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A meta-analysis about the relationship between family firms and firm performance

DISSERTATION

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Abbreviations

AIC	Akaike information criterion
BAM	Behavioral agency theory
df	Degrees of freedom
ES	Effect size calculated from primary study coefficients phi
DL	DerSimonian method of moments to estimate variance components
GCI	Global competitive index
GDP	Gross domestic product
GEE	General estimated equations
GLS	Generalized least squares regression
HE	Hedges & Olkin method of moments to estimate variance components
HS	Hunter & Schmidt method of moments to estimate variance components
HOMA	Hedges and Olkin type meta-analysis
MASEM;	Meta-analysis structural equation model
MARA	Meta-analysis regression analysis
HSMA	Hunter and Schmidt-type meta-analysis
RHOMA	Hedges, Olkin and Rosenthal type meta-analysis
HiLMMA	Hierarchical linear modelling meta-analysis
ICC	Intra class correlation
Log	Natural logarithm
ML	Maximum likely hood
MTB	Market to book ratio
OLS	Ordinary least squares regression
REML	Restricted maximum likelihood
ROA	Return on assets
ROE	Return on equity
ROI	Return on investment
SD	Standard deviation
s.e.	Standard error
RBV	Resource-based view
SME	Small and medium-sized company
SEW	Socioemotional wealth
USA	United States of America
var	Variance
Vif	Variance inflation factor
WLS	Weighted least squares regression

Symbols

β	Beta. Regression coefficient of primary study
b_0	Intercept of a meta-regression model
b_i	Regression coefficient of a meta-regression
Δ	Delta. Measures the difference of two variables
M	Meta-analytical mean effect size calculated from effect sizes (ES)
μ	Mü. True average meta-analytical main effect
θ	Phi. Coefficient of primary study
I^2	Measure for coefficient heterogeneity of primary studies
p-Value	Significance level. * p< 0.10, ** p<0.05, *** p<0.01
Q	Test for coefficient heterogeneity of primary studies
r	Bivariate correlation coefficient
r_{xy}	Partial correlation coefficient
R^2	Adjusted R^2 to measure the reduction of systematic variation
σ^2	Sigma. Sigma squared measures the variance within a primary study
τ^2	Tau. Tau squared measures the variance between primary studies
v_i	Teta. Within primary study error
X_i	Moderator and control variables in meta-regression
Y_i	Dependent variable of multivariate analyses
Z_r	Fisher´s z-transformed correlation
ζ_i	Zeta. Between primary study error

1 Introduction

Investigating the different sources of firm performance is a central theoretical and empirical debate in the field of strategic management (Hawawin et al., 2003), economics (Palmer, 1973) and sociology (Mizruchi, 2004). One stream of research investigates behavioral, sociological and strategic factors influenced by formal and informal contexts (e.g. shareholders, banks, employees, clients, states) which are embedding firms and therefore affecting performance (Hansen & Wernerfelt, 1989; Wagner, 1997). The other research stream, based on the economics tradition, assumes that external market factors, such as characteristics of the industry, relative position of the firm compared to competitors and firm resources (Scherer & Ross, 1990) influence firm success.

These two streams were condensed by a group of economists in the 1960s, and they brought up the idea that motives of corporate decision makers influence firm performance (Monsen et al., 1968; Kamerschen, 1968). This idea is based on the concern that (Berle & Means, 1933) splitting up ownership and control affects firm performance in a negative way: *"the explosion of the atom destroys the basis of the old assumption that the quest for profits will spur the owner of industrial property to its most effective use"* (Berle & Means, 1933). Berle & Means (1933) thoughts were addressed by Kotz (1978) revisiting them by coding firms in a more fine-grained view. He found that 80% of the firms are management-controlled, 60% family-controlled, or 40% were bank-controlled. Furthermore, he recognized that all these investigated firms are embedded in a context. Based on this argument Zeitlin & Ratcliff (1988) saw firms not as independent entities, but as tools of family groups to collect capital. The major finding in Zeitlin & Ratcliff (1988) study was, compared to Berle & Means (1933) approach, that family ownership and kinship are a better way of portraying the control relations of firms, on the one hand.

On the other hand *"The economic landscape of most nations remains dominated by family firms"* (Chrisman et al., 2003; Shanker & Astrachan, 1996; La Porta et al., 1999; Klein, 2000; Heck & Stafford, 2001; Morck & Yeung, 2003) and therefore control and ownership are one aspect of family groups. In quantitative figures, family firms account for 2/3 of all ventures worldwide (Davis, 07.06.2002), and about 44% of large firms in western Europe (Faccio & Lang, 2002), two-thirds in East Asian countries (Claessens et al., 2000), and between 33% and 46% of Standard and Poor (S&P) 500 and 1500 index, respectively (Anderson & Reeb, 2003; Chen et al., 2008; Cheng, 2014). As stated above, family firms are the heart of economies in most countries. Because in economic theory, it is axiomatic that the competition in markets forces inefficient ventures to vanish and only the structurally fittest organizations prevail (Schulze & Gedajlovic, 2010). So the world´s oldest companies are family firms such as *"The*

Hoshi Ryokan" - a Japanese inn founded in 718, a Japanese construction company (*Kongo Gumi*) that was founded in 578 and went bankrupt in 2006 or the *Berettas* developing guns since 1526 (The Economist, 18.04.2015).

Because of the above-mentioned facts, academia has started to recognize the importance of family firm research (Chrisman et al., 2003). Family firms are distinct organizational forms coping with unique interactions between family and business (Chrisman et al., 2009; Sharma et al., 2014). In these organizational forms, the family members massively influence the strategic decisions and future directions of the firms (Sharma et al., 2014). The unique feature of family firm research is to investigate, to understand reasons of the family members' behavior, meanings, and impacts of the family and the business system (Nordqvist et al., 2015). Hence, family firm research is not limited to some research areas, but spans a wide range of other research areas, such as: entrepreneurship, (strategic-) management, international business, finance, organization science, economics, law, psychology and accounting (Xi et al., 2013). Since 2000, the numbers of family firm publications have increased exponentially (Xi et al., 2013). For an overview of scientific journals covering the research field of family firm research, see Table 6-10 in descriptive statistics. In lockstep, the impact factors of relevant scientific journals in the field of family firm research increased dramatically. For instance, the *Family Business Reviews´* Thomson and Reuters impact factor (former ISI impact factor) raised from 2.426 in 2010 to 5.528 in 2014 and the *Journal of Family Business Strategy* received a Thomson and Reuters impact factor for the first time and started from 1.318 in 2015.

Based on this evidence, the present dissertation investigates the financial performance of family firms compared to nonfamily firms in different contexts.

However, the research of family firms matters in different ways depending on the context because family firms can exhibit best and worst practices (Morck & Steier, 2005). Therefore, Sharma (2004) investigated qualitatively **family firm performance** and **family firm definitions** to understand the domain and the scope of the research field. Yet up until now, it has not been clarified conclusively in an empirical way whether family firms have a better performance than nonfamily firms. For example McConaughy & Phillips (1999) found that family firms yield a lower company value (Tobin´s Q) compared to nonfamily firms, whilst Anderson & Reeb (2003) found exactly the opposite. In other countries, the evidence is also mixed (Villalonga & Amit, 2006; Sciascia & Mazzola, 2008; Sacristan-Navarro et al., 2011).

Therefore, the **main objective** of this dissertation is to aggregate empirically the results of hundreds of different family firm performance studies to make a general statement whether family firms outperform nonfamily firms in financial terms. Improving the generalizability of the research stream of family firm performance in an empirical way, I apply *meta-analytical methods* which are useful, yet underrepresented (Evert et al., 2015).

A *Meta-analysis* is the analysis of the analysis (Glass, 1976). That means, this method is based on already compiled empirical scientific manuscripts and aggregates these results. In meta-analytical language, an empirical scientific manuscript is a *primary study*. The objective of a meta-analysis is to wrap up all distracting results of primary studies.

To contribute to family firm research, I use 270 primary studies covering 42 countries, with a sampling period from 1980 to 2014. Meta-analytical methods are particularly appropriate because data from multiple primary studies give a more fine-grained insight into the relationship of financial performance of family firms. Specifically, I apply a univariate meta-analytical technique (HOMA) to investigate my research questions. Additionally, to give more insights into the relationships, a multilevel analysis, especially designed for meta- analytical purposes, will be applied. Hereby, I can control for several factors, such as measures of performance, study and country characteristics, influencing the main effect. This empirical method allows using, for statistical grounds, the *dependent replication approach*[1] accounting for correlation amongst several observations derived from primary studies (Raudenbush et al., 1988; Bijmolt & Pieters, 2001).

To aggregate primary studies about family firm performance properly, a clear definition of family firms is necessary. But the family firm research field has no common definition of family firms and therefore lacks a clear understanding of family firms (Sharma, 2004) and a common theory. This limitation is mirrored in an article of (Sarkar, Hernandez-Linares, & Cobo, 2014) analyzing close to 200 different definitions of family firms in a time span from 1964 till 2012. In this dissertation, the family firm definition is always derived from primary studies owed to the meta-analytical technique. While coding, I grouped the definitions of the primary studies as follows:

A family firm is: *either owned, managed or controlled by a family or a combination of these three characteristics. With the intention of shaping and pursuing a family vision about: how the firm will benefit the family over generations* (following and expanding the definitions of: The Economist, 18.04.2015; Chua et al., 1999; Bennedsen et al., 2007; Chrisman & Patel, 2012).

One reason for the absence of a common theory is the dichotomous comparison of family and nonfamily firms. Only recently, research has started to disentangle the heterogeneity of family firms (Chrisman et al., 2012; Chrisman & Patel, 2012; Deephouse & Jaskiewicz, 2013). Yet, it is not clear if only family ownership, family management, and/or family control are the drivers of financial performance of family firms. Empirical studies focusing on the positive or negative influences of family senior executives on financial performance do not provide a clear

[1] The dependent replication approach is based on Raudenbush et al. (1988) idea to treat multiple measures within one study as dependent replications and account for it with a nested error structure.

picture. These effects are going to be tested in a univariate and multivariate meta-analytical way in this dissertation.

Not only family firm heterogeneity itself and the related definitions are of major interest for academia and practice. One largely overlooked source of family firm heterogeneity is the culture as well as formal and informal institutional factors (Arregle et al., 2007; Stewart & Hitt, 2012; Arregle et al., 2013). One particular formal institutional factor can have a strong impact: the rule of law logic. The comparative research on family firm and nonfamily firm performance from different institutional contexts is surprisingly scarce (Gedajlovic et al., 2012).

Thus, a further **objective** of this dissertation is to investigate the institutional context in which family firms operate (Peng et al., 2008; Peng et al., 2009; Peng & Jiang, 2010; Liu et al., 2012) by using a multilevel meta-analytical method. While formal institutional differences in the functioning of the market and the legal system have already been addressed by research (La Porta et al., 1999; Luo & Chung, 2013; Peng & Jiang, 2010), differences in the institution "family" and thus family firms remain largely untapped. This status quo is unsatisfactory, because the family is one principal institution of society distinguishing not only family firms from nonfamily firms (Lansberg, 1983), but also family firms from each other around the globe (James et al., 2012). Indeed, differences among families can help explain family firm goals, behaviors, and structures (James et al., 2012; Jaskiewicz et al., 2015) – these differences have not yet been accounted for in family firm theory development, especially in meta-analytical testing using a cross country sample. By advancing several theories that account for differences in the institution of family across the world, I aim to fill this research gap and help to bridge country-specific empirical results that have so far been difficult to reconcile.

My study contributes to the literature of entrepreneurship and (international & strategic) management. Scholars investigating firm´s financial performance seek to understand influencing factors and drivers in organization. Past research, based on meta-analytical techniques, has studied antecedents of market orientation such as top management, interdepartmental factors and organizational systems (Kirca et al., 2005) or environmental (market share), strategic (R&D), and organizational factors (size) (Capon et al., 1990). But this research does not include family involvement as one of the dominating organizational and institutional factors around the world (see above) into these financial performance meta-analytical studies.

Moreover, my study has implications for the growing literature in family firm performance research (Figure 6-7). Thus, I disengage the different factors for the financial performance of family firms. At first, my meta-analysis contributes to the debate of the family involvement effects on performance, with a special focus on the factor family management and its professionalization (Stewart & Hitt, 2012). A second factor influencing family firms could be informal institutions such as culture represented as Hofstede´s cultural dimensions. Third, I try

proof that formal institutions such as minority shareholder protection and rule of law logic have a significant impact on the financial performance of family firms. Therefore, I contribute to the growing literature of the Institution-Based View. My distinctive features in the following analyses are the investigation of formal and informal institutional factors. Importantly, the analyses are carried out in a bivariate and multivariate way, accounting for several primary study characteristics in order to avoid omitted variable bias. Especially the major impact of the intra-class correlation within coefficients in primary studies is accounted for.

In sum, I shed light upon a more comprehensive and nuanced point of view regarding family firms' financial performance compared to nonfamily firms in ten chapters.

Chapter 2 deals with different approaches in defining family firms. It discusses definitions in the light of the essence and components of the involvement approach. This section is followed by an overview of relevant theories explaining the financial performance of family firms, such as Agency Theory, Stewardship Theory, Socioemotional Wealth, the Resource-Based View of the firm, and the Institution-Based View.

Chapter 3 presents a literature review covering the relevant meta-analyses in the field of family business financial performance research, followed by the deduction of research questions that were tested in a univariate and/or multivariate way. The research questions cover family firms' financial performance compared to nonfamily firms' financial performance, the differences in financial performance measures, the sample composition of the underlying primary studies, differences of family involvement and finally the formal and informal institutional influences on the financial performance of family firms.

Chapter 4 covers all relevant issues regarding the meta-analytical approach, such as objectives of meta-analyses, different effect sizes, the univariate and the multivariate meta-analytical approaches to the point of multilevel meta-analytical regressions. This chapter closes with an extensive overview of biases and quality criteria of meta-analyses.

