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Risk Reporting Incentives: A Cross-Country Study

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I dedicate my thesis to

My country, Egypt, hoping for a promising future

My parents and my siblings, for their infinite love and support

My wife, Ola, for love, understanding, sacrifice and support

My daughter, Hana, and my son, Mohamed, for always making me cheerful

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Abbreviations

AICPA	American Institute of Certified Public Accountants
APB	Accounting Principle Board
ARD	Aggregated Risk Disclosure
ASB	Accounting Standards Board
ASC	Accounting Standard Committee
BRD	Bad Risk Disclosure
BZ	Board Size
CAPM	Capital Asset Pricing Model
CCRO	Committee of Chief Risk Officers
CEO	Chief Executive Officer
CG	Corporate Governance
CIFAR	Centre for International Financial Analysis and Research
CICA	The Canadian Institute of Chartered Accountants
CL	Code Law
CML	Common Law
CPA	Certificate Public Accountants
DE	Dividend Effect
EDs	Executive Directors
EITF	The Emerging Issues Task Force
FASB	Financial Accounting Standards Board
FEM	Fixed Effect Models
FFC	Federal Fiscal Court
FR	Financing Risk
FRR	Financial Reporting Release

FRS	Financial Reporting Standard
GAAP	Generally Accepted Accounting Principles
GASB	German Accounting Standards Board
GE	Growth Effect
GLS	Generalised Least Squares
GRD	Good Risk Disclosure
HGB	Handelsgesetzbuch (German Commercial Code)
IASB	International Accounting Standards Board
IASC	International Accounting Standards Committee
ICAEW	The Institute of Chartered Accountants of England and Wales
ICAS	The Institute of Chartered Accountants of Scotland
IFRS	International Financial Reporting Standards
IND	Individualism
LR	Liquidity Risk
LS	Legal System
LTO	Long Term Orientation
MAS	Masculinity
MANOVA	Multivariate Analysis of Variance
MBAR	Market Based Accounting Research
MD&A	Management Discussion and Analysis.
MLA	Multilevel Analysis
MRR	Mandatory Risk Reporting
MRD	Mandatory Risk Disclosure
MRR_I	Mandatory Risk Reporting/ Inside mandated sections
MRR_T	Mandatory Risk Reporting/Total
MRR_V	Mandatory Risk Reporting revealed outside the mandated sections
N6	Nudist Software Version 6
NEDs	Non-executive Directors
OLS	Ordinary Least Squares

PAOB	Public Accounting Oversight Board
PE	Profitability Effect
PD	Power Distance
PINED	Proportion of Independent Non-executive Directors
PNED	Proportion of Non-executive Directors
RAR	Risk Adjusted Return
ROE	Return on Equity
RMMLA	Repeated Measures Multilevel Analysis
SE	Size Effect
SFAC	Statement of Financial Accounting Concepts
SFAS	Statement of Financial Accounting Standards
SOP	Statement of Position
SOX	Sarbanes-Oxley
SR	Systematic Risk
SSAP	Statement of Standard Accounting Practice
TR	Total Risk
UA	Uncertainty Avoidance
UK	The United Kingdom
USA	The United States of America
US	The United States
USR	Unsystematic Risk
VaR	Value at Risk
VRD	Voluntary Risk Disclosure
VRR	Voluntary Risk Reporting

Abstract

The current study aims to investigate empirically the main incentives for mandatory and voluntary risk reporting (MRR and VRR) across the USA, the UK and Germany, each of which has a unique approach towards risk reporting. While the UK approach encourages more voluntary risk reporting above imposing risk rules, the German approach formally requires firms to provide risk information in a certain place in their annual report narratives. The US approach is a compromise between these two approaches; it obligates and encourages firms to provide more information about their risks mandatorily and/or voluntarily, respectively. Investigating the incentives for risk reporting in such set of countries answers the calls of some prior research (e.g., Linsley and Shrives, 2006; Dobler, 2008; Dobler, Lajili and Zeghal, 2011) to deepen our understanding of what motivates firms to disclose their risks. To this end, computerised content analysis and multilevel analysis (MLA) on a large scale (compared with previous work e.g., Linsley and Shrives, 2005, 2006; Abraham and Cox, 2007) are utilised. The results are produced in four cumulative contexts through Chapters Six to Nine. These results are consistent with managers' incentives theories (discussed in Chapter Two) and prior risk reporting literature (discussed in Chapter Three and Chapter Four).

Based on 15 firms in each country during 2007 and 2008, multivariate analysis of variance (MANOVA) results reveal significant differences between a firm's risk levels and its risk disclosure levels across the USA, the UK and Germany. The correlation results indicate that these differences are statistically correlated, supporting the main argument of the current study that differences in a firm's risk levels should be reflected in their risk reporting practices (Chapter Six).

Based on 1160 firm-years of non-financial firms of the FTSE all share index over 2005-2008, linear mixed model (LMM) results document that firms with higher levels of systematic and financing risks are likely to exhibit significantly higher levels of aggregated and voluntary risk reporting, whereas firms with high variability of stock returns or lower levels of liquidity are likely to exhibit significantly lower levels of aggregated and voluntary risk reporting. The current study also finds, however, that MRR is associated significantly and positively with firm size rather than with risk levels. The results also indicate that managers of firms exhibiting greater compliance with UK risk reporting regulations have greater incentives to disclose voluntary risk information (Chapter Seven).

When the study extends the scope to the other two countries, different patterns of relations are found. Based on 1270, 1410 and 1005 firm-year observations over 2005 to 2009 in the USA, the UK and Germany, respectively, repeated measures multilevel analysis (RMMLA) results suggest that, in the USA, MRR is more sensitive to firm risk levels (total, systematic and liquidity risks) than is VRR, which is more correlated to other firm characteristics. The UK results suggest that VRR is more sensitive to firm risk levels (systematic and liquidity risks) than is MRR, which is dominated by firm size, among other firm characteristics. In Germany, however, both MRR and VRR are significantly related to risk levels (total, systematic, un-systematic, financing and liquidity risks) (Chapter Eight).

Based on 3685 firm-year observations during the period between 2005 and 2009, and concerning both firm- and country-level analyses, repeated measures multilevel analysis (RMMLA) results support that variations in MRR can be attributed to differences in the legal systems (country characteristics) and in firm size (firm characteristics). The variations

in VRR are more associated with firm characteristics, especially a firm's risk levels across the USA, the UK and Germany (Chapter Nine).

These results have many implications and support the respective regulatory approach adopted within each country by interpreting the extent to which either MRR or VRR is more or less sensitive to underlying risks.

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Based on my PhD thesis, three completed papers have been produced and formally presented in many conferences and workshops. Based on Chapter Seven, I produced my first paper; entitled *Aggregated, voluntary and mandatory risk disclosure incentives: Evidence from UK FTSE all Share*. This paper was presented at the 4th European Risk Conference at the University of Nottingham in September 2010. I would like to thank the discussant, Dr Philip Shrives, for his useful comments and suggestions.

Based on Chapter Eight, I produced my second paper; entitled *Do risk level variations drive mandatory and voluntary risk reporting variations within and between firms? Evidence from the USA, the UK and Germany*. This paper was presented at the 15th annual conference of the

Financial Reporting and Business Communication Research Unit at the University of Bristol in July 2011. I am grateful to the discussant, Matt Bamber, for his comments.

Based on Chapter Nine, I produced my third paper; entitled *Incentives for mandatory and voluntary risk reporting diversifications within and between firms across the USA, the UK and Germany.* This paper was presented at the British Accounting and Finance Association Conference at Aston Business School in April 2011. This paper has benefited from participants' useful comments and suggestions. This paper was presented at both the 35th European Accounting Association Annual Congress in Ljubljana, Slovenia (May 2012), and has accepted to be presented the 16th annual conference of Financial Reporting and Business Communication Research Unit at the University of Bristol (July 2012).

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Chapter One: Introduction

1.1. Overview

The main aim of accounting is to provide its users with relevant information in order to enable them to make decisions. These decisions are dynamic, subject to change according the surrounding environment. To increase the relevance of accounting information by responding to the main requirements of decision makers, accounting regulators might pay more attention to understanding these changes in circumstances that affect users' needs.

In recent years, therefore, there has been an ongoing debate among both academic researchers (e.g., Amir and Lev, 1996; Lev and Zarowin, 1999; Francis and Schipper, 1999; Fraser, Tarbert and Tee, 2009) and professional bodies (e.g., in the UK, the Institute of Chartered Accountants of Scotland (ICAS), 1989 and the Institute of Chartered Accountants of England and Wales (ICAEW), 1994; in the USA, the American Institute of Certified Public Accountants (AICPA), 1994 and the Financial Accounting Standards Board (FASB), 2001) on the extent to which accounting provides relevant information to users. To improve business reporting, a number of professional studies have suggested disclosing more relevant risk information, among some other types of information, such as forward-looking information and information about tangible assets, in firms' annual report narratives (German Accounting Standards Board (GASB), 2000; ICAEW, 1997, 1999, 2002, 2011).

Although considerable attention has recently been paid to risk disclosure, understanding how and the extent to which a firm's risk levels motivate a firm to provide risk information in its narratives is still relatively unknown within and/or across countries. Within single-

country research (e.g., Linsley and Shrives, 2005, 2006; Abraham and Cox, 2007; Beretta and Bozzolan, 2004), the main interest is in investigating how a firm's characteristics (e.g., a firm's size) and a firm's corporate governance (e.g., board characteristics) influence providing risk information in the firm's annual report narratives. While there is much research that investigates the impact of country-level variables, such as cultural and legal systems, on general disclosure (e.g., Jaggi and Low, 2000; Hope, 2003; William, 2004), no cross-country research investigates how and the extent to which those variables may affect risk reporting. Dobler, Lajili and Zeghal (2011) is the only study, to the best of the researcher's knowledge, that investigates risk reporting in more than one country. They do not examine, however, the impact of such factors on providing risk information. Given the fact that the nature of risk information is different from general disclosure, in a sense, risk information could be widely seen as unfavourable information (ICAWE, 1997, 2011). Difficulties of measuring risk reporting across countries is another factor that should be considered in relation to comparing cross-country risk reporting research with prior general disclosure research that uses scores from the Centre for International Financial Analysis and Research (CIFAR).

The rest of this chapter is organised as follows. Section 1.2 highlights the main research gaps and the main reasons that motivate the current study to investigate the main incentives for risk reporting within and across countries. Section 1.3 introduces the research objectives, research questions and research hypotheses. Section 1.4 provides details about the research methodology, which includes the sample selection and variables measurements. Key findings and their theoretical and practical implications are presented in Section 1.5. Section 1.6 explains how the current study contributes to the body of knowledge. The structure of the current study is discussed in Section 1.7.

1.2. Gaps and motivations

Two major strands of literature motivate this study. The first is prior risk reporting[1] research (e.g., Linsley and Shrives, 2005, 2006; Dobler, 2008) that identifies some gaps (e.g., cross-country investigation of the main determinants of risk reporting, and the incentives for mandatory and voluntary risk reporting (MRR and VRR) either within or across countries).

Dobler (2008) addresses the gap of risk reporting incentives and their relationship with regulation. He concludes that under either oriented-mandatory (e.g., German approach) or voluntary (e.g., UK approach) disclosure approaches; there are still essential needs to explore incentives that stimulate firms to provide risk information mandatorily and voluntarily, respectively, in their annual report narratives.

As a result, the current study is motivated to investigate the main incentives for both MRR and VRR, each of which may have different drivers. Prior risk reporting research, nevertheless, does not differentiate VRR from MRR (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007); alternatively, such research uses an aggregated measure to proxy VRR and ignores MRR. The current study distinctively uses a direct measure for MRR and distinguishes clearly between both types of risk reporting.

Linsley and Shrives (2005, 2006) emphasise the importance of studying risk reporting across countries to deepen our understanding of how risk reporting incentives vary across countries. This motivates the current study to provide a unique and extensive investigation

[1] Throughout the current study, the terms context risk disclosure and risk reporting can be used interchangeably to/in talk(ing) about providing risk information in annual report narratives mandatorily and/or voluntarily.

of such incentives, not only for VRR but also for MRR, and their variations either within or between non-financial firms across the USA, the UK and Germany, each of which has a unique approach to dealing with risk reporting.

On the one hand, Germany and the USA are highly oriented towards MRR. Most particularly, Germany has the only formal accounting standard to deal comprehensively with risk reporting (Dobler, 2008). This standard explains how German firms can provide information about their risks (such as identifying, measuring and managing their risks) in a specific section of their annual report narratives (Opportunities and Risks or Outlook). In the USA, however, the SEC published Financial Reporting Release (FRR) No. 48 on the market risk of financial instruments in 1997, which mandates the presentation of both qualitative and quantitative market risk information. The UK, on the other hand, has a different approach to dealing with risk reporting; it is highly oriented towards VRR, as argued by ICAEW (1997, 1999, 2011). These two approaches, therefore, have shaped two subsequent main streams of risk reporting literature (a detailed review of these streams is provided in Chapters Three and Four).

The first stream concerns the main determinants of VRR. Such research is mainly conducted in Europe, including Italy (e.g., Beretta and Bozzolan, 2004); The Netherlands (e.g., Deumes and Knechel, 2008); Belgium (e.g., Vandemaele, Vergauwen and Michels, 2009); and the UK (e.g., Linsley and Shrives, 2000, 2005, 2006; Abraham and Cox, 2007). The second stream concerns the usefulness of mandated risk reporting; such research represents the main focus of American risk reporting research (e.g., Rajgopal, 1999; Hodder and McAnally, 2001; Jorion, 2002; Linsmeier, Thornton, Venkatachalam and Welker, 2002; Jorgensen and Kirschenheiter, 2003, 2008).

Prior risk reporting research with a focus on a single country, therefore, has been widely conducted (e.g., Linsley and Shrives, 2000, 2005, 2006; Beretta and Bozzolan, 2004; Abraham and Cox, 2007; Li, 2008). So has research that is heavily restricted to one type of risk reporting, such as foreign exchange rate disclosure (e.g., Marshall and Weetman, 2002, 2007), usefulness of mandatory risk reporting (e.g., Li, 2008) and aggregated risk disclosure (e.g., Linsley and Shrives, 2000, 2005, 2006). Among this research, however, results of the extent to which firm risk levels can influence firms to provide risk reporting mandatorily and/or voluntarily in their annual report narratives are mixed. Consequently, this motivates this research to investigate these associations in three different approaches to risk reporting in three different countries. More specifically, the question 'do firms disclose their risk information as a function of their risk levels?' has not been answered. The current study investigates whether risky firms disclose more or less risk information in their annual reports narratives. This study examines such associations after controlling for a firm's size, profitability, growth and dividends.

MRR is distinguished from VRR to observe the pattern of associations with exploratory variables (firm and country characteristic variables). Knowing the pattern of how the US, UK and German firms respond to their risk levels can help in identifying to which type of risks these firms are more sensitive, expressed by disclosing either more or less risk information mandatorily and/or voluntarily. Considered simultaneously, these send some signals that either support or warn regulators of each approach by associating the observed trend of firms' MRR and VRR to their underlying risks.

The current study assumes, based on theory (managers' incentives theories) and relevant prior research (e.g., Linsley and Shrives, 2000, 2005, 2006), that UK firms disclose more risk information voluntarily than they do mandatorily, relative to their underlying risks. US

and German firms, in contrast, are likely to disclose more risk information mandatorily than they do voluntarily relative to their underlying risks. Obtaining empirical evidence that is consistent with previous arguments supports either UK regulators, on the one hand, or US and German regulators, on the other hand.

In a recent, related work, based on 40 manufacturing firms in 2005 from each of these countries, Dobler et al. (2011) investigate the extent to which firms disclose risk information subject to their risk levels. Dobler et al. (2011) do not distinguish between mandatory and voluntary risk reporting, although the USA and Germany are more highly regulated towards risk reporting than the UK, suggesting greater mandatory disclosure in the former two countries. They proxied firms' risk levels by considering just financing, systematic and nonfinancial risks. There is a lack of a clear justification of why they only chose those three risks. Similarly, it is not clear how they distinguished between market and accounting proxies for risk. In their OLS regressions, there is no attempt to control for any other effects (e.g. firm profitability), with the exception of firm size. Nevertheless, when they aggregate risk disclosure across these countries, their model ignores country factors, such as legal systems and cultural values, which could influence providing risk disclosures.

The current study distinguishes between mandatory and voluntary risk reporting, associates these disclosures to market and accounting risk measures over a five-year period, controls for profitability, growth and dividends in the firm-level analysis and controls for legal system and cultural values in the country-level analysis.

None of the previous work examines how country-level characteristics influence the provision of MRR and VRR, nor the extent to which such characteristics can explain the variability of risk reporting. The current study principally investigates how a country's legal

system and its cultural dimensions explain explicitly why MRR and VRR vary among firms across the USA, the UK and Germany.

The second strand motivating the current study comes from the literature that reviews and evaluates methods frequently used in accounting research to correct the dependency of cross-sectional or time series problems.[2] Bernard (1987) explains that much research in market-based accounting research (MBAR) has adopted ordinary least squares (OLS). Ignoring the problem of cross-sectional dependency stemming from the root of conducting statistical procedures that address this problem (e.g., two-stage generalised least squares (GLS) techniques; cross-sectional aggregation of the data; and use of a multi-index version of the market model) may cause some other serious applicable difficulties to arise.

Bernard (1987) identifies contexts in which ignoring cross-sectional dependence can lead to incorrect inference, and finds that when at least some of the returns are sampled from common time periods, cross-sectional dependency is more likely to exist. Specifically, his evidence shows that when the returns interval is long, incorrect inference is more likely to happen, caused by a bias of standard errors that arises from cross-sectional dependency. Bernard (1987) concludes, therefore, that all stock market reaction studies of accounting data on stock prices (e.g., Ball and Brown, 1968; Beaver, Clarke and Wright, 1979; Biddle and Lindahl, 1982) lead to biased estimations of standard error.

More recently, Gow, Ormazabal and Taylor (2010) comprehensively review and evaluate methods that are frequently used in accounting literature to correct not only cross-sectional

[2] The dependency of cross-sectional and/or time series problems stems from the underlying assumption of the independency of observation. This assumption, therefore, ignores the fact that observations from the same group (e.g., sector or country) or observations over time (longitudinal data) are more likely to be similar than those from other groups or non-longitudinal data (e.g., Hox, 2010).

dependence but also time-series dependence for a broad stream of accounting literature (121 studies), using panel data in their regression analyses. They reveal that while 25 percent (30) of these studies do not appear to address such dependence, 75 percent (91) of these studies attempt to address cross-sectional and time-series dependence using a variety of approaches. A major problem with these approaches is that while correcting the dependency in one direction, they assume independency in the other direction (e.g., Fama-MacBeth's regression). Gow et al. (2010) explain that prior research either ignores one or both forms of dependence, or even relies on methods developed within the accounting literature that have not been formally evaluated (e.g., aggregating firm- or industry-specific coefficients, Z2 statistic and Newey-West).

Steele (2008b) argues that ignoring data structure might make the standard errors of a regression's coefficients too small or underestimated. Thus, the confidence intervals will be too narrow and the p-values will be too small, which may lead researchers to accept a predictor that has no real impact on the dependent variable, when in fact the effect could be attributed to chance or to any other predictor (type II error).

Consistent with Steele (2008b), Heck and Thomas (2000, 2009) explain that failure to account for similarities among firms because of ignoring data structure results in biased estimates of model parameters and therefore incorrect conclusions about the effects of some predictors in the model.

Multilevel analysis (MLA), which was originally, and remains widely, used within educational and medical research, assumes dependency between observations; specifically, observations from the same group (e.g., sector, such as telecommunications, or country, such as the UK) tend to be more similar than those from different groups (other sectors,

such as services, or other countries, such as the USA). Furthermore, within the same group, it assumes any successive observations to be correlated during a time series (Heck, Thomas and Tabata, 2010).

Steele (2008a) explains that the underestimations of the coefficient are closely related to the group (sectors or countries) variables. Consequently, the correct standard error will be estimated only if variation among groups is allowed for in the analysis, which is accurately provided by using multilevel modelling. She explains that MLA enables researchers to investigate the nature of between-group variability and the effects of group-level characteristics on individual outcomes.

Essentially, the current study relies on MLA as a new technique to overcome drawbacks arising from using the most common techniques (OLS) or their modified forms (e.g., fixed effect model). Furthermore, residual dependency problems are accounted for by a complete consideration of the study's data structure, which expresses firms nested within countries over time.

1.3. Research objectives, research questions and research hypotheses

1.3.1. Research objectives

The current study seeks to address four principal objectives. First, it aims to identify the extent to which a firm's risk levels and a firm's risk reporting levels are significantly different between firms across these countries, and to what extent these differences are correlated (this aim is achieved in Chapter Six). Second, the current study aims to identify risk reporting incentives within the UK context using LMM in comparison to OLS and FEM (this aim is achieved in Chapter Seven). Third, identifying to what extent variations in MRR and/or VRR within and between firms over 2005 to 2009 can be attributed to those

variations in a firm's risk levels in each country is the main aim investigated by the current study in Chapter Eight. Fourth, exploring how and the extent to which firm-level and country-level characteristics interpret variations in MRR and/or VRR within and between firms over 2005 to 2009 across the USA, the UK and Germany is achieved in Chapter Nine.

1.3.2. Research questions and research hypotheses

The main research questions that are addressed by the current study are classified according to whether they concern firm-level or country-level analysis. Using the same distinction, the research hypotheses are formulated (a detailed discussion of these research questions and research hypotheses is provided in Chapter Four).

Research questions

The following summarises the research questions addressed by the current study.

- Are there any significant differences between firms across the USA, the UK and Germany in either their risk or risk disclosure levels? Are these differences correlated?
- Do a firm's risk levels (captured by market- and accounting-risk measures) motivate firms to provide their risk disclosure mandatorily and/or voluntarily (MMR and/or VRR) in their annual report narratives?
- Do MRR and VRR vary within and between firms across the USA, the UK and Germany between 2005 and 2009?
- Can MRR and VRR variations be attributed to firm characteristics (risk levels) and/or country-level characteristics (legal systems and cultural values)?
- Which variables of both firm- and country-level characteristics are significantly associated with variability of MRR and VVR?

Research hypotheses

To formulate the research hypotheses, two main levels are introduced. While the first investigates factors that significantly influence firms to disclose information about their risks within each country (these factors are known as firm-level characteristics), the second involves country-level characteristics; this level investigates how a country's characteristics explain variations in risk reporting across countries. The following formulates each level's hypotheses.

Firm-level analysis

In this level, the associations between a firm's risk levels (captured by both market- and accounting-risk measures) and its risk reporting levels (captured by both MRR and VRR) are formulated based on managers' incentives theories and prior risk reporting literature, as will be explained in detail in Chapter Four. Additionally, other firm characteristics (e.g., firm size) and corporate governance mechanisms (e.g., board characteristics) are also accounted for as control variables. The following six hypotheses, therefore, represent this level's concerns, which will be examined in the context of three main empirical chapters: Chapter Seven (the UK), Chapter Eight (within the USA, the UK and Germany, individually) and Chapter Nine (across the USA, the UK and Germany).

H1: Firms' market volatility (as a proxy of firms' total risk) is likely to be significantly and positively correlated to MRR and VRR.

H2: Firms' market beta (as a proxy of firms' systematic risk) is likely to be significantly and positively correlated to MRR and VRR.

H3: Firms' market volatility of the standard error of CAPM (as a proxy of firms' un-systematic risk) is likely to be significantly and positively correlated to MRR and VRR.

H4: Firms' Sharp ratio (as a proxy of firms' risk-adjusted return) is likely to be significantly and positively correlated to MRR and VRR.

H5: Firms' leverage (as a proxy of firms' financing risk) is likely to be significantly and positively correlated to MRR and VRR.

H6: Firms' current ratio (as a proxy of firms' liquidity risk) is likely to be significantly and positively correlated to MRR and VRR.

Country-level analysis

At this level, the impact of country characteristics on risk reporting is essentially considered. Additionally, this level explores the interactive impact of firm- and country-level variables on interpreting variations in MRR and VRR. The following hypotheses represent these concerns, which also are discussed in more detail in Chapter Four.

H7: Both a country's legal system and its cultural values are more likely to be complements than substitutes in explaining variations on MRR and VRR.

H8: The explanatory power of country characteristics (legal systems and cultural values) to explain the observed MRR variability between firms is higher than those explaining VRR variations.

1.4. Research methods

Thomson One Banker is used to obtain a list of NASDAQ, FTSE and Frankfurt (CDAX) all share firms in the USA, the UK and Germany, respectively. Excluding all financial firms, cross-listing firms and any firm without a complete series, these criteria yield a final list of 1270, 1410 and 1005 firm-years for the USA, the UK and Germany, respectively. More discussions about these issues are provided in Chapter Five.

Relying on a growing body of accounting and finance literature, firms' disclosure levels are captured using automated content analysis (e.g., Hussainey, Schleicher and Walker, 2003; Kothari et al., 2009; Muslu, Radhakrishnan, Subramanyam and Lim, 2010; Li, 2010; Gruning, 2011). Both MRR and VRR, therefore, are measured in these three countries by using Nudist 6 to count the number of risk-indicator statements in annual reports narratives.

Relying on extensive accounting literature that mainly examines the associations between accounting- and market-risk measures (e.g., Beaver, Kettler and Scholes, 1970; Lev and Kunitzky, 1974; Beaver and Manegold, 1975; Almisher and Kish, 2000; Giner and Reverte, 2006; Brimble and Hodgson, 2007), a firm's risk levels are captured. In this context, six main measures to comprehensively capture firm risk levels are utilised: volatility, beta and volatility of standard error of Capital Asset Pricing Model (CAPM) as market measures of total, systematic and unsystematic risk. Leverage and current ratio are used as accounting measures for financing and liquidity risks, respectively. To investigate the impact of country-level variables on both MRR and VRR, a country's cultural values are measured based on Hofstede's values (1980, 1991), which are widely used in prior general disclosure research (e.g., Chanchani and MacGregor, 1999; Doupnik and Tsakumis, 2004).

Three methods are utilised to examine the association between the main variables: ordinary least squares (OLS), fixed effect model (FEM) and multilevel analysis (MLA), through applying linear mixed model (LMM) and repeated measures multilevel analysis (RMMLA).

1.5. Empirical results and theoretical and practical implications

1.5.1. Empirical results

Empirical results appear in four chapters, commencing with a pilot study and then moving to UK evidence, empirical results for the USA, the UK and Germany, and then the pooled results for these countries.

Using a multivariate analysis of variance (MANOVA) of 15 randomly selected firms in each country during 2007 and 2008, the results report that there are significant differences between these firms in their levels of risk and risk disclosure. To discover the extent to which differences in risk disclosure can be attributed to underlying differences in risk levels, the current study uses correlation analysis, which reports significant associations between these two variables.

Expanding the analysis to include FTSE all share over 2005 to 2008 and implementing ordinary least squares (OLS), fixed effect model (FEM) and linear mixed model (LMM) methods, the results report that observed trends of aggregated risk reporting are identical to voluntary risk reporting, but differ from the observed trends of mandatory risk reporting. The results show that managers are more motivated to voluntarily disclose significantly more risk information in their annual report narratives relative to their risk levels than they do mandatorily. Managers who exhibit greater compliance with UK risk disclosure regulations have greater incentives to disclose risk information voluntarily. The study finds that high-risk firms appear to be more sensitive to underlying risk levels, resulting in disclosing more voluntary and mandatory risk information than low-risk firms.

Expanding the previous analysis to include American and German firms between 2005 and 2009, and implementing RMML, the study finds that a firm's risk levels have different

influences on mandatory and voluntary risk reporting (MRR and VRR) within each country. The results show that within the UK, risk levels are more correlated with voluntary risk reporting than mandatory risk reporting. Conversely, within the USA, the results report that a firm's risk levels are more likely to significantly affect mandatory rather than voluntary risk reporting. Within a German context, the results report that both mandatory and voluntary risk reporting are sensitive to risk levels.

Based on the same statistics, the results document significant variations of both mandatory and voluntary risk reporting within and between firms over the period of study across the USA, the UK and Germany. The study finds that a country's legal system and its cultural values have significantly higher abilities to explain MRR diversification than VRR diversification, which is more likely to be statistically correlated with firm characteristics that are derived hypothetically, based on the mangers' incentives theories (e.g., agency theory, signalling theory and capital needs theory). The study finds that a country's legal system and its cultural values are more likely to react with a firm's characteristics as complements rather than substitutes to explain MRR variation.

1.5.2. Theoretical and practical implications

The results have several theoretical and practical implications. The main theoretical implications are: distinction between mandatory and voluntary risk reporting, risk reporting incentives in highly regulated countries such as the USA and Germany, utilising a new technique to incorporate both firm- and country-level effects and where future research could be usefully carried out. Appraising each country's approach, by identifying how and the extent to which firms in each country respond to their underlying risk by disclosing more or less risk information either mandatorily or voluntarily, gives indicators for regulators in each country. All these implications are discussed as follows.

Theoretical implications

Previous results have some distinctive theoretical implications. First, it is suggested that distinguishing between the observed trend of mandatory and voluntary risk reporting is essential, emphasising that each risk disclosure type has its own drivers. This result, therefore, does not support those studies that do not distinguish voluntary from mandatory risk reporting (e.g., Linsley and Shrives, 2000, 2005, 2006; Abraham and Cox, 2007) when studying the incentives for risk reporting. Different conjectures between the observed trend of MRR and firm risk levels, compared to the observed trend of VRR, therefore, can be performed.

Second, previous results support Dobler's (2008) theoretical argument that studying risk reporting incentives is crucial even within highly regulated countries like the USA and Germany. The results suggest that even within these mandated requirements; managers still have incentives to voluntarily disclose information above these requirements. This could significantly add to compliance disclosure literature (e.g., Bamber and McMeeKing, 2010) by emphasising the importance of widening this research scope to pay more attention to variations above the mandated requirements (e.g., IFRS adoption), which provide a minimum of information to investors, as argued through regulatory theory (e.g., Leftwich, 1980; Cooper and Keim, 1983; Fields, Lys and Vincent, 2001; Ogus, 2001).

The third theoretical implication is utilising a new empirical model (MLA) that will be introduced through either LMM, shown in Chapter Seven, or using RMMLA, shown in Chapters Eight and Nine, concerning how to interact both the cross-sectional and time series effects simultaneously with correcting for the residual dependency.

Fourth, the significant variations of MRR and VRR within and between firms either in or across the USA, the UK and Germany over 2005 to 2009 express that there are other chances to expand the current design either at firm or country level of analysis by involving other explanatory variables to reduce the unexplained variations in risk reporting. Hence, all explanatory variables used by the current study significantly improved the interpretations of the observed variations between firms, known as level 2 variations, more than those occurring within firms, known as level 1 variations. In this regard, the current study suggests that more attention should be paid to those variables that may express variations in MRR and/or VRR within firms over 2005 to 2009. All these expansions will be discussed in the section on limitations and suggestions for future research.

Practical implications

These previous results have some distinctive implications for regulators in the USA, the UK and Germany. First, the results support the regulatory trend within the USA; hence, the results indicate that firms providing more risk information either mandatorily and/or voluntarily are subject to significant underlying risks. This result could be interpreted as US firms trusting the market's ability to correct any overestimations of these firms' uncertainties by disclosing more risk information. The theoretical expansion for this argument is the extent to which investors can understand risk information in annual report narratives, as was addressed within the US market by Li (2008), who used a text search for the words *risk* and *uncertainty* in 10-K annual filings as a direct measure of risk information content. Li's (2008) findings support investors becoming more familiar with risk information as time passes (within one year ahead).

Second, within the UK context, the practical implications stem from supporting the current trend of UK regulation, which encourages firms to voluntarily disclose

information about their risks rather than making such disclosure compulsory. In general terms, the results reinforce support for encouraging (by means of non-mandatory initiatives, such as those of the ICAEW) UK firms to provide risk information voluntarily rather than mandatorily. The evidence, however, also signals that firms may provide less risk information than what would constitute an appropriate response to their underlying risk levels.

Third, consistent with discussion within the US context, the study evidence also supports German regulators' approach towards risk reporting; the results indicate that organising risk practices by officially issuing formal accounting standards results in motivating German firms to provide higher levels of risk information, either mandatorily or voluntarily, as a response to their risk levels. At the same time, there are some situations where firms significantly disclose less risk information relative to their significant exposure to risk. This behaviour could be explained on the basis that those firms could see that disclosing more risk information could be costly, especially for those who were not aware of the firms' risks.

Fourth, considering each country's legal system and its cultural values is essential to minimise variations in the mandatory efforts, which result in enhancing current international convergence efforts. In other words, because considering these factors explains a significant proportion of variations in MRR across the USA, the UK and Germany, the International Accounting Standards Board (IASB) should pay much attention to legal systems and cultural values across the countries in order to minimise variations in risk reporting.

1.6. Contribution to knowledge

The current study contributes to the existing literature in the following three distinct respects.

First, the present study explores, using firm-level analysis, the impact of risk levels on three different risk disclosure types (aggregated, voluntary and mandatory), controlling for four other firm characteristics (firm size, profitability, growth and dividends). While prior risk reporting literature provides mixed empirical evidence on firm size, no previous work has examined the other three effects. Prior disclosure research, therefore, is advanced by considering whether or not there are any associations between firm risk levels and risk reporting, rather than investigating associations between risk levels and corporate disclosure generally (e.g., Firth, 1984; Lang and Lundholm, 1993; Ahmed and Courtis, 1999; Chavent, Ding, Stolowy and Wang, 2006; Hassan, 2011). Furthermore, the current study advances literature on the association between market- and accounting-risk measures (e.g., Beaver et al., 1970; Lev and Kunitzky, 1974; Beaver and Manegold, 1975; Almisher and Kish, 2000; Giner and Reverte, 2006; Brimble and Hodgson, 2007; Ecker, Francis, Olsson and Schipper, 2009) by investigating how these measures can explain variations in MRR and VRR within and between firms in the USA, the UK and Germany.

The current study further examines, using country-level analysis, how and to what extent a country's legal system and its cultural values can influence variations in both mandatory and voluntary risk reporting.

Second, previous work has applied manual content analysis to a one-year period within one country to examine the impact of firm sector and size on issues such as quantity and

quality of risk reporting (Beretta and Bozzolan, 2004); the association between aggregated risk disclosure and firm size, firm risk and risk sentence characteristics, such as good, bad, past and future risk disclosures (Linsley and Shrives, 2005, 2006); and the association between corporate governance characteristics and business, financial and internal risk reporting (Abraham and Cox, 2007). The current study investigates risk disclosure as a function of risk levels across the USA, the UK and Germany by text-searching a large-scale sample of annual reports over a five-year period (2005 to 2009).

The current study is the first to use automated content analysis within risk disclosure studies in such a large scale across these three countries (e.g., Linsley and Shrives, 2000, 2005, 2006; Abraham and Cox, 2007).

Third, three methods are utilised to examine the association between the main variables: ordinary least squares (OLS), fixed effect model (FEM) and multilevel analysis (MLA), through applying linear mixed model (LMM) and repeated measures multilevel analysis (RMMLA). The first two approaches have been used frequently in prior research. To mitigate problems caused by cross-sectional data (heteroskedasticity) and/or time series data (auto-correlation), however, the study uses MA, which accounts for the problem of residual dependency that is frequently neglected in market-based accounting research (see Bernard, 1987; Gow et al., 2010).

1.7. Structure of the thesis

This section outlines the structure of the thesis, which contains ten chapters, as shown in Figure 1.1. Chapter Two provides the theoretical framework of risk reporting, introducing the concept of risk by identifying how this concept has emerged in business usage, and then reviewing academic and professional efforts to define risk. Based on these efforts, the study further reviews risk categories. The chapter also produces both regulatory and managers' incentive theories to understand the underpinning reasons for providing risk information mandatorily and/or voluntarily, respectively, utilising firm-level analysis. Expanding such level of analysis to country-level, the current study utilises Hofstede's cultural values and the legal systems of the USA, the UK and Germany to interpret firms' levels of mandatory and voluntary risk reporting (MRR and VRR) across those countries.

Chapter Three reviews and appraises prior research in two areas, risk measurement and risk reporting, followed by another review of prior professional efforts. Relying on these efforts, the current study identifies the gaps in this prior research.

Chapter Four presents the research questions and develops the research hypotheses, distinguishing between firm-level and country-level characteristics in generating the research hypotheses, which are derived theoretically from underpinning theories discussed in Chapter Two, and empirically from prior research reviewed in Chapter Three.

To examine the developed hypotheses, Chapter Five describes the research methodology, which contains data collection and the sample selection, the proposed automated content analysis and the study variables.

Chapter Six conducts, introduces and interprets a pilot study that examines the extent to which there are significant differences among and between firms in these three countries in terms of their risk levels and risk reporting, and the extent to which these two variables are correlated.

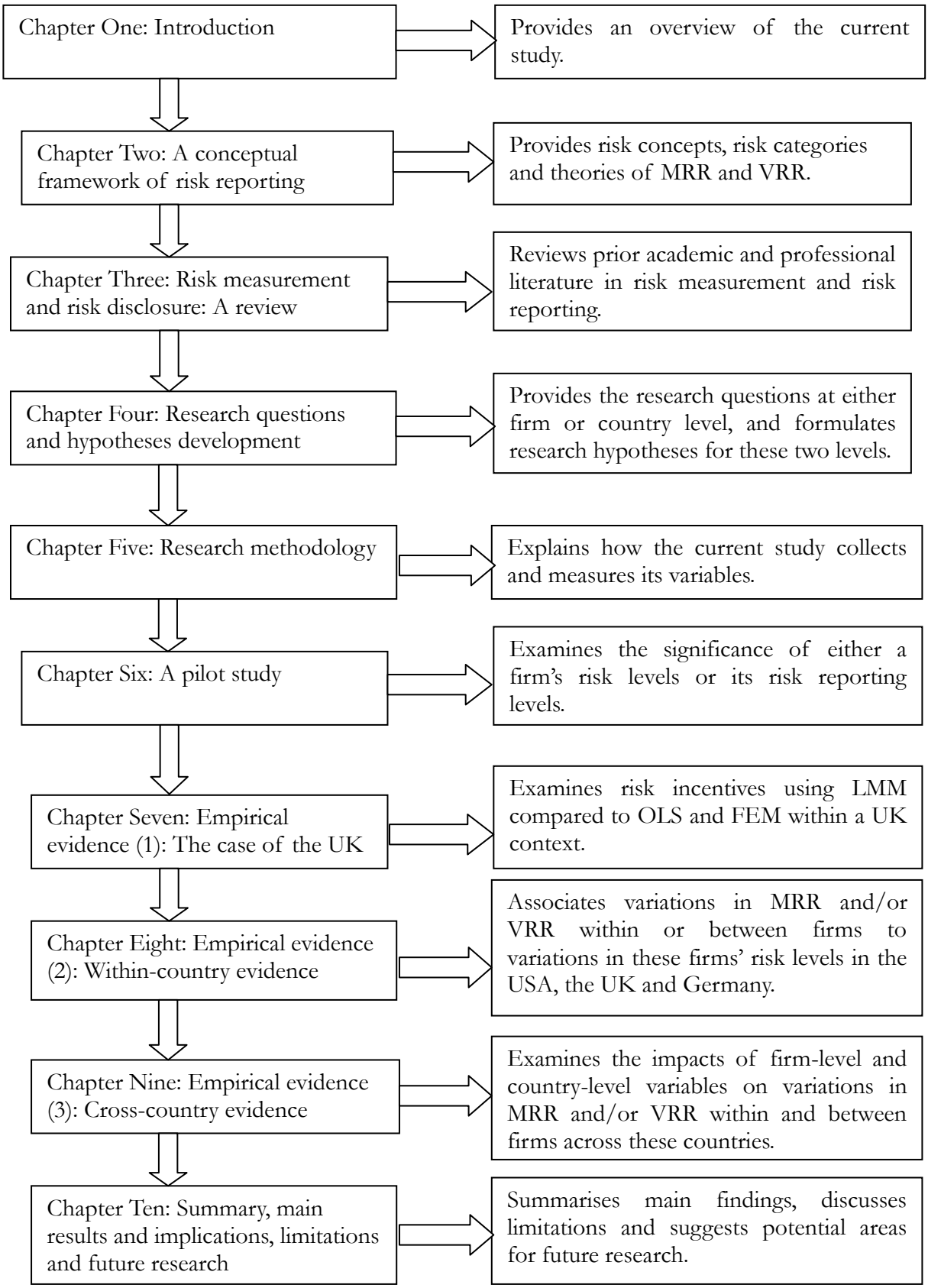
Chapter Seven introduces the empirical evidence of the extent to which firm risk levels can motivate firms to provide more or less risk information in their annual report narratives within a UK context, comparing OLS and FEM results with LMM results.

Chapter Eight expands the analysis in the previous chapter by including the other two countries and implementing RMMLA. The results reflect a different pattern of associations between a firm's risk levels and its mandatory and voluntary risk reporting.

Chapter Nine expands the analysis in the previous chapter to examine the extent to which firm- and country-level characteristics can express mandatory and voluntary variations within and between firms across the USA, the UK and Germany.

Chapter Ten provides a summary of the study, main conclusions, limitations and suggestions for future research.

Figure 1.1: The structure of the thesis



Chapter Two: A conceptual framework for risk reporting

2.1. Overview

Identifying a distinguished conceptual framework of risk reporting is the main aim of this chapter. To this end, the concepts of risk, risk categories, mandatory and voluntary risk reporting (MRR and VRR) theories and theories of variations in MRR and VRR are explained.

The chapter is structured as follows. Section 2.2 discusses concepts of risk. Section 2.3 addresses two main questions. Firstly, how can firms identify their risk? Secondly, how can firms categorise their risk? Section 2.4 explains the theory behind providing risk information mandatorily and/or voluntarily. Section 2.5 introduces theory explaining variations in such disclosures. The background of the main characteristics of accounting in the USA, the UK and Germany are discussed in Section 2.6. The concluding remarks are provided in Section 2.7.

2.2. The concept of risk

2.2.1. Background

The origin of the word *risk* is thought to be the Arabic word *risq*, which means anything that has been given to you by God and from which you can make profit, or the Latin word *risicum*, which originally referred to the challenges faced by sailors (Wharton, 1992).

In this context, Luhmann (1996) argues that the Latin word was used before the 16th century in sea trade, to describe legal problems in cases of loss and damage, whereas the Arabic word was used widely in the 16th century. He also explains that the term *risk* in the English language appears only in the 17th century, and has since been widely used and accepted as a principle term that replaced older notions of good and bad fortune. Thus, the term *risk* is used to attribute possible future successes and damages to external events, which, in turn, reflect the unpredictability or unforeseeability of these events, which could cause either good or bad outcomes.

Over time, these external events have been expanded to include internal events as a potential source of risk. While the former source can be attributed to fortune, the latter source can be attributed to anticipated circumstances. By the end of the 18th century, some other words were invented to express these two sources of risk under uncertain conditions, such as *hazard* and its synonyms (e.g., *danger* and *threat*). In general, these terms are considered synonymous in current practice (Luhmann, 1996). From the same perspective, Akintoye and MacLeod (1997) and Heggum (2004) argue that *hazard* can describe an event that has an adverse effect.

In terms of the English language, two definitions can be found. The first concentrates on the future and the probability of negative outcomes of an event, and is found in the Cambridge Dictionary (2004), which defines risk as the possibility of something bad happening. The second, however, concentrates on negative effects using some other terms, such as danger and hazard, and is found in the Concise Oxford Dictionary (2009), which defines risk as the chance of hazard, bad consequences, loss or exposure to danger.

The German definition is consistent with the latter one. Based on the Duden dictionary[3], risk is defined as a possible negative outcome for a company, which is associated with disadvantages, losses and damages; it can also apply to a project, a firm or an affiliated venture.

Before the 16th century, there was no real understanding of risk or the probability that is required to express how people could make decisions especially relative to the chance of dice gambling games (Bernstein, 1996). Therefore, chance was attributed to God(s). Even how to divide the points of an incomplete game between two players was a major problem; this was highlighted by Luca Paccioli, who in 1494 provided the double-entry method for bookkeeping systems, which is still used today. In 1654, Pascal and Fermat answered the previous question through their formation of the probability theory. This theory links the potential alternatives of a future event with the potential probability of each alternative; it is particularly useful in describing/predicting gambling (Sheynin, 2009). People at that time therefore become more able to deal with and forecast the future than before.

[3] German definition, as stated in Duden dictionary (2010), is "Risiko: möglicher negativer Ausgang bei einer Unternehmung, mit dem Nachteile, Verlust, Schäden verbunden sind; mit einem Vorhaben, Unternehmen o.Ä. verbundenes Wagnis".

Pascal and Fermat's analysis was expanded by the efforts of Jacob Bernoulli, who provided the basis for large number sampling in 1703. Consequently, through time, the usage of probability theory was extended from gambling and dice into a powerful instrument for organising, interpreting and applying information (Bernstein, 1996).

Expanding the efforts of Jacob Bernoulli, Abraham de Moivre introduced normal distribution in 1730, enabling users to accurately identify uncertainty within in smaller samples. Furthermore, de Moivre provided standard deviation as a measure of the dispersion of a set of data from its mean. These two concepts, standard deviation and normal distribution, are essential components of modern techniques used to quantify risk (Bernstein, 1996).

In the same context, in 1738, Daniel Bernoulli provided a basis to explain how people make choices relying on utility, rather than price, as the main determent of value. Depending on this utility, the value of risk can be measured (Bernoulli, 1738, translated by Sommer, 1954).

In 1850, Bayes concentrated on the importance of combining past and future data in order to enhance the calculation of the probability of various alternatives. Thus, he considers how frequently things happened in the past in order to draw conclusions about the present in order to predict potential future impacts.

A hundred years later, Harry Markowitz (1952) proposed the portfolio theory in a remarkable work, 'the Portfolio Selection' (e.g., Markowitz, 1952; Goetzmann, 2007). To optimise the reward for a given level of risk, portfolio theory describes how investors

balance the risk and the return of an investment in a portfolio. Using variance as a proxy of risk, he explains that investors should select an investment according to its returns, or the desirable outcome, compared with the variance of those returns, or the undesirable outcome.

William Sharp (1964) extends Markowitz's work through providing the Capital Asset Pricing Model (CAPM). This model treats the expected returns of an asset as a function of risk-free rate and risk premium, which is the difference between the risk-free rate and the expected returns. This risk premium should be, in turn, weighted by the variability of expected returns from actual returns. This weight is the market beta. Many other researchers have contributed to formation of this model, including Linter (1965) and Mossin (1966).

Based on Markowitz (1952), Sharp (1964), Linter (1965) and Mossin (1966), other prior research concerns the extent to which accounting information can surrogate market risk (e.g., Ball and Brown, 1968, 1969; Beaver et al., 1970; Beaver and Manaegold, 1975; Bowman, 1979; Almisher and Kish, 2000; Brimbl and Hodgson, 2007; Giner and Reverte, 2006). These studies will be discussed in the following chapter.

Based on portfolio theory, the concept of value at risk (VaR) appeared which describes the maximum losses expected in a specific period under a suitable level of confidence. It has been argued that VaR is not used in academic literature until the early 1990s (e.g., Holton, 2002 and 2003). During the end of the 1980s, Morgan (1996) developed a wide firm VaR system, which was provided as a technical document for risk metrics. This measure is broadly used and accepted in financial firms because of employing daily data, which is essential to calculate VaR.

VaR calculations can be achieved through many models; for instance, the simulation model, which relies on historical data (the historical simulation model) or future data (Monte Carlo simulation) (more details about the different methods of calculating VaR are provided in the following chapter, see note 6). The following table summarises these efforts and distinguishes the developments of the term *risk*, and how it has emerged in academic and business usage since the 15th century.

Table 2.1: Summary of development of risk concepts and their usage since the 15th century

Time period	Development of the term *risk* over time	Year	How risk has emerged in academic and business usage
The 15th century	The Latin word *risicum* is widely used to express legal problems in the sea trade, especially in cases of loss and damage.	1494	The problem of how to distribute the total points in an incomplete game between two players is highlighted by Luca Paccioli.
The 16th century	The Arabic word *risq* is used to express anything that has been given by God. Consequently, this concept includes either good things (gains) or bad things (losses).		
The 17th century	From the previous two words, the English word *risk* appears, replacing the notion of good and bad fortune. Thus, risk is used to attribute successes or damages to external (fortune) or internal events (anticipated).	1654	Pascal and Fermat answer the previous question using probability theory. This theory links potential alternatives and their potential probability. Thus, this theory helped people to articulate their forecasting.
The 18th century	To explain external and internal sources of risk, some other terms are introduced, such as *hazard*, *damage* and *threat*, each of which suggests adverse effects.	1703	The probability theory provided by Pascal and Fermat (1654) is restricted by using a small number of alternatives. An extension to this restriction is provided by Jacob Bernoulli, who introduces large number sampling, or the case of indefinite population.

