prob > chi <sup>2</sup>	***	***		***	***	***	***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	***	***	***	***	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	ns	ns	***	ns	ns	ns	ns	ns
<i>Test of strict exogeneity</i>								
Het. nationality	ns	ns	**	ns	ns	ns	ns	ns
Het. nationality <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

The outcomes of the Breusch and Pagan Lagrangian multiplier test of random effects are significant for all specifications of Table 25; therefore, OLS is invalid in all cases. The Hausman test shows that only a fixed effects estimator provides consistent estimates in the linear specification when performance is measured by *ROE* (column 3). Therefore, a fixed effects estimator should be applied. However, the test of strict exogeneity indicates that the heterogeneity variable is endogenous. Hence, in this case, an estimator according to ANDERSON/HSHIAO (1982) is applied and presented. For all other specifications the estimates provided by a random effects estimator are more efficient than the ones provided by a fixed effects estimator. Because the test of strict exogeneity reveals that no further method is necessary to control for endogeneity in these cases, random effects estimators are applied and displayed.

Between *nationality heterogeneity* and *ROA* no relation can be found, neither in the linear nor in the non-linear specification (columns 1 and 2). Yet, as before, the control variable *German standard* has a positive and *board size* a negative relation with *ROA*. Furthermore, *market value* has also a positive relation with *ROA*. This means that larger companies have a higher *ROA*.

Also, no effect of *nationality heterogeneity* on *ROE* can be found (columns 3 and 4). The relations of the included control variables with *ROE* remain the same to previously observed relations: *German standard* has a positive relation with *ROE* in the linear and the non-linear specification, *market value* has a positive relation with *ROE* in the non-linear specification and *board size* has a negative relation with *ROE* in the non-linear specification.

Between *nationality heterogeneity* and the performance measure *PTBV* no relation can be found. As before, *size of supervisory board* has a significant negative relation with *PTBV* in both specifications. Additionally, *German standard* has a significant positive relation with *PTBV* in the linear specification. This signifies that companies which apply the *German accounting standard* have a higher *PTBV*.

The effect of *nationality heterogeneity* on *Tobin's Q* is analyzed in columns 7 and 8 of Table 25. Neither in the linear specification nor in the non-linear specification a relation between *nationality heterogeneity* and *Tobin's Q* can be found. However, as seen before, *board size* has a negative relation with *Tobin's Q* in both specifications. Furthermore, the control variable *market value* has a positive relation with *Tobin's Q* meaning that larger companies have a higher *Tobin's Q*.



The results of the multivariate analysis of the relation between *nationality heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking* are shown in Table 26.

**Table 26: Relation between *nationality heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking***

Dependent variable	No. interventions		Corporate governance ranking	
Method	ZIP		OLS	
Constant	-4.7257 *** (1.1772)	-5.0285 *** (1.0748)	53.1996 (48.1187)	15.8854 (91.9013)
Het. nationality <sub>(t-1)</sub>	1.2035 (0.8746)	-3.3464 (2.8998)	39.1326 (36.0943)	-69.0753 (190.7638)
Het. nationality <sub>(t-1)</sub> <sup>2</sup>		4.9797 * (2.7758)		127.4035 (192.2878)
German standard			-36.9103 (27.5376)	-29.1081 (41.4978)
Market value	-0.0000 (0.0000)	-0.0000 (0.0000)	0.0006 (0.0006)	0.0007 (0.0008)
Board size <sub>(t-1)</sub>	0.2280 ** (0.0963)	0.2502 *** (0.0943)	-4.5600 ** (1.2433)	-3.6760 (1.6471)
Free float <sub>(t-1)</sub>			-0.1144 (0.5893)	0.0561 (0.9342)
<i>Inflation model</i>				
Constant	-14.7157 ** (6.1115)	-16.9547 *** (1.8497)		
No. observations	258	258	14	14
No. groups	92	92		
Year effects	yes	yes	no	no
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	no	no
R <sup>2</sup>	0.3540	0.3740	0.9137	0.9370
Prob > F			na °	na °
Prob > chi <sup>2</sup>	***	***		

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> is Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). ° The missing F model statistics are due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistics are significant (Prob > F: \*\*) in the linear specification and highly significant (Prob > F: \*\*\*) in the non-linear specification.

Source: Own compilation.

Between *nationality heterogeneity* and *number of interventions* a significant non-linear relation can be found (columns 1 and 2). The marginal effects evaluated at different values of nationality heterogeneity reveal that the function of the relation between *nationality heterogeneity* and *number of interventions* is concave up increasing in the relevant range of values. Looking at the integrated control variables, *board size* has again a positive relation with *number of interventions* meaning that larger supervisory boards intervene more often.

As can be seen in columns 3 and 4, no relation between *nationality heterogeneity* and *corporate governance ranking* can be found. Only the control variable *board size* has – as before – a negative relation with *corporate governance ranking*.<sup>28</sup>

The presented findings are ambiguous. *Nationality heterogeneity* has no relation with the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *corporate governance ranking*. The monotonously increasing link between *nationality heterogeneity* and *number of interventions* indicates that a rather high level of heterogeneity is best for the performance of the supervisory board. Hence, hypothesis 5, predicting a negative effect of *nationality heterogeneity* on performance, must be rejected.

Yet, it should be considered when interpreting the resulting relation between *nationality heterogeneity* and *number of interventions* that it is not clear if a large number of interventions is a sign of good performance.

Reason for the insignificant relations between *nationality heterogeneity* and performance when performance is measured by *ROA*, *ROE*, *PTBV*, *Tobin's Q* or *corporate governance ranking* could be due to the small number of observations and the categorization of nationality in only two categories – German and non-German.

### Age

Table 27 provides the findings of the multivariate analysis of the relation between *age heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*. The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 27. The outputs of the Hausman test indicate for all specifications except when the dependent variable is *Tobin's Q* that random and fixed effects estimators are consistent but that the random effects estimators are more efficient. In the case of *Tobin's Q*, only a fixed effects estimator provides consistent estimates according to the Hausman test. Testing for strict exogeneity shows that the heterogeneity variable is exogenous in all specifications. Therefore, the results of a random effects estimator are presented when performance is measured by *ROA* (columns 1 and 2), *ROE* (columns 3 and 4) and *PTBV* (columns 5 and 6) and a fixed effects estimator is applied when the performance variable *Tobin's Q* is used (columns 7 and 8).

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<sup>28</sup> The results qualitatively remain the same when the control variable *free float* is not included in the analysis of the effect of *nationality heterogeneity* on *corporate governance ranking*.

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**Table 27: Relation between *age heterogeneity* and the performance variables *ROA, ROE, PTBV* and *Tobin's Q***

Dependent variable	ROA		ROE		PTBV		Tobin's Q	
	RE	RE	RE	RE	RE	RE	FE	FE
Constant	-2.3707 (4.1751)	-5.3803 (8.4395)	-1.3699 (8.2583)	11.1956 (13.6082)	0.8611 (1.3172)	3.4429 (2.4401)	4.5888 *** (1.5342)	5.7999 *** (1.6130)
Het. age <sub>(t-1)</sub>	60.8417 *** (22.9618)	118.4618 (155.3085)	100.0571 *** (36.3246)	-149.3250 (248.8368)	12.4195 (12.3935)	-36.8248 (50.5401)	1.7156 (4.7733)	-19.6548 (18.4097)
Het. age <sub>(t-1)</sub> <sup>2</sup>		-239.8802 (605.8209)		1043.1740 (1014.2960)		206.1327 (245.6503)		90.9397 (83.6119)
German standard	3.9501 *** (1.6066)	3.8968 ** (1.6096)	9.1416 ** (4.1774)	9.5702 ** (4.1720)	1.4555 (1.3856)	1.4449 (1.3754)	0.1975 (0.3013)	0.1884 (0.2948)
Market value	0.0001 *** (0.0000)	0.0002 *** (0.0000)	0.0003 *** (0.0001)	0.0002 *** (0.0001)	0.0001 ** (0.0000)	0.0001 ** (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.5208 *** (0.1128)	-0.5325 *** (0.1187)	-0.6597 ** (0.2734)	-0.6093 ** (0.2898)	-0.1866 *** (0.0736)	-0.1784 *** (0.0679)	-0.3193 ** (0.1538)	-0.3245 ** (0.1518)
No. observations	237	237	237	237	237	237	237	237
No. groups	62	62	62	62	62	62	62	62
Year effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.1333	0.1343	0.1234	0.1283	0.2280	0.2190	0.1914	0.1955
Prob > F							***	***
Prob > chi <sup>2</sup>	***	***	***	***	***	***		
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>								
Prob > chi <sup>2</sup>	**	**	***	**	***	***	***	***
<i>Hausman Test</i>								
Prob > chi <sup>2</sup>	ns	ns	ns	ns	ns	ns	***	**
<i>Test of strict exogeneity</i>								
Het. age	ns	ns	ns	ns	ns	ns	ns	ns
Het. age <sup>2</sup>		ns		ns		ns		ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

A highly significant, positive relation between *age heterogeneity* and *ROA* can be observed (column 1). This signifies, the larger the degree of heterogeneity, the better the company performance measured by *ROA*. More precisely, if the *heterogeneity regarding age* rises by 0.1, *ROA* increases by 6.0842. As in previous cases, the control variables *German standard* and *market value* have a significant positive and *board size* a significant negative link with *ROA* in both models respectively.

Columns 3 and 4 of Table 27 present the results of the multivariate analysis of the effect of *age heterogeneity* on *ROE*. A linear positive effect of *age heterogeneity* on *ROE* can be found. Also, as before, *German standard* and *market value* have a positive and *size of supervisory board* a negative link with *ROE* in both specifications.

Between *age heterogeneity* and *PTBV* no relation can be found (columns 5 and 6). However, as previously found, the control variable *market value* has a significant positive and *board size* a significant negative relation with *PTBV*.

The effect of *age heterogeneity* on *Tobin's Q* can be seen in Columns 7 and 8 of Table 27. As in the case of the performance variable *PTBV*, no relation between *age heterogeneity* and *Tobin's Q* can be found. Yet, the control variable *board size* has – as before – a significant, negative link with *Tobin's Q*.

The findings of the multivariate analysis of the relation between *age heterogeneity* and the performance variable *corporate governance ranking* are displayed in Table 28. The relation between *age heterogeneity* and *number of interventions* cannot be analyzed because the observation number is too small.

Between *heterogeneity regarding age* and *corporate governance ranking* a significant non-linear relation can be found. The course of the function is hump-shaped with a global maximum at the heterogeneity value of approximately 0.15. Highest positions in the *corporate governance ranking* are observed for heterogeneity levels above 0.25. Thus, companies with a very heterogeneous supervisory board composition regarding age have the best positions in the *corporate governance ranking*. As before, the control variable *board size* has a significant, negative relation with *corporate governance ranking* in both models. Differently from prior analyses, the control variable *German standard* has a significant negative link with *corporate governance ranking* implying that companies which apply the *German accounting standards* have a better position in the *corporate governance ranking*.<sup>29</sup>

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<sup>29</sup> The results qualitatively remain the same when the control variable *free float* is not included in the analysis of the effect of *age heterogeneity* on *corporate governance ranking*.

**Table 28: Relation between *age heterogeneity* and the performance variable *corporate governance ranking***

Dependent variable	Corporate governance ranking	
Method	OLS	
Constant	50.9096 (36.5657)	-123.7256 * (65.4469)
Het. age <sub>(t-1)</sub>	9.9199 (266.9749)	3,110.4280 ** (1,250.6330)
Het. age <sub>(t-1)</sub> <sup>2</sup>		-12,319.6900 ** (5,179.8340)
German standard	-20.6257 (13.1657)	-12.0558 ** (4.4893)
Market value	-0.0000 (0.0003)	0.0004 (0.0002)
Board size <sub>(t-1)</sub>	-3.8553 *** (1.1034)	-4.6044 *** (0.5721)
Free float <sub>(t-1)</sub>	0.3862 (0.2275)	0.3186 (0.1798)
No. observations	20	20
Year effects	no	no
Industry effects	yes	yes
Firm effects	no	no
R <sup>2</sup>	0.8294	0.8971
Prob > F	***	***

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> is overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

The presented finding of the relation between *age heterogeneity* and performance are ambiguous. No significant relation between *age heterogeneity* and the performance measures *PTBV* and *Tobin's Q* can be observed. The relation between *age heterogeneity* and *ROA* as well as *ROE* is linear positive and the relation between *age heterogeneity* and *corporate governance ranking* is hump-shaped. Thus, hypothesis 6, which states a negative relation between *age heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions*. Yet, it cannot be rejected for values of *age heterogeneity* between zero and 0.15 when performance is measured by *corporate governance ranking*.

## 4.4.3.2.2 Moderating variables

## 4.4.3.2.2.1 Internationalization

**Occupational background**

Table 29 shows the findings of the analysis of the effect of the moderating variable *internationalization* (measured by *foreign sales to total sales*) on the relation between *occupational background heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

**Table 29: Moderating effect of the company's internationalization on the relation between occupational background heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	FE	RE	RE	RE
Constant	5.8943 (5.0401)	13.2658 ** (6.1816)	2.7768 *** (0.9570)	1.5813 *** (0.4684)
Het. occup. background <sub>(t-1)</sub>	-0.2686 (6.5346)	4.1295 (6.1700)	0.7247 (0.9500)	0.8108 (0.5845)
Foreign sales/total sales <sub>(t-1)</sub>	0.0196 (0.0869)	0.0306 (0.1041)	0.0070 (0.0239)	0.0068 (0.0134)
Het. occup. backgr <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-0.0884 (0.1035)	-0.0834 (0.1222)	-0.0171 (0.0270)	-0.0193 (0.0157)
German standard	0.5264 (0.6443)	3.7625 ** (1.6114)	0.4340 (0.2862)	0.0358 (0.0846)
Market value	0.0000 (0.0000)	0.0002 *** (0.0001)	0.0000 (0.0000)	0.0000 * (0.0000)
Board size <sub>(t-1)</sub>	-0.0002 (0.1965)	-0.3929 ** (0.1708)	-0.1087 *** (0.0395)	-0.0435 *** (0.0148)
No. observations	705	697	705	705
No. groups	135	135	135	135
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
R <sup>2</sup>	0.0462	0.1755	0.1481	0.1991
Prob > F	***			
Prob > chi <sup>2</sup>		***	***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. occup. background	ns	ns	ns	ns
Foreign sales/total sales	ns	ns	ns	ns
Het. occup. background x foreign sales/total sales	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 29. The result of the Hausman test indicates that the random and the fixed effects estimators are both consistent

but that the random effects estimator is more efficient in the specifications when performance is measured by *ROE* (column 2), *PTBV* (column 3) and *Tobin's Q* (column 4). When the performance variable *ROA* is used, only a fixed effects estimator provides consistent estimates (column 1). The test of strict exogeneity shows that the variable *occupational heterogeneity* as well as the variable *internationalization of the company* and the interaction variable are exogenous in all specifications. Therefore, a random effects estimator is applied when the performance variables *ROE*, *PTBV* and *Tobin's Q* are used and a fixed effects estimator is applied when performance is measured by *ROA*.

As can be seen in column 1 of Table 29, no moderating influence of *internationalization* on the relation between *occupational background heterogeneity* and *ROA* can be found. Also, none of the included control variables have a relation with *ROA*.

Also no moderating effect of *internationalization* on the relation between *occupational background heterogeneity* and performance can be observed when performance is measured by *ROE* (column 2). However, as previously observed, the control variables *German standard* and *market value* have a positive and *board size* a negative relation with *ROE*.

When performance is measured by *PTBV* (column 3), no moderating influence of *internationalization* can be found either. Only the control variable *board size* has – as in earlier analyses – a negative relation with *PTBV*.

In the last column of Table 29, performance is measured by *Tobin's Q*. As in the previous specifications, the variable *internationalization of the company* has no moderating effect on the relation between *occupational background heterogeneity* and performance. Yet, as before *market value* has a positive and *board size* a negative relation with *Tobin's Q*.

The results of the analysis of the moderating influence of *internationalization* on the effect of *occupational background heterogeneity* on the performance variables *number of interventions* and *position in the corporate governance ranking* are provided in Table 30.

*Internationalization* has no moderating effect on the relation between *occupational background heterogeneity* and the performance variable *number of interventions* (column 1). But as usual, *board size* has a positive relation with the *number of interventions*.

**Table 30: Moderating effect of the company's internationalization on the relation between occupational background heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate Governance ranking
Method	ZIP	OLS
Constant	-1.7507 (1.2009)	15.5932 (38.7797)
Het. occup. background <sub>(t-1)</sub>	-1.6103 (1.5228)	78.8675 * (41.6853)
Foreign sales/total sales <sub>(t-1)</sub>	-0.0021 (0.0311)	2.1460 ** (0.8957)
Het. occup. backgr. <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	0.0086 (0.0351)	-2.6137 *** (0.9809)
German standard		0.7307 (10.8818)
Market value	-0.0000 (0.0000)	-0.0005 ** (0.0002)
Board size <sub>(t-1)</sub>	0.1040 ** (0.0432)	-1.4308 (1.0004)
Free float <sub>(t-1)</sub>		-0.0764 (0.1580)
<i>Inflation model</i>		
Constant	0.9703 ** (0.4356)	
No. observations	708	61
No. groups	135	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0850	0.5125
Prob > F		na <sup>o</sup>
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). <sup>o</sup> The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is highly significant (Prob > F: \*\*\*).

Source: Own compilation.

A significant negative moderating effect of *internationalization* on the relation between *occupational background heterogeneity* and performance can be observed when performance is measured by *corporate governance ranking*. Because *corporate governance ranking* is an inverse measure of performance, this means that *internationalization* has a positive influence on the relation between *occupational background heterogeneity* and performance. As *occupational background heterogeneity* has a positive effect on the position in the *corporate governance ranking* when this relation is analyzed without the possible influence of a moderating variable (see section 4.4.3.2), this means that *internationalization* intensifies this positive effect. As



previously observed, the control variable *market value* has a significant negative relation with the performance variable *corporate governance ranking*.<sup>30</sup>

In sum, for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions*, no moderating effect of *internationalization* on the relation between *occupational background heterogeneity* and performance can be observed. When performance is measured by *corporate governance ranking*, a positive moderating influence can be found. Hence, hypothesis 7.1, which predicts a positive moderating effect of *internationalization* on the relation between *occupational background heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* but cannot be rejected for the performance variable *corporate governance ranking*.

### Tenure

The results of the analysis of the moderating effect of *internationalization* on the relation between *tenure heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are presented in Table 31.

The outputs of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid in all specifications of Table 31. The results of the Hausman test indicate that a random effects estimator is more efficient than a fixed effects estimator in the specifications when performance is measured by *ROE* (column 2), *PTBV* (column 3) or *Tobin's Q* (column 4). However, when performance is measured by *ROA* (column 1), only a fixed effects estimator provides consistent estimates according to the Hausman test. The test of strict exogeneity shows for the model when performance is measured by *ROA* that the interaction variable is endogenous and for the model when performance is measured by *ROE* that the heterogeneity variable and the interaction variable are endogenous. Therefore, the estimator according to ANDERSON/HIAO (1982) is applied in these cases. In the specifications with the dependent variables *PTBV* and *Tobin's Q*, all of the possibly endogenous variables are exogenous. Thus, in these cases, the random effects estimator can be applied and is presented.

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<sup>30</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimation analyzing the moderating effect of *internationalization* on the relation between *occupational background heterogeneity* and *corporate governance ranking*.

**Table 31: Moderating effect of the company's internationalization on the relation between tenure heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	Anderson/Hsiao	Anderson/Hsiao	RE	RE
Constant	-1.9501 ** (0.9403)	5.8069 * (3.0026)	3.6374 *** (0.9733)	2.6746 *** (0.4682)
Dependent variable <sub>(t-1)</sub>	0.6674 *** (0.2304)	0.7876 *** (0.1990)		
Het. tenure <sub>(t-1)</sub>	11.4552 * (6.5183)	16.6328 (15.7194)	-0.9528 (1.3165)	-0.3043 (0.7939)
Foreign sales/total sales <sub>(t-1)</sub>	0.0576 (0.0874)	-0.1030 (0.1925)	-0.0176 (0.0188)	-0.0080 (0.0096)
Het. tenure <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-0.2687 (0.1679)	-0.2493 (0.3229)	0.0487 (0.0471)	0.0007 (0.0189)
German standard	1.2116 (0.8361)	6.1945 * (3.6207)	0.3308 (0.2805)	0.0288 (0.1134)
Market value	0.0001 (0.0001)	0.0003 (0.0004)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	0.0590 (0.1818)	-0.1281 (0.4356)	-0.1090 *** (0.0410)	-0.0362 ** (0.0158)
No. observations	395	389	494	494
No. groups	90	88	98	98
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	yes	yes
R <sup>2</sup>			0.1360	0.1599
Prob > F	***	***		
Prob > chi <sup>2</sup>			***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. tenure	ns	**	ns	ns
Foreign sales/total sales	ns	ns	ns	ns
Het. tenure x foreign sales/total sales	*	**	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

*Internationalization* has no moderating influence on the relation between *tenure heterogeneity* and *ROA* (column 1). *Internationalization* has also no moderating influence on the relation between *tenure heterogeneity* and *ROE* (column 2). Of the included control variables, only *German standard* has – as before – a positive relation with *ROE*.

Furthermore, no moderating effect of *internationalization* on the relation between *tenure heterogeneity* and *PTBV* can be found. Yet, the control variable *board size* has – as usual – a negative relation with *PTBV*.

When performance is measured by *Tobin's Q* (column 4), *internationalization* has also no moderating influence on the relation between *tenure heterogeneity* and per-

formance. As before, the control variable *board size* has a negative relation with *Tobin's Q*.

Table 32 displays the findings of the moderating effect of *internationalization* on the relation between *tenure heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking*.

**Table 32: Moderating effect of the company's internationalization on the relation between tenure heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-1.9077 (1.6694)	16.8183 (41.8245)
Het. tenure <sub>(t-1)</sub>	-1.3721 (4.1850)	148.4636 (92.3473)
Foreign sales/total sales <sub>(t-1)</sub>	-0.0143 (0.0275)	1.2029 (0.7944)
Het. tenure <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	0.0382 (0.0646)	-2.9521 * (1.5942)
German standard		2.8439 (12.3297)
Market value	0.0000 (0.0000)	0.0001 (0.0003)
Board size <sub>(t-1)</sub>	0.0561 (0.0680)	-3.8221 *** (1.1799)
Free float <sub>(t-1)</sub>		0.2281 (0.1609)
<i>Inflation model</i>		
Constant	0.5527 (0.7387)	
No. observations	495	45
No. groups	98	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.1190	0.6326
Prob > F		na <sup>o</sup>
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). <sup>o</sup> The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is highly significant (Prob > F: \*\*\*).

Source: Own compilation.

No moderating influence can be observed when performance is measured by *number of interventions* (column 1). Also none of the other included variables has a relation with *number of interventions*.

However, a negative moderating effect of *internationalization* on the relation between *tenure heterogeneity* and *corporate governance ranking* can be found. Because *corporate governance ranking* is an inverse measure of performance, this means that *internationalization* has a positive influence on the relation between *tenure heterogeneity* and performance. Also, *board size* has again a negative relation with *corporate governance ranking* meaning larger supervisory boards have a better position in the *corporate governance ranking*.<sup>31</sup>

The presented findings regarding the moderating effect of *internationalization* on the relation between *tenure heterogeneity* and performance can be summarized as follows: No significant results can be observed for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions*. The finding for the performance variable *corporate governance ranking* shows that *internationalization* has a negative moderating effect on the relation between *tenure heterogeneity* and *corporate governance ranking*. Thus, hypothesis 7.2, stating a positive moderating effect of *internationalization* on the relation between *tenure heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* but cannot be rejected for the performance variable *corporate governance ranking*.

### **Number of supervisory board memberships**

The results of the analysis of the moderating effect of *internationalization* on the relation between *heterogeneity regarding the number of supervisory board memberships* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are shown in Table 33.

The Breusch and Pagan Lagrangian multiplier test for random effects shows that OLS is invalid for all specifications of Table 33. The outputs of the Hausman test indicate that in the specifications when performance is measured by *ROA* (column 1), *PTBV* (column 3) and *Tobin's Q* (column 4), random and fixed effects estimators provide both consistent estimates but that the random effects estimator is more efficient. Yet, when performance is measured by *ROE* (column 2), only a fixed effects estimator provides consistent estimates according to the Hausman test. The results of

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<sup>31</sup> When the control variable *free float* is not included in the estimation analyzing the moderating influence of *internationalization* on the relation between *tenure heterogeneity* and *corporate governance ranking*, the coefficient of the moderating variable becomes insignificant.

the test of strict exogeneity show that the variables heterogeneity, *internationalization* and the interaction variable are exogenous in all specifications. Therefore, a random effects estimator is provided when performance is measured by *ROA*, *PTBV* and *Tobin's Q* and a fixed effects estimator is used when performance is measured by *ROE*.

**Table 33: Moderating effect of the company's internationalization on the relation between heterogeneity regarding the number of supervisory board memberships and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	RE	FE	RE	RE
Constant	12.7247 *** (4.0907)	20.8615 *** (6.1978)	5.3038 *** (1.2561)	2.9889 *** (0.7134)
Het. no. memberships <sub>(t-1)</sub>	-11.2311 (7.0466)	-16.9529 (10.9940)	-2.2917 (2.1669)	-1.9685 (1.4566)
Foreign sales/total sales <sub>(t-1)</sub>	-0.1228 (0.1310)	-0.3687 ** (0.1684)	-0.0533 ** (0.0230)	-0.0309 *** (0.0119)
Het. no. memberships <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	0.2339 (0.2874)	0.5699 (0.3747)	0.1136 ** (0.0532)	0.0567 ** (0.0253)
German standard	0.4649 (0.6758)	1.8835 (2.1346)	0.3728 (0.2927)	0.0054 (0.0863)
Market value	0.0001 ** (0.0000)	0.0003 ** (0.0002)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.1847 * (0.0971)	-0.0029 (0.2083)	-0.1184 *** (0.0390)	-0.0414 *** (0.0142)
No. observations	664	656	664	664
No. groups	132	132	132	132
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
R <sup>2</sup>	0.1371	0.0596	0.1378	0.1843
Prob > F		***		
Prob > chi <sup>2</sup>	***		***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	***	ns	ns
<i>Test of strict exogeneity</i>				
Het. no. memberships	ns	ns	ns	ns
Foreign sales/total sales	ns	ns	ns	ns
Het. no. memberships x foreign sales/total sales	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

No moderating influence of *internationalization* on the relation between *heterogeneity regarding the number of supervisory board memberships* and *ROA* can be found (column 1). Yet, as before, the control variable *market value* has a positive and *board size* a negative relation with *ROA*.