Chapter 5 describes the sampling criteria, the procedure deriving primary studies for inclusion in the following empirical analyses, and coding of the data set.

Chapter 6 starts with a variable description of the data set and presents drawbacks of the third party data. This variable description is followed by descriptive statistics that describe the data set more closely. Here I present for example the overview of the number of primary studies per year, which countries these primary studies investigate, and finally the chapter closes with a figure depicting the development of the data set right up to the final sample for empirical analyses.

Chapter 7 analyzes the data in a univariate way, a so-called HOMA (Hedges & Olkin Type Meta-Analysis). The first part uses an inclusive way and considers only one effect size per

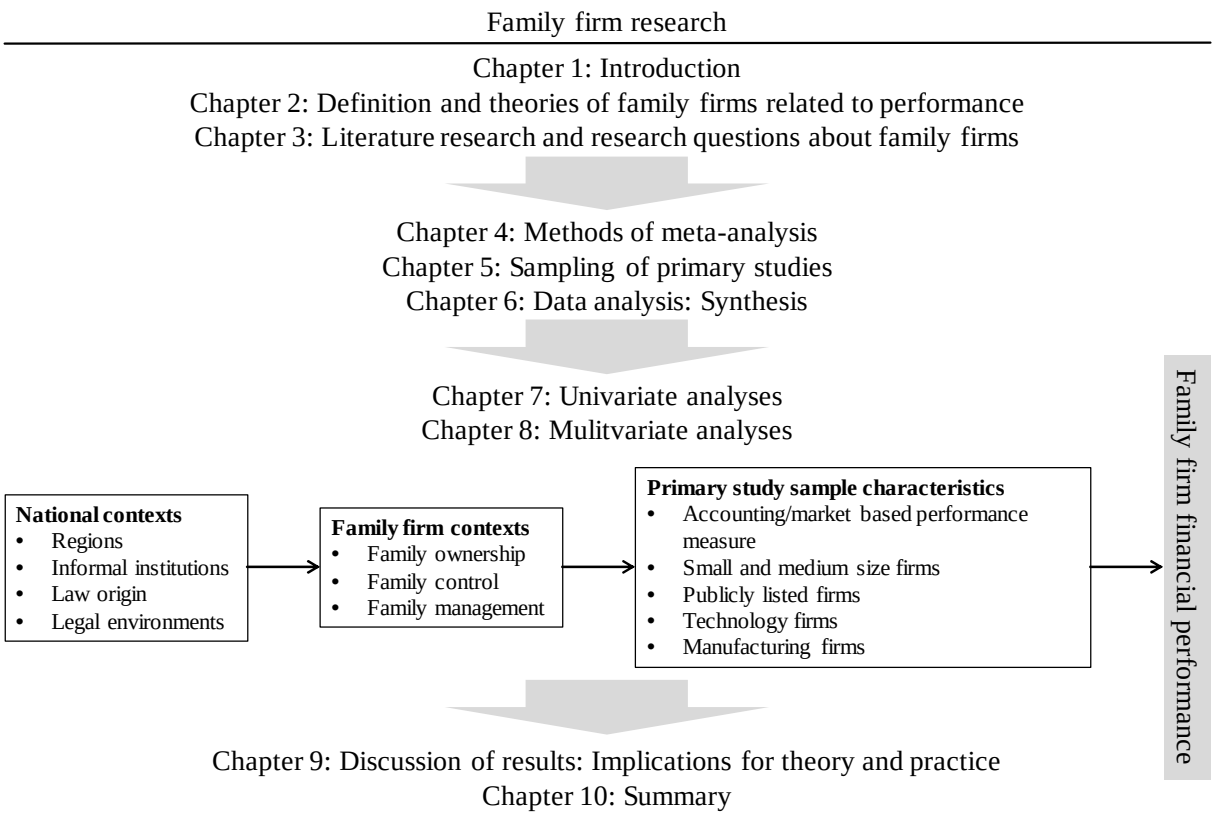
primary study. If several effect sizes in a primary study were presented, I averaged them. The objective is to re-analyze and go beyond a formerly published meta-analysis investigating family firms' financial performance compared to nonfamily firms' financial performance. This section is followed by a further univariate meta-analysis which tests the research questions of this dissertation. I use a multiple coefficients approach assuming that every effect is independent from each other to avoid the publication bias. This approach is used in more recent published meta-analyses in the research field of management and family business research (examples can be found in chapter 3).

Chapter 8 extends the former univariate approaches with multilevel regression analyses. This multivariate approach addresses partly the same research questions as univariate analyses to show the robustness of the results. Additionally, further research questions which cannot be answered with a univariate meta-analytical approach, are analyzed. Especially the further analyses cover country-level data from third party data sets, such as cultural distances, regional differences, law systems, and institutional factors.

Chapter 9 discusses the results of **chapter 7** and **chapter 8** from a theoretical and practical perspective. It highlights the theoretical and practical implications following the course of the research questions. **Chapter 9** closes with the limitation of this dissertation and provides avenues for further research.

Finally, in **chapter 10,** I summarize my results briefly and provides short take home messages. Additionally, a table gives an overview of the research questions and their related results.

Figure 1-1: Overview of the thesis



Source: Own illustration

2 Definition and theories of family firms related to performance

With the provision of this chapter, I want to enlighten the passionate reader and provide a guide through the jungle of assumptions, thoughts, ideas and notions about family firms. Afterwards, I give an overview of several theories and theoretical perspectives on family firms.

2.1 About family firms

This section gives an overview of different family firm definition streams. At first, it stresses the different views of external and internal stakeholders of family firms. Secondly, it describes two definitional streams developed and applied in academic research (components of involvement and essence approach).

When Freud was asked what he regarded as the secret of a full life, his answer was: *"Lieben und arbeiten"* [love and work]. So, for most humans their family (love/lieben) and work are most important, resulting in a compelling power of organizations that combine both, love and work (Gersick, 1997). Apparently, if love/family and work are connected, this connection makes them a special kind of venture. Therefore, some of those ventures proudly identify themselves as family firms. Other ventures, even if controlled by a family over generations, vehemently deny that they are a family firm rather than a "private" firm (Gersick, 1997, p. 1). Those families argue that family firms must be run and owned by family members without a single nonfamily employee (Chua et al., 1999). As one can see, even what is evaluated and judged as a family firm from an outside perspective might be regarded in a different way by insiders. Especially, the insider perspective will influence the intra- organizational decisions and management attitudes. Different (self)-perceptions make it a challenging task, like in all social sciences disciplines, to establish a common definition of family firms as research units (Sharma, 2006), since family firms range from small, informal shops to big supranational companies (Handler, 1989)[2] Therefore, numerous endeavors have been made to articulate conceptual and operational definitions (Sharma, 2006). But academia still has difficulties defining family firms. The focus of most of those reviews about family firm definitions lies on the distinction of family firms and nonfamily firms (Litz, 1995; Westhead & Cowling, 1998; Sharma, 2004). Chua et al. (1999) provides an overview of 21 definitions developed between the years 1964-1994. Habbershon (1999) found 44 in a time period from 1989 to 1999, Flören (2002) provides over 50 and Miller et al. (2007) an overview of 28 family firm definitions. As one can see, there is a lack of conviction by family members and academia what it is exactly that defines a family firm.

Possible ways of providing a definition are bundled into a framework of two streams. The *essence approach* assumes that family involvement is only a necessary condition. This approach,

[2] Example: Volkswagen AG: 31.5 % of equity is owned by the Porsche & Piech family. These two families possess 50.73% of the voting rights (Anon. 2015c).

however, suppose that the involvement must be directed towards certain behaviors assuring distinctiveness. Otherwise, the traditional stream, the *components of involvement approach,* has the implicit underlying assumption that family involvement is a sufficient criterion that a family firm is in place. This stream is operational in nature and fragmented into different components of family involvement (Sharma, 2004; Chrisman et al., 2005; Sharma, 2006). Those components are ownership (management and control), governance (family involvement) and transgenerational succession.[3]

2.1.1 Components of involvement approach to define family firms

- **Ownership:** Relies on the percentage of share capital owned by a family (empirical variable: ownership percentage). Otherwise, one can operationalize ownership/control if the family and/or employees accept the organization to be a family firm (empirical variable: ownership dummy)[4].
  - **Management**: Founder-managed, owner-managed, family-owned and family managed (empirical variable: F. management).
  - **Control**: Owner/founder/family member active in the board of directors, family-owned and externally managed.
- **Family involvement:** The number of families involved in management ownership or control: None, beyond owner, spouse, sole child, nuclear family members, nuclear and extended family members (empirical variable: F. control).
- **Next generation in line for generational transfer:** The extent to which the intention is to maintain family involvement in the future: None, sole heir, nuclear family members, nuclear and extended family members.

These above-mentioned operational variables can be evaluated relatively clearly. But the complexity increases due to accompanying circumstances, such as the size of the company, privately held or publicly listed ventures in the sample, governance systems, research questions of the study and the scientific research field. Some fields where family firm research is conducted are: entrepreneurship, corporate finance, corporate governance, small and medium-sized firms and of course in family business research (Handler, 1989; Xi et al., 2013). Besides, the countries of the study and the legal form of the companies have a remarkable impact on the way of assessing the operational variables. In two-tier boards, for example, there is a clear differentiation between ownership and control. But in a one-tier board, this differentiation is not at all clear, because one has to distinguish between audit and executive committee, which is not always possible (Jaskiewicz, 2006; Block, 2009).

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[3] Cf. Handler (1989); Neubauer & Lank (1998); Chua et al. (1999); Miller et al. (2007): show that lone founder firms outperform other firms.

[4] Names of variables in my meta-analytical analyses.

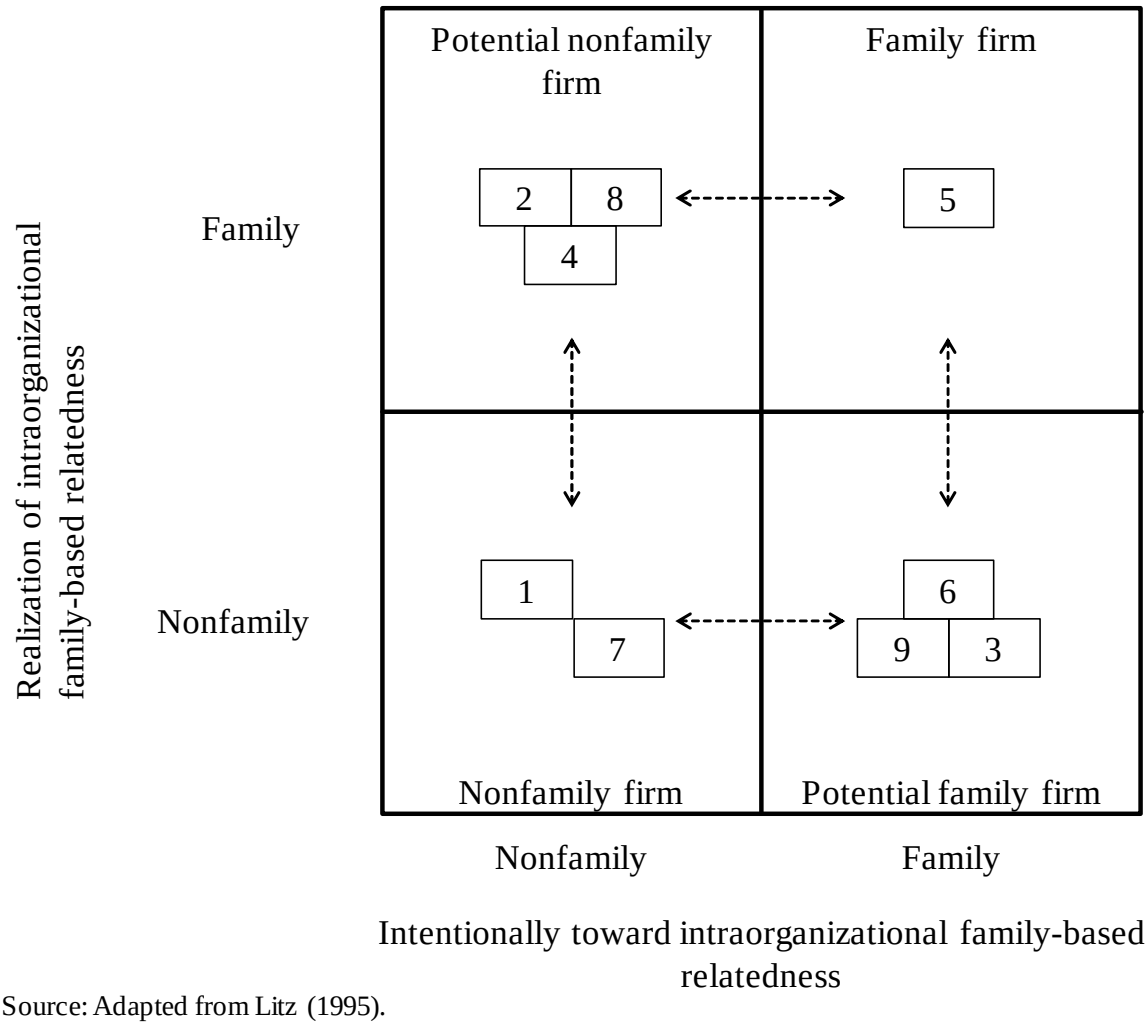
Altogether, one can state researchers have had problems in making these components precise. Additionally, the above-mentioned definitions depict just a static interaction of family and the business (Habbershon et al., 2003). Furthermore, those definitions lack a theoretical basis why these components matter. Especially if two imaginary firms have the same involvements, but differ in the purpose of their vision and/or behavior which represent the essence of a family firm (Chrisman et al., 2005). Therefore, a continuous measuring of the essence of a family firm could overcome such imprecisions of dichotomous measuring.

2.1.2 Essence approach to define family firms

The essence approach is theoretical in nature and could potentially contribute to creating a theory of family firms (Chrisman, 2003).