		1730	Relying on large number sampling, normal distribution and standard deviation are provided by de Moivre, making quantifying risk possible.
		1738	Daniel Bernoulli provides a new methodology to measure risk and uncertainty by adopting the concept of utility. Since then, value has been identified as a function of its utility rather than its price. Bernoulli's works make it possible to express people's choices.
The 19th century		1850	Bayes explains the importance of combining historical and future data by providing the concept of frequencies, which enable users to generate the potential impacts of a future event.
The 20th century		1952	Markowitz provides the portfolio theory, which explains how investors should select stocks to form their portfolio. To achieve that, and based on variance or standard deviation as proxies for risk, Markowitz shows how to balance between returns and risk.
		1964, 1965, 1966	Sharp (1964) extends Markowitz's (1952) work by providing the Capital Asset Pricing Model (CAPM), measuring systematic risk (risks that affect all firms) through beta, which, in turn, expresses the variability of the actual returns around the expected returns. Many significant elements are added to CAPM by Linter (1965) and Mossin (1966).
		1970	To answer the question of how accounting data surrogates market risk, Beaver, Kettler and Scholes associate accounting variables or ratio analysis with market beta.

		1996	Morgan introduces VaR, which means that losses will not exceed a target value within a specific period and a specific confidence level, as a measure for a firm's market risk.
The 21st century		2000 – present	VaR has been widely used to measure market risk, especially within financial firms, owing to the availability of market data. VaR calculations can be achieved through many models; for instance, the simulation model, which relies on historical data (the historical simulation model) or future data (Monte Carlo simulation).

2.2.2. Risk definitions

Based on whether or not the risk scope includes gains, three main trends are found in prior literature. The first trend concentrates on the negative effects of risk, including potential losses, damages or threats (e.g., Kaplan and Garrick, 1981; Akintoye and MacLeod, 1997; Adams, 2009). The second trend concentrates on a combination of the upside, the opportunities or potential gains of good risks, and the downside, the potential losses from bad risks (e.g., Schrand and Elliott, 1998; Elmiger and Kim, 2003; Damodaran, 2008). The third trend concentrates on a statistical perspective by relying on the probabilities of events that relate to either losses or gains (e.g., Lopes, 1987; Ansell and Wharton, 1992; Stonebumer, Goguen and Feringa, 2002).

Similar to the prior academic literature, prior professional efforts adopt various perspectives. Specifically, the Institute of Chartered Accountants in England and Wales (ICAEW) (1997) explains that risk equals uncertainty and, in both terms, should include potential gains and losses. Consistent with that, the Accounting Standards Board (ASB)

adopts the same trend in its accounting standards (e.g., Financial Reporting Standards (FRS) Number 5: Reporting the Substance of Transaction, 1994).

Likewise, in the literature (e.g., Rust, 1999) that distinguishes between risk and uncertainty by identifying whether the probability distribution is known (risk) or not (uncertainty), the AICPA and the Canadian Institute of Chartered Accountants (CICA) (2000) point out that uncertainty could be defined as a condition where the outcome can only be estimated. Furthermore, they explain that articulations of risk should include two angles, the opportunity or the upside (potential gains) and the threat, danger or downside (losses).

Nonetheless, the Securities and Exchanges Commission (SEC) explains that risk contains only potential losses (Financial Reporting Release (FRR) No. 48, 1997). Similarly, in many contexts of its accounting standards the Financial Accounting Standards Board (FASB) adopts an interspersion of risk as the exposure of potential losses and potential gains which may be caused by movements in price, exchange rate or interest rate (e.g., Financial Accounting Standard (FAS) 133, 136, 137 and 161).

The German Accounting Standards Board (GASB) provides an accounting standard (GAS: 5) to deal with how German firms can provide risk information in their annual reports. According to this standard, risk is defined as the possibility of future negative impact on the economic position of a firm. In the same context, GAS 5 explains that opportunity is the possibility of a future positive impact on the economic position of a firm. GAS 5 adopts, therefore, a narrow perspective that concentrates on potential losses. At the same time, GAS 5 emphasises that firms should provide suitable information about their potential opportunities in their financial reporting.

Consistent with what is mentioned above, the International Accounting Standards Board (IASB), formerly the International Accounting Standards Committee (IASC), explains in many sections of its accounting standards that risk includes losses as well as gains (e.g., IAS 32 and 39; IFRS 7). Table 2.2 summarises previous accounting professional efforts regarding the concept of risk.

Table 2.2: Summary of professional efforts on the concept of risk

Components of risk / Professional body/ country		Potential losses	Potential losses and potential gains
ICAEW	UK		X
ASB	UK		X
SEC	USA	X	
AICPA	USA		X
FASB	USA		X
GASB	Germany	X	
IASB	International		X

To sum up, the current study introduces the concept of risk through outlining a fundamental background about risk relative to its language, the development of its usage, and prior academic and professional efforts. The current study concludes that including or excluding potential gains from the concept of risk is the main conflict among prior research (e.g., Damodaran, 2008; Adams, 2009) and prior professional efforts (e.g., ICAEW, 1997; GASB, 2000).

It is worth mentioning that previous professional efforts, which rely on recommendations (ICAEW and AICPA), define risk as involving both potential gains and potential losses. Once, these professional bodies make up regulations, they adopt a narrow perspective through considering only potential losses rather than potential gains (SEC and GASB), although the IASB's and ASB's efforts are exceptions in terms of adopting a wide perspective in defining risk. One explanation, for the approaches of the SEC and GASB, could be the adoption of the discretionary approach with the former (e.g., Jorgensen and Kirschenheiter, 2008) and the prudence approach with the latter (e.g., Evans, Eierle and Haller, 2002). The trends of the ASB and IASB can be interpreted in light of the flexibility of the principle-based approach that is adopted by those professional bodies.

To respond to such conflict, risk can be defined as the variations or fluctuations around a target value at a specific time horizon. The content of this section, however, should be expanded to cover the risk categories, which will be discussed in the following section.

2.3. Risk categories

This section addresses two questions: how can firms identify their risk? And, what are the different categories of risk? Based on academic and professional prior research, these two questions will be addressed in the following subsections.

2.3.1. Identifying risk

Identifying each firm's risks is essential, because it can be argued that without an accurate identification of these risks, all subsequent efforts to categorise, measure or disclose risk will not be accurate. Each firm, therefore, seeks to rely on tools or techniques to generate its risks and then categorise them. Therefore, it is difficult to find a general list of risks

suitable for all firms, owing to the fact that each firm has its own circumstances; these may differ even within the same firm over time (e.g., Schrand and Elliott, 1998).

AICPA and CICA (2000) illustrate some tools or techniques that firms may rely on to identify their risks. They suggest relying on interviews, questionnaires and checklists to derive each firm's risks. These kinds of tools are useful in identifying each firm's risk categories, which differ from one firm to another.

2.3.2. Risk categories

Depending on one or more of the previous techniques, each firm might categorise its own risks to deal with them effectively. This can be considered an essential step because incorrectly identifying or listing risks can make conducting risk measurement and risk disclosure inaccurate. It is emphasised that the more accurate this list is, the more effective the measurement and disclosure of these risks will be.

Prior risk reporting literature (e.g., Jorion, 1997; Hodder and McAnally, 2000; Linsmeier et al., 2002; Cabedo and Tirado, 2003; Linsley and Shrives, 2006; Abraham and Cox, 2007) discusses different types of risk. Jorion (1997) explains three major types of risk: business, strategic and financial risk. Business risks are those related to a company's competition situation. Strategic risks are related to basic changes in the economy and the political environment surrounding a firm. Financial risks are those related to the possibility of market losses.

Treating derivatives as balance sheet activities rather than off-balance sheet activities draws regulators' attention to market risk, in which all risks arise from changes in market rates

and prices, such as interest rates, foreign currency rates, commodity prices and other relevant market or price changes (e.g., Hodder and McAnally, 2001; Linsmeier et al., 2002).

Cabedo and Tirado (2003) illustrate that firms are essentially exposed to two types of risk: non-financial risk and financial risk. The former does not have a direct effect on the firm's assets and liabilities; the latter, however, has a direct effect on the firm's assets and liabilities. Non-financial risk includes business risk and strategic risk. While business risk refers to the possible losses that arise from the competitive skills that a company has, strategic risk is related to changes in the economy.

Financial risk, on the other hand, contains market risk, credit risk and operational risk. Market risk usually arises from variations in exchange rates, interest rates, changes in stock prices and changes in commodity prices. Credit risk arises from the deterioration of a firm's client value. Operational risk arises from internal and external factors; consequently, operational risk may have negative effects on a firm's assets or liabilities.

Linsley and Shrives (2006) provide two main categories of risk to analyse the determinants of risk disclosure: financial and non-financial risk. The latter category contains five types of risk: operational, empowerment, technology, integrity and strategic risk. In the same context, Abraham and Cox (2007) concentrate on two types of risk: financial and business risk.

Damodaran (2008) summarises reasons that might make expected returns differ from actual returns into firm-specific risk, or project risk and market risk. The former stems from factors that differ from one firm to another, so it may be known as unsystematic risk.

Accordingly, firms can avoid project risks through a diversification policy. The latter, however, affects all firms, which trade on the market, so it may be known as systematic risk. Firms, therefore, cannot avoid market risks through a diversification policy.

In drawing connections between accounting and finance literature, it is essential to concentrate on systematic risk versus total risk. Ryan (1997) explains that the majority of finance and accounting research concentrates on systematic risk rather than total risk, owing to the increased usage of CAPM (more discussion about this point can be found in the following chapter).

In line with prior academic literature, the attention given to risk type by professional bodies has increased over the last three decades (e.g., ICAEW, 1997; AICPA & CICA, 2000; GASB, 2000; IASB, 2008). ICAEW (1997) argues that risks are usually derived from two factors: external factors, which provide external risks or environment risks, and internal factors, which provide internal risks or process risks. Internal risks are more controllable than external risks; consequently, providing information about external risks may not be useful, owing to these risks being a function of uncontrollable conditions and actions. ICAEW (1997), therefore, concentrates on internal risks, especially financial and non-financial risks. Financial risk can be categorised into price, liquidity and credit risks. Non-financial risk contains the other internal risks (e.g., operational and decision-making risks). Two other terms are used to refer to these two risk types: direct and indirect risks. Direct, or financial, risks have a direct effect on a firm's assets and liabilities. Indirect, or non-financial, risks do not have a direct effect on a firm's assets and liabilities.

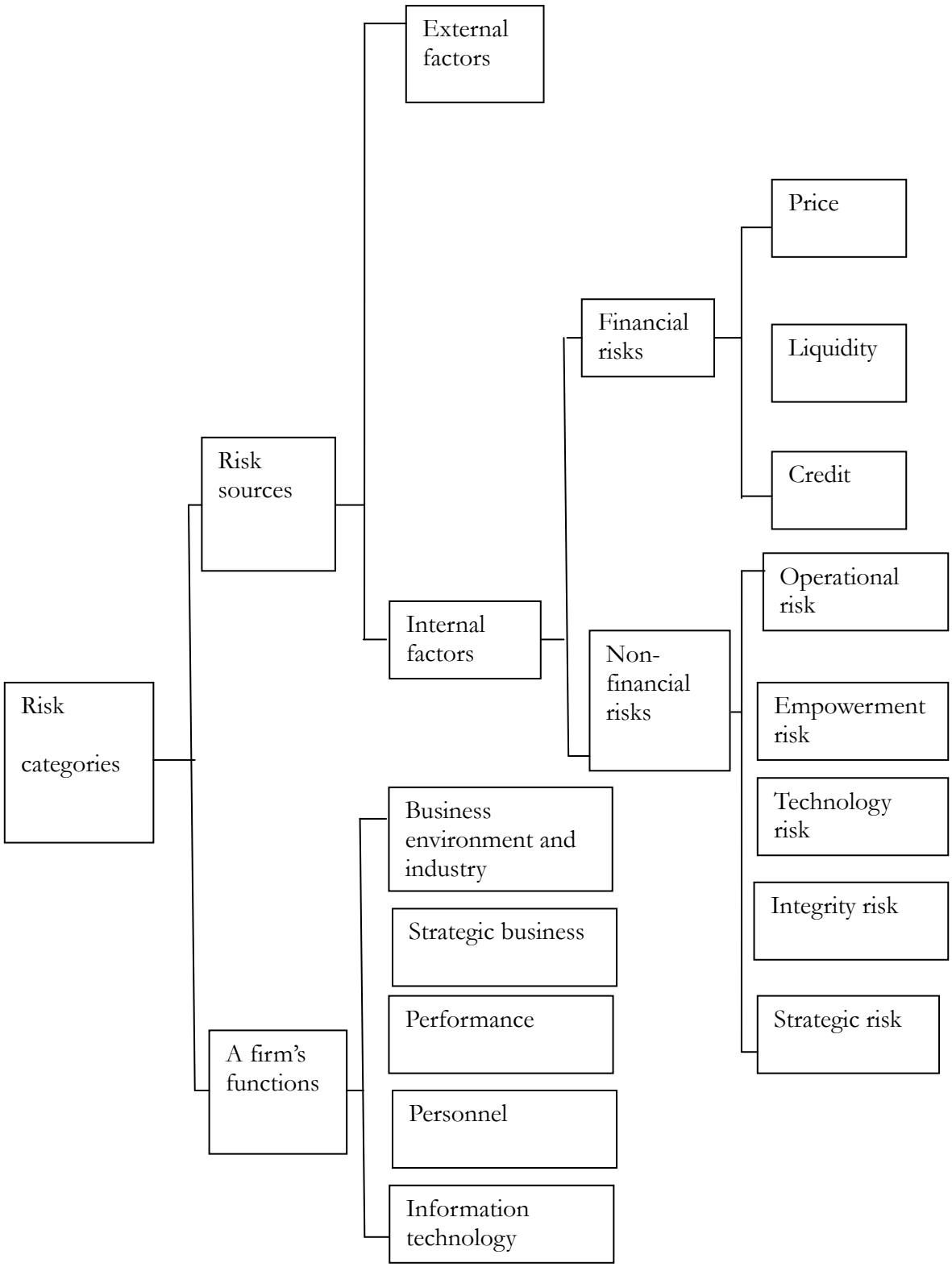
From the same perspective, and relying on the sources of risk to generate firms' risks, AICPA and CICA (2000) categorise risk into four principal types: environmental, strategic, operational and informational risks.

GAS 5 (2000) points out that firms should categorise their risks from an organisational and functional point of view. It provides seven categories of risk: business environment and industry; strategic business; performance; personnel; information technology; financial; and other risks. Furthermore, the standard provides examples for each main category rather than setting out any mandatory categorisation, since each firm will face different types of risks and these risks will change over time.

The IASB (2008) illustrates that risk categories related to financial instruments (IFAS: No. 7) are: credit risk, which arises from failing to discharge an obligation; liquidity risk, which usually arises from difficulties in meeting a firm's financial obligations; and market risk, which can be derived when the fair value or future cash flows of the financial instruments fluctuate, which is caused by changing market prices, interest and currency rates.

Previous efforts could be synthesised in Figure 2.1 as follows:

Figure 2.1: Summary of risk categories



This figure summarises the most common methods of classifying a firm's risks.

In summary, two main questions are addressed: how can a firm identify its risks? And, what risk categories do firms face? The first question is neglected in prior academic literature; nevertheless, some professional efforts (e.g., AICPA and CICA, 2000) suggest relying on interviews, questionnaires and checklists to identify a firm's risks. The main conclusion relative to the second question is that two main methods are widely used to classify a firm's risks. While the first is the sources of risk that can be derived from either internal or external factors, the second is the organisational and functional method, in which a firm's risk might be classified.

2.4. Theories of mandatory and voluntary risk reporting: Firm-level analysis

This section addresses why firms could disclose risk information in their annual report narratives either mandatorily and/or voluntarily. Regulatory theory is essential to justify some contexts in which regulators require firms to provide risk information according to specific rules. These contexts are likely to be related to macro circumstances, such as financial crises, financial scandals or, more generally, when the market fails to provide sufficient information by which the stock market could protect its investors. Managers' incentives theories are essential to understand why firms disclose information about their risks voluntarily. Managers may have some incentives, such as reducing agency cost between agency parties (agency theory), signalling the quality of their performance (signalling theory) or reducing uncertainty related to their future cash flows (capital needs theory) to voluntarily disclose information about their risks. These theories are discussed in the following two subsections by giving background information about each theory and describing how prior research relies on these theories to justify why firms mandatorily and/or voluntarily disclose financial disclosure generally, and risk information particularly.

2.4.1. Regulatory theory

Prior research (e.g., Leftwich, 1980; Cooper and Keim, 1983; Fields et al., 2001; Ogus, 2001) argues that an imperfect stock market and market failure are two main situations that require mandated disclosure (regulatory theory) to identify the minimum requirements of disclosure that should be provided to protect investors. Most importantly, these regulations might reduce the information gap between informed individuals (managers and/or sophisticated investors) and uninformed individuals (unsophisticated investors) in order to redistribute the wealth between them, as explained by Healy and Palepu (2001). Unverified information and the threat of economic disadvantages gives rise to a lack of motivation to disclose voluntarily; consequently, mandating risk disclosure by regulation stems from a regulator's need to provide the essential requirements of risk disclosure to inform investors (Dobler, 2008). While empirically studying the impact of risk regulations on the stock market is the main focus of US research in such a highly-regulated market (e.g., Rajgopal, 1999; Jorgensen and Kirschenheiter, 2003, 2008), some research within the UK context, as a low-regulated market (Marshall and Weetman, 2002; Abraham and Cox, 2007), studies the impact of risk regulations on risk disclosure.

2.4.2. Managers' incentives theories

Core (2001) suggests that further research is required on the association between voluntary disclosure and managerial incentives. Based on agency, signalling and capital needs theories, these managerial incentives can interpret voluntary risk disclosure.

Jensen and Meckling (1976) suggest agency theory, which posits complete separation between owners or shareholders (principals) and control or management (agents). This suggests that separation causes conflict between these agency parties, and then reduces shareholders' confidence. Managers, therefore, can voluntarily provide risk information to

reduce their agency cost (e.g., bonding cost, which occurs from the agent's activities) and the principals' mentoring cost such as measuring, observing and controlling agent behaviour, which in turn results in reducing risk information asymmetry. Empirically, some risk disclosure research (e.g., Abraham and Cox, 2007; Vandemaele et al., 2009) has used agency theory to explain why firms voluntarily disclose risk information.

Another motive for managers (insiders) to disclose risk information voluntarily, based on signalling theory, which was proposed by Akerlof (1970), developed by Spence (1973), and used by some prior general disclosure research (e.g., Lev and Penman, 1990; Aboody and Lev, 2000; Watson, Shrives and Marston, 2002), is to signal to the market (outsiders) their ability to identify, measure and manage their risks, distinguishing themselves from other firms' managers who respond poorly to risks.

Based on capital needs theory, as referred to by Meek and Gray (1989), or capital market transaction, as referred to by Healy and Palepu (2001), one last incentive for managers to voluntarily disclose risk is the consequences for cost of capital. If a firm has an information asymmetry gap with its investors, that leads to increased investor uncertainty, which in turn raises their desired rate of returns (discount rate or risk premium), which causes an increase in their cost of capital. These firms, however, can reduce their information asymmetry by increasing their risk information voluntarily so as to increase investors' certainty, which might reduce the desired rate on their investments, which in turn will result in reducing the cost of capital. Empirically, this theory is examined by prior general disclosure research (Botosan, 1997; Botosan and Harris, 2000; Botosan and Plumlee, 2002; Francis et al., 2005) and is recommended in risk disclosure by ICAEW (1997, 1999, 2002a).

In summary, providing risk information mandatorily and/or voluntarily aims toward reducing information asymmetry through requiring a minimum of risk disclosure by mandating disclosure through regulations and/or having managerial incentives for: (1) reducing conflicts between agency parties; (2) signalling their quality; and (3) reducing investors' uncertainties about the amount and time of their future cash flow.

It is noteworthy that in terms of the association between mandatory and voluntary disclosures, Verrecchia (2001) explains that both types of disclosure can reduce information asymmetry, resulting in integrating the efficiency of disclosure choices**,** increasing the incentives for disclosure and enhancing the reaction of different parties in the stock market. Dye's work (1986, 1990) is inconclusive, finding both positive (1986) and negative (1990) relations between mandatory disclosure and managers' incentives for voluntary disclosure. Gigler and Hemmer (1998), Marshall and Weetman (2002) and Deumes and Knechel (2008), however, support Dye's earlier work.

2.5. Theories of variations in mandatory and voluntary risk reporting: Country-level analysis

Previous discussions suggest three main countries that exhibit three unique approaches towards risk disclosure. These countries are the USA, the UK and Germany. Within the US context, there is a preference towards organising risk disclosure either by imposing specific requirements (e.g., FRR 48, 1997) or by encouraging US firms to provide more risk information. Within the German context, there is a preference to obligate firms to provide specific risk disclosure requirements through a formal accounting standard. In contrast, the UK approach prefers voluntary risk disclosure. These approaches have significantly influenced the main trends of prior risk reporting literature. Specifically, the US trend, which considers mandatory disclosure and its impact on the usefulness of accounting

information, the UK trend, which considers the main determinants of voluntary risk reporting, and the German trend, which analyses the expected impact of GAS 5 on other countries (as will be discussed in more detail in Section 3.3). After introducing the reasons that may explain variations in risk disclosure across these three countries, a brief description of the main characteristics of accounting in these three countries (the regulatory regime, cultural values, legal systems and other factor) is discussed in the following paragraphs.

Cross-country differences in accounting practices have received considerable attention from prior literature (e.g., Muller, 1967, 1968; Nobes, 1983, 1984; Frank, 1979; Nair and Frank, 1980). Gray (1988) distinguishes two main approaches in prior research on cross-country differences in accounting practices. The first is deductive, seeking to identify environmental factors, link them to the national accounting system and then classify these factors by country (e.g., Muller, 1967; Nobes, 1983). The second approach is inductive, seeking to identify differences in accounting practices and attribute such differences to some predictive patterns or factors (e.g., Frank, 1979; Nair and Frank, 1980). Such prior research, however, includes culture as an exploratory variable in order to examine the extent to which culture influences accounting practices. Hofstede (1980) defines culture as *"the collective programming of the mind which distinguishes the members of one human group from another"*. Such differences are explained by Gray (1988), who builds his theory on Hofstede's (1980) four dimensions of cultural values. Hofstede (1991) extends these four dimensions by providing his fifth dimension.

The first dimension, power distance (PD), is the extent to which power is distributed equally within a society and the degree to which the society accepts this distribution, from relatively equal to extremely unequal. Second, uncertainty avoidance (UA) is the degree to

which individuals in a society prefer structured over unstructured situations, and cope with risk and innovation, from relatively flexible to extremely rigid; a low uncertainty culture emphasises a higher level of standardisation and greater job security. Third, individualism (IND) is the degree to which individuals base their actions on self-interest versus the interests of the group. Fourth, masculinity (MAS) is a measure of a society's goal orientation: a masculine culture emphasises status derived from wages and position; a feminine culture emphasises human relations and quality of life. Fifth, long-term orientation (LTO) is the extent to which a society respects traditional, forward thinking.

Based on the first four dimensions, Gray (1988) suggests four accounting dimensions to express accounting values explicitly. First, professionalism is a preference for the exercise of individual professional judgment and the maintenance of professional self-regulation versus compliance with prescriptive legal requirements and statutory control. Second, uniformity is a preference for the enforcement of uniform accounting practices between companies and the consistent use of such practices over time, as opposed to flexibility in accordance with perceived circumstances of individual companies. Third, conservatism is a preference for a cautious approach to measurement to cope with the uncertainty of future events, versus a more optimistic, risk-taking approach. Fourth, secrecy is a preference for confidentiality and the restriction of information disclosed about the business to only those individuals who are closely involved with its management and financing, as opposed to a more transparent, open and publicly accountable approach.

Gray (1988) provides four hypotheses without testing them empirically. These four hypotheses are derived from identifying the potential impact of the cultural dimensions on the four accounting dimensions, which, in turn, identify the characteristics of either the accounting systems or the accounting practices.

Beginning with the cultural dimensions: Gray (1988) tries to derive the potential impact on the accounting dimensions. Four possible causes and four potential impacts are provided. First, countries which have a high score[4] in individualism (cultural dimension) and lower scores in uncertainty avoidance (cultural dimension) and power distance (cultural dimension) are highly expected to have a high score in professionalism (accounting dimension). Second, countries, which have high scores in uncertainty avoidance (cultural dimension) and power distance (cultural dimension), and a lower score in individualism (cultural dimension) are highly expected to have a lower score in uniformity (accounting dimension).

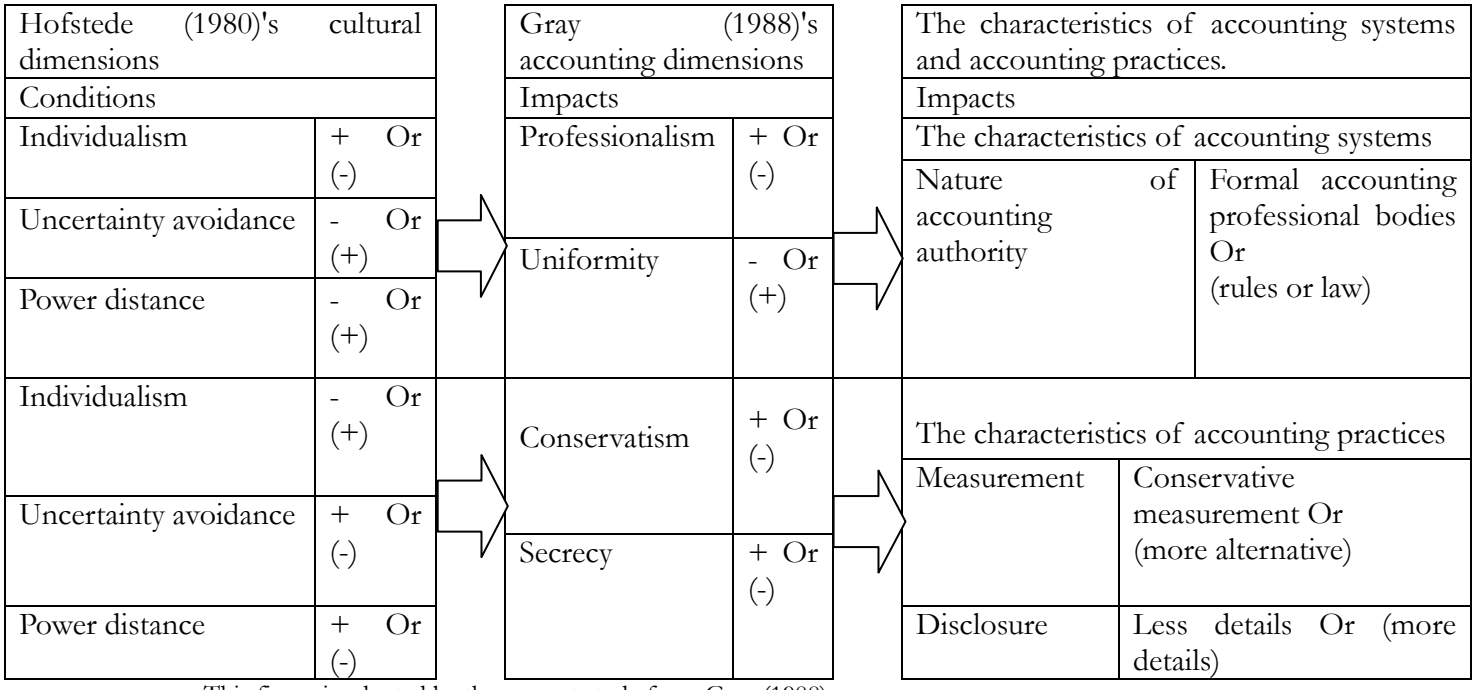
The previous two impacts of the cultural dimensions on the accounting dimensions are more related to determining the accounting system in terms of the nature of the accounting authority. As a result, accounting can be organised through professional bodies (e.g., FASB and AICPA in the USA; ASB in the UK) or by rules like commercial law (e.g., Germany). In the same context of identifying the potential impact on accounting practices, the latter two accounting dimensions are explained in the following paragraphs.

Countries that have a high score in uncertainty avoidance (cultural dimension) and a lower score in individualism (cultural dimension) are more likely to score high in conservatism (accounting dimension) (e.g., Germany). Fourth, countries which have high scores in uncertainty avoidance (cultural dimension) and power distance (cultural dimension), and lower scores in individualism and masculinity (cultural dimensions), are highly expected to

[4] Based on collected questionnaire responses from more than 116,000 IBM employees in over fifty countries, Hofstede calculates these scores, which are considered a benchmark for cultural values (e.g., Doupnik and Tsakumis, 2004).

have a high rank in secrecy (accounting dimension) (e.g., France). The interactions between these dimensions are explained in Figure 2.2

Figure 2.2: The interactions between cultural and accounting dimensions



This figure is adapted by the current study from Gray (1988)

The accounting dimensions (accounting values) are therefore generated from cultural dimensions (societal values). The former two accounting dimensions, professionalism versus control and uniformity versus flexibility, are likely to identify the nature of the accounting system in a country. The latter two accounting dimensions, conservatism versus optimism and secrecy versus transparency, are likely to identify the nature of measurement and disclosure practices, respectively. These distinctions are used by some subsequent research (e.g., Perera, 1989; Perera and Mathews, 1990; Radebaugh and Gray, 1993).

The Hofestede-Gray framework has been considerably investigated theoretically and empirically (for a comprehensive review see Chanchani and MacGregor, 1999; Doupnik and Tsakumis, 2004) using different units of analysis (country, firm and individual). This

has resulted in theoretical improvements to the framework, e.g., Perera (1989) and Perera and Mathews (1990) suggest that societal values may affect both accounting systems and practices through accounting values that are consistent with Radebaugh and Gray (1993).

It is noteworthy that although using Hofstede's framework is widely accepted in prior research, as is comprehensively reviewed and appraised by Doupnik and Tsakumis (2004), there are some other arguments for rejecting such usage in anthropology and sociology research, as argued by Baskerville (2003). She explains possible reasons for such rejection, including assumptions of equating nations with cultures, and the caveat of using numeric values to interpret culture. As a response to such limitations, Linsley and Shrives (2008) analytically analyse Mary Douglas's usage of culture to interpret risk management in light of some recent failures (e.g., Enron and WorldCom). For more details see, e.g., Harrison, McKinnon, Panchapakesan and Leung, 1994; Hussein, 1996; House, Hange, Javidan, Dorfman and Gupta, 2004.

Consistent with previous critiques, other research (e.g., Fechner and Kilgore, 1994; Baydoun and Willett, 1995), however, criticises Hofstede-Gray's framework and suggests other factors which may help to understand differences within and between countries. Some other empirical studies respond to such suggestions by investigating the impact of legal systems, inflation and exchange rate along with cultural values on expressing variations in disclosure (e.g., Jaggi and Low, 2000; Hope, 2003; Williams, 2004). In the following paragraphs, the current study discusses the background of the legal systems.

Legal systems

La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) explain that common law, which is English in origin, and civil law, which derives from Roman law, are the main sources of commercial laws. They further explain that modern commercial law originates from three major families: French, German and Scandinavian. They state that French and German civil traditions, in addition to the common law tradition, have spread around the world. La Porta et al. (1998) explain that laws across countries vary because of their different origins. They find that the highest level of protection for shareholder and creditors is in common law countries, followed by German civil law countries. They find the quality of enforcement is very strong in German civil law countries, followed by common law countries. La Porta et al. (1998) document that legal rules protecting investors vary systematically among legal traditions or origins; for more details see e.g., La Porta, Lopez-de-Silanes, Shleifer and Vishny (2000). In another recent study, La Porta, Lopez-de-Silanes and Shleifer (2008) find that common law is associated with better investor protection, which is subset to better access to finance and higher ownership dispersion, lighter government ownership and regulation.

Other factors

Prior research (Nobes and Barker, 2010) states many other factors (political effect e.g., Riahi-Belkaoui, 2002; economic effect e.g., Archambault and Archambault, 2003; financial system e.g., Nobes, 1998) that could explain differences in accounting practices across countries. Archambault and Archambault (2003) argue that economic factors (e.g., stage of economic development, inflation level) affect the level of disclosure. Countries with different levels of economic development are likely to have different levels of accounting practices generally and disclosure particularly.

Nobes (1998) suggests the importance of financial systems in classifying accounting systems and interpreting differences in accounting around the world. He distinguishes between insider and outsider financial systems as a response to the extent to which the source of finance is creditors (e.g., banks) or equity (e.g., investors), respectively. Nobes (1998) argues that the pressure to provide more information in the first market (outsider) is stronger than it is in the second market (insider).

2.6. Theoretical background of the main characteristics of accounting in the USA, the UK and Germany

In this section, the current study discusses the main characteristics of accounting in these three countries. These characteristics include the regulatory regime, cultural values, legal systems and other factors.

2.6.1. Regulatory regimes

The regulatory regime is essential to consider in this set of countries because it gives many useful insights in explaining how the accounting systems are involved.

USA

The USA has some specific laws that organise dealing with securities, which are enforced at the federal level, such as the Securities Act of 1933 and the Securities Exchange Act of 1934, each of which has many aspects relating to financial reporting. By these Acts, the SEC was established in 1934, aiming at providing for (existing and/or potential) investors' financial and non-financial information needs in order to improve their ability to make decisions. It is essential to note that SEC registered firms are obligated to follow the SEC's main requirements (e.g., published financial statements, filing forms such as 10-K and having Certificate Public Accountants (CPA) audits); other firms, however, do not have any

obligations to publish their financial reporting. In 2007, AICPA and FASB established a committee concerned with issues related to private companies.

The SEC has issued many statements related to registration matters. These statements are currently known as Financial Reporting Releases and were earlier known as Accounting Series Releases. These releases broadly describe several issues (e.g., rules of preparing financial reporting; different forms, such 10-K for domestic firms and 20-F for foreign firms).

In terms of accounting professional bodies, within the USA, the FASB was established in 1973 following two prior committees. The first covered the period of 1936 to 1959 and was known as the Committee of Accounting Procedure (CAP), followed by the Accounting Principle Board (APB) between 1959 to 1973. Three main types of publications are usually provided by the FASB (Nobes and Parker, 2010). These are the Statement of Financial Accounting Statements (SFASs), the Statement of Financial Accounting Concepts, and Interpretations. The Emerging Issues Task Force (EITF) observes any new issues in practice; this body contains a number of accountants from large firms in addition to members from AICPA and SEC as observers. After the largest collapses in recent American history by Enron and WorldCom in 2001, the Sarbanes-Oxley Act (SOX) established the Public Accounting Oversight Board (PAOB), which effectively has a wider role in issuing auditing standards than it does with accounting standards.

UK

In the UK, the Companies Act plays an essential role in creating the distinctive features of the regulatory system (e.g., Alexander, 1999). The Companies Act 1947 can be considered a big step in organising financial reporting (e.g., group financial statements, reserves and provision); many of these concepts were established in 1942 as a response to

recommendations on accounting principles from ICAEW system (Alexander, 1999). In 1985, a consolidated version of previous Acts was provided, which collected all previous efforts in one document. The latest Companies Act was published in 2006.

In 1969, the ICEW set up the Accounting Standard Steering Committee, later known as the Accounting Standard Committee (ASC), to mitigate professional criticism and reduce misleading financial reporting. The ASC issued Statements of Standard Accounting Practice (SSAPs); this committee, however, was replaced by the ASB in 1990. The ASB has the authority to issue accounting standards, known as Financial Reporting Standards (FRSs), but has adopted a number of previous SSAPs (Nobes and Parker, 2010).

Germany

The German Commercial Code, which is known as Handelsgesetzbuch or HGB, identifies German accounting regulations; all forms of German business, therefore, (e.g., partnerships, closed corporations and corporations) must follow these regulations. HGB contains essential accounting concepts and principles (e.g., prudence, recognition and timeliness), which firms are obligated to follow in their preparation of financial reporting (e.g., Evans, Eierle and Haller, 2002; Leuz and Wustemann, 2003; Eierle, 2005). In addition, decisions of tax law and the Federal Fiscal Court (TFFC), which is practically the highest authority, are a fundamental source of German rules. This is in contrast to the situation in the USA, where courts identify whether accounting standards are appropriate in specific circumstances.

The GASB was established by the 1998 Corporate Control and Transparency Act. It could be argued that the association between accounting rules and shareholder distribution is essential to understand the nature of the German accounting system; hence, the priority is to ensure payments to ownership and restrict pay-outs to other parties, which leads to an

obvious restriction of revenue recognitions (e.g., long-term contract, securities). On the other hand, losses have to be recognised as soon as they arise. This is a direct impact of prudence and, in some cases; such accounting for liabilities and contingences is more prudent than what is required in the USA and the UK. In this regard, the concept of distribution of profits and the principle of prudence are the most important concepts that form the German accounting system.

2.6.2. Cultural values

In the following paragraphs, the current study identifies Hofstede's cultural dimensions in the USA, the UK and Germany.

Power distance

This dimension deals with the fact that not all individuals in societies are equal. It expresses the attitude of the culture towards these inequalities amongst people (Hofstede, 1980-1991; Hussein, 1996; House, Hanges, Javidan, Dorfman, Gupta, 2004). The United States scored 40, suggesting a valued focus on equal rights in all aspects of American society and government. The UK scored 35, suggesting that Britain sits in the lower rankings of PD; this could be interpreted as British society believing that inequalities should be minimised. Highly decentralised and supported by a strong middle class, Germany scored 35, putting it among the lower power distant countries. German managers should take into account the co-determination rights, which are comparatively extensive.

Individualism

This dimension concerns the degree of interdependence a society maintains among its members and addresses whether people's self-image is defined in terms of "I" or "We" (Hofstede, 1980-1991; Hussein, 1996; House et al., 2004). The USA scored 91 on this dimension, which indicates a highly individualistic culture resulting in a loosely knit society in which the expectation is that people look after themselves and their immediate families.

At a score of 89, the UK is amongst the highest of the individualism scores**,** suggesting that the British are a highly individualistic and private people. Germany scored 67 on this dimension, suggesting that German society is truly individualistic.

Masculinity

This dimension concerns whether the society is driven by competition, achievement and success, with success being defined as being the "winner" or "best-in-the-field" (Hofstede, 1980-1991; Hussein, 1996**;** House et al., 2004). The USA scored 62 on this dimension and is considered a "masculine" society. As a result, Americans tend to display and talk freely about their "successes" and achievements in life, which are another basis for hiring and promotion decisions. The UK scored 66, suggesting that Britain is a masculine society – highly success-oriented and driven. Germany scored 66, making German society a highly masculine one, indicating that the society is driven by competition, achievement and success. These countries, therefore, have similar scores on this dimension.

Uncertainty avoidance

This dimension concerns the way that a society deals with the fact that the future can never be known: should we try to control the future or just let it happen? (Hofstede, 1980-1991; Hussein, 1996; House et al., 2004). The US scored 46 on this dimension; American society can be described as "uncertainty accepting", which can be considered slightly higher than the UK (35). This suggests that British society has low uncertainty avoidance, which means that as a nation they are quite happy to wake up not knowing what the day brings and are happy to 'make it up as they go along', changing plans as new information comes to light. Germany scored 65 in this dimension, suggesting that Germany is among the higher uncertainty avoidance countries. Such a result could stem from the philosophical heritage of Kant, Hegel and Fichte, suggesting that there is a strong preference for deductive rather than inductive approaches. In other words, German society prefers to compensate for their higher uncertainty by strongly relying on expertise.

Long-term orientation

This dimension concerns the extent to which a society shows a pragmatic future-oriented perspective rather than a conventional historical short-term point of view (Hofstede, 1980-1991; Hussein, 1996; House et al., 2004).The USA scored 29 in this dimension, the UK 25 and Germany 31, suggesting that all three are short-term oriented cultures that focuses on traditions and fulfilling social obligations, have great respect for history and tradition, as well as a focus on quick results in the future. Planning horizons tend to be short and business in particular is very focused on short-term quarterly goals and quick results. Societies with a short-term orientation generally exhibit great respect for traditions, a relatively small propensity to save, and a strong concern with establishing the Truth.

2.6.3. Legal systems

Based on La Porta et al. (1998, 2000, 2008) and previous detailed discussion on regulatory frameworks, it can be seen that the USA and the UK are examples of common law countries, while Germany is an example of a code law country. These classifications are theoretically grounded (e.g., La Porta et al., 2008; Nobes and Barker, 2010) and are used in empirical prior research (e.g., Dong and Stettler, 2011). The legal system, as one could expect, might be considered an essential factor in interpreting variations on disclosure generally (e.g., Jaggi and Low, 2000; Hope, 2003) and risk reporting particularly. As argued by Dobler et al. (2011), risk disclosure is a function of regulation and incentive that can be linked to the cultural environment (as will be explained in Section 4.4).

2.6.4. Other factors

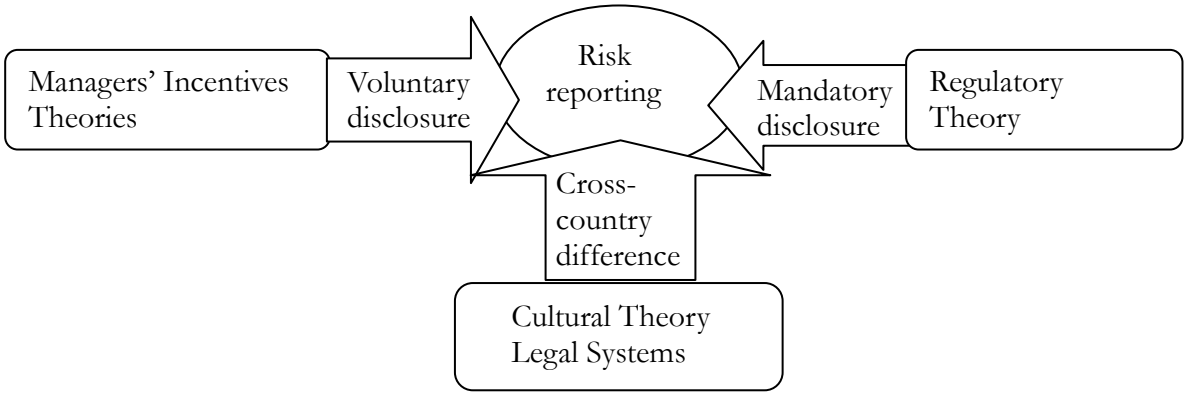
In these three countries, while the economic conditions are very similar (Dong and Stettler, 2011), the sources of finance differ among them. Specifically, the major source of finance in Germany is banks; by contrast, stock market (shareholders) is the major finance in the

USA and the UK. Nobes and Barker (2010) report that the equity market capitalisation relative to overall GDP is 28% in Germany, 55% in the UK and 81% in the USA.

In the present context, differences across the USA, the UK and Germany in their cultural values and their legal systems are used to interpret any variations on risk reporting across these countries. The main reasons for considering these factors among other factors that are utilised in prior general disclosure literature can be justified. First, discussing Hofstede's (1980, 1991) dimensions across these countries reveals some distinctive differences, especially in uncertainty avoidance and individualism, which could be the reasoning behind choosing these dimensions to be associated with risk reporting. Second, exploring the regulatory regimes within these countries, which are consistent with the main requirements of the legal system in each country, gives insights in how and the extent to which risk practices are organised within each country.

The main requirements of these regimes towards risk reporting are discussed in much detail in the following chapters in order to build a distinction between mandatory and voluntary risk disclosures. Other factors, such as economic factors, are excluded because these countries are in a very similar stage of economic development. The impact of the source of finance and political factors may be a limitation of the current study, as suggested for future research in Section 10.4. All previous discussions can be summarised as follows.

Figure 2.3: The theories of MRR, VRR, and cross-country variations in MRR and VRR



2.7. Concluding remarks

This chapter discusses the underlying basis of risk reporting. It covers the concept of risk and other related concepts by identifying the developments in these concepts from the 15th century until the present day. How a firm can identify its risks and how to categorise these risks are two main issues discussed in prior risk reporting literature and professional initiatives on risk disclosure.

Providing risk information mandatorily and/or voluntarily is justified based on regulatory and managers' incentives theories, respectively. These theories are employed to explain why risk reporting may vary between firms in each country (the USA, the UK and Germany), shown as firm-level analysis. Furthermore, cultural values and legal systems are used to explain variations in risk reporting between firms across countries, shown as country-level analysis. To extend the theoretical underpinning of risk reporting, both prior risk reporting literature and prior professional efforts are analysed in the following chapter.

Chapter Three: Risk measurement and risk reporting: A review

3.1. Overview

This chapter reviews and appraises the main trends and directions of prior risk measurement and risk disclosure literature. In line with this review, professional efforts on risk disclosure are analysed. Based on these reviews, the current study identifies the main gaps in prior research and then highlights its incremental contribution.

This chapter is structured as follows: the next section reviews and appraises risk measurement. Section 3.3 reviews prior risk disclosure literature. Section 3.4 evaluates the professional efforts on both risk measurement and risk disclosure. Finally, Section 3.5 highlights the main gaps in prior risk disclosure literature to distinguish the trend of the current study, at the same time explaining how the current study contributes to the knowledge. Section 3.6 introduces the concluding remarks.

3.2. Risk measurement: A review

Lev and Ohlson (1982), Ryan (1997) and Schrand and Elliott (1998) evaluate risk measurement in prior literature. In a comprehensive review of market-based empirical research in accounting, Lev and Ohlson (1982) distinguish two main approaches in using accounting data to estimate systematic risk. The first, a positive approach, correlates accounting data content and beta values; the second approach, a normative approach, examines the importance of accounting data in explaining and improving the assessment of systematic risk.

In discussing how accounting numbers can measure systematic risk, Ryan (1997) concludes that accounting earnings variability is historically the accounting variable most strongly related to systematic (non-diversifiable) equity risk. Thus, enhancing the information about the sources and amount of variability would be useful, and this might be achieved by providing more information about fair value measurement.[5] Ryan (1997) finds that systematic risk is positively related to sources of operating risk and operating leverage, whereas operating leverage and financial leverage are negatively related to the sources of these risks. Ryan (1997) points out that *ex post*[6] risk measures are not good predictors of future risk owing to changes in risk over time. Consequently, and relying on historical accounting data, accounting variables can be used as proxies to yield future risks using the Capital Asset Pricing Model (CAPM).

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[5] Recently, the fair value basis has become widely used to record and evaluate many financial statement items (e.g., financial instruments, investments and property, plant and equipment). This encourages accepting potential losses and gains to be recognised inside the financial statement in the current accounting model (for more details see for example, Statement of Financial Accounting Standard (SFAS) No (157), 2006: fair value measurement).

[6] *ex post* means after, or looking back. The root of this word is the Latin language. *ex ante* means before, or forward looking (for more details, see e.g., McAnally, 1996; Cheon et al., 1996).

As discussed in Chapter Two, Schrand and Elliott (1998) summarise discussions from an AAA/FASB conference that addressed issuing an accounting standard for risk reporting. The models, which enable a firm to measure its risk, the suitable types of risks to be quantified and the most suitable type of data to measure, are three sub-aspects related to risk measurement. With regards to the models, they conclude that it is difficult to rely on a single model to measure all types of risk. For the second point, the types of risk, Schrand and Elliott (1998) conclude that not all types of risks can be measured. With regards to data type, they conclude that historical and future data should be used, which in turn raises three problems: the reliability of measuring risk, the suitable probability distributions of future outcomes and the potential effects on financial statement items.

To overcome these problems, they suggest that using historical measures (e.g., volatility of cash flow) for risk exposure may help users to learn about firms' risks, and that combining historical and future data by using, for instance, simulation analysis, is an essential requirement to quantifying risk.

Two principal streams in the literature have emerged since the seminal work of Ball and Brown (1968, 1969).[7] The first stream explores how accounting-risk measures can be considered as proxies of market-risk measures (Beaver et al., 1970; Lev and Kunitzky, 1974; Beaver and Manegold, 1975; Almisher and Kish, 2000; Giner and Reverte, 2006; Brimble and Hodgson, 2007). Most studies find that accounting-risk measures can accurately express changes in systematic risk. The second stream, simultaneously with the

[7] The former study explains that accounting income numbers capture half of the net effect of all information available. The latter study reveals that 40% of the differences in market beta can be explained by the covariance of three accounting variables (operating income, net income and earnings per share).

first, attempts to explain theoretical associations of market and accounting-risk measures (Hamada, 1969, 1972; Bowman, 1979; Baginski and Wahlen, 2003; Chiou and Su, 2007).

Using seven accounting variables (dividend payout, growth, leverage, liquidity, assets size, variability of earnings and co-variability of earnings), Beaver et al. (1970) argue that these measures can surrogate total variability of firms' returns. Consequently, accounting-risk measures reflect both systematic and unsystematic risks. They find that accounting data generally, not just accounting beta, can provide a good basis to assess and anticipate market risk.

In the same context, Lev and Kunitzky (1974) use the same accounting measures for risk, volatility of income and lack of income smoothing, as predictors for market risk, aiming to investigate the associations between them. They reveal that there is a relationship between some determinants of income smoothing (volatility on sales, capital expenditures, dividends and earnings) and the risk of common stock.

Addressing the extent of the relationship between accounting beta and market beta more specifically, Beaver and Manegold (1975) point out significant associations between accounting beta and market beta with explanatory power of 20% for accounting beta.