Also, when performance is measured by *ROE* (column 2), no moderating effect of *internationalization* on the relation between *heterogeneity regarding the number of*

*supervisory board memberships* and performance can be observed. However, the control variable *market value* has – as previously – a positive relation with *ROE*.

In column 3 of Table 33, the moderating influence of *internationalization* on the relation between *membership heterogeneity* and *PTBV* is analyzed. Here, a positive moderating effect can be observed. Also, the control variable *board size* has, as earlier seen, a negative relation with *PTBV*.

Similar results can be seen when performance is measured by *Tobin's Q*. *Internationalization* has a positive moderating influence on the relation between *membership heterogeneity* and *Tobin's Q*. Furthermore, the control variable *board size* has a negative relation with *Tobin's Q*.

Table 34 provides the findings of the analysis of the moderating effect of *internationalization* on the relation between *heterogeneity regarding the number of supervisory board memberships* and the performance variables *number of interventions* and *corporate governance ranking*.

When performance is measured by the variable *number of interventions*, no moderating influence of *internationalization* can be found (column 1). Also, no other included variable has a relation with *number of interventions*.

Also no moderating effect of *internationalization* on the relation between heterogeneity and *corporate governance ranking* can be found (column 2). Only a significant negative relation between *market value* and *corporate governance ranking* and between *board size* and *corporate governance ranking* can be observed again.<sup>32</sup>

Concluding, hypothesis 7.3, predicting a positive moderating effect of *internationalization* on the relation between *membership heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *number of interventions* and *corporate governance ranking* but it cannot be rejected for the performance variables *PTBV* and *Tobin's Q*.

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<sup>32</sup> The result of the moderating effect of *internationalization* on the effect of *heterogeneity regarding the number of supervisory board memberships* on *corporate governance ranking* remains qualitatively the same when the control variable *free float* is not included in the analysis.

**Table 34: Moderating effect of the company's internationalization on the relation between heterogeneity regarding the number of supervisory board memberships and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-5.4667 ** (2.7805)	187.6873 *** (63.0110)
Het. no. memberships <sub>(t-1)</sub>	6.8138 (5.9602)	-179.0238 (144.3579)
Foreign sales/total sales <sub>(t-1)</sub>	0.0285 (0.0438)	-1.0890 (1.1983)
Het. no. memberships <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-0.0598 (0.0918)	1.6463 (2.6990)
German standard		0.0879 (11.0872)
Market value	0.0000 (0.0000)	-0.0003 * (0.0002)
Board size <sub>(t-1)</sub>	0.0554 (0.0467)	-1.8442 ** (0.8507)
Free float <sub>(t-1)</sub>		-0.1364 (0.1637)
<i>Inflation model</i>		
Constant	0.9215 ** (0.4755)	
No. observations	667	58
No. groups	132	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0850	0.5075
Prob > F		na <sup>o</sup>
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). <sup>o</sup> The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is highly significant (Prob > F: \*\*\*).

Source: Own compilation.

## Gender

The findings of the analysis of the moderating effect of *internationalization* on the relation between *gender heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are presented in Table 35.

The outputs of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 35. The results of the Hausman test indicate that in the specifications when performance is measured by *ROE* (column 2) and *PTBV* (column 3), random and fixed effects estimators are both consistent but that the random effects estimator is more efficient. When performance is

measured by *ROA* (column 1) or *Tobin's Q* (column 4), only a fixed effects estimator provides consistent estimates. The test of strict exogeneity shows that the heterogeneity variable is endogenous in the specifications explaining *ROA* and *PTBV*. Therefore, when performance is measured by *ROA* or *PTBV*, the estimator according to ANDERSON/HIAO (1982) is applied; when performance is measured by *ROE*, a random effects estimator is presented and in the case of *Tobin's Q* a fixed effects estimator is used.

**Table 35: Moderating effect of the company's internationalization on the relation between gender heterogeneity and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q***

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	Anderson/Hsiao	RE	Anderson/Hsiao	FE
Constant	-1.2393 (0.7585)	17.6943 *** (4.7495)	0.0764 (0.2301)	1.7323 *** (0.2359)
Dependent variable <sub>(t-1)</sub>	0.5698 *** (0.1730)		0.4744 *** (0.0844)	
Het. gender <sub>(t-1)</sub>	-7.3213 (4.7264)	-6.0216 (6.1162)	0.8305 (0.7485)	0.0152 (0.3589)
Foreign sales/total sales <sub>(t-1)</sub>	-0.0897 *** (0.0346)	-0.0742 * (0.0430)	0.0031 (0.0078)	-0.0123 *** (0.0043)
Het. gender <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	0.2371 * (0.1262)	0.1676 (0.1173)	-0.0277 (0.0205)	0.0046 (0.0061)
German standard	1.6718 *** (0.6162)	4.0623 *** (1.6572)	1.0120 (0.6273)	0.0414 (0.0989)
Market value	0.0001 (0.0001)	0.0002 *** (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.0034 (0.2065)	-0.3525 ** (0.1662)	-0.0424 (0.1036)	0.0041 (0.0142)
No. observations	569	697	565	705
No. groups	127	135	125	135
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	cluster	yes	yes	yes
R <sup>2</sup>		0.1796		0.1327
Prob > F	***		***	***
Prob > chi <sup>2</sup>		***		
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	ns	ns	***
<i>Test of strict exogeneity</i>				
Het. gender	**	ns	*	ns
Foreign sales/total sales	ns	ns	ns	ns
Het. gender x foreign sales/total sales	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/HIAO (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

When performance is measured by *ROA* (column 1), *internationalization* has a positive moderating effect on the relation between *gender heterogeneity* and perform-



ance. Also, the control variable *German standard* has – as before – a positive relation with *ROA*.

*Internationalization* has no moderating influence on the relation between *gender heterogeneity* and performance when performance is measured by *ROE* (column 2). However, as previously observed, the control variables *German standard* and *market value* have a positive and the control variable *board size* a negative relation with *ROE*.

No moderating effect of *internationalization* can be found when performance is measured by *PTBV* (column 3) or *Tobin's Q* (column 4). Also, none of the included control variables have a significant relation with *PTBV* or *Tobin's Q*.

Table 36 displays the results of the analysis of the moderating effect of *internationalization* on the relation between *gender heterogeneity* and the performance variables *number of interventions* (column 1) and *corporate governance ranking* (column 2).

When performance is measured by the variable *number of interventions* (column 1), a negative moderating influence of *internationalization* on the relation between *gender heterogeneity* and performance can be observed. Furthermore, the control variable *board size* has – as previously found – a positive relation with performance measured by *number of interventions*.

No moderating effect of *internationalization* can be found when performance is measured by the variable *corporate governance ranking*. However, as in earlier cases, the control variable *board size* has a negative relation with *corporate governance ranking*.<sup>33</sup>

Hypothesis 7.4, which states a positive moderating effect of *internationalization* on the relation between *gender heterogeneity* and performance, must be rejected for the performance variables *ROE*, *PTBV*, *Tobin's Q*, *number of interventions* and *corporate governance ranking* but it cannot be rejected for the performance variable *ROA*. However, when interpreting the moderating effect of *internationalization* on the relation between *gender heterogeneity* and *number of interventions*, it should be kept in mind that it is not clear if a large number of interventions is a sign of good performance.

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<sup>33</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimation analyzing the moderating influence of *internationalization* on the relation between *gender heterogeneity* and *corporate governance ranking*.

**Table 36: Moderating effect of the company's internationalization on the relation between gender heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-2.9273 ** (1.2096)	110.1318 *** (20.8813)
Het. gender <sub>(t-1)</sub>	0.3230 (1.0758)	-3.5060 (26.0113)
Foreign sales/total sales <sub>(t-1)</sub>	0.0076 (0.0100)	-0.2344 (0.2421)
Het. gender <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-0.0342 * (0.0193)	-0.3991 (0.4765)
German standard		-1.4248 (10.3984)
Market value	-0.0000 (0.0000)	-0.0003 (0.0002)
Board size <sub>(t-1)</sub>	0.0895 ** (0.0444)	-1.6545 ** (0.7324)
Free float <sub>(t-1)</sub>		-0.2043 (0.1571)
<i>Inflation model</i>		
Constant	0.7998 (0.5159)	
No. observations	708	61
No. groups	135	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0970	0.5008
Prob > F		na °
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). ° The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is highly significant (Prob > F: \*\*\*).

Source: Own compilation.

## Nationality

Table 37 shows the results of the analysis of the moderating effect of *internationalization* on the relation between *nationality heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

The Breusch and Pagan Lagrangian multiplier test for random effects shows that OLS is invalid for all specifications of Table 37. The Hausman test indicates that in the specifications when performance is measured by *ROA* (column 1), *ROE* (column 2) and *Tobin's Q* (column 4), random and fixed effects estimators are both consistent but that the random effects estimator is more efficient. Yet, when performance is

measured by *PTBV* (column 3), only a fixed effects estimator provides consistent estimates. The test of strict exogeneity reveals that the heterogeneity variable is endogenous in the specification when performance is measured by *ROE* and that the interaction variable is endogenous when *Tobin's Q* is used as performance variable. Thus, when performance is measured by *ROE* or *Tobin's Q*, the estimator according to ANDERSON/Hsiao (1982) is applied, when performance is measured by *ROA*, a random effects estimator is presented and in the case of *PTBV* a fixed effects estimator is applied.

**Table 37: Moderating effect of the company's internationalization on the relation between nationality heterogeneity and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q***

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	RE	Anderson/Hsiao	FE	Anderson/Hsiao
Constant	8.2987 ** (3.7449)	8.0149 (5.2944)	6.2226 *** (2.1483)	0.0518 (0.2013)
Dependent variable <sub>(t-1)</sub>		1.0257 ** (0.4872)		0.3064 * (0.1791)
Het. nationality <sub>(t-1)</sub>	-1.8912 (3.6549)	-16.4295 (12.9113)	-1.0836 (1.6903)	0.0099 (0.5339)
Foreign sales/total sales <sub>(t-1)</sub>	-0.0107 (0.0403)	-0.0033 (0.2297)	-0.0081 (0.0570)	-0.0107 (0.0080)
Het. nationality <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	0.0402 (0.0925)	0.0901 (0.2522)	-0.0586 ** (0.0281)	-0.0151 (0.0134)
German standard	0.4020 (1.6661)	15.9714 (9.9084)	0.2948 (0.8254)	0.2114 (0.2631)
Market value	0.0001 *** (0.0001)	0.0010 (0.0012)	0.0001 * (0.0001)	0.0000 * (0.0000)
Board size <sub>(t-1)</sub>	-0.3777 ** (0.1633)	-0.3638 (1.7898)	-0.0699 (0.1240)	0.0997 (0.0792)
No. observations	220	136	220	137
No. groups	81	53	81	53
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	cluster	yes	cluster
R <sup>2</sup>	0.1447		0.1796	
Prob > F		ns	*	***
Prob > chi <sup>2</sup>	**			
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	ns	***	ns
<i>Test of strict exogeneity</i>				
Het. nationality	ns	*	ns	ns
Foreign sales/total sales	ns	ns	ns	ns
Het. nationality x foreign sales/total sales	ns	ns	ns	*

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

Column 1 of Table 37 provides the result of the analysis of the moderating influence of *internationalization* on the relation between *nationality heterogeneity* and *ROA*. No moderating effect can be found in this model. However, as before, the control variable *market value* has a positive and the control variable *board size* a negative link with *ROA*.

Also no moderating influence of *internationalization* on the relation between *nationality heterogeneity* and performance can be observed when performance is measured by *ROE* (column 2).

Yet, when performance is measured by *PTBV* (column 3), *internationalization* has a negative moderating effect on the relation between *nationality heterogeneity* and performance. Also, *market value* has – as previously – a positive relation with *PTBV*. Column 4 of Table 37 presents the outcome of the analysis of the moderating influence of *internationalization* on the relation between *nationality heterogeneity* and *Tobin's Q*. In this model, no moderating effect of *internationalization* can be found. As usual, the control variable *market value* has a positive link with *Tobin's Q*.

Table 38 displays the results of the analysis of the moderating influence of *internationalization* on the relation between *nationality heterogeneity* and the performance variable *number of interventions*. The effect of *internationalization* on the relation between *nationality heterogeneity* and *corporate governance ranking* cannot be analyzed because of too few observations.<sup>34</sup> No moderating influence of *internationalization* can be observed when performance is measured *number of interventions*. Also, none of the included control variables have a significant relation with *number of interventions*.

In sum, hypothesis 7.5, predicting a positive moderating effect of *internationalization* on the relation between *nationality heterogeneity* and performance, must be rejected for all performance variables.

This result seems especially surprising as one would expect the moderating effect of *internationalization* to particularly have a significant effect on the relation between *nationality heterogeneity* and performance. However, the missing significant results might be due to the low number of observations and the categorization of nationality into only the two categories German and non-German.

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<sup>34</sup> The observation number is also too small for the analysis without the control variable *free float*.

**Table 38: Moderating effect of the *company's internationalization* on the relation between *nationality heterogeneity* and the performance variable *number of interventions***

Dependent variable	No. interventions
Method	ZIP
Constant	-19.4731 *** (1.0726)
Het. nationality <sub>(t-1)</sub>	1.9471 (1.7276)
Foreign sales/total sales <sub>(t-1)</sub>	0.0082 (0.0184)
Het. nationality <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-0.0230 (0.0320)
Market value	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	0.1296 (0.0946)
<i>Inflation model</i>	
Constant	-0.8799 (1.3343)
No. observations	222
No. groups	82
Year effects	yes
Industry effects	yes
Firm effects	cluster
R <sup>2</sup>	0.3470
Prob > chi <sup>2</sup>	***

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. The regression includes a constant. The reported R<sup>2</sup> is Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression).

Source: Own compilation.

## Age

The findings of the analysis of the moderating effect of *internationalization* on the relation between *age heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are shown in Table 39.

The outcomes of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 39. The results of the Hausman test indicate that in all specifications random and fixed effects estimators are both consistent but that the random effects estimator is more efficient. The test of strict exogeneity reveals that the heterogeneity variable is endogenous in the specifications including *ROA* and *ROE*. Thus, when performance is measured by *ROA* or *ROE*, the estimator according to ANDERSON/Hsiao (1982) is applied, when performance is measured by *PTBV* or *Tobin's Q*, a random effects estimator is used.

**Table 39: Moderating effect of the company's internationalization on the relation between age heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	Anderson/Hsiao	Anderson/Hsiao	RE	RE
Constant	1.3139 (3.4808)	2.7447 (8.3567)	1.7466 (2.1885)	1.2340 (0.8173)
Dependent variable <sub>(t-1)</sub>	1.1095 ** (0.5044)	1.7688 * (1.0117)		
Het. age <sub>(t-1)</sub>	-15.4165 (32.4988)	-67.0416 (119.3771)	27.9480 (18.8438)	4.6330 (6.6456)
Foreign sales/total sales <sub>(t-1)</sub>	-0.3577 * (0.2119)	-0.8964 (0.5932)	0.0699 (0.0459)	-0.0032 (0.0185)
Het. age <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	1.9778 (1.2609)	6.4605 (4.4191)	-0.5687 (0.3546)	-0.0127 (0.1451)
German standard	2.7150 (2.1011)	15.0928 (11.9401)	-0.2391 (0.7971)	-0.1386 (0.2853)
Market value	-0.0000 (0.0001)	-0.0006 (0.0006)	0.0000 * (0.0000)	0.0000 *** (0.0000)
Board size <sub>(t-1)</sub>	-0.1505 (0.5262)	-0.9698 (1.8848)	-0.1910 ** (0.0840)	-0.0786 *** (0.0297)
No. observations	151	151	209	209
No. groups	48	48	58	58
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	cluster	cluster	yes	yes
R <sup>2</sup>			0.1661	0.2369
Prob > F	ns	ns		
Prob > chi <sup>2</sup>			***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. age	*	*	ns	ns
Foreign sales/total sales	*	ns	ns	ns
Het. age x foreign sales/total sales	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

No moderating effect of *internationalization* on the relation between *age heterogeneity* and *ROA* can be found (column 1). Also no moderating influence of *internationalization* can be observed when performance is measured by *ROE* (column 2). In these models, none of the included controls have a significant link with *ROA* or *ROE*. When performance is measured by *PTBV* (column 3), no moderating effect of *internationalization* on the relation between *age heterogeneity* and performance can be found. Yet, as usual the control variable *market value* has a positive and *board size* a negative relation with *PTBV*.

Similar results can be seen when performance is measured by *Tobin's Q* (column 4). *Internationalization* has no moderating influence on the relation between *age heterogeneity* and *Tobin's Q* but, as before, *market value* has a positive and *board size* a negative link with *Tobin's Q*.

The results of the moderating effect of *internationalization* on the relation between *age heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking* are provided in Table 40.

**Table 40: Moderating effect of the company's internationalization on the relation between age heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-46.5347 *** (13.3520)	203.6156 ** (61.6548)
Het. age <sub>(t-1)</sub>	165.6032 ** (73.9691)	-1,147.7780 * (556.3710)
Foreign sales/total sales <sub>(t-1)</sub>	0.3309 ** (0.1541)	-2.8113 * (1.1895)
Het. age <sub>(t-1)</sub> x foreign sales/total sales <sub>(t-1)</sub>	-2.2961 ** (1.0631)	17.5131 (9.0829)
German standard		-3.0706 (8.7287)
Market value	0.0000 (0.0000)	-0.0001 (0.0003)
Board size <sub>(t-1)</sub>	0.1823 (0.1369)	-1.0212 (1.1402)
Free float <sub>(t-1)</sub>		0.2644 (0.2359)
<i>Inflation model</i>		
Constant	-20.6897 *** (1.0437)	
No. observations	209	18
No. groups	58	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.4520	0.9250
Prob > F		***
Prob > chi <sup>2</sup>	na <sup>■</sup>	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). <sup>■</sup> The missing chi<sup>2</sup> model statistic is due to the number of non-zero observations which is too low for the analysis (n<sub>non-zero</sub>=12).

Source: Own compilation.

When performance is measured by the variable *number of interventions* (column 1), a negative moderating effect of *internationalization* on the relation between *age heterogeneity* and *number of interventions* can be observed.<sup>35</sup> In contrast, no moderating effect of *internationalization* on the relation between *age heterogeneity* and performance can be found when performance is measured by *corporate governance ranking* (column 2).<sup>36</sup> In both models, the included control variables have no link with the respective performance variable.

In conclusion, hypothesis 7.6, stating a positive moderating effect of *internationalization* on the relation between *age heterogeneity* and performance, must be rejected for all performance variables.

Reason for the missing significant findings could be the low number of observations and the small range of *age heterogeneity* in the sample.

### 4.4.3.2.2 Innovativeness

#### **Occupational background**

Table 41 displays the results of the analysis of the moderating influence of the *company's innovativeness* (measured by *intangible to totals assets*) on the relation between *occupational background heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

The Breusch and Pagan Lagrangian multiplier test for random effects shows that OLS is invalid for all specifications of Table 41. The outputs of the Hausman test indicate for all specifications except when *ROA* is the dependent variable (column 1) that a random and fixed effects estimators are both consistent but that the random effects estimator is more efficient. In the case of the dependent variable *ROA*, only a fixed effects estimator provides consistent estimates. The test of strict exogeneity shows that the variable *innovativeness* is endogenous in the specification including *PTBV*. Hence, when performance is measured by *PTBV*, the estimator according to ANDERSON/HIAO (1982) is applied, when performance is measured by *ROA*, a fixed effects estimator is applied and in the other specifications a random effects estimator is used.

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<sup>35</sup> It should be kept in mind when interpreting this result that it is not clear if a large number of interventions is a sign of good performance.

<sup>36</sup> The moderating effect of *internationalization* on the relation between *age heterogeneity* and *corporate governance ranking* qualitatively remains the same when the control variable *free float* is not included in the estimation.



No effect of the moderating variable on the relation between *occupational background heterogeneity* and *ROA* can be found (column 1). However, the control variable *German standard* has – as in previous analyses – a positive relation with *ROA*. When performance is measured by *ROE* (column 2), *innovativeness* has no moderating influence on the relation between *occupational background heterogeneity* and performance either. Of the included control variables, *German standard* and *market value* have, as before, a positive significant link with *ROE*.

**Table 41: Moderating effect of the company's innovativeness on the relation between occupational background heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	FE	RE	Anderson/Hsiao	RE
Constant	16.9989 *** (4.6842)	20.0537 *** (5.5633)	-0.1804 (0.1573)	2.5997 *** (0.5257)
Dependent variable <sub>(t-1)</sub>			0.5356 *** (0.0543)	
Het. occup. background <sub>(t-1)</sub>	-12.9412 *** (4.9841)	-10.3085 ** (4.8351)	2.9853 *** (0.8332)	-0.0001 (0.5890)
Intangibles/total assets <sub>(t-1)</sub>	-0.1510 (0.2405)	-0.1391 (0.2238)	0.0257 (0.0326)	-0.0137 (0.0273)
Het. occup. backgr <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	-0.0265 (0.2900)	0.0070 (0.3087)	-0.0465 (0.0311)	0.0055 (0.0335)
German standard	1.2580 * (0.7663)	3.2857 * (1.9848)	0.5805 (0.6136)	-0.0172 (0.1076)
Market value	-0.0000 (0.0001)	0.0001 ** (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.0080 (0.2245)	-0.1868 (0.1928)	-0.0977 (0.0971)	-0.0551 *** (0.0144)
No. observations	828	813	672	830
No. groups	150	150	142	150
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	cluster	yes
R <sup>2</sup>	0.1012	0.0958		0.1643
Prob > F	***		***	
Prob > chi <sup>2</sup>		***		***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. occup. background	ns	ns	ns	ns
Intangibles/total assets	ns	ns	*	ns
Het. occup. background x intangibles/total assets	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

Column 3 of Table 41 shows the result of the analysis of the moderating effect of *innovativeness* on the relation between *occupational background heterogeneity* and *PTBV*. *Innovativeness* has no moderating influence in this model. Also, no moderat-

ing influence of *innovativeness* on the relation between *occupational background heterogeneity* and performance can be found when performance is measured by *Tobin's Q* (column 4). However, as usual, the control variable *board size* has a negative relation with *Tobin's Q*.

The results of the analysis of the moderating influence of *innovativeness* on the relation between *occupational background heterogeneity* and the performance measured by the *number of interventions* and *corporate governance ranking* are provided in Table 42.

**Table 42: Moderating effect of the company's innovativeness on the relation between occupational background heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate Governance ranking
Method	ZIP	OLS
Constant	-1.5775 (1.3202)	121.6249 *** (25.2774)
Het. occup. background <sub>(t-1)</sub>	-0.7121 (1.4115)	-56.3616 * (29.4861)
Intangibles/total assets <sub>(t-1)</sub>	-0.0135 (0.0525)	-0.4063 (1.3079)
Het. occup. backgr. <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.0297 (0.0578)	0.4761 (1.5468)
German standard		8.3735 (11.1862)
Market value	-0.0000 (0.0000)	-0.0007 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0718 ** (0.0344)	-0.5621 (0.9411)
Free float <sub>(t-1)</sub>		-0.1998 (0.1487)
<i>Inflation model</i>		
Constant	1.0602 *** (0.3622)	
No. observations	840	71
No. groups	150	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0780	0.4295
Prob > F		***
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

No effect of the moderating variable on the relation between *occupational background heterogeneity* and performance measured by *number of interventions* can be

observed (column 1). Yet, *board size* has, as previously, a positive relation with *number of interventions*.

When performance is measured by the variable *corporate governance ranking* (column 2), no moderating influence of *innovativeness* can be found. As before, the control variable *market value* has a negative relation with *corporate governance ranking*.<sup>37</sup>

Concluding, hypothesis 8.1, predicting a positive effect of the moderating variable *innovativeness* on the relation between *occupational background heterogeneity* and performance, must be rejected for all performance variables.

### Tenure

The findings of the analysis of the moderating influence of *innovativeness* on the relation between *heterogeneity regarding supervisory board tenure* and performance measured by *ROA*, *ROE*, *PTBV* and *Tobin's Q* can be seen in Table 43.

The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 43 and the outputs auf the Hausman test reveal that both the random and the fixed effects estimators are consistent but that the random effects estimator is more efficient when measuring performance by *ROE*, *PTBV* and *Tobin's Q*. Yet, when performance is measured by *ROA*, only the fixed effects estimator provides consistent estimates. The test of strict exogeneity shows for the model using *PTBV* that the variable *innovativeness* is endogenous. Thus, in the model including *ROA*, a fixed effects estimator is provided, when performance is measured by *ROE* and *Tobin's Q*, a random effects estimator is used and in the case of *PTBV* an estimator according to ANDERSON/HSIAO (1982) is applied.

When performance is measured by *ROA* (column 1), no significant moderating influence of *innovativeness* on the relation between *tenure heterogeneity* and performance can be found. Also no moderating effect of *innovativeness* on the relation between *tenure heterogeneity* and performance can be observed when performance is measured by *ROE* (column 2). Of the included control variables, *market value* has a positive and *board size* a negative link with *ROE* as in earlier cases.

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<sup>37</sup> The results of the estimation analyzing the influence of the moderating variable *innovativeness* on the relation between *occupational background heterogeneity* and *corporate governance ranking* qualitatively remain the same when the control variable *free float* is not included in the estimation.

**Table 43: Moderating effect of the company's innovativeness on the relation between tenure heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	FE	RE	Anderson/Hsiao	RE
Constant	10.8403 *** (3.4369)	17.3249 *** (5.4914)	-0.2755 * (0.1512)	1.9767 *** (0.3055)
Dependent variable <sub>(t-1)</sub>			0.4672 *** (0.0818)	
Het. tenure <sub>(t-1)</sub>	-4.2388 (7.9868)	-9.8460 (6.2976)	0.6637 (2.5501)	-0.1846 (0.4618)
Intangibles/total assets <sub>(t-1)</sub>	-0.3245 ** (0.1477)	-0.2872 ** (0.1233)	-0.0046 (0.0369)	-0.0087 (0.0076)
Het. tenure <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.4449 (0.3576)	0.5244 (0.3649)	0.0123 (0.0750)	0.0018 (0.0184)
German standard	0.1727 (1.0266)	1.2170 (2.5828)	0.2586 (0.2323)	0.0422 (0.1025)
Market value	-0.0001 (0.0001)	0.0002 *** (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.1534 (0.2271)	-0.3891 * (0.2123)	0.0457 (0.0596)	-0.0500 *** (0.0168)
No. observations	587	578	471	588
No. groups	111	111	103	111
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
R <sup>2</sup>	0.0955	0.1791		0.1808
Prob > F	***		***	
Prob > chi <sup>2</sup>		***		***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. tenure	ns	ns	ns	ns
Intangibles/total assets	ns	ns	**	ns
Het. tenure x intangibles/total assets	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

When the performance variables *PTBV* (column 3) or *Tobin's Q* (column 4) are used, no moderating influence of *innovativeness* can be found. However, in the latter model, the control variable *board size* has, as usual, a negative link with *Tobin's Q*.