Litz (1995) tried to sort the definitional confusion by merging a structure-based and an intention-based definitional classification (Litz, 1995). The structure-based approach separates family involvement into controlling ownership and management control according to (Berle & Means, 1933). These two dimensions concentrate three different stages adapted from Deeks (1973) organizational structure (Deeks, 1973). So management control and controlling ownership could be individual, familial or widely held. Accordingly, the structure based approach results in a two-dimensional nine cells hosting grid illustrating the diverse range of alignments between the interests of ownership and management (see small cells in Figure 2-1). But this structure-based approach does not address the ambition of organizations to evolve toward or away from becoming a family firm. This leads to the intention-based approach relying on (Mintzberg & Waters, 1985). Figure 2-1 shows the integrated approach of Litz (1995) to generate a *"[…] fuller definitional perspective."* What remarkable is that two cells of the grid will consider firm in the transition toward/away from a family firm. Accordingly, if the controlling ownership is "individual", the managerial control could be widely held, familial or individual, then it is a *potential family firm*. Otherwise a *potential nonfamily firm* is in place if the controlling ownership is familial and the managerial control is individual or widely held. In this case, it is a family firm if managerial control and controlling ownership are familial. Finally, it is not a family firm if the controlling ownership is widely held and the managerial control is individual or widely held.

Figure 2-1: Defining family firms: Integrating structure and intention



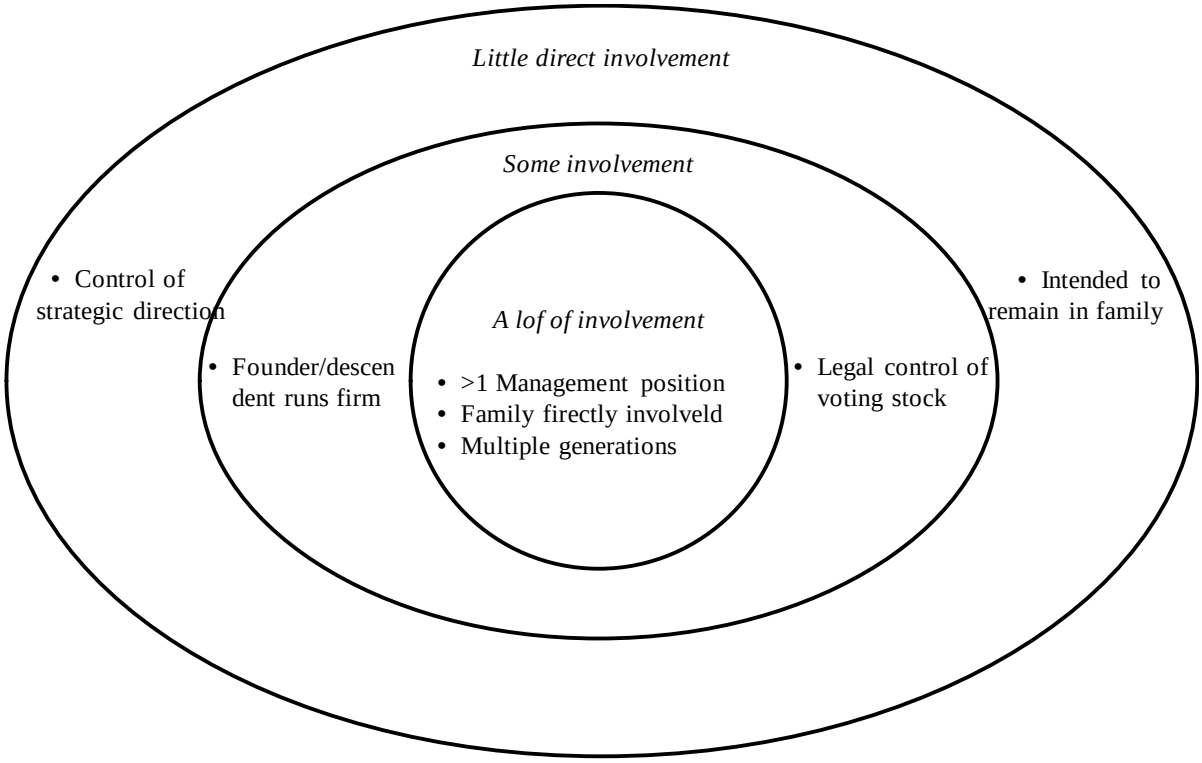
Source: Adapted from Litz (1995).

Litz´ approach focuses on content: the intention and the intraorganizational factors interacted with management control and controlling ownership. But he does not provide any judgment calls or measurement hints for the involvement variables to assign them into the structure and the intention-based approach.

This gap could be filled by considering the resources that are distinctive to a firm to capture the involvement of a family in the business. Embedding this idea into the resource-based view (RBV) of competitive advantage, the family involvement and resources could be identified as the "familiness" of the firm (Wernerfelt, 1984; Barney, 1991; Habbershon & Williams, 1999). The familiness of the firm outlines a theoretical framework to highlight the *"[…] relationships among individual family firm behaviors, the advantages of being family-controlled, and their distinctive performance capabilities."* (Habbershon & Williams, 1999) The main idea is that familiness is a specific resource consisting of the interaction of the family, the single members, and the business. But it is not to be confused with the standard resources of nonfamily firms such as: physical capital, human capital, organization capital, and process capital resources. These further resources could be summed up as firm level resources, particularly the sum of the resources and capabilities (Habbershon et al., 2003). Additionally, with this familiness approach,

one could assess how the family forms the business to achieve a competitive advantage (Habbershon & Williams, 1999). But families unnecessarily limit their boundaries to wealth creation (Chrisman, Chua, & Litz, 2003). Otherwise, noneconomic goals do not have to mean a loss in economic efficiency and must be added (Jensen & Meckling, 1994). Therefore, wealth creation should replace Habbershon´s value creation goal. Additionally, (Shanker & Astrachan, 1996) added vision to these essences of family firms. To capture vision, they developed the family universe Bull´s Eye. This Bull´s eye shows how definitions could have an impact on the size of the family business universe (Astrachan & Shanker, 2003).

Figure 2-2: Family universe Bull´s eye



Source: Adapted from Astrachan (2003).

Drawing conclusions from the previously described ideas, the essence of family firms consists of (Chrisman et al., 2003):

- The intention to maintain family control
- Interactions and family involvement resulting from unique, inseparable, and synergistic resources
- Transgenerational value creation by a common vision
- Pursuance of such a vision

These thoughts were adapted, extended and measured by Astrachan et al. (2002), providing a continuous scale (F-PEC) depicting the influence and involvement of the family (Klein et al., 2005; Rau, 2010). This family influence is measured by the extent of power, experience and

culture. The purpose, however, is to compare firms by focusing on the levels of family involvement and the effect on behavior. Additionally, this approach reconciles the components of involvement and the essence approaches (Chrisman et al., 2005). The great advantage is to overcome (Litz, 1995) subjective evaluation by utilizing data aggregated from several variables into three subscales and a total score. The three subscales are:

- **Power subscale:**
  - Ownership
  - Governance
  - Management
- **Experience subscale:**
  - Generation of ownership
  - Generation active in management
  - Generation active on the governance board
  - Number of contributing family members
- **Culture subscale**
  - Overlap between family values and business values
  - Family business commitment

The *power subscale* does not only take into account the ownership stake, but also the one- and two-tier board structures according to different legal systems. Moreover, this subscale does not assess whether a nonfamily CEO would serve better, but looks at the degree of overall influence. Hence, this subscale allows ownership, governance and management to be interchangeable or additive (Klein, 2000; Rau, 2010).

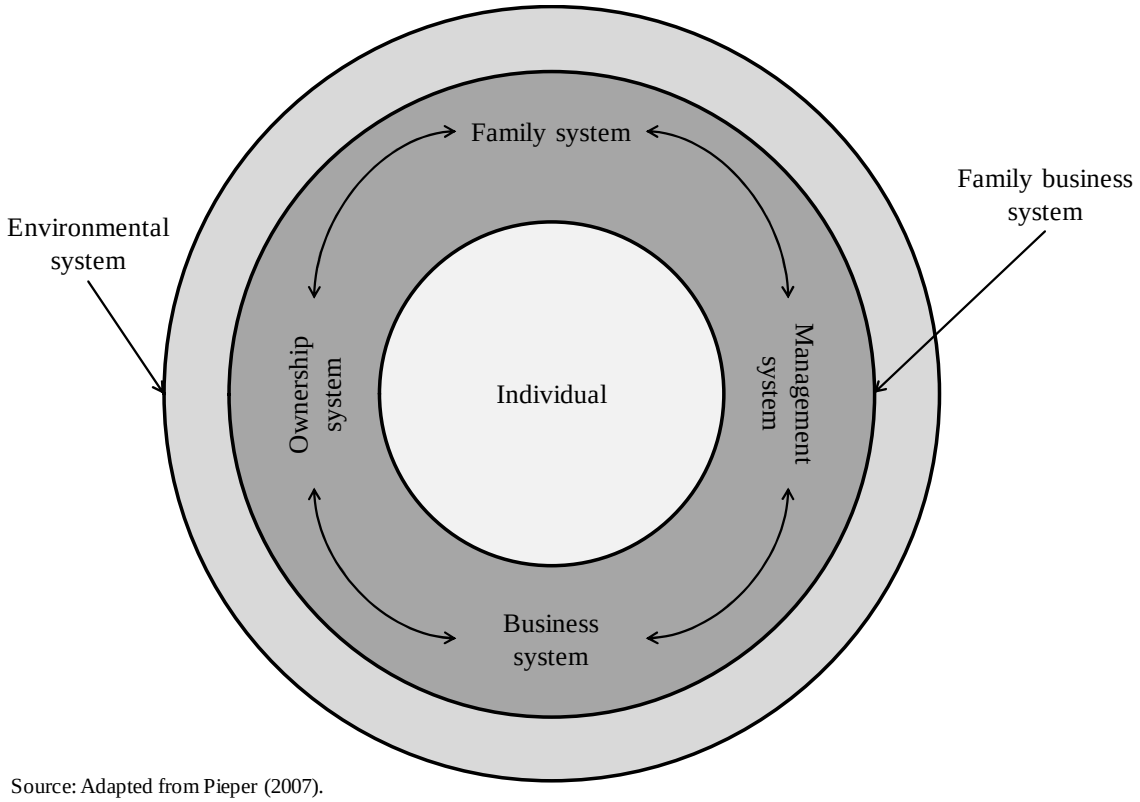
The family business *experience subscale* accumulates involvement of the family members and the experiences within the family firm that are passed on to the next generation (succession). These dimensions of generation involvement, activities in the management and governance boards are weighted with a nonlinear algorithm.

The *culture* dimension, the third dimension, has two main factors measuring the overlap of values and the commitment of family members towards the family firm. These two factors are split up into further 12 dimensions (Astrachan et al., 2002). The latter of the two factors is based on the assumption that highly committed families have a high level of influence on the business.

Again, the F-PEC model assesses the involvement of the family in terms of power, experience and culture. Litz´s (1995) model condenses the complexity in defining family firms into intraorganzation and intention-based family relatedness. Habbershon´s (1999 and 2003) familiness model supplements the further model by the Resource-Based View of the firm. Both models are still closed system approaches, but consider the subsystems of management and ownership. However, the drawback of these models is their relatively high level of complexity.

An open system approach includes the individual family members, the subsystems of the family business, the environment (rule of law, tax) and their interactions. Therefore, the comprehensive bull's eye open system approach is applicable if different levels of analysis are needed to explain a certain phenomenon (Pieper & Klein, 2007).

Figure 2-3: The Bull's eye



Source: Adapted from Pieper (2007).

According to 267 recent articles and 49 journals containing review articles of family firm definitions (Harms; 2014), about nine percent rely on the component and essence approach and nine percent on the F-PEC scale. The majority of the researchers publish with self-developed (25%), other (16%) and empirical oriented (8%) definitions. 33% of the articles - mostly published before the year 2000 – even present their results without any explicit definitions. Summing up, a profound consolidation of family firm definitions is still missing. This leads to a still vaguely determined key variable "family firm".

Yet, there is no consensus which approach should be used in order to define family firms. Early researchers just focus on components of involvement like: ownership, management and control. But this does not determine if a firm is a family firm or not. But focusing just on components lacks the essential features (Chrisman et al., 2003). Therefore, the F-PEC scale could integrate the essence and the component of involvement approach into a continuous measure of family firms. If the interaction and different levels of analysis are important, an open system approach is more applicable because the interactions between subsystems and individuals are mirrored and measured.

2.2 Theories on the performance of family firms

After discussing several ways and opportunities of family firm definitions, the potential reactions and strategic decision of family firms depend on their characteristics and the related interpretation is of major interest in academia. Thus, in the following chapter, I present different theories widely used in family firm performance primary studies.

2.2.1 Agency theory and its different aspects

Agency theory is one of the dominant and mainstream theoretical frameworks of management research (Bocatto et al., 2010; Kellermanns et al., 2012; Block, 2012; Jain & Shao, 2014). Its root lies in information economics and has developed along two streams: namely, principal-agent and the positivist stream (Jensen, 1983). These two streams share common assumptions, but differ in their mathematical rigor. Positivist agency research is less mathematical and focuses on situations with conflicting goals in large public firms (Eisenhardt, 1989). This theory explains a particular organizational problem, the relationship between two parties within a firm, the delegator and the receiver (Eisenhardt, 1988). This view is applicable especially for family firm research. Subsequently, in this chapter I focus on the positivists stream.

Fama (1980) sees the firm as a team. Those teams are personified by agents, therefore they are both manager and risk bearer. Furthermore, agents realize that the survival of their own team depends on the competition with other teams (Fama, 1980). Those teams consist of self-interested members (agents) with conflicting objectives within a world of incomplete information (Levinthal, 1988).[5]

Self-interests and incomplete information relationships are modeled by agents and principals and governed by a contract. A principal assigns work to an agent to carry out his tasks (Eisenhardt, 1988). In this case, the agent is a professional manager imposing costs on the firm, without ownership interests. These costs, so-called monitoring costs, are introduced by lack of information and non-aligned interests between principals and agents (Eisenhardt, 1989; Daily & Dollinger, 1992). Hence, the agency theory tries to identify the most efficient and less costly contract to match these interests of agents and principals (Jensen, 1983). The key issues of the agency theory are rolled out in Table 2-1.