To summarise, some prior research results conflict in their ranking of the extent to which accounting-risk measures act as surrogates for market-risk measures. Nevertheless, the majority of these studies suggest that accounting variables, especially accounting beta, can express changes in market systematic risk (market beta). Within this majority, however, the results do not reveal the same percentage for the explanatory power of accounting beta. The importance of some accounting variables, such as volatility of earnings, is another

area of conflict between prior researchers. Lev and Kunitzky (1974) support such importance, contrary to Bowman's (1979) findings.

Recent literature (e.g., Almisher and Kish, 2000; Chun and Ramasamy, 2003; Abdelghany, 2005; Giner and Reverte, 2006; Brimble and Hodgson, 2007) supports the possibility of replacing market-risk measures with accounting-risk measures.

Simultaneously with the first stream, another stream of literature has formed, which concerns the theoretical basis for associations between accounting- and market-risk measures. The relation between these two measures is analytically analysed by Hamada (1969, 1972), who divided firms' market-based beta into operational and financial leverage.

Based upon Capital Asset Pricing Model (CAPM) assumptions, Bowman (1979) provides a theoretical basis for accounting market-risk measures. In particular, he reveals a direct theoretical relation between market risk or systematic risk and leverage and accounting beta. In contrast, market risk is not directly correlated with earning variability, firm size or dividends.

Chiou and Su (2007) analyse the theoretical background of the relationship between the accounting measures for risk (proxied by eight accounting variables, such as operational and financial leverage, sales growth and dividends) and market risk (systematic risk). Chiou and Su's (2007) theoretical framework is based on a wider perspective than previous similar analyses (e.g., CAPM, scenario analysis).

To sum up, from the early works of Ball and Brown (1968, 1969) two main streams have been formed. The first concerns how accounting-risk measures can be used as a proxy for

market-risk measures (Beaver et al., 1970; Lev and Kunitzky, 1974; Beaver and Manegold, 1975; Almisher and Kish, 2000; Giner and Reverte, 2006; Brimble and Hodgson, 2007). The second stream concerns the theory of the relation between these measures (Hamada, 1969, 1972; Bowman, 1979; Chiou and Su, 2007). In the following paragraphs, the current study explains its approach to capturing a firm's risk levels by addressing the quantification of risk.

Ho and Pike (1992) explain that a firm could measure risk by relying on the probabilistic approach, which depends on the probabilities of the events under study. To obtain a value for the firm's risk, three main steps should be identified: estimating the uncertainty, deriving the suitable probability distributions and deriving the statistics variables (e.g., the mean, the variance and the standard deviation). All these steps can be derived through sensitivity analysis and/or probability analysis.

Sensitivity analysis begins with identifying the risk factors that have a high impact on the main variables under analysis. These may include future cash flow, expected profit, share prices and discounted rate. Probability analysis concerns how to derive the probabilities through many analytical methods, such as decision trees. To generate a probability distribution for the period, it is essential to generate the probability distribution for cash flows period by period (Ho and Pike, 1992).

Based on the concept of dispersion, two measures of total risk are suggested by Brachinger (2002). The first measure is variance, or standard deviation, and the second measure is absolute deviation. In the same context, Clarke (2003) explains that there are some measures, which are commonly used to measure risk, such as standard deviation or variance, tracking error variance, probability of shortfall, expected shortfall, lower partial

moments and semi-variance. These measures will be discussed in more detail in the following paragraphs.

Culp and Mensink (1999) illustrate that volatility of returns is a common measure of a firm's total risk. In this case, the expected returns are usually drawn from some probability distribution, such as normal distribution. For this reason, the variance of returns reflects the possibility that the actual returns may be above or below the expected returns.

The previous measures, however, assume that the probability distribution of returns is known, which may be practically difficult. Statistical measures relying on sample and historical data, therefore, can be used instead, to determine the potential statistical distribution of the whole population (Culp and Mensink, 1999).

Previous measures also suppose that a firm's returns are distributed normally. In other words, variance as a measure of volatility (total risk) assumes that the data of the returns is symmetrical. In practice, however, it may be difficult for market returns data to meet the symmetrical assumption (e.g., Damodaran, 2008). In this case, using variance or standard deviation as measures for risk is misleading. Consequently, some other measures should be conducted, such as skewness, to measures the degree to which a return distribution is asymmetric, and kurtosis, to measure the fitness of the distribution through the tail and the peak of the central distribution (Culp and Mensink, 1999).

Some other measures of risk can be used when the return is not distributed normally or is asymmetrical. A popular measure for risk is downside risk; it concentrates on potential losses, which in turn can be derived by comparing actual or expected returns with the target value of this return.

All previous risk measures concentrate on a firm's total risk, which in turn can be attributed to two main sources, a firm's market and specific risks, referring to systematic risk or un-diversified risk, and unsystematic risk or diversified risk. To measure systematic risk, beta is widely used to measure the effect of the movements of the market's returns on the firm's returns. In other words, this measure expresses the extent to which variances in a firm's returns are associated with variance in the market's returns, so it is also known as un-diversified risk. The random error of CAPM, in contrast, can be used as a measure for unsystematic risk.

In a summary, risk can be quantified by a variety of measures.[8] The measures representing a firm's total risk, namely volatility measured through variance or standard deviation, are the most popular. These measures are also expanded by compartmentalising a firm's total risk into its components, based on its sources; specifically, beta and the standard error of CAPM to measure systematic and unsystematic risk, which expresses wide and firm-specific risks, respectively.

[8] In addition to these measures, VaR is another measure that summarises the possible portfolio losses which occur as a result of normal market movements. To calculate VaR, two main methods may be utilised. The first are parametric methods, which include the variance-co-variance methods; the second are non-parametric methods, which include historical simulation and the Monte Carlo simulation. Each method requires identifying the basic parameters (e.g., time horizon, confidence level) and the relevant market factors (e.g., prices, earnings, cash flows). These requirements rely on frequent data on a daily basis, such as daily stock prices. The current study, therefore, will not use VaR because of the nature of its data, which is based on an annual basis (e.g., Jorion, 1996; Wiener, 1997; Schreiber, Wiener and Zaken, 1999; Alexander and Baptista, 2003).

3.3. Risk reporting: A review

This section analyses and synthesises main trends in prior risk disclosure literature. The main focus is summarising these efforts; further discussions of all these efforts, therefore, will be provided when the research hypotheses are generated in the following chapter. As discussed in the previous section, Ryan (1997) concludes that current disclosure models should concentrate on providing useful information, which helps investors identify the sources of risk. This information should enable investors to determine both the *ex post* realisation of risk as well as the *ex ante* exposure to risk. In other words, current disclosure models should permit firms to provide information about current risks and their impact (*ex post*) as well as expected risks and their potential effects (*ex ante*).

Prior risk disclosure research can be distinguished into two main streams. While the first focuses on the impact of mandatory risk disclosure on the usefulness of financial reporting, and measuring this impact quantitatively (Rajgopal, 1999; Hodder and McAnally, 2001; Jorion; 2002; Linsmeier et al., 2002; Jorgensen and Kirschenheiter, 2003, 2008), the second stream of risk reporting literature concentrates on voluntary risk disclosure utilising content analysis and identifying the main determinants of such disclosure. Most American research is part of the first stream; most European risk disclosure studies are in the second (e.g., Beretta and Bozzolan, 2004; Vandemaele et al., 2009), particularly UK studies (e.g. Marshall and Weetman, 2002; Linsley and Shrives, 2006; Abraham and Cox, 2007).

Prior research in the first stream has informed some mandated requirements, such as Financial Reporting Release (FRR) No. 48, issued in 1997 by the Securities and Exchange

Commission (SEC)[9] on market risk disclosures of financial instruments. The requirements of this release have become a major research focus (e.g., Rajgopal, 1999; Hodder and McAnally, 2001; Jorion, 2002; Linsmeier et al., 2002; Jorgensen and Kirschenheiter, 2003, 2008).

The main findings of this stream report empirical usefulness of the required SEC forms, either generally (Rajgopal, 1999) or in a specific form (tabular form: Hodder and McAnally, 2001; VaR form: Linsmeier et al., 2002 and Jorion, 2002), on stock returns, share price sensitivity and predicting and comparing variability in trading revenues and portfolios. Jorgensen and Kirschenheiter (2003, 2008) investigate the impact of voluntary and mandatory risk disclosures on firms' stock returns, betas and future cash flows.

In the second stream, which will be also discussed further in Section 4.3 in the following chapter, Marshall and Weetman (2002) provide empirical evidence of the impact of regulation on risk reporting. Beretta and Bozzolan (2004) propose a framework to measure the quality of risk disclosure, including the influence of firm size and sector on both quality and quantity of risk disclosure. Linsley and Shrives (2006) also investigate the main determinants of risk reporting. Subsequent studies that draw on these three papers include Abraham and Cox (2007) and Vandemaele et al. (2009), which respectively explore the impact of corporate governance and firm characteristics on risk disclosure.

All previous studies regarding mandatory and voluntary risk disclosures concern either the usefulness or the main determinants of risk disclosure in the USA or the UK, respectively.

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[9] (SEC) provides FRR (48), which deals with market risk of derivatives. In particular, three formats for quantitative disclosure are provided: sensitivity analysis, value at risk and tabular formats. These three formats should provide the impact of any changes in the market rate and prices on cash flow, earnings and fair value.

In the following section, professional efforts by these two countries, alongside with such efforts in Germany, are discussed, aiming at identifying main features of risk reporting within each national context.

3.4. Risk measurement and risk reporting: Professional efforts: A review

The main purpose of this review is to identify the main requirements to measure and report risk. To this end, the current study distinguishes national levels, comprising professional efforts in the UK, the USA and Germany, and international levels, comprising the professional efforts of the IASB. These countries have unique approaches towards risk reporting (as explained in Section 1.2) and prior risk research within these countries is influenced by these approached (as explained in the previous section). At both levels the special reports, conceptual frameworks and accounting standards which have been provided by the professional bodies will be analysed. This will be illustrated in the following subsections.

3.4.1. Professional efforts in the UK

This section reviews and evaluates professional efforts in the UK. To this end, the efforts of the Institute of Chartered Accountants in England and Wales (ICAEW) and the Accounting Standards Board (ASB) will be evaluated. Thus, the special reports of the ICAEW (1997, 1999, 2002a, 2002b, 2011), the relevant accounting standards and its conceptual framework issued by ASB (ASB, 1990 to present) will be reviewed in the following paragraphs in terms of risk reporting. These two professional bodies are chosen because of their essential efforts towards measuring and reporting risk.

The content of regulations and professional initiatives on risk is fundamental to the distinction between voluntary and mandatory risk disclosure and thus to the main purpose of the research investigating the incentives for each disclosure type. This section reviews UK professional risk reporting initiatives as well as accounting standards with a risk orientation. Thus, the publications of the Institute of Chartered Accountants in England and Wales (ICAEW 1997, 1999, 2002a, 2002b, 2011) on risk reporting and the conceptual frameworks and relevant accounting standards of the International Accounting Standards Board[10] (IASB) and the UK Accounting Standards Board (ASB) are reviewed.

Since neither the IASB nor the ASB has issued standards specifically on risk reporting, the non-mandatory risk publications of the ICAEW assume particular importance. The ICAEW's first publication to address risk reporting (1997) discusses comprehensively why and how firms provide risk disclosures in their annual reports. The four key points of ICAEW (1997) are: (1) the adoption of the volatility approach to risk, encapsulating both gains and losses; (2) that firms have to deal with different types of risk but special attention is paid to the distinction between financial and non-financial risks; (3) that commercial sensitivity moderates the disclosure of certain risks; and (4) the quantification of risk using both accounting and non-accounting data is given special attention.

ICAEW (1999) recommends that firms provide risk information voluntarily in order to minimise cost of capital, providing theoretical and practical arguments for its principles-based recommendations. ICAEW (2002a) summarises previous risk reporting efforts and addresses the theory underpinning risk disclosure, while ICAEW (2002b) deals with risk reporting for small entities.

[10] There has been a requirement for UK listed companies to adopt International Financial Reporting Standards (IFRS) since 2005.

ICAEW (2011) identifies challenges in disclosing risk information in annual report narratives (e.g., doubts regarding the accuracy of reporting either quantitative or qualitative risk disclosures, raising higher competitive cost for firms that disclose risk information relative to those do not, and the difficulties of outlining all risks that firms face). ICAEW (2011) suggests, therefore, some ways of improving risk reportage in annual reports (e.g., continuously considering investors' needs, prioritising quantitative over qualitative risk information and running effectively short lists of risks).

While the ASB has not published accounting standards specifically on risk reporting, the conceptual frameworks, as well as various standards, address some aspects of risk reporting. The ASB conceptual framework, or Statement of Principles (ASB, 1999), states that financial statements are intended to: (1) provide information about firms' financial structure to assess their ability to generate future cash flows and ensure the suitable distribution of these future cash flows; (2) provide information about firms' risk profile, risk management and ability to adapt to surrounding circumstances so as to give investors information about the extent to which firms are at risk; and (3) provide information identifying how and to what extent investors will suffer or profit from variability in firms' outcomes.

The researcher notes six principal themes or topics related to risk which are addressed by UK and international accounting standards; namely, contingencies (FRS 12), segment reporting (SSAP 25), foreign exchange (FRS 23), substance of transactions or investments (FRS 5), related party disclosure (FRS 8) and derivatives (FRS 13, 25, 26 and 29). Table 3.1 provides an overview of these accounting standards and professional publications on risk reporting.

Table 3.1: Summary of UK professional efforts on risk reporting

Body and study year	Study objective(s)	Study discussions
ICAEW (1997)	Provides a framework for preparers and users who believe that risk reporting should be enhanced.	ICAEW (1997) discusses three themes. First, it considers all risk types, based on the Arthur Andersen Business Risk Model ™. A wide range of risks can affect a firm's future cash flows; thus, all risks related to business risk are considered in this statement. Second, firms should inform their users about actions taken to manage risk, especially if this constitutes useful information to investors. Third, using a wide range of risk measurements using both accounting and non-accounting information, ICAEW (1997) states that the development and improvement of risk measures is important not only to the future of external risk reporting but also to internal risk control itself.
ICAEW (1999)	Explains how providing risk information can help firms obtain capital at the lowest cost.	ICAEW (1999) reveals, firstly, the importance of and the reason for providing risk information. Secondly, ICAEW (1999) depends on analysing five UK listed firms' annual report narratives. Thirdly, this report shows that these firms had the ability to provide suitable risk information in their annual reports. Fourthly, ICAEW (1999) illustrates that strong incentives for risk reporting exist. Additionally, the ICAEW does not envisage a need for additional risk reporting requirements. Nevertheless, it is necessary to persuade UK listed firms to provide risk information since that is key to reducing their cost of capital.
ICAEW (2002a)	Reviews the previous reports to explain the theory behind providing risk information.	ICAEW (2002a) summarises the two previous reports. However, it highlights some important points which reflect the ICAEW's policy on risk disclosure. These are: firstly, risk disclosure is essential for listed firms in order to minimise cost of capital. Secondly, UK listed firms' annual report narratives should contain information about significant risk factors. Thirdly, directors should communicate their actions to manage these risk factors clearly. Fourthly, information that enables investors to assess or judge different types of risk should be provided. Fifthly, firms should indicate how they measure risks.
ICAEW (2002b)	Establishes good practice for SMEs.	ICAEW (2002b) concentrates on risk management and risk reporting as a dual objective, whereby each element reinforces the other. Accordingly, an integrated risk management process should result in better risk reporting.
ICAEW (2011)	Explores risk reporting practices in either financial	ICAEW (2011) identifies challenges in disclosing risk information in annual report narratives (e.g., doubts regarding the accuracy of reporting either quantitative or qualitative risk disclosures, higher competitive cost for firms that disclose risk information relative to

	or non-financial firms and provides some suggestions for further improvements.	those do not, and the difficulties of outlining all risks that firms face). Considering investors' needs, prioritising quantitative over qualitative risk information and running effectively short lists of risks are the main areas that require more attention in order to improve risk reportage in annual reports.
ASB (1990 – 2009)	The Statement of Principles.	The conceptual framework of the UK accounting standards emphasises the importance of providing suitable information that helps users in decision-making. This type of information is related to a firm's risks and uncertainties. Furthermore, the definition of assets and liabilities reflects the uncertainty in expected cash flows.
	SSAP 25	*Segmental Reporting,* this standard indicates how different segments may have different rates of profitability, growth opportunities and degrees of risk. Thus, SSAP (25) emphasises providing information that enables users to understand the potential losses and gains of certain forms of risk, such as political, industrial and market risks.
	FRS 5	*Reporting the Substance of Transactions*, this standard includes the definition of uncertainty, and how to deal with both potential losses and potential gains.
	FRS 8	*Related Party Disclosures,* this standard requires providing information about the future to reduce the negative effects of the historical cost model.
	FRS 12	*Accounting for Contingencies*, this standard explains how a firm can involve loss in its financial statements because of risk consequences.
	FRS 23	*The Effects of Changes in Foreign Exchange Rates,* this standard explains that firms' foreign investments are subject to many changes in exchange rates that consequently affect investment value. These changes should be reported in annual reports.
	FRS 13 FRS 25 FRS 32 FRS 26 FRS 29	*Derivatives and other Financial Instruments*, these standards generally require disclosing risk information related to currency, liquidity, fair value, financial assets and liabilities hedging, market price and commodity contracts. FRS 26*, Financial Instruments: Recognition and Measurement* and FRS 29, *Financial Instruments: Disclosures,* highlight the importance of qualitative and quantitative market risk disclosures, and the aggregation of related risks.

After reviewing UK professional efforts, the main features of the UK approach to risk reporting can be identified as follows. First, voluntary rather than mandatory disclosure is

preferred. Second, each firm can identify its risks individually and accurately rather than providing a list of risk types. Third, providing risk information in annual reports has positive effects on increasing the quality of accounting information and reducing the cost of capital. Fourth, these reports provide risk measures which depend on non-accounting, as well as accounting, information (e.g., number of employees).

3.4.2. Professional efforts in the USA

In 1994, The American Institute of Certified Public Accountants (AICPA) provided the Statement of Position (SOP) to identify the required disclosure of certain types of uncertainties and risks. AICPA and CICA (2000) provide a special report on how firms can manage their risks. This report adopts a broad approach in identifying risk by including gains with losses; moreover, it provides many instances of both quantitative and qualitative methods of quantifying firms' risks, as well as emphasising the importance of providing both internal and external risk reporting.

SEC (1997) provides FRR No. 48 to organise how listed firms disclose suitable information about their market risk that is sufficiently related to their derivatives. In 2000, the SEC proposed two main forms, 10-K and 20-F, for domestic and international firms respectively, which organise many aspects of risk reporting under items 1.a and 7.a to describe a firm's risk factors and market risks.

Similar to the SEC's requirements, the SOX (2002), in sections 302 and 404, requires that US firms protect their investors by improving both the accuracy and reliability of their disclosures. Particularly, these two sections require providing information about firms'

significant risks, hedging activities, contingent liability identification and foreign exchange accounting (for more details see Leech, 2003; Kogan, Routledge, Sagi and Smith, 2010).

Although the Financial Accounting Standards Board (FASB) does not provide a specific standard of risk reporting, many of its accounting standards deal with how firms report certain types of risk. The current study finds six main themes or topics especially related to risk reporting: contingency (FAS 5), segment reports (FAS 14), foreign exchange (FAS 52), investment (FAS 115), derivatives (FAS 133) and fair value (FAS 157). The current study summarises all these efforts in Table 3.2.

Table 3.2: Summary of USA professional efforts on risk			
Body / Year	Aim(s)	Discussions and Findings	
AICPA (1994)	The SOP indicates the required disclosures for certain significant risks and uncertainties.	This study describes the information that firms have to provide in their annual reports, particularly regarding certain types of risks.	
AICPA and CICA (2000)	Provides a report to explain how firms can manage their risk under the new economy.	The study explains: (a) how companies can identify their risks; (b) how to choose suitable strategies to manage their risk; (c) how to quantify risks; and (d) how to report their risks.	
SEC (1997)	FRR 48 illustrates that every firm has to provide quantitative and qualitative disclosures of market risks that arise from movements in market rate and prices, such as interest rate, foreign exchange rates; commodity prices and changes on equity prices.	Three tools were provided in this study. These tools present a new approach to providing suitable information about risk disclosure related to derivatives. The researcher can summarise them as follows:	
		Sensitivity analysis	Potential losses in income, cash flow and fair value because of the market rate or prices.
		Value at Risk	The maximum loss of the firm at a given period with a given probability because of market rate or price changes, which includes other sources of risks.
		Tabular disclosure	The losses in this method are unmeasured. However, firms can provide suitable information about the impacts of market factors on their sensitive assets and liabilities. From that, users can derive the potential losses or gains.
FASB from 1973 to 2009		FAS 5	*Accounting for Contingencies*, this standard shows the following aspects related to risk: the likelihood that future event(s) will confirm the loss or impairment of assets; the conditions of recognition and disclosure of losses and gains of contingencies; the definition of probable, reasonably and remote, each of which expresses a probability of occurrence.
		75	

		FAS 14	*Financial Reporting for Segments of a Business Enterprise*, the content of this standard reflects risks because it adopts returns and risks as a basis to classify business into segments.
			Financial Reporting and Changing Prices, this standard emphasises providing suitable information to investors about a firm's ability to assess amounts, timing and uncertainty of prospective net cash flows. It also concerns the potential effects of price changes on a firm's future cash flows and performances.
		FAS 52	*Foreign Currency Translation*, the content of this standard indicates risk because it accounts for the potential impacts of the movement of exchange rates on decreasing or increasing a firm's assets and liabilities values. Therefore, the losses and gains related to these movements should be recognised in income statements or on the owner equity in balance sheet.
		FAS 115	*Accounting for Certain Investments in Debt and Equity Securities,* the main content of this standard concerns how firms can report changes in fair value and how firms can measure, recognise and disclose unrealised holding gains and losses according to each type of security. These changes express risks because they cause many fluctuations, which affect a firm's future losses and gains.
		FAS 133	*Accounting for Derivative Instruments and Hedging Activities,* this standard explains the accounting treatment for potential losses and gains related to fair value and cash flow hedging. Furthermore, the standard requires that firms disclose information about their risks either quantitatively or qualitatively.
		FAS 157	*Fair Value Measurement*, some of the content of this standard indicates risk, especially in the sections that deal with changes in valuation based on a fair value basis.

The American Conceptual Framework from 1973 to 2009		SFAC: No. 1	*Objectives of Financial Reporting by Business Enterprises*, this statement illustrates that financial reporting should provide information about a firm's risks in order to achieve the following purposes: (a) to help present and potential investors in assessing the amounts, timing and uncertainty of prospective cash flows; and (b) based on the reported earnings, investors could assess the risk of investing in or lending to a firm.
		SFAC: No. 2	*Qualitative Characteristics of Accounting Information*, this statement indicates risk relative to the following definition: (a) it defines conservatism as a prudent reaction to uncertainty to ensure that uncertainty and risks inherent in business situations are adequately considered; and (b) it defines relevance as the capacity for information to make a difference in a decision by helping users make predictions about the outcomes of past, present and future events.
		SFAC: No. 6	*Elements of Financial Statements*, the content of this statement expresses risk in the following aspects: (1) the definitions of asset and liability reflect the meaning of risk; hence, they commonly require assessments of probability to identify the degree of future cash flow or future economic benefits; and (2) the effects of uncertainty show how the current accounting model should deal with the impact of uncertainty. An effect of uncertainty is to increase the cost of financial reporting and the costs of recognition and measurements in particular.
		SFAC: No. 7	*Using Cash Flow Information and Present Value in Accounting Measurements,* this statement reflects risk relative to the following aspects: (1) the requirements to calculate the present value from the financial reporting data, such as estimating future cash flow; possible variations not only in the amount of cash flow but also on the timing of these amounts; the time value

			of money, which is represented by the risk free rate of interest; and the price for bearing the uncertainty inherent in assets or liability; (2) risk refers to any exposure to uncertainty, especially when this exposure has potential negative consequences; and (3) the objective of including uncertainty and risk in accounting measurements is to imitate the market's behaviour toward assets and liabilities.
Sarbanes-Oxley (SOX) Act (2002)	This Act was issued in 2002 after a chain of the biggest collapses in the American market (e.g., Enron; Worldcom).	Sections 302 and 404 indicate risk management by emphasising the importance of protecting investors by improving the accuracy and reliability of corporate disclosures. According to these two sections, firms are obligated to provide information about their significant risks, derivatives/hedging activities, contingent liability identification and foreign exchange accounting. All this information must be provided in financial statement consolidation, financial statement notes and supplemental SEC10K disclosures (e.g., Leech, 2003).	

The main features of the American approach towards risk reporting can be summarised in four distinctive points. First, it respectively requires and encourages firms to provide information about their risk either mandatorily or voluntarily, in either quantitative (e.g., risk mapping, value at risk and sensitivity analysis) or qualitative formats, with particular attention to the former risk type and risk form. Second, the main interest of this approach is to link risk reporting (especially market risk of financial instruments) and the impact on either some accounting measures (e.g., future earning and future cash flow) or the qualitative characteristics of financial information (e.g., comparability, relevance and reliability). Third, this approach is mainly rule-based rather than principle-based in organising risk reporting (the requirements of: SEC, 1997 and FAS, 133). Fourth, while the SEC considers losses as a main indicator of risk, the AICPA considers losses and gains as elements of risk, whilst the FASB uses uncertainty and risk synonymously.

3.4.3. Professional efforts in Germany

The German Accounting Standards Board (GASB) published GAS 5 for risk reporting, which makes Germany's experience unique by being the only attempt to organise risk

reporting by formally issuing an accounting standard. As a consequence, Dobler (2005, 2008) argues that the German experience may lead accounting professional efforts towards issuing an accounting standard to deal comprehensively with risk reporting.[11]

GAS 5 adopts the narrow perspective of risk only describing losses and not gains. However, GAS 5 illustrates the importance of providing information about a firm's opportunities (gains). GAS 5 provides instances of firms' risk categories rather than restricting these categories according to a specific list of risk types.

GAS 5 explains that financial risks are more likely to be quantified with three conditions of each risk measure: its reliability, its cost and its relevance to users' decision-making. Remarkably, GAS 5 permits the insertion of the financial impacts of risks inside the financial statements through accruals and provisions. Thus, to the best of the researcher's knowledge, this is the only standard that permits firms to include their measurable future risks in their financial statements. This could be interpreted based on the fact that German culture (as discussed in detail in Section 2.6) carefully avoids any uncertainty related to the future, so they may accept accounting for any future losses inside the financial statements once these losses are reasonably measured. Furthermore, the concept of prudence that dominates many Germany accounting practices (e.g., leases, financial instruments), as

[11] Schrand and Elliott (1998) summarise main discussions of the AAA/FASB conference, which addresses obstacles to issuing accounting standards of risk reporting within a US context. They explain, however, that risk concept, risk types and risk measurement are three main problems for issuing an accounting standard for risk reporting. They explain that the scope of the concept of risk should be expanded to contain losses and gains rather than using risk as an accounting synonym for uncertainty. They conclude that accurately identifying a list of risk types for all firms is unrealistic, owing to each firm having its own circumstances, which in turn generate different types of risks. The model, eligibility to be quantified and type of data are the core issues related to measurement. Schrand and Elliott (1998) explain the difficulties of a single model of risk measurement, because not all risk types can be measured, and that risk measures should rely on both historical and future data. To overcome these shortages, they provide two suggestions: the first is that using historical measures (e.g., volatility) of risk exposure may help users be aware of firms' risks; the second suggests combining historical with future data by using simulation analysis.

discussed earlier in Section 2.6, could be behind the practical treatment of future losses. The standard, however, neither explains the suitable information to quantify a firm's risks nor explains how to confirm the three conditions to quantify risk. These aspects can be summarised in the following table.

Table 3.3: Summary of GAS 5

Body/Year	Contents and Discussions	
GASB (2000)	Concept of risk	The possibility of a future negative impact on the economic position.
	Risk categories	Provides examples of risk types. The standard explains the difficulties in having a specific list of risk types for all German firms.
	Recognition	Permits recognition in the financial statement by accruals and provisions.
	Measurement	The standard suggests some measures, such as sensitivity analysis, cash flow at risk, earnings at risk, or more generally using VaR. The standard provides three main conditions as the main determinants for risk measurement: the reliability of the measurement, the cost of the measurement and the usefulness of quantified information for users.
	Disclosure	German firms have to provide suitable information about their risks and suitable procedures to reduce these risks.

GAS 5 emphasises disclosing firms' residual risks, especially indusial and market risks, or any other risks having a significant impact on firms' existence. All these disclosures should be addressed in a specific section of annual reports narratives (normally under Risks and Opportunities or Outlook). All German firms, therefore, are obligated to provide risk information in a specific place in their financial reporting. But the problem is that the standard neither shows exactly what information firms have to provide nor how firms can link their different types of risk.

The main features of the German approach to risk reporting can be summarised, therefore, in the following aspects. Firstly, GAS 5 is the only formal accounting standard, which deals comprehensively with both measurement and disclosure of firms' risks. Secondly, while the standard formally adopts losses as the main expression of risk, it nevertheless encourages German firms to provide information voluntarily about their opportunities.

3.4.4. Professional efforts of the IASB

What has been mentioned previously represents the professional efforts of some developed countries (the UK, the USA and Germany). These countries have many regulations to organise how companies can provide risk information in their financial reporting. In order to extend the previous country-level perspective to include international professional bodies, the efforts of the International Accounting Standards Board (IASB, formerly the International Accounting Standards Committee (IASC), are analysed and evaluated. Considering these efforts is essential, especially after the adoption of such efforts (IFRSs) within the UK and Germany in 2005, and the convergence of these efforts within the USA. To this end, the conceptual framework and the relevant accounting standards are analysed as summarised in Table 3.4.

Table 3.4: Summary of the IASB's efforts on risk

Body/Year	Contents and Discussion	
IASB (1973-2009)	IAS 11	*Construction Contracts*, this standard indicates risk relative to expressing the accounting treatment of the potential losses and potential gains.
	IAS14 (replaced by IFRS (8) 2008))	*Segment Reporting*, this standard adopts a return and risk approach to distinguish between businesses in order to measure and disclose risk.
	IAS 32 (issued 1995)	*Financial Instruments: Presentation* , this standard explains many types of risks related to derivatives, and the information that should be provided in financial reporting.
	IAS 37 (issued 1998)	*Provision, Contingent Liabilities and Contingent Assets*, this standard refers to risk in some aspects; hence, it defines the provision as a liability of uncertain timing or amount. It is essential, therefore, to consider the impact of future events. The standard explains that contingent assets and liabilities should be unrecognised but that the firm has to provide suitable information about them in their narratives.
	IFRS 7	*Financial Instruments: Disclosures*, this standard requires providing information about credit, liquidity and market risks qualitatively and/or quantitatively, using sensitivity analysis.
	The conceptual framework	The conceptual framework in its first chapter explains that financial reporting should provide information which enables present and potential users to assess all the variables related to the entity's future cash flows. Furthermore, in its second chapter, it illustrates that the relevant information is capable of making a difference in users' decisions by helping them evaluate the potential effects of the past, present and future on the future cash flow (predictive cash flow).

The main features of the IASB's approach to risk reporting can be summarised as follows. First, it requires some specific information about risk (such as those required within financial instruments) and it encourages firms to provide more risk information voluntarily, in either quantitative (using sensitivity analysis) or qualitative formats.

Second, this approach is mainly principle-based rather than rule-based in organising risk reporting. Third, the term *uncertainty* is alternatively used to refer to the term *risk*, which includes both potential losses and gains.

3.5. The current study: Overall and assessment

The main gaps in prior research and professional efforts can be summarised through the following two main research questions. First, do firms disclose their risk information as a function of their risk levels? In other words, how and to what extent do a firm's risk levels influence its risk disclosure levels? Prior research (e.g., Marshall and Weetman, 2002, 2007; Beretta and Bozzollan, 2004; Linsley and Shrives, 2006) has not provided a comprehensive explanation of such influences.

Second, how can country characteristics affect the provision of risk information? And what is the extent to which these characteristics can react with other firm characteristics in explaining the variability of providing information about risk reporting either voluntarily or mandatorily? As suggested by prior research (e.g., Linsley and Shrives, 2006; Vandemaele et al., 2009), investigating the main drivers of risk reporting across countries is essential to deepen the understanding of the main incentives for risk reporting.

3.6. Concluding remarks

This chapter summarised main efforts of both prior risk reporting literature and prior professional efforts to measure and disclose risk information. Based either on intensive literature that investigates the extent to which accounting data can be used as proxies for market risk or on two major trends in risk reporting, investigating potential associations

between a firm's risk levels and a firm's risk disclosure levels becomes essential to fill a real gap in extant literature.

Rising the same question relative to prior professional efforts in the USA, the UK and Germany emphasises investigating how and the extent to which firms might respond to their risk levels by providing more or less information about their risks in their annual report narratives. Observing this pattern of associations gives indications to support or warn professional bodies in each country. In the following chapter, the research questions and research hypotheses will be discussed.

Chapter Four: Research questions and hypotheses development

4.1. Overview

Based on the review of prior literature and prior professional efforts on risk reporting previously carried out in Chapter Three, the current research was able to identify two main gaps addressing both firm- and country-level analyses. This chapter aims, therefore, to highlight the main research questions in these levels of analyses and then develops the hypotheses. These hypotheses are statistically examined by four different models in four different contexts. Specifically, the study commences its empirical evidence by using multivariate analysis of variance (MANOVA) and correlation analysis in 15 firms in each country as a pilot study, in Chapter Six, and then uses the linear mixed model (LMM) in contrast to traditional approaches (e.g., OLS and FEM) within one country (the UK), in Chapter Seven. After that, repeated measures multilevel analysis is utilised to draw specific conclusions about the main incentives of variations in both MRR and VRR in each country (single analysis), in Chapter Eight, and all three countries together (pooled analysis), in Chapter Nine.

The reminder of this chapter is organised as follows. Section 4.2 addresses the main research questions, at firm and country levels. Based on these questions, the current study proposes its firm- and country-level hypotheses in Section 4.3 and Section 4.4, respectively. Concluding remarks are provided in Section 4.5.

4.2. Research questions: Firm- and country- level analyses

4.2.1. Firm-level analysis research questions

These questions concern how and the extent to which a firm's characteristics generally, and a firm's risk levels particularly, might affect and motivate US, UK and German firms to provide mandatory and/or voluntary risk reporting in their annual report narratives. The research question concerning this level can be presented as follows. Do a firm's risk levels (captured by market- and accounting-risk measures) motivate firms to provide their risk disclosure mandatorily and/or voluntarily (MMR and/or VRR) in their annual report narratives? What other firm characteristics affect providing risk information in annual report narratives?

4.2.2. Country-level analysis research questions

These questions investigate the impact of a country's legal system and its cultural values in expressing why firms across the USA, the UK and Germany might provide varying degrees of risk information in their annual report narratives. These questions can be introduced as follows.

Do MRR and VRR vary within and between firms across the USA, the UK and Germany between 2005 and 2009? Can MRR and VRR variations be attributed to firm characteristics (risk levels) and/or country-level characteristics (legal systems and cultural values)? Which variables of both firm- and country-level characteristics are significantly associated with variability of MRR and VVR?

4.3. Firm-level hypotheses: Firm characteristics (risk levels and control variables)

At this level, the current study essentially distinguishes between potential associations between a firm's characteristics and its risk reporting in general and risk disclosure studies. As discussed in Section 2.4 of Chapter Two, regulatory theory could be utilised to justify why regulators might require firms to provide risk information in their annual reports narratives. It has been argued that imperfect markets and market failure are the two main reasons that are widely accepted to justify enforcing firms to reveal risk information (Leftwich, 1980; Cooper and Keim, 1983; Fields et al., 2001; Ogus, 2001).

Managers have incentives to provide risk information voluntarily in annual report narratives. These incentives aim at reducing information asymmetry by reducing the gap between managers, who have access to all information, and investors, who do not have such access to all information.

Three different motives for reducing this gap have been suggested, each of which has different consequences. First, managers voluntarily disclose risk information to reduce uncertainty related to investors' future cash flows, resulting in reducing their potential desired rate, which practicably is used as a discount rate to calculate the cost of capital for those managers' firms that encourage investors to invest in them. If managers need external funds, they could, therefore, provide higher levels of risk information voluntarily (known as capital needs theory; see e.g., Botosan, 1997; ICAEW, 1999).

Second, managers could reduce information asymmetry to signal their quality to the stock market by clearly disclosing more information about their abilities to identify and manage risks. This would distinguish them from managers who could not manage their risks

effectively (known as signalling theory; see e.g., Akerlof, 1970; Spence, 1973; Watson et al., 2002).

Third, to increase stockholders' confidence and reduce any conflict between agency parties, managers might disclose more about their risks to assure other parties that they dealt with their firms' risks successfully (known as agency theory; see e.g., Jensen and Meckling, 1976; Abraham and Cox, 2007). Accordingly, the agency cost, which includes some other costs, such as bonding cost, will be reduced by voluntarily revealing more information about risks.

Based on this theoretical underpinning, prior research (the main trends of which are grouped and synthesised in Section 3.3) from each country are reviewed and evaluated in order to associate both market- and accounting- risk measures with risk reporting, as will be discussed in the following sub-sections.

4.3.1. Market-risk measures and firms' risk reporting

Within an American context, general prior disclosure studies examine the extent to which a firm's risk levels may affect its provision of general voluntary disclosures (Lev and Penman, 1990; Lang and Lundholm, 1993; Alexander, 1996; Kothari et al., 2009).

Kothari et al. (2009) regress firms' disclosures (from three main sources: corporate annual reports, analysts' reports and business press) on their stock returns volatility as a proxy for total risk, distinguishing between good news disclosure (favourable) and bad news disclosure (unfavourable). They reveal that when firms provide (un)favourable news their levels of risk (increase) decline significantly.

Examining the same association from the opposite direction, Lang and Lundholm (1993) argue that performance variability affects information asymmetry, and consequently disclosure levels, negatively. They find a negative association between the volatility of stock returns and general firm disclosure levels.

Other research provides mixed results. Lev and Penman (1990) find no significant relation between disclosure frequency and earnings volatility. Alexander (1996), however, reveals that firms with more volatile earnings are more likely to provide information in their annual reports in order to reduce this volatility.

Ryan (1997) surveys the accounting and finance literature to identify the extent to which accounting numbers can measure equity systematic risk. He concludes that accounting earning variability has historically been the accounting variable most strongly correlated to systematic (non-diversifiable) equity risk. Consequently, enhancing information about the sources and amount of variability would be very useful; this can be achieved through providing more information about fair value measurement. Consecutive prior risk reporting literature mainly examines the usefulness of mandated risk reporting according to the SEC's requirements (e.g., Rajgopal, 1999; Hodder and McAnally, 2001; Jorion, 2002; Linsmeier et al., 2002; Jorgensen and Kirschenheiter, 2003, 2008; Li, 2008).

Rajgopal (1999) examines the usefulness of the SEC's requirements and finds a significant association between these requirements and both stock returns and share price sensitivity. He finds, however, incomparability of divertive market risk reporting under the three required formats. To overcome this weakness, Hodder and McAnally (2001) propose a methodology to convert the information from the tabular format to the other two formats,

suggesting that the tabular format is effective in providing useful information about firms' derivatives market risk.

Nevertheless, Jorion (2002) points out that value at risk disclosures are informative since this type of disclosure enables investors to predict variability in trading revenues and make sufficient comparisons of trading portfolios. Linsmeier et al. (2002) draw the same conclusion.

Firms' future cash flows theoretically are a function of two sources of risk: market-wide risk and firm-specific risk. Concerning the first source of risk, Jorgensen and Kirschenheiter (2003) propose managers' strategies to provide risk information, relying on variance in future cash flow, according to the SEC's requirements for market risk. They conclude that managers' decisions to make voluntary disclosures affect firms' returns, betas and share prices. Considering firm-specific risk, Jorgensen and Kirschenheiter (2008) propose a theoretical model to analyse the consequences of firms' mandatory disclosure for their future cash flow sensitivity.

By counting the frequency of words related to risk and uncertainty in the 10-K from 1994 to 2005, Li (2008) finds that US firms which provide higher levels of risk sentiment are more likely to have negative future returns relative to firms with lower levels of risk sentiments for the year ahead. He concludes that the stock market does not fully reflect the risk content in future earnings, which in turn signals market inefficiency.

Within a UK context, both prior general and risk disclosure results are relatively mixed regarding the extent to which a firm's risk levels motivates it to provide general or risk disclosures, respectively. Firth (1984) hypothesises a positive relationship between a firm's

disclosure level and its risk exposure. He utilises the variance of stock returns, beta and the standard error of CAPM as measures for total, systematic and unsystematic risks, respectively. Based on these measures as proxies for firm risk exposure, he investigates the association between them and the aggregated disclosures in annual report narratives. His results, nevertheless, indicate no significant impact of firms' disclosure level on their risks. More recently, utilising beta as a proxy for a firm's risk level, Hussainey and Al-Najjar (2011) reveal a non-significant association with future-oriented information in a large-scale study of UK firms. They suggest, however, the possibility of identifying other proxies of a firm's risk levels, such as volatility.

Prior risk reporting studies, however, mainly examine determinants of voluntary risk reporting. One such determinant is firm risk level, which is captured by a variety of measures. The main weakness of this research is that it does not determine the extent to which a firm's risk levels motivate it to provide risk reporting; furthermore, the pattern of such associations gives signals to support or warn regulators.

Linsley and Shrives (2006) argue that the associations between risk levels and risk disclosure level can be hypothesised positively or negatively. The positive trend assumes that managers in high-risk firms are more likely to provide information to justify their high risks and explain the extent to which they can manage these successfully. The opposing argument presumes that higher-risk firms may not wish to attract market attention and so they provide less risk information. Linsley and Shrives (2006), however, do not find significant associations, and instead find that risk disclosure level is related more to firm size than to firm risk levels. Their results are consistent with their earlier work (Linsley and Shrives, 2000, 2005). Abraham and Cox (2007) support the first direction; hence, they find a positive association between risk levels and risk disclosure. Marshall and Weetman (2002),

however, support the contention that firms with high risk levels are more likely to disclose less than those with marginally lower risk levels. Hill and Short (2009), however, do not find that risk levels impact significantly on the provision of risk information for a sample of initial public offering (IPO) firms. Likewise, Dobler et al. (2011) reveal that aggregated risk disclosure is not significantly associated with risk levels.

Within a German context, among general disclosure studies, Cormier, Magana and Velthoven (2005) find a positive association between German firms' betas and their environmental disclosure levels. In terms of prior risk reporting, little research has been conducted on the extent to which German firms' risk levels can motivate these firms to disclose risk information in their annual reports narratives. One main reason for this could be that the mandated approach to risk reporting in Germany may restrict research from empirically investigating the incentives of such disclosure, even though such reason seems inconsistent with Dobler's (2008) conclusion about investigating risk reporting incentives being essential even in highly regulated countries. Dobler et al. (2011), however, find that systematic risk does not significantly influence German firms in providing risk information.

The Sharp ratio[12] may be used as a proxy for firm risk levels (Scholz and Wilkens, 2005), as firms with higher Sharp ratios may be more attractive to investors in exhibiting lower levels of risk relative to excess returns. Firms with low Sharp ratios may be more likely to disclose risk information in order to justify their high risk levels to investors.

[12] The Sharp ratio is a measure of the excess return (which is the difference between market returns and risk free rate; e.g., it could be the governmental Treasury rate) divided by standard deviation of market returns.

Based on a review of the theory and literature, the following set of hypotheses posits positive associations between risk levels (proxied by market-risk measures) and risk reporting (MRR and VRR).

H1: Firms' market volatility (as a proxy of firms' total risk) is likely to be significantly and positively correlated to MRR and VRR.

H2: Firms' market beta (as a proxy of firms' systematic risk) is likely to be significantly and positively correlated to MRR and VRR.

H3: Firms' market volatility of the standard error of CAPM (as a proxy of firms' un-systematic risk) is likely to be significantly and positively correlated to MRR and VRR.

H4: Firms' Sharp ratio (as a proxy of firms' risk-adjusted return) is likely to be significantly and positively correlated to MRR and VRR.

4.3.2. Accounting-risk measures and firms' risk reporting

General disclosure literature argues that both leverage and liquidity influence disclosure level (Malone, Fries and Jones, 1993; Wallace, Naser and Mora, 1994; Ferguson, Lam and Lee, 2002; Cormier et al., 2005). High-leverage firms are more likely to have higher levels of monitoring costs, making these firms more likely to provide more information to reduce these costs (Ahmed and Courtis, 1999). Distinguishing between bad and good news disclosures, Kothari et al. (2009) find the nature of this relation to be negative and positive, respectively, for these two types of disclosure. Wallace et al. (1994) suggest that high-liquidity firms are more motivated to disclose risk information than low-liquidity firms. They find, however, that liquidity has a significant and negative impact on disclosure level.

Prior risk research also uses leverage as a proxy for firm risk levels (Linsley and Shrives, 2006; Abraham and Cox, 2007; Marshall and Weetman, 2007; Rajab and Handley-Schachler, 2009), but with mixed results. Abraham and Cox (2007), Linsley and Shrives (2006) and Rajab and Handley-Schachler (2009) all reveal that there is no significant association between leverage and risk disclosure. Marshall and Weetman (2007) confirm that high-leverage firms are more likely to provide foreign exchange risk disclosure.

Marshall and Weetman (2007) argue that low liquidity firms are more motivated to provide higher levels of risk information. However, their findings suggest that high-liquidity firms provide more foreign exchange risk information in order to signal their strong position to investors. More recently, Dobler et al. (2011) find that high leverage US firm are likely to provide more risk information in their annual reports narratives than German firms, which tend to report less risk information. Their findings, nevertheless, do not support any influence of leverage on risk disclosure for UK firms. Hill and Short (2009) find that high leverage and low liquidity firms disclose more risk information.

Based on a review of the theory and literature, the study suggests the following set of hypotheses positing positive associations between risk levels (proxied by accounting-risk measures) and risk reporting (MRR and VRR).

H5: Firms' leverage (as a proxy of firms' financing risk) is more likely to be significantly and positively correlated to MRR and VRR.

H6: Firms' current ratio (as a proxy of firms' liquidity risk) is more likely to be significantly and positively correlated to MRR and VRR.

4.3.3. The control variables (other firm characteristics)

In order to examine the association between risk reporting levels and risk levels, the current study discusses the following potential effects.

Firm size

Prior general disclosure research has found firm size to be positively associated with general disclosure level (e.g., Meek et al., 1995; Ahmed and Courtis, 1999; Francis et al., 2005; Chavent et al., 2006). One explanation is that larger firms have larger analyst followings and hence are better able to distribute firm information (King, Pownall and Waymire, 1990). Smaller firms, however, are motivated to provide less information owing to the disadvantages related to their competitive situation (Chavent et al., 2006).

Prior risk disclosure research has provided mixed results. Beretta and Bozzolan (2004) and Rajab and Handley-Schachler (2009) find that firm size does not influence risk disclosure. Linsley and Shrives (2006) and Abraham and Cox (2007), however, find that aggregated and voluntary risk disclosures are significantly and positively correlated with firm size.

Firm profitability

While no study specifically focuses on the effect of firm profitability on risk disclosure level, a positive relation could be suggested based on prior studies on general voluntary disclosure[13] (Wallace and Naser, 1995; Giner, 1997; Chavent et al., 2006) indicating that firms with higher levels of profitability are more likely to provide information about their risks and their management.

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[13] Ahmed and Courtis (1999) are an exception in not finding any significant association between aggregated disclosure level and profitability.

Firm growth

Khurana, Pereira and Martin (2006) argue that as disclosure enhances firms' abilities to obtain external financing through reducing information asymmetry, firm growth is likely to impact positively on disclosure level. This is supported by their empirical evidence and that of Chavent et al. (2006) and O'Sullivan, Percy and Stewart (2008).

The current study argues that high-growth firms have positive incentives to provide risk disclosure in order to signal how they cope with these risks.

Firm dividends

Empirical research (e.g., Khang and King, 2006; Hussainey and Walker, 2009) based on signalling theory argues that firms that have high levels of asymmetric information are more likely to signal to their investors by paying higher dividends, and finds a negative association between a firm's disclosure and its dividends policy. Some other research (e.g., Deshmukh, 2005; Li and Zhao, 2008) finds that firms that have low levels of asymmetric information are more likely to pay higher dividends; such firms may be underinvested. Consistent with these studies in the USA, Hussainey and Al-Najjar (2011) reveal a positive association between future-oriented information and dividends for UK firms.

Based on this literature, the study controls for firm dividend effect and expects to find a positive association between risk disclosure and dividends; hence, firms with high-risk disclosure may be more motivated to pay higher levels of dividends to compensate their investors for their high risk levels.

To sum up, the current study controls for these four effects and expects, based on signalling theory, that large-size, high-profit, high-growth and high-dividend firms have

greater incentives to signal their ability in identifying and managing their risk relative to other firms.

Corporate governance (CG) effects

To further control for corporate governance effects, the analysis is informed by the following considerations.