Table 44 presents the results of the analysis of the moderating effect of *innovativeness* on the relation between *tenure heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking*.

When performance is measured by the *number of interventions* (column 1), no moderating influence of *innovativeness* on the relation between *tenure heterogeneity* and performance can be found. However, a negative moderating effect of *innovativeness* on the relation between *tenure heterogeneity* and performance can be observed when

performance is measured by *corporate governance ranking* (column 2). Because *corporate governance ranking* is an inverse measure of performance, this means that the *innovativeness* influences positively the effect of heterogeneity on performance.<sup>38</sup> Furthermore, the control variable *board size* has, as in previous analyses, a negative relation with *corporate governance ranking*.

**Table 44: Moderating effect of the company's innovativeness on the relation between tenure heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-2.4110 ** (1.1070)	61.6051 ** (27.4820)
Het. tenure <sub>(t-1)</sub>	1.0127 (2.3355)	58.1126 (53.7709)
Intangibles/total assets <sub>(t-1)</sub>	0.0363 (0.0281)	1.1816 (0.9115)
Het. tenure <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	-0.0809 (0.0758)	-3.8263 * (2.1586)
German standard		5.7926 (17.2304)
Market value	0.0000 (0.0000)	-0.0004 (0.0003)
Board size <sub>(t-1)</sub>	0.0505 (0.0469)	-2.6719 ** (1.1048)
Free float <sub>(t-1)</sub>		-0.0047 (0.2333)
<i>Inflation model</i>		
Constant	0.9021 * (0.5045)	
No. observations	594	52
No. groups	111	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0900	0.4938
Prob > F		na °
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). ° The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is highly significant (Prob > F: \*\*\*).

Source: Own compilation.

<sup>38</sup> When the control variable *free float* is not included in the regression analyzing the influence of the moderating variable *innovativeness* on the relation between *tenure heterogeneity* and *corporate governance ranking*, the coefficient of the moderating variable becomes insignificant.

In sum, hypothesis 8.2, stating a positive moderating effect of the *company's innovativeness* on the relation between *tenure heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *PTBV*, *Tobin's Q* and *number of interventions* but it cannot be rejected for the performance variable *corporate governance ranking*.

### Number of supervisory board memberships

Table 45 displays the results of the analysis of the moderating influence of *innovativeness* on the relation between *heterogeneity regarding the number of memberships* and performance measured by *ROA*, *ROE*, *PTBV* and *Tobin's Q*.

**Table 45: Moderating effect of the *company's innovativeness* on the relation between *heterogeneity regarding the number of memberships* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q***

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	RE	RE	RE	Anderson/Hsiao
Constant	14.0081 *** (4.6189)	24.3610 *** (6.1673)	4.3515 *** (0.8247)	0.0950 (0.0794)
Dependent variable <sub>(t-1)</sub>				0.0212 (0.2288)
Het. no. memberships <sub>(t-1)</sub>	-10.7385 (10.5374)	-7.2894 (8.9187)	-0.7418 (1.5775)	-0.6646 (0.9700)
Intangibles/total assets <sub>(t-1)</sub>	-0.0150 (0.1202)	-0.1816 (0.1678)	-0.0270 (0.0233)	-0.0110 (0.0190)
Het. no. memberships <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	-0.2247 (0.3227)	0.1158 (0.4340)	0.0162 (0.0529)	0.0417 (0.0282)
German standard	0.6804 (0.7728)	2.3409 (2.0979)	0.4051 (0.2923)	0.0939 (0.0728)
Market value	0.0000 (0.0000)	0.0002 ** (0.0001)	0.0000 * (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.1507 (0.0995)	-0.3993 *** (0.1591)	-0.1109 *** (0.0305)	0.0179 (0.0178)
No. observations	768	754	769	617
No. groups	145	145	145	138
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	cluster
R <sup>2</sup>	0.0776	0.0903	0.1276	
Prob > F				***
Prob > chi <sup>2</sup>	***	***	***	
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. no. memberships	ns	ns	ns	ns
Intangibles/total assets	ns	ns	ns	ns
Het. no. memberships x intangibles/total assets	ns	ns	ns	**

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

The output of the Breusch and Pagan Lagrangian multiplier test for random effects reveals that OLS is invalid for all specifications of Table 45. The results of the Hausman test show that the random and the fixed effects estimators are both consistent but that the random effects estimator is more efficient for all specifications of Table 45. The test of strict exogeneity shows that the endogeneity concern has been resolved in all specifications except when performance is measured by *Tobin's Q* (column 4). Thus, in this case an estimator according to ANDERSON/HSHIAO (1982) is applied. In the remaining specifications, a random effects estimator is used.

*Innovativeness* has no moderating influence on the relation between *heterogeneity regarding the number of memberships* and *ROA* (column 1). It has also no moderating effect when performance is measured by *ROE* (column 2). In the latter model, the control variable *market value* has a significant positive and *board size* a significant negative link with *ROE* as in previous analyses.

When performance is measured by *PTBV* (column 3), the results are similar to those when performance is measured by *ROE*: *Innovativeness* has no moderating effect on the relation between heterogeneity and *PTBV*; *market value* has – as before – a positive and *board size* – as usual – a negative link with *PTBV*.

In the last column of Table 45, performance is measured by *Tobin's Q*. As in the other models of Table 45, *innovativeness* has no moderating influence on the relation between *membership heterogeneity* and performance when performance is measured by *Tobin's Q*.

The results of the analysis of the moderating effect of *innovativeness* on the relation between *heterogeneity regarding the number of memberships* and performance measured by *number of interventions* and *corporate governance ranking* are shown in Table 46.

No moderating influence of *innovativeness* on the relation between heterogeneity and performance can be found when performance is measured by *number of interventions* (column 1) or by *corporate governance ranking* (column 2).<sup>39</sup> In the latter model, the control variables *market value* and *board size* have – as before – a significant negative link with *corporate governance ranking*.

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<sup>39</sup> A significant negative effect of the moderating variable *innovativeness* on the relation between *heterogeneity regarding the number of supervisory board memberships* and *corporate governance ranking* can be observed when the control variable *free float* is not included in the analysis.

**Table 46: Moderating effect of the company's innovativeness on the relation between heterogeneity regarding the number of memberships and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-2.6609 * (1.4115)	88.1291 * (48.4820)
Het. no. memberships <sub>(t-1)</sub>	1.5749 (2.5955)	-10.0119 (100.9327)
Intangibles/total assets <sub>(t-1)</sub>	-0.0662 (0.0603)	2.2166 (1.8916)
Het. no. memberships <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.1469 (0.1342)	-5.7597 (4.2694)
German standard		2.2832 (12.3320)
Market value	0.0000 (0.0000)	-0.0006 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0576 (0.0367)	-1.3368 * (0.8035)
Free float <sub>(t-1)</sub>		-0.1562 (0.1656)
<i>Inflation model</i>		
Constant	1.0412 *** (0.3856)	
No. observations	778	66
No. groups	145	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0810	0.4295
Prob > F		***
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

In conclusion, hypothesis 8.3, which predicts a positive effect of the moderating variable *innovativeness* on the relation between *heterogeneity with regard to the number of supervisory board memberships* and performance, must be rejected for all performance variables.

## Gender

The outcomes of the analysis of the moderating effect of *innovativeness* on the relation between *gender heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are provided in Table 47.



**Table 47: Moderating effect of the *company's innovativeness* on the relation between *gender heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q***

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	FE	FE	FE	RE
Constant	10.2990 *** (3.0853)	21.7952 *** (4.8553)	2.6360 *** (0.7610)	2.5741 *** (0.2591)
Het. gender <sub>(t-1)</sub>	-5.1282 (4.1328)	-14.8123 *** (5.6620)	-1.5767 (1.5107)	0.0947 (0.3026)
Intangibles/total assets <sub>(t-1)</sub>	-0.2042 ** (0.1038)	-0.2851 ** (0.1189)	-0.0333 *** (0.0116)	-0.0116 *** (0.0045)
Het. gender <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.2029 (0.1744)	0.3562 (0.2643)	0.0411 (0.0441)	0.0141 (0.0176)
German standard	0.9789 (0.7652)	2.8071 (2.1792)	0.4165 (0.2898)	-0.0198 (0.1058)
Market value	-0.0000 (0.0001)	0.0002 * (0.0001)	0.0000 (0.0000)	0.0000 (0.0000)
Board size <sub>(t-1)</sub>	-0.2315 (0.1936)	-0.4612 (0.3655)	-0.0499 (0.0533)	-0.0583 *** (0.0141)
No. observations	828	813	830	830
No. groups	150	150	150	150
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
R <sup>2</sup>	0.0710	0.0718	0.1208	0.1732
Prob > F	***	***	***	
Prob > chi <sup>2</sup>				***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	***	***	***	ns
<i>Test of strict exogeneity</i>				
Het. gender	ns	ns	ns	ns
Intangibles/total assets	ns	ns	ns	ns
Het. gender x intangibles/total assets	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

The Breusch and Pagan Lagrangian multiplier test for random effects reveals that OLS is invalid for all specifications of Table 47 and the results of the Hausman test show that the random effects estimator is more efficient for the specification when performance is measured by *Tobin's Q* (column 4). When performance is measured by *ROA* (column 1), *ROE* (column 2) and *PTBV* (column 3), only the fixed effects estimator provides consistent estimates. The test of strict exogeneity shows that the heterogeneity variables, the interaction variables and the variable *innovativeness* are exogenous in all models of Table 47.

*Innovativeness* has no moderating influence on the relation between *gender heterogeneity* and *ROA* (column 1). When performance is measured by *ROE* (column 2), *innovativeness* has also no moderating effect on the relation between *gender hetero-*

*generosity* and performance. Of the included control variables, *market value* has a positive link with *ROE*, as usually.

In column 3 of Table 47, the moderating effect of *innovativeness* on the relation between *gender heterogeneity* and *PTBV* is analyzed. No moderating influence of the *company's innovativeness* on the described relation can be found.

When performance is measured by *Tobin's Q* (column 4), *innovativeness* has also no moderating effect on the relation between *gender heterogeneity* and performance. However, the control variable *board size* has, as previously, a negative link with *Tobin's Q*.

**Table 48: Moderating effect of the *company's innovativeness* on the relation between *gender heterogeneity* and the performance variables *number of interventions* and *corporate governance ranking***

Dependent variable Method	No. interventions	Corporate governance ranking
	ZIP	OLS
Constant	-2.7889 *** (0.8442)	87.3713 *** (15.9975)
Het. gender <sub>(t-1)</sub>	-1.2802 ** (0.6280)	-4.2267 (15.4040)
Intangibles/total assets <sub>(t-1)</sub>	0.0050 (0.0146)	0.1728 (0.3949)
Het. gender <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.0109 (0.0329)	-0.9418 (1.0510)
German standard		5.0648 (11.7476)
Market value	-0.0000 (0.0000)	-0.0006 *** (0.0002)
Board size <sub>(t-1)</sub>	0.0829 ** (0.0344)	-1.2746 * (0.7694)
Free float <sub>(t-1)</sub>		-0.2291 (0.1619)
<i>Inflation model</i>		
Constant	0.9894 *** (0.3950)	
No. observations	840	71
No. groups	150	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.0870	0.4056
Prob > F		***
Prob > chi <sup>2</sup>	***	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation).

Source: Own compilation.

Table 48 presents the results of the analysis on the moderating influence of the variable *innovativeness* on the relation between *gender heterogeneity* and the performance variables *number of interventions* (column 1) and *corporate governance ranking* (column 2).

*Innovativeness* has no moderating influence on the relation between *gender heterogeneity* and *number of interventions* (column 1). Yet, the control variable *board size* has, again, a positive link with *number of interventions*.<sup>40</sup>

When performance is measured by *corporate governance ranking*, *innovativeness* has also no moderating influence on the relation between *gender heterogeneity* and performance (column 2). The control variables *market value* and *board size* have both – as in earlier analyses – a negative link with *corporate governance ranking*.<sup>41</sup>

Hypothesis 8.4, stating a positive moderating effect of *innovativeness* on the relation between *gender heterogeneity* and performance, must be rejected for all performance variables.

### **Nationality**

The findings of the analysis of the moderating influence of *innovativeness* on the relation between *national heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are displayed in Table 49.

The results of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 49 and the output of the Hausman test indicates for all specifications that both the random and the fixed effects estimators are consistent but that the random effects estimator is more efficient. The test of strict exogeneity reveals that the heterogeneity variable is endogenous when performance is measured by *ROE* and that the interaction variable is endogenous when performance is measured by *PTBV*. Hence, a random effects estimator is used when performance is measured by *ROA* or *Tobin's Q* and an estimator according to ANDERSON/Hsiao (1982) is applied when performance is measured by *ROE* or *PTBV*.

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<sup>40</sup> Because it is not clear if a large number of interventions is a sign of good performance this result should be interpreted with care.

<sup>41</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimations analyzing the moderating effect of *innovativeness* on the relation between *gender heterogeneity* and *corporate governance ranking*.

When performance is measured by *ROA* (column 1), the variable *innovativeness* has no moderating influence on the relation between *nationality heterogeneity* and performance. Yet, as in earlier estimations, the control variables *German standard* and *market value* have a positive and *board size* a negative link with *ROA*.

Also no moderating influence of *innovativeness* on the relation between heterogeneity and performance can be found when the performance variable *ROE* is used (column 2). Of the included control variables, *German standard* has, as before, a positive relation with *ROE*.

**Table 49: Moderating effect of the company's innovativeness on the relation between nationality heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	RE	Anderson/Hsiao	Anderson/Hsiao	RE
Constant	1.3303 (4.9007)	3.8566 (5.0591)	0.1776 (0.4821)	2.7609 *** (0.5868)
Dependent variable <sub>(t-1)</sub>		0.7442 ** (0.2964)	0.5348 *** (0.1269)	
Het. nationality <sub>(t-1)</sub>	-2.8227 (3.5184)	-14.4307 (9.5828)	-0.5873 (0.5166)	0.4304 (0.5270)
Intangibles/total assets <sub>(t-1)</sub>	-0.1343 (0.1172)	-0.9475 *** (0.3672)	0.0085 (0.0117)	-0.0062 (0.0115)
Het. nationality <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	0.2908 (0.1973)	0.4500 (0.4177)	0.0921 ** (0.0368)	-0.0201 (0.0228)
German standard	4.6764 ** (2.3885)	21.6157 * (11.0412)	-0.0801 (0.4893)	0.3719 (0.2925)
Market value	0.0002 *** (0.0001)	0.0003 (0.0008)	0.0001 ** (0.0000)	0.0000 ** (0.0000)
Board size <sub>(t-1)</sub>	-0.5376 *** (0.1471)	-2.8743 (3.0350)	0.1042 (0.1318)	-0.1134 *** (0.0290)
No. observations	246	152	156	246
No. groups	88	58	58	88
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	cluster	cluster	yes
R <sup>2</sup>	0.2529			0.2039
Prob > F		***	***	
Prob > chi <sup>2</sup>	***			***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	***	***	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. nationality	ns	**	ns	ns
Intangibles/total assets	ns	ns	ns	ns
Het. nationality x intangibles/total assets	ns	ns	**	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation). No R<sup>2</sup> is reported when an estimator according to ANDERSON/Hsiao (1982) is applied because R<sup>2</sup> has no statistical meaning in the context of this method (see SRIBNEY/WIGGINS/DRUKKER 2005).

Source: Own compilation.

As can be seen in column 3 of Table 49, the variable *innovativeness* has a positive moderating effect on the relation between *nationality heterogeneity* and *PTBV*. Also,

as in previous analyses, a positive link between *market value* and *PTBV* can be observed.

When the performance variable *Tobin's Q* is used (column 4), *innovativeness* has no moderating influence on the relation between *nationality heterogeneity* and performance. As before, *market value* has a positive and *board size* a negative link with *Tobin's Q*.

Table 50 shows the outcome of the analysis of the moderating effect of *innovativeness* on the relation between *nationality heterogeneity* and the performance variable *corporate governance ranking*. Because of too few observations, the moderating influence of *innovativeness* on the relation between *nationality heterogeneity* and the performance variable *number of interventions* cannot be analyzed.

**Table 50: Moderating effect of the company's innovativeness on the relation between nationality heterogeneity and the performance variable corporate governance ranking**

Dependent variable	Corporate governance ranking
Method	OLS
Constant	-740.2427 (1,475.8740)
Het. nationality <sub>(t-1)</sub>	-353.0280 (722.1724)
Intangibles/total assets <sub>(t-1)</sub>	-13.0511 (22.9701)
Het. nationality <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	61.1347 (111.5370)
German standard	798.2460 (1,543.3190)
Market value	0.0217 (0.0395)
Board size <sub>(t-1)</sub>	-8.1548 (8.5237)
Free float <sub>(t-1)</sub>	3.7681 (7.4071)
No. observations	14
No. groups	
Year effects	no
Industry effects	yes
Firm effects	no
R <sup>2</sup>	0.9465
Prob > F	na <sup>o</sup>

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. The regression includes a constant. The reported R<sup>2</sup> is overall R<sup>2</sup> for OLS (Ordinary least squares estimation).<sup>o</sup> The missing F model statistic is due to the included industry dummies. When these are omitted from the model, the results qualitatively remain the same and the F model statistic is significant (Prob > F: \*\*).

Source: Own compilation.

*Innovativeness* has no moderating influence on the relation between *nationality heterogeneity* and *corporate governance ranking*.<sup>42</sup> Also, none of the included control variables have a significant link with *corporate governance ranking*.

In conclusion, hypothesis 8.5, which states a positive effect of the moderating variable *innovativeness of the company* on the relation between *nationality heterogeneity* and performance, must be rejected for the performance variables *ROA*, *ROE*, *Tobin's Q* and *corporate governance ranking* but it cannot be rejected for the performance variable *PTBV*.

Reason for the small number of significant results could be the low number of observations.

### **Age**

The findings of the analysis of the moderating influence of *innovativeness* on the relation between *age heterogeneity* and the performance variables *ROA*, *ROE*, *PTBV* and *Tobin's Q* are provided in Table 51.

The outputs of the Breusch and Pagan Lagrangian multiplier test for random effects show that OLS is invalid for all specifications of Table 51 and the results of the Hausman test show for all specifications that both the random and the fixed effects estimators are consistent but that the random effects estimators are more efficient. The test of strict exogeneity reveals that the heterogeneity variables, the innovativeness variables and the interaction variables are exogenous in all specifications. Thus, in all specifications, a random effects estimator is applied.

When performance is measured by *ROA* (column 1), the variable *innovativeness* has a positive moderating effect on the relation between *age heterogeneity* and *ROA*. Furthermore, the control variables *German standard* and *market value* have a positive and *board size* a negative relation with *ROA*, as in earlier analyses.

When performance is measured by *ROE* (column 2), *innovativeness* has no influence on the relation between *age heterogeneity* and performance. As usual, *market value* has a positive and *board size* a negative link with *ROE*.

Also no moderating influence of *innovativeness* on the relation between *age heterogeneity* and performance can be observed when performance is measured by *PTBV*

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<sup>42</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimation analyzing the moderating effect of *innovativeness* on the relation between *nationality heterogeneity* and *corporate governance ranking*.

(column 3). As before, *market value* has a positive and *board size* a negative link with *PTBV*.

Similar results can be seen in column 4 of Table 51. *Innovativeness* has no moderating influence on the relation between *age heterogeneity* and *Tobin's Q* but the control variable *market value* has a positive and *board size* a negative link with *Tobin's Q*.

**Table 51: Moderating effect of the company's innovativeness on the relation between age heterogeneity and the performance variables ROA, ROE, PTBV and Tobin's Q**

Dependent variable	ROA	ROE	PTBV	Tobin's Q
Method	RE	RE	RE	RE
Constant	3.5758 (5.1010)	1.5075 (9.8414)	0.2939 (1.9473)	0.7967 (0.5970)
Het. age <sub>(t-1)</sub>	26.9425 (32.1358)	58.8648 (44.9488)	16.6330 (17.2815)	6.3836 (4.7352)
Intangibles/total assets <sub>(t-1)</sub>	-0.6186 * (0.3243)	-0.6286 (0.4963)	0.0588 (0.0776)	0.0238 (0.0331)
Het. age <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	3.8216 * (2.1733)	4.3527 (3.3682)	-0.3891 (0.5485)	-0.2184 (0.2276)
German standard	3.4320 ** (1.7673)	7.9530 (4.9414)	1.7838 (1.6785)	0.4355 (0.3144)
Market value	0.0002 *** (0.0000)	0.0003 *** (0.0001)	0.0001 *** (0.0000)	0.0000 *** (0.0000)
Board size <sub>(t-1)</sub>	-0.5870 *** (0.1293)	-0.7067 ** (0.2946)	-0.1885 *** (0.0732)	-0.0988 *** (0.0239)
No. observations	231	231	231	231
No. groups	61	61	61	61
Year effects	yes	yes	yes	yes
Industry effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
R <sup>2</sup>	0.1691	0.1325	0.2333	0.2626
Prob > chi <sup>2</sup>	***	***	***	***
<i>Breusch and Pagan Lagrangian multiplier test for random effects</i>				
Prob > chi <sup>2</sup>	*	**	***	***
<i>Hausman Test</i>				
Prob > chi <sup>2</sup>	ns	ns	ns	ns
<i>Test of strict exogeneity</i>				
Het. age	ns	ns	ns	ns
Intangibles/total assets	ns	ns	ns	ns
Het. age x intangibles/total assets	ns	ns	ns	ns

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant*. All regressions include a constant. The reported R<sup>2</sup> are overall R<sup>2</sup> for RE (Random effects estimation) and OLS (Ordinary least squares estimation) and within R<sup>2</sup> for FE (Fixed effects estimation).

Source: Own compilation.

Table 52 presents the results of the analysis of the moderating effect of *innovativeness* on the relation between *age heterogeneity* and performance measured by *number of interventions* and *corporate governance ranking*.

The moderating variable *innovativeness* has no influence on the effect of *age heterogeneity* on the performance variables *number of interventions* (column 1) or *corpo-*

rate governance ranking (column 2). Yet, in the latter specification the control variable *board size* has, as usual, a negative relation with *corporate governance ranking*.<sup>43</sup>

**Table 52: Moderating effect of the company's innovativeness on the relation between age heterogeneity and the performance variables number of interventions and corporate governance ranking**

Dependent variable	No. interventions	Corporate governance ranking
Method	ZIP	OLS
Constant	-19.6770 *** (2.3578)	44.3373 (44.2220)
Het. age <sub>(t-1)</sub>	19.3793 (23.1717)	24.0432 (339.3578)
Intangibles/total assets <sub>(t-1)</sub>	0.0557 (0.1705)	0.2793 (2.8997)
Het. age <sub>(t-1)</sub> x intangibles/total assets <sub>(t-1)</sub>	-0.3901 (0.9537)	-0.4228 (24.2042)
German standard		-19.3338 (15.4809)
Market value	0.0000 (0.0000)	-0.0001 (0.0004)
Board size <sub>(t-1)</sub>	0.0255 (0.0960)	-3.6771 ** (1.1751)
Free float <sub>(t-1)</sub>		0.3741 (0.2724)
<i>Inflation model</i>		
Constant	-1.4063 (6.1894)	
No. observations	234	20
No. groups	62	
Year effects	yes	no
Industry effects	yes	yes
Firm effects	cluster	no
R <sup>2</sup>	0.2630	0.8369
Prob > F		***
Prob > chi <sup>2</sup>	na <sup>■</sup>	

Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively. ns stands for *not significant* and na for *not available*. All regressions include a constant. The reported R<sup>2</sup> are Cragg and Uhlers's R<sup>2</sup> for ZIP (Zero-inflated Poisson regression) and overall R<sup>2</sup> for OLS (Ordinary least squares estimation). <sup>■</sup> The missing chi<sup>2</sup> model statistic is due to the number of non-zero observations which is too low for the analysis (n<sub>non-zero</sub>=15).

Source: Own compilation.

Hypothesis 8.6, predicting a positive effect of the moderating variable *innovativeness* on the relation between *age heterogeneity* and performance, must be rejected for the performance variables *ROE*, *PTBV*, *Tobin's Q*, *number of interventions* and *corporate governance ranking* but it cannot be rejected for the performance variable *ROA*. Reason for the scarce significant findings might be the small number of observations.

<sup>43</sup> The results qualitatively remain the same when the control variable *free float* is not included in the estimation analyzing the moderating influence of *innovativeness* on the relation between *age heterogeneity* and *corporate governance ranking*.



### 4.4.3.3 Summary and interpretation of results

The focus of this chapter is to recapitulate and interpret the multivariate results of section 4.4. Table 53 displays the empirical findings of the multivariate analyses.

#### 4.4.3.3.1 Specific types of heterogeneity

*Occupational background heterogeneity* has a linear negative effect on *ROA*, *ROE* and *corporate governance ranking* and a non-linear relation with *PTBV*. The function of the relation between *occupational background heterogeneity* and *PTBV* is concave down decreasing. According to the theoretical arguments of this study, the linear negative effects on *ROA* as well as *ROE* and the non-linear effect on *PTBV* suggest that the costs of occupational heterogeneity in terms of different special languages are larger than the benefits in form of a broader range of knowledge available to the supervisory board. For the performance variable *corporate governance ranking*, however, the negative relation with *occupational background heterogeneity* proposes that the benefits of heterogeneity are larger than the costs because *corporate governance ranking* is an inverse measure of performance. While the negative effects of *occupational background heterogeneity* on *ROA*, *ROE* and *PTBV* are not in accordance with the findings in previous literature, the positive relation between *occupational background heterogeneity* and performance measured by *corporate governance ranking* conforms to the results in the previous team and top management team literature. HORWITZ/HORWITZ (2007) observe positive effects of functional diversity in teams on team performance measured by qualitative as well as quantitative team outcomes, and CERTO et al. (2006) find a positive effect of functional diversity in top management teams on company performance measured by *ROA* in their meta-analysis. Although the results for the performance measure *corporate governance ranking* are similar to those in the literature, deviations with respect to the remaining results could be due to differences in the classification of occupational background heterogeneity compared to functional heterogeneity, differences with respect to the teams studied and in part due to differences in the performance variables employed. For the variable *tenure heterogeneity* no effect of heterogeneity on any of the performance variables can be found. In contrast to this result, a number of empirical studies in the literature find evidence for different tenures of members of top management teams having positive effects on the top management team's *strategic deci-*

sions (see, e.g., GOLL/RASHEED 2005) and the company's performance measured by *ROA* (see CERTO et al. 2006). The different teams studied and partly the varying dependent variables applied could explain the discrepancy in results.