[5] This belief was an extension from Jensen and Meckling (1976). They view the firm as a bundle of contracts amongst other production factors.

Table 2-1: Overview of the agency theory

Agency theory	
Key idea	Principal agent relationships should reflect efficient organization of information and risks-bearing costs
Unit of analysis	Contract between principal and agent
Human assumptions	Self-interest, bounded rationality, risk aversion
Information assumptions	Partial goal conflict among participants, efficiency as the effectiveness criterion, information asymmetry between principal and agent
Information assumption	Information as a purchasable commodity
Contracting problems	Agency (moral hazard and adverse selection), risk sharing
Problem domain	Relationships in which the principal and the agent have partly differing goals and risk preferences (e.g., compensation, regulation, leadership, impression management, whistle-blowing, vertical integration, transfer pricing)

Source: Adapted from Eisenhardt (1989).

The above-mentioned efficiency is measured by the costs arising from separating control and ownership. These special kinds of costs are the so-called agency costs consisting of the monitoring costs of the principal, bonding expenditure by the agent and the residual loss (Jensen & Meckling, 1976; Cuevas-Rodríguez et al., 2012). The separation of management and ownership in corporations perfectly fits the definition of an agency relationship (Jensen & Meckling, 1976). When ownership and management are separated, for example if the firm is family-owned and professionally managed, professionally owned and managed, professionally owned and family-managed, agency costs are in place because different utility functions arise from different interests (Daily & Dollinger, 1992). Otherwise, Fama & Jensen (1983a) assigned a higher efficiency to family firms due to the alignment of ownership and management. Researchers assume lower agency costs in this context because kinship ties could raise altruistic behavior within a family (Chrisman et al., 2004; Schulze et al., 2002).

Altruistic behavior appears when an agent lowers his own consumption to increase simultaneously the consumption of others (Becker, 1976; Becker, 1991; Haltiwanger & Waldman, 1993). An effective altruist takes actions to raise the family's income and avoids actions lowering it. Hence, family income is the sum of his income and his beneficiary's income (Becker, 1981). In a highly altruistic family-firm-environment, the interdependence of family members is reinforced and encourages them to place the firm objectives ahead of their own (Zahra, 2003). Furthermore, communication and cooperation are expected to be high and relationship conflicts are reduced in family firms (Daily & Dollinger, 1992; Eddleston & Kellermanns, 2007). In sum, all these reasons reduce potential agency costs because of the reduced costs of accessibility of family members, a lesser need to monitor family members and to enforce agreements (Schulze et al., 2003). Besides, research found that an efficient

governance system is only in place during uncertainty and/or the start-up phase (Schulze et al., 2002; Karra et al., 2006).

Till now, just one side of the coin has been considered, the positive aspect of altruism. But family firms are likely to be subject to agency conflicts (Le Breton-Miller & Miller, 2013). The negative aspects of altruism and therefore rising agency costs are present in the later stage of the venture (Schulze et al., 2002; Karra et al., 2006). Altruism gives the family agents an incentive to shrink and hide information. This could increase the monitoring costs, another driver of monitoring costs is due to employment determined by the family status and professional qualifications. Furthermore, monitoring is necessary to ensure that the decisions and activities of the family agent are in line with the family interests, policies, his position and level of authority (Schulze et al., 2001; Schulze et al., 2003). One reason to behave in a manner that is not aligned could be driven by selfishness, which economists assume in market transactions, anyway (Becker, 1981). This selfishness is described in the altruistic agency theory literature as the rotten kid theorem. The rotten kid theorem in economics explains the interaction between altruistic parents and a selfish kid (agent). The selfish kid maximizes the wealth of the family (Becker, 1974 & 1976). But this is only the case in a one-stage scenario. In a two-stage scenario introduced by Bruce and Waldman (1990), the kid could save not enough in the first period and consumes relative to the family's efficiency perspective. So, the kid maneuvers itself into an impoverished position, inducing a larger transfer from parents in the second period. As a result, the wealth is not increasing anymore, although the parents (principals) still behave altruistically and therefore reduce their own wealth. This scenario results in a so-called Samaritan´s dilemma due to the inefficiency of a bigger transfer in the second period by parents (Buchanan, 1975). This dilemma arises by a lack of self-control of parents (principals) (Schulze et al., 2003). Self-control problems arise whenever the principal has the ability and the incentive to harm themselves (Jensen, 1994). This harm could arise when the transfer of wealth is in the shape of feelings of responsibility towards relatives. This ends up in employment, even when a lack of qualification is in place and the company is run to honor a family tradition (Levinson, 1971; Miller et al., 2007; Lubatkin et al., 2007).

This kind of behavior, hiring relatives, is the so-called nepotism (Ewing, 1965; Vinton, 1998). When this kind of abuse is present, family conflicts are enhanced and could cause serious problems. For example, the systems of measurement and rewards based on family ties rather than competence diminish the institution´s ability (Donnelley, 1964; Pollak, 1985). Due to family ties, family agents could have the incentive of shirking work instead of working when family principals behave altruistically (Bergstrom, 1989). This could result in a lower performance when family CEOs are in charge (Bennedsen et al., 2007). Executive managers might avoid disciplining employed family members on lower management levels. In sum,

parental altruism (e.g .Samaritan´s dilemma and nepotism) characterizing the governance of family firms can raise agency costs (Lubatkin et al., 2007), simultaneously lowering the performance of a family firm.

A further issue that raises agency cost is when the above-mentioned actions are included in the culture of a family firm. This is particularly the case when several stakeholders of the family firm have different interests. These interests are mirrored in the ownership structure of the firm and conflicts may be heightened amongst different classes of shareholders (Fama & Jensen, 1983b;Faccio & Lang, 2002; Jain & Shao, 2014). For example, dispersed ownership structures are predominant in Anglo-American countries, USA, Australia, the UK and Ireland, (La Porta et al., 1999), whereas in western European countries, especially in emerging markets, ownership concentration is in place (La Porta et al., 1999; Faccio & Lang, 2002). These problems arise mainly in arm´s length markets, e.g. emerging economies, with weak formal institutions regarding the protection of minority shareholders. Strong formal institutions could protect minority shareholders and diminish the principal agent conflict. The power of these institutions is represented in the transparency and quality of financial reports due to qualified equity analysts, audit companies and good governance systems (Lin & Chuang, 2011). Good governance systems supplemented with quality disclosure environments result in a higher firm value (Renders & Gaeremynck, 2012).

Agency´s popularity is based on the predictions how individuals behave in professional relationships, where each individual has an information asymmetry about their effort and interests. So, agency theory focuses on the most efficient contracts between principals and agents (Jensen, 1983; Cuevas-Rodríguez et al., 2012). By contrast, critics highlight the simplistic assumptions and the narrow focus limiting the predictive validity (Eisenhardt, 1989). In sum, principals and agents are not always selfish. They may self-regulate in response to socioemotional rewards based on accomplishment and cooperation (Cuevas-Rodríguez et al., 2012).

Moreover, the following theories concerning family firms do rely on the agency theory and are widely used in family firm research (Nordqvist, 2015).

2.2.2 Stewardship theory

Strategic management has been heavily influenced by agency theory, assuming that managers (agents, homines economici) will maximize their own wealth instead of the shareholders' wealth (Berle & Means, 1933; Jensen & Meckling, 1976; Donaldson & Davis, 1991). Therefore, the appropriate governance structures protecting the shareholder interests have to be implemented reducing agency costs (Eisenhardt, 1989). In sum, the research field of organizational economics assumes a model of man who is opportunistic (Donaldson & Davis, 1991). This view can be attributed to Theory X (man is unwilling) developed by the

organizational psychologist McGregor (1957). A countervailing theory to agency theory derived from McGregor´s Theory Y (man is committed) and explored corporate governance was introduced by Donaldson and Davis (1989), the so-called stewardship theory (Donaldson et al., 1989; Donaldson, 1990). They created the organizational behavior research stream. This stewardship theory is a means*"[...] of defining relationships based upon other behavioral premises."* (Davis et al., 1997). Subordinates are seen as collectivists, pro-organizational, and trustworthy. So, managers' (stewards) motives are aligned with the objectives of their principals (shareholders), because for stewards, collectivistic behavior has a higher utility than typical behavior of the homo economicus. This collectivistic behavior does not imply survival needs of the managers (stewards). But the difference between agency theory and stewardship theory is how the needs are satisfied. The steward, however, evaluates the tradeoff of his own needs and organizational needs, in the belief that by achieving the objectives of the organization, his personal needs are met, too (Davis et al., 1997).

It was found that the stewardship theory reflects the behavior in Japanese companies better, in contrast to U.S. corporations which fit better to agency theory, according to R&D investments (Lee & O'Neill, 2003). As one can see, no theory could explain the motives and objectives worldwide due to institutional differences. This is the case because not only institutional differences are in place, but also different governance systems, particularly when shareholder concentration plays a vital role in the governance system of companies because of family involvement. Thus, Anderson & Reeb (2004) found firm performance is enhanced when founding family ownership and family board presence is assured. They trace their results back to agency and stewardship theory. So agency and stewardship theory offer similar predictions. But agency theory just explains the cost reduction of dysfunctional behaviors in organizations. The stewardship theory, however, explains the potentials to maximize performance within organizations because of pro organizational attitudes (Corbetta & Salvato, 2004). This positive attitude towards the organization could be enhanced due to altruistic behavior of the principals diminishing relationship conflicts (Eddleston & Kellermanns, 2007).

Therefore stewardship theory could be seen as a special case of the agency theory if principal and agent put the same weight on the other party´s and their own interests (Albanese et al., 1997; Yuan, 2003). This could be the case when family managers are in charge resulting in lowering agency costs and arousing stewardship behavior among principal and agent (Miller & Le Breton-Miller, 2006). Furthermore, this stewardship behavior could rely on the embeddedness of the actors in different social systems. If the family actors are more embedded in the family environment, they may tend to be more altruistic, therefore enhancing stewardship behavior and vice versa, thus increasing agency costs (Le Breton-Miller & Miller, 2009). But more care should be taken; altruistic behavior could be traced back to individuals while

stewardship serves as a shared value. Summing up, an individual could be temporarily and interpersonally removed from the consequences of stewardship behaviors (Hernandez, 2012).

Table 2-2: Comparison of agency and stewardship theory

	Agency theory	Stewardship theory
Model of man	Economic man, Self-serving	Self-actualizing man, Collective serving
Psychological mechanisms		
Motivation	Lower order/economic needs (physiological, security, economic)	Higher order needs (growth, achievement, self-actualization)
	Extrinsic	Intrinsic
Social comparison	Other managers	Principal
Identification	Low-value commitment	High-value commitment
Power	Institutional (legitimate, coercive, reward)	Personal (expert, referent)
Situational Mechanisms		
Management philosophy	Control-oriented	Involvement-oriented
Risk orientation	Control mechanisms	Trust
Time frame	Short term	Long-term
Objective	Cost control	Performance enhancement
Cultural Differences	Individualism	Collectivism
	High power distance	Low power distance

Source: Adapted from Davis et al. (1997).

2.2.3 Socioemotional wealth

Stewardship theory as well as agency theory explains the principal-agent relationship of stakeholders. A further branch within the agency framework is the behavioral agency theory (Shukla et al., 2014) relying on the risk preferences which can be represented by noneconomic goals. Hence, family firms have, like all for-profit companies, economic but also noneconomic goals (here: risk preferences) (Chrisman et al. 2004; Chrisman et al., 2012). But there is an agreement in academia that family firms significantly differ from nonfamily firms (Gomez-Mejia et al., 2011; Berrone et. al, 2012). This difference is represented in their way of framing problems and in the kinds of actions undertaken (Naldi et al., 2013). Family firms are more willing to reduce their economic performance in favor of noneconomic objectives (Chrisman & Patel, 2012). They avoid risky decisions, but they also accept risks for their firm's performance when special circumstances are in place. As an example, family firms sacrifice initial public offering (IPO) proceeds by higher IPO underprizing or their attitude to social responsibility which is different to nonfamily firms (Gómez-Mejía et al., 2007; Leitterstorf & Rau, 2014; Berrone et al., 2010; Dyer & Whetten, 2006; Block & Wagner, 2014). Those inconsistent decisions, compared to nonfamily firms, are made just to maintain their socioemotional wealth (SEW) and are not in accordance with mainstream theories in

management research (Gómez-Mejía et al., 2007). SEW is *"[…] the stock of affect-related value that the family has invested in the firm […]"* (Berrone et al., 2010). This approach seems to be an appropriate umbrella to explain the difference between family firms and nonfamily firms. Because SEW could be their reference point (Gómez-Mejía et al., 2007).

SEW was generated by Gomez-Mejia et al. (2000) based on behavioral agency theory (Wiseman & Gomez-Mejia, 1998). This Behavioral Agency Model (BAM) was developed under a meso-theroretic perspective, including corporate governance and complementary views of risk. This was done by merging agency theory and prospect theory (Kahneman & Tversky, 1979)[6] under the assumption that interests of agents and principals differ (Wiseman & Gomez-Mejia, 1998). According to behavioral theory decision makers, attitudes towards risk change based on the framework of a problem. As a result, SEW theory relaxes the inflexible assumption from agency theory towards a more contingency-based view that principals do not always hold a consistent risk preference (Gómez-Mejía et al., 2007; Gomez-Mejia et al., 2001). These risk preferences are driven by beliefs that actions bearing costs and uncertainty are compensated by noneconomic gains. Due to different drivers of beliefs and risks, the SEW concept is multidimensional. Berrone et al. (2012) identified five dimensions.