First, further research on the impact of board size on corporate disclosure is suggested by Gul and Leung (2004). Jensen (1993) argues that large board size may lead to less effective coordination, communication and decision-making. Prior research provides mixed results; for instance, Cheng and Courtenay (2006) find that the impact of board size on disclosure is insignificant. Hussainey and Al-Najjar (2011) and Byard, Li and Weintrop (2006) find positive and negative associations between board size and disclosure, respectively.

Second, board composition (executive directors, or EDs, and non-executive directors, or NEDs) and independence (dependent NEDs and independent INEDs) have also been highlighted by prior research as potentially important corporate governance variables for financial disclosure (e.g., Chen and Jaggi, 2000; Gul and Leung, 2004; Cheng and Courtenay, 2006; Abraham and Cox, 2007; Jaggi, Leung and Gul, 2009).

The role of NEDs, in countries such as the UK, may be rationalised in terms of reducing agency costs and strengthening the motivation for risk disclosures (Abraham and Cox, 2007). Prior research further distinguishes between NEDs who have businesses or relationships with management from those who do not. Chen and Jaggi (2000) and Cheng and Courtenay (2006) find a positive association between INEDs and general disclosure; Abraham and Cox (2007), however, find a specific and positive association between INEDs and risk disclosure.

Third, Jensen (1993) suggests, from an agency theory perspective, that firms separate CEO responsibilities and roles from those of the board chair. Gul and Leung (2004) find that firms where those roles are combined (CEO duality) disclose significantly less information than do other firms. They also analyse the extent to which NED expertise can mitigate the negative impact of CEO duality on disclosure, and find that a high proportion of expert NEDs moderates the negative association between CEO duality and disclosure. Cheng and Courtenay (2006), however, find that the impact of CEO duality is insignificant.

These considerations motivate the researcher to include several proxies for corporate governance; specifically, board size (BZ), proportion of non-executive directors (PNED), proportion of independent non-executive directors (PINED) and chief executive officer (CEO) duality.

4.4. Country-level hypotheses: Country characteristics: (legal systems and cultural values)

Two main streams in prior research have examined Hofstede-Gray's framework. The first considers the associations between societal and accounting values as proposed by Gray (1988) (e.g., Eddie, 1990; Salter and Niswander, 1995). The second stream concentrates on the impact of the societal values suggested by Hofstede (1980) on disclosure, which has been used as a proxy for secrecy[14] (e.g., Gray and Vint, 1995; Jaggi and Low, 2000; Hope, 2003; Williams, 2004). The current study considers the second stream because it analyses

[14] Gray's (1988) original hypothesis (p.11) is that "*if a country has a high score in uncertainty avoidance and also a high score in power distance, with a lower score in individualism and masculinity, then this country is highly expected to have a high rank in secrecy*".

the cultural dimensions as indicators of variability of both mandatory and voluntary risk reporting across the USA, the UK and Germany.

Zarzeski (1996) argues that market forces in addition to cultural factors will affect financial disclosures. Her findings are consistent with theory and results of prior research; hence, she finds a significant impact of all Hofstede's (1980) dimensions in the expected directions, except for power distance. Zarzeski (1996) further analyses financial disclosure and its associations with cultural factors, distinguishing local from international firms based on a ratio of foreign sales to total sales, and finds that cultural dimensions, especially uncertainty avoidance (UA) and masculinity (MAS), are more likely to explain differences in financial disclosure for local firms than international firms.

The main conclusion from such results is that international firms moderate the association between Hofstede's societal values (1980) and Gray's accounting values (1988). The same conclusions are also held by Wingate (1997), who empirically tests the impact of cultural dimensions on firms' disclosure. She finds a significant impact of UA and individualism (IND), rather than power distance (PD), on disclosure.

Williams (2004) finds that firms from common law countries were more likely to provide higher levels of disclosure about the problem of the year 2000 (Y2K) than firms in code law countries. Power distance is the only factor that significantly explains the variability of firms' disclosures. The sensitivity of these results does not imply the impact of including or excluding legal systems on the associations between cultural values and disclosure levels. In other words, the extent to which the observed trend of disclosure differs with cultural

values (among some other variables, like firm size) is subject to interacting the legal systems with cultural values.

Jaggi and Low (2000), therefore, argue that the cultural factors of a country have an indirect impact on financial disclosure through its legal system, based on prior research which investigates the effect of a legal system on accounting practices (e.g., La Porta, Lopez-de-Silance, Shleifer and Vishny, 1998, 2000). Jaggi and Low (2000) find that firms from common law countries are more likely to provide significantly higher levels of disclosure than firms from code law countries. However, in the case of common law countries, they find a non-significant impact of cultural values on disclosure. Nevertheless, in code law countries, they find a significant impact of Hofstede's (1980) values (expect UA) on disclosure, but in diverted directions (except IND).

Discriminating code from common law countries, Hope (2003) addresses the question of whether cultural values have any explanatory power for disclosure in each legal system. Based on Jaggi and Low's (2000) argument and a larger sample (from the Centre for International Financial Analysis and Research (CIFAR) in 1993 and 1995), he provides empirical evidence on the importance of the legal system as a conditioning variable for the role of cultural values. For the full sample, he finds a limited role of culture to explain disclosure variability; IND and MAS are the only significant factors, with an unpredicted direction for the latter. Once he distinguishes common from code law countries, he finds, in the case of common law countries, that all cultural dimensions are significantly associated with disclosure and in the expected direction, except IND. In the case of code law countries, he finds that all the cultural variables are significant in explaining the variability of disclosure, except PD, but the directions of significance of the variables are in the unexpected direction, except IND.

To sum up, prior research (e.g., Jaggi and Low, 2000; Hope, 2003; William, 2004) finds mixed results regarding the extent to which cultural values and legal systems have explanatory power to express differences of disclosure. Hope (2003) finds all the cultural values have significant influences on firms' financial disclosure in both common and code law countries (with the exception of PD in the latter countries). The directions of such impacts are wholly diversified in these two kinds of legal systems. These directions are consistent with neither what is theoretically anticipated by Hofstede-Gray's framework nor what is empirically revealed by Jaggi and Low (2000) for common law countries.

The current study expects that cultural dimensions and legal systems may simultaneously have an essential role in explaining variations in risk reporting across countries. The current study, therefore, expects complementary rather than substitutable reactions between a country's legal system and its cultural values.

H7: Legal system and cultural values are more likely to be complements than substitutes in explaining variations of MRR and VRR.

To examine and explore the extent to which these two variables can reduce the un-explained variance of both MRR and VRR, two distinct changes are made. First, the current study weights code law/low cultural score countries relative to common law/high cultural score countries, respectively. In other words, the current study intends to treat both of these variables as factors or dummies rather than covariates, due to the small number of countries (three countries) at the higher level (level 2). Having a bigger number of countries makes the variations in cultural and legal variables between these countries large enough to drawing conclusions. Another possible justification is that these two variables

slowly change over time, they could be treated as factors or as dummies variables (e.g., Doupnik and Tsakumis, 2004; Heck et al., 2010).[15] Second, MRR from VRR are distinguished to observe the impact of both legal system and culture on explaining variations in each risk reporting type.

The current study argues that both mandatory and voluntary risk reporting have different patterns of associations with both legal systems and cultural values. It could be argued that both legal and cultural values have a higher explanatory power to express and anticipate the observed variations of MRR between firms across the USA, the UK and Germany than variations of VRR. The main reasoning behind such an argument is that different legal systems could imply different regulations to organise risk reporting, which in turn can affect what firms disclose about their risk in their annual report narratives. Nevertheless, firms' variations of VRR can be attributed to managers' incentives theories. The following hypothesis, therefore, can be formulated for MRR and VRR.

H8: The explanatory power of country characteristics (legal systems and cultural values) explaining the observed MRR variability between firms is higher than those explaining VRR variations.

4.5. Concluding remarks

In this chapter addresses the research questions that are related to either firm-level analysis, based on regulatory and managers' incentive theories of both mandatory and voluntary risk reporting, respectively, or country-level analysis, based on culture theory. The former

[15] Econometrically having dummy variables and if the empirical model includes intercept, for the legal system; this requires excluding the other category of legal system (common law countries). For culture variables, which have more than two categories, so high scores in each dimension will be excluded and the model will report the low score of each dimension (see, for instance, Heck et al., 2010; Gujarati, 2004).

level is concerned with how, and the extent to which, a firm's risk levels can influence whether it provides more or less risk information in its annual report narratives. The latter level is concerned with how a country's legal system and its cultural values act as substitutes and/or complements to express how, and the extent to which, either mandatory and/or voluntary risk reporting vary across countries.

In firm-level analysis, hypotheses are proposed based on market- and accounting-risk measures. At this level, four other effects are accounted for because they might affect the main associations. In particular, the analysis further considers a firm's size, profitability, growth and dividends. In country-level analysis, the current study investigates whether country characteristics act as substitutes or complements in explaining variations in MRR and VRR. Furthermore, the analysis highlights the extent to which legal systems and cultural values have different explanatory powers in interpreting variations in mandatory and voluntary risk reporting across the USA, the UK and Germany. To examine these hypotheses, the methodology is described in the following chapter and then empirical results are produced in three following chapters.

Chapter Five: Research methodology

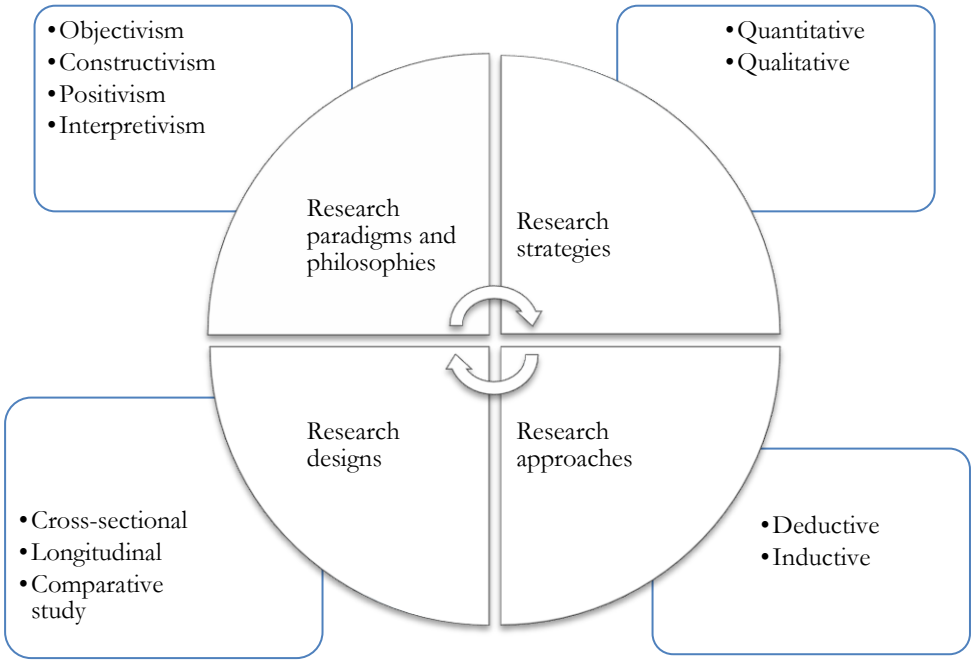
5.1. Overview

This chapter discusses the research methodology. Specifically, the chapter describes how the data is collected and the main criteria used to generate the main sample. The study utilises automated content analysis to measure mandatory and voluntary risk reporting (MRR and VRR). Accordingly, this chapter explains the three main steps taken to generate risk disclosure scores: constructing a risk word list, interacting disclosure scores by designed programme, and explaining the main risk reporting scores. These scores are then validated manually and statistically. To associate these scores (dependent variable) with a firm's characteristics and a country's characteristics (independent variables), all these variables are first defined and all these variables sources are then identified.

The reminder of this chapter consists of five sections. The philosophy of research of research and the current study's methodology are discussed in Section 5.2. Section 5.3 provides a description of the data collection and sample selection. Section 5.4 summarises the main approaches to measure mandatory and voluntary risk reporting. Section 5.5 introduces the automated content analysis to capture both mandatory and voluntary risk reporting. Defining the dependent and independent variables at either firm or country level and the measurement of these variables is discussed in Section 5.6. Section 5.7 offers concluding remarks.

5.2. The current study's methodology: Alternatives and justifications

Figure 5.1: Summary of research paradigms, strategies, approaches and designs



This section states the current study's research paradigm and philosophy (as presented in Figure 5.1). The research paradigm can be referred to as a set of general philosophical assumptions that concern the nature of the world (ontology) and how we can understand it (epistemology). The research paradigm compromises both ontology and epistemology to identify how the researcher sees his subject and how he intends to investigate it (e.g., Hussey and Hussey, 1997; Remenyi, Williams, Money and Swartz, 1998; Maxwell, 2005).

The ontological considerations concern the nature of existence by considering whether, for instance, social entities can be regarded as objective entities that have a reality external to social actors, or could be built up from the perceptions of those social actors (e.g., Collis and Hussey, 2003; Bryman, 2004). The former consideration is known as objectivism or realism, and the latter consideration is known as constructivism or idealism.

Epistemology can be seen as a branch of philosophy that investigates the nature of knowledge and how it is created. Therefore, it concerns the question of how we know what we know (Crotty, 1998). The research epistemology, therefore, could be classified based on our beliefs, and goes from positivism, at one extreme, to interpretivism on the other. Positivistic researchers are interested in testing hypotheses that are formulated based on certain theories (deductive research), or based on relationships discovered through the analysis of data; they could develop new hypotheses (inductive research). Such theories tend to be aggregated rather than specific to the cases. Interpretivism denotes an alternative to positivist epistemology. It is predicated upon the view that a strategy is required that respects the difference between people and the objects of the natural sciences and therefore requires a social scientist to grasp the subjective meaning of social action (Bryman, 2004).

The research strategy identifies the research orientation. To this end, two main distinctive approaches are widely utilised in social research. The first is quantitative, emphasising quantification in the collection and analysis of data. The second is qualitative, emphasising words rather than quantification in the collection and analysis of data.

The research approach shapes the way these strategies are used. Based on the link between the relationships under investigation and the theory, two main approaches can be adopted. The first is the deductive approach, where the researcher is normally interested in developing a hypothesis (or hypotheses), empirically testing it (these) and then accepting or rejecting this (these) hypothesis (es). In the inductive approach, in contrast, the theory is the outcome of analysing observations. Researchers using the former approach begin with what is known about a particular domain, based on theoretical considerations in relation to

that domain, and then end with being consistent or inconsistent with that theory. The latter approach begins with collecting observations and interpreting these observations in a specific context and ends with formulating a theory (Saunders, Thornhill and Lewis, 2009). The research design is a framework by which the data collection and the data analysis can be explained (Bryman, 2004).

The current study

Quantitative research, on the one hand, entails a deductive approach to the relation between theory and research, incorporates the practices and norms of the natural scientific model (positivism) and views social reality as an external (objectivism). Qualitative research, on the other hand, is inductive in its approach to formulating a theory, rejects the practices and norms of the natural scientific model (interpretivism) and views social reality as emerging from individuals.

The current study aims at investigating the main incentives for risk reporting across the USA, the UK and Germany over a period of five years (for the period of 30 June 2005 to 30 June 2010). To achieve this aim and further answer the research question, the current study uses a mixed-method approach to capture mandatory and/or voluntary risk reporting, which is based on analysing annual reports narratives during this period. This approach could be seen as a direct implication of qualitative research, as discussed earlier in this section. Furthermore, based on relevant theory and prior research, as discussed in the previous chapter, identifying some incentives that could interpret the reasoning behind providing risk information in each country or across these countries over time, could be seen as a direct implication of quantitative research. More details are given in the following section to highlight the data collection and sample selection, and how the current study captures both dependent and independent variables.

5.3. Data collection and sample selection

Thomson One Banker is used to obtain a list of NASDAQ, FTSE, Frankfurt (CDAX) all share firms. Financial firms are excluded, as in prior research (Beretta and Bozzolan, 2004; Linsley and Shrives, 2006; Abraham and Cox, 2007), because of their distinctive regulations and accounting practices. These criteria yield a list of 1680, 339 and 716 US, UK and German firms, respectively. The 1680 US firms are then re-sampled randomly to be consistent with the UK sample, whereas choosing annual reports written in English or German and English is the main criterion to re-sample the German list. Three main reasons could justify such re-sampling for German firms. First, the researcher does not know German and so could not read and understand many of these annual report narratives, either in the stage of identifying the initial word list or in the stage of validating risk disclosure scores. Second, Campbell, Beck and Shrives (2005) study the extent to which translated annual reports from German to English convey the same context; they find empirical evidence that supports the usage of the translated German annual reports. Third, more recently, Dobler et al. (2011) use translated annual reports from German to English in their risk disclosure study to avoid any bias of comparing different languages. Accordingly, the current study obtains a list of 320, 339 and 219 US, UK and German firms, respectively.

Annual reports for the UK and German firms are collected from either Thomson One Banker or the company's website, and the SEC annual filing of 10-K of the US firms is collected from historical SEC EDGAR. All these collections are for financial years ending within the period 30 June 2005 to 30 June 2010. The research focuses on annual reports since these remain a primary source of information for investors compared with other forms, like interim reports. There is increasing usage of these reports, indicating their value

relevance to investors (e.g., Beattie, McInnes and Fearnley, 2004; Beattie, McInnes and Pierpoint, 2008). This time period is chosen since IFRSs became mandatory for UK and German listed companies in 2005.

All annual reports are converted to text files so as to be readable by Nudist 6. Therefore, those annual reports which could not be converted to text files are excluded (15 US firms, 16 UK firms and 15 German firms). Furthermore, any firm without a complete time series of both annual reports and market data is omitted (US (51), UK (41), and Germany (4)). Consequently, the total size of the sample is 1270, 1410 and 1005 firm-years for the USA, the UK and Germany, respectively.[16]

5.4. Measuring MRR and VRR using automated content analysis

Much research has used content analysis to measure firm disclosure levels (e.g., Botosan, 1997; Core, 2001; Botosan and Plumlee, 2002; Beattie et al., 2004, 2008; Kothari et al., 2009; Gruning, 2011). Some research uses content analysis to measure specific types of disclosure; namely, forward-looking information (e.g., Hussainey et al., 2003; Muslu et al., 2010; Li, 2010) and risk disclosure (e.g., Beretta and Bozzolan, 2004; Linsley and Shrives, 2006; Abraham and Cox, 2007).

Two principal methods of content analysis have been employed by previous research: (1) the manual method (Beattie et al., 2008; Beretta and Bozzolan, 2004; Linsley and Shrives, 2006; Abraham and Cox, 2007); and (2) the automated method (Hussainey et al., 2003; Kothari et al., 2009; Muslu et al., 2010; Gruning, 2011). Either method may employ the

[16] These are the main criteria and the main sample of the current study. Some of the following chapters, however, use different numbers based on some other circumstances, which will be explained in their context.

word, sentence or line as the unit of analysis. Hussainey et al. (2003), Beattie et al. (2004, 2008) and Muslu et al. (2010) use the sentence as the unit of analysis; Kothari et al. (2009), Li (2010) and Gruning (2011) use a combination of word, sentence and line.

5.5. The automated content analysis steps

The researcher constructs three successive steps, shown in Figure 5.1, to measure both MRR and VRR of firms in the USA, the UK and Germany. Firstly, in order to determine the final risk word list, the researcher identifies a comprehensive list of risk-related keywords. To construct such a list, the current study is essentially based on three main sources. First, prior academic and professional research on risk concepts (e.g., Bernstein, 1996; Luhmann, 1996; Ricciardi, 2004; AICPA & CICA, 2000) are used. To expand these words, secondly, Roget's Thesaurus is used to source all relevant synonyms for words the current study gets from the first source(s). Lastly, 15 annual report narratives from each country are randomly selected and read to identify words indicating risk. To examine the extent to which words featuring in the initial list, as shown in Table 5.1, are in use, an intensive text search is conducted using Nudist 6 for another 15 randomly selected annual report narratives from each country. All words that do not appear in this text search are excluded. The study thus identifies the final risk word list, as shown in Table 5.2, which is further examined for reliability and validity as explained in the following section. From this world list, Table 5.3 is derived; hence, positive and negative risk disclosures are derived. As well, mandatory risk disclosure is derived based on mandated topics or mandated themes discussed in Section 3.4.

The annual report narratives from each country are then prepared for text-searching to capture the risk reporting level in each country.

For USA and Germany, the researcher eliminates all the sections indicative of mandated risk reporting (as shown in Section 3.4) according to the SEC's requirements in the USA (item 1.a for Risk Factor; 7.a for Quantitative and Qualitative Disclosure about Market Risk), and GAS 5 in Germany (the section of Risk and Opportunity or Outlook). While these sections indicate mandatory risk reporting (MRR) according to these requirements (MRR_I), there are some possibilities for US and German firms to disclose information about some aspects related to MRR in other annual report narrative sections. In these other sections, firms mainly provide their voluntary risk disclosure (VRR), but firms could still voluntarily disclose information about risks, which is related to mandated topics or themes, (MRR_V). The total mandatory risk disclosure scores in USA and in Germany is obtained as the total number of sentences, which indicate risk in the mandated sections (MRR_I) and in the other narrative sections of annual report (MRR_V).

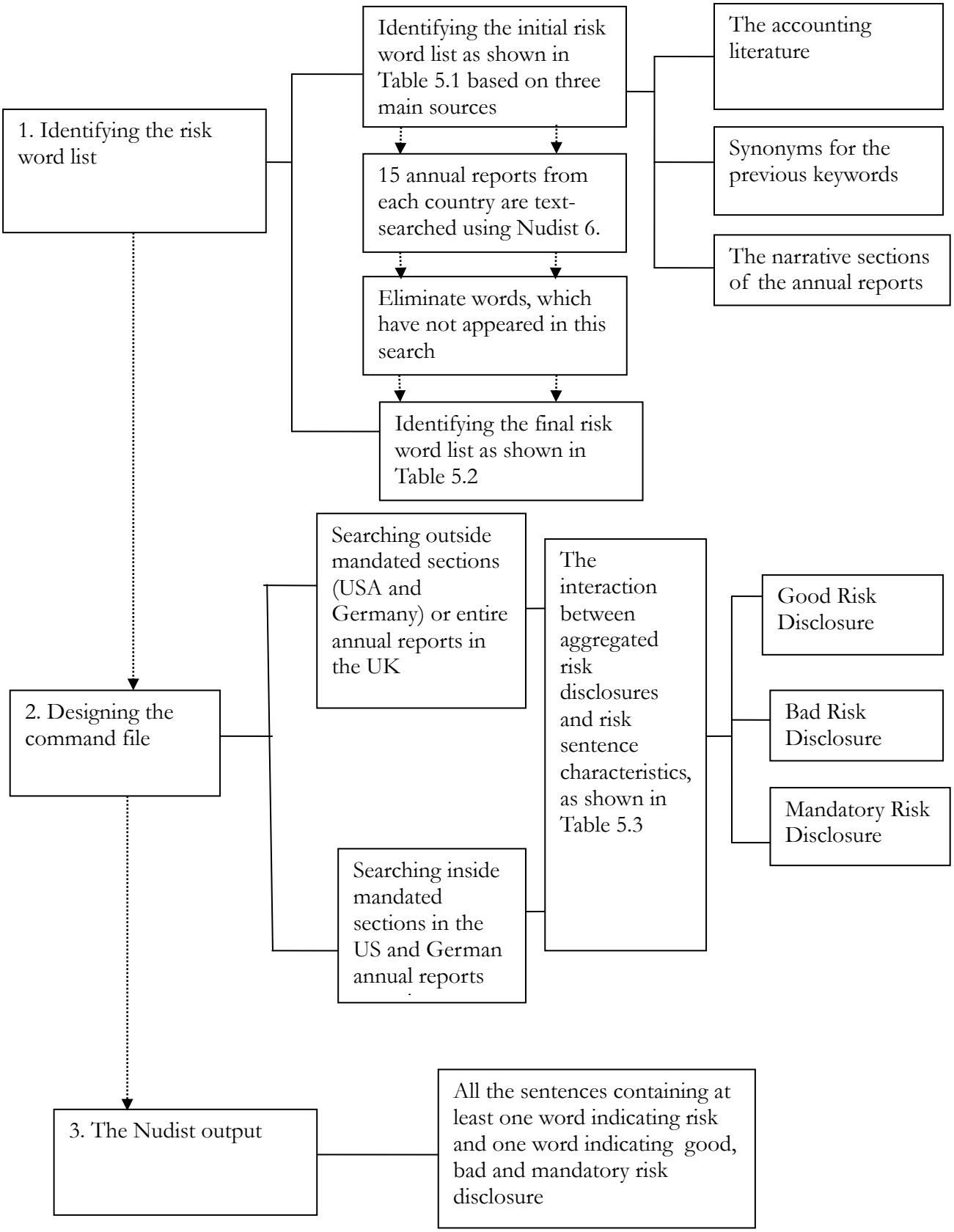
In the case of the UK firms' annual report narratives, however, the full annual report is used to obtain MRR and VRR since there are no mandated requirements similar to those in the USA or Germany.

The current study therefore uses the special command instructions of the Nudist software and designs an automated programme to search for the words on the risk word list previously generated. The current study counts all statements containing at least one relevant risk word in mandated sections (for the US and German annual report narratives) and voluntary sections (for the US, German and UK annual report narratives). Statements of risk in voluntary sections are used as a proxy for firms' aggregated risk reporting levels.

By assessing the regulations in these three countries, as detailed in Section 3.4., the researcher is able to identify the mandated risk reporting topics. To differentiate between

voluntary and mandatory statements in the entire annual reports of the UK firms, or from the other narrative sections of annual reports of the US and German firms, the researcher separates those statements, which contain at least one mandated risk theme or topic from aggregated risk statements. The researcher, therefore, obtains total mandatory risk scores for UK firms, or MRR_V, for the US and German firms. The researcher then excludes these scores from the aggregated risk scores to determine voluntary risk reporting for the UK, US and German firms; examples of risk statements that captured by Nudist 6 , are provided in Appendix 1. The total mandatory risk disclosures for the USA and Germany are obtained by considering all risk statements in mandated sections (MRR_I) in addition to all mandated statements outside these sections (MRR_V). Finally, all scores are tested manually and statistically to ensure their reliability and validity. Tests for reliability and validity are discussed in the following sub-section.

Figure 5.2: Automated content analysis steps



This figure describes the three main steps to generate MRR and VRR scores.

Table 5.1: The risk word list

Negative effects	Positive effects	Statistical concepts
1. Against 2. Adverse effect 3. Adversely affect 4. Bad effect 5. Catastrophic 6. Challenges 7. Confusion 8. Dare 9. Damage 10. Danger 11. Decline 12. Decrease 13. Diminish 14. Do not realise (realize) 15. Downside 16. Exposure 17. Fail 18. Harm 19. Hazard 20. Hinder 21. Inhibit 22. Insufficient 23. Less 24. Loss(es) 25. Lower 26. Offset, partially offset 27. Overestimate, overestimated 28. Potential disadvantage(s) 29. Potential losses 30. Risk* 31. Reduce 32. Shortage 33. Threat 34. Unable 35. Uncertain 36. Undiversified 37. Unfavourably 38. Unsatisfactory 39. Verse 40. Viable 41. Went down	42. Chance 43. Changes 44. Differ 45. Differences 46. Diversify (diversified, diversification, diversifications) 47. Fluctuation 48. Growth 49. Grew over 50. Highest 51. Increase 52. Opportunity 53. Over 54. Peak(ed) 55. Potential advantage 56. Potential gains 57. Sufficient 58. Upside 59. Variability 60. Vary 61. Went up	62. Likelihood 63. Likely 64. Probability (probabilities) 65. Possible 66. Possibilities 67. Potential consequence(s) 68. Random outcome 69. Significant impact

* means any other derivatives from the original word

Table 5.2: The final list of risk words

Negative effects	Positive effects	Statistical concepts
1. Against 2. Catastrophe (catastrophic) 3. Challenge (challenges) 4. Decline (declined, decrease (decreased) 5. Fail (failure) 6. Less 7. Loss (losses) 8. Low* 9. Risk (risky, riskiness) 10. Shortage 11. Threat 12. Unable 13. Uncertain (uncertainty, uncertainties) 14. Verse (versed, reverse, reversed)	15. Chance (chances) 16. Differ (differed, difference, differences 17. Diversify* 18. Fluctuate (fluctuated, fluctuation, fluctuations) 19. Gain (gains) 20. Increase (increased) 21. Peak (peaked)	22. Probable * 23. Significant

This table summarises the final word list in three categories (negative, positive effects and statistical concepts). * means any other derivatives of the original word.

Table 5.3: The final list of risk sentence characteristics

<table>
<tr><th>Good risk disclosure</th><th>Bad risk disclosure</th><th colspan="2">Mandatory risk reporting</th></tr>
<tr><td rowspan="5">1. Chance (chances)
2. Differ (differed, difference, differences
3. Diversify*
4. Fluctuate (fluctuated, fluctuation, fluctuations)
5. Gain (gains)
6. Increase (increased)
7. Peak (peaked)</td><td rowspan="5">1. Against
2. Catastrophe (catastrophic)
3. Challenge (challenges)
4. Decline (declined, decrease (decreased)
5. Fail (failure)
6. Less
7. Loss (losses)
8. Low*
9. Risk (risky, riskiness)
10. Shortage
11. Threat
12. Unable
13. Uncertain (uncertainty, uncertainties)
14. Verse (versed, reverse, reversed)</td><td>USA</td><td>1-Contingence (FAS 5)
2-Derivatives (FRR 48; FAS 133)
3-Fair value (FAS 157)
4-Investment (FAS 115)
5- Segment reports (FAS 14)</td></tr>
<tr><td>UK</td><td>1-Contingence (FRS 12)
2-Derivatives (FRS 4)
3-Foreign exchange (FRS23)
4-Investment (FRS 5)
5- Related party disclosure (FRS 8)
6- Segment reports (SSAP 25)</td></tr>
<tr><td>Germany</td><td>GAS 5, 2000 for risk reporting</td></tr>
<tr><td colspan="2">Common topics</td></tr>
<tr><td colspan="2">1-Contingency
2-Derivative; financial instrument; financial instruments
3-Fair value; fair values
4- Foreign currency
5- Investment; investments
6-Segment; segments</td></tr>
</table>

The first and second columns (good and bad risk disclosures, respectively) are derived from the previous list of risk words (Table 5.2). The third column is derived from accounting standards' topics related to risk (analysed and discussed in more detail in Chapter Three).

5.6. The reliability and validity of risk disclosure scores

The reliability and validity of the risk disclosure scores are checked in two stages. First, the extent to which the final word list captures statements with a risk focus in firms' annual report narratives is examined. To this end, 30 randomly selected statements from the Nudist output for 15 firms in each country are read. The researcher finds that the final risk keywords list is very successful (80% on average) in identifying statements indicative of risk.

Second, after calculating final risk disclosure scores, two post hoc procedures are carried out. Firstly, the first stage statements are manually reviewed, considering the word list's ability to discriminate between voluntary and mandatory risk reporting. To this end, the current study finds the keywords able to differentiate reasonably between these disclosures by around 77% (on average). This percentage is calculated based on reviewing those 30 statements in those three countries in 2007, all examples of risk statements, shown in appendix 1, reflect the mandatory risk disclosure. These examples are reviewed with supervisors[17]. Secondly, Cronbach's Alpha is used as a statistical test to examine the reliability of the aggregated, voluntary and mandatory risk disclosure scores. This test measures how well a data set captures a particular underlying construct. For the computed risk disclosure scores, Cronbach's Alpha is 82%, as an average score in these three countries, indicating that inter-consistency between the aggregated, voluntary and mandatory risk reporting scores is high when compared with the generally acceptable

[17] A related point that raised by one of the examiners, the extent to which the mandated sections are checked for any voluntary disclosure. The current study treats all risk information in the mandated sections as mandatory risk disclosure. Any risk information revealed outside these sections could either be related to some mandated topics that were identified in light of the risk regulations within each country, as shown in Section 3.4, or could be treated as voluntary risk disclosure. The researcher manually checked item 1.a for Risk Factor and 7.a for Quantitative and Qualitative Disclosure about Market Risk. The raised point could be applicable with the latter item, but it could be difficult to apply to the former item. To explain more, it could be argued that the extent to which American firms could disclose information about risk in item 7.a, but this information does not relate to financial instruments. The result shows strong support for considering risk disclosure inside these sections as mandatory disclosure.

societal science measure of 70% (see Bryman, 2004; Deumes and Knechel, 2008). The current study concludes that the computed disclosure scores are reliable[18].

5.7. Study Variables

5.7.1. Dependent variables

Mandatory and voluntary risk reporting (MRR and VRR) are measured by counting the number of statements, which include at least one word from the risk word list using the automated content analysis.

5.7.2. Independent variables

Firm-level variables

The current study employs various risk measures. In terms of market-risk measures, volatility of market returns *(Datastream item 009E)* is used as a measure for total risk, and beta *(Datastream item 897E)* and standard error of CAPM *(Datastream item 519E)* as measures for systematic and unsystematic risk, respectively. The Sharp ratio *(Datastream item 457E)* is employed to reflect the risk-adjusted return of the firm. In terms of accounting-risk measures, the current study uses ratio analysis for further insights into unsystematic risk. Leverage *(Worldscope item WC08231)* and current ratio (*Worldscope item WC8106)* are used to measure financing and liquidity risks, respectively. In total, therefore, six risk measures are used to capture firm risk levels.

Based on the prior literature, the current study also controls for firm size, measured by natural logarithm of total assets *(Worldscope item WC02999)*, firm profitability, measured by the Return on Equity (ROE) *(Worldscope item WC08301)*, firm growth, measured by the

[18] To validate the automated method against the manual method, at earlier stage before proceeding with the pilot study and using the automated method to capture risk disclosure, the researcher reviewed seven 10-K forms within the USA. The Coding was reviewed by Dr Hussainey.

growth in earnings *(Datastream item E018)* and dividend payments, measured by the dividends per share *(Datastream item 512E)* (if not available, the current study uses dividends payout ratio (*Worldscope item WC09502*).

Several proxies for corporate governance (CG) are manually collected[19] and empirically included to control for any potential effects of CG. Specifically, board size (BZ), proportion of non-executive directors (PNED), proportion of independent non-executive directors (PINED) and chief executive officer (CEO) duality.

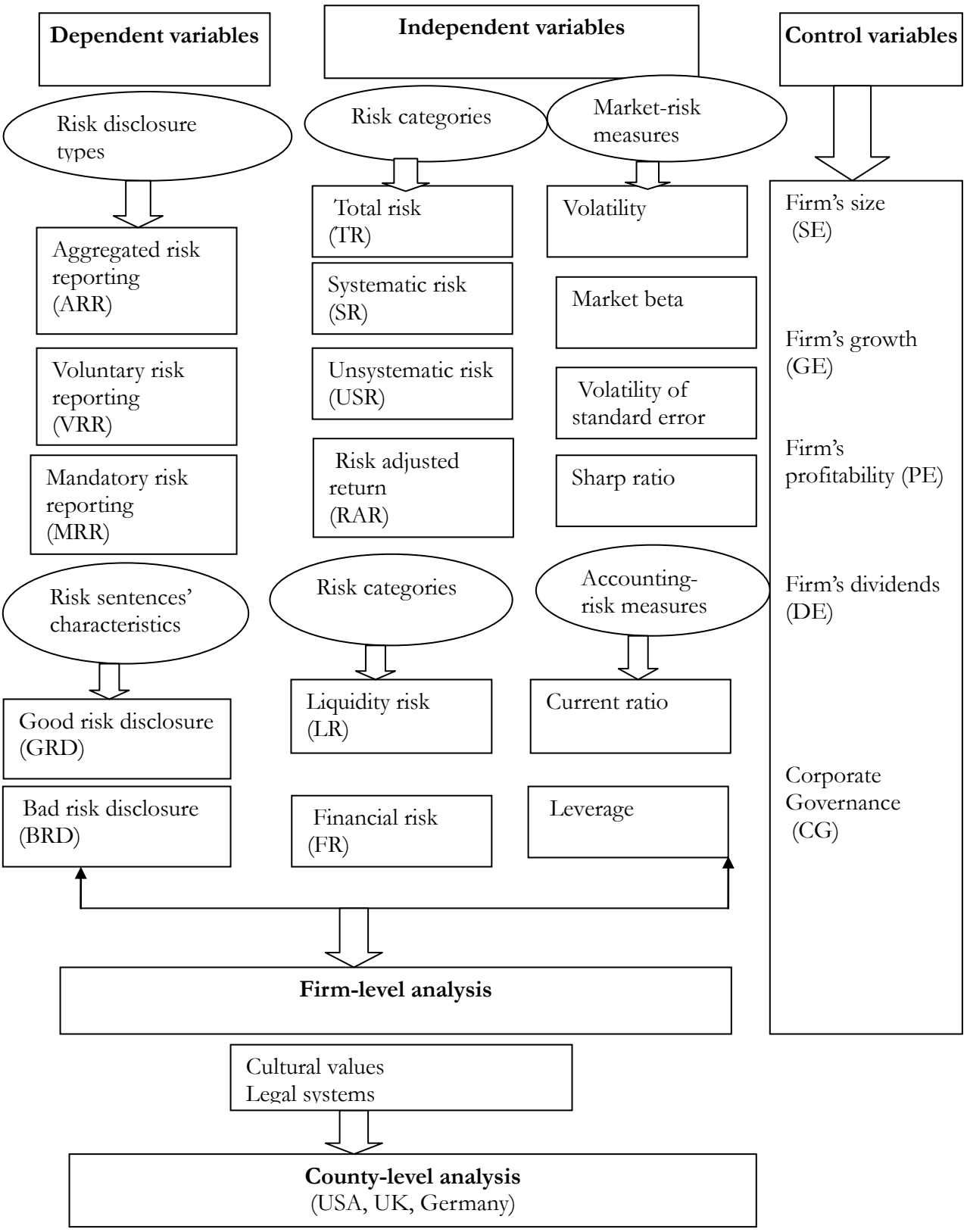
Country-level variables

A dummy variable as a proxy for a country's legal system is used, with a value of 1 or 0 if the country uses common law or code law, respectively. Hofstede's values for cultural values, specifically, power distance, uncertainty avoidance, individualism, masculinity and long-term orientation are also used (as discussed in Section 2.5). All of these variables are obtained from Hofstede's official website (see http://www.geert-hofstede.com)

All these variables and these two levels of analyses are summarised in Figure 5.2, and the measurements and sources of these variables are provided in Table 5.4.

[19] Availability of CG data is essential to consider. The BoardEx database is the only authorised available source to collect CG data at the University of Stirling; it provides CG data only for UK firms. It is worth mentioning that the analysis in Section 7.3.3 showed that including or excluding CG variables does have a serious impact on the main conclusions that are drawn in both cases.

Figure 5.3: Summary of dependent and independent variables and levels of analysis



This figure provides both firm- and country-level variables, divided into dependent variables (risk disclosure levels) and independent variables, either at firm-level analysis, which includes firm risk levels (market- and accounting-risk measures and other firm characteristics as control variables), or at country-level analysis, which includes both a country's legal systems and its cultural values.

Table 5.4: Summary of variable definitions and measures

Variable	Definition	Measures
ARR	Risk information provided by firms as a response to either a specific regulation or managerial incentives. Calculated by counting the number of statements that indicate risk based on the final list of risk words.	Nudist (6)
MRR	Risk information provided by firms as a response to a specific regulation. Calculated by counting the number of statements that indicate risk based on the final risk word list and that contain at least one topic related to mandated topics or themes in the final list of risk sentence characteristics.	Nudist (6)
VRR	Risk information provided voluntarily by firms as a response to managerial incentives. Calculated as a residual of ARR after excluding MRR.	Nudist (6)
TR	Total risk is the volatility of market returns, which is in turn measured by the standard deviation.	Datastream item 009E
SR	Systematic risk is the volatility of a firm's market return relative to a market index. The calculations are based on between 23 and 35 consecutive month-end prices of US, UK and German firms relative to market returns of S&P 500, FT All Share and FazAktien, respectively.	Datastream item 897E
USR	Unsystematic risk is the volatility of a firm-specific risk, which is the standard deviation of the standard error of the CAPM.	Datastream item 519E
FR	Financing risk is the extent to which firms have problems related to debt, measured by leverage proxied as the ratio of total debt to total equity.	Worldscope item WC08231
LR	Liquidity risk is the extent to which firms have problems related to payments, measured by current ratio, proxied by dividing total assets to total liabilities.	Worldscope item WC8106
SE	A firm's size, measured by the natural logarithm of total assets in local currency or US dollars.	Worldscope item WC 02999 and then converted into US dollars
PE	A firm's profitability, measured by dividing net income before proffered dividends by the year end common equity.	Worldscope item WC 08301

GE	A firm's growth, measured by growth in earnings, or by obtaining the ratio of net sales growth as (NS1-NS0/NS0).	Datastream item E018 or Worldscope item WC 01001		
DE	A firm's dividends, measured by the ratio of dividend per share or dividend payout.	Worldscope item WC09502		
BZ	The board size, measured by the natural logarithm of total number of board directors.	BoardEx database		
PNED	Expresses the proportion of non-executive directors relative to board size.	BoardEx database		
PINED	Expresses the proportion of independent non-executive directors relative to board size.	BoardEx database		
CEO duality	Chief executive officer duality is produced as a dummy variable with a value of 1 if the chief executive officer is also chairman of the board of directors, and a value of 0 otherwise.	BoardEx database		
LS	A country's legal system, which is identified as a code or common law.	Dummy variable 1 and 0 for common law (CML) and code law (CL) countries, respectively.		
Culture dimensions		Hofstede's website		
		USA	UK	Germany
PD	Power distance, as defined by Hofstede (1980)	40	35	35
UA	Uncertainty avoidance, as defined by Hofstede (1980)	46	35	65
IND	Individualism, as defined by Hofstede (1980)	91	89	67
MAS	Masculinity, as defined by Hofstede (1980)	62	66	66
LTO	Long–term orientation, as defined by Hofstede (1991)	29	25	31

5.8. Concluding remarks

In this chapter, the current study introduces its methods, which include how the researcher collects the data and expresses the main criteria for the sample. The proposed automated method is introduced to capture the firms' mandatory and voluntary risk reporting by counting the number of statements indicating risk in their annual report narratives. A description of measuring other variables is provided.

The potential main associations between these variables will be examined empirically through three different approaches. While the first (ordinary least squares, or OLS) and the second (fixed effect model, or FEM) have been frequently used by prior research (e.g., Beretta and Bozzolan, 2004), the third, multilevel analysis (MLA) is rarely used by prior accounting research. These approaches will be introduced and discussed in their relevant contexts in the following chapters (Chapter Seven: linear mixed model; Chapters Eight and Nine: repeated measures multilevel analysis).

In the following chapter, the pilot study is introduced in order to address the extent to which there are significant differences in either a firm's risk levels or a firm's risk reporting levels. Then, firms' risk levels are correlated with their risk reporting levels.

Chapter Six: Differences in firms' risk levels and risk reporting levels across the USA, the UK and Germany: A Pilot study

6.1. Overview

This chapter determines whether there are significant differences in a firm's risk levels (as a first hypothesis) and in a firm's risk disclosure levels (as a second hypothesis) across the USA, the UK and Germany[20]; furthermore, the extent to which any such differences in a firm's risk levels and its risk disclosure are associated (as a third hypothesis). The hypotheses of this chapter, therefore, are concerned with either the significance of possible differences in or between a firm's risk levels and a firm's risk disclosure levels across these countries. Accepting these hypotheses supports what has been argued in Chapters Three and Four, and moves the current study's main interest forward, investigating such arguments on a larger scale (as will be discussed in the following three chapters) than the one used in this chapter (15 firms from each country).

The results reveal significant differences in firm risk levels and disclosure levels across the USA, the UK and Germany. The results indicate that these differences are statistically correlated, supporting the main argument of the current study, that differences in a firm's risk levels within (nationally) and/or across (internationally) these countries should be reflected in their risk reporting practices.

This chapter is structured as follows. Section 6 .2 discusses the pilot study's methods. Section 6 .3 reveals the empirical results. Concluding remarks are expressed in Section 6 .4.

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[20] The main reasons for choosing these countries have been previously provided; see, for instance, Section 1.2.

6.2. The method

6.2.1. The sample and data

15 firms were randomly chosen in each country from 2007 and 2008; each year in turn is divided into four quarters. The data from annual reports were collected from Thomson One Banker, and then transformed into text files to be readable by Nudist 6 software.

The market data of these 15 firms in each country were collected from Datastream.

6.2.2. Variables: Measurement

Firms' risk level variables (total, systematic, unsystematic, risk-adjusted return, financing and liquidity risks) and risk disclosure level variables (ARD, MRD) are defined and measured in Table 5.4.

6.2.3. Statistical analysis

To examine whether there are significant differences in firms' risk levels and risk disclosure levels between these three countries during 2007 and 2008, one-way multivariate analysis of variance (MANOVA) is used; hence, the pilot study has three independent samples (USA, UK and Germany) in these two years. Two main underlying assumptions should be checked before using MANOVA. While the first concerns the extent to which the variable values are normally distributed, which is known as the assumption of normality, the second concerns the extent to which the variance of the variable values are homogenous, which is known as the assumption of homogeneity. The null hypothesis for the former assumption, normality, is that a variable's values are normally distributed. This hypothesis might be statistically examined by using either Kolmogorov-Smirnov or Shapiro-Wilks. In both tests, the null hypothesis should be accepted if the p-values are above one of the three common acceptable significance levels of 10%, 5% or 1%. Based on these two tests,

the results indicate (not reported) that all variables are normally distributed. The null hypothesis of the latter hypothesis, homogeneity, is that each group of the independent groups (the three countries, the USA, the UK and Germany) has the same variance on interval dependent variables (a firm's risk levels and risk reporting levels). This hypothesis might be statistically examined by using Levene's test, in which the null hypothesis can be accepted or rejected based on either deviation from the group mean, median or adjusted median for the degree of freedom for each dependent variable (e.g., total, systematic and unsystematic risks). If results of Levene's test are significant, then that indicates the variances are significantly different in different groups; the null hypothesis should therefore be rejected. Based on this test, the results indicate that the variances of most firms' risk level variables and risk disclosure level variables are similar in these three countries. For any other variables that exhibit violation of the assumption of homogeneity, such as aggregated risk reporting in 2007 and 2008, which will be discussed in Section 6 .3.2, there are some other techniques (such as Tamhane test) that can be utilised to overcome such violation (for more details see Field, 2009).

Explicitly, the MANOVA results might either suggest significant or non-significant differences in either a firm's risk levels (such as total and systematic risks) or a firm's risk disclosure (such aggregated and mandatory risk reporting) between firms in these three countries. If the results suggest significant differences in these variables among these three countries (together), it is essential to investigate specifically in which pair of countries (USA and UK; USA and Germany; UK and Germany) these differences exist. Two other statistical tests can therefore be utilised, subject to the extent to which there is a violation of the assumption of homogeneity. The first is the Bonferroni test, which supposes that the variance of variables under analysis in each group is equal. The Tamhane test, however, gives the same result if the variance is not equal.

To examine whether there are any associations between a firm's risk levels and a firm's risk disclosures (as a third hypothesis for this chapter), correlation analysis is used (Pearson correlation coefficient); hence, all variables are measurable and continuous. If the results suggest that there are significant associations between a firm's risk levels and its risk reporting levels across these three countries, it might help in identifying the extent to which firms in these three countries are motivated to provide significantly more or less risk information in their annual report narratives as a response to their underlying risks.

6.3. Empirical results

6.3.1. Differences in firms' risk levels across the USA, the UK and Germany

2007

Panel A of Table 6.1 indicates that there are significant differences between a firm's risk levels across the USA, the UK and Germany during the four quarters of 2007 for financing risk (FR), at a p-value of 0.000 for each quarter, and for liquidity risk (LR), at p-values of 0.056, 0.044, 0.062 and 0.046 for each quarter, respectively. As well, there are significant differences in total risk (TR) and risk-adjusted return (RAR) between American, British and German firms during the first two quarters of 2007, at p-values of 0.037, 0.015 and 0.084, respectively. All these variables exhibit similar variances across these three countries, confirming the assumption of homogeneity and suggesting the use of the Bonferroni test in order to identify in which pair of countries these significant differences exist (e.g., USA with UK; USA with Germany) .

Nevertheless, there are no significant differences between the other risks of firms across the USA, the UK and Germany. In particular, there are no significant differences in the systematic (SR) and unsystematic risks (USR) of firms across the USA, the UK and Germany.