**Table 53: Summary of results**

<i>Summary of multivariate results</i>						
<i>Relationship between heterogeneity and performance</i>						
	ROA	ROE	PTBV	Tobin's Q	No. interv.	CG ranking
Het. occup.	-	-	/-			-
Het. tenure						
Het. memberships						-
Het. gender		-/+			-	
Het. nationality					/+	
Het. age	+	+				+/-
<i>Moderating effect of internationalization on the relation between heterogeneity and performance</i>						
	ROA	ROE	PTBV	Tobin's Q	No. interv.	CG ranking
Het. occup.						-
Het. tenure						-
Het. memberships			+	+		
Het. gender	+				-	
Het. nationality			-			
Het. age					-	
<i>Moderating effect of innovativeness on the relation between heterogeneity and performance</i>						
	ROA	ROE	PTBV	Tobin's Q	No. interv.	CG ranking
Het. occup.						
Het. tenure						-
Het. memberships						
Het. gender						
Het. nationality			+			
Het. age	+					

+ indicates a linear positive relation between the particular heterogeneity variable and the specific performance variable or a positive effect of the particular moderating variable on the relation between the specific heterogeneity variable and the particular performance variable. - suggests a linear negative relation between the specific heterogeneity variable and the particular performance variable or a negative effect of the particular moderating variable on the relation between the specific heterogeneity variable and the particular performance variable. -/+ implies a significant U-shaped link and +/- a significant hump-shaped link between the specific heterogeneity variable and the particular performance variable. Finally, /- indicates that the function of the relation between the particular heterogeneity variable and the specific performance variable is concave down decreasing and /+ suggests that the relation between the specific heterogeneity variable and the particular performance variable is concave up increasing.

Source: Own compilation.

A negative relation between *heterogeneity with respect to the number of memberships* and *corporate governance ranking* can be observed. Because *corporate governance ranking* is an inverse measure of performance, this suggests that the benefits in terms of different experiences as supervisory board members overlay the costs of heterogeneity in the form of higher communication and process costs. While there are no studies on this particular question, this result complements the results by FERIS/JAGANNATHAN/PRITCHARD (2003) and FICH/SHIVDASANI (2006). These authors do not analyze the effects of *heterogeneity* with respect to the number of memberships but the relation between the *number* of memberships held by the board mem-

bers and company performance. While FERRIS/JAGANNATHAN/PRITCHARD (2003) find a positive relation between the number of board memberships per board member and *market to book value*, FICH/SHIVDASANI (2006) find that companies with a majority of board members holding three or more board memberships have a significantly lower *market to book value*.

*Heterogeneity with respect to gender* has a U-shaped link with *ROE*. The course of the function has a global minimum at the heterogeneity level of approximately 0.4 and highest performance values for heterogeneity levels above 0.84. In accordance with the theoretical considerations of this study, this means that the benefits of heterogeneity in terms of different business relevant abilities and skills are larger than the costs in form of different ways of communicating verbally and non-verbally for low and high levels of heterogeneity but that the costs overlay the benefits of heterogeneity for medium values of heterogeneity. As no supervisory board in the sample consists of only women, a homogeneous supervisory board has only male members and a heterogeneous supervisory board has at least one female member. Hence, this result suggests that the benefits of gender heterogeneity in supervisory boards can only be used to full capacity above a critical mass of female supervisory board members. Also, a negative relation between *gender heterogeneity* and *number of interventions* can be observed. This implies that heterogeneous supervisory boards intervene less than supervisory boards with only male members. In line with the theoretical arguments and under the assumption that the *number of interventions* is a sign of good performance, this means that the costs of *gender heterogeneity* outbalance the benefits. In contrast, previous empirical studies find a positive effect of *gender heterogeneity* or the presence of women in addition to men in top management teams on company performance measured by, e.g., *return on sales* or *ROA* (see, e.g., KRISHNAN/PARK 2005). Hence, with respect to the theoretical considerations, these results imply that the negative effects of *gender heterogeneity* are smaller than the positive effects. While the U-shaped link between *gender heterogeneity* and *ROE* of this study hints at a more complex relation between *gender heterogeneity* and performance, the negative relation between *gender heterogeneity* and *number of interventions* could also be in accordance with the previous literature. Depending on the interpretation of a large number of interventions as an indicator of good performance or rather a sign of prior bad performance, the presented results could also speak in

favour of a positive relation between *gender heterogeneity* and performance and, therefore, be along the lines of the results of previous studies.

*Nationality heterogeneity* has a non-linear relation with *number of interventions*. The function of this relation is concave up increasing. If the *number of interventions* is assumed to be a sign of good performance, this suggests in the context of this study's theoretical arguments that the benefits of *nationality heterogeneity* in form of different knowledge about national company practices and foreign markets overlay the costs in terms of language difficulties, longer decision-making processes and higher coordination costs. However, if the *number of interventions* is interpreted as a sign of prior bad performance, this relation implies that the costs of heterogeneity are larger than the benefits. In a previous study, STEGER (2006) observes a positive link between the percentage of foreign supervisory board members and company performance measured by *ROE*. The presented result of this study would be in accordance with this result if a large number of interventions is interpreted as a sign of good performance. However, no effect of *nationality heterogeneity* on the performance variable *ROE* can be found. The different measure of nationality and the low number of observations in both studies might be the reason for the discrepancy in results.

For *heterogeneity with reference to age* significant positive effects of heterogeneity on *ROA* and *ROE* can be found. Given the theoretical considerations, this means that the advantages of heterogeneity with respect to age in terms of different abilities, life experience and expert knowledge are larger than the disadvantages in the form of higher communication and process costs. Additionally, a hump-shaped link between *age heterogeneity* and *corporate governance ranking* can be found. The course of the function has a global maximum at the heterogeneity value of approximately 0.15 and highest positions in the *corporate governance ranking* are observed for heterogeneity levels above 0.25. Because *corporate governance ranking* is an inverse measure of performance, this implies – in line with the theoretical arguments – that the benefits of *age heterogeneity* outweigh the costs for low and high values of heterogeneity and that the opposite applies for medium values of heterogeneity. These results are in contrast to the result by SIMONS/PELLED/SMITH (1999) observing no effect of a top management team's *age heterogeneity* on performance measured by *firm profitability* and *sales*. The variation in results could be due to the different teams studied and the different performance measures used.

### 4.4.3.3.2 Internationalization

The *company's internationalization* has a negative *moderating* effect on the relation between *occupational background heterogeneity* and *corporate governance ranking*. Because *corporate governance ranking* is an inverse measure of performance, this signifies that the *company's internationalization* moderates positively the relation between *occupational background heterogeneity* and performance. More specifically, as a positive relation between *occupational background heterogeneity* and performance measured by *corporate governance ranking* can be observed when this relation is analyzed without controlling for a possible effect of a moderating variable (see Table 53), an increasing degree of *internationalization* intensifies this positive relation. These results support the theoretical considerations of this study arguing that the disjunct knowledge of the heterogeneous board members with regards to their occupational background is not only relevant in and by itself but becomes – as the task of the supervisory board is influenced by the company's degree of *internationalization* – more and more relevant with an increasing degree of *internationalization*. This results in larger benefits of occupational background heterogeneity as the degree of the *company's internationalization* rises.

*Internationalization* also has a positive moderating influence on the relation between *tenure heterogeneity* and performance measured by *corporate governance ranking*, on the relation between *heterogeneity regarding the number of supervisory board memberships* and *PTBV*, on the relation between *heterogeneity regarding the number of supervisory board memberships* and *Tobin's Q*, and on the relation between *gender heterogeneity* and *ROA*. Based on the theoretical analysis, a plausible explanation for the positive moderating effect is that the disjunct knowledge of the members of heterogeneous supervisory boards with regards to these heterogeneity types becomes more relevant as the *internationalization of the company* increases leading to larger benefits of heterogeneity than costs.

In contrast, the relation between *gender heterogeneity* and *number of interventions* is influenced negatively by *internationalization*. This signifies that the negative effect of *gender heterogeneity* on the *number of interventions* – when this effect is analyzed without a possible moderating effect (see Table 53) – is intensified by an increasing degree of *company internationalization*. In line with the theoretical arguments and assuming that a large *number of interventions* is a sign of good performance, this

means that the benefits of *gender heterogeneity* are already smaller than the costs when the effect of *gender heterogeneity* on the *number of interventions* is analyzed without a possible moderating effect; as the degree of *internationalization* increases, the task of the supervisory board is altered and the disjunct knowledge of the members of a heterogeneous supervisory board regarding *gender* seem to become even less relevant. Thus, the benefits of *gender heterogeneity* become smaller leading to a larger negative net effect of *gender heterogeneity* on performance measured by *number of interventions* as the *company's internationalization* rises. In contrast, if a large *number of interventions* is interpreted as a sign of prior bad performance, the benefits of *gender heterogeneity* are larger than the costs when the effect of *gender heterogeneity* on the *number of interventions* is analyzed without the possible effect of a moderating variable. As the task of the supervisory board is influenced by an increasing degree of *internationalization*, the disjunct knowledge of the members of a heterogeneous supervisory board regarding *gender* becomes more relevant with a rising degree of *internationalization* resulting in an even larger positive net effect.

Moreover, the *company's internationalization* has a negative moderating effect on the relation between *age heterogeneity* and *number of interventions* and surprisingly also on the relation between *nationality heterogeneity* and *PTBV*. According to the theoretical considerations these results suggest that the diverse knowledge of the members of a heterogeneous supervisory board with regards to these types of heterogeneity becomes less relevant as the *company's internationalization* increases resulting in smaller benefits of heterogeneity than costs. The result for *nationality heterogeneity* surprises especially because one would expect the diverse knowledge of a heterogeneous supervisory board regarding *nationality* to be particularly relevant in an *international* company.

### 4.4.3.3 Innovativeness

The *company's innovativeness* has a negative moderating effect on the relation between *tenure heterogeneity* and *corporate governance ranking*. Because *corporate governance ranking* is an inverse measure of performance, this means that *innovativeness* moderates positively the relation between *tenure heterogeneity* and performance. Also, *innovativeness* has a positive moderating effect on the relation between *nationality heterogeneity* and *PTBV*. These results suggest in the context of the theoretical arguments of this study that the task of the supervisory board is influenced by

the *company's degree of innovativeness* and that the disjunct knowledge of a heterogeneously composed supervisory board regarding tenure and nationality becomes more relevant as the *innovativeness of the company* rises. This leads to larger benefits of heterogeneity than costs in these cases as the *company's innovativeness* increases.

In addition, *innovativeness* has a positive influence on the relation between *age heterogeneity* and *ROA*. Thus, the positive effect of *age heterogeneity* on *ROA* when this relation is analyzed without controlling for a possible moderating effect (see Table 53) is intensified by an increasing degree of *company innovativeness*. In line with the theoretical considerations, the disjunct knowledge of a heterogeneously composed supervisory board regarding age seems to become even more relevant as the *innovativeness of the company* increases leading to larger benefits of *age heterogeneity* when performance is measured by *ROA* and thus to a larger positive net effect.

### 4.5 Conclusion

This study analyzes the effect of supervisory board heterogeneity on supervisory board performance and company performance. Furthermore, it studies how the company's degree of internationalization and innovativeness moderate the relation between board heterogeneity and board performance or company performance.

It can be shown that supervisory board heterogeneity has, to some extent, a significant effect on supervisory board performance and company performance: This effect varies depending on the type of heterogeneity and the used performance variable. In addition, for some heterogeneity types and performance measures the company's internationalization and innovativeness have a moderating influence on the relation between supervisory board heterogeneity and supervisory board performance or company performance.

These results, first of all, show that supervisory board heterogeneity has different effects on performance depending on the kind of heterogeneity. Therefore, it is important to distinguish between different types of diversity and no overall statement regarding the effects of diversity can be made. The results also demonstrate that it is important how performance is measured. Depending on the used performance meas-

ure, different effects of supervisory board heterogeneity can be found. Furthermore, moderating effects should be considered. The degree of the company's internationalization and the company's innovativeness can have moderating effects on the relation between supervisory board heterogeneity and supervisory board performance or company performance. It, therefore, cannot be assumed that even if diversity of a certain kind in and by itself has a positive effect on performance, that this will be the case for every company.

As a practical implication of these results, it should be advised against "recipe like" recommendations to companies about the optimal composition of supervisory boards as, e.g., in the GCGK (see GCGC 2010). Such recommendations do not even prove to be consistent for specific types of characteristics because its effects depend on the chosen performance measure. Further, the influence of these characteristics is altered by moderating variables in different ways. Thus, it cannot be foreseen how certain compositions affect the supervisory board performance or the company performance in general.

This study contributes to the previous literature by analyzing the effects of supervisory board heterogeneity on performance for a broad range of heterogeneity types for the first time. It, furthermore, presents evidence for the importance of moderating variables for the relation between supervisory board heterogeneity and performance and enlarges the previously used (company) performance variables by two innovative measures which scale the performance of supervisory boards in a directer way: the number of interventions by the supervisory board and the company's position in the corporate governance ranking.

Finally, this study delivers a basis for further analyses: Moderating variables have been disregarded by the literature so far. Thus, additional moderating variables, e.g., company contexts, could be identified and examined to explore in more detail how they influence the effect of supervisory board heterogeneity on performance. Moreover, additional measures of supervisory board performance should be considered and analyzed to facilitate a better evaluation of the work of supervisory boards.



# 5

## Interventionsaktivitäten von Aufsichtsräten

(Erscheint als: Vetter, Karin; Ursula Weber: Interventionsaktivitäten von Aufsichtsräten: Eine empirische Analyse deutscher Aktiengesellschaften. In: *Betriebswirtschaftliche Forschung und Praxis*.)

### 5.1 Motivation und Fragestellung

Durch zahlreiche Aufsehen erregende Insolvenzen und Unternehmenskrisen, wie die der Bremer Vulkan-Werft oder der Holzmann AG, sind Aufsichtsräte vermehrt in die Kritik geraten. Ihnen wird vorgeworfen, ihren Kontrollauftrag nur unzureichend zu erfüllen.

Der deutsche Gesetzgeber stellt dem Aufsichtsrat zur Kontrolle der Unternehmensleitung eine Reihe unterschiedlicher Eingriffsinstrumente zur Verfügung. Diese sollen zum einen zur Disziplinierung des Managements beitragen und zum anderen die Aufgabenerfüllung des Aufsichtsrats erleichtern. Dabei reicht das Spektrum an Interventionsmöglichkeiten von Meinungsäußerungen des Aufsichtsrats über Abberufungen von Vorstandsmitgliedern bis hin zum gerichtlichen Vorgehen gegen entlassene Vorstandsmitglieder. In diesem Zusammenhang sollen im Rahmen des vorliegenden Beitrags folgende Fragen beantwortet werden: Welche gesetzlichen Interventionsmöglichkeiten haben Aufsichtsräte in ihrer Funktion als kontrollierendes Organ des Unternehmens? Kann der Einsatz der verschiedenen Interventionsmaße beobachtet werden? Ist dies der Fall, in welchen inhaltlichen Kontexten wird von ihnen Gebrauch gemacht und sind in den jeweiligen Kontexten Muster des Gebrauchs erkennbar? Die Antworten auf diese Fragen geben Aufschluss über die praktische Bedeutung der gesetzlichen Interventionsmöglichkeiten. Darüber hinaus wird durch einen Abgleich der durch die Deutsche Prüfstelle für Rechnungslegung (DPR) und die Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) als fehlerhaft ausgewiesenen Jahres- bzw. Konzernabschlüsse mit den festgestellten Interventionsmaßnahmen untersucht, ob es in diesem

Bereich zu Kontrollversäumnissen der Aufsichtsratsgremien kommt.<sup>44</sup> Schließlich soll in diesem Beitrag geprüft werden, ob sich bestimmte Trends bezüglich des Einsatzes der unterschiedlichen Maßnahmen über den Untersuchungszeitraum hinweg erkennen lassen. Der gewählte Untersuchungszeitraum ist hierfür insbesondere deshalb interessant, da er nur kurz nach Verabschiedung des Gesetzes zur Kontrolle und Transparenz<sup>45</sup> im Jahr 1998 einsetzt und die Einführung des Deutschen Corporate Governance Kodex sowie dessen Verzahnung mit dem Aktiengesetz durch das Transparenz- und Publizitätsgesetz im Jahr 2002 in dessen Mitte fällt. Durch diese Maßnahmen, die dem Zweck der Verbesserung der Unternehmensüberwachung dienen, ist nicht nur die Aufmerksamkeit (vgl. PELTZER 2003: 224), die den Aufsichtsräten und deren Handlungen zukommt, erhöht worden, sondern es sind auch Regelungen hinsichtlich der Aufsichtsratsmitglieder und deren Handlungen hinzugekommen (vgl. WITT 2000: 160). Damit erhöht sich der Druck auf die Aufsichtsratsgremien, ihre Überwachungstätigkeit aktiver auszuführen. Zur Beantwortung der eingangs gestellten Fragen wird ein Datensatz basierend auf den Kontrollaktivitäten ausgewählter Aufsichtsräte der Indizes DAX, MDAX, SDAX und TecDAX der Jahre 2000 bis 2006 erhoben und auf die erwähnten Aspekte hin analysiert.

Aus wissenschaftlicher Perspektive sind diese Forschungsfragen in mehrerer Hinsicht von Relevanz. Während die öffentliche Diskussion über die Effizienz der verschiedenen Corporate Governance Systeme in jüngster Zeit stark zugenommen hat, liegen die wenigen wissenschaftlichen Untersuchungen zu deutschen Unternehmen im Bereich der Aufsichtsratsaktivitäten zeitlich sehr weit zurück bzw. beschäftigen sich nur mit einer geringen Anzahl an Unternehmen. Sie stellen damit lediglich eine erste Basis für eine Diskussion des Themas dar. Der vorliegende deskriptive Ansatz erweitert diese Basis, indem er die aktuelle Interventionspraxis deutscher Aufsichtsräte thematisiert und aufzeigt, wie sich die Interventionsaktivitäten deutscher Aufsichtsräte über den Untersuchungszeitraum verändern. Dabei liegt der Schwerpunkt dieser Arbeit im Gegensatz zu bisherigen Studien nicht nur in einer quantitativen, sondern auch in einer

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<sup>44</sup> Die DPR prüft seit dem 01.07.2005 die Rechnungslegung von Unternehmen, die am regulierten Markt in Deutschland vertreten sind stichprobenartig, bei konkreten Anhaltspunkten für einen Verstoß gegen Rechnungslegungsvorschriften oder auf Verlangen der BaFin. Wirkt das Unternehmen nicht freiwillig an der Prüfung der DPR mit, ist es mit dem Ergebnis der Prüfung nicht einverstanden oder bestehen an der Richtigkeit des Prüfungsergebnisses oder an der ordnungsgemäßen Durchführung der Prüfung durch die Prüfstelle erhebliche Zweifel, prüft auf zweiter Stufe die BaFin (vgl. BAFIN 2009).

<sup>45</sup> Dieses sieht u.a. häufigere Sitzungen des Aufsichtsrats und eine bessere Abstimmung zwischen Aufsichtsrat und Abschlussprüfer vor (vgl. GROTHE 2006: 2).

qualitativen Betrachtung. Zusätzlich zu bisherigen Untersuchungen analysiert der vorliegende Beitrag, in welchen inhaltlichen Kontexten interveniert wird, und prüft für den inhaltlichen Teilbereich der Feststellung des Jahres- bzw. Konzernabschlusses, inwieweit ein Interventionserfordernis bestand und ob – wenn notwendig – interveniert wurde. Die aktuelle systematische Untersuchung der Interventionsaktivitäten deutscher Aufsichtsräte stellt damit einen Beitrag zur Schließung der Forschungslücke für das deutsche Corporate Governance System dar: Während auf internationaler Ebene bereits eine Vielzahl an Forschungsarbeiten zu einer bestimmten Interventionsart, nämlich zur Entlassung von Managementmitgliedern, vorwiegend für das monistische System existieren, liegt eine umfassende Untersuchung aller Interventionsaktivitäten von Aufsichtsräten weder international noch Deutschland betreffend vor. Ebenso ist die Interventionsart „Vorstandsentsorgung“ (allein) bisher für Deutschland nicht erforscht. Auch im Zusammenhang der weiteren Corporate Governance-Literatur sind deutsche Unternehmen bisher kaum untersucht worden. Die wenigen existierenden Forschungsbeiträge befassen sich fast ausschließlich mit der Wirkung der Unternehmensmitbestimmung.<sup>46</sup> Durch dieses Ungleichgewicht der Forschungsintensität zwischen dem dualistischen und dem monistischen Corporate Governance System ist eine Vergleichbarkeit der beiden Systeme bisher nur sehr begrenzt möglich.<sup>47</sup> Dieser Vergleich hat nicht zuletzt durch die Schaffung der Rechtsform der europäischen Gesellschaft (Societas Europaea) auch in praktischer Hinsicht erheblich an Bedeutung gewonnen, da diese neue Rechtsform den Unternehmen einen gewissen Entscheidungsspielraum zwischen den Governance-Systemen bietet.

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<sup>46</sup> Vgl. hierzu u.a. GERUM (2007), der ebenfalls auf diesen Mangel hinweist.

<sup>47</sup> Für einen Vergleich des deutschen und amerikanischen Corporate Governance Systems aus Sicht institutioneller Anleger siehe SEGLER/WALD/WEIBLER (2007).

## 5.2 Aufgaben und Interventionsmöglichkeiten des Aufsichtsrats

### 5.2.1 Aufgaben des Aufsichtsrats

Charakteristisch für deutsche Kapitalgesellschaften ist die Trennung zwischen dem Vorstand als Geschäftsführungsorgan und dem Aufsichtsrat als Überwachungsorgan (vgl. BLEICHER/LEBERL/PAUL 1989: 44). Diese Überwachungsaufgabe des Aufsichtsrats wird in § 111 Abs.1 AktG geregelt. Da der Inhalt der Überwachungstätigkeit selbst nicht festgesetzt ist, muss aus den Berichtspflichten des Vorstands an den Aufsichtsrat der Inhalt der Überwachungstätigkeit des Aufsichtsrats geschlossen werden (vgl. MIELKE 2005: 216). Die Berichtspflichten des Vorstands an den Aufsichtsrat werden in § 90 AktG nach Gegenstand und Häufigkeit der Rechenschaftslegung bestimmt (vgl. WESTERBURG 2002: 21). Sie erstrecken sich auf die Grundfragen der Geschäftspolitik und Unternehmensplanung – dabei insbesondere auf die Finanz-, Investitions- und Personalplanung –, die Rentabilität der Gesellschaft, den Gang der Geschäfte und die Lage der Gesellschaft wie auch auf andere Sachverhalte, die für das Unternehmen von besonderer Wichtigkeit sind (vgl. § 90 Abs. 1 AktG). Weitere Aufgaben des Aufsichtsrates sind in § 171 Abs. 1 AktG festgelegt. Diese beinhalten die Prüfung und Feststellung des Jahres- bzw. Konzernabschlusses, des Lageberichts sowie den Vorschlag zur Verwendung des Bilanzgewinns an die Aktionäre (vgl. § 171 Abs. 1 AktG). Die aufgeführten Aufgaben des Aufsichtsrats innerhalb seiner Überwachungstätigkeit lassen sich in eine zukunftsorientierte Überwachung und eine vergangenheitsbezogene Kontrolle einteilen (vgl. KOHLENBACH 2003: 4). So fallen unter die zukunftsorientierte Überwachung unter anderem die beabsichtigte Geschäftspolitik oder die Unternehmensplanung des Vorstandes, wohingegen die vergangenheitsorientierte Kontrolle beispielsweise die Feststellung des Jahres- bzw. Konzernabschlusses beinhaltet. Gezielten Einfluss auf die Entscheidungen der Unternehmensleitung kann der Aufsichtsrat somit nur ex ante vornehmen, während er ex post lediglich die durchgeführten Aktivitäten kontrollieren kann. (Vgl. AUGÉ-DICKHUT 1999: 31.)

Die Aufgaben des Aufsichtsrates umfassen neben der Überwachung der Geschäftsführung auch die Personalentscheidungen bezüglich des Vorstands. Unter diese zweite Aufgabe fallen die Bestellung, Wiederbestellung und Abberufung der Geschäftsführungsmitglieder sowie die Gestaltung von deren Arbeitsverträgen (vgl. § 84 AktG) und

die Festsetzung von deren Vergütung (vgl. § 87 Abs. 1 AktG). Die Verknüpfung dieser beiden Aufgaben erweist sich dahingehend als sinnvoll, dass die Überwachung des Vorstands auch die Abberufung von Vorstandsmitgliedern zur Konsequenz haben kann (siehe Abschnitt 5.2.2) und somit die relevanten Kompetenzen in der Hand desselben Gremiums liegen.

### 5.2.2 Interventionsmöglichkeiten des Aufsichtsrats

Die Einflussmöglichkeit des Aufsichtsrats als Kontrollorgan des Unternehmens hängt vom Ausmaß seiner Interventionsmöglichkeiten gegenüber der Geschäftsführung ab.<sup>48</sup> Stellt der Aufsichtsrat Mängel in der Geschäftsführung fest, ist er zum regulierenden Eingreifen verpflichtet. Dafür stellt ihm der Gesetzgeber unterschiedliche Instrumente zur Verfügung, deren Anwendung oder alleinige Androhung das Management zur pflichtgemäßen Aufgabenerfüllung motivieren soll. (Vgl. VOGEL 1980: 264.) Der Aufsichtsrat muss dabei selbst entscheiden, welches Mittel er in der jeweiligen Situation für angemessen hält (vgl. SEMLER 1996: 124).

Abbildung 2 gibt einen Überblick über die bestehenden gesetzlichen Interventionsmöglichkeiten. Diese sind kategorisiert nach Einsatzzeitpunkt (ex ante oder ex post) und Intensität.

Wie aus Abbildung 2 ersichtlich, verfügt der Aufsichtsrat über ein abgestuftes Interventionspotential, welches ihm einen unterschiedlich starken Einfluss auf die Geschäftsführung ermöglicht:

Die erste *Ex-ante*-Eingriffsmöglichkeit, die Meinungsäußerung durch Stellungnahme an den Vorstand, bezieht sich auf berichtspflichtige Sachverhalte des Vorstands, zu deren Prüfung der Aufsichtsrat verpflichtet ist (vgl. § 90 AktG). In Form einer Stellungnahme muss der Aufsichtsrat seine Ansichten nach der Prüfung der Geschäftsführung mitteilen. Wenn diese Ansichten mögliche Handlungsvorschläge für den Vorstand beinhalten, muss der Vorstand diesen allerdings nicht Folge leisten. Die Stellungnahmen als präventive Maßnahmen lassen sich dem Inhalt nach in drei Kategorien klassifizieren: 1. der Aufsichtsrat nimmt an, dass das Vorhaben des Vorstands unrechtmäßig bzw. ungeeignet ist, 2. der Aufsichtsrat hält das Vorhaben des Vorstands zwar für sinnvoll, präferiert jedoch eine Alternative oder 3. der Aufsichtsrat

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<sup>48</sup> Laut SCHMIDT et al. (1997) werden die insgesamt zur Verfügung stehenden gesetzlichen Einwirkungsmittel in der Literatur als ausreichend bewertet.

befürwortet die Ansichten des Vorstands und signalisiert dies durch Stillschweigen. (Vgl. STEINBECK 1992: 159-164.) Die zweite Ex-ante-Einwirkungsmöglichkeit des Aufsichtsrats beinhaltet das Recht, „bestimmte Arten von Geschäften“ (§ 111 Abs. 4 Satz 2 AktG) seiner Zustimmung zu unterwerfen und dadurch das autonome Handeln des Vorstands einzuschränken. Dieses Recht stärkt seine Position gegenüber dem Vorstand, da es eine frühzeitige Einflussnahme auf die Geschäftspolitik ermöglicht. (Vgl. RAISER 1992: 119.)