- **Family control and influence:** Family control could be exerted directly as manager, director or founder and indirectly by family coalitions or shareholders.
- **Family members´ identification with the firm:** The family is tied to the organization. So stakeholders see this venture as an extension of the family itself.
- **Binding social ties:** Family firms' social relationships are tied to collective benefits arising in closed networks, e.g. social capital and trust. Even nonfamily members share the identity and the commitment towards the family firm.
- **Emotional attachment:** Commonly shared experiences and events in the past affect the contemporary activities, events and relationships. This dimension helps to understand why family members are sometimes altruistic or considered as trustworthy.
- **Renewal of family bonds to the firm through dynastic succession:** Transgenerational sustainability is one of the central aspects of SEW. This kind of sustainability impacts the time horizons of decisions and leads to a long term oriented strategy.

To preserve these five dimensions, three strategic behaviors were identified. (1) control and influence over ownership and operations. (2) maintaining the family dynasty and (3) sustaining the reputation. Therefore, a family CEO would foster these three strategic goals (Naldi et al., 2013).

[6] Prospect theory is a behavioral economics theory. This theory describes how people choose between probabilistic alternatives.

2.2.4 Resource-Based View

Agency theory and Organizational Behavior theory could be seen as contradictory in a narrow sense, but the Resource-based view (RBV) is a more intimate integration to study competitive advantage (Barney, 1991). A main issue in strategic management research is whether family involvement induces higher performance and hereby a competitive advantage. This competitive advantage is built on strategic and idiosyncratic[7] resources which are heterogeneously distributed crosswise amongst firms (Barney, 1991; Hitt et al., 2001; Habbershon et al., 2003). Looking at resources (capital, labor and land) has a long tradition in economics. However, a resource is anything that could be a strength or weakness of a firm (Wernerfelt, 1984). Thus, resources can be split up into "systemic" resources embedded in the organization and "discrete" resources which are easier to transfer (Miller & Shamsie, 1996). For example (Wernerfelt, 1984, Barney, 1991):

1. **Systemic resources:** Knowledge of technology, employment of skilled staff, efficient processes, human capital resources, organizational capital resources.
2. **Discrete resources:** Brand names, information, assets (physical, capital resources).

Resource-Based View (RBV), in fact, applies the analyses to the firm or business unit and separates strategic resources that are complex, intangible, and dynamic. The resources of a firm are similar to an inventory of raw materials. Raw materials change on a regular basis (Sirmon & Hitt, 2003). Hence, family firms have been described as complex, and especially rich in intangible resources. RBV is a proper means to analyze family firms (Habbershon & Williams, 1999). Thus, family involvement could be seen as a special kind of resource. Family firm resources could be defined as the "familiness". Familiness is the *[…] unique bundle of resources a particular firm has […]"* because of the interaction of family members and the firm (Habbershon & Williams, 1999). The interactions of the subsystems, family unit, business entity and individual family member generate an idiosyncratic pool of resources and capabilities displayed in the following table (Habbershon et al., 2003).

[7] Idiosyncratic resources are also surfaced by the agency theory (Habbershon & Williams, 1999).

Table 2-3: Comparing the uniqueness of resources and attributes of family firms

		Focal family firms		
Resource	Definition	Positive	Negative	Nonfamily firms
Human capital	Acquired knowledge, skills, and capabilities of a person	Extraordinary commitment; warm, friendly, and intimate relationships; potential for deep firm-specific tacit knowledge	Difficult to attract and retain highly qualified managers; path dependencies	Not characterized by the positives, but have fewer limitations
Social capital	Resources embedded in network, accessed through relationships	Components embedded in family; legitimacy with constituencies enhanced; development of human capital	Limited number of networks accessed; often excluded from elite networks (i.e. Fortune 500 CEOs)	Networks can be more diverse; maybe opportunistic in accessing and leveraging; sometimes used for managers´ benefit – agency costs
Patient financial capital	Invested financial capital without threat of liquidation	Generational outlook; not accountable to strict short-term results; effective management of capital; allows pursuit of creative and innovative strategies	Nonfamily investors excluded; limited to availability of family´s financial capital	Largely do not have the benefits or limitations
Survivability capital	Pooled personal resources family members, loan, contribute, and share with business	Helps sustain the business during poor economic times or redevelopment of the business; safety net	Not all family firms have it	Do not enjoy due to lack of commitment by employees and stakeholders
Governance structure & costs	Costs associated with control of firm; examples include incentives, monitoring, and controls	Family-owned and operated firms´ structures, trust, and family bonds reduce governance costs	Some family firms may not have an effective structure, trust and strong family bonds, thereby producing greater governance costs	Professional management and capital diversification often increase governance costs

Source: Adapted from Sirmon & Hitt (2003).

Henceforth, RBV supports a researcher's aim to explain how resources (e.g. familiness) raise competitive advantages and how these resources could be acquired (Chrisman et al., 2005). Within strategic management research, RBV is perceived as a good framework to evaluate firm performance and competitive advantage (Habbershon & Williams, 1999).

2.2.5 Institution-Based view

In strategic management, research decisions are not only determined by industry conditions, capabilities (resources), and the behavior of stakeholders of firms, but are also influenced by the institutional framework executives are confronted with (Peng et al., 2008). The formerly mentioned theories showed how strategy is influenced by inter-personal and intra-organizational constraints. These constraints massively influence not only the strategy of the firms or decisions and organizational action (Friedland & Alford, 1991), but also performance

(North, 1990). However, these theories, especially the Resource-Based View, exemplified by (Barney, 1991), are largely ignoring the context of competition amongst industries and economies. This context is spanned by the formal and informal institutions (North, 1990; Peng et al., 2008). Thus, the Institution-Based View became the cutting edge of strategy research and therefore the third stream besides the Resource-based and the Industry- based view (Peng et al., 2008).

Institutions are *"the humanly devised constraints that structure human interaction"* to reduce uncertainty (North, 1990). In other words, institutions yield *"regulative, normative, and cognitive structures and activities that provide stability and meaning in social behavior"* (Scott, 1995 & 2014). Thornton et al. (2011) following suit, institutions *"establishing a stable structure for human interaction"*. In sum institutions are *"[…] arrangements or a set of fundamental political, social, and legal rules […]"* (North, 1990). This theory can be used as a meta-theoretical framework to analyze institutions, individuals and organizations (Thornton et al., 2012). But institutions and organizations are not interchangeable, so institutions are the rules of the game and organizations can be considered as players (North, 1990).

The most important institutions in society are the market, the state, firms, the profession, religion, family and relational contracting (Friedland & Alford, 1991) Additionally, it was suggested that culture is *"a substream of institutional arrangements"* (Hofstede et al., 2002; Hofstede, 2007). An overview of institutions is shown in the following table.

Table 2-4: Overview of institutions

Degree of formality (North, 1990)	**Examples**	**Supportive Pillars (Scott, 1995)**
Formal institutions	Markets Profession Regulations Law Contracts	Regulative
Informal institutions	Norms Family Ethics Culture Religion	Normative Cognitive

Source: Adapted from Peng et al. (2009).

3 Literature review and research questions about family firms and performance

This chapter presents a literature review focusing on meta-analyses investigating family firm performance. The final section of this chapter provides a summary deriving research questions.

3.1 Literature review: Meta-analyses on family firms and performance

O'Boyle et al. (2012) pose the question *"What is the relation between family involvement and firms´s financial performance?"* This question is raised due to the evolutionary perspective that working in a family firm could enhance substantial advantages. Otherwise, family involvement could foster disadvantages. The authors investigate the research question from an evolutionary psychology and agency theory perspective (see above). To answer this question they employ three hypotheses. Theses hypotheses were tested with Hunter and Schmidt´s (2004) random effects analytical approach and a subgroup analysis. The authors coded accounting and marked based regression and correlation coefficients resulting in 95 effect sizes derived from 78 articles. The regression coefficients were transformed to partial correlations with the Peterson and Brown (2005) formula and aggregated with the extracted correlation coefficients. These composite effect sizes were modified with Fisher´s z-transformation followed by an outlier detection analysis. The meta-analysis itself is not significant in any subgroup. Likewise, the overall mean effect is insignificant. Hence, the authors interpret these results concluding that positive and negative effects of family involvement balance each other. Furthermore, they assume the agency costs are really reduced because of the governance systems in family firms.

The article *"Measuring Performance Gaps Between Family and Non-Family Business: A Meta-Analysis of Existing Evidence"* (Machek et al., 2013) points out that the question if family firms are superior performers compared to nonfamily firms is not solved, yet. Hence, several primary studies addressing this question present mixed results according to this question. The authors of this article trace these mixed results back to different analytical approaches. Therefore, Machek et al. (2013) carried out meta-analysis including 78 primary studies. Their theoretical ground is the stakeholder theory and altruism. Based on these theories, they employed the Hunter and Schmidt meta-analytical approach to derive their results. The hypothesis *"The relation between family involvement and firm performance is always positive"* was tested by applying a special kind of effect size. The authors did not use the standard approach based on correlation or regression coefficients. They coded non-significant or mixed results in a study with 0, a negative relation is represented by -1, otherwise a positive one with +1. Additionally, they weighted their effect sizes according to the publication quality. The analyses result in a

positive, but not significant mean effect size. Furthermore, they concluded that ROA is used most frequently as the performance measure in primary studies.

The following article *"What do we know about private family firms? A Meta-Analytical Review"* (Carney et al., 2013) investigates if publicly listed family firms outperform other types of firms. This frameworking-question is divided into three subquestions. *Is there a unique set of strategic choices? Do performance effects remain after the transition and could these effects be based on intergenerational shifts in corporate governance and strategy?* However, these three questions are answered by applying a principal agent, Resource-Based View of the firm, stewardship theory and socioemotional wealth as a theoretical framework. The empirical analyses itself are based on 74 primary studies. They were synthesized at first with a Hedges & Olkin type random-effects meta-analysis (HOMA), as univariate analysis, the main effect. This was followed by a structural equation model (MASEM) which is verified by a meta-regression analysis (MARA). These analyses show that publicly listed family firms in the U.S. outperform other types of companies. Additionally, it was shown after succession (passing on the firm to the next generation) that the first generation does not maintain the performance of the founder due to more conservative decisions.

The following two tables give an overview of already compiled meta-analyses in the research field of family firm performance.

Table 3-1: Overview of prior meta-analyses (1)

Id	Author(s)	Year	Journal	No. of citations[1]	Methodological Approach							
					Analytical approach	Transformation	Effects coded	Dependent variable	Sample	No. of studies	No. of effect sizes	Country(s)
1.	O´Boyle, Ernest H.; Pollack, Jeffrey M.; Rutherford, Matthew W.	2012	JBV	26	HSMA	Fisher´s z	Correlations & regression coefficients	Accounting & Market	Public & private	78	78	Worldwide
2.	Machek, Ondrej; Brabec, Martin; Hnilica, Jiri	2013	IJBM	0	HSMA	Principal conclusion for effect size: -1; 0; +1	One effect per study	Accounting & Market	Public & private	78	78	Worldwide
3.	van Essen, Marc; Carney, Michael; Gedajlovic, Eric R.; Heugens, Pursey P.M.A.R.	2013	CGAIR	2	HOMA MASEM MARA	Fisher´s z	Correlations & regression coefficients	Accounting & Market	Public	74	247	USA

Source: Own illustration

Journal	Analytical approach
APJM: Asia Pacific Journal of Management	HOMA: Hedges & Olkin-type meta-analysis
CGAIR: Corporate Governance: An International Review	HSMA: Hunter & Schmidt-type meta-analysis
IJBM: International Journal of Business & Management	MARA: Meta-regression Analysis
JBV: Journal of Business Venturing	MASEM: Meta-analysis structural equation model
WP: Working paper	HiLMMA: Hierarchical linear modelling meta-analysis

[1] Retrieved: 06.10.2014

Table 3-2: Overview of prior meta-analyses (2)