Table 6.1: Results of differences in firm risk levels in 2007

Panel A: One-way MANOVA analysis 2007

Dependent variable	Q1/2007	Q2/2007	Q3/2007	Q4/2007
	Sig.	Sig.	Sig.	Sig.
Total risk (TR)	0.051*	0.074*	0.619	0.795
Systematic risk (SR)	0.588	0.302	0.444	0.454
Unsystematic risk(USR)	0.249	0.249	0.249	0.249
Risk-adjusted return (RAR)	0.037**	0.015**	0.102	0.172
Financing risk (FR)	0.000***	0.000****	0.000***	0.001***
Liquidity risk (LR)	0.056*	0.044**	0.062*	0.046**

Panel B: The Bonferroni test (multiple comparisons)

Dependent variable	Statistical	I G2	J G2	Q1/2007	Q2/2007	Q3/2007	Q4/2007
				Mean difference (I-J)	Mean difference (I-J)	Mean difference (I-J)	Mean difference (I-J)
RAR	Bonferroni	USA	UK	0.079 (0.988)	-0.125 (1.000)		
			Germany	-0.687 (0.110)	0.847** (0.039)		
		UK	USA	-0.079 (0.988)	-0.125 (1.000)		
			Germany	-0.767*** (0.008)	-0.972** (0.018)		
		Germany	USA	0.687 (0.110)	0.847** (0.039)		
			UK	0.767*** (0.008	0.972** (0.018)		
FR	Bonferroni	USA	UK	-2.354*** (0.010)	1.012*** (0.002)	-2.399*** (0.003)	-2.521*** (0.005)
			Germany	-3.302*** (0.000)	0.568*** (0.000)	-3.268*** (0.000)	-3.185*** (0.001)
		UK	USA	2.354*** (0.010)	-1.012*** (0.002)	2.399*** (0.003)	2.521*** (0.005)
			Germany	-0.948 (0.326)	-0.444 (0.0409)	-0.869 (0.424)	-0.664 (0.937)
		Germany	USA	3.302 (0.000)	-0.567*** (0.000)	3.268*** (0.000)	3.185*** (0.001)
			Germany	0.948 (0.326)	0.444 (0.409)	0.869 (0.424)	0.664 (0.937)
LR	Bonferroni	USA	UK		1.012**		1.040**

		(0.043)	(0.045)
	Germany	0.56800	0.556
		(0.405)	(0.464)
UK	USA	-1.012**	-1.040**
		(0.043)	(0.045)
	Germany	-0.444	-0.484
		(0.702)	(0.633)
Germany	USA	-0.568	-0.556
		(0.405)	(0.464)
	UK	0.4440	0.4840
		(0.702)	(0.633)

This table explains differences in firms' risk levels (RAR, FR, LR) across the USA, the UK and Germany in 2007's four quarters. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively, All variables' definitions are shown in Table 5.4. Panel A reports any significant differences in firms' risk levels in 2007 across these three countries. Significant differences from Panel A are further analysed to identify specifically between which two pairs (I and J) of countries (e.g., USA with UK; USA with Germany) the mean difference remains significant.

To determine in which two pairs of countries these differences exist, the Bonferroni test, shown in Panel B of Table 6.1, indicates that the main differences of FR are in US firms and either UK or German firms, at p-values around 0.000. Furthermore, this test reveals significant differences in financing risk between UK firms and US firms rather than German firms, which seem to have similar levels of financing risk to UK firms.

In the second and fourth quarters of 2007, the US firms significantly differed in LR from the UK firms rather than the German firms. For the same two quarters, there were no significant differences in LR between German firms and UK or US firms.

The Bonferroni test indicates that there are significant differences in the risk-adjusted return (RAR) between German firms and both UK and US firms in the first two quarters of 2007, and with the US firms in the second quarter of this year. The same statistical test reveals that there are no significant differences between the US firms and the UK firms in (RAR). For TR the results were identical with those results obtained from RAR, so the results of RAR were chosen to be presented in Panel B of Table 6.2.

2008

Panel A of Table 6.2 indicates that there are significant FR differences between firms across these three countries. The Bonferroni test (Panel B of Table 6.2) reveals that there are significant differences in FR between the US firms and the German firms during the four quarters of 2008. In this context, these differences between the US firms and the UK firms appear in all 2008 quarters except the fourth.

Table 6.2: Results of differences in firm risk levels in 2008

Panel A: One-way MANOVA analysis 2008

Dependent variable	Q1/2008	Q2/2008	Q3/2008	Q4/2008
	Sig.	Sig.	Sig.	Sig.
TR	0.628	0.453	0.327	0.300
SR	0.398	0.407	0.382	0.327
UR	0.249	0.249	0.249	0.249
RAR	0.192	0.285	0.331	0.192
FR	0.006***	0.007***	0.006***	.0012***
LR	0.155	0.143	0.103	0.453

Panel B: The Bonferroni test (multiple comparisons)

		(I)	(J)	Q1/2008	Q2/2008	Q3/2008	Q4/2008
				Mean difference (I-J)	Mean difference (I-J)	Mean difference (I-J)	Mean difference (I-J)
FR	Bonferroni	USA	UK	-2.436*	-3.003**	-3.049**	-2.720
				(0.079)	(0.040)	(0.035)	(0.162)
			Germany	-3.873***	-3.873**	-3.920***	-4.791**
				(0.005)	(0.008)	(0.007)	(0.012)
		UK	USA	2.436*	3.003**	3.049**	2.727
				(0.079)	(0.040)	(0.035)	(0.162)
			Germany	-1.4370	-0.870	-0.870	-2.064
				(0.484)	(1.000)	(1.000)	(0.496)
		Germany	USA	3.873***	3.873***	3.920***	4.791**
				(0.005)	(0.008)	(0.007)	(0.012)
			UK	1.437	0.870	0.870	2.064
				(0.484)	(1.000)	(1.000)	(0.496)

This table explains differences in firms' risk levels across the USA, the UK and Germany in 2008's four quarters. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively. All variables' definitions are shown in Table 5.4. Panel A reports any significant differences in a firm's risk levels in 2008 across these three countries. Any significant differences (FR) from Panel A are further analysed to identify specifically in which two pairs of countries these significant differences remain.

To sum up, statistically based on MANOVA analysis, there are significant differences between firms' risk levels across the USA, the UK and Germany during 2007 and 2008. As a result, the first hypothesis of this chapter can be accepted. Additionally, these differences are further investigated using the Boferroni test in order to determine in which pair of countries the differences exist. The following section identifies whether there are significant differences in firm risk disclosure levels across the USA, the UK and Germany. If the results support the existence of such significant differences, then the analysis will be developed to further associate such differences in firms' risk levels with those differences in firms' risk disclosure levels across the USA, the UK and Germany.

6.3.2. Differences in firms' risk disclosure levels across the USA, the UK and Germany

To statistically examine whether there are significant differences between the US, UK and German firms' levels of risk disclosure during 2007 and 2008, one-way MANOVA analysis is used. All firms' risk disclosure level variables meet the homogeneity assumption, except the aggregated risk disclosure (ARD) in 2007; hence, the variance of ARD across these three countries is not equal. The Tamhane test, therefore, is used as the most appropriate alternative in order to follow MANOVA (e.g., Field, 2009). Any other significant differences in firms' risk disclosure levels across the USA, the UK and Germany are followed by the Bonferroni test, which supposes that the variance of risk disclosure across these countries is equal.

Panel A of Table 6.3 illustrates that there are significant differences in ARD, bad risk disclosure (BRD) and mandatory risk disclosure (MRD) in 2007 and 2008 between the US, UK and German firms. These significant differences are followed by either Tamhane or Boferroni tests to identify specifically in which two pairs of countries the differences exist, as shown in Panel B of Table 6.3.

Table 6.3: Results of differences in risk disclosure in 2007 and 2008

Panel A: One-way MANOVA analysis

	2007 Sig.	2008 Sig.
Aggregated risk disclosure (ARD)	0.020**	0.006***
Good risk disclosure (GRD)	0.019**	0.225
Bad risk disclosure (BRD)	0.036**	0.004***
Mandatory risk disclosure (MRD)	0.022**	0.043**

Panel B: Multiple comparisons

		(I) G2	(J) G2	2007	2008
				Mean Difference (I-J)	Mean Difference (I-J)
ARD	Tamhane test	USA	UK	-0.150*	-0.176***
				(0.092)	(0.007)
			Germany	-0.134	-0.134**
				(0.116)	(0.039)
		UK	USA	0.150*	0.176***
				(0.092)	(0.007)
			Germany	0.016	0.042
				(0.973)	(1.000)
		Germany	USA	0.134	0.134**
				(0.116)	(0.039)
			UK	-0.016	-0.042
				(0.973)	(1.000)
GRD	Bonferroni test	USA	UK	-0.034	
				(0.390)	
			Germany	-0.055	
				(0.435)	
		UK	USA	0.034	
				(0.390)	
			Germany	-0.020	
				(1.000)	
		Germany	USA	0.055	
				(0.435)	
			UK	0.020	
				(1.000)	
BRD	Bonferroni test	USA	UK	-0.104***	-0.156***
				(0.004)	(0.004)
			Germany	-0.074**	-0.118**
				(0.027)	(0.027)
		UK	USA	0.104***	0.156***
				(0.004)	(0.004)
			Germany	0.029	0.037
				(1.000)	(1.000)
		Germany	USA	0.074**	0.118**
				(0.027)	(0.027)

			UK	-0.029	-0.037
				(1.000)	(1.000)
MRD	Bonferroni test	USA	UK	-0.020*	-0.023*
				(0.060)	(0.060)
			Germany	-0.022	-0.019
				(0.135)	(0.135)
		UK	USA	0.020*	0.023*
				(0.060)	(0.060)
			Germany	-0.001	0.003
				(1.000)	(1.000)
		Germany	USA	0.022	0.019
				(0.135)	(0.135)
			UK	0.0019	-0.004
				(1.000)	(1.000)

This table explains differences in firms' risk reporting levels across the USA, the UK and Germany in 2007 and 2008. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively. All variables' definitions are shown in Table 5.4. Panel A reports any significant differences in firms' risk reporting levels in 2007 and 2008 across these three countries. Any significant differences from Panel A are further analysed to identify between which two pairs of countries these differences remain significant.

The Tamhane test, as shown in Panel B of Table 6.3, reveals significant differences in ARD between US and UK firms in 2007 and 2008, and between US and German firms in 2008. The result also indicates that there are no significant differences in ARD in either 2007 or 2008 between UK and German firms. These results suggest that both UK and German firms disclosed similar levels of TRD during 2007 and 2008.

The Bonferroni test, as shown in Panel B of Table 6.3, reports that the significant differences in BRD across these three countries during 2007 and 2008 particularly exist between US and UK firms and between US and German firms. The same test indicates that there are no significant differences in BRD between UK and German firms during 2007 and 2009. This result is consistent with previous discussion on TRD in USA and UK. As can be seen from Panel B of Table 6.3, the Bonferroni test suggests that significant differences in MRD exist between US and UK firms in 2007 and 2008 rather than between US and German firms. This result suggests that US and German firms disclose

significantly similar levels of MRD. This result is consistent with the argument in Chapter Three that both US and German approaches require firms to provide risk information in their annual reports narratives mandatorily.

Regarding GRD, the results from the Bonferroni test suggest, however, that there are no significant differences in 2007 between any pair of countries, as shown in Panel B in Table 6.3. It can be concluded from such result that firms across these three countries disclose similar levels of GRD.

To conclude, and based on all previous results, there are significant differences between the risk disclosure levels of US, UK and German firms. The question arises of whether these differences in firms' risk disclosure levels are associated with those differences in firms' risk levels across the US, the UK and Germany. It has been argued (as discussed in Chapter Four) that the pattern of providing risk disclosure should be interpreted in light of a firm's risk levels. As a result, the following section examines the relationship between these two variables.

6.3.3. The associations between a firm's risk levels and its risk disclosure levels

The Pearson coefficient is used to determine whether there are any associations between a firm's risk levels and its risk disclosure levels across the USA, the UK and Germany during 2007 and 2008. The aggregated correlation analysis, shown in Panel A of Table 6.4, reveals that ARD is significantly and negatively associated with a firm's TR, USR and LR, at p-values of 0.000, 0.001 and 0.000, respectively. These results are consistent with Linsley and Shrives's (2006) theoretical argument, and empirically with Marshall and Weetman (2002). The same panel reports that ARD in these three countries is likely to be significantly and

positively correlated with FR, at a p-value of 0.017. This result is consistent with what has been argued in Chapter Four in terms of firms with higher levels of risk having greater incentives to disclose more about their risks in order to provide details about the nature of such risks and how they successfully manage these risks effectively. This result is consistent with some prior risk research arguments (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007; Rajab and Handley-Schachler, 2009) and with some prior risk reporting literature findings (e.g., Hassan, 2008).

Table 6.4: Correlation matrix

Panel A: Aggregated Correlation

RD/R	TR	SR	USR	RAR	LR	FR
ARD	-0.341***	0.101	-0.300***	0.029	-0.449***	0.222**
	(0.000)	(0.276)	(0.001)	(0.771)	(0.000)	(0.017)
MRD	-0.16	0.385***	0.034	0.325***	-0.258***	0.207***
	(0.863)	(0.000)	(0.711)	(0.001)	(0.005)	(0.025)
GRD	-0.385***	0.055	-0.176*	0.067	-0.298***	0.090
	(0.000)	(0.551)	(0.054)	(0.497)	(0.001)	(0.339)
BRD	-0.338***	0.126	-.397***	0.024	-0.409***	0.255***
	(0.000)	(0.173)	(0.000)	(0.810)	(0.000)	(0.006)

Panel B: Correlation controlled by country type

		TR	SR	USR	RAR	LR	FR
Country RD/R							
USA	ARD	-0.673***	-0.180	-0.270	-0.200	0.019	-0.295*
		(0.000)	(0.266)	(0.092)	(0.215)	(0.907)	(0.064)
	MRD	-0.707***	0.013	-0.339**	-0.142	0.099	-0.290*
		(0.000)	(0.936)	(0.032)	(0.384)	(0.544)	(0.070)
	GRD	-0.727***	-0.098	-0.342**	-0.225	0.043	-0.342**
		(0.000)	(0.548)	(0.031)	(0.162)	(0.790)	(0.031)
	BRD	-0.675***	-0.072	-0.450***	-0.138	0.157	-0.461***
		(0.000)	(0.659)	(0.004)	(0.396)	(0.334)	(0.003)
UK	ARD	-0.414***	-0.585***	-0.166	-0.441***	-0.574***	0.284*
		(0.008)	(0.000)	(0.306)	(0.004)	(0.000)	(0.084)
	MRD	0.040	-0.272	0.297	0.028	0.026	0.308*
		(0.805)	(0.110)	(0.063)	(0.862)	(0.879)	(0.060)
	GRD	-0.267*	-0.447***	0.000	-0.335**	-0.505***	0.132
		(0.096)	(0.004)	(0.999)	(0.035)	(0.001)	(0.429)

	BRD	-0.495***	-0.658***	-0.284	-0.506***	-0.623***	0.325**
		(0.001)	(0.000)	(0.076)	(0.001)	(0.000)	(0.046)
Germany	ARD	0.230	0.127	0.537***	-0.103	0.316*	0.351**
		(0.153)	(0.447)	(0.000)	(0.632)	(0.053)	(0.031)
	MRD	0.670***	0.539***	0.850***	0.683***	0.457***	-0.009
		(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.956)
	GRD	-0.068	-0.157	-0.475***	-0.170	0.175	0.367**
		(0.678)	(0.347)	(0.002)	(0.428)	(0.294)	(0.023)
	BRD	0.432***	0.303	0.520***	0.284	0.431***	0.227
		(0.005)	(0.065)	(0.001)	(0.179)	(0.007)	(0.171)

This table shows the Pearson correlation coefficient between a firm's risk level variables and its risk disclosure level variables in the USA, the UK and Germany. Panel A presents the aggregated correlation between these variables across these three countries together. Panel B, however, shows such correlations between these variables in each country separately. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively. All variables are defined in Table 5.4.

The correlation analysis reveals that the US, UK and German firms tend to provide significantly higher levels of MRD as a response to their higher levels of SR, FR and LR, at p-values of 0.000, 0.025 and 0.005, respectively. These results suggest that providing risk information mandatorily is more sensitive to a firm's risk levels across these three countries. The Pearson correlation, however, indicates that such risk disclosure is negatively correlated to RAR, at a p-value of 0.001.

Panel A of Table 6.4 reports that GRD is significantly and negatively associated with a firm's TR and USR, at p-values of 0.000 and 0.054, respectively. That relation is positive on liquidity risk, at a p-value of 0.001. This result suggests that US, UK and German firms tend to provide significantly little information about their potential opportunities (GRD) when they have higher levels TR and USR.

Providing BRD is significantly associated with FR, TR, USR and LR, at p-values of 0.006, 0.000, 0.000 and 0.000, respectively. The trend of such associations is positive on LR but negative on the other significant risks. This suggests that US, UK and German firms are

more sensitive to disclosing significant levels of BRD in their annual report narratives as a response to underlying risks. Such results are consistent with what has been argued in previous chapters (e.g., Chapters Three and Four), since firms should reflect their high levels of risk by disclosing more risk information in an attempt to reduce conflict between managers and investors. These firms, however, tend to provide significantly less information about their risks even if they have significantly higher levels of risk; namely, TR and USR. The results, therefore, support accepting the third hypothesis, in which firms tend to provide different levels of risk disclosure subject to the different levels of risks they face. The following analysis distinguishes previous associations within each country as presented in Panel B of Table 6.4.

US firms

Correlation analysis indicates that ARD is either negatively associated with TR or positively associated with FR, at p-values of 0.000 and 0.064, respectively. This result suggests that US firms tend to provide relatively lower and higher levels of risk disclosure as a response to total and financing risks, respectively. US firms tend to provide lower (higher) levels of MRD subject to higher (lower) levels of TR, USR and (FR), at p-values of 0.000, 0.032 and (0.072), respectively. This result also indicates that US firms are more sensitive to reflecting their underlying risks through MRD than through ARD. These results are consistent with what has been argued in Chapter Four as well as the main results provided in Chapter Eight.

GRD and BRD are found to be negatively correlated with TR and USR, at p-values of 0.000 and 0.031. These two types of risk disclosure are also found to be negatively correlated with FR, at a p-value of 0.03. Such results suggest that the American firms are

responding in the same way to their underlying risks (TR, USR and FR) by disclosing either BRD or GRD.

UK firms

ARD is significantly and negatively correlated to TR, SR and FR, at p-values of 0.008, 0.000 and 0.084, respectively. These results suggest that UK firms tend to provide significantly lower levels of risk information even if they have significantly higher levels of TR, SR and FR. The results report that TRD is significantly and positively associated with RAR and LR, at p-values of 0.004 and 0.000, respectively. From the same panel, the correlation analysis documents that MRD is only influenced by financing risk, at a p-value of 0.060. This result is consistent with prior expectations that UK firms tend to be more sensitive to underlying risk through TRD than through MRR. These results are also supported by Chapter Eight's main findings.

As shown in the same panel, both GRD and BRD are significantly influenced by TR, SR, RDR, LR and FR. Similar to the US results, the trends of these associations are identical for both types of risks (GRD and BRD) with all significant underlying risks.

German firms

As can be seen from Panel A of Table 6.4, ARD is significantly and positively associated with USR, at a p-value of 0.000. Providing this type of risk information is significantly and negatively associated with LR and FR, at p-values of 0.053 and 0.031, respectively. MRD is significantly and positively related to TR, SR and USR, at a p-value of 0.000 for each type of risk. These results suggest that German firms are likely to be motivated to provide higher levels of MRD relative to their higher levels of TR, SR and USR. Such results are consistent with both Chapter Four's main arguments and Chapter Eight's main findings.

MRD, however, is significantly and negatively associated with RAR and LR, at p-values of 0.000 and 0.004, respectively. These results suggest that German firms tend to provide lower levels of risk information mandatorily, while these firms have significantly higher levels of liquidity and financing risks. Such results support the argument in Chapter Four that German firms have a better ability to convey their significant underlying risk through their MRD than through ARD.

As shown in Panel B of Table 6.4, GRD is significantly and negatively associated with USR and FR, at p-values of 0.002 and 0.023, respectively. BRD is significantly and positively correlated with both TR and USR, at p-values of 0.005 and 0.001, respectively. BRD, however, is found to be significantly and negatively associated with LR, at a p-value of 0.007. These results suggest that German firms are more likely to respond to their underlying risks through disclosing significantly more BRD than GRD.

Unlike the previous two markets, the German market does distinguish between the trends of good and bad risk disclosure relative to a firm's underlying risk levels.

6.4. Concluding remarks

The main conclusion of pilot study is that there are significant differences between the US, UK and German firms' risk levels. Additionally, there are significant differences between the US, UK and German firms' risk disclosure levels. Since it has been argued in this and previous chapters that differences between US, UK and German firms should be attributed to the differences between these firms' levels of risks, the results provide initial empirical evidence which supports such argument. The results suggest that there are

significant associations between a firm's risk levels and its risk disclosure levels in these three countries.

In particular, the differences in ARD between US, UK and German firms are found to be significantly derived from the differences in those firms' risk levels. Specifically, the associations between ARD and TR, USR, LR and FR are significant. In this regard, SR and RAR are found to be insignificant in influencing firms to provide risk information in their annual report narratives. These results are consistent with the main arguments provided in Chapter Four and the main empirical findings in Chapter Eight.

From a comparable perspective, ARD, on the one hand, is more sensitive to being influenced by a firm's risk levels in the UK and the USA than in Germany. MRD, on the other hand, is more sensitive to being influenced by a firm's risk levels in both Germany and the USA than the UK. Providing GRD and BRD in these markets is also significantly correlated with a firm's risk levels in these countries. The results explain that the German market has a greater ability to differentiate the trend of the observed GRD from BRD relative to underlying significant risks than the other two markets.

These results contribute to prior research in three ways. Firstly, they provide clear empirical evidence that a firm's risk disclosure levels are likely to be influenced by its risk levels. Secondly, this is the first study investigating such relations across these countries. Thirdly, measuring risk disclosure by automated content analysis at these levels of analysis (across three countries) can be considered as the first attempt to generate risk disclosure scores by an automated method.

To analyse risk/risk disclosure associations on a larger scale of observation, these associations are investigated first within a UK context, implementing a new econometric method (linear mixed model). This is in contrast to conventional approaches, such as ordinary least squares, which have been frequently utilised within prior research (e.g., Beretta and Bozzolan, 2004; Abraham and Cox, 2007). This is discussed in the following chapter. As an extension of the following chapter, two other chapters will consider either the single or the pooled regressions within these three countries, utilising repeated measures multilevel analysis, which is an extension of LMM, after adjusting the unit of analysis from sectors over years to firms across countries over years.

Chapter Seven: Empirical Evidence (1): The Case of the UK:

Aggregated, voluntary and mandatory risk disclosure incentives: Evidence from UK FTSE all share

7.1. Overview

This chapter contributes to the existing literature in three distinct respects. Firstly, previous work has applied manual content analysis to a one-year period to examine the impact of a firm's industry and a firm's size on issues such as quantity and quality of risk reporting (Beretta and Bozzolan, 2004); the association between aggregated risk disclosure and firm size, firm risk and risk sentence characteristics, such as good, bad, past and future risk disclosures (Linsley and Shrives, 2005, 2006); and the association between corporate governance characteristics and business, financial and internal risk reporting (Abraham and Cox, 2007). The present chapter investigates risk disclosure as a function of risk levels by text-searching a large scale sample of annual reports over a four-year period scale (1160 firm-years of non-financial firms of the FTSE all share index over 2005-2008). The current study is thus of a much larger scale than previous work.

Secondly, the present chapter explores the impact of risk levels on three different risk disclosure types (aggregated, voluntary and mandatory), controlling for four other firm characteristics (firm size, profitability, growth and dividends). While prior risk reporting literature provides mixed empirical evidence on firm size, no previous work has examined the other three effects.

Thirdly, this chapter uses three methods to examine the association between the main variables: ordinary least squares (OLS), fixed effect model (FEM) and linear mixed model (LMM). The first two approaches have been used frequently in prior research to mitigate

problems caused by cross-sectional data (heteroskedasticity) and/or time series data (auto-correlation). However, this chapter introduces LMM, which accounts for the problem of residual dependency, which is frequently neglected in market-based accounting research (see Bernard, 1987; Gow et al., 2010).

The results demonstrate that both aggregated and voluntary risk disclosure are positively influenced by systematic and financing risks, risk-adjusted return, and both firm size and profitability. Additionally, both aggregated and voluntary risk disclosure are negatively influenced by total and liquidity risks. The results also indicate that mandatory risk disclosure is positively influenced by risk-adjusted return, financing risk and firm size.

The remainder of the chapter is structured as follows. The following section discusses the research methods, including data collection and sample selection, the measurement and description of variables and the empirical model. The results are discussed in Section 7.3. Section 7.4 provides conclusions, discusses limitations and suggests areas for future research.

7.2. Methods

7.2.1. Data collection and sample selection

The researcher collects annual reports for 339 non-financial firms of FTSE all share (based on the main criteria explained in Chapter Five) via either Thomson One Banker or, if unavailable, the company's website, for financial years ending within the period 30 June 2005 to 30 June 2009. The available data at the time of running the analysis for this chapter and the following two chapters, however, considered data from 30 June 2005 to 30 June 2010. The research focuses on annual reports since these remain a primary source of information for investors; there is increasing usage of such reports, indicating their value relevance to investors (e.g., Beattie et al., 2004, 2008). This period is chosen because it includes the recent economic and financial crisis, which commenced in 2007, and because IFRSs became mandatory for UK listed companies in 2005. Any firm without a complete time series is excluded; this reduces the sample from 1356 firm-years (339 firms) to 1216 firm-years (304 firms).

All annual reports were converted to text files so as to be readable by Nudist 6, with the exception of 14 annual reports which could not be converted to text files. Consequently, the total size of the sample is 1190 firm-years (290 firms). In order to minimise the effect of outliers, the researcher transformed the data to natural logarithms[21], which also improved the distribution of variables.

[21] Such transformation does not affect the original pattern of these variables; the researcher checked the results of the OLS regression model before and after the data transformation and the results were almost identical (for more details see Hair, Black, Babin and Anderson 2009).

Table 7.1 provides information about the number of observations (percentages in parentheses) in the final sample per year, sorted by industry type. Panel A shows the sample divided into eight main sectors. Industrial firms represent the highest number and percentage, with 103 firms (35.5%). Telecommunication firms, on the other hand, account for only five firms (1.7%). To avoid effects from the dissimilar sizes of the eight sectors, the researcher merges these into four larger sectors based on the similarity of these sectors. These are shown in Panel B.

Table 7.1: Final sample

Panel A: Final sample by industry type

Industry	Frequency (%)
Industry	103 (35.5)
Service	81 (27.9)
Consumer	34 (11.7)
Health	16 (5.5)
Material	18 (6.3)
Utilities	9 (3.1)
Telecommunication	5 (1.7)
Technology	24 (8.3)
Total	290 (100)

Panel B: Final sample by merged industry type

Industry	Frequency (%)
Material & Industry (M_I)	121 (41.7)
Health & Service (H_S)	97 (33.5)
Consumer & Utilities (C_U)	43 (14.8)
Telecommunication & Technology (T_Tec)	29 (10)
Total	290 (100)

This table provides information about the sample distribution. Panel A gives information about the eight sectors of the study; Panel B gives information about the sample after merging sectors based on their similarities.

7.2.3. Variables: Measurement and description

Table 7.2 provides descriptive statistics for the variables[22]. The essential point to note is that, in the case of the dependent variables, the aggregated risk disclosure (ARD) exhibits the highest mean (2.378), and mandatory risk disclosure (MRD) the lowest (1.428). This suggests that UK firms tend to disclose voluntarily approximately 40% more risk information than what is mandated. This is consistent with Deumes and Knechel (2008), who find that managers in low regulation environments are highly motivated to provide more voluntary risk information in response to economic incentives.

[22] Table 3 may also be used to confirm the extent to which the current study's variables are normally distributed. Comparing the mean with the median and shape of each variable distribution through both Kurtosis and Skewness suggests that all variables are normally distributed. Kolmogorov-Smirnov and Shapiro-Wilks tests are used to investigate this.

Table 7.2: Descriptive statistics for dependent, independent and control variables

	Mean	Median	25%	75%	Skewness	Kurtosis	Observations
ARD	2.378	2.386	2.243	2.505	.-0.064	0.210	1160
VRD	2.321	2.330	2.187	2.445	-0.166	1.356	1160
MRD	1.428	1.454	1.255	1.623	-0.438	0.362	1160
TR	-0.513	-0.528	0.425	1.303	-0.626	-0.428	1140
SR	-0.0237	0.000	-0.722	3.102	-0.1674	0.1335	1119
USR	-1.775	-1.698	0.290	-0.679	-2.000	-1.698	1152
RAR	1.415	1.385	0.430	0.192	1.078	1.724	1160
FR	1.650	1.784	-1.105	2.313	1.390	2.061	1014
LR	0.1083	0.1038	0.479	2.982	-0.041	0.232	1140
SE	5.800	5.800	-.286	1.063	5.338	6.277	1147
PE	1.300	1.300	-.454	5.788	1.100	1.50	992
GE	2.210	2.270	-1.502	7.117	2.100	2.310	1160
DE	0.944	0.968	-0.349	0.404	0.677	1.217	1024

ARD is aggregated risk disclosure, measured by the natural logarithm of the total number of risk sentences in the firm's annual report narratives; VRD is the voluntary risk disclosure, measured by the natural logarithm of the total number of risk sentences revealed voluntarily; MRD is the mandatory risk disclosure, measured by the natural logarithm for the total number of risk sentences revealed mandatorily; TR is the total risk, measured by the natural logarithm of standard deviation (volatility) of the firm's market returns during the year; SR is the systematic risk, measured by the natural logarithm for the covariance-variance (beta) of the firm's returns around the market returns; Un-SR is the unsystematic risk, measured by the natural logarithm of the volatility of the standard error of CAPM during the year; RAR is risk-adjusted return, measured by the natural logarithm of the Sharp ratio, which in turn is the firm's risk premium divided by a unit of the firm's risk; FR is the financing risk, measured by the natural logarithm of the leverage, which in turn is the total debt divided by the total equity; LR is the liquidity risk, measured by the natural logarithm of the current ratio, which in turn is the total current assets divided by the total liabilities; SE is the firm's size effect, measured by the natural logarithm of the total assets; PE is the firm's profitability effect, measured by the natural logarithm of the firm's Return on Equity (ROE); GE is the firm's growth effect, measured by the natural logarithm of earnings growth; and DE is the firm's dividends effect, measured by the natural logarithm of the firm's dividends.

7.2.4. The empirical model

Three main models are used to examine the association between risk levels and risk disclosure.

OLS regression model

The researcher regresses six explanatory variables representing firm risk levels, considering four control variables on aggregated, voluntary and mandatory risk disclosure, using cross-sectional ordinary least squares (OLS) model as follows:

$$RD_{ijt} = \beta_1 + \beta'\left[(TR, SR, Un\_R, RAR, FR, LR)\right]_{ijt} + \beta''\left[SE, PE, GE, DE)\right]_{ijt} + \varepsilon_{ijt} \quad (7.1)$$

Where RD is the aggregated, voluntary and mandatory risk disclosure scores for firm *i* in sector *j* in year *t*, β_1 is the intercept, and β' and β'' are the slope coefficients for the predictors and control variables, respectively. TR, SR, Un_R, RAR, FR and LR are the total, systematic and unsystematic risks, risk-adjusted return, financing risk and liquidity risk, respectively, for firm *i* in sector *j* in year *t*. SE, PE, GE and DE are firm size, profitability, growth and dividends effects, respectively, for firm *i* in sector *j* in year *t*. ε is the standard error of residual for firm *i* in sector *j* in year *t*.

To account for heteroskedasticity and auto-correlation problems, the researcher examines whether these problems exist by conducting R^2 change and Durbin-Watson tests, respectively. To control for these two problems partially or entirely, the current study employs the second empirical model.

FEM regression

The Fixed Effect Model (FEM) considers differences between industries (cross-sectional) and/or years (time series) effects by producing dummy variables for industries and/or years. Three different empirical models are provided after explaining the general equation of this model, as follows:

The general equation

Where all variables have the same definition as in equation (1), in addition to ($\beta_1+\mu_1$) to reflect the coefficients of the dummy variables for industry and/or year, as follows.

$$RD_{ijt} = \left[\beta_1 + \mu_1\right] + \beta'\left[(TR, SR, Un\_R, RAR, FR, LR)\right]_{ijt} + \beta''\left[SE, PE, GE, CGE)\right]ijt + \varepsilon_{ijt}$$

(7.2)

Industry-fixed effect: intercepts varying across industries

$$RD_{ijt} = \left[\beta_1 + \beta_2 M\_I + \beta_3 H\_S + \beta_4 C\_U\right] + \beta'\left[(TR, SR, Un\_R, RAR, FR, LR)\right]_{ijt} + \beta''\left[SE, PE, GE, CGE)\right]_{ijt} + \varepsilon_{ijt}$$

(7.3)

Year-fixed effect: intercepts varying across years

$$RD_{ijt} = \left[\lambda_1 + \lambda_2 2006 + \lambda_3 2007 + \lambda_4 2008\right] + \beta''\left[(TR, SR, Un\_R, RAR, FR, LR)\right]_{ijt} + \beta''\left[SE, PE, GE, CGE)\right]_{ijt} + \varepsilon_{ijt}$$

(7.4)

Industry- and year-fixed effects: intercepts varying across industries and years

$$RD_{ijt} = \left[\beta_1 + \beta_2 M\_I + \beta_3 H\_S + \beta_4 C\_U + \lambda_2 2006 + \lambda_3 2007 + \lambda_4 2008\right] + \beta'\left[(TR, SR, Un\_R, RAR, FR, LR)\right]_{ijt} + \beta''\left[SE, PE, GE, CGE)\right]_{ijt} + \varepsilon_{ijt}$$

(7.5)

Where all variables have the same definition as in equation (7.2). Additionally, the researcher uses six dummies, M_I (material and industry), H_S (health and service), C_U

(consumer and utilities), 2006, 2007 and 2008, to interact with industries and/or years, respectively.

Nevertheless, after permitting the intercepts to vary across industries and/or years, FEM does not consider either the interaction of the intercepts and slopes of risk levels and the control variable slopes across industries and years, or the residual dependency. To overcome these problems, the current study utilises the following empirical model.

LMM regression

The third model is the Linear Mixed Model (LMM), which this chapter uses to further examine whether firms' risk disclosure levels are affected by their risk levels, given the limitations of the OLS and FEM models. Using this model is essential to considering either the interaction of the intercepts and slopes of risk levels and the control variables across industries over years with risk disclosures, or residual dependency, by declaring both industry and year (level 2's grouping unit) as random factors to adjust the risk disclosure of each firm (level 1's unit).

There are many structures for each level's error (e.g., first-order autoregressive structure, AR (1); first order autoregressive moving average structure, ARMA (1)) (e.g., Field, 2009; Gelman and Hill, 2009; Hox, 2010). These problems are encountered frequently when using other statistical approaches which assume complete independency among observations (e.g., ordinary least squares (OLS) and fixed effect model (FEM); see Gow et al., 2010). LMM is employed in two consecutive stages. The first stage is the null, or unconditional random effect, model. At this stage, the researcher measures the impact of industry and year separately on the aggregated, voluntary and mandatory risk disclosures.

This model, therefore, is used as a baseline or null model to evaluate explicitly the extent to which all independent variables improve the model. The full, or conditional, model (FM) could interpret risk disclosure variations across industries over years, as a second stage. These stages can be described as follows:

The null model: unconditional or one-way ANOVA with random effect model

$$RD_{ijt} = \beta_1 + \beta_2 \left[\left(M\_I, H\_S, C\_U, T\_Tec \right), \left(2005, 2006, 2007, 2008 \right) \right] + \varepsilon_{ijt}$$

(7.6)

All variables have the same definitions as presented in the equations above, while (T_Tec) is technology and telecommunication sectors, and β_2 is the slope coefficient of both industry and year impact.

The full model: conditional model

$$RD_{ijt} = \beta_1 + \beta' + \mu_1 \left[(TR, SR, Un\_R, RAR, FR, LR) \right]_{ijt} + \beta'' + \mu_2 \left[SE, PE, GE, DE) \right]_{ijt} + \varepsilon_{ijt}$$

(7.7)

Where all variables have the same definitions as in the previous model, while ($\beta'+\mu_2$), ($\beta''+\mu_1$) are the slopes of the independent and control variables, respectively, which are allowed to vary across industries and years.

7.3. Correlation analysis, empirical results and further analysis

7.3.1. Correlation analysis

Table 7.3 provides univariate analysis implementing Pearson correlation coefficients to measure the strength and direction for the linear association between any pair of variables.[23] All risk disclosure types are statistically correlated with all exploratory variables (except mandatory risk disclosure and profitability).

It is noteworthy that voluntary risk disclosure is significantly and positively associated with mandatory risk disclosure ($p<0.01$). Therefore, UK firms, which exhibit higher levels of mandatory risk disclosure, are more likely to disclose risk information voluntarily. This result supports Dye (1986) and is consistent with Gigler and Hemmer (1999), Marshall and Weetman (2002) and Deumes and Knechel (2008).

[23] Additionally, the coefficients among both independent and control variables can be used as an initial diagnosis of multi-collinearity, which in turn explains that no variables exhibit collinearity problems. To examine that statistically, the principal rule among the regressors is that the higher the inter-correlation of these regressors, the higher the possibilities for the tolerance coefficients to approach zero, and have the problem of collinearity. If the tolerance of any of the predicted variables is less than 0.1 (alternatively, if the Variance Inflation Factor (VIF) is more than 10), this suggests multi-collinearity problems (Field, 2009). Both these tests (not reported) indicate that no regressors exhibit this problem.

Table 7.3 : Correlation matrix (Pearson coefficient)

Dependent Variables Independent Variables Control Variables

	VRD	MRD	TR	SR	USR	RAR	FR	LR	SE	PE	GE	DE
ARD	0.982*** (0.000)	0.757** (0.000)	-0.141*** (0.000)	0.056* (0.06)	-0.120*** (0.000)	0.082*** (0.000)	0.217*** (0.000)	-0.087*** (0.003)	0.536*** (0.000)	0.080** (0.011)	-0.080*** (0.007)	0.227*** (0.000)
VRD		0.663*** (0.000)	-0.132*** (0.000)	0.063** (0.036)	-0.120*** (0.000)	-0.071** (0.015)	0.207*** (0.000)	-0.087*** (0.003)	0.531*** (0.000)	0.088*** (0.005)	-0.078*** (0.008)	0.226*** (0.000)
MRD			-0.098*** (0.001)	0.040** (0.0184)	-0.120*** (0.000)	-0.103*** (0.000)	0.193*** (0.000)	-0.056* (0.057)	0.401*** (0.000)	0.030 (0.347)	-0.083*** (0.005)	0.159*** (0.000)
TR				0.521*** (0.000)	0.296*** (0.000)	-0.420*** (0.000)	-0.201*** (0.000)	0.156*** (0.000)	-0.279*** (0.000)	-0.131*** (0.000)	-0.411*** (0.000)	-0.148*** (0.000)
SR					0.156*** (0.000)	-0.333*** (0.000)	-0.039 (0.224)	0.099*** (0.001)	-0.590** (0.049)	-0.048 (0.137)	-0.147*** (0.000)	-0.121*** (0.000)
USR						-0.023 (0.427)	-0.168*** (0.0000)	0.170*** (0.000)	-0.248*** (0.000)	-0.161*** (0.000)	-0.198*** (0.000)	0.013 (0.649)
RAR							-0.340 (0.281)	0.032 (0.279)	-0.006 (0.845)	0.116*** (0.000)	0.163*** (0.000)	0.378*** (0.000)
FR								-0.361*** (0.000)	0.265*** (0.000)	0.177*** (0.000)	0.138*** (0.000)	-0.080** (0.011)
LR									-0.292*** (0.000)	-0.098*** (0.002)	-0.024 (0.445)	0.018 (0.540)
SE										0.100*** (0.002)	-0.041 (0.167)	0.417*** (0.000)
PE											0.162*** (0.000)	0.132*** (0.000)
GE												0.036 (0.246)

Table 7.3 shows the correlation analysis between all variables; the numbers represent the linear Pearson coefficients, while p-values are given in parentheses. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). The definitions for all variables are the same as in the previous table.

7.3.2. Empirical results

In this section, the researcher presents the results of this chapter's three regression models. Table 7.4 shows the results from the pooled models (OLS) and (FEM). Table 7.5 shows panel regressions using the Linear Mixed Model (LMM).

OLS regression

Panel A of Table 7.4 exhibits results for the OLS model, in addition to the cross-sectional OLS for 2005-2008. The researcher first discusses the pooled OLS and then the results for each year, concentrating on the aggregated and voluntary risk disclosure first, followed by mandatory risk disclosure.

Aggregated and voluntary risk disclosure

The current study finds both aggregated and voluntary disclosure are significantly and positively associated with two market-risk measures (beta and Sharp ratio, for systematic risk and risk adjusted return, respectively), and with one accounting-risk measure (leverage, for financing risk). The coefficients on SR, RAR and FR for the aggregated (voluntary) risk disclosure model are 0.073 (0.073), 0.029 (0.022) and 0.03 (0.028) at the 1%, 5% and 10% levels of significance. These two types of risk disclosure are found to be significantly and negatively correlated with total and liquidity risks at the 1% significance level. The coefficients on TR and LR for aggregated (voluntary) risk disclosure are 0.02 (0.206) and 0.105 (0.103), respectively.

These results suggest that firms with higher systematic, unsystematic, financing and risk-adjusted return risks are more likely to disclose more about their risk voluntarily.

The results are consistent with the researcher's a priori expectations based on managers' incentive theories and empirical research. Capital needs theory suggests that firms with

higher risk exposure will disclose more risk information in order to reduce uncertainty about cash flows, leading to a decrease in investors' required rate of return. Agency theory suggests that managers of high-risk firms may have greater incentives to reduce agency and monitoring costs by disclosing more voluntary information, thus reducing information asymmetry. Similarly, signalling theory suggests that managers who manage risks successfully will disclose more voluntary risk information to distinguish themselves from those who do not. The results are also consistent with previous empirical research (Abraham and Cox, 2007; Vandemaele et al., 2009).

Nevertheless, this chapter's empirical evidence suggests that firms characterised by high total risk levels (high volatility of market returns) or lower levels of liquidity appear less willing to provide voluntary risk information. One possible explanation, based on capital needs theory, is that managers may consider that disclosing risk information impacts negatively on their market reaction indicators (e.g., stock market returns). Those managers may suspect the market's ability to react appropriately to voluntary risk disclosures. This is consistent with the theoretical arguments in Linsley and Shrives (2006) and with the empirical findings in Marshall and Weetman (2002, 2007). The researcher therefore accepts **H2, H4** and **H5,** rejecting **H1**, **H6 (**due to the direction of results) and **H3** (due to insignificant results).

The results generally, however, suggest that UK firms respond positively to their risk levels when providing risk information in their annual report narratives. Disclosed risk information may correct firms' market risk exposure. The provision of voluntary risk disclosures by UK firms provides some support for the current UK approach of having limited mandatory regulation in this area, reinforced by professional (e.g., ICAEW) recommendations. The evidence, however, also suggests that the extant UK regulatory

regime allows sub-optimal risk disclosure by some UK firms regarding certain (total and liquidity) risks.

In terms of the control variables, the coefficients for aggregated (voluntary) risk disclosure on SE, PE and GE are 0.170 (0.171), 0.028 (0.033) and 0.046 (0.055) at the 1%, 5% and 10% levels of significance, respectively. The directions of these coefficients are positive on SE and PE for both aggregated and voluntary disclosures, and negative on GE. The coefficients on DE are insignificant.

These results are consistent with signalling theory, which suggests that managers in larger and more profitable firms have greater incentives, relative to smaller and less profitable firms, to provide risk information in order to signal their greater ability to identify and manage their risk to the market. The results for firm size are consistent with prior research (Linsley and Shrives, 2006; Abraham and Cox, 2007). Firms with low-earnings growth, however, disclose significantly higher levels of voluntary risk information in their annual report narratives. Managers could have incentives to reassure investors about their growth by providing reasons to justify the decline in their earnings growth and to suggest prospective future earnings. Considering low-earnings growth as bad news, which could be a risk indicator, managers might voluntarily disclose more information to avoid legal costs (stockholder lawsuits) and reputational costs (imposed costs by investors to compensate firms holding bad news) (Skinner, 1994). This result is also consistent with the results regarding the impact of variability of earnings (less volatile firms) on firm incentives to disclose more risk information (**H1**).

Mandatory risk disclosure

As far as mandatory risk disclosure is concerned, the coefficients of mandatory risk disclosure on RAR and FR are significant and positive at 5% and 1% respectively, as shown in Panel A of Table 7.4. The coefficient on LR is significant and negative at 1%. These results are consistent with those for both aggregated and voluntary risk disclosures. Firm size is the only control variable that influences mandatory disclosure significantly and positively.

This result may be rationalised on the basis that managers in large firms may exhibit greater information asymmetry and may intend to reduce this by providing more risk information in their annual reports. Reporting information is a costly decision, hence managers of larger firms have a greater ability to collect and prepare information at a lower cost relative to smaller firms (Verrecchia, 2001). These results therefore support Dobler's (2008) theoretical argument that even within regulated regimes managers still have incentives to disclose more risk information.

In summary, the results show that risk levels do influence mandatory risk disclosure, albeit at less significant levels than for aggregated and voluntary risk disclosures. Based on these findings, the researcher accepts **H4** and **H5** regarding mandatory disclosure, and rejects the other hypotheses.

For the 2005-2008 period, the current study runs cross-sectional OLS regression for each disclosure type, as shown in Panel A of Table 7.4, demonstrating that all three types of risk information are significantly influenced by three main variables: risk-adjusted return, liquidity risk and firm size. The direction of this association is positive in relation to risk-adjusted return and firm size, while negatively related to liquidity risk. The significance of

the other main or control variables differs subject to risk disclosure type and year. These results are consistent with what was predicted and explored by the pooled OLS[24]. All the regression models shown in Panel A of Table 7.4 are statistically significant ($p<0.01$)[25]. In addition, all adjusted R^2 indicate that the explanatory power of the predictors (exploratory variables) is acceptable.

In order to incorporate the cross-sectional and year effects, the Fixed Effect Model is constructed to re-examine the association between risk disclosure level and risk level after controlling for several firm characteristics. This is discussed in the following sub-section.

FEM regression

Panel B of Table 7.4 explains the association between the same variables involving industry as a cross-sectional effect and/or year as a time series effect. Panel B shows the three different risk disclosure types under three main conditions, incorporating, respectively, industry, year and both industry and year as dummy variables.

Overall, inserting the dummy variables improves the significance levels of the coefficient estimates for both risk types and control variables. The results are also consistent with the OLS results. When the researcher controls for cross-sectional effects, however, mandatory risk disclosure becomes more sensitive to risk level in terms of the impact of firm sector on compliance with UK risk regulations.

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[24] In 2008, the year most associated with the recent financial crisis, aggregated and voluntary risk disclosure are substantially associated with firm size rather than with other risk and control variables. The same applies to mandatory risk disclosure, with one difference: firms with higher levels of unsystematic risk are more likely to significantly reveal lower levels of mandatory risk information.

[25] Additionally, the Durbin-Watson regression diagnostic is used to examine the independence of each regression model's residual errors (auto-correlation). The results indicate that all Durbin-Watson values are approximately equal to two, which is the acceptable benchmark.

Considering industry and year increases the explanatory power of each regression model: adjusted R^2s are progressively increased.[26] Consequently, the sensitivity of risk disclosure to risk levels increases significantly. The main weaknesses of this model are that it only permits the intercepts of FEM variables to vary across group or time rather than predictors' slopes, and that it assumes complete independence across observations. To address these limitations, the current study implements the LMM, as discussed in the following sub-section.

[26] Durbin-Watson values increase marginally under these three conditions (industry, year or both) for each risk disclosure type. The value is around two once the impact of time (auto-correlated errors) is accounted for.