**Abbildung 2: Gesetzliche Interventionsmöglichkeiten des Aufsichtsrats nach Einsatzzeitpunkt und Intensität**



Quelle: Eigene Darstellung in Anlehnung an Vogel (1980: 265) und Westerburg (2002: 27-32).

Im Rahmen der *Ex post*-Kontrolle kann der Aufsichtsrat als mildeste Maßnahme die Geschäftsführung des Vorstands in seinem Prüfungsreport an die Hauptversammlung offiziell beanstanden (vgl. § 171 Abs. 2 AktG). Diese Möglichkeit erlaubt dem Aufsichtsrat, die Aktionäre über Probleme in der Geschäftsführung in Kenntnis zu setzen. Des Weiteren kann der Aufsichtsrat, wenn er das rechtmäßige Handeln des Vorstands in Frage stellt, einen Sonderprüfer beauftragen, um bereits abgeschlossene Geschäftsvorfälle einer erneuten Prüfung zu unterziehen (vgl. § 142 Abs. 1 AktG). Eine stärkere Ex-post-Sanktionsmöglichkeit des Aufsichtsrats gegenüber der Unternehmensleitung ist die Verweigerung der Billigung des Jahres- bzw. Konzernabschlusses (vgl. § 171 Abs. 2 AktG). Sofern die Aufsichtsratsmitglieder Einwände gegen die

bilanzpolitischen Entscheidungen des Vorstands haben, können sie ihre Zustimmung zum Jahres- bzw. Konzernabschluss verweigern und dadurch die Feststellungsbefugnis an die Hauptversammlung übertragen (vgl. § 173 Abs. 1 AktG).

Die Einberufung einer außerordentlichen Hauptversammlung verkörpert ein weiteres Ex-post-Eingriffsinstrument. Zu dieser Maßnahme ist der Aufsichtsrat verpflichtet, wenn er den Eindruck gewinnt, dass das Wohl der Gesellschaft gefährdet ist (vgl. § 111 Abs. 3 Satz 1 AktG). Die Aktionäre werden bei Einberufung der Hauptversammlung über mögliche Versäumnisse der Leitung in Kenntnis gesetzt und können daraufhin dem Vorstand frühzeitig ihr Vertrauen entziehen. Damit können die Aktionäre dem Aufsichtsrat nach § 84 Abs. 3 Satz 2 AktG einen wichtigen Grund für die Kündigung des Arbeitsverhältnisses des Vorstands liefern. (Vgl. LUTTER/KRIEGER 2002: 49.)

Die vorzeitige Aufhebung des Dienstverhältnisses eines Vorstandsmitglieds stellt die zweitstärkste Sanktionierung von Fehlverhalten dar. Als Voraussetzung für den Einsatz dieses Instrumentes muss ein wichtiger Grund vorliegen, der nach § 84 Abs. 3 Satz 2 AktG in einer groben Pflichtverletzung (z. B. durch Schädigung des Unternehmens), in der Unfähigkeit zur ordnungsmäßigen Geschäftsführung (z.B. durch fehlende Qualifikation) oder im Vertrauensentzug der Hauptversammlung liegen kann. Darüber hinaus können auch unüberwindbare Differenzen zwischen den beiden Organen bezüglich der Unternehmenspolitik eine Kündigung nach sich ziehen. (Vgl. LUTTER/KRIEGER 2002: 146f.)

Die stärkste Ex-post-Interventionsmöglichkeit des Aufsichtsrats beinhaltet die Klage auf Schadensersatz wegen Pflichtverletzung gegen ein Vorstandsmitglied nach dessen Abberufung. Dieses Recht unterscheidet sich von den anderen Interventionsrechten dahingehend, dass kein direkter Einfluss (mehr) auf das entlassene Mitglied ausgeübt werden kann. (Vgl. STEINBECK 1992: 171.)

### 5.3 Stand der Forschung

In der bisherigen Literatur haben sich vor allem drei Untersuchungen mit den Kontrollaktivitäten *deutscher* Aufsichtsräte beschäftigt. Da die Studien von PELKE (1972: 35ff.) und VOGEL (1980: 54ff.) zeitlich weiter zurückliegen, stammt die einzige aktuelle Untersuchung in diesem Bereich von GROTHE (2006: 111ff.). In der Zeit von März bis Juli 2004 befragt er 46 Aufsichtsratsmitglieder von DAX-Unternehmen, mittels

welcher Instrumente der Aufsichtsrat seine Überwachungsfunktion bei negativen Ergebnissen des Vorstands erfüllt. Die Befragten geben an, in erster Linie durch Stellungnahmen und Beanstandungen (89,1 Prozent) ihre Überwachungsfunktion wahrzunehmen. Des Weiteren setzen sie die Abberufung (67,4 Prozent) bzw. die Ablehnung der Verlängerung der Amtszeit (54,3 Prozent) von Vorstandsmitgliedern sowie die Verweigerung der Zustimmung zu bestimmten Geschäften (28,3 Prozent) als Interventionsinstrument ein. Die Veranlassung einer Sonderprüfung (8,7 Prozent) oder die Einberufung einer außerordentlichen Hauptversammlung (8,7 Prozent) werden laut ihren Angaben kaum als Maßnahmen zur Erfüllung ihrer Überwachungsaufgabe gewählt. (Vgl. GROTHE 2006: 311ff.)

Die bisherigen Untersuchungen beschränken sich darauf prozentual zu analysieren, wie oft interveniert (vgl. PELKE 1972) und welche Art der Intervention angewandt wird (vgl. GROTHE 2006; VOGEL 1980). Keine der Studien untersucht darüber hinaus, in welchen inhaltlichen Kontexten die verschiedenen Interventionen eingesetzt werden. Zudem liegen die Untersuchungen zum Teil schon längere Zeit zurück. Die vorliegende Untersuchung trifft daher zum einen aufgrund ihrer Aktualität und zum anderen wegen ihrer umfassenderen Analyse – sowohl im quantitativen als auch im qualitativen Bereich – auf eine Forschungslücke.

## 5.4 Empirische Untersuchung der Aufsichtsratsinterventionen

### 5.4.1 Untersuchungsobjekt und Untersuchungsdesign

Als Untersuchungsobjekt werden 151 Unternehmen deutscher Rechtsform aus den Indizes DAX, MDAX, SDAX und TecDAX<sup>49</sup> der Jahre 2000 bis 2006 herangezogen. Als Datenquelle für die Aktivitäten der Aufsichtsräte dieser Unternehmen werden Nachrichten der Frankfurter Allgemeinen Zeitung (FAZ), Ad hoc- und Corporate News-Meldungen verwendet, die im Zeitraum vom 01.01.2000 bis 31.12.2006 veröffentlicht wurden. Als Quelle der Ad hoc- und Corporate News-Meldungen wird die

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<sup>49</sup> Der DAX umfasst die Werte der 30 größten Unternehmen des Prime Standard nach Marktkapitalisierung und Börsenumsatz. Der MDAX umfasst die Werte der 50 größten Unternehmen des Prime Standard, die dem DAX folgen und der SDAX umfasst die Werte der 50 größten Unternehmen des Prime Standard, die dem MDAX folgen. Der TecDAX umfasst die Werte der 30 größten Unternehmen des Prime Standard im Technologiesektor (vgl. DEUTSCHE BÖRSE 2009).



Datenbank der Deutschen Gesellschaft für Ad-hoc-Publizität<sup>50</sup> herangezogen. Die Suche nach Nachrichten zu den Aufsichtsgremien der 151 Unternehmen ergibt nach Bereinigung für Mehrfachmeldungen 4.103 FAZ-, 921 Ad hoc- und 143 Corporate News-Meldungen.<sup>51</sup> Aus der Gesamtzahl dieser Meldungen werden die Nachrichten über Aktivitäten, die von den Aufsichtsräten ausgehen, erfasst und in inhaltsbezogene Kategorien eingeteilt. Die Kategorisierung der Aktivitäten stützt sich dabei auf eine von RÖDER (2000: 571) entwickelte Einteilung, die für die vorliegende Fragestellung an einigen Stellen erweitert bzw. gekürzt wurde.<sup>52</sup> Im Anschluss daran werden die Aktivitäten in Interventionen und Zustimmungen unterteilt. Eine Intervention des Aufsichtsrats liegt bei einem Einschreiten des Aufsichtsrats gegenüber dem Vorstand vor und eine Zustimmung bei einer Bestätigung der Handlung des Vorstands.

### 5.4.2 Untersuchungsergebnisse

#### 5.4.2.1 Häufigkeitsverteilung der Gesamtaktivitäten

Im Rahmen der Untersuchung können unter den insgesamt 5.167 Nachrichten 555 Aufsichtsratsaktivitäten festgestellt werden, davon 478 mit zustimmendem und 77 mit intervenierendem Charakter. Abbildung 3 zeigt die Anzahl der zustimmenden und intervenierenden Aufsichtsratsaktivitäten innerhalb des Untersuchungszeitraums in Abhängigkeit des Meldungsinhalts.

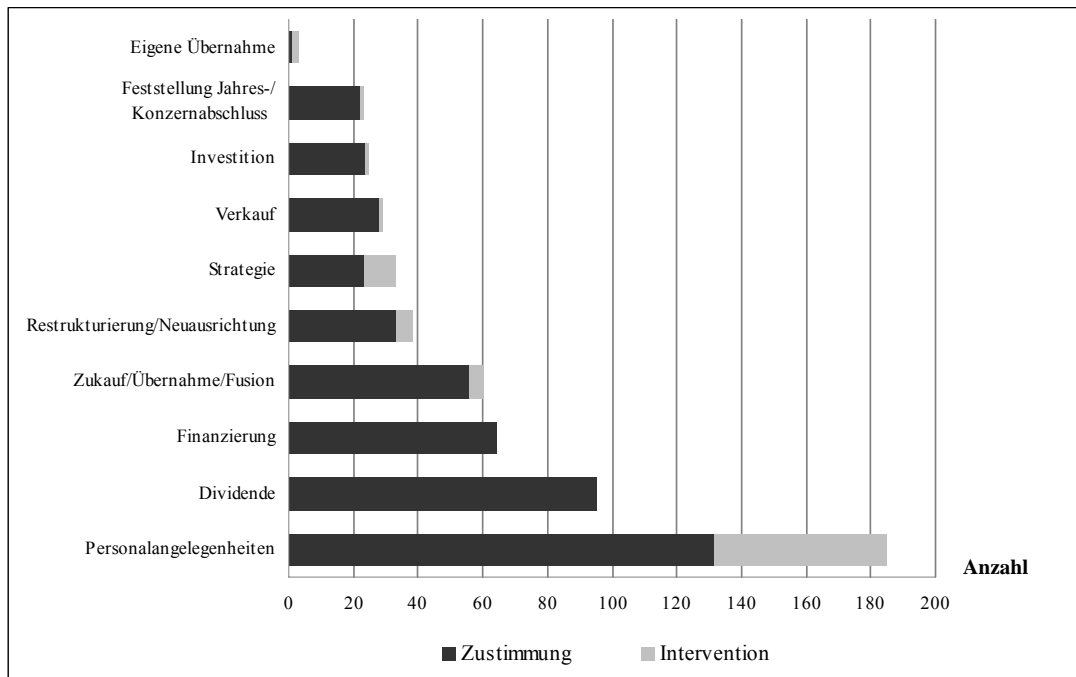
Über die Aktivitäten der Aufsichtsräte allgemein wird am häufigsten im Zusammenhang mit Personalangelegenheiten berichtet, d.h. wenn es um Veränderungen im Vorstand geht. Die Nachrichten der zweithäufigsten Kategorie beziehen sich auf die auszuschüttende Dividende und die der dritthäufigsten Kategorie stehen im Zusammenhang mit der Finanzierung. Interventionshandlungen der Aufsichtsräte finden größtenteils in Zusammenhang mit Personalangelegenheiten des Vorstands, gefolgt von Handlungen bezüglich der Strategie und der Restrukturierung bzw. Neuausrichtung eines Unternehmens statt. Keine Interventionshandlungen lassen sich bei Finanzierungsentscheidungen sowie im Bereich der Festsetzung der Dividende nachweisen.

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<sup>50</sup> Die Deutsche Gesellschaft für Ad-hoc-Publizität ist eine Institution zur Erfüllung der Pflichtpublizität für börsennotierte Unternehmen (vgl. DGAP 2009).

<sup>51</sup> Aufgrund der drei Untersuchungsquellen sind Mehrfachnennungen möglich. Um eine Verfälschung der Ergebnisse auszuschließen, wird bei Mehrfachnennungen nur die Mitteilung mit dem frühesten Datum der Analyse zugrunde gelegt.

<sup>52</sup> RÖDER (2000) analysiert Ad hoc-Meldungen mit dem Ziel, Erkenntnisse über deren Informationswirkungen zu gewinnen.

**Abbildung 3: Anzahl der Gesamtaktivitäten**

Quelle: Eigene Darstellung in Anlehnung an RÖDER (2000: 571).

In Anlehnung an die Argumentation von KOHLENBACH (2003: 4) und AUGÉ-DICKHUT (1999: 31) werden die inhaltlichen Kontexte in die Gruppen „zukunftsorientierte Überwachungsaufgabe“, „vergangenheitsorientierte Kontrolle“ und „Personalangelegenheiten“ zusammengefasst. Bei deren Vergleich lässt sich feststellen, dass sich die Gruppen in Bezug auf den Anteil der Interventionen an allen Aktivitäten unterscheiden: Die Interventionen der zukunftsorientierten Überwachung, unter die die Bereiche Eigene Übernahme, Investition, Verkauf, Strategie, Restrukturierung/Neuausrichtung, Zukauf/Übernahme/Fusion und Finanzierung fallen, nehmen im Mittelwert 9,13 Prozent der Aktivitäten ein. In den Kontexten der vergangenheitsorientierten Kontrolle – Feststellung des Jahres- bzw. Konzernabschlusses sowie Festsetzung der Dividende – füllen Interventionen einen Anteil von 0,85 Prozent der Aktivitäten und im Bereich der Personalangelegenheiten von 28,65 Prozent aus.

Die Tatsache, dass Meldungen zu Aktivitäten der Aufsichtsräte gefunden werden können, zeigt, dass die Öffentlichkeit Aufsichtsratshandlungen, darunter auch Interventionsaktivitäten, beobachten kann. Die Ergebnisse offenbaren zudem, dass die untersuchten Aufsichtsräte besonders bei Personalangelegenheiten und zukunftsorientierten Entscheidungen nicht nur zustimmend, sondern auch intervenierend aktiv sind. Sowohl die Personalentscheidungen in Bezug auf den Vorstand als auch die langfristige Strategie des Unternehmens sind Kerngebiete, die zu den Personal- und Kontroll-

aufgaben eines Aufsichtsrats gehören (vgl. Abschnitt 5.2), da sie für die Aktionäre und alle anderen Interessensgruppen der Unternehmen von großer Bedeutung sind. Bei den zukunftsorientierten Entscheidungen der Finanzierung lassen sich allerdings keine Interventionen verzeichnen, ebenso wenig bei den vergangenheitsorientierten Kontrollaktivitäten hinsichtlich der Festsetzung der Dividende. Da die Unternehmen laut ACHLEITNER/WICHELS (2003: 57) in der Regel das Konzept der Dividendenkontinuität verfolgen und ihre Dividende daher in der Höhe über die Jahre stabil gehalten wird, ist es wenig überraschend, dass hinsichtlich der Dividende keine Interventionen festgestellt werden. Bei den vergangenheitsorientierten Kontrollaktivitäten hinsichtlich der Feststellung des Jahres- bzw. Konzernabschlusses kann unter den 23 Aktivitäten lediglich eine Intervention festgestellt werden. Dies ist insofern verwunderlich, da die Aufsichtsratsmitglieder nach § 111 Abs. 5 AktG ihre Aufgaben nicht durch andere wahrnehmen lassen dürfen und sie sich daher nicht auf das Urteil eines Wirtschaftsprüfers als Sachverständigen nach § 109 Abs. 1 Satz 2 AktG oder das Urteil des Abschlussprüfers verlassen dürfen (vgl. THEISEN 1994: 811f). Zudem stellt die DPR bzw. die BaFin für neun Unternehmen der Stichprobe jeweils einen fehlerhaften Jahres- und/oder Konzernabschluss im Untersuchungszeitraum fest (siehe Anhang 2). Nur bei einem der acht Unternehmen findet eine Intervention in diesem Bereich statt.<sup>53</sup> Auch in den übrigen Fällen hätten die Aufsichtsräte intervenieren müssen, um ihrer Kontrollpflicht nachzukommen. Diese Kontrollversäumnisse offenbaren Defizite in der internen Unternehmensüberwachung (vgl. u.a. BÖCKING/DUTZI/MÜBIG 2004).

### 5.4.2.2 Häufigkeitsverteilung der Interventionen

Die 77 Interventionen verteilen sich gemäß Abbildung 4 auf die folgenden Maßnahmen: Die Aufsichtsräte wenden 23-mal die vergleichsweise schwächeren **Ex-ante**-Eingriffsmittel an. Davon entfallen 16 Interventionen auf die Meinungsäußerung und sieben auf die Zustimmungsverweigerung. Im Vergleich zu den Ex-ante-Interventionsmitteln greifen die Aufsichtsräte häufiger, insgesamt 54-mal, zu **Ex-post**-Interventionsinstrumenten. 53-mal machen sie Gebrauch von der zweitstärksten Interventionsart, der Abberufung von Vorstandsmitgliedern. Lediglich einmal wird eine Sonderprüfung veranlasst. Zu den übrigen Interventionsmöglichkeiten werden bei den

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<sup>53</sup> Hier handelt es sich um die Zapf Creation AG.

untersuchten Gesellschaften keinerlei Aufsichtsratsaktivitäten gefunden.

Von den insgesamt 53 Abberufungen sind 22 Vorstandsvorsitzende und 31 einfache Vorstandsmitglieder betroffen. Die Abberufungen setzen sich dabei aus den folgenden Fällen zusammen: In 29 Fällen entlässt der Aufsichtsrat ein Mitglied des Vorstands, vier Mitglieder des Vorstands treten auf Druck des Aufsichtsrats zurück und 20 Trennungen finden „in gegenseitigem Einvernehmen“ statt.

**Abbildung 4: Inanspruchnahme der gesetzlichen Interventionsmaßnahmen nach Einsatzzeitpunkt und Intensität**

↑ Intensität	Gerichtliches Vorgehen gegen Vorstandsmitglieder: §§ 93, 112, 404, 405 AktG	= 0	}	<b>ex post</b>
	Abberufung von Vorstandsmitgliedern: § 84 Abs. 3 AktG	= 53		
	Einberufung einer außerordentlichen Hauptversammlung: § 111 Abs. 3 AktG	= 0		
	Verweigerung der Billigung des Jahresabschlusses: § 171 Abs. 2 AktG	= 0		
	Veranlassung einer Sonderprüfung: § 142 Abs. 1 AktG	= 1		
	Förmliche Beanstandung des Vorstands: § 171 Abs. 2 AktG	= 0	}	<b>ex ante</b>
	Zustimmungsverweigerung: § 111 Abs. 4 AktG	= 7		
	Meinungsäußerung durch Stellungnahme: § 90 AktG	= 16		

Quelle: Eigene Darstellung in Anlehnung an Vogel (1980: 265) und Westerburg (2002: 27-32).

Die Ergebnisse zeigen, dass die Aufsichtsräte der Stichprobe mehr beobachtbare Ex-post- als beobachtbare Ex-ante-Interventionen einsetzen. Das zweitstärkste Interventionsmaß des Aufsichtsrats, die Abberufung von Vorstandsmitgliedern, erweist sich als das in dieser Untersuchung am häufigsten genutzte.<sup>54</sup> Damit bestätigt die vorliegende Untersuchung auch für deutsche Aufsichtsräte die Befunde internationaler Studien, die die Personalangelegenheiten bezüglich des Vorstandes als *die* Hauptaufgabe des Board of Directors (im monistischen System) attestieren (vgl. u.a. HERMALIN/WEISBACH

<sup>54</sup> Für kleinere Unternehmen stellen wir sowohl weniger Aktivitäten als auch weniger Interventionen fest. Bei diesen Unternehmen ist der Anteil der stärkeren Interventionen zudem größer. Dies kann darauf zurückgeführt werden, dass die Meldung über die Abberufungen eines Vorstandsmitglieds eine kursbeeinflussende Information ist und sie daher nach § 15 WpHG ad hoc-meldepflichtig ist, während dies für schwächere Interventionsmaßnahmen nicht gilt oder diese bei kleineren Unternehmen möglicherweise eher ohne Wissen der Öffentlichkeit angewendet werden.

2003: 14). Auffällig ist, dass häufig die Formulierung „in gegenseitigem Einvernehmen“ gewählt wird. Dies liegt laut SEMLER (2009: 200) darin begründet, dass sich die beteiligten Parteien zur Vermeidung von negativ konnotierten förmlichen Abberufungen auf diese Sprachregelung einigen. Darüber hinaus finden sich kaum Nachrichten zu verwendeten mildereren Ex-post-Interventionsmaßnahmen. Lediglich einmal wird eine Sonderprüfung veranlasst. Die Tatsache, dass zu den übrigen Ex-post-Interventionsmöglichkeiten keine empirischen Nachweise festgestellt werden, gibt Anlass zur Vermutung, dass Aufsichtsräte die gesetzlichen Interventionsmöglichkeiten nicht in vollem Umfang ausschöpfen. Bekräftigt wird diese Vermutung dadurch, dass der Einsatz von präventiven, schwächeren Kontrollmaßen beobachtet werden kann und damit nicht die Medienberichterstattung Grund für die fehlenden Meldungen zu sein scheint.

In welchen inhaltlichen Kontexten die soeben präsentierten Interventionen eingesetzt werden, stellt Tabelle 54 dar.

**Tabelle 54: Beobachtete Interventionen klassifiziert nach Interventionsart und inhaltlichem Kontext**

Inhaltlicher Kontext		Interventionsart				Summe
		ex ante-Intervention		ex post-Intervention		
		Meinungs- äußerung	Zustimmungs- verweigerung	Abberufung von Vorstands- mitgliedern	Sonder- prüfung	
Zukunfts- orientierte Überwachung	Eigene Übernahme		2			2
	Investition		1			1
	Verkauf		1			1
	Strategie	7	3			10
	Restrukturierung/ Neuausrichtung	5				5
	Zukauf/ Übernahme/ Fusion	4				4
	Finanzierung					0
Vergangen- heits- orientierte Kontrolle	Feststellung Jahres- bzw. Konzernabschluss				1	1
	Dividende					0
Personalangelegenheiten				53		53
Summe		16	7	53	1	77

Quelle: Eigene Darstellung.

Die festgestellten Ex-post-Interventionen werden fast ausschließlich im Bereich der Personalangelegenheiten im Falle einer für den Aufsichtsrat nicht zufrieden stellenden Leistung des Vorstands angewandt. Dabei wird 53-mal ein Vorstandsmitglied abberufen. Nur eine Ex-post-Intervention wird im Bereich der Jahres- bzw. Konzernabschlüsse verwendet. Dabei handelt es sich um eine Sonderprüfung, die zur Kontrolle der Ein-

haltung gesetzlicher Vorschriften in den Geschäftsberichten vergangener Jahre eingesetzt wird. 16 Meinungsäußerungen, bei denen der Aufsichtsrat das Management zum Handeln aufruft, den Vorstand ermahnt oder kritisiert, werden erfasst. Davon betreffen sieben Meinungsäußerungen strategische Entscheidungen, fünf eine Restrukturierung bzw. Neuausrichtung des Unternehmens und vier den Zukauf oder die Übernahme eines Unternehmens bzw. die Fusion mit einem anderen Unternehmen. Ihre Zustimmung verweigern die Aufsichtsräte zweimal zu einem Übernahmeangebot und je einmal zur Fortführung einer Investition und zum Verkauf einer Tochtergesellschaft. Außerdem verwehren sie dreimal ihre Zustimmung im Bereich der Strategie, dabei jeweils einmal zu einer Aktienumwandlung, zur Schließung von Werken und zu einer Umwandlung in eine Europäische Aktiengesellschaft.

Die Ergebnisse bestätigen die in Abschnitt 5.2.1 präsentierten Überlegungen von AUGEDICKHUT (1999: 31), dass die zukunftsorientierte Überwachung durch Ex-ante-Interventionen und die vergangenheitsorientierte Kontrolle durch Ex-post-Interventionen durchgeführt werden. Weiterhin zeigen die vorliegenden Ergebnisse, dass die Aufsichtsräte im Bereich der Personalentscheidungen durch Ex-post-Maßnahmen intervenieren.