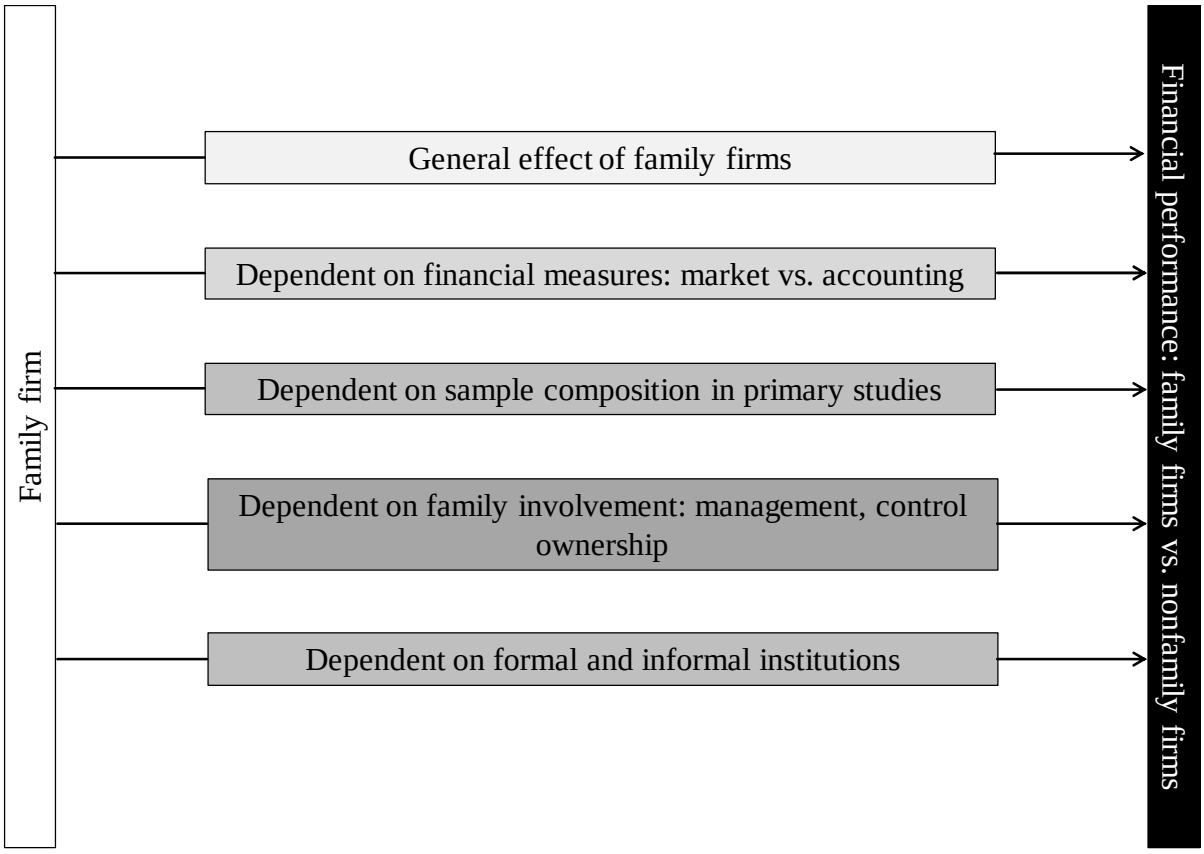
Id	Author(s)	Theoretical Background	Hypotheses/research questions	Central findings
1.	O´Boyle, Ernest H.; Pollack, Jeffrey M.; Rutherford, Matthew W.	Evolutionary psychology Agency theory Resource-Based View Stewardship theory	1. The relationship between family involvement and firm performance is more positive and stronger in public listed firms than in private firms. 2. The relation between family involvement and firm performance is positive and stronger in larger firms than in smaller firms. 3. a) The relation beteween family involvement and firm performance is positive and stronger in firmst hat exist in a more collectivistic culture relative to firmst hat exist in more individualistic culture. 3. b) The relation between family involvement and firm performance is positive and stronger in firms that exist in cultures where power distance is high relative to where power distance is low.	There is no relationship between family involvement and firm performance.
2.	Machek, Ondrej; Brabec, Martin; Hnilica, Jiri	Altrusim, Stakeholder theory.	The relation between family involvement and firm performance is always positive.	There is a positive not significant relation between family ownership and management on firm performance.
3.	van Essen, Marc; Carney, Michael; Gedajlovic, Eric R.; Heugens , Pursey P.M.A.R.	Principal agent theory Resource-based view Stewardship theory Socioemotional wealth	1. Publcly listes ff are more/less profitable than publicly listed non ff. 2. F control negatively/positively influences the profitability of publicly listes ff through ist negative effects. 3. F control negatively/positively influences the profitability of publicly listed firms through its negative effects on internationalization. 4. F control negatively/positively influences the profitability of publicly listed firms through its negative effect on leverage. *5.* Successor control of publicly listed firms negatively influences profitability through its influence on: control-enhancing devices/firm strategies.	US family firms outperform other public corporations. The performance of family firms drops after the first generation due to more conservative strategic decisions.

Source: Own illustration

3.2 Research questions on family firm performance

The research questions are directly derived from previous chapters, namely the theory chapter 2.2 and the literature review chapter 3.1. I believe that both scholars and practitioners are interested in these research questions about family firms and the drivers of performance.

Figure 3-1: Dependencies of financial performance of family firms



Source: Own illustration

3.2.1 Family firm performance vs. nonfamily firm performance: main effect

Financial performance is analyzed in three meta-analyses[8], based on different theoretical perspectives. Two out of three meta-analyses come up with the result that family involvement leads to a better performance compared to nonfamily firms. The other one yields no significant results.

Research question 1: *Do family firms show a better financial performance compared to nonfamily firm?*

[8] For details see literature review chapter 3.1.

3.2.2 Dependent variables in primary studies: performance measures

The objective of this study is to investigate the link between the nature of family firms and their efficiency measured as financial performance (Mazzi, 2011). Two main categories of financial performance variables are used as dependent variables in primary studies: accounting and market based measures[9]. Neither accounting- nor market-based performance measures are perfect but accepted as valid measures of firm performance (Gentry & Shen, 2010). But the relationship between accounting- and market-based measures is a bit unclear (Combs et al., 2005; Richard et al., 2009; Gentry & Shen, 2010).

> **Research question 2:** *Is the direction of market-based measures different from accounting-based measures comparing family firms' and nonfamily firms' financial performance?*

3.2.3 Sample composition drives results of primary studies

Meta-analyses are based on studies investigating (nearly) the same research topic. This research method makes sense if the results of these primary studies are diverse. These different empirical results in primary studies can be due to different sample compositions. In my case, samples may consist of publicly listed companies, privately held companies, a mix of publicly listed and privately held samples or samples focused on one type of industry. Furthermore, industry affiliation could be another driver of financial performance. Therefore, I investigate the drivers mentioned beforehand.

> **Research question 3a:** *Do small and medium family firms show a different financial performance compared to small and medium nonfamily firms?*
>
> **Research question 3b:** *Do publicly listed family firms show a different financial performance compared to publicly listed nonfamily firms?*
>
> **Research question 3c:** *Do technological family firms show a different financial performance compared to technological nonfamily firms?*
>
> **Research question 3d:** *Do manufacturing family firms show a better financial performance compared to manufacturing nonfamily firms?*

Interestingly, there is empirical evidence that privately held companies outperform publicly listed companies in the United Kingdom (Akguc et al., 2013). Managers in smaller companies act more stewardly and conduct earnings management in favor of the related SME company (Burgstahler et al., 2006). Nepotism and altruism play a tangential role in SME; otherwise, publicly listed companies face more complex administrative tasks which reduce

[9] For details, see chapter variable description 6.1.

efficiency (Miller et al., 2013). Both sets of constraints could have an impact on firm performance.

Research question 3e: *Which family firms have a positive financial performance compared to those family firms in primary study samples with only publicly listed samples?*

Research question 3f: *In primary study samples consisting of only small and medium-sized enterprises: Do family firms have a positive financial performance compared to those in mixed primary study samples?*

3.2.4 Family involvement influences firm performance

The link between family firm performance and the nature of family firm is determined by ownership, control and/or management, as main variables in primary studies.[10] That is, holding either cash flow, voting rights or both (variables *F.control* or *F.ownership*) (Mazzi, 2011). Alternatively, the family is actively involved in business operations (variable *F.management*). An important difference to nonfamily firms, even with large blockholders, are the longer time horizons in strategy compared to nonfamily firms with a short-term focus (Chrisman et al., 2009).

As one might imagine, different combinations of ownership, control and management are present in family firms in the real world. These different combinations of family involvement can lead to an increasing or decreasing performance because of induced costs. These costs arise due to separation of ownership/control and management (Chrisman et al., 2004). Jensen & Meckling (1976) called them agency costs. Agency costs are associated with the agency problem occurring if two parties have different objectives and division of labor is in place (Jensen & Meckling, 1976). One party has the supervision (principal) and the other one the execution (agent) task. Thus, the supervisor has to control the executive party (manager/agent) by monitoring his actions to ensure that his goals are achieved by the manager/agent. Not only are the monitoring systems costly, measuring and rewarding the manger/agent´s behavior along with administrative efforts also induces further costs (Jensen & Heckling, 1995).

Positive effects of family involvement on firm performance

These agency costs, in that case monitoring costs, in family firms are more or less zero or insignificant if ownership/control and management is in one, namely in the family's´ hand (Jensen & Meckling, 1976; Fama & Jensen, 1983b; Demsetz & Lehn, 1985; Eisenhardt, 1989). Families have the incentive to manage cost-efficiently (McConaughy et al., 1998) due to the long-term presence in their firms (Anderson & Reeb, 2003) and familial enmeshment. In addition, families have more informal communication channels and rules that are not costly (Burgstahler et al., 2006).

[10] For details see chapter variable description 6.1.

Furthermore, measuring, rewarding and monitoring actions are negligible in family firms if the interests of family manager and owner are aligned due to intrinsic motivation of the family manager to pursue the family´s interests. So, family managers seek self- actualization by achieving firm goals because of a higher utility for themselves (Chrisman et al., 2007). This closeness with the firm can enhance the stewardship attitudes (Miller et al., 2013) based on commitment of family owners and managers (Sciascia & Mazzola, 2008). In sum, these attitudes minimize agency costs and maximize the performance of the family firm.

This attitude, commitment and trust between family managers and owners support the power of representation of the family manager, resulting in close relationships with clients, suppliers and employees (Miller et al., 2009). These close relationships are a useful form of social capital (Sirmon & Hitt, 2003). In addition, the long-term orientation of family firms and transitions over generations creates a bundle of unique resources leading to a socioemotional resource profile driving the performance of a firm (Greene & Brown, 1997; Anderson & Reeb, 2003; Arregle et al., 2007; Gómez-Mejía et al., 2007).

Summing up, positive family firm performance is related to lower agency costs which are advantageously influenced by long term presence of the family, informal communication channels, trust, commitment according to goals and a pack of unique resources[11].

Research question 4a: *Do owner managers of family firms impact firm performance positively?*

Negative effects of family involvement on firm performance

Otherwise, prior literature suggests that family ownership can lead to poor firm performance (Morck et al., 2000) because family firms have both economic and noneconomic goals (Lee & Rogoff, 1996). These contradicting goals yield conflicts that arise in extended families (Gersick, 1997). For example, in conflicting situations, the family manager could prefer to decide based on family sentiment instead of economic logic (Kets de Vries, 1996). This altruistic behavior leads to a squandering of the family firm's resources, on behalf of their own personal welfare (Lim et al., 2010). One conflict could be an inefficient family member who got the position in the family firm because of nepotism (Handler, 1989). A further driver to preserve this socioemotional wealth, despite altruism and nepotism, are strategic decisions (Berrone et al., 2010; Chrisman et al., 2012) that eschew economic risks, sacrificing firm performance (Miller et al., 2014).

Research question 4b: *Do owner managers of family firms impact firm performance negatively?*

[11] Examples of resources: Gedajlovic & Carney (2010).

3.2.5 Institutions influence family firm performance

The notation that family involvement in companies is characterized by interaction of single members of a family with the business leading to distinctive performance capabilities makes a family firm unique (Habbershon & Williams, 1999). These distinctive performance capabilities massively influence strategic decisions (Sirmon & Hitt, 2003; Arregle et al., 2007) and therefore the performance of the related firm. These capabilities can be seen as the ability to manage explicit and implicit contracts inducing transaction costs in economic organizations, here family firms (Williamson, 2007). These explicit and implicit contracts are controlled and enforced by institutions which are *"[…] arrangements or a set of fundamental political, social, and legal rules […]"* (North, 1990). This set of institutional rules define the start, end and shape of means which determine and pursue interests of social actors (Whitley, 2006) such as firms, managers, employees, society and political parties, within this framework (Scott, 1987).

These social actors are embedded in this institutional framework and rule the game in society (North, 1990). Institutional frameworks influence and differ, however, within countries and create diverse economic systems (North, 1990; Whitley, 1999; Hall, 2001; Jackson & Deeg, 2008). Subsequently, institutional factors can be analyzed to explain cross- country, regional and economic differences, because they determine the particular national context (van Essen et al., 2012). These different national and/or regional contexts dynamically influence interactions of organizations and institutions, leading to appropriate strategic decisions of the relevant stakeholders (Peng, 2002).

For example, in weak distinct institutional environments, the strategic decision to reduce risk can be taken to gain more control of the firm (Jensen, 1993). This control could lead to reduced monitoring costs, especially in family firms, because of aligned interests in management (Liu et al., 2012). So, empirical evidence proved that family firms outperform nonfamily firms in underdeveloped institutional frameworks (Barth et al., 2005). In contrary, in developed institutional frameworks organizations rely less on internal controls and more on informal family ties (Liu et al. 2012). Stronger developed institutions lead to positive outcomes in family firms (Carney et al., 2011).

These strengths and weaknesses of institutional frameworks can be roughly approximated by regions.

> **Research question 5a:** *How is family firm performance influenced by regional institutional contexts?*

To investigate the institutional influence on organizational outcomes in more detail, it was recently suggested (Peng et al., 2009) to investigate institutions framed as formal and informal (North, 1990; Stiglitz, 2001). Informal institutions consist of conventions and behaviors (North, 1993) in enduring frameworks of social beliefs (Scott, 1987). Primarily, informal institutions

have a cultural background (Whitley, 2006) that can be modeled by Hofstede´s cultural dimensions (see chapter variable description 6.1). These dimensions could impact family firm performance because of the behavior of stewardly family firm manager which again reduces monitoring, and therefore agency costs.

Research question 5b: *How is family firm performance influenced by informal institutional contexts?*

Formal institutions, in contrast, have an impact on private property rights, access to finance and labor relations (Whitley, 2006). They observe political rules, legal decisions and economic issues (Peng, 2000). It was shown that legal frameworks have an impact on firm performance (La Porta et al., 1999; Klapper & Love, 2004). Particularly, these legal frameworks differ remarkably depending on their legal origins, such as common law and civil law, the latter dating back to Roman law (La Porta et al., 1999). Corporate governance systems are designed based on common and civil law frameworks. Therefore, if no two-tier systems are in place, that is a separation of management from controlling functions, the law cannot automatically prevent altruistic and nepotistic behavior of family members in charge.

Research question 5c: *How is family firm performance influenced by legal origin?*

Not only can the legal origin shape performance of family firms, even more important is the strength of institutions pushing their issues and objectives. The lack of strong formal institutions can increase the role of informal institutions such as culture or family ownership (Lodh et al., 2014). Informal norms substitute market intermediaries in weak formal environments (Luo & Chung, 2013). To measure the quality of enforcement of property rights, I follow (La Porta et al., 1998) by using a rule of law logic. This logic variable is a compound consisting of several rule of law variables from different origins (see variable description 6.1). However, the efficiency of law enforcement massively influences the behavior of family members in firms. In stronger formal environments, they tend to behave like professional managers, whereas in weaker formal frameworks, the informal institutions become more prevalent. This professional behavior of family members will enhance economic goals on the one hand, on the other hand reducing socioemotional wealth.