Table 7.4: Regression analysis

Panel A: Pooled OLS and each year regression model

In/ De		Pooled regression					ARD				VRD				MRD			
	ES	ARD	ES	VRD	ES	MRD	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
Intercepts	?	1.376*** (0.000)	?	1.325*** (0.000)	?	.407*** (0.005)	1.605*** (0.000)	1.543*** (0.000)	1.262*** (0.000)	1.29*** (0.000)	1.501*** (0.000)	1.490*** (0.000)	1.230*** (0.000)	1.290*** (0.000)	0.969*** (0.004)	0.699*** (0.007)	0.169 (0.466)	-0.163 (0.637)
TR	+	-0.2*** (0.000)	+	-0.206*** (0.000)	+	-0.105 (0.231)	-0.179 (0.161)	-0.190* (0.076)	-0.128 (0.243)	-0.001 (0.990)	-0.147 (0.237)	-0.175* (0.100)	-0.110 (0.312)	-0.018 (0.851)	-0.349 (0.134)	-0.194 (0.250)	-0.17 (0.301)	0.183 (0.303)
SR	+	0.073*** (0.000)	+	0.079*** (0.001)	+	0.059 (0.135)	0.037 (0.551)	0.001 (0.980)	0.054 (0.266)	0.043 (0.322)	0.014 (0.821)	0.005 (0.914)	0.053 (0.271)	0.053 (0.221)	0.177 (0.120)	0.038 (0.578)	0.104 (0.148)	-0.042 (0.607)
USR	+	0.021 (0.497)	+	0.027 (0.395)	+	-0.009 (0.858)	0.025 (0.695)	0.066 (0.255)	0.009 (0.870)	-0.039 (0.515)	-0.006 (0.919)	0.093 (0.114)	0.016 (0.783)	-0.026 (0.666)	0.188 (0.105)	0.102 (0.264)	-0.171** (0.046)	-0.197* (0.078)
RAR	-	-0.029** (0.034)	-	-0.022* (0.100)	-	-0.044** (0.041)	-0.056* (0.095)	-0.106*** (0.000)	-0.057** (0.046)	0.001 (0.950)	-0.071** (0.032)	-0.083*** (0.004)	-0.054* (0.057)	0.002 (0.911)	0.012 (0.847)	-0.136*** (0.002)	-0.070* (0.100)	0.002 (0.953)
FR	+	0.030*** (0.002)	+	0.028*** (0.004)	+	0.044*** (0.004)	0.024 (0.276)	0.033* (0.057)	0.048*** (0.005)	0.012 (0.514)	0.031 (0.148)	0.023 (0.198)	0.045*** (0.008)	0.011 (0.519)	-0.004 (0.920)	0.081*** (0.003)	0.087*** (0.001)	0.013 (0.698)
LR	-	0.105*** (0.000)	-	0.103*** (0.000)	-	0.126*** (0.004)	0.168*** (0.003)	0.188*** (0.010)	0.144*** (0.003)	0.009 (0.866)	0.183*** (0.001)	0.105** (0.04)	0.14*** (0.004)	0.010 (0.850)	0.092 (0.371)	0.155** (0.050)	0.221** (0.003)	0.001 (0.988)
SE	+	0.170*** (0.000)	+	0.171*** (0.000)	+	0.176*** (0.000)	0.172*** (0.000)	0.152*** (0.000)	0.165*** (0.000)	0.178*** (0.000)	0.167*** (0.000)	.169*** (0.000)	0.165*** (0.000)	.173*** (0.000)	0.186*** (0.000)	0.15*** (0.000)	0.127** (0.000)	0.22** (0.000)
PE	+	0.028* (0.067)	+	0.033** (0.035)	+	0.015 (0.541)	0.038 (0.193)	0.041 (0.188)	0.036 (0.256)	0.002 (0.937)	0.029 (0.304)	0.065** (0.044)	0.041 (0.188)	0.004 (0.868)	0.096* (0.072)	-0.027 (0.587)	-0.017 (0.712)	-0.019 (0.688)
GE	+	-0.046* (0.067)	+	-0.055** (0.033)	+	-0.054 (0.179)	-0.175*** (0.001)	-0.010 (0.836)	0.052 (0.329)	0.006 (0.898)	-0.16*** (0.003)	0.047 (0.355)	0.048 (0.358)	0.001 (0.976)	0.269*** (0.007)	-0.024 (0.754)	0.062 (0.432)	0.031 (0.707)
DE	+	-0.011 (0.482)	+	-0.013 (0.407)	+	0.003 (0.893)	-0.013 (0.698)	0.021 (0.511)	-0.043 (0.184)	-0.009 (0.745)	-0.011 (0.737)	0.012 (0.720)	-0.044 (0.168)	-0.008 (0.753)	-0.011 (0.865)	0.057 (0.251)	-0.036 (0.454)	-0.011 (0.829)
D_W		1.744		1.676		2.048	1.709	1.945	2.122	1.903	1.695	1.932	2.065	1.921	1.967	2.202	2.099	1.871

Adjusted R^2%	35.90	35.40	18.50	38.80	42.00	37.40	34.10	41.30	42.00	37.20	33.50	16.90	28.70	22.60	17.20
ANOVA	45.80*** (0.000)	45.10*** (0.000)	20.40*** (0.000)	13.62*** (0.000)	15.76*** (0.000)	13.85** (0.000)	10.80*** (0.000)	14.41*** (0.000)	15.76*** (0.000)	13.74*** (0.000)	10.56*** (0.000)	4.88*** (0.000)	8.22*** (0.000)	7.28*** (0.000)	4.9*** (0.000)
Ob	804	804	804	192	205	216	191	192	205	216	191	192	205	216	191

Panel B: FEM

In/De	ARD				VRD				MRD			
	ES	Industry Dummy	Year Dummy	Industry and Year Dummies	ES	Industry Dummy	Year Dummy	Industry and Year Dummies	ES	Industry Dummy	Year Dummy	Industry and Year Dummies
Intercepts	?	1.397*** (0.000)	1.341*** (0.000)	1.33*** (0.000)	?	1.345*** (0.000)	1.248*** (0.000)	1.261*** (0.000)	?	0.442*** (0.003)	0.412*** (0.004)	0.446*** (0.003)
TR	+	-0.209*** (0.000)	-0.098* (0.062)	-0.108** (0.039)	+	-0.216*** (0.000)	-0.091* (0.082)	-0.101* (0.052)	+	-0.113 (0.193)	-0.085 (0.343)	-0.093 (0.298)
SR	+	0.073*** (0.004)	0.042* (0.074)	0.044* (0.062)	+	0.079*** (0.003)	0.043* (0.065)	0.043* (0.068)	+	0.07* (0.081)	0.055 (0.165)	0.067* (0.10)
USR	+	0.027 (0.386)	0.008 (0.781)	0.014 (0.633)	+	0.032 (0.306)	0.011 (0.698)	0.017 (0.565)	+	-0.001 (.992)	-0.01 (0.84)	-0.002 (0.973)
RAR	-	-0.031** (0.021)	-0.045*** (0.000)	-0.048*** (0.000)	-	-0.024* (0.072)	-0.041*** (0.001)	-0.044*** (0.001)	-	-.049** (0.024)	-0.047** (0.031)	-0.052** (0.017)
FR	+	0.032*** (0.001)	0.03*** (0.001)	0.031*** (0.001)	+	0.03*** (0.002)	0.028*** (0.002)	0.03*** (0.001)	+	0.046***	0.044*** (0.005)	0.046*** (0.003)
LR	-	0.079*** (0.005)	0.115*** (0.000)	0.087*** (0.001)	-	0.08*** (0.005)	0.114*** (0.000)	0.088*** (0.001)	-	0.087* (0.056)	0.129*** (0.003)	0.09** (0.048)
SE	+	0.173*** (0.000)	0.171*** (0.000)	0.174*** (0.000)	+	0.175*** (0.000)	0.172*** (0.000)	0.176*** (0.000)	+	0.178*** (0.000)	0.176*** (0.000)	0.178*** (0.000)
PE	+	0.028* (0.069)	0.029** (0.045)	0.029** (0.045)	+	0.032** (0.036)	0.033** (0.022)	0.033** (0.022)	+	0.015 (0.534)	0.017 (0.488)	0.017 (0.479)

GE	+	-0.045* (0.071)	-0.041* (0.089)	-0.039* (0.098)	+	-0.054** (0.034)	-0.047** (0.048)	-0.046** (0.05)	+	-0.051 (0.201)	-0.056 (0.166)	-0.053 (0.188)
DE	+	-0.016 (0.331)	-0.009 (0.534)	-0.015 (0.31)	+	-0.17 (0.298)	-0.011 (0.453)	-0.017 (0.27)	+	-0.005 (0.833)	0.004 (0.886)	-0.006 (0.831)
Industry-fixed effects		include	exclude	include		exclude	include	include		include	exclude	include
Year -fixed effects		exclude	include	include		exclude	include	include		exclude	include	include
D_ W		1.734	1.937	1.93		1.667	1.925	1.92		2.042	2.053	2.047
Adjusted R^2%		36.9	42.9	43.9		36.4	44.7	45.7		20.3	18.4	20.3
ANOVA		37.1*** (0.000)	47.38*** (0.000)	40.29*** (0.000)		36.35*** (0.000)	50.99*** (0.000)	43.188*** (0.000)		16.77*** (0.000)	15.86*** (0.000)	13.74*** (0.000)
Ob		804	804	804		804	804	804		804	804	804

Panel A provides pooled OLS regression for each level of risk disclosure type. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). Variables' definitions are the same as in Table 7.2. Additionally, D_W is the Durbin-Watson to test auto-correlation, adjusted R^2s in percentages, ANOVA tests for the validity of regression model, F values are given in parentheses and Ob is the number of observations for firm-years.

Panel B provides FEM for each level of risk disclosure type. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). Variables' definitions are the same as in Table 7.2. Additionally, fixed effect for both industry and year is inserted, D_W is the Durbin-Watson to test auto-correlation, adjusted R^2 in percentages, ANOVA tests for the validity of regression model, F values are given in parentheses and Ob is the number of observations.

Linear mixed model (LMM)

Both firm risk and control variables are regressed on aggregated, voluntary and mandatory risk disclosure using the LMM. The results are shown in Table 7.5 under two main models. The first, baseline, model is used to evaluate the improvements of the second, full or conditional, model, which incorporates all the variables. All coefficients in the two models are assessed using the Wald test.

For both aggregated and voluntary risk disclosures, the baseline model indicates that with 95% level of confidence, the intercepts are different from zero for both types of risk disclosure under the fixed effect. The random effect, however, indicates that the variances of aggregated and voluntary risk disclosure are primarily within or between industries and years. Overall, based on the Wald test and as reported in Table 7.5, the variances of the aggregated and voluntary risk disclosure are significant within firms or between industries and years.

To investigate these results further, the intra-class correlation coefficients[27] (ICC) are calculated, which explain the proportion of aggregated or voluntary risk disclosures caused by variances within and between firms. The results indicate that 7.5% of the variation of aggregated risk disclosure is caused by industry and year; the remainder (92.5%) reflects within firms' variations. In the case of voluntary disclosure, 10% of the total variation is explained by industry and year. This confirms the importance of sector and time effects and is consistent with general disclosure studies (e.g., Beattie et al., 2004, 2008) as well as

[27] The ICC for residual may be calculated as variance of estimate residual/(variance of estimate residual + variance of estimate for industries and years). In order to get ICC for the random factor, reflecting the effects of the cross-sectional (industries) and time series (years), the current study replaces the denominator by the variance of estimate for industries and years.

with prior risk disclosure literature highlighting industry impact (e.g., Beretta and Bozzolan, 2004).

In order to identify factors which explain these aggregated and voluntary risk disclosure variations, the researcher runs the full, or conditional, model. Table 7.5 indicates that aggregated and voluntary risk disclosures are significantly and positively influenced by systematic risk, financing risk and risk-adjusted return.[28] While the t-statistics for aggregated risk disclosure on these variables are 0.042, 0.032 and -0.045, at p-values of 0.073, 0.000 and 0.003, respectively, the T test coefficients for voluntary risk disclosure on these variables are 0.04, 0.03 and -0.042, at p-values of 0.087, 0.001 and 0.007, respectively. Furthermore, the results suggest that higher variability in market returns or lower liquidity have a significant negative impact on aggregated (voluntary) risk disclosure; hence, the coefficients on these variables are -0.108 (-0.105) and 0.086 (0.089), at p-values of 0.035 (0.04) and 0.041 (0.017), respectively.

These results suggest that firms with higher systematic, financing and risk-adjusted return risks are more likely to disclose more voluntary risk information. These results are consistent with the theoretical and empirical arguments for the associations between risk-risk disclosures as explained in previous discussions.

[28] To assess the goodness of fit of this model, the principal rule is that if the differences of -2 Log Likelihood (-2LL) decrease, the full model is improved. In order to examine such improvements statistically, change chi-square should be conducted. Accordingly, if the difference between the -2LL for the full and the baseline models is greater than the value of the change chi-square (the critical or cut-off point of the chi-square distribution), the model fits. On that basis, the full model for ARD, VRD and MRD indicates a significant improvement.

Table 7.5: LMM results of the impact of risk levels on ARD, VRD and MRD

In/De		ARD		VRD		MRD	
	ES	BM	FM	BM	FM	BM	FM
Intercept	?		1.39***		1.34***		0.39***
			(0.000)		(0.000)		(0.006)
TR	+		-0.108**		-.105**		-0.0873
			(0.035)		(0.04)		(0.313)
SR	+		0.043*		0.04*		0.0548
			(0.073)		(0.087)		(0.165)
USR	+		0.019		0.021		-0.0029
			(0.497)		(0.449)		(0.952)
RAR	-		-0.045***		-0.042***		-0.045**
			(0.003)		(0.007)		(0.039)
FR	+		0.032***		0.03***		0.045***
			(0.000)		(0.001)		(0.003)
LR	-		0.086**		0.089**		0.1032
			(0.041)		(0.017)		(0.135)
SE	+		0.172***		0.174***		0.178***
			(0.000)		(0.000)		(0.000)
PE	+		0.028**		0.033**		0.0133
			(0.045)		(0.019)		(0.582)
GE	+		-0.030		-0.040*		-.040
			(0.215)		(0.098)		(0.304)
DE	+		-0.014		-0.015		-0.001
			(0.328)		(0.293)		(0.997)
1-Fixed effect							
Intercept (F value)		212227.6***		16464.5***		20268.4***	
		(0.000)		(0.000)		(0.000)	
2-Random effect							
(1) Variance Estimate:							
• Residual		0.037		0.037		0.083	
• Intercept (industry/year)		0.003		0.004		0.000	
(2) Wald Z:							
• Residual		18.868***		18.866***		20.05***	
		(0.000)		(0.000)		(0.000)	
• Intercept (industry/year)		2.184**		2.295**		0.230**	
		(0.029)		(0.022)		(0.040)	
Changes -2 LL		406.78***		408.7***		258.24***	
(Change chi-square)		(0.000)		(0.000)		(0.000)	
Ob		804		804		804	

This table provides LMM for each type of risk disclosure. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). Variables' definitions are the same as in Table 7.2. This table contains four main parts. The first gives the coefficients of each parameter using T test. The second part assesses the overall model's parameters using both fixed effect, which statistically examines the intercept of the baseline model using F test, and the random effect, which additionally provides the ICC between the residual and intercept, using the Wald Z test. The third appraises the model; -2LL is implemented and change chi-square is used to test such significance statistically. The fourth gives the number of observations (Ob). T, F, Wald Z and change chi-square values are given in parentheses.

In the case of mandatory risk disclosure, Table 7.5 shows that the baseline model indicates the intercept as being significantly different from zero. Variances of the intercept within and between industries and years are significant. The ICC, however, shows that all variations of mandatory risk disclosure reflect variance within firms rather than across industries or years. The conditional model indicates that mandatory risk disclosure is significantly and positively influenced by risk-adjusted return and financing risk. Firm size is the only control variable that statistically and positively affects the information the firms provide mandatorily.

In summary, this chapter concludes that the relations of both aggregated and voluntary risk disclosure with both independent and control variables are very similar under these three models. However, the corresponding relations in the case of mandatory risk differ slightly with each model. Table 7.6 presents a summary of the results of the main hypotheses under each model.

Table 7.6: Summary of hypotheses tests

Risk reporting studies			ES	Hypotheses			Regression models								
ARD	VRD	MRD					Pooled OLS			FEM			LMM		
							ARD	VRD	MRD	ARD	VRD	MRD	ARD	VRD	MRD
+/-	+/-	?	+	Independent variables	H1	Total risk	A -	A -	R -	A -	A -	R -	A -	A -	R -
+/-	+/-	?	+		H2	Systematic risk	A +	A +	R +	A +	A +	A +	A +	A +	R +
?	?	?	+		H3	Unsystematic risk	R +	R +	R +	R +	R +	R +	R +	R +	R +
?	?	?	+		H4	Risk-adjusted return	A +	A +	A +	A +	A +	A +	A +	A +	A +
+/-	+/-	?	+		H5	Financing risk	A +	A +	A +	A +	A +	A +	A +	A +	A +
?	+/-	+/-	+		H6	Liquidity risk	A -	A -	A -	A -	A -	A -	A -	A -	R -
+/-	+/-	+	+	Control variables	Size effect		A +	A +	A +	A +	A +	A +	A +	A +	A +
?	?	?	+		Profitability effect		A +	A +	R +	A +	A +	R +	A +	A +	R +
?	?	?	+		Growth effect		A -	A -	R -	A -	A -	R -	R -	A -	R -
?	?	?	+		Dividends effect		R -	R -	R -	R -	R -	R -	R -	R -	R -

ARD, VRD and MRD are aggregated, voluntary and mandatory risk disclosure. A means acceptance that there is significant association, R means rejection that there is significant association, + means positive direction, - means negative direction, +/- means mixed result from prior research, and ? means no prior research, to the best of the researcher's knowledge, has been conducted on this variable.

7.3.3. Further analysis

Corporate Governance (CG) effects

As previously discussed in Section 4.3.3 based on agency theory and relevant prior research, several proxies can be utilised to identify the impact of CG on risk disclosure. Specifically, these proxies are board size (BZ), proportion of non-executive directors (PNED), proportion of independent non-executive directors (PINED) and chief executive officer (CEO) duality[29].

Table 7.7 indicates the effect of these corporate governance variables on aggregated, voluntary and mandatory disclosure. The researcher finds that firms with high PINED; PNED and large BZ are more likely to disclose significantly higher levels of voluntary risk information, at p-values of 0.006, 0.086 and 0.000, respectively. Mandatory risk disclosure is influenced significantly by BZ, at a p-value of 0.000. Table 7.7 indicates that CEO duality affects neither voluntary nor mandatory disclosure significantly.

[29] These variables are manually collected from the BoardEx database over the period 2005-2008. The descriptive statistics (not tabulated) indicate that 1035 (88.2%) of 1069 firm-years are not characterised by CEO duality. In these 1069 firm-years, there are 13,666 directors, 1489 EDs (approximately 11%) and 12,177 NEDs (approximately 89%). Of these NEDs, 9443 (77.6%) may be described as independent. The correlation matrix indicates significant and positive (negative) impact of BZ (PNED) on voluntary and mandatory disclosures at p-value 0.000 (0.049). Pearson correlation coefficients, however, document insignificant differences (associations) between firms in terms of CEO duality (PINED) relative to (and) voluntary and mandatory risk disclosure. Pearson coefficients indicate potential multi-collinearity between ED and NED (0.950 at p-value 0.000) and this is confirmed by VIF (15.8). ED is excluded, therefore, from LMM.

Table 7.7: LMM results of the impact of risk levels on ARD, VRD and MRD after considering CG effects

In/De	ES	ARD		VRD		MRD	
		BM	FM	BM	FM	BM	FM
Intercept	?		-2.288***		-2.527***		1.31**
			(0.000)		(0.000)		(0.037)
TR	+		-0.120*		-0.116*		-0.091
			(0.090)		(0.100)		(0.442)
SR	+		0.955**		0.910**		1.054
			(0.024)		(0.031)		(0.132)
USR	+		6.420		8.480		-1.446
			(0.720)		(0.642)		(0.700)
RAR	-		-0.825**		-0.856**		-0.957
			(0.024)		(0.018)		(0.126)
FR	+		0.049***		0.047***		0.062**
			(0.003)		(0.004)		(0.030)
LR	-		0.486***		0.498***		0.533
			(0.004)		(0.003)		(0.186)
SE	+		0.123***		0.123***		0.121***
			(0.000)		(0.000)		(0.000)
PE	+		0.048		0.061		0.064
			(0.420)		(0.808)		(0.884)
GE	+		-0.026		-0.005		0.003
			(0.442)		(0.479)		(0.875)
DE	+		-0.038		-0.035		-0.037
			(0.277)		(0.316)		(0.530)
BZ	?		0.327***		0.324***		0.320***
			(0.000)		(0.000)		(0.001)
PNED	?		0.168***		0.160***		0.196
			(0.006)		(0.009)		(0.066)
PINED	?		0.046*		0.044*		0.064
			(0.086)		(0.096)		(0.160)
CEO duality	?		-0.042		-.051		-0.061
			(0.914)		(0.903)		(0.943)
1-Fixed effect							
Intercept (F value)		19853.7***		15082.01***		20268.4***	
2-Random effect		(0.000)		(0.000)		(0.000)	
(1) Variance Estimate:							
• Residual		0.024		0.025		0.073	
• Intercept (industry/year)		0.004		0.006		0.002	
(2) Wald Z:							
• Residual		16.599***		16.664***		16.703***	
• Intercept (industry/year)		(0.000)		(0.000)		(0.000)	
		2.150**		2.288**		0.932	
		(0.032)		(0.022)		(0.351)	
Changes -2 LL		155.26***		172.11***		148.90***	
(Change chi-square)		(0.000)		(0.000)		(0.000)	
Ob		795		795		795	

The table provides LMM for each type of risk disclosure after including CG effects. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). Variables' definitions are the same as in Table 7.2. In addition, CG variables appear; specifically, BZ,

measured by the natural logarithm of the total number of board directors, PNED, expressing the proportion of non-executives, PINED, expressing the proportion of independent non-executives relative to the BZ, and CEO as a dummy variable with a value of 1 if the chief executive officer is also chairman of the board of directors and a value of 0 otherwise. This table contains four main parts. The first gives the coefficients of each parameter using T test. The second part assesses the overall model's parameters using both the fixed effect model, which statistically examines the intercept of the baseline model using F test, and the random effect model, which additionally provides the ICC between the residual and intercept, using Wald Z test. The third appraises the model; -2LL is implemented and change chi-square is used to test such significance statistically. The fourth gives the number of observations (Ob). T, F, Wald Z, and change chi-square values are given in parentheses.

The main consideration of corporate governance effects leaves the researcher's principal conclusions about the extent to which firm risk levels motivate firms to provide voluntary and mandatory risk disclosure unaffected.

High- and low-risk firms

LMM for the same variables was run after discriminating between high- and low-risk firms. Beta is used to highlight such differentiation; if a firm's beta is more (less) than one, the firm will be classified as high- (low-) risk.

Firstly, Table 7.8 indicates that the results for high-risk firms, in terms of aggregated and voluntary risk disclosure, are the same as the LMM for the entire sample. Firm size is the only control variable that (significantly and positively) influences voluntary disclosure. Firm size and firm profitability are the only control variables that (significantly and positively) influence mandatory risk disclosure.

Secondly, the results for low-risk firms indicate that aggregated and voluntary risk disclosures are associated negatively with total and liquidity risks and positively with risk-adjusted return. Mandatory risk disclosure is not associated with risk levels but is significantly and positively influenced by size and profitability.

To conclude, the results suggest that high-risk firms appear more likely to disclose both mandatory and voluntary risk information relative to their risk levels than low-risk firms.

Table 7.8: LMM results for low- and high-risk firms of the impact of risk levels on ARD, VRD and MRD

In/De	ES	Low-risk firms						High-risk firms					
		ARD		VRD		MRD		ARD		VRD		MRD	
		BM	FM	BM	FM	BM	FM	BM	FM	BM	FM	BM	FM
Intercept	?		1.467***		1.430***		0.3299*		1.254***		1.71***		0.453**
			(0.000)		(0.000)		(0.079)		(0.000)		(0.000)		(0.039)
TR	+		-.183***		-.176**		-0.162		-0.100		-0.113		-0.012
			(0.008)		(0.011)		(0.170)		(0.231)		(0.173)		(0.931)
SR	+		-0.004		-0.014		0.050		0.151**		.158**		0.161
			(0.882)		(0.638)		(0.844)		(0.047)		(0.035)		(0.203)
USR	+		-0.043		-0.005		0.021		0.0061		0.015		0.044
			(0.988)		(0.886)		(0.753)		(0.885)		(0.709)		(0.534)
RAR	-		-0.437***		-0.046***		-0.028		-0.031		-0.018		-0.051
			(0.006)		(0.004)		(0.288)		(0.238)		(0.508)		(0.135)
FR	+		0.007		0.0098		0.003		0.060***		0.055***		0.085***
			(0.530)		(0.423)		(0.846)		(0.000)		(0.000)		(0.000)
LR	-		0.099*		0.105**		0.078		0.096**		0.087**		0.130**
			(0.064)		(0.032)		(0.424)		(0.021)		(0.034)		(0.052)
SE	+		0.164***		0.161***		0.191***		0.176***		0.183***		0.159***
			(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
PE	+		0.041**		0.035*		0.080**		0.004		0.022		-0.073**
			(0.023)		(0.052)		(0.011)		(0.832)		(0.337)		(0.052)
GE	+		-0.072**		-0.072**		-0.073		-0.010		-0.025		-0.025
			(0.029)		(0.031)		(0.186)		(0.750)		(0.445)		(0.656)
DE	+		-0.021		-0.024		0.008		-0.007		-0.014		0.0142
			(0.262)		(0.201)		(0.793)		(0.765)		(0.568)		(0.710)

1-Fixed effect						
Intercept (F value)	15773.4***	12488.280***	4936.18***	19487.4***	1518.282***	91616.162***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2-Random effect						
(1) Variance Estimate:						
• Residual	0.037	0.0388	0.079	0.037	0.037	0.082
• Intercept (industry/year)	0.004	0.005	0.002	0.003	0.004	0.000
(2) Wald Z:					16.468***	13.565***
• Residual	16.72***	16.722***	14.393***	16.471***	(0.000)	(0.000)
• Intercept (industry/year)	(0.000)	(0.000)	(0.000)	(0.000)	2.195**	
	2.04**	2.136**	1.311	2.017**	(0.028)	--
	(0.041)	(0.033)	(0.190)	(0.044)		
Changes -2 LL	201***	216***	117.5***	90.4***	91.8***	78***
(Change chi-square)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ob	575	575	575	557	557	557

The table provides LMM for each type of risk disclosure under both low- and high-risk firms. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). Variables' definitions are the same as in Table 7.2. This table contains four main parts. The first gives the coefficients of each parameter using T test. The second part assesses the overall model's parameters using both the fixed effect model, which statistically examines the intercept of the baseline model using F test, and the random effect model, which additionally provides the ICC between residual and intercept, using Wald Z test. The third appraises the model; -2LL is implemented and change chi-square is used to test such significance statistically. The fourth gives the number of observations (Ob). T, F, Wald Z and change chi-square values are given in parentheses.

Sensitivity analysis

To examine the extent to which the results are sensitive to using different models, the FEM regression was run for high- and low-risk firms respectively for aggregated, voluntary and mandatory risk disclosure. The results (not tabulated), compared with the results obtained for aggregated, voluntary and mandatory risk disclosure, give identical results for low-risk firms and very similar results for high-risk firms.

7.4. Concluding remarks

This chapter empirically investigates the main incentives for aggregated, voluntary and mandatory risk disclosure, and is the first to comprehensively investigate the relation between these three types of disclosure and risk levels for a large sample of the UK all share index over an extended time period using automated content analysis.

This chapter examines the extent to which different firm risk levels (namely, total, systematic, unsystematic, risk-adjusted return, financing and liquidity risks) influence corporate risk reporting. The results demonstrate that both aggregated and voluntary risk disclosures are significantly and positively associated with risk-adjusted return and both systematic and financing risks. These results are consistent with both managers' incentives theories, suggesting that managers are motivated to provide higher levels of risk information voluntarily to reduce both information asymmetry and agency costs, and some prior empirical literature (e.g., Abraham and Cox, 2007; Kothari et al., 2009).

The results also exhibit, however, significant negative associations between aggregated and voluntary risk disclosures and total and liquidity risks, suggesting that firms with higher

total risk or lower liquidity levels are less likely to provide risk information in their annual report narratives. Whilst this result conflicts with prior theory, it is consistent with some empirical literature (e.g., Marshall and Weetman, 2002, 2007).

This chapter also finds significant and positive associations between aggregated and voluntary risk reporting and firm size and profitability. These results are consistent both with agency theory and prior empirical research (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007). There is a significant negative association between these two risk disclosure types and firm growth.

In contrast with both aggregated and voluntary risk disclosures, mandatory risk disclosure is found to be unrelated to firm risk levels. The results suggest that mandatory risk disclosure is significantly and positively responsive to firm size.

Methodologically, the results are reinforced by the use of three different regression models, namely, OLS, FEM and LMM. The study is the first to use LMM to examine these relations, in order to overcome the problems resulting from reliance on the more common OLS and FEM approaches. Under LMM, the associations between risk disclosure levels and risk levels are explored by combining cross-sectional and time series effects. Most importantly, this method considers the residuals dependency problem, which has been largely neglected in market-based accounting research (e.g. Bernard, 1987; Gow et al., 2010).

These results have implications for the regulation of risk reporting, particularly within the UK. In general terms, they reinforce support for encouraging (by means of non-mandatory initiatives such as those of the ICAEW) UK firms to provide risk information

voluntarily rather than mandatorily. The evidence, however, also signals that firms may provide less risk information than what would constitute an appropriate response to their underlying risk levels. The study also provides the first evidence confirming that the variability of aggregated and voluntary risk disclosure of UK firms is associated with the variability of firm risk.

This chapter has some limitations. Further research may deal with these by extending the present research design. Additional variables might be applied to the study of the risk-risk disclosure relations, which are the focus of the present chapter. Such variables might focus on both finance (e.g., listing status, dual listing and capital structure) and corporate governance (e.g., ownership structure; internal and external audit characteristics). Risk disclosure may be measured on the basis of sources other than annual reports (e.g., financial releases, financial newspapers; see e.g., Kothari et al., 2009). Further research might also usefully explore risk reporting incentives across countries which are subject to differing regulatory regimes (as discussed in Section 2.5). This will be investigated in the following two chapters.

Chapter Eight: Empirical Evidence (2): Within-country Evidence

Do risk level variations drive mandatory and voluntary risk reporting variations within and between firms? Evidence from the USA, the UK and Germany

8.1. Overview

This chapter contributes to risk reporting research by using repeated measures multilevel analysis and computer-based content analysis to examine the main incentives for mandatory and voluntary risk reporting (MRR and VRR) within and between firms in the USA, the UK and Germany. This chapter addresses two major questions; the first concerns the extent to which firm risk levels explain MRR and VRR variations within and between firms in the three countries. The second concerns the extent to which specific categories of risk influence MRR and VRR in each country.

The results show that incorporating firm risk levels with other firm characteristics improves the models' ability to express explained against unexplained MRR and VRR variations within and between firms in each country.

The results report that US firms characterised by high volatile market returns, systematic risk, high liquidity risk, large size, low profitability and high growth exhibit significantly higher levels of MRR in their 10-K narratives. US firms characterised by low liquidity, large size and low profitability, however, are more likely to exhibit significantly higher levels of VRR.

In the case of the UK, the results show that MRR is dominated significantly and positively by firm size rather than by risk levels. By way of contrast, however, UK firms characterised by high systematic risk, low liquidity risk, large size and high profitability are more motivated to disclose significantly higher levels of VRR in their annual report narratives.

Finally, the results document that both MRR and VRR by German firms are sensitive to risk levels. Specifically, firms characterised by lower market returns volatility, higher systematic risk, lower liquidity risk and larger size are more likely to disclose higher levels of MRR in their annual report narratives. German firms, however, which are characterised by lower volatility, lower unsystematic risk, higher systematic risk, higher financing risk and larger size, have incentives for disclosing significantly higher levels of VRR.

These results suggest that, in the US, MRR is more sensitive to firm risk levels (total, systematic and liquidity risks) than VRR, which is more correlated to other firm characteristics. The UK results suggest that VRR is more sensitive to firm risk levels (systematic and liquidity risks) than MRR, which is dominated by firm size, among other firm characteristics. In Germany, however, both MRR and VRR are significantly related to risk levels (total, systematic, un-systematic, financing and liquidity risks). These results have many implications and support the respective regulatory approach adopted within each country.

The remainder of the chapter is organised as follows. The following section explains the research methods, including data collection and sample selection, the measurement and description of variables and the empirical model. The results are discussed in Section 8.3. Section 8.4 provides conclusions, discusses limitations and suggests areas for future research.

8.2. Method

8.2.1. Data collection and sample selection

The main detailed criteria used to identify this chapter's sample are the same as those introduced in the methodology chapter (Chapter Five). Hence, these criteria yield a list of 320, 339 and 219 US, UK and German firms, respectively. The researcher collects annual reports for the UK and German firms from either Thomson One Banker or the company's website, and collects 10-Ks from the US firms from historical SEC EDGAR. All these collections are for financial years ending within the period 30 June 2005 to 30 June 2010. All annual reports are converted to text files so as to be readable by Nudist 6. Consequently, the total size of the sample is 1270, 1410 and 1005 firm-years for the USA, the UK and Germany, respectively.

8.2.2. Variables: Measurement and description

This chapter uses firm characteristics variables that are defined in Table 5.3.

8.2.3. Empirical model

Repeated measures multilevel analysis is utilised to associate firm risk levels and other firm characteristics with variations in MRR and VRR within each firm over a repeated period of time from 2005 to 2009, which expresses level 1, and between each firm to another, which expresses level 2 (in the UK, the USA and Germany between 2005 and 2009). In level 1, variations in MRR and VRR are measured within each firm over 2005 to 2009 in the USA, the UK and Germany, as in the following equation

$$RR_{ti} = \beta_{0i} + \beta_{1i} Z_{ti} + \beta_{2i} Z_{ti}^2 + \varepsilon_{ti} \quad (8.1)$$

Where RR is risk reporting (MRR and VRR) of firm *i* in year *t*; B_{0i} is the intercept of firm *i*; $\beta 1$ and β_{2i} are the slopes of time-varying variables with firm *i*. Z_{ti} and Z^2_{ti} are both linear and quadratic components of time of firm *i* at time *t* during 2005 to 2009, which are the main parameters at level 1 (shown under the null Model), each of which is given according to polynomial curves. Coding time is essential at this level to be consistent with the main requirements of these curves. Most importantly, these codes affect the model's intercept interpretations.[30]

In level 2, the variations in MRR and VRR amongst all US, UK and German firms (β_{pi}) are measured through explanatory variables that are a firm's risk levels (shown under Model 1) and other characteristics (control variables, shown under Model 2), as in the following equation.

$$\beta_{pi} = \beta_{p0} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qi} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qi} + r_i \qquad (8.2)$$

Where Xfl_{qi} is firm-level analysis of specific characteristics of firm *i*, which is a function of firm risk levels (namely, total, systematic, unsystematic, financing and liquidity risks) and other control variables (namely, a firm's size, profitability, growth and dividends). β_{rq} and β_{oq} represent the effect of firm-level characteristics (Xfl_{qi}) on both linear and quadratic components of time of growth rate of MRR and VRR. ε_{ti} is the standard error of firm *i* at time *t* between 2005 to 2009.

[30] The interpretation of the model's intercept depends on the way the time is coded over the period under analysis. For instance, if the time in yearly intervals commencing from 0 is coded, then the intercept is called a true or an initial trajectory of VRR or MRR of firm *i* at country *j* at time point 0. Therefore, the intercept serves as a baseline to appraise the subsequent model's variables. There are some other situations in which the intercept can stand for the middle or the end status if the middle or the end year is considered. Hox (2010) argues that coding time as such appropriates the repeated measures of polynomial curves that can identify changes within and between firms by estimating the standard linear modelling procedures.

These two equations can be aggregated in the following equation:

$$RR_{ti} = \beta_{0i} + \beta_{1i} Z_{ti} + \beta_{2i} Z^{2}_{ti} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qi} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qi} + \varepsilon_{ti} + r_i \quad (8.3)$$

All the variables in equation (8.3) have the same definitions as in equation (8. 1) and equation (8. 2). It is essential to consider error structure at either level 1(ε_{ti}) or level 2 (r_i) in all the above equations. The error or the residual of level 1 is the variability between the estimated and the actual values of MRR/VRR within firms over time. If the data under analysis have a common trend towards rising or declining between two points in time, as is common in time series data, the AR (1) or the first order autoregressive structure with homogenous variance will be the most appropriate form for structuring this level's error (Heck et al., 2010). AR (1) admits, as an underlying assumption, that there is a correlation between residuals which will be stronger in successive than in non-successive points in time.[31] The error structure of level 2 (r_i), however, can be explicitly reflected through random effect at that level, which, in turn, might contain random intercept, random linear slope and covariance between the intercept and the linear slope.

8.3. Empirical results

8.3.1. Primary results

Figure 8.1 gives the developments on average of MRR, VRR, and market- and accounting-risk measures (volatility, beta and volatility of standard error of CAPM; leverage and

[31] There are other forms of errors structure (e.g., the scale identity and the first order autoregressive moving average structure (ARMA)). For more details see Heck et al., 2010.

current ratio, respectively) in each country. The figure shows that, on average, the US firms tend to provide higher levels of MRR than VRR between 2005 and 2009 by approximately 60 mandated statements of risk disclosure on average. Conversely, the UK and German firms, on average, provided higher levels of VRR than MRR between 2005 and 2009 by around 280 and 100 mandated statements, respectively. Furthermore, over this period, both USR and LR were more stable. Other risks (namely, TR, SR and FR), however, fluctuated on average between 2005 and 2009.

Consistent with these conclusions, Panels A, B and C of Table 8.1 report descriptive statistics of main variables in the USA, the UK and Germany, respectively. Panel A indicates that US firms exhibit, on average, 16% more MRR than VRR. The fluctuations in MRR, as indicated from standard division among the US firms, therefore, are double of those VRR. Panel B indicates that UK firms disclose, on average, 86% more VRR than MRR. This is similar to German firms, which disclose; on average, more VRR than they do MRR by 50%, as is shown in Panel C. Consequently, among the UK and German firms, the fluctuations in VRR are higher than those in MRR.

US firms exhibit the highest level, on average, of MRR compared with the disclosures revealed by UK and German firms. US firms reveal 86% more than the UK firms' MRR and 53% more than the German firms' MRR. In contrast, the UK firms exhibit 20 % of their VRR more than US firms, and 9% more than German firms. These results suggest that in all these three distinctive approaches to risk reporting, managers have incentives to explain more about their risks by providing more risk information voluntarily, along with exhibiting high levels of compliance with risk reporting regulations. One main reason might be that managers are compromising voluntary with mandatory risk reporting to optimise their risk reporting levels. Among other variables, these panels report that

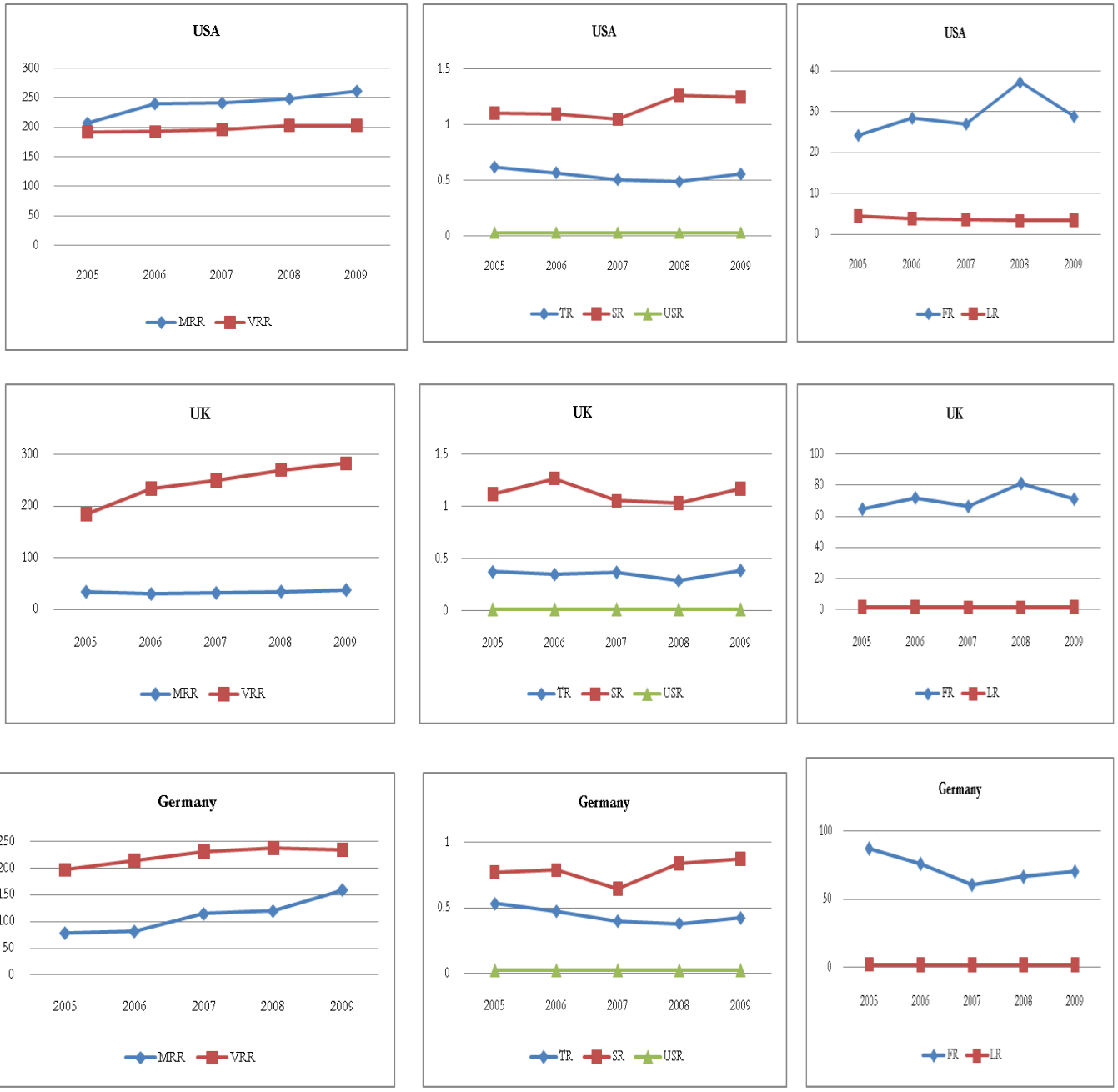
leverage, as a proxy for financing risk, is the highest fluctuating variable in the UK, Germany and the USA.

Identifying the extent to which there is significant association between each pair of our variables, Panel A, Panel B and Panel C of Table 8.2 report Pearson coefficients in the USA, the UK and Germany, respectively. The results reveal the significant associations between MRR and VRR in each of these countries, indicating that firms that reveal mandated risk disclosure have the incentive to voluntarily disclose information about their risks in these countries; all the p-values are 0.000. These results also indicate that the automated method for scoring firm disclosure in each country is valid. Consistent with prior research, the coefficients of MRR and VRR as dependent variables on the one hand, and other variables such as firm risk levels and control variables as explanatory variables, on the other hand, indicate significant relations, with p-values of 0.000 for most of these variables.

The consistency of the coefficients on MRR and VRR as dependent variables, on the one hand, and a firm's risk levels and control variable as explanatory variables, on the other hand, with prior research indicates validity of the automated method for scoring risk reporting in each country, as was argued in Chapter Five.

In the following sections, the current study statistically examines the extent to which MRR and VRR within and between firms in these countries can be attributed to firm risk levels.

Figure 8.1: The average of firm risk reporting and firm risk levels in the USA, the UK and Germany



This figure explains the mean of firms' risk reporting levels that are captured by both MRR and VRR. Additionally, the figure explains the mean of firms' risk levels that are compromised (?) both market-risk measures, which are volatility, beta and volatility of standard error of CAPM as proxies of TR, SR and USR, respectively, and accounting-risk measures, which are current ratio and leverage as proxies of LR and FR, respectively. All these variables are defined in previous tables. To accurately identify the main trends in these variables, all these variables' scales are based on their original values, without any transformation. Specifically, a firm's risk reporting levels (MRR and VRR) are measured by the number of statements that indicate risk, a firm's risk levels are measured by market-risk measures that are volatility, beta and volatility of standard error of CAPM, and by accounting-risk measures that are current ratio and leverage.

Table 8.1: Descriptive Statistics

Panel A: USA

	Mean	Standard division	25%	Median	75%	N
MRR	236.7	147.573	143.000	225.000	310.750	1392
VRR	197.23	74.245	150.25	191.00	235.00	1392
TR	0.544	0.208	0.379	0.519	0.676	1361
SR	1.151	0.790	0.641	1.085	1.585	1358
USR	0.029	0.013	0.020	0.027	0.037	1379
FR	28.182	121.832	0.000	4.74	41.80	1368
LR	3.711	4.366	1.560	2.430	4.350	1375
SE	5.328	0.730	4.829	5.237	5.696	1331
PE	-13.958	127.583	-14.207	5.450	15.592	1308
GE	-0.265	6.754	-0.029	0.079	0.184	1341
DE	4.611	14.030	0.000	3.56	5.821	1261

Panel B: UK

	Mean	Standard division	25%	Median	75%	N
MRR	33.590	21.492	18.00	28.00	43.00	1400
VRR	242.33	122.11	160.00	225.00	290.00	1398
TR	0.344	0.156	0.242	0.308	0.388	1432
SR	1.127	0.868	0.680	1.000	1.400	1431
USR	0.018	0.009	0.010	0.020	0.020	1447
FR	71.199	158.55	10.640	51.640	104.365	1441
LR	1.582	1.840	0.900	1.280	1.710	1431
SE	6.122	0.720	5.575	6.019	6.607	1420
PE	26.908	91.542	7.995	17.310	27.865	1381
GE	-0.213	1.360	-0.186	0.131	0.289	1408
DE	38.338	24.045	23.120	40.080	53.340	1203

Panel C: Germany

	Mean	Standard division	25%	Median	75%	N
MRR	110.16	81.498	51.00	96.00	156.00	932
VRR	221.86	135.598	140.00	188.00	268.00	931
TR	0.439	0.180	0.309	0.407	0.531	1008
SR	0.783	0.522	0.448	0.749	1.077	1008
USR	0.021	0.015	0.014	0.018	0.025	1025
FR	67.985	133.070	5.575	33.370	84.480	1013
LR	2.128	1.691	1.190	1.710	2.360	1006
SE	5.675	0.995	4.932	5.465	6.240	1020
PE	8.144	38.139	3.932	10.985	18.997	1002
GE	-0.035	1.130	-0.030	0.0546	0.123	1019
DE	26.790	27.139	0.000	25.935	44.540	936

This table provides descriptive statistics for all variables, which have the same definitions as in Table 5.3. All statistical measures are calculated based on these variables' original data, without any transformation.

Table 8.2: Correlation matrix (Pearson)

Panel A: USA

	VRR	TR	SR	USR	FR	LR	SE	PE	GE	DE
MRR	0.300***	0.142***	0.249***	0.071***	-.0600**	0.136***	0.076***	-0.233***	0.147***	-0.192***
	(0.000)	(0.000)	(0.000)	(0.008)	(0.027)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VRR		0.134***	0.179***	0.047*	-0.069**	-0.071***	0.191***	-0.241***	0.010	-0.156***
		(0.000)	(0.000)	(0.08)	(0.011)	(0.009)	(0.000)	(0.000)	(0.712)	(0.000)
TR			0.390***	0.294***	-0.146***	0.096***	-0.412***	-0.350***	-0.009	-0.364***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0749)	(0.000)
SR				0.139***	-0.110***	0.080***	0.090***	-0.240***	-0.030	-0.195***
				(0.000)	(0.000)	(0.003)	(0.001)	(0.000)	(0.268)	(0.000)
USR					-0.017	0.052*	-0.266***	-0.368***	-0.086***	-0.224***
					(0.521)	(0.055)	(0.000)	(0.000)	(0.002)	(0.000)
FR						-.345***	0.168***	0.002	-0.029	0.093***
						(0.000)	(0.000)	(0.955)	(0.282)	(0.001)
LR							-0.164***	-0.141***	-0.005	-0.129***
							(0.000)	(0.000)	(0.844)	(0.000)
SE								0.263***	0.052*	0.211***
								(0.000)	(0.060)	(0.000)
PE									0.208***	0.341***
									(0.000)	(0.000)
GE										-0.009
										(0.746)

Panel B: UK

	VRR	TR	SR	USR	FR	LR	SE	PE	GE	DE
MRR	0.653***	-0.137***	0.029	-0.132***	0.192***	-0.090***	0.516***	0.026	-0.007	0.133***
	(0.000)	(0.000)	(0.284)	(0.000)	(0.000)	(0.000)	(0.000)	(0.348)	(0.783)	(0.000)
VRR		-0.142***	0.064**	-0.096**	0.188***	-0.074***	0.565***	0.047*	-0.24	0.058**
		(0.000)	(0.018)	(0.000)	(0.000)	(0.006)	(0.000)	(0.086)	(0.386)	(0.047)
TR			0.548***	0.325***	-0.212***	0.152***	-0.293***	-0.246***	0.234***	-0.347***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SR				0.186***	-0.043	0.090***	0.002	-0.139***	0.070***	-0.206***
				(0.000)	(0.106)	(0.000)	(0.928)	(0.000)	(0.000)	(0.000)
USR					-0.170***	0.158***	-0.214***	-0.243***	-0.007	-0.179***
					(0.000)	(0.000)	(0.000)	(0.000)	(0.786)	(0.000)
FR						-0.315***	0.367***	0.60**	-0.055**	0.127***
						(0.000)	(0.000)	(0.026)	(0.039)	(0.000)
LR							-0.226***	-0.088***	0.081***	-0.136***
							(0.000)	(0.001)	(0.002)	(0.000)
SE								0.073***	-0.011	0.157***
								(0.007)	(0.688)	(0.000)
PE									0.048	0.140***
									(0.079)	(0.000)
GE										-0.127***
										(0.000)

Panel C: Germany

MRR	0.537***	-0.197***	0.224***	-0.140	0.247***	-0.225***	0.351***	-0.023	-0.167***	0.099***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.480)	(0.000)	(0.004)
VRR		-0.277***	0.124***	-0.195***	0.304***	-0.228***	0.383***	0.026	-0.042	0.144***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.433)	(0.200)	(0.000)
TR			0.489***	0.349***	-0.202***	0.140***	-0.247***	-0.121***	0.037	-0.384***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.246)	(0.000)
SR				0.081**	-0.085*	0.009	0.076**	-0.058*	-0.008	0.090***
				(0.010)	(0.066)	(0.778)	(0.016)	(0.070)	(0.792)	(0.006)
USR					-0.045	0.117***	-0.236***	-0.220***	-0.054*	-0.302***
					(0.155)	(0.000)	(0.000)	(0.000)	(0.083)	(0.000)
FR						-0.644***	0.394***	-0.022	-0.119***	-0.012
						(0.000)	(0.000)	(0.492)	(0.000)	(0.710)
LR							-0.307***	-0.045*	0.048	0.015
							(0.000)	(0.089)	(0.131)	(0.650)
SE								0.111***	-0.049	0.132***
								(0.000)	(0.118)	(0.000)
PE									0.326***	0.369***
									(0.000)	(0.000)
GE										0.009
										(0.788)

This table shows the correlation analysis between risk reporting and all firm characteristics using Pearson coefficients; the p-values are given in parentheses. *, **, *** are significant at 0.1, 0.05 and 0.01, respectively (all two-tailed). The definitions for all variables are the same as in Table 5.3.