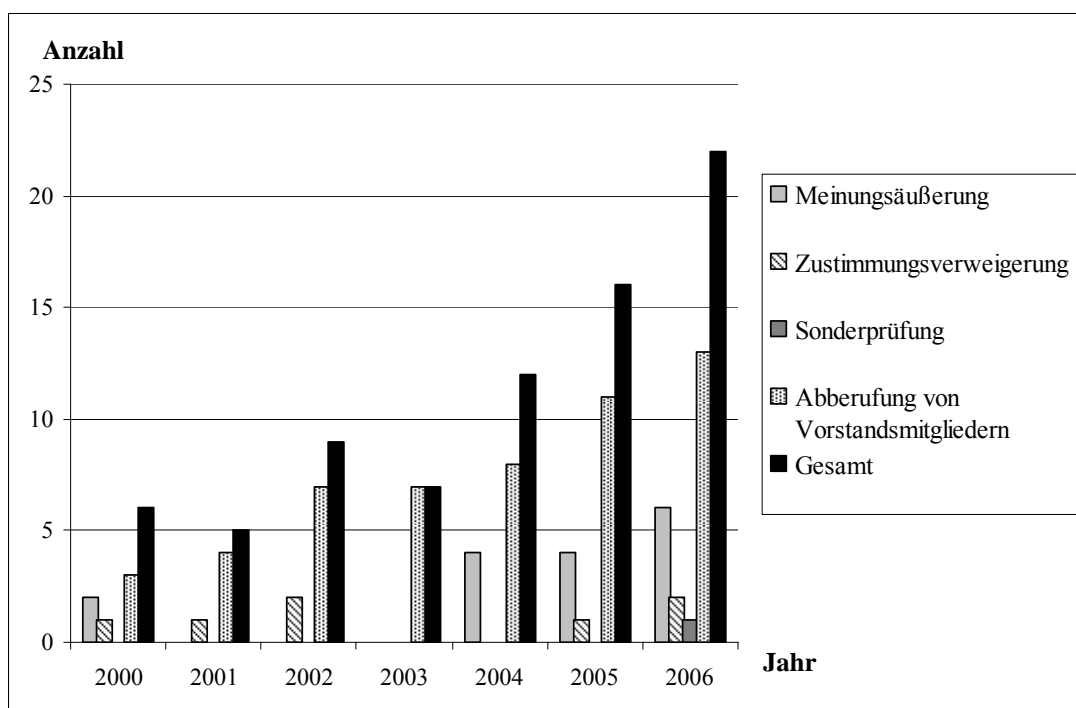
### 5.4.2.3 Trendverlauf der Interventionen

Durch die Verabschiedung des Gesetzes zur Kontrolle und Transparenz im Unternehmensbereich im Jahr 1998 sowie die Einführung des Corporate Governance Kodex im Februar 2002 und dessen Verzahnung mit dem Aktiengesetz durch das Transparenz- und Publizitätsgesetz im Juli 2002 wurden die Regelungen zur Kontrolltätigkeit der Aufsichtsräte erweitert sowie die Aufmerksamkeit, die den Aufsichtsratsgremien zukommt erhöht. Daher ist eine Betrachtung der Interventionen über den Untersuchungszeitraum interessant, um zu analysieren, ob sich die Eingriffe der Aufsichtsräte in die Geschäftsführungsaktivitäten der Vorstände verändert haben. In Abbildung 5 sind die 77 Interventionen in Bezug auf die einzelnen Jahre abgetragen.

Es ist zu beobachten, dass die Interventionsaktivitäten von Aufsichtsräten insgesamt angestiegen sind. Dies trifft ebenso auf die Gruppe der Meinungsäußerungen zu: Während vor der Novellierung des Aktiengesetzes nur wenige Meinungsäußerungen von Aufsichtsräten verzeichnet werden können, werden im Jahr 2006 sechs beobachtet. Ein deutlicher Anstieg lässt sich auch bei der Praxis der Abberufungen von Vorstandsmitgliedern erkennen. Die Zahl der Abberufungen ist von drei im Jahr 2000 auf 13 im

Jahr 2006 gestiegen. Lediglich bei der Veranlassung von Sonderprüfungen sowie bei den Zustimmungsverweigerungen durch den Aufsichtsrat können keine wesentlichen Veränderungen festgestellt werden. Aufgrund der sowohl positiven als auch negativen konjunkturellen Entwicklungsphasen im Untersuchungszeitraum kann die beobachtete Zunahme der Interventionen nicht nur auf die Performance der Unternehmen zurückgeführt werden (vgl. u.a. COOLS/VAN PRAAG 2007; JENTER/KANAAN 2006; KAPLAN/MINTON 2006; DENIS/DENIS 1995).

**Abbildung 5: Trendverlauf der Interventionen**



Quelle: Eigene Darstellung.

Die Ergebnisse zeigen, dass die Kontrollaktivitäten von Aufsichtsräten insgesamt in den letzten Jahren angestiegen sind. Dies könnte auf die gesetzlichen Änderungen hinsichtlich der Rechte und Pflichten von Aufsichtsräten zurückgeführt werden. Eine aktivere Ausübung der Aufsichtsratskontrolle könnte ebenso in den Forderungen und im Druck der Öffentlichkeit durch die großen Unternehmenskrisen begründet sein. Möglicherweise ist der beobachtete Trend auch nicht ausschließlich auf einen Anstieg der Aufsichtsratsaktivitäten, sondern zudem auf ein gestiegenes Medieninteresse zurückzuführen.

## 5.5 Fazit

Im Rahmen dieses Beitrags können unterschiedliche Befunde präsentiert werden: Zunächst gelingt es zu zeigen, dass Aktivitäten des Aufsichtsrats beobachtbar sind. Diese betreffen vor allem die inhaltlichen Kontexte der Personalangelegenheiten des Vorstands, Entscheidungen bezüglich der Dividende sowie der Finanzierung. Bei Unterscheidung der Aktivitäten in zustimmende und intervenierende Aktivitäten werden mehr zustimmende als intervenierende Aktivitäten festgestellt. Intervenierend aktiv sind die Aufsichtsräte bei Personalangelegenheiten sowie in den Bereichen der zukunftsorientierten Überwachung. Kaum Interventionen können dagegen bei der vergangenheitsorientierten Kontrolle vermerkt werden. Hier kann mittels der durch die DPR und die BaFin als fehlerhaft befundenen Jahres- bzw. Konzernberichte einiger Unternehmen der Stichprobe zudem ein Kontrollversäumnis der Aufsichtsräte nachgewiesen werden. Die untersuchten Aufsichtsräte nutzen bei ihren Eingriffen vermehrt Ex-post-Interventionen. Dabei ist die Abberufung von Vorstandsmitgliedern die am häufigsten gewählte Interventionsmaßnahme. Lediglich eine Sonderprüfung kann als ein anderes Ex-post-Interventionsmaß in der Stichprobe im Untersuchungszeitraum festgestellt werden. Bei den restlichen beobachteten Interventionsmaßnahmen handelt es sich um Ex-ante-Interventionen, die sich zu zwei Dritteln aus Meinungsäußerungen und zu einem Drittel aus Zustimmungsverweigerungen zusammensetzen. Eine Aufschlüsselung der Interventionen nach Interventionsart und inhaltlichem Kontext ergibt für die Stichprobe der Analyse, dass Ex-post-Interventionen in den Bereichen der Personalangelegenheiten sowie der vergangenheitsorientierten Kontrolle und Ex-ante-Interventionen bei der zukunftsorientierten Überwachung eingesetzt werden. Schließlich zeigen die Ergebnisse, vor allem für Meinungsäußerungen und Vorstandsentlassungen, in den untersuchten Jahren einen positiven Trend in der Anzahl der Anwendungen von Interventionen.



# 6

## Stock Price Reaction to Supervisory Board Interventions

(Available as: Vetter, Karin; Philipp Sturm (2011): Stock Price Reaction to Supervisory Board Interventions: Empirical Evidence from Germany. At: *Social Science Research Network*.)

### 6.1 Introduction

Since the turn of the century, the discussion about the efficiency of different corporate governance systems around the world has been spurred by scandals of big corporations in many countries. Within this context, supervisory boards as internal controlling bodies have been subject to particular scrutiny because of accusations claiming they are not fulfilling their controlling obligations (see KÖHLER 2010).

While several studies focus on this issue by investigating the intervening actions (see VETTER/WEBER 2010; GROTHE 2006; VOGEL 1980; PELKE 1972) used by supervisory boards to control the management, it remains unclear how stock prices react to these interventions. For example, previous empirical studies provide mixed evidence for the stock price reaction to forced executive turnover (see for an overview COOLS/VAN PRAAG 2007 and section 6.2.2). Theoretical considerations by HERMALIN/WEISBACH (1998) offer an explanation for these inconsistent findings as they suggest that the stock price reaction depends on whether the information for the board's decisions is private or public.

With our study we are among the first to empirically test these propositions by HERMALIN/WEISBACH (1998)<sup>55</sup> by addressing the following questions: What information is contained in news about intervention activities of the supervisory board for the

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<sup>55</sup> To the knowledge of the authors, only HÖPPE/MOERS (2008) test the same propositions so far. However, their approach is different since their study is mainly based on bonus contract information.

stock market? Do the observed effects vary for different groups of companies depending on the amount of information available to the public? To answer these questions, we examine the news about intervention activities of supervisory boards of German listed companies in the indices DAX, MDAX, SDAX and TecDAX within the time period of 2000 to 2006 and analyze the stock price reaction to these interventions. On the basis of the number of relevant news items for each company in the *Frankfurter Allgemeine Zeitung* (FAZ), one of Germany's major newspapers, we use the media coverage of the firms to measure the information available to the public. Applying standard event study methodology we are able to test hypotheses derived from HERMALIN/WEISBACH (1998).

The main contribution of this paper is to empirically test two (related) propositions of HERMALIN/WEISBACH (1998) regarding the stock market reaction to dismissals of CEOs. In order to do so, we proxy for the information available to the public by measuring the media coverage of the respective firms. While the number of news items is well established as a measure of media coverage (see FANG/PERESS 2009), we propose this figure as a proxy for the amount of information available to the public. The results of our empirical analysis are in line with the predictions of HERMALIN/WEISBACH (1998). Furthermore, our results contribute to the explanation of inconsistent findings in previous studies examining the effect of forced top executive departures on firm value. Last but not least, we contribute to the research on corporate governance and the ongoing discussion with our analysis in different ways: We present recent empirical evidence on supervisory board interventions in Germany. Moreover, we do not only analyze forced top executive departures but look at the whole legally provided range of intervention measures of which dismissals of top executives are only one part of.

In more detail, our results show that news about intervention activities by the supervisory board contains relevant information for the capital market. Consequently, it has significant effects on stock prices. Moreover, these effects vary for groups of companies with different levels of media coverage: We observe insignificant abnormal returns around the time of intervention for companies with high media cover-

age.<sup>56</sup> However, when cumulated over several days including the days preceding the date of intervention, abnormal returns for high media coverage companies are positive and statistically significant. When looking at companies with low media coverage, we find a negative and significant stock price reaction to interventions indicating that the information effect (bad news about management performance) outweighs the real effect (good news about the board) which we attribute to lower media coverage on (management) performance before the intervention. For companies with low media coverage, we also observe stronger negative reactions to more severe measures of interventions relative to weaker measures and stronger negative reactions to dismissals of CEOs compared to dismissals of other members of management; however, the differences in the means of these sub-groups are not statistically significant. Our results prove to be robust when including variables controlling for company characteristics (especially size) in multivariate regressions.

The remainder of this paper proceeds as follows: Section 6.2 takes a look at the regulatory framework of supervisory boards and reviews prior literature. The theoretical background for our analysis is provided in section 6.3 before section 6.4 presents the empirical analysis including the results. Section 6.5 concludes.

## 6.2 Regulatory framework and literature review

### 6.2.1 Duties, responsibilities and possibilities of intervention of the supervisory board

The main characteristic of the German corporate governance system is the division between the management as executive body and the supervisory board as controlling body (see BLEICHER/LEBERL/PAUL 1989: 44). While, according to national law, the management conducts all business on its own authority, the supervisory board has the duty to monitor the management. Simultaneous affiliations to both, the management and the supervisory board are strictly prohibited to avoid possible conflicts of interest and to ensure the independence of members of the supervisory board. Beside the task of monitoring the management, the supervisory board also has the duty of appoint-

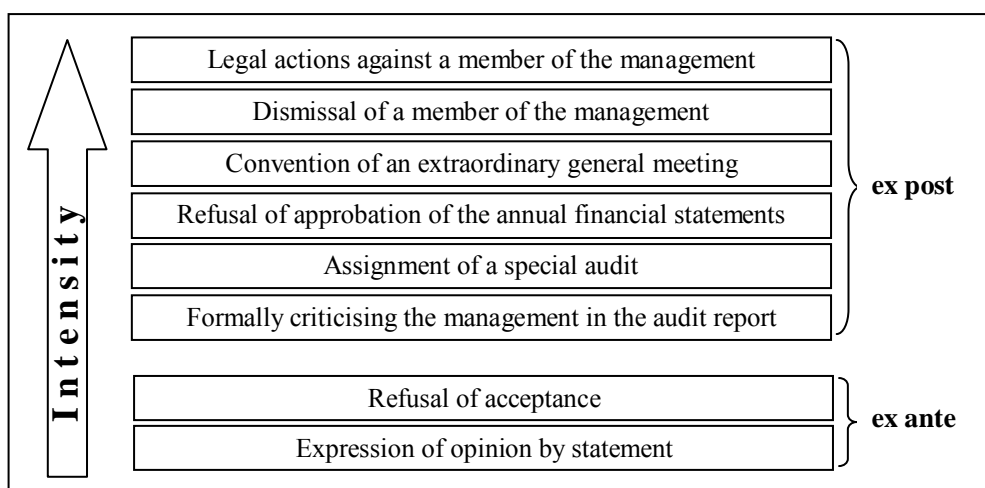
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<sup>56</sup> Note that inconclusive results might be due to two competing effects (positive real effect and opposing information effect (see COOLS/VAN PRAAG 2007: 8, 14)): The positive real effect results from the board's monitoring (good information about the board), the opposing information effect occurs due to negative news about firm performance (bad news about the management).

ing, reappointing and withdrawing members of the management and is in charge of designing their employment contracts.

As controlling body, the power of the supervisory board heavily depends on the extent of possibilities to take corrective action against the company's management. In order to do so, the supervisory board has a set of interventions of gradually increasing intensity at hand which enable it to exert influence on the management with different degrees of power. Figure 6 outlines the existing legitimate possibilities of intervention. They are categorized by their intensity and by the time of intervention relative to the disputed issue (*ex ante* or *ex post*).

**Figure 6: Legal possibilities of intervention by intensity**



Source: Illustration based on VETTER/WEBER (2010).

The first *ex ante* possibility of action, the *expression of opinion by statement* to the management, applies to all facts that have to be reported to the supervisory board by the management and are thus subject to the audit of the supervisory board (see sec. 90 AktG). The supervisory board reports its views to the management in form of a statement after auditing; the management, however, is not obliged to obey the expressed comments. The supervisory board's second *ex ante* possibility of action is the right to *submit certain kinds of affairs to its approbation* (see sec. 111 subs. 4 sent. 2 AktG) and thereby limits the autonomous authority of the management to act. This right strengthens the supervisory board's position against the management enormously since it allows an early exercise of influence on the business policy.

Within the context of *ex post* control, the mildest measure of intervention by the supervisory board is *formally criticizing the management in its audit report* at the annual general meeting (see sec. 171 subs. 2 AktG). This possibility allows the board to

inform the stockholders about problems in the management at an early stage. In case it questions the legality of the management's actions, the supervisory board can furthermore *assign a special audit* to let already completed business transactions be reassessed (see sec. 142 subs. 1 AktG). Therewith, the controlling body expresses clearly its distrust against the management. The *refusal of approbation of the annual financial statements* is another possibility of imposing an ex post sanction against the management (see sec. 171 subs. 1 AktG). In case the members of the supervisory board have objections against the management's decisions concerning accounting policies, the supervisory board can refuse its acceptance of the annual statement and thereby defer the decision to the annual general meeting (see sec. 173 subs. 1 AktG). Another measure of ex post intervention is *convening an extraordinary general meeting*. The supervisory board is obliged to apply this measure when the well-being of the company renders this necessary (see sec. 111 subs. 3 sent. 1 AktG). The stockholders are informed about possible failures of the management and can hereupon deprive the management of its trust at an early stage. With this action, the stockholders can give the supervisory board an important reason for the dismissal of one or more members of the management according to sec. 84 subs. 3 sent. 2 AktG (see LUTTER/KRIEGER 2002: 49).

Aside from legal actions for damages, the *dismissal of one or more members of the management* is the strongest instrument of sanction for malpractice. An important reason must be on hand which according to sec. 84 subs. 3 sent. 2 AktG must consist of a serious violation of obligations (e.g., by damaging the company), the inability of proper management (e.g., because of missing qualifications) or the withdrawal of confidence for an important cause by the general meeting (see LUTTER/KRIEGER 2002: 146 et seq.). Insurmountable differences concerning the business policy of the company between the two bodies can furthermore be a reason for dismissal (see LUTTER/KRIEGER 2002: 146 et seq.). Finally, the supervisory board can *take legal actions against a member of the management* after its dismissal and sue it for damages because of neglect of duty (see sec. 93 subs. 2 AktG).<sup>57</sup>

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<sup>57</sup> The supervisory board represents the company against the management in this case (see sec. 112 AktG).

## 6.2.2 Related Literature

The question of how capital markets react to news about different kinds of supervisory board interventions has not been addressed so far. There are however studies which are closely related to our work.

While empirical work on control activities of supervisory boards in Germany is rather descriptive (see VETTER/WEBER 2010; GROTHE 2006; VOGEL 1980; PELKE 1972), previous international studies more specifically analyze the relation between stock market returns and control activities of boards of directors. These international studies, however, mostly focus on the dismissals of CEOs or other members of the management and thus only on one kind of intervention. Related work on dismissals of top executives can be classified into three groups: The first group deals with the question if CEO dismissals follow bad company performance. These studies find that more dismissals follow bad performance which supports the supposition of an effective control by the supervisory board (dualistic system) or the board of directors (monistic system) (see, e.g., JENTER/KANAAN 2006; KAPLAN/MINTON 2006). The second group analyzes the effects which dismissals of CEOs and members of the management have on the long-term performance of companies. These studies arrive at mixed results (see, e.g., DENIS/DENIS 1995, MURPHY/ZIMMERMANN 1993). The third and for our analysis most relevant group of studies analyzes how the stock market responds to news about dismissals of CEOs or members of the management. They all use event study methodology in order to investigate stock price reactions. COOLS/VAN PRAAG (2007) additionally study volumes of trade. So far, companies within the US, UK, France, the Netherlands and Japan have been subject to research (see, e.g., COOLS/VAN PRAAG 2007, JENTER/KANAAN 2006). The results of these studies are mixed and shall therefore be presented in more detail: Several authors find evidence for a significant positive stock price reaction to the announcement of forced departures of executives or CEOs. FURTADO/ROZEFF (1987) and DENIS/DENIS (1995) observe this effect in the US for forced departures of top executives, WEISBACH (1988) and HUSON/PARRINO/STARKS (2001) for CEOs. KANG/SHIVDASANI (1996) confirm this result for CEOs in Japan. Other studies find no significant effect such as WARNER/WATTS/WRUCK (1988) looking at top executives in the US, DHERMENT-FERERE/RENNEBOOG (2002) studying CEO turnover in France and DANIS-EVSKA/DE JONG/ROSELLON (2003) analyzing top executives and CEOs in the Nether-

lands. Significant negative stock price reactions are observed by MAHAJAN/LUMMER (1993) for top executives in the US and by DEDMAN/LIN (2002) for British CEOs.

One explanation for these inconsistent empirical results is offered by HERMALIN/WEISBACH (1998: 110). In their formal model, they present two propositions (among others) which we will test within this paper. The two propositions from the model are discussed in more detail in the following section.

### 6.3 Theoretical background and development of hypotheses

Theoretical basis for our analysis is a formal model by HERMALIN/WEISBACH (1998) which explains the board selection process as a bargaining game between the CEO and the board of directors. In their model, HERMALIN/WEISBACH (1998) derive several propositions on board monitoring and CEO turnover. In our study, we focus on two propositions of HERMALIN/WEISBACH (1998) which state that a firm's stock price falls if the CEO is fired on the basis of the board's private information and rises if the CEO is fired on the basis of public information. While HERMALIN/WEISBACH (1998) arrive at these propositions analytically, there is also a very intuitive explanation to them. Due to the fact that the market will react only to new information conveyed by the news about the dismissal of a CEO, two scenarios with different implications for the reaction of the stock price can be distinguished: 1. If the market is not completely informed about the performance of the management, and the supervisory board's decision is based on information not available to the public (i.e., private information), we expect a negative stock price reaction. In this case, news about the supervisory board's decision contains not only information about the supervisory board's action itself but is likely to include additional information about the reason why the CEO was fired (such as poor CEO performance which was revealed to the public by the supervisory board's action) thus triggering a negative stock price reaction. 2. If the market is completely informed about the performance of the management (i.e., all information is available to the public), and based on this information the supervisory board decides to dismiss the CEO, we expect a positive stock price reaction. In this case the supervisory board's action contains no news about the (bad)

performance of the CEO but good news about the supervisory board in the sense that it is acting in the shareholders' best interest.

In the following, this model is conveyed to our more general approach. As mentioned before, we look at all possible intervention activities by supervisory boards. The dismissal of the CEO or any other member of the management is in this context only one kind of possible intervention (as presented in section 6.2.1). The propositions by HERMALIN/WEISBACH (1998) are therefore generalized in the way that their idea is applied to all kinds of supervisory board interventions.

In order to be able to empirically test hypotheses geared towards the two propositions of HERMALIN/WEISBACH (1998), we look at companies with different levels of media coverage. If there is high media coverage on a company, the information advantage of supervisory boards over the public should be smaller because the public is relatively well informed. If media coverage is scarce, the public is consequently only poorly informed compared to the supervisory board. In combination with the arguments proposed by HERMALIN/WEISBACH (1998), this yields hypotheses 1a and 1b:

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Hypothesis 1a: The stock price reaction to intervention activities of the supervisory board is negative for companies with low media coverage.

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In the case of companies with low media coverage, intervention activities are (to a considerable extent) based on information that is only available to the supervisory board. Therefore, the news about supervisory board's action does not only convey information about the intervention itself but also contains some information about the reasons for this decision which were not known before. As a result, the stock price reaction to these interventions should be negative since they (also) reveal mismanagement to the market. Applying the same line of argumentation to companies with high media coverage yields:

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Hypothesis 1b: The stock price reaction to intervention activities of the supervisory board is positive for companies with high media coverage.

---

In this case the public is assumed to be completely informed about the (under-) performance of the company and its management. The supervisory board's interven-



tion conveys no news about the management's performance but solely about the supervisory board itself. The supervisory board is actively controlling the management, thus showing it is acting independently and fulfilling its legal obligations diligently. As discussed in section 6.2.1, the supervisory board has a set of possible interventions at hand which can be applied depending on the circumstances in a given situation. The possible means of intervention can thereby be sorted by their intensity (see Figure 6). Since the impact of a more severe intervention of the supervisory board is larger, it should cause a stronger market reaction. This yields:

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Hypothesis 2: The stock price reaction is stronger, the more severe the supervisory board's intervention.

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Members of management have different competencies and responsibilities. Especially the CEO of a company has a larger influence on the business policy, the long term strategy and major decisions. Thus, the dismissal of a CEO should have a stronger impact on the company and should result in a stronger stock price reaction than the dismissal of any other member of management. This yields:

---

Hypothesis 3: The stock price reaction is stronger if the dismissed member of the management is the CEO.

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## 6.4 Empirical analysis of the stock price reaction to supervisory board interventions

### 6.4.1 Data description

For our analysis, we collect information about supervisory board activities of companies listed in one of the German stock exchange indices DAX, MDAX, SDAX or TecDAX<sup>58</sup> at the time of intervention. Sources for our data are all issues of one of Germany's major newspaper, the FAZ, ad hoc announcements<sup>59</sup> and corporate press releases which were published within the time period of January 1<sup>st</sup>, 2000 to December 31<sup>st</sup>, 2006.<sup>60</sup> All ad hoc announcement and corporate press releases, which we use for our analysis, originate from the database of the Deutsche Gesellschaft für Ad-hoc-Publizität (DGAP)<sup>61</sup>. Our final sample consists of 74 interventions by the supervisory boards of 43 different companies.

According to the classification in section 6.2.1, these interventions are distributed among the different categories of intensity as shown in Figure 7. Note that in one news item the dismissal of a member of management after the completion of a special audit was announced. Because this event falls into two categories, the sum over all events in Figure 7 adds up to 75.

According to our data, supervisory boards made use of the weaker *ex-ante* measures of intervention in 23 cases. Of these, 16 interventions are identified as expressions of opinion by statement while seven fall into the category of a refusal of acceptance. By

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<sup>58</sup> The DAX reflects the segment of blue chips admitted to the Prime Standard Segment and comprises the 30 largest and most actively traded companies that are listed on the FWB® Frankfurter Wertpapierbörse (the Frankfurt Stock Exchange). The index portfolio of the MDAX comprises 50 mid-cap issues from traditional sectors which, in terms of size and turnover, rank below the DAX. These companies are also selected from the continuously traded companies in the Prime Standard Segment. The SDAX comprises the next 50 issues from the traditional sectors within the Prime Standard Segment that are ranked below the MDAX. The TecDAX tracks the 30 largest and most liquid issues from the various technology sectors of the Prime Standard Segment beneath the DAX. (See DEUTSCHE BÖRSE 2009.)

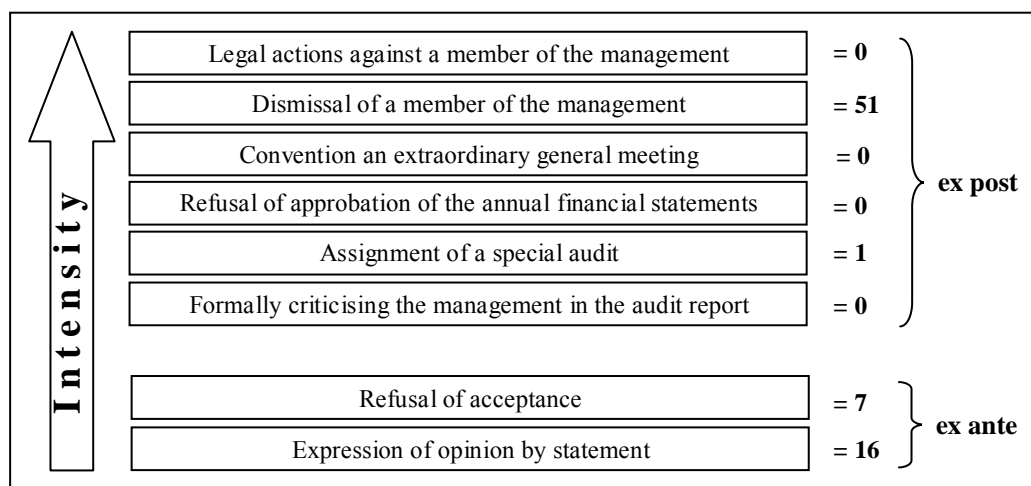
<sup>59</sup> On January 1<sup>st</sup> 1995, the second Financial Market Development Act and readjustments of sec. 15 WpHG came into effect. Ever since, emitters of shares traded at any German stock exchange are obliged to announce facts not publicly known, which could influence the stock price, to the Federal Financial Supervisory Authority and to publish them immediately to prevent insider trading. (See RÖDER 2000: 568.)

<sup>60</sup> Due to the three different sources, multiple announcement dates of one event are possible. In this case, the announcement with the earliest date is included in our analysis.