Research question 5d: *How is family firm performance positively influenced by more efficient legal environments?*

4 Methods of meta-analysis

The chapter gives an overview of different schools and procedures of meta-analyses. Followed by the detailed description of univariate meta-analytical approaches which are extended by two multivariate empirical approaches, namely meta-analytical regression analysis (MARA) and multilevel analysis (HiLMMA). The last section rounds out the method chapter by representing quality criteria of meta-analyses.

4.1 Objectives of meta-analyses, related effect sizes and classification

"Meta-analysis refers to the analysis of analyses". (Glass, 1976). Therefore, meta-analyses belong to the scientific research methods of systematic reviews and research syntheses (Chalmers et al., 2002). The term systematic review was used earlier than research synthesis (Mandel, 1936). Broadly defined meta-analysis is *"a quantitative review and synthesis of results of related but independent* (primary) *studies"* (Normand, 1999).

4.1.1 Objectives and usefulness of meta-analyses

Even for experts, developments and findings within a certain research area could not be overlooked. It is therefore necessary to summarize research results (Beelmann, 1994; Riley et al., 2011; Haidich, 2010). Summarizing with meta-analyses in the context of all other primary studies has become one of the important objectives of meta-analyses in order to assess the degree to which results generalize (Steel et al., 2014; Borenstein, 2009). A further objective is to detect the study-to-study heterogeneity in effect sizes (Nelson & Kennedy, 2009) and to look for some order in contradictory confusing empirical findings (Botella & Gambara, 2006). Conclusions of meta-analyses summarize the state of the science, what is already known and not known in the specific field and which theory is valid or not (Schmidt, 1992; Schmidt, 1996; Glass, 1976) and to shed light on debates of alternative positions (Botella & Gambara, 2006). For this reason, meta-analyses resolve conflicting evidence regarding outcomes in different primary studies to advance the research field and for practical applications (Rosenthal & DiMatteo, 2001). Meta-analyses display the aggregated statistical findings in a more differentiated and advanced manner than conventional qualitative systematic reviews (Lipsey & Wilson, 2006). So, meta-analyses are a set of methods to synthesize collected statistical results which can be seen as brick related to blueprints provided by theorists (Glass, 1976; Drinkmann, 1990; Cooper & Hedges, 2009b). Thus, researchers receive conclusions that are more precise and credible than results in primary studies or narrative reviews (Rosenthal & DiMatteo, 2001). The following Table 4-1 gives an overview of the usefulness of meta-analyses:

Table 4-1: Usefulness of meta-analyses

Tasks	Description
Description of the research field	Influences on practice and political decision-making processes.
Description of causal relations	Not based on authors whim (to avoid publication bias)
Contribution for theory confirmation and development	Systematic rules to generalize the results
Well suited to analyze mediating and moderating variables	Could integrate more research outcomes
Examination of the direction and magnitude of effects	Test differences between effect sizes (sensitivity and subgroup analyses)
Hypothesis testing is possible (Meta-regression)	Enhancing statistical power and precision

Source: Adapted from Beelmann (1994); DeCoster (2009); Durlak & Lipsey (1991); Rosenthal & DiMatteo (2001); Normand (1999); Hunter & Schmidt (2004); Borenstein (2009); Stanley (2001).

4.1.2 Overview of research and common research process

Hence, meta-analyses have revolutionized the field of management (Aguiniset al., 2010). But this method is also applied in different other fields, such as economics since 1989-1990 (Nelson & Kennedy, 2009), education in 1981 (Hartung et al., 2008), social sciences starting around 1980 (Ringquist, 2013, Kulik et al., 1980), medicine in the late 1970s (Haidich, 2010) and psychology in 1976/1977 (Schmidt & Hunter, 1977; Glass, 1976). All these different research fields have a common process to carry out a meta-analysis (Beelmann, 1994; Smith & Pattanayak, 2002; DeCoster, 2009). The next table gives an overview.

Table 4-2: Research process of meta-analyses

Process
1. Formulation of an already empirically proven research problem/question
2. Systematic collection of empirical primary studies (literature search and study selection)
3. Coding and evaluation with regards to content and methodical characteristics
4. Aggregation of quantitative summative findings and quantitative analyzes. Analyzing the impact of moderating variables and the distribution
5. Interpretation of results
6. Documentation of results

Source: Own illustration

4.1.3 Definition and overview of effect sizes

Especially step four in Table 4-2 is the distinguishing characteristic of meta-analyses compared to narrative reviews. Therefore, a multiplicity of aggregation opportunities of results in primary studies (Hedges & Olkin, 1985), the calculation of so-called effect sizes out of coefficients of primary studies, were established. An effect sizes is *"[…] a value which reflects the […] strength of a relationship between two variables, it is the currency of a meta-analysis."* (Borenstein, 2009). These effect sizes are calculated separately from each single primary study

(Tischler, 2011), based on primary study coefficients. Briefly, the investigator analyses a set of primary studies that contain a common empirical outcome (i. e. coefficient) (Nelson & Kennedy, 2009). Afterwards, the meta-analysis combines the coefficients (alternative terms: results, measurements, estimates) of single primary studies and explains the variation behind the estimates (Nelson & Kennedy, 2009).

Correspondingly, two main considerations should drive the choice of primary study **coefficients** (Borenstein et al., 2009). First, the coefficients from different primary studies must be comparable; they should measure the same relationship. Second, the coded coefficients must be convertible to effect sizes with information presented in primary studies (Borenstein et al., 2009; Durlak & Lipsey, 1991). In meta-analyses, sometimes coefficients of primary studies become an effect size without any conversion. Otherwise, coefficients of primary studies must be transformed into analyzable effect sizes. The following Table 4-3 gives an overview of measurements used in meta-analyses (Borenstein et al., 2009). These measurements are mostly derived by conducting an experiment in natural sciences. An independent group design uses two separate groups of participants, in a matched group design participants are grouped according to a specific variable or measure (e.g. music preferences jazz and classic), pre-post designs test the effectiveness of an intervention, and one-group designs are not considered as experiments. The latter is the standard case in management research.

Table 4-3: Overview of measures and effect sizes in meta-analyses

Coefficients
Effect size based on means
Raw (unstandardized) mean difference (*D*)
Based on studies with independent groups
Based on studies with matched groups and pre-post designs
Standardized mean difference (*d* or *g*)
Based on studies with independent groups
Based on studies with matched groups and pre-post designs
Response rations (*R*)
Based on studies with independent groups
Effect size based on binary data
Risk ratio (*RR*)
Based on studies with independent groups
Odds ratio (*OR*)
Based on studies with independent groups
Risk difference (*RD*)
Based on studies with independent groups
Effect size based on correlational data
Correlation (*r*)
Based on studies with one group
Partial correlation (r_{xy})
Based on studies with one group

Source: Adapted from Borenstein et al. (2009).

The main effect sizes applied are the *r* family and the *d* family. The *r* family of product moment correlations includes:

- Pearson *r* (both variables in primary studies are continuous)
- *phi* (both variables are dichotomous)
- point biserial *r* (one variable is dichotomous and one is continuous)
- Spearman *rho* (both variables are in ranked form)
- Z_r (Fisher transformed correlations)

Problems in the *r* family arise when they are squared, such as r^2, *omega* squared, *epsilon* squared or *eta* squared because these effect sizes lose directionality.

The three main members of the d family of effect sizes are: Cohen´s *d* (denominator: square root of the pooled variance σ^2), Hedges´s *g* (denominator: square root of the pooled variance S^2), and Glass´s *delta* (denominator: square root of the control group variance S^2).

$$\text{Cohen´s } d = \frac{M_1 - M_2}{\sigma_{pooled}} \quad 4\text{-}1$$

$$\text{Hedges´s } g = \frac{M_1 - M_2}{S_{pooled}} \quad 4\text{-}2$$

$$\text{Glass´s } \Delta = \frac{M_1 - M_2}{S_{control\ group}} \quad 4\text{-}3$$

The advantage of several measures in Table 4-3 is that they could be converted into each other. So the standardized mean difference (*d* or *g*) could be transformed to log odds ratio (*OR*) and vice versa. On the other hand, the standardized mean difference is also convertible to correlations (*r*).[12]

$$r_1 = \sqrt{\frac{d^2}{d^2 + 4}} \quad 4\text{-}4$$

$$d = \frac{2r}{\sqrt{1 - r^2}} \quad 4\text{-}5$$

The conversion of *r* into the dichotomous *d* will lose information. Thus, the effect size *r* has several advantages over *d*. One advantage is that *r* represents the relationship between independent variables and scores on the dependent (when a regression is included in the analyses

[12] For in-depth information see: Glass (1976); Hedges & Olkin (1985); Rosenthal & DiMatteo (2001); Hunter & Schmidt (2004); Lipsey & Wilson (2006); Borenstein (2009); DeCoster, (2009).

of primary studies). Additionally, *r* allows analyzing trends across more than two groups. Furthermore, *r* is easier to interpret in terms of practical importance.

Otherwise, r_{xy} (partial correlations) can be computed from *t* statistics, *F* statistics, chi square and from standard normal deviate *Z* or the p-Value transformed to *Z* (Rosenthal & DiMatteo, 2001; Greene, 2008). These partial correlations, especially extracted from regression models, are well acknowledged as effect sizes (Cooper & Hedges, 2009a; Greenwald et al., 1996, Stanley & Doucouliagos, 2012). Furthermore, partial correlations (r_{xy}) check for endogeneity and possible omitted variable bias (Stanley & Jarrell, 1989).

Partial effect sizes could be organized in three groups:

1. Effect sizes derived from full regression models with GLS and covariance matrix (Becker & Wu, 2007).
2. Effect sizes approximate the bivariate correlation when it is not reported (Peterson & Brown, 2005):

$$r_6 = 0.98\beta + 0.05\lambda \qquad 4\text{-}6$$

   β : Regression coefficient of primary study

   λ : Is an indicator variable that equals 1 when β is positive and 0 otherwise

3. Effect sizes extracted inter alia from regression models and descriptive statistics (Gustafson, 1961; Olkin & Siotani, 1976; Anderson, 1984; Pedhazur, 1997; Keef & Roberts, 2004; Aloe & Becker, 2012). *t* is the value of the t-statistics of the regression coefficient and *df* are the degrees of freedom ($df = N - 2$) with *N* as sample size of the primary study (Hunter & Schmidt, 2004, p. 278). *t* values are either extracted directly from the regression table or calculated from the standard errors. Whereas, $t = \frac{b}{s.e.}$, *b* represents the regression coefficient and *s.e.* the standard error, respectively:[13]

$$r_2 = \sqrt{\frac{t^2}{t^2 + df}} = \frac{t}{\sqrt{t^2 + df}} \qquad 4\text{-}7$$

$$var(r_2) = \frac{(1 - r^2)^2}{N - p - 1} \qquad 4\text{-}8$$

$$r_3 = \frac{t\ \sqrt{1 - R_y^2}}{\sqrt{N - p - 1}} \qquad 4\text{-}9$$

[13] Another stream of combining results is the combination with a hypothesis test. For further reading see Hedges (1992).

$$r_4 = \frac{Z}{\sqrt{N}} \quad \text{4-10}$$

$$r_5 = \sqrt{\frac{\chi^2\,(1)}{N}} \quad \text{4-11}$$

N: Number of cases

p: Number of predictors in regression model of the primary study

R_y^2: Squared multiple correlation for the full regression model

Z: Fisher´s z-transformed correlation coefficient

In essence, the partial correlation is an effect size that could be defined as the test of significance divided by an index of size of the study (Rosenthal & Rubin, 1986).

In management research, mostly correlations and partial correlations (r_2) are used to conduct a meta-analysis. It was shown in recent simulation studies that partial correlations have excellent statistical properties (Aloe, 2014). Additionally, using partial correlations to impute missing bivariate correlations normally produces accurate effect size estimates in analyses (Peterson & Brown, 2005). The advantage of partial correlations - especially of r_2 - is its variance which has the same form of the bivariate correlation. So, after transformation of *r* to z Fisher´s z-transformation (Hedges & Olkin, 1985) could be used for significance testing.

$$Z_r = 0.5 \log\left[\frac{1+r}{1-r}\right] \quad \text{4-12}$$

$$SE_Z = \frac{1}{\sqrt{N-3}} \quad \text{4-13}$$

A further advantage of Fisher´s z-transformation is that it acts as a variance stabilizing transformation for correlation coefficients with a benefit of an effective normalizing transformation (Fisher, 1921). But it must be considered that partial correlations and bivariate correlations should not be combined. Meta-analyses should present a set of separate analyses (Aloe & Thompson, 2013), except they are addressed in a multivariate analysis controlling them.

4.1.4 Classification of meta-analyses

Since meta-analysts could use different measures and transformation methods to derive effect sizes (see above), researchers tried to categorize and distinguish different types of meta-analyses (Rosenthal, 1984; Bangert-Drowns, 1986; Durlak & Lipsey, 1991). A straightforward categorization was derived by Durlak and Lipsey (1991). They differentiate between group

contrast and correlation-associated meta-analyses (Table 4-3). In contrast, (Beelmann, 1994) differentiate meta-analyses according to their research process and discrete dimensions.

Table 4-4: Classification of meta-analyses

Group contrast meta-analyses
Treatment effectiveness meta-analysis
Survey research on a defined treatment domain to summarize treatment and the relation of those effects.
Group differences meta-analysis
Research on more or less naturally occurring groups (e.g. males and females).
Correlation association analyses
Test validity meta-analysis
Investigation of the correlation between a test and criterion variable.
Variable covariation meta-analysis
This meta-analysis is solely for practical interests. Research on the covariation of two or more variables.

Source: Adapted from: Durlak & Lipsey (1991).