8.3.2. MRR and VRR variations and firm risk levels in the USA, the UK and Germany

The following section provides the empirical results of the extent to which changes in a firm's risk levels can explain variations in MRR and VRR within and between firms in the three distinctive contexts of the USA, the UK and Germany. The results are presented into two main panels (A and B) in Tables 8.3 and 8.4.

Panel A gives information about the significance of and the value for the coefficients of all explanatory variables under three models. The first model is known as the null Model and provides variations in MRR and VRR over the period of study (2005 to 2009) without using any explanatory variables or any predictors, so this model serves as a baseline model in appraising the subsequent models (1 and 2). The second is known as Model 1, which concerns variations in MRR and VRR subject to a firm's risk level variables (TR, SR, USR, LR and FR). The third is known as Model 2, and incorporates the null Model's and Model 1's variables with other firm characteristics as control variables (firm size, profitability, growth and dividends) to investigate the impacts of all these variables on variations in MRR and VRR, so this model is known as a full Model.

Panel B provides overall information about the models' ability to explain the variations in risk reporting through interpreting the variance of level 1 and level 2. These variances indicate how much risk reporting variations exist at each level (based on inter-class correlation or ICC). The ICC[32] is the proportion of variability (variance) in either MRR or VRR at level 1 (within each firm over 2005 to 2009) and at level 2 (between firm to another in each country) (e.g., Sinjder and Bosker, 1999; Heck et al., 2010; Hoax, 2010). The

[32] ICC can be calculated at each level; for level 1, for instance, σ^2 level 1/ (σ^2 of level 1+ σ^2 of level 2). To calculate ICC at level 2, replacing the denominator by the variance of level 2 is therefore required.

significance of these variances indicates potential possibilities to reduce the unexplained variance through including the model with each model's explanatory variables. In order to identify how much of the variances in MRR and VRR can be explained by each model's explanatory variables, R^2 can be calculated at either level 1 or level 2 as the proportional reduction in variances of either Model 1 or Model 2.[33]

To assess the overall improvement of either Model 1 or Model 2, the differences of -2 Log Likelihood (-2LL) between each model and the null Model should be considered. If such differences decrease, the main conclusion suggests that this model is improved. To examine such improvements statistically, change chi-square should be used to examine a null hypothesis of no variations in risk reporting within and between firms over 2005 to 2009 in each country. If the difference between the -2LL for Model 2 (the full Model) and the null Model (the baseline model) is greater than the value of the change chi-square, Model 2 is then statistically acceptable. Based on this structure, the empirical results are discussed in the following subsections.

MRR variations and firm risk levels in the USA, the UK and Germany

USA

Panel B of Table 8.3 indicates that, under the null Model, 43% (39% in the intercept and 4% in the time) of MRR variations are significant between firms. The rest of the MRR variations (57%) are within each firm over 2005 to 2009. The significance of these variations at p-values of 0.000 suggest that there are still some significant variations to be explained at level 1 (within each US firm over 2005 to 2009) and level 2 (between firms) by including Model 1's (a firm's risk levels) and Model 2's (both a firm's risk levels and its other characteristics, such as size) predictors.

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[33] R^2 of Model 1 instantly at level 2 can be calculated as σ^2null Model- $\sigma^2$of Model 2/ σ^2 null Model.

In Panel A of Table 8.3, Model 1, which expresses firm risk levels, shows that MRR variations of the US firms are significantly influenced by variations in these firms' total, systematic and liquidity risks, at p-values of 0.011, 0.088 and 0.001, with t-statistics (not tabulated) of 2.53, 1.71 and 3.42, respectively. The results suggest that highly volatile, high-beta and highly liquid US firms have higher incentives to disclose more about their risks mandatorily. US regulations do not set a maximum limit of risk information that should be included in firms' narratives sections; on the contrary, these regulations, as has been argued by regulatory theory, only provide minimum requirements. These results support Dobler's (2008) theoretical argument in which he calls for further research even within highly regulated countries, as even within such countries investigating the incentives for risk reporting is important. In essence, this chapter's evidence suggests that managers of US firms could have some incentives to disclose more about their mandated risks, which in turn results in some variations in MRR among those firms.

These results, therefore, are consistent with managers' incentives theories. Specifically, and based on capital needs theory, if firms have significantly high risk levels (total and systematic risks), investors could therefore require higher desired rates on their investments, and they may overestimate such rates if they do not have sufficient information about risks related to their investments (Healy and Palepu, 2001; Deumes and Knechel, 2008). As a result, managers could provide more risk information to reduce any overestimations, which would help investors to reduce their uncertainty and adjust the overestimated desired rate, which in turn would reduce the cost of capital (Botosan and Harris, 2000; Botosan and Plumlee, 2002).

Managers at highly liquid US firms, based on signalling theory, might have high incentives to disclose more about their mandated risk to inform their investors of how they successfully manage their firms' liquidity, aiming to distinguish themselves from managers who cannot, or only less effectively, manage their liquidity. This result is consistent empirically with Marshall and Weetman (2007).

As shown in Panel B of Table 8.3, extending the null Model by including a firm's risk levels (Model 1) improves the model's ability to express MRR variations between the US firms by 24% (as R^2).[34] The same panel reports that 33% of MRR variations are between US firms whereas 62% of such variations are within US firms between 2005 and 2009. This result, however, suggests that the explained variations in the observed MRR variations increase when including the null Model with a firm's risk level variables against the increase of unexplained variations in the observed MRR within the US firms over 2005 to 2009. The significance of MRR variations indicates the potential possibilities to include other predictors (such as in Model 2) to those in Model 1, which may reduce the unexplained variations in MRR within and between the US firms.

In Panel A of Table 8.3, Model 2, which includes other firm characteristics along with firm risk levels, documents that US firms characterised by high liquidity, highly volatile market returns and high covariance of these firms' market returns relative to the market index are more likely to exhibit significantly higher MRR variations, at p-values of 0.010, 0.041 and 0.0001, respectively. These results are consistent with both the theoretical basis and empirical prior research, as explained in Model 1.

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[34] Based on our previous notice and based on data in Panel B of Table 8.3, R^2 = 6753.2-5159.13/6753.2 *100 = 24%.

The results in Panel A of Table 8.3 also suggest that large, less profitable, high growth and low paying dividends US firms exhibit significantly higher MRR variations, at p-values of 0.002, 0.000, 0.000 and 0.011, at t-statistics (not tabulated) of 0.15, -4.60, 4.19 and -2.60, respectively. Based on these results, managers in these firms have greater abilities to collect and prepare information at a lower average cost (e.g., Verrecchia, 2001). Managers in such firms might have higher incentives to reveal more mandated risk information to distinguish themselves from managers that exhibit low compliance with the SEC's risk regulations. Therefore, as far as MRR variations in the USA are concerned, this chapter accepts **H1** and **H2** and rejects **H3, H5** and **H6**.

Panel B of Table 8.3 suggests that a firm's risk levels and other characteristics explain 46% (as R^2) of the observed MRR variations between the US firms. From the same panel it can be seen, at a p-value of 0.000, 30% of MRR variations are between US firms, whereas 70% of MRR variations are within US firms during 2005 to 2009.

UK

Panel B of Table 8.3 shows that, under the null Model, 58% of MRR variability (56% in the intercept and 2% in the time) is between UK firms. The rest of the MRR variations are within UK firms between 2005 and 2009 (variations within each firm over 2005 to 2009). The significance of these variations, at p-values of 0.000, suggests that there are still considerable variations to be explained by extending the null Model by including a firm's risk level variables, shown in Model 1.

Model 1, which expresses a firm's risk levels, in Panel A of Table 8.3, suggests that total, systematic and financing risks are likely to significantly influence MRR variations in UK firms' annual report narratives, at p-values of 0.045, 0.064 and 0.078, respectively. The results indicate, on the one hand, that UK firms with higher levels of systematic and

financing risks are highly motivated to exhibit higher levels of risk information mandatorily. On the other hand, those firms tend to provide lower levels of risk information as a response to their highly volatile market returns.

These results are consistent with theoretical arguments that suggest that firms with high risk levels provide more risk information in order to reduce the cost of capital by reducing investor uncertainty caused by a lack of information about risk, and signal their quality performance. Empirically, these results are consistent with Linsley and Shrives (2006) and Abraham and Cox (2007).

To assess the extent to which Model 1's variables explain variations in MRR, Panel B of Table 8.3 suggests that around 12% (as R^2) of MRR variations between British firms can be explained by variations in their risk levels. Due to adding a firm's risk levels as exploratory variables, the variations in MRR between UK firms steadily decrease to compare to the null Model (56%). The result indicates, nevertheless, that there are still significant variations of MRR that can be explained by further including in Model 1 some other variables at a p-value of 0.000, as are be explained in Model 2.

Model 2 in Panel A of Table 8.3 considers other firm characteristics; the results report that providing MRR is significantly dominated by a firm's size rather than other variables, at a p-value of 0.000 (t-statistic = 12.37, not tabulated). This result suggests that managers in large UK firms exhibit higher MRR diversification than those in small UK firms, relative to their risks. Managers at those larger firms have greater abilities to collect and prepare information at a relatively lower average cost than small firms, resulting in encouragement for managers to signal their high compliance with UK risk initiatives and regulations in order to distinguish themselves from others who exhibit low compliance of risk reporting.

As far as MRR variations in the UK are concerned, this chapter, therefore, rejects its hypotheses (from **H1 to H6**) suggesting that within the UK context, MRR variations are not significantly associated with firm risk levels, consistent with what has been argued and found in Chapter Seven. It is also consistent with some prior risk reporting research (e.g., Linsley and Shrives, 2005, 2006).

Under Model 2 in Panel B of Table 8.3, therefore, the MRR variations between firms (level 2) significantly declined to 29%, from 50% in Model 1. Consequently, incorporating a firm's risk levels and other characteristics explains 60% of MRR between the UK firms (as R^2).

Germany

The null Model in Panel B of Table 8.3 documents that 47% of MRR variations (46% in the intercept and 1% in the time) are between German firms(level 2), whereas the remainder of MRR variations are within German firms between 2005 and 2009(level 1), all at p-values of 0.000. At both levels, the results indicate that significant variations remain and can be explained by including in the null Model either a firm's risk levels (Model 1) or other characteristics (Model 2).

A firm's risk levels, as shown under Model 1 in Panel A of Table 8.3, explain that German firms' MRR variations are significantly influenced by their total, systematic and liquidity risks, at p-values of 0.000, 0.000 and 0.003, respectively. These results suggest that variations in the MRR of German firms are significantly associated with these firms' high beta, lower liquidity and lower volatility. These results, which suggest that the high variability of MRR is a function of these firms' risk level variations, are consistent with both theory and prior research, as discussed with reference to MRR in the USA and the

UK. To assess the extent to which including a firm's risk levels in Model 1 improves the overall explanations of MRR variations, Panel B of Table 8.3 reports that firms' risk levels explain 33% of MRR variations between these firms. Consequently, the MRR variations between German firms significantly decreased to 40%, at a p-value of 0.000, compared with the null Model (46%). The significance of these variations, however, suggests that the model can be expanded to include some other variables to reduce the unexplained variations in MRR either within or between German firms. This is explained through Model 2.

Panel A of Table 8.3 reports under Model 2 that, in addition to total, systematic and liquidity risks, a firm's size is the only factor (among the control variables) that significantly affects the MRR of German firms, at a p-value of 0.000.

Model 2 in Panel B of Table 8.3 explains that risk level variables, together with other firm characteristics, explain 41% of MRR variations between firms, at a p-value of 0.000. This result indicates that there are significant variations to be explained by seeking some other indicators at either level 1 or level 2. As far as MRR variations in Germany are concerned, this chapter, therefore, accepts **H2** and **H5** and reject the other hypotheses.

To sum up, changes in firm risk levels are the main indicators that explain variations in MRR and VRR in the USA, the UK and Germany. Although including the model of the other firm characteristics (the control variables) improves the model's ability to explain why MRR varies across firms, the significance of firm risk levels varies from complete domination of a firm's size in the case of the UK firms to having a substantial impact, as in the USA and Germany.

Table 8.3: Mandatory risk reporting variations

Panel A: Estimates of fixed effects (MRR_T)

	USA			UK			Germany		
	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2
Intercept	194.57***	117.12***	95.11***	33.88***	33.31***	14.65***	86.63***	112.73***	83.38***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TR		0.44**	0.53***		-4.97**	-1.52		-68.37***	-57.90***
		(0.029)	(0.010)		(0.045)	(0.546)		(0.000)	(0.000)
SR		0.36**	0.26**		4.26*	3.20		79.87***	74.11***
		(0.019)	(0.041)		(0.064)	(0.152)		(0.000)	(0.000)
USR		-0.00	-0.03		-2.54	-0.84		-22.01*	-10.71
		(0.989)	(0.731)		(0.305)	(0.721)		(0.088)	(0.407)
FR		0.09	-0.01		4.00**	.0415		15.56	-0.76
		(0.643)	(0.952)		(0.049)	(0.815)		(0.267)	(0.957)
LR		0.52***	0.63***		1.23	2.37		-42.90***	-39.11***
		(0.006)	(0.001)		(0.567)	(0.248)		(0.002)	(0.003)
SE			0.72***			37.07***			62.98***
			(0.002)			(0.000)			(0.000)
PE			-0.75***			-0.40			2.43
			(0.000)			(0.843)			(0.809)
GE			0.51***			-1.33			-10.97
			(0.000)			(0.403)			(0.219)
DE			-0.079**			3.35			3.55
			(0.010)			(0.134)			(0.741)
Time	34.28***	42.31***	38.02***	-3.45***	-4.46***	-5.74***	0.85		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.846)		
Time	-5.94***	-7.66***	-6.28***	1.13***	1.38***	1.54***	3.93***	2.99***	2.78***
quadratic	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N-S	254	254	254	282	282	282	201	201	201
Ob	1270	1270	1270	1410	1410	1410	1005	1005	1005

Panel B: Estimates of covariance (MRR_T)

	USA			UK			Germany		
	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2
V RM (within firms)	9762.08*** (0.000)	9801.40*** (0.000)	10149.35*** (0.000)	179.17*** (0.000)	201.55*** (0.000)	223.21*** (0.000)	3052.48*** (0.000)	2657.37*** (0.000)	2690.72*** (0.000)
V I (between firms)	6753.20*** (0.000)	5159.13*** (0.000)	3656.66*** (0.005)	239.92*** (0.000)	210.54*** (0.000)	94.79*** (0.000)	2655.70*** (0.000)	1772.94*** (0.000)	1578.56*** (0.000)
VT (between firms)	722.48*** (0.000)	752.39*** (0.000)	669.87*** (0.000)	10.55*** (0.000)	6.66* (0.59)	3.08 (0.237)	68.42 (0.105)	8.59*** (0.002)	7.75*** (0.000)
ICC (VRM)	57%	62%	70%	42%	48%	69%	53%	60%	63%
ICC (VI)	39%	33%	25%	56%	50%	29%	46%	40%	37%
ICC (VT)	4%	5%	5%	2%	2%	2%	1%	-	-
R^2(VI)	---	24%	46%	---	12%	60%	----	33%	41%
Changes -2LL Change chi-square		15.730*** (0.000)	30.68*** (0.000)		2539.84*** (0.000)	134.63*** (0.000)		129.53*** (0.000)	49.03*** (0.000)

Panel A provides the estimates of the predictors through three models for each country. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). The null Model presents the impact of the (non-)linear component of time on MRR_T. The successive models provide how the predictive variables can express variation in MRR_T within and between firms. Therefore, Model 1 explores the impact of a firm's risk levels on its MRR_T variations. Model 2 provides the impact of firm risk level and four other characteristics; namely, size, profitability, growth and dividends effects, respectively. T-statistics are given in parentheses, N-S is the number of Subjects under analysis, and Ob is the number of Observations for firm-years. The definitions for all variables are the same as defined in Table 5.4.

Panel B provides estimates of variance of each level of the analysis. The variance of repeated measures (VRM) expresses the variance of MRR_T that can be attributed to variation within firms over five years (our time series), the variance of intercepts (VI) expresses the variance of MRR_T that can be attributed to variation between firms, and the variance of time (VT) expresses the variance of MRR_T that can be attributed to variation between firms over time. The ICC is the intra-class correlation, which can be calculated at each level; for level 1, for instance, σ^2 level 1/ (σ^2 of level1+ σ^2 of level 2). R^2 explains the extent to which the overall model's predictors can implicitly explain changes in MRR, which can be calculated as (σ^2 *M1*- σ^2 *M2*/ σ^2 *M1)*; hence, *M1* is the null Model variance component, whereas *M2* refers to the current model's predictors. While change of -2 Log Likelihood (-2LL) is employed to assess each model's improvements, change chi-square is used to examine such improvements statistically. Wald Z statistics are given in parentheses.

VRR Variations and firm risk levels in the USA, the UK and Germany

USA

The null Model in Panel B of Table 8.4 reports that 71% (70% in the intercept + 1% in time) of VRR variations are between US firms; 29% of such variations were within US firms between 2005 and 2009. The variations at both levels (within each US firm over 2005 to 2009, known as level 1, and between US firms, known as level 2, are statistically significant at a p-value of 0.000, which in turn expresses the importance of exploring factors that may cause these variations, as will be explained by Model 1 and Model 2.

Firm's risk levels in Model 1 in Panel A of Table 8.4 show that the VRR variations of the US firms are significantly and positively influenced by their total and liquidity risks, at p-values of 0.001 and 0.004, with t-statistics (not tabulated) of 2.51 and -1.71, respectively. Highly volatile and low liquidity firms are highly motivated to provide significantly higher risk information voluntarily in their annual report narratives. Looking at the same model in Panel B of the same table shows that these firm risk level variables have significant explanatory power to explain 2% of VRR variability between US firms. The significance of variations in VRR expresses the model's ability to include other variables, which can improve our ability to explain the variations in the observed VRR within and between the US firms, as will be explained by Model 2.

It is apparent from Model 2 in Panel A of Table 8.4 that, in addition to a firm's risk levels, both a firm's size and its profitability are more likely to affect it to significantly and voluntarily provide risk information. The results document that large, less profitable firms have higher incentives to disclose risk information voluntarily to the stock market.

Involving a firm's other characteristics along with its risk levels in model 2 therefore reduces the unexplained variations in VRR between firms by 3% (69% - 66% Model 1 and 2 respectively). These variables explain 14% of VRR variations between US firms. The significance of the VRR variations within and between firms suggests further research is needed to look at some other explanatory variables to decrease the unexplained variations in the observed VRR between 2005 and 2009. As far as VRR variations in USA are concerned, **H1** and **H5** are accepted and the other hypotheses (**H2**, **H3** and **H6**) are rejected.

UK

The null Model in Panel B of Table 8.4 reports that 71% (69% in the intercept + 2% in time) of VRR variations are significant between the UK firms, whereas 29% of VRR variations are within firms from 2005 to 2009, at a p-value of 0.000 for each of these two levels (Wald Z statistics of 9.47 and 13.03, not tabulated). These results show that there are significant variations to be explained by the subsequent models' variables (firm risk levels in Model 1, and other firm characteristics in Model 2).

Model 1 in Panel A of the same table explains that both systematic and liquidity risks are significantly associated with variations of VRR, at p-values of 0.010 and 0.031, respectively. The result indicates that high-covariate and high liquidity UK firms have a high incentive to disclose significantly more information about their risk voluntarily. As a consequence of adding a firm's risk levels, as shown under Model 1 in Panel B, the VRR variations between the UK firms significantly declined, reflecting great improvements (6%) in the model's explanatory power. At the same time, the result indicates that significant variations of VRR remain at both levels, at a p-value of 0.000, suggesting potential possibilities to extend Model 1 by including other firm characteristics, as shown under Model 2.

Model 2 in Panel A of Table 8.4 shows that UK firms characterised by high covariance, high liquidity, large size and high profitability are more likely to exhibit significantly higher levels of VRR, at p-values of 0.000, 0.031, 0.000 and 0.067, respectively. As far as VRR variations in the UK are concerned, **H2** is accepted and the other hypotheses (**H1**, **H3**, **H5** and **H6**) are rejected.

Incorporating a firm's risk levels with its other characteristics, as shown in Model 2 in Panel B, explains 54% of VRR variations between the UK firms.

Germany

The statistics in Panel B of Table 8.4 under the null Model report that more than half (57%, which includes both 56% in intercept and 1% in time) of VRR variations are between firm, whereas the rest (43%) of VRR variations are within German firms over 2005 to 2009. The significance of these variations in VRR at these two levels suggests opportunities to explain such variations by expanding the null Model to include predicted variables, as in Model 1 and Model 2.

Specifically, as can be seen from Panel A from the same table under Model 1, the variations in VRR in German firms are more likely to be significantly influenced as a full function of their risk levels (except liquidity risk), with a range of p-values between 0.000 and 0.015. In particular, German firms, on the one hand, significantly disclose voluntary risk information when they have higher levels of systematic and financing risks, at p-values of 0.000 and 0.014, respectively. On the other hand, these firms have higher incentives to disclose significantly less risk information voluntarily if they have high volatility on both market returns and standard errors of their CAPM, at p-values of 0.000 and 0.015, respectively.

Thus, under Model 1, 34% of VRR variability between German firms can be explained by their levels of risk, which leads to a significant decrease in VRR variations between firms, to 45%. The result shows, nevertheless, that a significant proportion of VRR variations either within or between firms remains unexplained, which in turn suggests investigating other factors which may reduce such variations, as shown under Model 2.

Model 2 in Panel A of Table 8.4 documents that German firms characterised by low volatility, low standard error of CAPM, high covariance, high leverage, large size and high-paying dividends are highly motivated to provide significantly higher levels of risk information voluntarily. As far as VRR variations in Germany are concerned, **H1** and **H6** are accepted and the other hypotheses are rejected.

Owing to combining firms' risk level with their firm characteristics, 40% of VRR variability between German firms can be explained by this model's variables.

Table 8.4: VRR variations

Panel A: Estimates of fixed effects (Dependent variable = VRR)

	USA			UK			Germany		
	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2
Intercept	185.40***	190.13***	185.95***	187.97***	166.75***	52.09***	197.43***	227.19***	167.84***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)
TR		0.19**	0.22***		-13.34	-3.46		-98.97***	-84.00***
		(0.026)	(0.010)		(0.273)	(0.779)		(0.000)	(0.000)
SR		0.06	0.03		27.34***	27.65***		78.76***	74.60***
		(0.324)	(0.566)		(0.001)	(0.000)		(0.000)	(0.000)
USR		-0.17	-0.15		-7.94	6.23		-82.84***	-58.19**
		(0.220)	(0.273)		(0.525)	(0.598)		(0.001)	(0.015)
FR		-0.013	-.006		30.41***	12.638		84.62***	58.47***
		(0..888)	(0.44)		(0.000)	(0.249)		(0.000)	(0.010)
LR		-0.16**	-.015***		8.35	18.42**		-14.89	-12.30
		(0.050)	(0.004)		(0.435)	(0.031)		(0.511)	(0.582)
SE			0.395***			211.54***			106.48***
			(0.002)			(0.000)			(0.000)
PE			-0.27***			18.40*			-18.644
			(.000)			(0.067)			(0.221)
GE			.009			8.13			-6.259
			(0.852)			(0.302)			(0.645)
DE			-0.025			-13.24			28.60*
			(0.249)			(0.233)			(0.087)
Time	6.37**	4.83***	4.03***	42.40***	38.57***	33.01***	25.15***	18.95***	20.20***
	(0.023)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.005)
Time quadratic	-0.46			-4.54***	-3.91***	-2.89**	-4.64***	-4.58***	-5.34***
	(0.474)			(0.000)	(0.002)	(0.026)	(0.000)	(0.005)	(0.002)
N-S	254	254	254	282	282	282	201	201	201
Ob	1270	1270	1270	1410	1410	1410	1005	1005	2005

Panel B: Estimates of covariance (Dependent variable = VRR)

	USA			UK			Germany		
	Null Model	Model 1	Model 2	Null Model	Model 1	Model 2	Null-Model	Model 1	Model 2
V RM (within firms)	1506.59***	1512.39***	1596.42***	3526.29***	3562.12***	3714.65***	7241.48***	7307.17***	7128.70***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
V I (between firms)	3636.21***	3565.85***	3145.08***	8414.11***	7891.74***	3863.77***	9494.60***	6258.95***	5657.35***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VT (between firms)	67.33**	60.44**	44.84	328.83***	323.73***	291.78***	178.98	211.09**	210.61**
	(0.026)	(0.41)	(0.126)	(0.000)	(0.000)	(0.000)	(0.118)	(0.050)	(0.43)
ICC (VRM)	29%	29%	33%	29%	30%	47%	43%	53%	55%
ICC (VI)	70%	69%	66%	69%	67%	49%	56%	45%	44%
ICC (VT)	1%	2%	1%	2%	3%	4%	1%	2%	1%
R^2(VI)	----	2%	14%	---	6%	54%	--	34%	40%
Changes of -2LL		20.06***	43.68***		47.96***	167.88***		112.10***	51.85***
Change chi-square		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)

This table provides the repeated measures of two multilevel analyses of voluntary risk reporting (VRR) in the USA, the UK and Germany. All other variables interpretations are introduced in the previous table.

MRR verses VRR relative to firm risk levels: A summary

USA

Both MRR and VRR variations are significantly sensitive to firm risk levels, after controlling for other firm characteristics. While MRR variations are significantly attributed to total, systematic and liquidity risks, VRR variations are significantly attributed to total and liquidity risks. The explanatory power of firm risk levels to explain MRR variations is higher than their explanatory power to explain VRR variations.

UK

Variations in VRR rather than variations in MRR are significantly correlated with firm risk levels, namely systematic and liquidity risks, with a control for other firm characteristics. The explanatory power of risk levels along with other characteristics to explain MRR variations is higher than their explanatory power to explain VRR variations.

Germany

Variations in either MRR or VRR are significantly associated with German firms' risk levels, with a control for other firm characteristics. VRR variations, however, are more sensitive to risk levels, namely total, systematic, unsystematic and financing risks, than MRR variations, which are significantly influenced by total, systematic and liquidity risks. The explanatory power of risk levels along with control variables to explain MRR is equal to that of VRR. Table 8.5 summarises, therefore, all hypotheses for MRR and VRR in each country.

Table 8.5: Summary of results of MRR and VRR variations (as shown under Model 2)

			ES	MRR			VRR		
				USA	UK	Germany	USA	UK	Germany
Firms' characteristics	Firms' risk levels	TR	+	S (+)	NS	S (-)	S(+)	NS	S (-)
		SR	+	S (+)	NS	S (+)	NS	S (+)	S (+)
		UNR	+	NS	NS	NS	NS	NS	S (-)
		FR	+	NS	NS	NS	NS	NS	S (+)
		LR	+	S (-)	NS	S (+)	S (+)	S (-)	NS
	Control variables	SE	+	S (+)	S (+)	S (+)	S (+)	S (+)	S (+)
		PE	+	S (-)	NS	NS	S (-)	S (+)	NS
		GE	+	S (+)	NS	NS	NS	NS	NS
		DE	+	S(-)	NS	NS	NS	NS	NS

This table summarises the results of how firm characteristics (risk levels and control variables) influence firm MRR and VRR in the USA, the UK and Germany. ES means the expected sign, + means positive direction, S means significant and NS means non-significant. All variables' definitions are shown in Table 5.3.

8.4. Robustness tests

To ensure the validity of these results, this chapter further analyses its results in several ways. First, the researcher increases the dependent and some of the independent variables by 10% in order to observe how previous conclusions are sensitive to such changes in the pattern of associations between these variables. Specifically, the researcher increases both MRR and VRR and all firm risk levels variables within each country. After doing so, the researcher obtained identical conclusions to those obtained from the main analysis.

Second, the researcher further uses some other proxies for firm size, profitability and dividends by using market capitalisation (Worldscope item *WC08001*), return on asset (Worldscope item *WC08326*) and dividends per share (Datastream item *512E*) instead of using total assets, return on equity and dividend payout, respectively; the results are identical to the previous results.

Third, the researcher omits some of the main variables. Principally, the researcher omits volatility and then beta with volatility of standard error of CAPM, and then runs the analysis on the remaining variables. It draws similar conclusions about how firm risk levels can influence providing MRR and/or VRR.

Fourth, the researcher examines the effects of considering some corporate governance variables within the UK context (specifically, this chapter added board size (BZ), proportion of non-executive directors (PNED), proportion of independent non-executive directors (PINED) and chief executive officer (CEO) duality). Based on the results, the researcher concludes that including CG variables in the model does not affect the main

conclusions about the extent to which firm risk levels can motivate firms to provide either MRR or VRR.

8.5. Concluding remarks

Motivated by conflicting theoretical arguments and empirical results on the extent to which firm risk levels can influence firms to provide risk reporting voluntarily and/or mandatorily in their annual report narratives, the current study investigates such associations in three different approaches towards risk reporting within three different countries. While the first, the UK approach, encourages more voluntary risk reporting above imposing risk rules, the second, the German approach, formally requires firms to provide risk information in a certain section in their annual report narratives, and the third, the US approach, is a compromise between these two approaches; hence, it requires and encourages firms to provide more information about their risks mandatorily and/or voluntarily, respectively.

A firm's risk reporting levels are measured by utilising a computerised based approach in which a number of sentences indicating risk, based on developing a unique word list of risk, are counted. Such scores are manually and statistically validated to ensure their reliability. The current study distinguishes between voluntary and mandatory risk disclosures to observe the pattern of associations for each type of risk disclosure. Knowing the pattern of how the US, the UK and German firms respond to their risk levels can help identify which type of risks these firms are more sensitive to, by disclosing either more or less risk information voluntarily and/or mandatorily. Based on managers' incentives theories and prior empirical research, the current study posits positive plausible

associations between market- and accounting-risk measures and mandatory and voluntary risk reporting within each country.

To correlate differences in firm risk levels to variations in MRR and VRR within and between firms in each country, repeated measures multilevel analysis is used to intersect cross-sectional with time series data and account for the residual dependency.

For the USA, the results indicate that firms are more sensitive to providing their MRR and VRR as a function of their risk levels, along with their other characteristics. Specifically, in large, less profitable US firms, providing VRR is significantly influenced by volatility and current ratio. Furthermore, the results report that in large, less profitable and high growth US firms, providing MRR is significantly associated with volatility, beta and current ratio. The results indicate that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce the systematic unexplained variations between firms' MRR than they do with VRR. The results indicate that the US market pays close attention to volatility, beta and current ratio as proxies for total, systematic and liquidity risks by disclosing significantly more risk information mandatorily and/or voluntarily, with an exception in the latter case of liquidity risk.

These results have theoretical and practical implications. First, this chapter's evidence supports and warrants risk reporting research. It supports Dobler's (2008) theoretical argument that studying risk reporting incentives is crucial even within highly regulated countries like the USA. This chapter's evidence significantly adds to disclosure literature by emphasising the importance of widening this research scope to pay more attention to variations above the mandated requirements (e.g., IFRS adoption), which provide a minimum of information to investors, as argued through regulatory theory (e.g., Leftwich,

1980; Cooper and Keim, 1983; Fields et al., 2001; Ogus, 2001). This chapter's findings do not support those studies that do not distinguish voluntary from mandatory risk reporting (e.g., Linsley and Shrives, 2000, 2005, 2006; Abraham and Cox, 2007) when studying the incentives for risk reporting. Therefore, the study documents different conjectures between the observed trend of MRR and firm risk levels compared to the observed trend of VRR.

Practically, this result supports the regulatory trend within the USA; hence, the study finds that firms providing more risk information either mandatorily and/or voluntarily are subject to significant underlying risks. US firms trust the market's ability to correct any overestimations of these firms' uncertainties by disclosing more risk information. The theoretical expansion for this argument is the extent to which investors can understand risk information in annual report narratives, as was addressed within the US market by Li (2008), who uses a text search for the words *risk* and *uncertainty* in the 10-K as a direct measure of risk information content. This is in comparison with prior risk disclosure research, which uses indirect measures for the usefulness of risk disclosures (e.g., Rajgopal, 1999; Hodder and McAnally, 2001; Jorion; 2002; Linsmeier et al., 2002). Li's (2008) findings support investors becoming more familiar with risk information as time passes (one-year ahead).

For the UK firms, providing risk information voluntarily is significantly subject to firm risk levels, specifically systematic and liquidity risks rather than other risk types. Significantly, in those firms, providing risk information mandatorily is only determined by firm size.

This result indicates that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce the systematic unexplained variations between firms in either MRR or VRR. The result indicates that UK firms paid closer attention to beta and

current ratio as proxies for systematic and liquidity risks than they paid to other risks by disclosing significantly high levels of risk information voluntarily. The UK firms, however, did not pay any attention to their risks when providing mandated risk reporting. These results have theoretical and practical implications.

The theoretical implications are consistent with those discussed with reference to the USA; the practical implications stem from supporting the current trend of UK regulation, which encourages firms to disclose information voluntarily about their risks rather than making such disclosure compulsory.

For German firms, providing risk information mandatorily and/or voluntarily is a function of their risks. This result supports the fact that even in highly mandated risk-reporting markets, there are still managerial incentives to disclose voluntarily further risk information.

The results indicate that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce the systematic unexplained variations between firms in either MRR or VRR. The results indicate that German firms paid closer attention to volatility, beta and current ratio as proxies for systematic and liquidity risks than they paid to other risks, by disclosing significantly high levels of risk information mandatorily. The German firms, however, paid closer attention to all their risks (except liquidity risk) when providing voluntary risk reporting.

These results have theoretical and practical implications. The theoretical implications are consistent with those discussed with reference to the USA and the UK; the practical implications are consistent with those discussed within the US context. The results signal

that organising risk reporting by formally implementing an accounting standard significantly improves the disclosure environment by encouraging the provision of more risk information either mandatorily or voluntarily, most importantly as a response to firm risk levels.

Further research could be useful by including some other explanatory variables in the model, which might decrease the unsystematic (idiosyncratic) unexplained variations in MRR and VRR within firms between 2005 and 2009. It could be useful to consider some recent trends in disclosure literature that look at unsystematic (idiosyncratic) demographic characteristics of managers as an essential driver for idiosyncratic voluntary disclosure variations (Bamber et al., 2010).

Incorporating both a firm's characteristics variables with a country's characteristics variables is another area of interest in how to observe the impact of these characteristics on either general disclosure studies or risk reporting studies. In general disclosure studies, the debate is how international accounting studies statistically examine the impact of firm and country factors on financial disclosure; for more details see Dong and Stettler, 2011. In risk reporting studies, no prior risk reporting research investigates such impacts on variations in MRR and VRR. That will be discussed in the following chapter.

Chapter Nine: Empirical Evidence (3): Cross-country Evidence: Incentives for mandatory and voluntary risk reporting variations within and between firms across the USA, the UK and Germany

9.1. Overview

Looking more closely at mandatory and voluntary risk reporting (MRR and VRR) variations within and between firms in each nation from 2005 to 2009 is useful to clearly identify the extent to which support for regulators either relies intensely on regulations (USA and Germany) or on voluntary disclosure (UK). This chapter investigates the main incentives for MRR and VRR variations within and between firms across the USA, the UK and Germany. This chapter answers two major questions. The first question deals with firm-level analysis and examines the extent to which firm risk levels can explain such variations after considering other firm characteristics that might affect corporate disclosure. The second question deals with country-level analysis and examines the extent to which a country's legal system and its cultural values can explain MRR and VRR variations within and between American, British and German firms.

The results suggest significant variations in both MRR and VRR within and between firms from 2005 to 2009 across the USA, the UK and Germany. It is found that a country's legal system and its cultural values have significantly high abilities to explain MRR variations. The present chapter finds that a country's legal system and its cultural values are more likely to react with firm characteristics as complements rather than substitutes to explain variation in MRR. Conversely, the results suggest that both legal and cultural characteristics are less essential in explaining VRR variations between firms across countries. These results suggest that differences in VRR between firms across the USA, the UK and

Germany are more likely to be statistically correlated with firm characteristics that are derived hypothetically based on managers' incentives theories.

This chapter contributes to existing research in two ways. This chapter provides the first empirical evidence as to how corporate risk reporting varies under three distinctive approaches to risk disclosure in the USA, the UK and Germany. The observed patterns of VRR diversifications within and between firms across these countries differ from those of MRR. Such conclusions have theoretical and practical implications.

Theoretically, either general disclosure research or risk reporting research might usefully distinguish the trend of mandatory from voluntary risk reporting to avoid any misinterpretation of relying on aggregated disclosure scores to draw conclusions about either voluntary or mandatory risk reporting rather than directly observing the trend of each type separately. This chapter is the first to compare the main incentives for mandatory and voluntary risk reporting within and between firms across the USA, the UK and Germany over the period of 2005 to 2009. Consequently, this chapter is able to look at whether risk disclosure incentives vary within and between firms in these countries and, most importantly, over time.

Practically, the higher ability of legal and cultural values to express MRR variations across countries than VRR variations, which, in turn, are significantly more closely correlated to firm characteristics, gives signals to the IASB regarding its current efforts for international convergence. In essence, specific rules for mandating risk reporting should be weighted within each country's legal system and its cultural values to reduce any potential differences in risk reporting across countries.

Secondly, repeated measures multilevel analysis is preformed to mitigate problems that arise from relying on controversial methods used in prior research, such as OLS and FEM, by utilising direct interactions between firm-level analysis variables (firm risk levels and other firm characteristics) and country-level analysis variables (legal systems and cultural values). Most importantly, this method accounts for the problem of residual dependency, which is neither ignored nor corrected by using some other methods to correct the bias of residual (Gow et al., 2010). It is therefore recommended that future research in disclosure studies generally, and in cross-country disclosure studies particularly, employs this method to directly interact both firm and country characteristics.

The remainder of this chapter is organised as follows. The following section explains the research methods, including data collection and sample selection, the measurement and description of variables and the empirical model. The results are discussed in Section 9.3. Section 9.4 provides conclusions, highlights theoretical and practical implications, discusses limitations and suggests areas for future research.

9.2. Method

9.2.1. Data collection and sample selection

The total size of the sample is 1270, 1410 and 1005 firm-years for the USA, the UK and Germany, respectively. The main criteria of this selection are explained in previous chapters.

9.2.2. Variables: Measurement and description

Rank transformation is utilised for all variables among firm characteristics proxied by ratios to improve the distribution of these ratio variables, as suggested by prior research (e.g., Iman and Conover, 1979; Conover and Iman, 1980; Kane and Meade, 1998) and as in prior accounting literature (e.g., Lang and Lundholm, 1993; Baginski and Wahlen, 2003).

As seen from Table 9.1, firms across the USA, the UK and Germany voluntarily disclose approximately twice as much as they mandatorily disclose. This suggests that, on average, managers that mandatorily reveal risk information are more willing to reveal more risk information voluntarily. This result is consistent with the main findings of Chapters Seven and Eight, as will be explained further in the next section while interpreting the correlation between MRR and VRR. As can be indicated, relying on the standard deviation from the same table, MRR, VRR, FR, PE and DE fluctuate greatly between firms across these countries from 2005 to 2009 (standard deviations of these variables are 137.53, 122.76, 421.53, 98.08 and 26.31, respectively). There are limited fluctuations in market-risk measures between these firms and across these countries from 2005 to 2009.

Table 9.1: Descriptive statistics on risk reporting and firm characteristics variables

	Mean	Standard deviation	25%	Median	75%	Ob
MRR	128.690	137.530	65.250	113.780	198.000	3724
VRR	220.160	112.760	150.000	210.030	164.000	3721
TR	0.441	0.201	0.290	0.388	0.556	3801
SR	1.044	0.201	0.290	0.388	0.556	3796
USR	0.033	0.013	0.015	0.020	0.300	3851
FR	31.776	421.539	0.570	28.085	81.562	3822
LR	2.494	3.144	1.140	1.630	2.670	3812
SE	5.721	0.876	5.099	5.625	6.265	3771
PE	7.603	98.081	1.590	11.500	20.990	3691
GE	0.183	4.156	0.052	0.078	0.204	3768
DE	12.650	26.317	5.660	11.745	22.35	3400

This table provides descriptive information on variables. All variables are defined in Table 5.4. Ob is the number of observations for firm-years. The scale of both MRR and VRR is the number of statements that indicates risk; other variables are scaled by ratios, except SE, which is scaled by the natural logarithm of US dollar of total assets.

9.2.3. Empirical models: A repeated measures multilevel analysis

A repeated measures multilevel technique is used to measure variations in MRR and VRR within and between firms across the USA, the UK and Germany according to the following aggregate equation:

$$RR_{tij} = \beta_{0ij} + \beta_{1ij} Z_{tij} + \beta_{2ij} Z_{tij}^2 + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qij} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qij} + \sum_{q=1}^{Qc} \beta_{cq} Xcl_{qij} + \varepsilon_{tij} + r_{ij}$$

(9.1)

This aggregate equation combines level 1 and 2, which are as follows:

Level 1 concerns risk reporting variations within firms over 2005 to 2009 as a function of time and standard error, as follows:

$$RR_{tij} = \beta_{0ij} + \beta_{1ij} Z_{tij} + \beta_{2ij} Z_{tij}^2 + \varepsilon_{tij}$$

(9.2)

Level 2 concerns risk reporting variations between firms through observing the direct impact of between firms' indicators on intercept and growth rate, which can be described as follows:

$$\beta_{pij} = \beta_{p0j} + \sum_{q=1}^{Qr} \beta_{rq} Xfl_{qij} + \sum_{q=1}^{Qo} \beta_{oq} Xfl_{qij} + \sum_{q=1}^{Qc} \beta_{cq} Xcl_{qij} + r_{ij}$$

(9.3)

where, in all the above equations, RR_{tij} is risk reporting (MRR or VRR) of firm *i* in country *j* in year *t*. $\beta 0^{35}{}_{ij}$ is the intercept of firm *i* in country *j*. $\beta 1$ and $\beta 2$ are the slopes of time varying variables with firm *i* in country *j*. Z_{tij}, and $Z^2{}_{tij}$ are the linear and quadratic components of time of firm *i* in country *j* at time *t* during 2005 to 2009. These are the main parameters of level 1, each of which is determined according to polynomial curves. Coding the time period (2005 to 2009) is essential at this level because these codes affect the model's intercept interpretations.

The following parameters capture level 2 of repeated measures. Xfl_{qij} is a function of a firm's risk level characteristics; namely, total, systematic, unsystematic, financing and liquidity risks, and other characteristics or control variables; namely, firm size, profitability, growth and dividends. Xcl_{qij} is a function of a country's characteristics, which include a country's legal system and its cultural values. β_{rq}, and β_{oq} represent the effect of Xfl_{qij}, Xfl_{qij} on both linear and quadratic components of time of MRR and VRR growth rates. β_{cq} stands for the effect of Xcl_{qij} in code law and low cultural score countries relative to common law and high cultural score countries (as reference groups) on linear and quadratic components of time of MRR and VRR growth rates. Furthermore, ε_{tij} is the standard error.

The error structure is essential to consider at either level 1(ε_{tij}) or level 2 (r_{ij}). At the former level, the error or the residual is the variability in measuring MRR/VRR within firms over time. In other words, it is the difference between the estimated and the true value of

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[35] Econometrically, if the empirical model includes intercept and there are dummy variables, attention should be paid for whether each dummy has two or more than two categories. While the legal system has two categories (code and common law countries), each cultural dimension has more than two categories (scores for the USA, the UK and Germany). The results, therefore, report code law relative to common law countries and low scored countries in each cultural dimension relative to high scored countries (see, for instance, Heck et al., 2010; Gujarati, 2004).

MRR/VRR. Theoretically, in repeated measures designs, the most appropriate choice for the error structure[36] is the first order autoregressive structure with homogenous variance AR (1), as was argued by Heck et al. (2010), since this kind of data has a common trend, such as a decrease or increase according to how far away from each other they are in time. AR (1) assumes that the residual in 2005 is more likely to be less similar to the residual in 2009 than either would be to the residual in 2006.

Furthermore, in level 2, error structure is also considered, which can be reflected through random effects at that level, subject to the dimensionality of both residual variance and covariance matrix. The components may be random intercept, random linear slope and covariance between the intercept and the linear slope.

9.3. Empirical results

9.3.1. Correlation analysis

Table 9.2 provides Pearson and Spearman[37] correlation coefficients (assuming linear and non-linear associations, respectively). The associations between MRR and VRR based on parametric and nonparametric coefficients indicate a significant relation, at a p-value of 0.000. This result suggests that managers who exhibit high compliance with risk reporting

[36] There are many other error structure forms, ranging from lower (e.g., the scale identity) to higher sophistication (e.g., the first order autoregressive moving average structure (ARMA)) error structures (Heck et al., 2010; Hox, 2010).

[37] Multi-collinearity is initially checked through checking the coefficients among independent variables, and it is found that no variables exhibit collinearity problems (all coefficients are below 0.7, see Gujarati, 2004). To examine that statistically, the researcher calculated the condition index, which is the square root of maximum eigenvalue divided by minimum eigenvalue. If this index is more than 30, the variable has a severe muti-collinearity problem (e.g., Gujarati, 2004). The researcher checked this and did not find that any of the explanatory variables had this problem.

regulations in the USA, the UK and Germany have higher incentives to exhibit high levels of voluntary risk disclosure. This result supports the descriptive findings discussed in the previous section. This result is consistent with Chapter Seven's findings. More generally, it is consistent with Dye (1986). The significant associations between these two variables, on the one hand, and other variables, on the other, are consistent with prior empirical research (e.g., Beretta and Bozzolan, 2004; Linsley and Shrives, 2006; Abraham and Cox, 2007) that, in turn, validates this chapter's MRR and VRR scores.

The patterns of MRR over exploratory variables (TR, USR, FR, LR, PE and DE) differ from those of VRR. As a result, this supports arguments for the importance of treating MRR and VRR separately, to observe the main incentives for each risk type rather than correlating exploratory variables as main drivers for such incentive to aggregate scores to draw either conclusions for a specific risk disclosure type or conclusions for general risk disclosure. For more interactive associations to examine the current study hypotheses, the main results from the regression models are discussed in the following section.

Table 9.2 : Correlation matrix (Pearson above diagonal and Spearman below)

	MRR	VRR	TR	SR	USR	FR	LR	SE	PE	GE	DE
MRR		0.111***	0.327***	0.176***	0.262***	-0.182***	0.299***	0.165***	-0.305***	0.025	-0.419***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.00)	(0.133)	(0.000)
VRR	0.211***		-.0.173***	0.093***	-0.154***	0.199***	-0.182***	0.415***	0.031*	-0.020	0.149***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.065)	(0.226)	(0.000)
TR	0.333***	-0.145***		0.408***	0.433***	-0.293***	0.3000***	-0.450***	-0.362***	0.058***	-0.558***
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SR	0.132***	0.136***	0.408***		0.152***	-0.090***	0.069***	0.570**	-0.142***	0.031*	-0.172***
	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.059)	(0.000)
USR	0.252***	-0.14***	0.433***	0.152***		-0.188***	0.257***	-0.356***	-0.358***	-0.054***	-0.415***
	(0.000)	(0.000)	(0.000)	(0.000)		(0.0000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
FR	-0.174***	0.188***	-0.293***	-	-0.188***		-0.492***	0.394***	0.120***	-0.040**	-0.244**
	(0.000)	(0.000)	(0.000)	0.090***	(0.000)		(0.000)	(0.000)	(0.000)	(0.014)	(0.000)
				(0.000)							
LR	0.317***	-0.174***	0.300***	0.069***	0.257***	-0.492***		-0.369***	-0.233***	0.016	-0.320***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.342)	(0.000)
SE	0.154***	0.419***	-0.450***	0.057***	-0.355***	0.394***	-0.369***		0.274***	0.024	0.373***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.138)	(0.000)
PE	-0.314***	0.004	-0.362***	-	-0.358***	0.120***	-0.234***	0.274***		0.173***	0.442***
	(0.000)	(0.797)	(0.000)	0.142***	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)
				(0.000)							
GE	-0.021	-0.024	0.058***	0.030*	-0.054**	-0.040**	0.015	0.024	0.173***		-0.020
	(0.209)	(0.144)	(0.000)	(0.063)	(0.001)	(0.013)	(0.345)	(0.139)	(0.000)		(0.245)
DE	-0.445***	0.166***	-0.558***	-	-0.416***	0.244***	-0.322***	0.372***	0.433***	-0.020***	
	(0.000)	(0.000)	(0.000)	0.173***	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
				(0.000)							

This table shows the correlation analysis between risk reporting and firm characteristics. The numbers above the diagonal represent the linear Pearson coefficients; the numbers below the diagonal represent Spearman coefficients, while p-values are given in parentheses. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all two-tailed). The definitions for all variables are the same as in the previous table

9.3.2. Repeated measures multilevel analysis results

In this section, the main findings of MRR and VRR variations across the USA, the UK and Germany over 2005 to 2009 are introduced. Interoperations are introduced through a general structure for Panel A, which examines firm-level hypotheses, and Panel B, which examines country-level hypotheses, of Table 9.3 and 9.4. Panel A of Table 9.3 and 9.4 presents the coefficients of random effects of both firm- and country-level variables, which are essential to write the aggregate equation or each level's equation.