<sup>61</sup> The *Deutsche Gesellschaft für Ad-hoc-Publizität (DGAP)* is an institution which facilitates the compliance of disclosure requirements. In 2006, the providers *Deutsche Börse AG*, *Reuters AG* and *vwd* aligned with each other and took over the publication of ad hoc announcements, corporate press releases and other news for traded companies (see DGAP 2009).

comparison, the supervisory boards used more frequently (in total 52 times) ex-post measures of intervention. In 51 cases, they applied the second strongest measure, namely the dismissal of a member of the management. Only in one case a supervisory board assigned a special audit. To all other measures of intervention, no activities by the supervisory boards were found.

**Figure 7: Observed number of supervisory board interventions by intensity**



Source: Illustration based on VETTER/WEBER (2010).

A reliable proxy for the level of media coverage on the companies in our sample is crucial for our analysis. We use the number of newspaper articles on a company to proxy for the company's overall media coverage.<sup>62</sup> For this purpose we refer to the electronic database of the FAZ, one of Germany's leading newspapers. In this database company labels are applied to all news items relevant to a specific company. This feature allows for searching all news items with firm-specific information about a particular company over a certain period of time.<sup>63</sup> By using this specific search option we identify and count all news items with relevant information for all companies included in our dataset. Sorting the companies by the number of news items identified and splitting the 43 companies at the median in two groups yields a group of 21 companies with high media coverage and a group of 21 companies with low

<sup>62</sup> The number of newspaper articles as a proxy for media coverage is also used in other studies (see, e.g., FANG/PERESS 2009).

<sup>63</sup> Simply counting the occurrences of the companies' names in all newspaper articles yields a very similar picture; however, this approach is not without problems, since some of the companies' names are regular German words (e.g., Allianz or Premiere).

media coverage (adding up to 42 companies plus the median company and 73 interventions plus the intervention of the median company).<sup>64</sup>

Table 55 shows the number of news items found for the companies in each group within the time period of January 1<sup>st</sup>, 2000 to December 31<sup>st</sup>, 2006. On average, we find 512 news items per company for the 42 companies included in the analysis. More specifically, there are on average 889 news items for each company in the group of companies with high media coverage and 135 news items in the group of low media coverage companies.

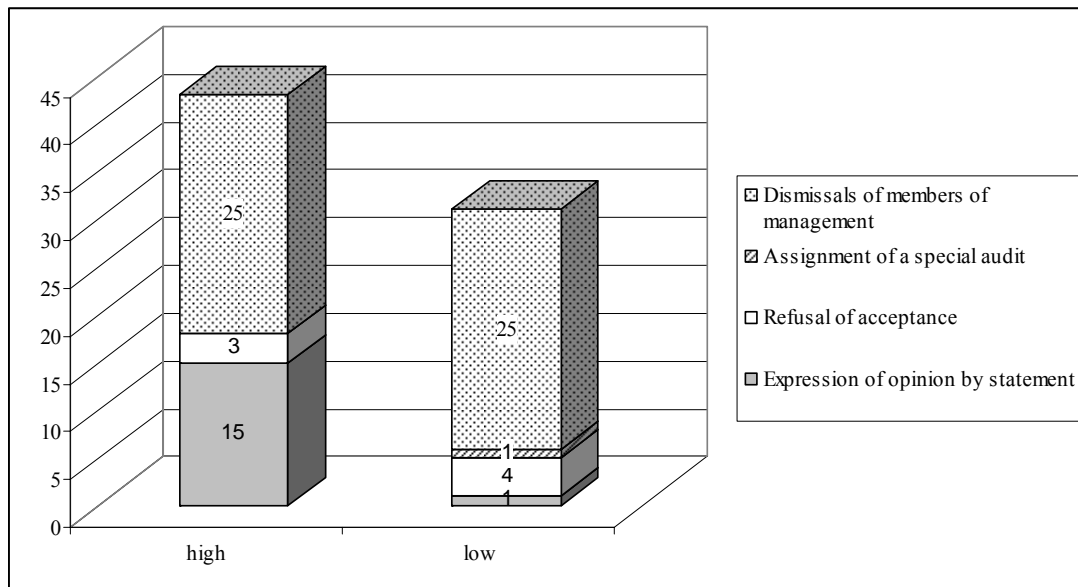
**Table 55: Number of relevant news items for the different groups of media coverage**

Group of companies with different levels of media coverage	FAZ reports	Ad hoc announcements	Corporate press releases	Sum	# of companies in sample	# of news items per company
high	17,909	699	68	18,676	21	889
low	2,085	592	165	2,842	21	135
Sum/Average	19,994	1,291	233	21,518	42	512

Source: Own compilation.

Figure 8 apportions the intervening activities according to the two groups of different levels of media coverage. The supervisory boards of companies with high media coverage used their legal power to intervene in 43 cases. Thereof, 25 times they dismissed a member of the management, in three cases they refused their acceptance and 15 times they expressed their opinion by statement. The dismissals apply to 11 CEOs and 14 other members of the management. For the controlling bodies of the 21 companies with low media coverage, 31 intervening activities were found which consist of one expression of opinion by statement, four refusals of acceptance, one assigned special audit and dismissals of nine CEOs and 16 other members of the management.

<sup>64</sup> Alternative classifications of the companies according to their media coverage were applied as a robustness check leading to qualitatively identical results.

**Figure 8: Supervisory board interventions for groups of companies by media coverage**

Source: Own compilation.

In sum, we find generally more interventions and in particular more ex ante interventions for companies with high media coverage than for companies with low media coverage, while the amount of dismissals is the same for both groups. A possible explanation is that supervisory boards of high media coverage companies are more active than supervisory boards of companies with low media coverage, especially in intervening with weaker measures. However, in some cases the newspaper editorial department may decide not to publish milder forms of intervention of less known companies because they might not be considered important enough. In addition, the small number of observed expressions of opinion by statement for companies with low media coverage could indicate that in smaller companies more expressions of opinion are communicated informally and are, therefore, not visible to media and public.

In order to control for several company characteristics (in particular size), a set of variables is included in the multivariate regression models used in the empirical analysis (see section 6.4.4). Summary statistics for these variables are presented in Table 56. The company characteristics are displayed for the overall sample of supervisory board interventions as well as for supervisory board interventions in high media coverage companies and low media coverage companies respectively.

**Table 56: Company characteristics for the events in the sample**

	N	Mean	Median	Min	Max
<b>All companies</b>					
Total assets (in bn. €)	73	83.1627	6.1421	0.1165	903.5110
Market value (in mio. €)	74	12,687.8800	2,319.8300	60.2400	81,436.2500
Employees	73	88,352.4400	15,526.0000	408.0000	466,938.0000
Price to book value	73	2.0452	1.6500	0.5400	5.4600
Beta	74	0.7078	0.6418	-0.2503	2.2338
Financial services	74	0.1757	0.0000	0.0000	1.0000
<b>Companies with high media coverage</b>					
Total assets (in bn. €)	42	143.2316	33.0948	1.1805	903.5110
Market value (in mio. €)	43	21,274.1300	9,153.5000	539.7000	81,436.2500
Employees	42	146,428.5000	96,751.0000	1,392.0000	466,938.0000
Price to book value	42	1.8355	1.5200	0.5400	4.1700
Beta	43	0.8385	0.9122	-0.0281	2.2338
Financial services	43	0.2326	0.0000	0.0000	1.0000
<b>Companies with low media coverage</b>					
Total assets (in bn. €)	30	1.6336	1.0056	0.1165	12.6167
Market value (in mio. €)	30	765.4990	523.4400	60.2400	6,165.8400
Employees	30	8,930.6330	5,088.0000	408.0000	47,126.0000
Price to book value	30	2.3837	2.2500	0.7800	5.4600
Beta	30	0.5319	0.4728	-0.2503	1.4663
Financial services	30	0.1000	0.0000	0.0000	1.0000

Total assets (in bn. Euro), market value (in mio. Euro) and employees are as of December 31st of the year preceding the event date and are proxies for company size. Price to book value accounts for the value vs. growth characteristics of firms. Beta measures the companies' systematic risk. Financial services is an industry dummy for banks and other firms in the financial industry (one if yes, zero otherwise). Total assets, employees and price to book value are available for all but one observation. The number of observations for the subsamples does not add up to the total as the observation with the median level of media coverage is not included.

Source: Own compilation.

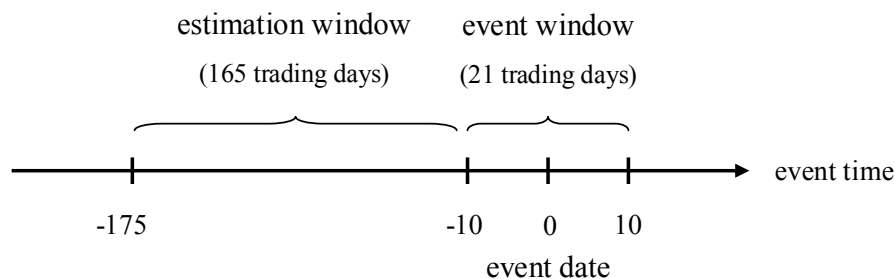
## 6.4.2 Event study methodology

To analyze the effect of supervisory board interventions on stock prices, we apply standard event study methodology (as discussed by MACKINLAY 1997). This technique is based on the work of BALL/BROWN (1968) studying the reaction of stock prices to unexpected earnings announcements and FAMA et al. (1969) analyzing the stock market reaction to the announcement of stock splits. In an event study, the effect of new information on stock prices is measured by calculating abnormal returns (AR) around the announcement date of the event under investigation.

To calculate abnormal returns around the announcement date of supervisory board interventions, the calendar dates of all interventions  $j = 1, \dots, N$  have to be converted to event time. Therefore, the day of the announcement of the supervisory board's intervention is defined as day [0], i.e., the event date. Abnormal returns are calculated on a daily basis by subtracting expected returns from actual returns. While ac-

tual or realized returns can be calculated directly from the stock market data<sup>65</sup> of Thomson Reuters, we estimate expected returns using the market model (see BROWN/WARNER 1985). The market model estimates the expected return of a stock by determining the historic relation between the stock and the market using ordinary least squares (OLS). The resulting regression parameters are  $\alpha$  (a constant) and  $\beta$  (a measure of the stock's responsiveness to changes in the market return). We choose the CDAX, which encompasses all German securities across Prime and General standard, as our market index and an estimation period of 165 days from day [-175] to day [-11] preceding the event day. Thus, in our particular case, the time line for the event study is as follows:

**Figure 9: Time line of event study**



Source: Own illustration.

The parameters of the market model are obtained from the stock market data on the securities and the market index in the estimation period by OLS. Using the market model to estimate the expected return, the abnormal returns for each event is

$$AR_{jt} = R_{jt} - \hat{\alpha}_j - \hat{\beta}_j R_{mt} \quad (1)$$

where  $R_{jt}$  is the return of the affected company of event  $j$  on day  $t$  and  $R_{mt}$  is the CDAX return on day  $t$ . The coefficients  $\hat{\alpha}_j$  and  $\hat{\beta}_j$  are the OLS estimates of the parameters of the market model.

Abnormal returns are aggregated over events by computing average abnormal returns across all events at day  $t$  in the event period as follows:

$$AR_t = \frac{1}{N} \sum_{j=1}^N AR_{jt} \quad (2)$$

<sup>65</sup> Here, the Total Return Index, which is adjusted for dividends and stock splits, was used.

In order to aggregate abnormal returns through time, cumulative abnormal returns (CAR) are calculated over time periods of two or more trading days beginning with day  $t_1$  and ending with day  $t_2$ :

$$CAR_{t_1, t_2} = \sum_{t=t_1}^{t_2} AR_t \quad (3)$$

To test for statistical significance of the (cumulative) abnormal returns, we apply the traditional t-test as surveyed by BROWN/WARNER (1985). The sample variance measure  $\sigma_{\varepsilon_i}^2$  from the market model regression in the estimation window is used as an estimator to calculate the variance of the abnormal returns:

$$\hat{\sigma}^2(AR_t) = \frac{1}{N} \sum_{j=1}^N \hat{\sigma}_{\varepsilon_j}^2 \quad (4)$$

The variance of the cumulative abnormal returns is obtained by summing up the variances of the abnormal returns starting from day  $t_1$  to day  $t_2$ :

$$\hat{\sigma}^2(CAR_{t_1, t_2}) = \sum_{t=t_1}^{t_2} \hat{\sigma}^2(AR_t) \quad (5)$$

The null hypothesis to be tested is that stock prices do not respond to the announcement of supervisory board interventions. Assuming that abnormal returns are independent, identically distributed, and normal, the test statistic is distributed student-t under the null hypothesis. The test statistic for the t-test performed on the average abnormal returns is

$$t = \frac{AR_t}{\hat{\sigma}(AR_t)} \quad (6)$$

Similarly, the test statistic for the cumulative abnormal returns is given by:

$$t = \frac{CAR_{t_1, t_2}}{\hat{\sigma}(CAR_{t_1, t_2})} \quad (7)$$

### 6.4.3 Discussion of results

The following section presents the results of the empirical analysis of the stock market reaction to supervisory board interventions. Since our hypotheses differ for companies with high media coverage on the one hand and companies with low media coverage on the other, the following tables and figures display the results for both groups respectively.



Table 57 presents the abnormal and cumulative abnormal returns with the corresponding levels of significance for the overall sample of supervisory board interventions over the window [-10; +10] around the event day. The displayed cumulative abnormal returns of Table 57 are illustrated graphically in Figure 10.

**Table 57: Abnormal ( $AR_t$ ) and cumulative abnormal returns ( $CAR_t$ ) for all supervisory board interventions and companies with different levels of media coverage**

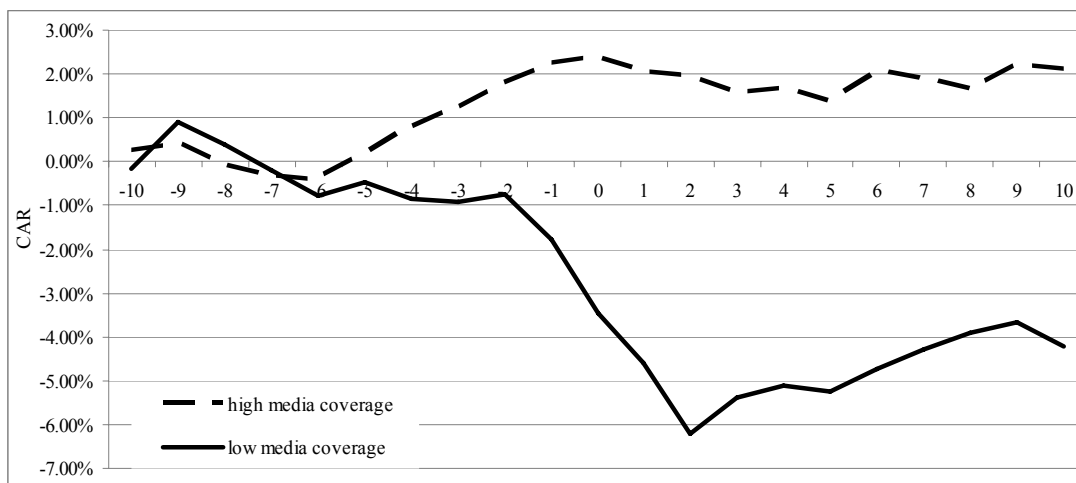
Companies with high media coverage					Companies with low media coverage				
Event Day	$AR_t$	t-stat	$CAR_t$	t-stat	Event Day	$AR_t$	t-stat	$CAR_t$	t-stat
-10	0.25%	0.72	0.25%	0.72	-10	-0.17%	-0.38	-0.17%	-0.49
-9	0.16%	0.45	0.41%	0.83	-9	1.07%	2.34 **	0.89%	1.82 *
-8	-0.50%	-1.43	-0.09%	-0.15	-8	-0.52%	-1.15	0.37%	0.62
-7	-0.24%	-0.70	-0.33%	-0.48	-7	-0.58%	-1.28	-0.21%	-0.30
-6	-0.07%	-0.20	-0.40%	-0.52	-6	-0.58%	-1.26	-0.79%	-1.02
-5	0.63%	1.83 *	0.23%	0.27	-5	0.32%	0.71	-0.46%	-0.55
-4	0.58%	1.68 *	0.82%	0.89	-4	-0.39%	-0.86	-0.85%	-0.93
-3	0.44%	1.27	1.25%	1.28	-3	-0.07%	-0.15	-0.93%	-0.94
-2	0.55%	1.59	1.80%	1.74 *	-2	0.19%	0.42	-0.73%	-0.71
-1	0.43%	1.24	2.23%	2.04 **	-1	-1.05%	-2.32 **	-1.79%	-1.63
0	0.14%	0.41	2.38%	2.07 **	0	-1.67%	-3.67 ***	-3.46%	-3.01 ***
1	-0.29%	-0.83	2.09%	1.74 *	1	-1.12%	-2.46 **	-4.58%	-3.82 ***
2	-0.16%	-0.47	1.93%	1.54	2	-1.64%	-3.60 ***	-6.22%	-4.98 ***
3	-0.37%	-1.06	1.56%	1.20	3	0.83%	1.83 *	-5.38%	-4.15 ***
4	0.11%	0.32	1.67%	1.25	4	0.27%	0.59	-5.12%	-3.81 ***
5	-0.29%	-0.85	1.38%	0.99	5	-0.12%	-0.26	-5.23%	-3.78 ***
6	0.69%	1.99	2.07%	1.45	6	0.52%	1.14	-4.72%	-3.30 ***
7	-0.18%	-0.52	1.89%	1.29	7	0.44%	0.97	-4.28%	-2.91 ***
8	-0.22%	-0.63	1.67%	1.11	8	0.38%	0.84	-3.89%	-2.58 **
9	0.53%	1.53	2.20%	1.42	9	0.24%	0.52	-3.66%	-2.36 **
10	-0.10%	-0.29	2.10%	1.32	10	-0.56%	-1.23	-4.22%	-2.66 **

This table shows abnormal returns ( $AR_t$ ) and cumulative abnormal returns ( $CAR_t$ ) for the event period [-10;+10]. To test for statistical significance t-statistics based on BROWN/WARNER (1985) are displayed next to the (cumulative) abnormal returns. \*\*\*/\*\*/\* indicate significance at the 1%/5%/10%-level (two-tailed test).

Source: Own compilation.

As can be seen in Table 57, (cumulative) abnormal returns of interventions in high and low media coverage companies differ remarkably over the time around the event day. Daily abnormal returns for the group of interventions in companies with low media coverage are significantly negative during the [-1;+2] period around the event day. Due to this strong stock market reaction, cumulative abnormal returns are also statistically significant negative from the event day on. In contrast, abnormal returns for the group of interventions in companies with high media coverage are positive on and prior to the event date, even though mostly not significant. However, cumulative abnormal returns are statistically significant for certain time periods around the event day. Figure 10 illustrates the results from Table 57 graphically.

**Figure 10: Cumulative abnormal returns (CAR) for all supervisory board interventions and companies with different levels of media coverage**



This figure plots cumulative abnormal returns for all supervisory interventions of companies with different levels of media coverage. The CAR of day  $[t]$  equals the sum of ARs from trading day  $[-10]$  to  $[t]$ .

Source: Own compilation.

Table 58 shows (cumulative) abnormal returns with the corresponding levels of significance for different types of interventions and different event windows. According to our main hypotheses, we expect a negative stock price reaction to supervisory board interventions for firms with low media coverage (hypothesis 1a) and a positive stock price reaction to supervisory board interventions for companies with high media coverage (hypothesis 1b). Examining the results for companies with low media coverage, we find a negative and highly significant AR on the event day (-1.67 percent); CARs for all other event windows are negative (between -2.72 percent and -5.48 percent) and highly significant as well. Looking at the AR and CARs for the companies with high media coverage, we observe insignificant returns. However, the differences in means of the two groups (high media coverage and low media coverage) are statistically significant for all event windows. Even though there is no evidence for a positive stock price reaction for companies with high media coverage when focusing on small event windows (Table 58), cumulating abnormal returns over time, including the trading days before the intervention, reveals a positive and statistically significant effect on stock prices (CARs fluctuate around 2 percent starting from day  $[-1]$ ; see Table 57). On the grounds of these results we cannot reject hypothesis 1a and hypothesis 1b.

**Table 58: ARs and CARs for different types of supervisory board interventions and different levels of media coverage**

	CAR(-1,0)	AR(0)	CAR(0,+1)	CAR(-1,+1)	CAR(0,+2)	CAR(-1,+2)	CAR(-1,+3)
<b>All interventions (hypotheses 1a and 1b)</b>							
Low media coverage companies (n=30)	-2.72% ***	-1.67% ***	-2.79% ***	-3.84% ***	-4.43% ***	-5.48% ***	-4.65% ***
High media coverage companies (n=43)	0.57%	0.14%	-0.14%	0.28%	-0.31%	0.12%	-0.25%
Difference mean(high) - mean(low)	3.29% ***	1.81% **	2.65% **	4.12% ***	4.12% ***	5.60% ***	4.40% **
<b>Dismissals and other interventions (hypothesis 2)</b>							
Dismissals							
Low media coverage companies (n=25)	-2.93% ***	-1.80% ***	-2.91% ***	-4.04% ***	-4.86% ***	-5.99% ***	-5.06% ***
Other interventions							
Low media coverage companies (n=5)	-1.70%	-1.00%	-2.18%	-2.87%	-2.26%	-2.96%	-2.58%
Difference mean(other) - mean(dismissal)	1.23%	0.80%	0.73%	1.20%	2.60%	3.03%	2.48%
Dismissals							
High media coverage companies (n=25)	-0.17%	-0.04%	0.25%	0.12%	0.28%	0.15%	-0.35%
Other interventions							
High media coverage companies (n=18)	1.60% **	0.40%	-0.70%	0.51%	-1.12%	0.08%	-0.10%
Difference mean(dismissal) - mean(other)	-1.77%	-0.44%	0.95%	-0.39%	1.40%	0.07%	-0.25%
<b>Dismissals of CEOs and other members of the management (hypothesis 3)</b>							
Dismissals of CEOs							
Low media coverage companies (n=9)	-3.48% ***	-2.17% ***	-3.55% ***	-4.87% **	-6.88% ***	-8.20% ***	-6.52% ***
Dismissals of other members							
Low media coverage companies (n=16)	-2.62% ***	-1.60% **	-2.55% ***	-3.57% ***	-3.73% ***	-4.75% ***	-4.24% ***
Difference mean(other member) - mean(CEO)	0.86%	0.57%	1.00%	1.30%	3.15%	3.45%	2.28%
Dismissals of CEOs							
High media coverage companies (n=11)	-0.41%	0.23%	0.59%	-0.05%	1.24%	0.60%	0.19%
Dismissals of other members							
High media coverage companies (n=14)	0.02%	-0.25%	-0.01%	0.26%	-0.47%	-0.20%	-0.77%
Difference mean(CEO) - mean(other member)	-0.43%	0.48%	0.60%	-0.31%	1.71%	0.80%	0.96%

This table reports ARs and CARs by type of supervisory board intervention and amount of media coverage for seven different event windows. To test for statistical significance of the ARs and CARs a parametric t-test was applied. The table also reports the difference in means of the ARs and CARs of two respective groups. To test for statistical significance of these differences, a two-sample t-test with unequal variances was used. \*\*\*/\*\*/\* indicate significance at the 1%-/5%-/10%-level (two-tailed test).

Source: Own compilation.

Hypothesis 2 suggests that the stock market reaction is stronger the more severe the supervisory board's intervention. Our sample of interventions is composed of dismissals, refusals of acceptance and expressions of opinion. In order to be able to test hypothesis 2, we compare the group of dismissals with the group of refusals of acceptance and expressions of opinion ("other"). With respect to companies with low media coverage, we find negative returns for both groups, "dismissals" and "other" (a AR of -1.80 percent and CARs between -2.91 percent and -5.99 percent for "dismissals" and a AR of -1.00 percent and CARs between -1.70 percent and -2.96 percent for "other"). The ARs and CARs for the two groups, however, differ from each other in the way that we find stronger reactions and high significance levels for dismissals while the AR and CARs for the group of other interventions are insignificant. While the differences in returns for the two groups are in line with our hypothesis,

empirical support remains scarce due to the small number of other interventions. Consequently, a two sample t-test yields no statistically significant difference in the means. Turning to companies with high media coverage, the resulting ARs and CARs for the two groups of intervention “dismissal” and “other” are inconsistent and except for one event window in the case of “other” insignificant. Looking at the fact that CARs for all supervisory board activities in companies with high media coverage are close to zero (and not significant), this is not very surprising. In addition, the independent two sample t-test reveals that there is no statistically significant difference in the means of the two groups. Even though the differences in returns for the two groups of interventions have the expected sign, looking at the companies with low media coverage, we have to reject hypothesis 2 as these differences are (although economically considerable) statistically not significant.

Finally, hypothesis 3 proposes a stronger market reaction to dismissals of CEOs than to dismissals of any other members of the management. Looking at the companies with low media coverage, our results show different ARs and CARs for the two groups of intervention: For dismissals of CEOs, we observe highly significant negative returns (i.e., an AR of -2.17 percent and CARs between -3.48 percent and -8.20 percent). When other members of the management are dismissed, the stock market reaction is highly significant and negative but not as pronounced (i.e., an AR of -1.60 percent and CARs between -2.55 percent and -4.75 percent). However, the differences in the means of the two groups are not significant. In the case of the companies with high media coverage, the AR and CARs for dismissals of the CEO and dismissals of other members of management show different signs over event windows and are insignificant. Differences in means are close to zero and not statistically significant. Thus, we reject hypothesis 3.

The fact that our results differ for companies with high and low media coverage is in accordance with the mixed findings of previous literature (see section 6.2.2). However, we are able to show that results vary systematically for companies depending on their level of media coverage. Even though the stock market reaction to interventions of supervisory boards of high media coverage companies is not significant when focusing on small event windows, our overall results clearly support HERMALIN/WEISBACH (1998).

#### 6.4.4 Controlling for company characteristics

Event study results show a striking difference in the development of abnormal returns around the time of intervention for the companies with high media coverage and the companies with low media coverage. However, the question arises whether the observed effect is indeed due to different levels of media coverage or whether results are driven by other company characteristics which might differ systematically for the two groups. In particular, it can reasonably be argued that company size and media coverage are strongly related and that, in consequence, the observed differences are due to a concealed size effect rather than media coverage. With the objective of corroborating our results, we estimate multivariate regression models with (cumulative) abnormal returns as the dependent variable and several variables to control for company characteristics on the right hand side. More specifically, the variables included in the models are the following: Media coverage is a dummy variable indicating whether the company belongs to the high media coverage group or the low media coverage group (one if high, zero if low). Total assets which equals the total assets of the firm (in bn. Euro) as of December 31<sup>st</sup> of the year preceding the event date controls for company size. The variable price to book value accounts for the value vs. growth characteristics of firms. Beta is the  $\beta$ -coefficient from the market model (see section 6.4.2) and measures the companies' systematic risk. Finally, financial services is an industry dummy for banks and other firms in the financial industry (one if yes, zero otherwise) which is included because of the specific characteristics of these companies. Two models are estimated for every dependent variable, i.e., the (cumulative) abnormal returns from different event windows: a short model with media coverage as well as a size variable (e.g., total assets) as independent variables and a long model with all the variables described above on the right hand side. In other words, the short model controls for size only, while the long model controls for various company characteristics.

**Table 59: Multivariate results**

	CAR(-1,0)		AR(0)		CAR(0,+1)		CAR(-1,+1)		CAR(0,+2)		CAR(-1,+2)		CAR(-1,+3)	
Constant	-0.027 *** (0.010)	-0.0543 (0.018)	-0.0167 *** (0.006)	-0.0331 *** (0.012)	-0.0279 *** (0.010)	-0.0361 ** (0.017)	-0.0384 *** (0.014)	-0.0572 ** (0.024)	-0.0443 *** (0.011)	-0.0394 ** (0.020)	-0.0548 *** (0.015)	-0.0605 (0.026)	-0.0465 *** (0.016)	-0.0637 ** (0.027)
Media coverage (0/1)	0.0368 *** (0.014)	0.0379 ** (0.015)	0.0200 ** (0.008)	0.0186 ** (0.008)	0.0312 ** (0.012)	0.0315 *** (0.011)	0.0480 *** (0.018)	0.0508 *** (0.017)	0.0457 *** (0.014)	0.0402 *** (0.013)	0.0625 *** (0.019)	0.0595 *** (0.019)	0.0474 ** (0.020)	0.0458 ** (0.019)
Total assets (in bn. €)	-0.0000 (0.000)	0.0000 (0.000)	0.0000 (0.000)	0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 * (0.000)	-0.0000 (0.000)	-0.0000 (0.000)	-0.0000 (0.000)
Price to book value		0.0080 (0.009)		0.0032 (0.004)		0.0026 (0.008)		0.0074 (0.013)		-0.005 (0.008)		-0.0005 (0.013)		0.0038 (0.015)
Beta		0.0197 (0.012)		0.0196 ** (0.008)		0.0063 (0.017)		0.0064 (0.019)		0.0177 (0.018)		0.0177 (0.019)		0.0226 (0.023)
Financial Serv. (0/1)		-0.0258 (0.023)		-0.0161 (0.012)		-0.0128 (0.015)		-0.0225 (0.025)		-0.0156 (0.015)		-0.0253 (0.025)		-0.0381 (0.028)
Prob > F	0.0155	0.0143	0.0033	0.0107	0.0466	0.1444	0.0307	0.1281	0.0073	0.0396	0.0055	0.0463	0.0708	0.1318
R <sup>2</sup>	0.1138	0.1643	0.1187	0.1979	0.0932	0.1031	0.1089	0.1279	0.1405	0.1794	0.1554	0.1762	0.0836	0.1174
Adj. R <sup>2</sup>	0.0881	0.1009	0.0931	0.1372	0.0996	0.0351	0.0830	0.0619	0.1155	0.1173	0.1309	0.1137	0.0570	0.0505

This table shows results based on OLS regressions of AR and CARs on media coverage and firm characteristics. The independent variables are defined as follows: Media coverage is a dummy variable indicating whether the company belongs to the high media coverage group or the low media coverage group (one if high, zero if low). Total assets equals the total assets of the firm (in bn. Euro) as of December 31<sup>st</sup> of the year preceding the event date and controls for company size. The variable price to book value accounts for the value vs. growth characteristics of firms. Beta is the  $\beta$ -coefficient from the market model and measures the companies' systematic risk. Financial services is an industry dummy for banks and other firms in the financial industry (one if yes, zero otherwise). Robust standard errors in parentheses. \*\*\*, \*\* and \* indicate significance at 1%, 5% and 10%, respectively.

Source: Own compilation.

Results (see Table 59) show that the coefficient of the dummy variable for media coverage is positive and statistically significant (at the 10 percent level or better) in all regression models irrespective of the event window and the model under consideration. In contrast, coefficients of controls are insignificant with few exceptions where single coefficients are significant for one specific event window only. Thus, the level of media coverage has an effect on the stock price reaction to supervisory board interventions even when controlling for size and other company characteristics. The same models were estimated using employees or market capitalization instead of total assets as size variable. Results (not reported) do not differ qualitatively from the evidence presented in Table 59.

In order to test hypotheses 2 and 3 in a multivariate regression setting, we estimated models with dummy variables for different types of interventions (dismissal vs. other intervention and dismissal of CEO vs. dismissal of other member of management) from the data of the subsamples for high media coverage and low media coverage. Results are in line with overall findings but the coefficients of the variables of interest with respect to hypotheses 2 and 3 are not significant. Moreover, regression models with interaction terms for the event type variables and the media coverage variable did also not provide evidence in support of hypotheses 2 and 3. Consequently, results are not reported in more detail.

### 6.5 Conclusion

With our analysis, we are able to show that news about supervisory board interventions has significant effects on stock prices. In line with our hypotheses based on the considerations of HERMALIN/WEISBACH (1998), we find that these effects vary for different groups of companies which contributes to the explanation of mixed results in previous literature. Dividing our sample into two groups based on the companies' level of media coverage yields the following results: For companies with high media coverage we observe insignificant abnormal returns around the time of intervention but significant positive abnormal returns when cumulated over time including the days prior to the date of intervention. For companies with low media coverage, in contrast, we find a significant negative stock price reaction to interventions. Thus, we are among the first to provide empirical evidence in support of HERMALIN/WEISBACH

(1998). Moreover, we observe stronger negative reactions to more severe measures of interventions relative to weaker measures and stronger negative reactions to dismissals of CEOs compared to dismissals of other members of the management for companies with low media coverage. While these differences prove not to be significant, our main results can be confirmed in a multivariate regression setting when controlling for company characteristics in particular size.



# 7

## Zusammenfassung

Den Aufsichtsräten innerhalb des deutschen Corporate Governance Systems ist in den letzten Jahren vermehrt Aufmerksamkeit zugekommen, indem Empfehlungen gegeben und Regelungen verabschiedet wurden, die die Zusammensetzung des Aufsichtsratsgremiums sowie dessen Tätigkeiten betreffen. Bei diesen Empfehlungen und Regelungen zur Besetzung der einzelnen Aufsichtsratsposten wurde dabei bis ins Jahr 2008 der Schwerpunkt auf die fachliche Qualifikation der einzelnen Aufsichtsratsmitglieder gelegt. Im Jahr 2009 wurde dieser Schwerpunkt um einen neuen Aspekt erweitert. So soll bei der Besetzung des Aufsichtsrats auch „auf *Vielfalt (Diversity)* geachtet werden“ (DCGK 2010, Abschnitt 5.4.1).

Dem beschriebenen Reformprozess steht ein Mangel an wissenschaftlichen Studien zu Aufsichtsräten in deutschen Unternehmen gegenüber. So muss bisher größtenteils auf Studien aus anderen Corporate Governance Systemen, hauptsächlich dem US-amerikanischen, zurückgegriffen werden, die auf die Besonderheiten des deutschen Systems nicht eingehen.

Vor dem Hintergrund dieser aktuellen Entwicklungen und der dargestellten Forschungslücke hatte die vorliegende Arbeit das Ziel, dualistische Aufsichtsräte in Deutschland näher zu beleuchten.

Zunächst widmete sich Kapitel 2 der Frage, wie deutsche Aufsichtsräte hinsichtlich ihrer fachlichen Qualifikation und ihrer demographischen Merkmale zusammengesetzt sind und welche systematischen Unterschiede bei der Zusammensetzung der Aufsichtsräte bestehen. Der diesem Kapitel zu Grunde liegende, selbst erhobene Cross-Section-Datensatz zu 151 Unternehmen deutscher Rechtsform der Indizes HDAX und SDAX des Jahres 2005 stellte eine einzigartige Datenbasis dar, die umfassende deskriptive und neue Erkenntnisse ermöglichte: Es konnten deutliche Unterschiede in der durchschnittlichen Besetzung der Gremien festgestellt werden. Diese Unterschiede ließen sich zum Teil auf die unterschiedliche Indexzugehörigkeit

oder Mitbestimmungsform zurückführen und boten den Ausgangspunkt für weitere Fragestellungen, so beispielsweise zu *Ursachen* und *Effekten* einer heterogenen Aufsichtsratszusammensetzung, die im Folgenden näher betrachtet wurden.

Auf Kapitel 2 aufbauend untersuchte Kapitel 3 die *Ursachen* der heterogenen Aufsichtsratszusammensetzung. Im Detail analysierte Kapitel 3, inwiefern die Größe des Unternehmens die heterogene Zusammensetzung des Aufsichtsrats in Bezug auf fachliche und demographische Eigenschaften beeinflusst. Für den Fall der fachlichen Heterogenität wurde die Aufsichtsratsheterogenität hinsichtlich der Hauptbeschäftigung und für die demographische Heterogenität die Aufsichtsratsheterogenität bezüglich der Nationalität untersucht. Grundlage dieser Analyse war ein selbst erhobener Cross-Section-Datensatz zu 151 Unternehmen deutscher Rechtsform der Indizes HDAX und SDAX des Jahres 2005. Hier konnte festgestellt werden, dass die Unternehmensgröße einen Einfluss auf die Aufsichtsratsheterogenität hat. Dieser Einfluss unterscheidet sich für die beiden untersuchten Heterogenitätsarten: Während in Bezug auf die Hauptbeschäftigung ein linearer positiver Zusammenhang mit der Unternehmensgröße beobachtet werden konnte, handelt es sich bei der Aufsichtsratsheterogenität hinsichtlich der Nationalität um einen konkaven Zusammenhang. Die Aufsichtsratsheterogenität erhöht sich daher bei steigender Unternehmensgröße bezüglich der Hauptbeschäftigung gleichmäßig, während sie im Hinblick auf die Nationalität nur bis zu einem gewissen Niveau ansteigt. Mit diesen Ergebnissen lieferte Kapitel 3 erstmals Erkenntnisse über eine Einflussgröße der Aufsichtsratsheterogenität. Zudem zeigten die Ergebnisse, dass fachliche und demographische Arten der Heterogenität durch die Unternehmensgröße unterschiedlich beeinflusst werden. Eine mögliche Erklärung für die verschiedenen Effekte könnte sein, dass Heterogenität im Aufsichtsrat für eine ansteigende Komplexität innerhalb des Gremiums sorgt, die negative Effekte auf das Identifikationsniveau der Gremienmitglieder untereinander haben, emotionale, nicht-produktive Konflikte auslösen und damit die Kommunikationskosten erhöhen kann. Die dabei entstehenden Kosten der Heterogenität kommen bei demographischen Arten der Heterogenität stärker zum Tragen als bei fachlicher Heterogenität. Vor dem Hintergrund der Ergebnisse dieses Kapitel sollten zukünftige Studien, die die Aufsichtsratsheterogenität untersuchen, daher je nach Heterogenitätsart unterscheiden.

Die *Effekte* unterschiedlich heterogener Zusammensetzungen des Aufsichtsrats auf dessen Performance sowie die Unternehmensperformance waren Kern von Kapitel 4.

Datenbasis dieses Kapitels war ein für 151 Unternehmen deutscher Rechtsform der Indizes HDAX und SDAX selbst erhobener *Paneldatensatz* für die Jahre 2000 bis 2005, um mögliche Endogenitätsprobleme berücksichtigen zu können. Der Zusammenhang zwischen Aufsichtsratsheterogenität und Aufsichtsrats- bzw. Unternehmensperformance wurde zunächst allgemein untersucht, bevor im Anschluss daran der Einfluss moderierender Variablen auf den Zusammenhang zwischen Aufsichtsratsheterogenität und Aufsichtsratsperformance bzw. Unternehmensperformance analysiert wurde. Es konnte festgestellt werden, dass die heterogene Zusammensetzung des Aufsichtsrats einen signifikanten Effekt sowohl auf die Aufsichtsrats- als auch die Unternehmensperformance hat. Dieser unterschied sich je nach Heterogenitätsart und Performancemaß. Zudem konnte für einen Teil der Heterogenitätsarten und Performancemaße ein signifikanter moderierender Einfluss der Internationalität und Innovativität des Unternehmens auf den Zusammenhang zwischen Aufsichtsratszusammensetzung und Aufsichtsrats- bzw. Unternehmensperformance festgestellt werden. Die Ergebnisse dieses Kapitels lassen Ratschläge wie die des DCGK, bei der Besetzung des Aufsichtsrats auf *Vielfalt (Diversity)* zu achten (vgl. DCGK 2010, Abschnitt 5.4.1), in dieser allgemeinen Form als nicht sinnvoll erscheinen. Vielmehr sollte nach Art der Heterogenität und eventuell relevanter moderierender Faktoren differenziert werden. Neben der für eine große Anzahl an Heterogenitätsarten erstmaligen Untersuchung der Effekte der Aufsichtsratsheterogenität auf die Performance und der darüber hinaus durchgeführten Analyse des Einflusses zweier moderierender Faktoren auf diese Zusammenhänge wurden in Kapitel 4 zwei neue Performancemaße, die die Leistung des Aufsichtsrats direkter messen sollen, vorgestellt und verwendet: die Interventionsaktivitäten des Aufsichtsrats und der Rang des Unternehmens im Corporate Governance Ranking. Dadurch konnte Kapitel 4 in mehrfacher Hinsicht einen innovativen Beitrag zur bisherigen Literatur leisten.

Kapitel 5 hatte die Interventionsaktivitäten von Aufsichtsräten – eines der innovativen Maße zur Messung der Performance des Aufsichtsrats aus Kapitel 4 – zum Gegenstand. Nach einer Aufarbeitung des institutionellen Kontexts in Deutschland zu den Aufgaben der Aufsichtsräte und deren Möglichkeiten der Intervention bot dieses Kapitel anhand eines selbst erhobenen Datensatzes zu 151 Unternehmen deutscher Rechtsform der Indizes HDAX und SDAX der Jahre 2000 bis 2006 erstmalig eine detaillierte empirische Bestandsaufnahme der Interventionsaktivitäten deutscher Aufsichtsräte zu einer Vielzahl von Unternehmen über den Zeitraum mehrerer Jahre.

Es konnte gezeigt werden, dass Aufsichtsräte nicht alle der ihnen zur Verfügung stehenden Eingriffsrechte nutzen und bestimmte Interventionsarten häufiger als andere einsetzen. Zudem wurde festgestellt, dass in verschiedenen inhaltlichen Kontexten mittels unterschiedlicher Eingriffsmöglichkeiten interveniert wird. Darüber hinaus konnten für einen inhaltlichen Teilbereich Nachlässigkeiten einzelner Kontrollgremien beobachtet werden und über den Zeitraum der Untersuchung war der Trend zu einem häufigeren Eingreifen der Aufsichtsräte zu erkennen. Mit seiner detaillierten Betrachtung der Interventionsaktivitäten deutscher Aufsichtsratsgremien mehrerer Jahre lieferte Kapitel 5 neue deskriptive Befunde zur praktischen Relevanz der institutionell eingeräumten Interventionsmöglichkeiten und zu den Einsatzbereichen der einzelnen Interventionsmaßnahmen. Eine Neuerung dieses Kapitels stellte zudem der Abgleich der Interventionsaktivitäten mit den durch die DPR und die BaFin als fehlerhaft befundenen Jahres- bzw. Konzernberichten einiger Unternehmen der Stichprobe dar. Dieser Abgleich ist erst seit dem Jahr 2005 möglich und wurde in diesem Kapitel erstmals vorgenommen. Hierdurch war es möglich, einen direkten Vergleich zwischen dem als fehlerhaft befundenen Jahres- bzw. Konzernbericht und der daher notwendigen (aber in der überwiegenden Zahl der Fälle nicht stattgefundenen) Intervention zu ziehen.

Schließlich betrachtete Kapitel 6 auf Grundlage eines selbst erhobenen Datensatzes zu 151 Unternehmen deutscher Rechtsform der Indizes HDAX und SDAX der Jahre 2000 bis 2006, wie der Marktwert öffentlich gehandelter Unternehmen vom Einsatz unterschiedlicher Interventionsarten beeinflusst wird. Als einer der ersten Untersuchungen konnte dieses Kapitel zwei Hypothesen von HERMALIN/WEISBACH (1998) übertragen auf den Fall der unterschiedlichen Interventionsaktivitäten des Aufsichtsrats empirisch testen und stützen. Diese Hypothesen sagen eine negative Aktienkursreaktion vorher, wenn der Aufsichtsrat aufgrund privater Informationen interveniert, und eine positive, wenn der Aufsichtsrat aufgrund von öffentlichen Informationen eingreift. Dieser Test wurde durch die Wahl der Medienberichterstattung als Maß für den Umfang privater und öffentlicher Informationen ermöglicht. Darüber hinaus konnte gezeigt werden, dass unterschiedliche Interventionsarten den Unternehmenswert in ungleichem Maße beeinflussen. Mit diesen Ergebnissen bot Kapitel 6 sowohl Hinweise dafür, dass Meldungen zu Aufsichtsratsinterventionen signifikante Effekte auf den Aktienkurs haben, als auch dafür, dass sich diese Effekte für verschiedene Gruppen von Unternehmen in Abhängigkeit der Medienberichterstattung unterschei-

den. Damit konnten nicht nur zwei Hypothesen von HERMALIN/WEISBACH (1998) empirisch gestützt werden, sondern es konnte auch ein Beitrag zur Erklärung der gemischten empirischen Ergebnisse in der bisherigen Literatur geleistet werden.

Die einzelnen Beiträge dieser Arbeit haben in unterschiedlichen Teilgebieten dazu beigetragen, die Forschungslücke für das deutsche Corporate Governance System zu verkleinern. Gleichwohl bleiben innerhalb des Themengebietes viele offene Fragen. Über die in den einzelnen Kapiteln dieser Arbeit aufgeworfenen Forschungsideen für weitere Beiträge hinaus, wäre beispielsweise die Untersuchung der Wirkung aktueller gesetzlicher Änderungen interessant. Mit den bisherigen Neuerungen dürfte das Ende des regulatorischen Prozesses noch nicht erreicht sein.

# Anhang

## **Anhang A zu Kapitel 2**

**A-1: Index-Zusammensetzung (DAX/MDAX/SDAX/TecDAX);  
Stand 31.12.2005**

DAX	MDAX	SDAX	TecDAX
adidas-Salomon	AachenMünchener Lebensversicherung	Arques Industries	Aixtron
Allianz	Aareal Bank	Balda	Bechtle
Altana	AWD Holding	BayWa	ComBOTS
BASF	Bayerische Hypo- und Vereinsbank	Beate Uhse	Conergy
Bayer	Beiersdorf	BHW	Dräger
BMW Group	Bilfinger Berger	Böwe Systec	Epcos
Commerzbank	Celesio	Centrotec Sustainable	ErSol Solar Energy
Continental	Degussa	CeWe Color Holding	Evotec
DaimlerChrysler	Dt. EuroShop	comdirect bank	freenet.de
Dt. Bank	Dt. Postbank	CTS Eventim	Funkwerk
Dt. Börse Group	Douglas Holding	Curanum	GPC Biotech
Dt. Post World Net	Fielmann	D+S europe	IDS Scheer
Dt. Telekom	Fraport	DAB bank	Jenoptik
E.ON	Fresenius	Deutz	Kontron
Fresenius Medical Care	GEA Group	DIS	MediGene
Henkel	Hannover Rückversicherung	Dt. Beteiligungs	mobilcom
Hypo Real Estate Group	HeidelbergCement	Dyckerhoff	MorphoSys
Infineon Technologies	Heidelberger Druckmaschinen	elaxis	Pfeiffer Vacuum Technology
Linde	Hochtief	ElringKlinger	Q-Cells
Lufthansa	Hugo Boss	EM.TV	QSC
MAN Gruppe	IKB Deutsche Industriebank	Escada Group	Singulus Technologies
Metro Group	IVG Immobilien	Fluxx	Software
Münchener-Rück-Gruppe	IWKA	Fuchs Petrolub	SolarWorld
RWE	K+S	Gerry Weber International	T-Online
SAP	KarstadtQuelle	GfK	United Internet
Schering	Krones	Gildemeister	
Siemens	Lanxess	Grammer	
ThyssenKrupp	Leoni	Grenkeleasing	
TUI	Medion	H&R Wasag	
Volkswagen	Merck	Hawesko Holding	
	MLP	HCI Capital	
	MPC Münchmeyer Petersen Capital	Hornbach Holding	
	MTU Aero Engines	INDUS Holding	
	Norddeutsche Affinerie	Interhyp	
	Pfleiderer	Jungheinrich	
	Premiere	Klößner-Werke	
	ProSiebenSat.1 Media	Koenig & Bauer	
	Puma	Loewe	
	Rheinmetall	Masterflex	
	Rhön-Klinikum	MVV Energie	
	Salzgitter	Rational	
	Schwarz Pharma	schlott gruppe	
	SGL Carbon	Sixt	
	Stada Arzneimittel	Takkt	
	Südzucker	Villeroy & Boch	
	Techem	Vivacon	
	Vossloh	WCM Beteiligung- und Grundbesitz	
	Wincor Nixdorf	Zapf Creation	

Quelle: Eigene Darstellung.

**A-2: Anteile der Mitbestimmungsformen bei den Unternehmen der Untersuchungsgesamtheit**

<b>Mitbestimmungsgrundlage</b>	<b>Gesamt</b>	<b>DAX</b>	<b>MDAX</b>	<b>SDAX</b>	<b>TecDAX</b>
<b>MontanMitbestG</b>	1%	-	2%	-	-
<b>MitbestG</b>	52%	90%	65%	29%	24%
<b>DrittelbG</b>	17%	3%	19%	25%	16%
<b>oMitbestPflicht</b>	30%	7%	15%	46%	60%
<b>Anzahl Unternehmen</b>	151	30	48	48	25

Quelle: Eigene Berechnung.



## **Anhang B zu Kapitel 5**

**B-1: Unternehmen der Stichprobe**

Aareal Bank AG	Deutsche EuroShop AG	Heidelberger Druckmaschinen AG	Pfeiffer Vacuum Technology AG
Adidas AG	Deutsche Lufthansa AG	Henkel KGaA	Pfleiderer AG
Aixtron AG	Deutsche Post AG	Hochtief AG	Premiere AG
Allianz SE	Deutsche Postbank AG	Hornbach Holding AG	ProSiebenSat.1 Media AG
Altana AG	Deutsche Telekom AG	Hugo Boss AG	Puma AG
AMB Generali Holding AG	Deutz AG	Hypo Real Estate Holding AG	Q-Cells AG
Arcandor AG	DIS AG	IDS Scheer AG	QSC AG
Arques Industries AG	Douglas Holding AG	IKB Deutsche Industriebank AG	Rational AG
AWD Holding AG	Drägerwerk AG & Co. KGaA	INDUS Holding AG	Rheinmetall AG
Balda AG	Dyckerhoff AG	Infineon Technologies AG	Rhön-Klinikum AG
BASF SE	E.ON AG	Interhyp AG	RWE AG
Bayer AG	Elexis AG	IVG Immobilien AG	Salzgitter AG
Bayerische Hypo- und Vereinsbank AG	ElringKlinger AG	Jenoptik AG	SAP AG
Bayerische Motorenwerke AG	EM.TV & Merchandising AG	Jungheinrich AG	Schering Pharma AG
BayWa AG	Epcos AG	K+S AG	Schlott Gruppe AG
Beate Uhse AG	Ersol Solar Energy AG	Klößner-Werke AG	Schwarz Pharma AG
Bechtle AG	Escada AG	Koenig & Bauer AG	SGL Carbon AG
Beiersdorf AG	Evotec AG	Kontron AG	Siemens AG
BHW-Holding AG	Fielmann AG	Krones AG	Singulus Technologies AG
Bilfinger Berger AG	Fluxx AG	IWKA AG	Sixt AG
Böwe Systec AG	Fraport AG	Lanxess AG	Software AG
Celesio AG	Freenet AG	Leoni AG	SolarWorld AG
Centrotec Sustainable AG	Fresenius Medical Care AG & Co. KGaA	Linde AG	Stada Arzneimittel AG
CeWe Color Holding AG	Fresenius SE	Loewe AG	Südzucker AG
Combots AG	Fuchs Petrolub AG	MAN AG	Takkt AG
Comdirect Bank AG	Funkwerk AG	Masterflex AG	Techem AG
Commerzbank AG	GEA Group AG	Medigene AG	ThyssenKrupp AG
Conergy AG	Gerry Weber International AG	Medion AG	T-Online International AG
Continental AG	GfK AG	Merck KGaA	TUI AG
CTS Eventim AG	Gildemeister AG	Metro AG	United Internet AG
Curanum AG	GPC Biotech AG	MLP AG	Villeroy & Boch AG
D+S Europe AG	Grammer AG	Mobilcom AG	Vivacon AG
DAB Bank AG	Grenkeleasing AG	MorphoSys AG	Volkswagen AG
DaimlerChrysler AG	H&R Wasag AG	MPC Münchmeyer Petersen Capital AG	Vossloh AG
Degussa AG	Hannover Rückversicherung AG	MTU Aero Engines Holding AG	WCM Beteiligungs- und Grundbesitz-AG.
Deutsche Bank AG	Hawesko Holding AG	Münchener Rückversicherungs-Gesellschaft AG	Wincor Nixdorf AG
Deutsche Beteiligungs AG	HCI Capital AG	MVV Energie AG	Zapf Creation AG
Deutsche Börse AG	HeidelbergCement AG	Norddeutsche Affinerie AG	

Quelle: Eigene Darstellung.

**B-2: Veröffentlichungen nach § 37q Abs. 2 WpHG**

<b>Unternehmen</b>	<b>Veröffentlichungs- datum</b>	<b>Fehlerhaftes Dokument</b>
Curanum AG	24.06.2009	Konzernabschluss zum Abschlussstichtag 31.12.2005
Deutsche Beteiligungs AG	01.09.2008	Konzernabschluss zum Abschlussstichtag 31.10.2005
Deutsche Post AG	25.08.2008	Konzernabschluss zum Abschlussstichtag 31.10.2005
INDUS Holding AG	24.10.2007	Jahresabschluss und Konzernabschluss zum Abschlussstichtag 31.10.2005
Interhyp AG	15.02.2007	Konzernabschluss zum Abschlussstichtag 31.10.2005
MTU Aero Engines Holding AG	22.01.2007	Konzernabschluss zum Abschlussstichtag 31.10.2005
Schwarz Pharma AG	10.11.2008	Konzernabschluss zum Abschlussstichtag 31.10.2005
Vivacon AG	06.08.2007	Konzernabschluss zum Abschlussstichtag 31.10.2005
Zapf Creation AG	27.02.2007	Konzernabschluss zum Abschlussstichtag 31.10.2004

Quelle: In Anlehnung an die Veröffentlichungen des elektronischen Bundesanzeigers (Stand: 30.09.2009).

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