Panel B of Table 9.3 and 9.4 explains the variance of the random intercept of level 1 and both the random intercept and the random error of level 2. Such variance indicates how much variability in MRR/VRR remains at each level. Particularly, level 1 explains the variability in MMR/VRR within firms over 2005 to 2009 through the residual, which also reflects the population variability in firms' MRR/VRR average growth around their true trajectories. These errors are unobserved, so some assumptions about their distributions should be considered. There are two key parameters at level 1 to consider. The first parameter is the intercept that describes the firms' MRR/VRR changes at a specific point in time, which is 2005, so this intercept can be called the initial, or true, trajectory. The second parameter is the change rate, which describes the rate at which the MRR/VRR changed between 2005 and 2009. The Wald Z test is used to examine whether there are remaining residual outcomes to be explained by other variables at either level 1 or 2.

Additionally, this panel gives overall information about each model and its parameters, commencing with the null Model and passing through those models that reflect both a firm's and a country's characteristics. The main aims of using the null Model are: (1) to get a baseline to assess subsequent models; and (2) to get the total variations in MRR/VRR

within and between firms over time without any predictors. To assess the overall improvement of a model, change chi-square should be conducted[38] to examine a null hypothesis that there is no variation of MRR/VRR within and between firms over time within the population. If we reject this hypothesis, we should then explore in subsequent models (1-7) which predictors can anticipate variations in MRR/VRR.

Incentives for MRR variations: firm- and country-level analyses

Under the null Model from Panel B of Table 9.3, there is significant variation in MRR within firms over 2005 to 2009 (level 1), whereas there are considerable variations in intercept and slope between firms across countries (level 2), each of which is significant at a p-value of 0.000. The current study therefore rejects the null hypothesis that MRR variations within firms over 2005 to 2009 and between firms across the USA, the UK and Germany are 0. Particularly, the result reveals that 68%[39] of total MRR variations are between firms across the USA, the UK and Germany (Wald Z = 14.44, not tabulated), whereas just 3% of such variations are between these firms over 2005 to 2009 (Wald Z = 7.12, not tabulated). The remainder of MRR variations, which is 29% with Wald Z = 14.65 at p-values of 0.000, can then be attributed to within firms over 2005 to 2009. Under the same model, the result shows that there is a possibility to explain such variations by including the model with firm (firm's risk level under Model 1 and control factors under

[38] Decreasing the differences of -2 Log Likelihood (-2LL) means that the full model is improved. By using change chi-square, it is possible to examine such improvements statistically. The main rule is that the model fits if the difference between the -2LL for the full model and baseline model is greater than the value of the change chi-square (the critical point or the cut point of the chi-square distribution) (Field, 2009). All the models from 1-7 are statistically significant, indicating the higher ability of each model's predictors to improve its overall explanations and predictions.

[39] This expresses the intra-class correlation (ICC), which can be calculated at each level; for level 1, for instance, σ^2 level 1/ (σ^2 of level 1+ σ^2 of level 2).

model 2) and country (a country's legal system and its cultural factors – Models 3 to 7) characteristics, respectively.

To identify the extent to which the indicators of both firm and country characteristics are significantly related to the variability in MRR, Panel A of Table 9.3 is used. It commences with the null Model, which describes the shape of the firm's risk disclosure trajectories and determines whether the initial intercept and the random slope of time vary across firms or not. The results indicate that the initial intercept is significant.

Looking at firm risk level variables under Model 1 in Panel A, both firms' total and unsystematic risks are found to be significantly and positively correlated with MRR variations over 2005 to 2009 (t-statistics are 2.4 for both risk types, not tabulated), at $p<0.05$. This result suggests that firms across the USA, the UK and Germany vary their MRR subject to variations in their total and unsystematic risk. These results are consistent with theory and prior risk reporting research. Relying on capital needs theory; these firms' managers could have higher incentives to disclose more than the minimum of risk reporting requirements to help their investors reduce uncertainty over their future cash flows by providing more risk information than is mandated in their annual report narratives. Such result can be interpreted using signalling theory; hence, these firms' managers could have higher incentives to signal their ability to control their risks related to mandated requirements in order to distinguish themselves from those who do not manage their risks. These results are consistent with the findings in Chapters Seven and Eight, the main theoretical arguments of Linsley and Shrives (2006) and Dobler (2008), and the empirical findings of Abraham and Cox (2007) and Deumes and Knechel (2008).

Additionally, high-liquidity firms are likely to exhibit lower levels of MRR variations. In other words, the results report a significant and negative relation between firm liquidity risk, at a p-value of 0.000 (t-statistics = 3.6, not tabulated) and MRR. This result is consistent with Chapter Seven's findings within a UK context. This result could be interpreted either theoretically, based on signalling theory, or empirically, based on prior risk reporting research. Firms which have higher current ratios have strong liquidity positions (high-liquidity firms) and are more likely to signal strong positions to assure their investors about their high quality performance. The result is consistent with Marshall and Weetman (2007). Panel B of Table 9.3 is used in order to analyse how much a firm's risk levels improve the models' ability to explain variations in MRR.

Panel B of Table 9.3, under Model 1, shows that firm risk levels explain 17% (as R^2) of all MRR variations between firms across these countries. At the same time, differences in MRR between firms across countries decline considerably, to become 63%, at a p-value of 0.000 (Wald Z = 12.79, not tabulated). The variations in MRR within firms over 2005 to 2009, however, significantly increase, to 34%, at a p-value of 0.000 (Wald Z = 14.97, not tabulated). These results suggest that considering the variations in a firm's risk levels reduces the unexplained variations in MRR between firms across the USA, the UK and Germany. The significance of these variations, however, indicates that there are potential chances to explain such variations through considering other firm characteristics (as shown in Model 2).

Panel A of Table 9.3, under Model 2, indicates that, after adding the other firm characteristics, firms which have higher and lower variations in their systematic and liquidity risks, respectively, are more likely to exhibit higher levels of MRR variations across the USA, the UK and Germany over 2005 to 2009, at p-values of 0.061 and 0.001,

respectively. These results are consistent with the current study's findings in prior chapters and other prior risk reporting research. In addition to these risk levels, the current study finds that larger, less profitable firms that pay out fewer dividends are highly likely to be more diversifiable in their MRR.

Model 2 in Panel B of Table 9.3 reports that other firm characteristics improve the model's ability to predict and express variations in MRR between firms across the USA, the UK and Germany due to decreasing the (-2LL) of the model (significant at $p<0.05$). Specifically, these predictors, along with firm risk levels, significantly and steadily decrease the variations in MRR by 4%, compared to variations in MRR under Model 1. In other words, the result indicates that around 62% (59% intercept, 3% time) of MRR variations can be attributed to differences between the American, British and German firms. 38% of MRR variations are within these firms over 2005 to 2009. All these variations are significant at p-values of 0.000, which indicates that there remain variations of MRR, which might be explained by adding country characteristics, as shown in Tables 3 to 7.

Panel A of Table 9.3 under Models 3 to 7 explains the impact of both legal systems and cultural values on explaining how firms are diversified on their MRR during 2005 to 2009. The results show that both the intercept and the linear time component are still significant, at p-values of 0.000.

Under all these models, the results indicate that MRR variations across the USA, the UK and Germany over 2005 to 2009 are significantly and positively correlated to systematic risk variations, at a p-value of 0.000 (t-statistics = 18.4, not tabulated). This result is consistent with the current study's theoretical arguments based on managers' incentive theories, as shown Model 1, and based on its empirical findings, as shown in Chapter

Seven. This result is consistent with prior risk reporting research, such as the theoretical arguments of Linsley and Shrives (2006) and Vandemaele et al. (2009). The result shows non-significant associations between other risk variables and MRR. The current study can therefore accept **H2** and reject other firm-level hypotheses (**H1, H3, H5** and **H6**).

As shown in the same panel under these models, the results document that large, less profitable firms with high growth are more likely to influence MRR variations significantly and positively, all at p-values of 0.000. Such results are consistent with signalling theory; hence, large firms and high growth firms have greater abilities to exhibit higher compliance with risk reporting rules because such firms have a greater ability to collect and prepare their risk disclosure at a lower average cost relative to small size or low growth firms. Less profitable firms, however, could have incentives to disclose more to justify their performance and related risks.

From Models 3 to 7, the researcher finds that legal systems and cultural values have a significant influence on MRR variations, at p-values of 0.000. The interpretations of these associations are subject to the combination of legal system and cultural values. Particularly, once the model combines a country's legal system and its score of PD and MAS, the current study finds that firms in code law countries (Germany) exhibit significantly higher levels of MRR variations than firms from common law countries (the USA and the UK). These results suggest that, given a country's legal system, its PD and MAS have an identical impact on MRR through either their direct effects or through firm characteristics.

Likewise, the results report that a given legal system and a country's UA, IND and LTO convey the same content, which explains why firms vary in disclosing their MRR.[40]

A remarkable improvement of the model's ability to explain MRR variations occurs once the current study includes, in subsequent models, both legal and cultural exploratory variables. Hence, Models 3 to 7 under Panel B of Table 9.3 show that both country and firm characteristics can precisely explain around 73% of MRR variations between American, British and German firms. The model's ability to explain MRR variation increases markedly, more than two-fold, by adding country factors. One could anticipate such influences because these factors might have a direct impact on each country's regulations, which in turn can be considered a principle determinant of mandated risk indicator statements within each country's context, and then an essential driver of MRR variations. The significance of within and between firms' variations at level 1 and 2, respectively, expresses potential possibilities for improving these models' abilities to decrease unexplained MRR variations by expanding these models by some other explanatory variables at either firm- or country-level analyses.

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[40] The result indicates that firms from countries with lower PD, UA, IND and LTO scores are more likely to provide significantly lower MRR than firms from countries that have high scores of these cultural values. The result of IND is consistent with pre expectation based on Gray (1988) framework, while the other results are consistent with such framework. One main explanation, as one could argue, is that revealing information about risk differs from revealing general information (as was theorised and hypothesised in general disclosure research, for a review see e.g., Doupnik and Tsakumis, 2004). To specify, disclosing risk information could have negative effect on investors especially for those whom do not aware of these risks. In particular, firms from countries which highly assess UA and LTO (Germany is an example of such a country) are more likely to provide more information about risk to avoid any possibility of increasing their uncertainty. Furthermore, firms from countries with lower MAS scores are more likely to be highly motivated to provide more mandated risk disclosures in their annual report narratives than those from highly scored MAS countries. These results are consistent with the prior empirical findings of Jaggi and Low (2000) and Hope (2003).

Most importantly, the current study finds the interaction between a country's legal system and its cultural values is more likely to be one of complements than substitutes.[41] The researcher thus accepts **H7.**

This result answers two questions addressed by prior research. The first is Hope's (2003) question about the extent to which a country's legal system and its cultural values are substitutes or complements. The second is Doupnik and Tsakumis's (2004) question about the extent to which the culture of a country can influence its rules, especially after full adaption of IFRSs in many countries around the world. Hence, this result suggests that even under the new approach of international convergence through IFRSs, a country's legal system and its cultural values have higher explanatory power to interpret any MRR variations within and between firms.

[41] Including the legal system without the cultural variable has the following impact (not reported): it was found that the legal system is non-significant with variability of MRR and VRR. The model's ability to interpret MRR and VRR differences within and between firms across countries decreases. Including the cultural values separately has the following impacts, the cultural values are significantly associated with MRR rather VRR. Including the model by those dimensions improved the model's ability to explain the variations in MRR than it did in VRR.

Table 9.3: Repeated measures multilevel analysis of MRR

Panel A: Estimates of fixed effects (MRR)

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	104.83*** (0.000)	63.84*** (0.000)	131.45*** (0.000)	188.87*** (0.000)	188.87*** (0.000)	188.87*** (0.000)	-8.93 (0.537)	188.87*** (0.000)
TR		21.98** (0.016)	-1.33 (0.891)	-14.29 (0.117)	-14.29 (0.117)	-14.29 (0.117)	-14.29 (0.117)	-14.29 (0.117)
SR		10.68 (0.139)	13.57* (0.061)	30.32*** (0.000)	30.32*** (0.000)	30.32*** (0.000)	30.32*** (0.000)	30.32*** (0.000)
USR		24.20** (0.016)	11.11 (0.271)	-.11.76 (0.178)	-.11.76 (0.178)	-.11.76 (0.178)	-.11.76 (0.178)	-.11.76 (0.178)
FR		-8.03 (0.358)	-10.57 (0.229)	0.95 (0.905)	0.95 (0.905)	0.95 (0.905)	0.95 (0.905)	0.95 (0.905)
LR		32.27*** (0.000)	28.06*** (0.001)	8.68 (0.285)	8.68 (0.285)	8.68 (0.285)	8.68 (0.285)	8.68 (0.285)
SE			4.69 (0.723)	56.34*** (0.000)	56.34*** (0.000)	56.34*** (0.000)	56.34*** (0.000)	56.34*** (0.000)
PE			-30.05*** (0.000)	-26.38*** (0.000)	-26.38*** (0.000)	-26.38*** (0.000)	-26.38*** (0.000)	-26.38*** (0.000)
GE			11.49** (0.018)	12.97*** (0.000)	12.97*** (0.000)	12.97*** (0.000)	12.97*** (0.000)	12.97*** (0.000)
DE			-66.00*** (0.000)	-6.37 (0.500)	-6.37 (0.500)	-6.37 (0.500)	-6.37 (0.500)	-6.37 (0.500)
Legal (0)				83.06*** (0.000)	-115.74*** (0.000)	-115.74*** (0.000)	83.06*** (0.000)	-115.74*** (0.000)
PD(35)				-198.80*** (0.000)				
UA (35)					-198.80*** (0.000)			
IND (67)						-198.80*** (0.000)		
MAS (62)							198.8*** (0.000)	
LTO (25)								-198.80*** (0.000)
Time	10.69*** (0.000)	8.97*** (0.000)	8.15*** (0.000)	7.24*** (0.000)	7.24*** (0.000)	7.24*** (0.000)	7.24*** (0.000)	7.24*** (0.000)
Quadratic time	-0.65 (0.348)							
N-S	737	737	737	737	737	737	737	737
Ob	3685	3685	3685	3685	3685	3685	3685	3685

Panel B: Estimates of covariance (MRR)

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
V RM (within firms)/ICC	4177.62*** (0.000)	4298.51*** (0.000)	4312.81*** (0.000)	4584.51*** (0.000)	4584.51*** (0.000)	4584.51*** (0.000)	4584.51*** (0.000)	4584.51*** (0.000)
V I (between firms across countries)/ICC	9731.70*** (0.000)	8056.28*** (0.000)	6875.09*** (0.000)	2675.64*** (0.000)	2675.64*** (0.000)	2675.64*** (0.000)	2675.64*** (0.000)	2675.64*** (0.000)
VT (between firms across countries)/ICC	385.81*** (0.000)	388.57*** (0.000)	392.52*** (0.000)	267.13*** (0.000)	267.13*** (0.000)	267.13*** (0.000)	267.13*** (0.000)	267.13*** (0.000)
ICC (VRM)	29%	34%	38%	61%	61%	61%	61%	61%
ICC (VI)	68%	63%	59%	36%	36%	36%	36%	36%
ICC (VT)	3%	3%	3%	3%	3%	3%	3%	3%
R^2 (VI)	---	17%	29%	72.5%	72.5%	72.5%	72.5%	72.5%
Change -2LL		74.38	91.97	525.43	525.43	525.43	525.43	525.43
Change chi-square		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table provides the repeated measures of two multilevel analyses of MRR. Panel A provides the estimates of the predictors through seven models. *, **, *** indicate significance at 0.1, 0.05 and 0.01, respectively (all one-tailed except when sign is not predicted or mixed). The null Model presents the impact of both (non-) linear component of time on MRR. The successive models provide how the predictive variables can express variation in MRR within and between firms across the USA, the UK and Germany. Therefore, Model 1 explores the impact of a firm's risk levels on its MRR variations. Model 2 provides the impact of firm risk level and the effects of four other firm characteristics; namely, size, profitability, growth and dividends, respectively. The subsequent models provide the interaction of firm characteristics with country characteristics, combining legal system with a single aspect among five aspects of the cultural dimensions. T-statistics are given in parentheses, N-S is the number of subjects under analysis and Ob is the number of observations for firm-years.

Panel B provides estimates of variance of each level of the analysis; the variance of repeated measures (VRM) therefore expresses the variance of MRR that can be attributed to variation within firms over five years (time series). Furthermore, the variance of intercepts (VI) expresses the variance of MRR that can be attributed to variation between firms across the USA, the UK and Germany, and the variance of time (VT) expresses the variance of MRR that can be attributed to variation between firms over time. The ICC is the intra-class correlation, which can be calculated at each level; for level 1, for instance, σ^2 level 1/ (σ^2 of level 1+ σ^2 of level 2). R^2 explains the extent to which the overall model's predictors can implicitly explain changes of MRR, which can be calculated as (σ^2 *M1*- σ^2 *M2*/ σ^2 *M1)*; hence, *M1*is the null Model variance component, whereas *M2* refers to the current model's predictors. While change of -2 Log Likelihood (-2LL) is employed to assess each model's improvements, change chi-square is used to examine such improvements statistically. Wald Z values are given in parentheses. The definitions of all the variables are the same as in previous tables.

Incentives for VRR variations: firm- and country-level analyses

Panel B of Table 9.4, under the null Model, shows that approximately 67% of the total variations of VRR are between firms across the USA, the UK and Germany during 2005 to 2009. Additionally, the rest (33%) of these variations are within firms across countries over the period of study. All these variations are significant, at p-values of 0.000, which suggests that there is significant variation of VRR at each level to be explained by other variables at either level 1 or level 2.

As can be seen from Panel A of Table 9.4 regarding Model 1, total, systematic and financing risks are significantly and positively associated with variability of VRR across these countries. This result suggests that high variability of firms' VRR across countries is significantly associated with the high levels of variability of firms' returns or the variability of firms' returns around the market returns (total and systemic risk, respectively). Furthermore, firms which have high levels of financing problems are likely to provide higher levels of risk disclosure voluntarily in their annual report narratives.

These results are consistent with what the current study anticipates based on managers' incentive theories. Such results are also consistent with empirical research (e.g., Abraham and Cox, 2007; the current study's findings in Chapter Seven). The variability of firms' VRR across the USA, the UK and Germany, however, is significantly and negatively more likely to be related to firms' idiosyncratic risk. This result, however, is still consistent with some theoretical arguments (see, for instance, Linsley and Shrives, 2005, 2006) and empirical results (e.g., Marshall and Weetman, 2002; the current study's findings in Chapter Seven).

Model 1 under Panel B of Table 9.4 suggests the R^2 of firm risk level predictors that explain the variability of the true, or initial, intercept and the growth rate of VRR between firms across the USA, the UK and Germany are 11% and 10%, respectively. The ICC suggests that 62.3% of the variability of VRR can be attributed to the variability of VRR between firms across the three countries. Most importantly, one could expect that these systematic variations can be explained by other firm characteristics (control variables in Model 2) which improve the model's ability to express VRR deviation between firms across the USA, the UK and Germany.

Model 2 contains other firm characteristics and firm risk levels. The researcher finds that variations in firms' VRR across countries over time are significant and can be attributed to differences in both firm size and profitability, at p-values of 0.000 and 0.024, respectively. It is apparent from the same panel that firms across these three countries significantly vary their VRR as a response to variation in their systemic, unsystematic and financing risks, at p-values of 0.011, 0.010 and 0.033. This result shows these VRR variations are positively associated with systematic and financing risks, whereas they are negatively related to firms' unsystematic risks.

Therefore, the variations of VRR, under Model 2 in Panel B of Table 9.4, between firms across countries over 2005 to 2009, decrease to 57.1%. The remainder (42.9%) is the variability of VRR within American, British and German firms over 2005 to 2009. In other words, the firm characteristics (risk and control variables) implicitly explain approximately 29% of the variability of VRR between firms across these three countries. The variations of VRR between firms are more likely to be attributed to variability of both firm risk levels and other characteristics (control variables, especially firm size and profitability) than firm risk levels only. Together, the results explain, nevertheless, that there is still significant

changeability of VRR at each level, which can be explained by systematic changes of between countries characteristics (provided from Models 3 to 7).

Models 3 to 7 explain the effect of country-level characteristics on explaining VRR variability among and between firms across these three countries. The result shows that VRR variations are significantly and positively associated with variability of firms' systematic and financing risks (at $p<0.000$), whereas the researcher finds these VRR variations are more likely to be statistically and negatively correlated to firms' unsystematic risk (at $p<0.013$). Based on these results, the researcher accepts **H2** and **H5** and rejects **H1**, **H3** and **H6**.

The current study finds significant and positive (negative) relations between VRR variations and a firm's size (profitability). The result documents that VRR across countries is not statistically associated with both legal system and cultural values. The combination of both legal system with PD or MAS are the only exceptions to such findings. Hence, the current study finds that variability of VRR between firms in code law countries (Germany) is higher than the variability of VRR between firms in common law countries (the USA and the UK).

The results, through Model 3 to Model 7 in Panel A of Table 9.4, nonetheless explain that there are slight improvements in these models' abilities to explain differences of VRR among firms across the USA, the UK and Germany. Hence, there is still significant variation of VRR, which can be explained by other predictors at either level 1 or level 2 (Wald Z is significant at a p-value of 0.000). The systematic changes of country characteristics explain 29% of the total variations of the random intercept of VRR between firms across these three countries.

These results suggest that differences in VRR between firms across the USA, the UK and Germany are more likely to be statistically correlated with firm characteristics that are derived hypothetically based on managers' incentives theories. In essence, the current study finds that both legal and cultural factors have less influence in explaining variations in VRR within firms across countries. This result, therefore, supports accepting **H7**.

Table 9.4: Repeated measures multilevel analysis of VRR

Panel A: Estimates of fixed effects (VRR)

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	190.14***	195.73***	127.24***	126.88***	126.88***	126.88***	118.60***	126.88***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TR		15.70*	4.87	2.09	2.09	2.09	2.09	2.09
		(0.07)	(0.603)	(0.825)	(0.000)	(0.000)	(0.825)	(0.000)
SR		26.36***	17.28**	18.47***	18.47***	18.47***	18.47***	18.47***
		(0.000)	(0.011)	(0.005)	(0.000)	(0.000)	(0.005)	(0.000)
USR		-38.18***	-23.97***	-23.44**	-23.44**	-23.44**	-23.44**	-23.44**
		(0.000)	(0.010)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
FR		31.00***	17.48**	17.04**	17.04**	17.04**	17.04**	17.04**
		(0.000)	(0.033)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
LR		-10.61	-1.94	-.3.07	-3.07	-3.07	-.3.07	-3.07
		(0.204)	(0.813)	(0.712)	(0.712)	(0.712)	(0.712)	(0.712)
SE			134.06***	137.58***	137.58***	137.58***	137.58***	137.58***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PE			-15.40**	-14.74**	-14.74**	-14.74**	-14.74**	-14.74**
			(0.024)	(0.03)	(0.030)	(0.030)	(0.03)	(0.030)
GE			1.011	1.35	1.35	1.35	1.35	1.35
			(0.827)	(0.770)	(0.770)	(0.770)	(0.770)	(0.770)
DE			2.43	3.90	3.90	3.90	3.90	3.90
			(0.0792)	(0.686)	(0.686)	(0.686)	(0.686)	(0.686)
Legal (0)				14.13*	5.85	5.85	14.13*	5.85
				(0.092)	(0.491)	(0.491)	(0.092)	(0.491)
PD (35)				-8.28				
				(0.353				
UA (35)					-8.28			
					(0.353)			
IND (76)						-8.28		
						(0.353)		
MAS (62)							8.28	
							(0.353)	
LTO (25)								-8.28
								(0.353)
Time	25.18***	23.35***	22.28***	21.91***	21.91***	21.91***	21.91***	21.91***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Quadratic time	-3.24***	-3.04****	-3.13***	-3.06***	-3.06***	-3.06***	-3.06***	-3.06***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N-S	737	737	737	737	737	737	737	737
Ob	3685	3685	3685	3685	3685	3685	3685	3685

Panel B: Estimates of covariance (VRR)

	Null Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
V RM (within firms)	3718.97*** (0.000)	3886.98*** (0.000)	3994.45*** (0.000)	3951.31*** (0.000)	3951.31*** (0.000)	3951.31*** (0.000)	3951.31*** (0.000)	3951.31*** (0.000)
V I (between firms across countries)	7212.12*** (0.000)	6386.18*** (0.000)	5136.33*** (0.000)	5123.92*** (0.000)	5123.92*** (0.000)	5123.92*** (0.000)	5123.92*** (0.000)	5123.92*** (0.000)
VT (between firms across countries)	277.89*** (0.000)	250.19*** (0.000)	203.21*** (0.000)	214.76*** (0.000)	214.76*** (0.000)	214.76*** (0.000)	214.76*** (0.000)	214.76*** (0.000)
ICC (VRM)		36.7%	42.9%	42%	42%	42%	42%	42%
ICC (VI)	65%	60%	55%	55%	55%	55%	55%	55%
ICC (VT)	2.4%	2.3%	2.1%	3%	3%	3%	3%	3%
R^2 (VI)	---	11%	29%	29%	29%	29%	29%	29%
Change -2LL Change chi-square		94.44 (0.000)	147.25 (0.000)	14.75 (0.000)	14.75 (0.000)	14.75 (0.000)	14.75 (0.000)	14.75 (0.000)

This table provides the repeated measures of two multilevel analyses of voluntary risk reporting (VRR) across the USA, the UK and Germany. All other variables' interpretations as introduced in the previous table.

Overall, after comparing MRR and VRR variations, the current study reports that country factors have a higher ability to express MRR variations than those of VRR. To investigate this conclusion further, the current study analyses the impact of both legal and cultural values on MRR_T's components, which are MRR_I and MRR_V in the USA and Germany. The result (not tabulated)[42] confirms the significant impact of legal system on MRR_I rather than MRR_V, which in turn supports that providing even more information about mandated risk is more likely to be associated with firms' managers' incentives. The result then shows the importance of differentiating mandatory from voluntary disclosure to adequately estimate the impact of both legal systems and cultural values on each risk disclosure type. Based on this, the current study accepts **H8.** Table 5 summarises all results under Model 7.

[42] The results are available from the author upon request.

Table 9.5: Summary of hypotheses results of MRR and VRR under Model 7; firm and country characteristics.

				ES	MRR		VRR	
Firm-level characteristics	A firm's risk levels	TR	**H1**	+	NS	R	NS	R
		SR	**H2**	+	S (+)	A	S (+)	A
		UNR	**H3**	?	NS	R	S (-)	A
		FR	**H5**	+	NS	R	S (+)	A
		LR	**H6**	+	NS	R	NS	R
	Control variables	SE		+	S(+)		S(+)	
		PE		+	S(-)		S(-)	
		GE		+	S(+)		NS	
		DE		+	NS		NS	
Country-level characteristics	Legal system	CL	**H7 / H8**	PD	S(+) relative to CM-L		S(+)	A
				UA	S(-) relative to CM-L		NS	
				IND	S(-) relative to CM-L		NS	
				MAS	S(+) relative to CM-L		S(+)	
				LTO	S(-) relative to CM-L		NS	

All variables have the same definitions as provided in previous tables. ES is the excepted direction, S means significant, + or – means positive or negative associations, respectively. A means accepted hypothesis, R means rejected hypothesis.

9.4. Robustness tests

The researcher checked the MRR and VRR variations either across the USA, the UK and Germany or individually in each country in many different ways. First, the study examines the extent to which the results using repeated measures multilevel analysis are sensitive to change as a response to specific changes in both dependent and independent variables. The study, therefore, raises some risk level variables (specifically, the researcher increases volatility and beta) and both MRR and VRR by 10%. The researcher then recalculates all the transformed scores and re-runs the analysis. The results of the MRR and VRR variations within and between the US, UK and German firms were identical.

Second, original data without any transformation were utilised; the results are very similar to what the researcher obtained with ranked transformations.

Third, the researcher used some other proxies of some of these variables; in particular, market capitalisations in US dollars, return on assets (ROA) and dividend per share instead of total assets in US dollars, return on equity and dividend payout as a proxy of firm's size, profitability and dividend, respectively. The researcher draws the same conclusions under these new proxies.

Fourth, the researcher divided each country sample randomly into two sub-samples, recalculating the transformed scores of these new samples and then re-running the analysis. The results of these sub-samples are similar either to each other or to each country's whole sample.

9.5. Concluding remarks

This chapter uses repeated measures multilevel analysis to empirically investigate the following questions: Are there any variations in both mandatory and voluntary risk reporting within and between firms across these countries from 2005 to 2009? If yes, to what extent can characteristics at both firm and country level explain such variations, concerning risk factors at the former level?

The results document significant MRR and VRR variations within and between US, UK and German firms. The researcher finds that the legal systems and cultural values have significantly high abilities to express MRR variations. The current study in this regard contributes to prior research (see Doupnik and Tsakumis, 2004) that questions the extent to which the cultural values of a country can influence its rules, especially after the full adoption of IFRSs in many countries around the world. The results report that even under the new approach of international convergence, the national culture and legal system of a country are still significant factors in expressing MRR variation.

Conversely, both legal and cultural factors are found to be less important in explaining VRR variations among firms across countries. These results suggest that differences in VRR among firms across the USA, the UK and Germany are more likely to be statistically correlated with firm characteristics that are derived hypothetically based on managers' incentives theories.

These results have theoretical and practical implications. First, the significant variations of MRR and VRR within and between firms across the USA, the UK and Germany over 2005 to 2009 express that there are other chances to expand the current design either at firm or

country level by involving other explanatory variables to reduce the unexplained variations in risk reporting. Hence, these variables significantly improved the interpretations of the observed variations between firms, known as level 2 variations, than those occurring within firms, known as level 1 variations. In this regard, the current study suggests more attention should be paid to those variables that may express variations in MRR and/or VRR within firms over 2005 to 2009. There is a recent trend in accounting literature (e.g., Bamber, Jiang and Wang, 2010) that looks more deeply at the demographic characteristics of managers (e.g., educational background, such as managers who come from finance, accounting or legal backgrounds; distinguishing managers who have military experience from those who do not) in this kind of research. Bamber et al. (2010) find personal managerial styles play a significant role in explaining cross-sectional variation in voluntary financial disclosure.

The second theoretical implication the current study provides is a new empirical model concerning how to interact both the cross-sectional and time series effects simultaneously with correcting for the residual dependency. The current study can be expanded through adding one or more levels to its two levels. Future research may examine a different set of countries, or consider the sector effect. In such cases, the potential design will rely on firms nested within sectors, which are in turn nested within countries over years, leading to three levels of analysis.

The practical implication of the previous results is providing empirical evidence for the current international convergence efforts by either considering each country's legal system and its cultural values as essential to minimise diversifications of the mandatory efforts, or considering managerial incentives within each country to minimise variation in their voluntary disclosure.

Chapter Ten: Summary, theoretical and practical implications, limitations and suggestions for future research

10.1. Overview

The main aim of the current study was to identify the main incentives for risk reporting across three different country settings, each of which exhibits a distinctive approach to risk reporting. The first, the UK approach, encourages voluntary risk reporting rather than mandatory regulations; the second, the German approach, mandates the provision of risk information in annual report narratives. The third, the US approach, is a compromise between enforcement and encouragement to provide risk information mandatorily and/or voluntarily. Investigating the incentives for risk reporting within this group of countries answers the calls of some prior research (e.g., Linsley and Shrives, 2006; Dobler, 2008) to deepen our understanding of what motivates firms' risk disclosure.

The current study considered how and the extent to which firms in these three countries respond to their significant underlying risk by disclosing more or less risk information either mandatorily and/or voluntarily. Observing such response(s) gives signals to regulators within each country, practically, of whether a firm responds properly to significant exposure to specific underlying risks by disclosing and explaining more (based on theory with mixed results from prior research) about these risks mainly mandatorily (highly expected within US and German contexts) and/or voluntarily (highly expected within a UK context).

This chapter summarises the main empirical findings set out in Chapters Six, Seven, Eight and Nine. Then, the main theoretical and practical implications are highlighted, followed by discussing the limitations of the current study and providing suggestions for future research.

10.2. Summary

To investigate the main incentives for risk reporting across the USA, the UK and Germany, firm- and country-level analyses were performed. In both levels, risk reporting was the main variable (the dependent variables), compromising either mandatory or voluntary risk reporting (MRR or VRR), which was measured using automated content analysis. Three main steps were performed to capture the levels of MRR and VRR in each country.

In the first step, generating a final risk word list was achieved through relying on analysing prior research, using possible synonyms from previous sources and using annual reports narratives to identify any other words related to those identified based on the other two sources.

In the second step, a command file was created based on the final risk word list to text-search annual reports narratives for all statements containing at least one word from this final list of risk words. Before commencing the second step, however, annual reports in each country were further prepared by either converting them to texts so as be readable by N6, or eliminating specific sections which reflected mandated requirements within the US (item 1.a for Risk Factor; 7.a for Quantitative and Qualitative Disclosure about Market Risk) and German (the Risk and Opportunity or Outlook sections) contexts. For the UK context, text-searching was undertaken without eliminating any annual reports narrative sections because there are no existing requirements for disclosing risk information in specific sections.

The last step was aggregating scores from these sections with other sections (the rest of the annual report narratives) to obtain scores that proxied MRR and VRR by distinguishing between scores that provide mandatory risk disclosure (in either specific sections or

according to some requirements in accounting standards, as discussed in Chapter Three) and aggregating risk disclosure scores (based on the final list of risk words, as discussed in Chapter Five).

Firm-level analysis variables are mainly a firm's risk levels and other firm characteristics. A firm's risk level variables are proxied by two main measures: market- and accounting-risk measures. While the market-measures contain volatility, market beta and volatility of standard error of CAPM to measure total, systematic and unsystematic risks, respectively, the accounting-measures contain current ratio and leverage to measure liquidity and financing risks. Other firm characteristics include some control variables: a firm's size, profitability, growth and dividends.

To identify the extent to which there are significant differences in a firm's risk levels and its risk reporting levels, multivariate analysis of variance (MANOVA) was preformed, as shown in Chapter Six. The results indicate that there are significant differences between firms across the USA, the UK and Germany in their risk and risk reporting levels. Correlation analysis was utilised to associate differences in risk levels with differences in risk disclosures. The results identified significant associations between risk and risk reporting levels, as expected based on the theoretical argument (as discussed in Section 2.4) in which one could expect that firms respond significantly to their underlying risks by disclosing risk information in their annual reports narratives. These results are also consistent with most prior research (as discussed in Section 3.3 and Section 4.3).

Based on UK data, and by regressing market- and accounting-risk measures on aggregated, voluntary and mandatory risk disclosures, linear mixed model (LMM) was performed against two other models widely used by prior research, specifically, ordinary least squares

(OLS) and fixed effect model (FEM), as shown in Chapter Seven. The results revealed that managers that exhibit high compliance with risk reporting requirements are more likely to reveal more risk information voluntarily in their annual report narratives than managers that exhibit low levels of compliance with risk regulation. This result is consistent with Dye (1986). The results explain that the observed trend of mandatory risk disclosure is different from voluntary risk reporting trends relative to these firms' underlying risks. Voluntary risk disclosure is more sensitive to underlying risks than mandatory risk disclosure. Specifically, the results demonstrate that both aggregated and voluntary risk disclosure are significantly and positively associated with risk-adjusted return and both systematic and financing risks. These results are consistent with managers' incentives theories, suggesting that managers are motivated to provide higher levels of risk information voluntarily to reduce both information asymmetry and agency costs, as well as some prior empirical literature (e.g., Abraham and Cox, 2007; Kothari et al., 2009).

There were, however, significant negative associations between aggregated and voluntary risk disclosures and total and liquidity risks, suggesting that firms with higher total risk or lower liquidity levels are less likely to provide risk information in their annual report narratives. Whilst this result conflicts with prior theory, it is consistent with some empirical literature (e.g., Marshall and Weetman, 2002, 2007). This chapter also found significant and positive associations between aggregated and voluntary risk reporting and firm size and profitability. These results are consistent both with agency theory and prior empirical research (e.g., Linsley and Shrives, 2006; Abraham and Cox, 2007). In contrast with both aggregated and voluntary risk disclosure, mandatory risk disclosure is found to be unrelated to firm risk levels. The results suggest that mandatory risk disclosure is significantly and positively responsive to firm size.

To associate variations in firm risk levels to variations in MRR and VRR within and between firms in the USA, the UK and Germany over 2005 to 2009, repeated measures multilevel analysis (RMMLA) was performed, as shown in Chapter Eight.

For the USA, the results indicate that firms are more sensitive to providing their MRR and VRR as a function of their risk levels, along with other firm characteristics. Specifically, in large, less profitable US firms, variations in VRR were significantly influenced by volatility and current ratio. Furthermore, the results report that in large, less profitable and high growth US firms, variations in MRR were significantly associated with volatility, beta and current ratio. The result indicates that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce systematic unexplained variations between firms' MRR than VRR. The results suggest that the US firms pays close attention to volatility, beta and current ratio as proxies for total, systematic and liquidity risks by disclosing significantly more risk information mandatorily and/or voluntarily, with an exception in the latter case of liquidity risk.

For the UK firms, variations in VRR were significantly subject to firm risk levels, specifically systematic and liquidity risks rather than other firm risk types. Significantly, in those firms, variations in MRR were only determined by firm size.

The results also indicate that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce systematic unexplained variations in either MRR or VRR. The results suggest that UK firms pay closer attention to beta and current ratio as proxies for systematic and liquidity risks than they pay to other risks, by disclosing significantly high levels of risk information voluntarily. The UK firms, however, did not pay any attention to their risks when providing mandated risk reporting.

For German firms, providing risk information mandatorily and/or voluntarily was a function of their risks. This result supports the fact that even in highly mandated risk reporting markets, there are still managerial incentives to voluntarily disclose further risk information.

The results indicate that firm risk levels, along with other firm characteristics, have significantly higher abilities to reduce systematic unexplained variations in either MRR or VRR. The results suggest that German firms pay closer attention to volatility, beta and current ratio as proxies for systematic and liquidity risks than they pay to other risks, by disclosing significantly higher levels of risk information mandatorily. These firms, however, pay closer attention to all their risks (except liquidity risk) when providing VRR.

Based on Chapter Eight's data and analysis, Chapter Nine concerned the pooled associations across these countries rather than considering these associations in each country. The analysis, therefore, integrated firm-level analysis, which was utilised in all previous chapters, with country-level analysis, which was produced in Chapter Nine. The results indicate that the legal systems and cultural values have significantly high abilities to express MRR variations. This result answered Doupnik and Tsakumis's (2004) question regarding the extent to which a country's culture can influence its rules, especially after the full adoption of IFRSs in many countries around the world. The result reports, therefore, that even under the new approach of international convergence, the national culture and legal system of a country are still significant factors in expressing any variations in MRR.

Conversely, both legal and cultural factors were found to be less important in explaining VRR variations among firms across countries. These results suggest that variations in VRR

between firms across the USA, the UK and Germany were likely to be statistically correlated with firm characteristics that were derived hypothetically based on managers' incentives theories.

10.3. Theoretical and practical implications

10.3.1. Theoretical implications

The results summarised in the previous section have some distinctive theoretical implications. First, it is suggested that distinguishing between the observed trend of mandatory and voluntary risk reporting is essential, supporting the main argument of the current study, which is that each risk disclosure type has its own drivers. This result, therefore, does not support those studies that do not distinguish voluntary from mandatory risk reporting (e.g., Linsley and Shrives, 2000, 2005, 2006; Abraham and Cox, 2007) while studying the incentives for risk reporting. Therefore, the current study documented different conjectures between the observed trend of MRR and firm risk levels compared to the observed trend of VRR. The results also suggest that the trend of aggregated risk disclosure is consistent with the trend of voluntary risk disclosure relative to a firm's characteristics, such as its risk levels and other characteristics (e.g., firm size, profitability, growth, dividends and corporate governance mechanisms, such as board characteristics). This result suggests that aggregated risk disclosure can be used as a proxy for voluntary risk disclosure and in both cases should be differentiated from mandatory risk reporting.

Second, previous results support Dobler's (2008) theoretical argument that studying risk reporting incentives is crucial even within highly regulated countries like the USA and Germany. The results suggest that managers still have incentives to disclose additional

information above these requirements. This could significantly add to compliance disclosure literature (e.g., Li, 2010) by emphasising the importance of widening this research scope to pay more attention to variations above the mandated requirements (e.g., IFRS adoption), which provide a minimum of information to investors, as argued through regulatory theory (e.g., Leftwich, 1980; Cooper and Keim, 1983; Fields et al., 2001; Ogus, 2001).

The third theoretical implication of the previous results was utilising a new empirical model (MLA) that was introduced through either using the linear mixed model, shown in Chapter Seven, or RMMLA, shown in Chapters Eight and Nine, concerning how to interact both the cross-sectional and time series effects simultaneously with correcting for the residual dependency.

Fourth, the significant variations of MRR and VRR within and between firms either in or across the USA, the UK and Germany over 2005 to 2009 expressed that there are other chances to expand the current design either at firm- or country-level analysis by involving other explanatory variables to reduce the unexplained variations in risk reporting. Hence, all explanatory variables used by the current study significantly improved the interpretations of the observed variations between firms, which were known as level 2 variations, more than those occurring within firms, which were known as level 1 variations. In this regard, the current study suggests more attention should be paid to those variables that may express variations in MRR and/or VRR within firms over 2005 to 2009. All these expansions are discussed in the section on limitations and suggestions for future research.

10.3.2. Practical implications

These previous results have some distinctive implications for regulators in the USA, the UK and Germany. First, the results support the regulatory trend within the USA; the results indicate that firms providing more risk information either mandatorily and/or voluntarily are subject to significant underlying risks. This result could be interpreted as US firms trusting the market's ability to correct any overestimations of these firms' uncertainties by disclosing more risk information. The theoretical expansion for this argument was the extent to which investors can understand risk information in annual report narratives, as was addressed within the US market by Li (2008), who used a text search for the words *risk* and *uncertainty* in 10-K annual filings as a direct measure of risk information content. Li's (2008) findings support investors becoming more familiar with risk information as time passes (one-year period).

Second, within the UK context, the practical implications stem from supporting the current trend of UK regulation, which encourages firms to voluntarily disclose information about their risks rather than making such disclosure compulsory. In general terms, the results reinforce support for encouraging (by means of non-mandatory initiatives, such as those of the ICAEW) UK firms to provide risk information voluntarily rather than mandatorily. The evidence, however, also signals that firms may provide less risk information than what would constitute an appropriate response to their underlying risk levels.

Third, consistent with discussion within the US context, the results in the German context signal that organising risk reporting by formally implementing an accounting standard significantly improves the disclosure environment by encouraging the provision of more

risk information either mandatorily or voluntarily, most importantly as a response to firm risk levels.

Fourth, the practical implication in an international context was considering each country's legal system and its cultural values as essential to minimising variations in the mandatory efforts.

10.4. Limitations and suggestions for future research

By utilising computerised content analysis and multilevel analysis (LMM and RMMLA), the current study identified risk reporting incentives across the USA, the UK and Germany. The current study, therefore, extends the empirical knowledge and contributes to risk disclosure literature. The current study, however, has some limitations, either in firm- or country-level analyses or in its research methodology, which have to be considered as potential avenues for future research.

First, in firm-level analysis, the current study emphasised firm risk levels as main incentives and controlled for some other effects (other firm characteristics and corporate governance mechanisms). The limitations in this level are related to using just these variables; some other variables could be used. In terms of measuring firm risk levels, the current study relies on extended literature that has utilised market and accounting risk measures. Using some other techniques to measure a firm's risk levels, such as value at risk, could be one area of interest for future research.

For the control variables, the current study accounted for four effects; namely, size, profitability, growth and dividends effects. Some other effects have been suggested in

general disclosure studies, such as analyst following, audit firm size and multi-nationality (e.g., Khlif and Souissi, 2010).

The current study accounts for CG effects within the UK based on the availability of data, and only considers board characteristics as a main mechanism. Not considering other CG mechanisms (such as ownership structure, e.g., Demsetz and Villalonga, 2001) in either the UK or in the other two countries could be a limitation of the current study, and also may be an area of interest for future research.

Further research could be useful by including some other explanatory variables in the model, which might decrease the unsystematic (idiosyncratic) unexplained variations in MRR and VRR within firms between 2005 and 2009. It could be useful to consider some recent trends in disclosure literature that look at unsystematic (idiosyncratic) demographic characteristics of managers as an essential driver for idiosyncratic voluntary disclosure variations (Bamber et al., 2010).

Second, in country-level analysis, the current study acknowledged the main criteria of choosing these three countries. Other countries, however, could have different and attractive approaches to risk reporting. Investigating risk reporting incentives in other countries could be useful to understand the main drivers of risk reporting. Using other variables to proxy the country effects could be useful to extend the current study's design, which is based mainly on legal and cultural values. Other variables, such as inflation exchange rate, financing types (internal versus external finance), and country level of risk could have a significant impact on risk reporting; most importantly, they could react differently with firm characteristics in interpreting risk reporting incentives. These three countries, even on this large scale, could be extended by involving other countries. Thus,

observing how country variables could vary becomes achievable. In other words, the current design is limited by these three countries to observe the impact of all country variables on variations in MRR and/or VRR because of many of these variables (cultural dimensions, legal systems) are involved as dummy variables, as a subsequent; involving other dummies could not be reasonably acceptable statistically within only three countries. Extending the current design to include other countries is essential to observe the impact of some other factors (e.g., the sources of finance; political factors) on risk reporting variations.

Third, in terms of methodology, the current study relied on annual reports and automated content analysis using Nudist 6. Annual reports are one way for firms to convey information; however, there are other sources, such as financial releases and financial newspapers; see e.g., Kothari et al., 2009, which could be utilised to measure a firm's risk reporting levels. Other software could be utilised to capture risk reporting levels. Further research could usefully implement some of those techniques (e.g., Kothari et al., 2009; Li, 2010; Gruning, 2011).

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Appendix

Appendix 1: Examples of risk statements captured by Nudist 6

Sentence	Firm and (year of annual report)
'Foreign currency exchange risk: Derivatives are entered into in order to hedge exposure to foreign currency exchange risk'. 'Short term investment in financial instruments is partially undertaken on behalf of the group by substantial external fund managers who are limited to dealing in debt instruments and certain defined derivative instruments and are given strict guidelines on credit, diversification and maturity profiles'.	Arriva PLC (2007)
'New wave revenue in this segment increased by 24% to £677 million driven mainly by the 20% growth during the year in the number of BT Business Broadband customers to 579,000 at 31 March 2007'. 'TREASURY POLICY: The group has a centralised treasury operation whose primary role is to manage liquidity, funding, investment and the group's financial risk, including risk from volatility in currency and interest rates and counterparty credit risk'.	BT Group PLC (2007)
'The different service areas of our business offer different opportunities for growth and returns on our investment'. 'We believe that attractive returns can be delivered from investment in bolt-on acquisitions where we can leverage our market leading position and scale to deliver higher levels of operational efficiency to the acquisitions that we have made'.	Davis Service Group PLC(2007)
'Capital Investment: A wrong decision in respect of the Company's planned fleet growth, in terms of timing, aircraft numbers or fleet type, could have a material adverse impact on the Group's future performance. 934 Foreign Currency Risk The Group generates a surplus in most of the currencies in which it does businesses'. 'Gains and losses on derivatives designated as cash flow hedges and assessed as effective for the period, are taken to equity in accordance with the requirements of IAS 39'.	British Airways PLC (2007)
'The Company's operations are also subject to a variety of other risks and uncertainties relating to trading in numerous foreign countries, including the imposition of any import or investment restrictions, including tariffs and import quotas or any restrictions on the repatriation of earnings and capital, and changes in tax regulations and international tax treaties'. 'Sensitivity to interest rate risk: The Group's profit is not sensitive to changes in the fair values of the interest rate swaps and the intrinsic values of the interest rate collars since these achieve hedge accounting'.	Bunzl PLC (2007)