Meta-analyses provide a shared subjectivity rather than true objectivity. Because researchers must make decisions based on their own judgment (judgment calls), such as choosing the measure to extract in primary studies, including and excluding primary studies and the moderator variables of interest (DeCoster, 2009). Finally, an important point is that no one's meta-analysis is the final word. All meta-analyses have methodological or other deficiencies (e.g. number of primary studies) and may be displaced by a later one (DeGeest & Schmidt, 2010). So, the average inaccuracy of the standard deviation (SD) of effect sizes shrinks with the increasing number of primary studies and converges asymptotically to an SD of 0.030 with 100 primary studies (Steel et al., 2014). That is, the number of primary studies drives the precision of a meta-analysis.

4.2 Univariate approaches

Meta-analysis is a technique to aggregate coefficients from independent comparable primary studies (publications about the same topic) (DerSimonian & Kacker, 2007). The basic principle is to calculate effect sizes for primary studies. That is, extract the coefficient from primary studies and transform them to a common metric (in management: Fisher´s z). Afterwards, they will be combined to obtain an average effect size. Furthermore, the effect sizes are weighted by the accuracy of the coefficient of the primary study (e.g. using the primary study´s sample size or the number of observation included in regression analyses) (Field, 2001).

4.2.1 Overview of meta-analytical schools for univariate analyses

Hedges / Olkin and Rosenthal / Rubin meta-analysis (RHOMA)

Correlation coefficients as effect sizes are applicable in both approaches (Hedges & Olkin, 1985; Hedges & Vevea, 1998) and in Rosenthal and Rubin approach as well (Rosenthal, 2010).

Rosenthal´s school is the oldest meta-analytical method based on social psychology (Rosenthal, 1961,). His approach is the extension of Fisher's (1932) and Pearson's (1933) ideas. The logic is to transform coefficients to effect sizes to standard normal metrics based on Fisher´s r- to z-conversion. These effect sizes are combined to weighted means (see 4.2.2).

Hedges and Olkin´s (1985) school refers to research in education. Usually, primary study results are converted into standard deviation units. But also, correlations as effect sizes are addressed in that seminal work. These effect sizes are explained by using models with continuous and categorical moderators (Hedges & Olkin, 1985; Johnson et al., 1995).

Nevertheless, there are two differences between the two streams. Rosenthal (1991) does not provide a random-effects approach. Additionally, Rosenthal advocates that the probabilities of each effect appear by chance (Rosenthal & Rubin, 1982; Rosenthal, 2010).

Hunter / Schmidt meta-analysis

The third stream of meta-analyses is based on the validity generalization tradition of industrial organizational psychology and organizational behavior (Hunter & Schmidt, 2004). This approach does not just combine the effect sizes to a weighted mean, opposing to Hedges and Olkin and Rosenthal and Rubin. They advocate accounting for error sources (e.g. sampling error, range variation in the dependent variable, or reporting errors) (Hunter & Schmidt, 2004). In sum, Hunter and Schmidt (2004) try to account for 11 study artifacts altering the value of the coefficients. But this approach is seldom completely applicable because most primary studies do not report sources of error and relevant information (Johnson et al., 1995).

These three schools try to answer three general analytical key questions in meta-analyses. *Central tendency* is the result and achieved due to the combination of coefficients, significance levels and confidence intervals around the newly derived mean effect size. *Variability* is the heterogeneity of the effect sizes and is represented by homogeneity test of effect sizes (4.5.2). *Prediction* refers to the moderator analyses explaining the drivers of the main effect and their variability (Johnson et al., 1995). Meta-regression refers to the basic analytical questions of central tendency, variability and prediction. The following table gives an overview how these basic questions are addressed by the different schools.

Table 4-5: Answer of three meta-analytical schools to basic statistical questions

	Meta-analytical school		
Basic analytical question	Rosenthal (1991)	Hedges & Olkin (1995)	Hunter & Schmidt (2004)
Central tendency	Mean weighted effect size; significance levels	Mean weighted effect size; significance levels	Mean weighted effect size; significance levels
Variability	Diffuse comparison of effect sizes; Fail Safe N	Homogeneity statistic	Test of no variation across effects
Moderator analysis based on:	Correlations; comparison of effect sizes	Continuous/categorical models; contrasts between mean weighted effect sizes	Correlations

Source: Adapted from: Johnson et al. (1995)

To address the advanced statistical question of how to analyze the variance there are three more or less analogous conceptualizations of methods in bivariate meta-analysis: fixed, random, and mixed effects in multivariate models. Table 4-6 illustrates the communalities and differences of these three meta-analytical schools. Furthermore, these three conceptualizations are addressed in the following chapters 4.2.2 and 4.2.3.

Table 4-6: Overview of meta-analytical methods

	Meta-analytical school		
Method	Rosenthal (1991)	Hedges & Olkin (1985)	Hunter & Schmidt (2004)
Fixed effects			
Random effects			
Mixed effects			

Source: Own illustration

Furthermore, the first two bivariate methodological conceptualizations fixed and random effects (Table 4-6) are addressed in the following chapters 4.2.2 and 4.2.3. The starting point of both methods of univariate meta-analyses are the observed coefficients in the primary study (Borenstein, 2009). A short overview how an idealized data set could be constructed as the starting point of random- and fixed-effect meta-analyses can be seen in Table 4-7.

Table 4-7: Example of a data set in meta-analyses

Study No.	Coefficient of primary study	Fisher´s z-effect size estimate	Variance of *ES* given θ
1	θ_1	ES_1	σ_1^2
2	θ_2	ES_2	σ_2^2
.	.	.	.
.	.	.	.
.	.	.	.
k	θ_k	ES_k	σ_k^2

Source: Partly Adapted from Hedges & Vevea (1998).

It is assumed that ES_i (effect sizes estimate) is normally distributed about the related primary study coefficient θ_i with a known variance of σ_i^2 see 3-14. This assumption is true for Fisher´s z-transformed correlation coefficients ES_i (Hedges & Vevea, 1998).

$$ES_i \sim N(\theta_i , \sigma_i^2) \text{ with } i = 1, \ldots, k. \qquad 4\text{-}14$$

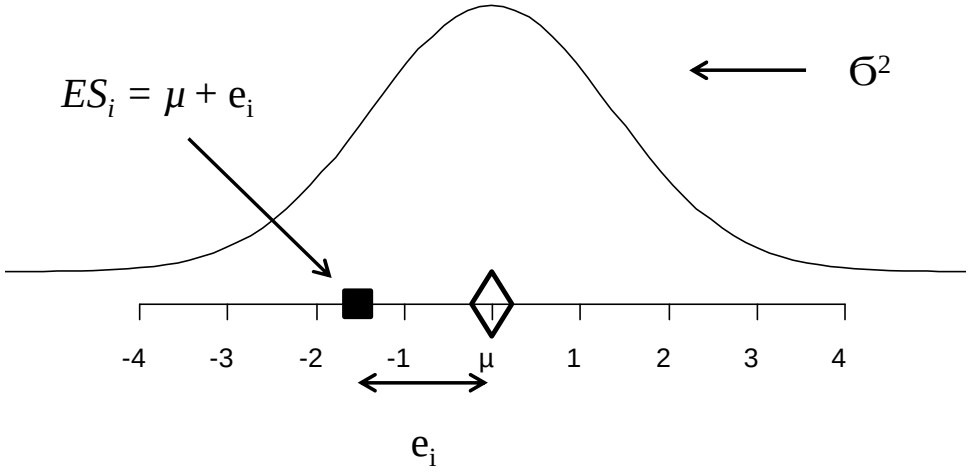
4.2.2 Fixed-effects meta-analysis

The underlying assumption of a fixed-effect meta-analytical model is that all primary studies share a common effect size (Borenstein, 2009) $ES_i = ES_j = ES_k = ES$. That is, if all primary studies would have an infinite sample size the meta-analysis result would not be driven by chance and the differences in primary study coefficients would completely disappear (Riley et al., 2011). Furthermore, the objective of fixed-effects models in meta-analysis is to make a *conditional inference* about *k* primary studies in the analyses (Hedges & Vevea, 1998). The following question is addressed in in a fixed-effect model without moderators: How large is the average true effect μ in the data set of *k* studies (Viechtbauer, 2010). Therefore, main ES_i can be expressed as sum of the average true effect plus an error term which measures the distance from the true average effect (it is the sampling error):

$$ES_i = \mu + e_i \qquad 4\text{-}15$$

In Figure 4-1, one can see that observed effects ES_i are sampled from a normal distribution around their true effects μ with a known variance σ^2. In effect, there is only one level of sampling because all studies are derived from a population with a true-effect size μ. Whereas e_i represents the overall error which is in the fixed-effect case the **within primary study error** (Borenstein, 2009).

Figure 4-1: Fixed-effect model distribution for ES



Source: Own illustration. Adapted from Borenstein (2009)

Since the analyst is interested in the average true-effect size (mean of ES_i), one has to pool the *ES* for each study. If the sample size (n) of the included primary studies coefficients differs, the *ES* from larger primary studies will be more precise than *ES* from small primary studies. Therefore, meta-analysts give more weight to the more precise primary studies included in analyses. However, this leads to a weighted mean of *M* by its inverse variance σ_k^2 (Paule & Mandel, 1982; Hedges & Vevea, 1998; Lipsey & Wilson, 2006; Borenstein, 2009; Ringquist, 2013).

$$M = \frac{\sum_{i=1}^{k} w_i \times ES_i}{\sum_{i=1}^{k} w_i} \qquad 4\text{-}16$$

$$w_i = \frac{1}{6_i^2} \text{ with } 6_i^2 = \frac{1}{n-3} \text{ (see Fisher´s transformation formula 3-12)} \qquad 4\text{-}17$$

$$Confidence\ Interval\ (CI) = M \pm 1.96 \times SE_M \text{ with } SE_M = \sqrt{\frac{1}{\sum_{i=1}^{k} w_i}} \qquad 4\text{-}18$$

4.2.3 Random-effects meta-analysis

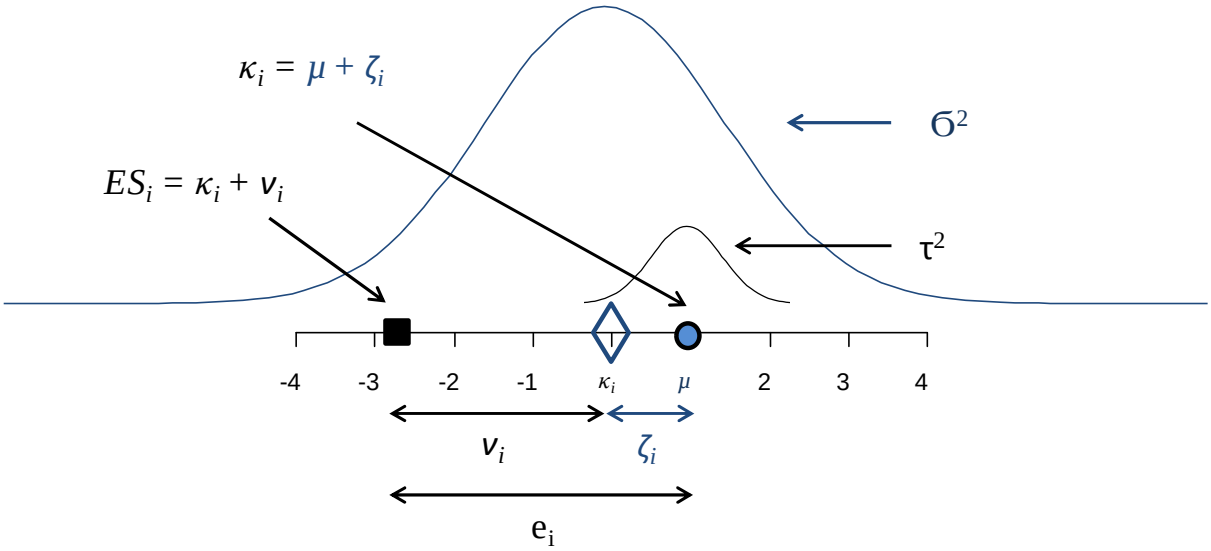
The underlying assumption of a random-effects meta-analysis is, the observed coefficients of primary studies can vary across studies due to real differences in the primary study coefficients and sampling variability (chance) (Riley et al., 2011). The true value of the coefficients is obtained if they were sampled from a universe of possible coefficients (Hedges, 1992). In other words, random-effects meta-analysis accounts for an inter-primary study variance and the within study variance (distance from the true average effect). This variance is based on the diverse nature of the combined primary studies (DerSimonian & Kacker, 2007). Therefore, the objective of a random-effects meta-analysis is an *unconditional inference* (Hedges & Vevea,

1998). This objective is addressed by the following question: How large is the average true effect in this larger population (universe of coefficients) of primary studies (Viechtbauer, 2010). Therefore, ES_i can be expressed:

$$ES_i = \kappa_i + v_i = \mu_i + \zeta_i + v_i \qquad 4\text{-}19$$

In Figure 4-2 one can see that observed effects ES_i are sampled from a distribution with true effects κ_i plus **within primary study error** v_i and variance σ^2. In turn, true effect κ_i is derived from distribution with the mean of all true effects μ and the **between primary study error** ζ_i with variance τ^2. Whereas e_i represents the overall error which is in the random-effect case the **within- and between-primary-study error** (Borenstein, 2009).

Figure 4-2: Random-effect model distribution for ES



Source: Own illustration. Adapted from Borenstein (2009)

The pooling of the mean effect size ES_i is based on the same formula as the fixed-effects model. But the weight w_i is decomposed as the following formula shows. Whereas σ_k^2 depends on the sample size of the primary study (within primary study variance) and τ^2 (between-primary-study variance) represents the distribution of the true effects around their mean (Borenstein et al., 2009). Confidence intervals in the random-effects meta-analyses are shown in the following formula 4-18.

$$w_i = 6_i^2 + \hat{0}^2 \text{ with } 6_i^2 = \frac{1}{n-3} \qquad 4\text{-}20$$

Weights in random-effects meta-analyses

To account for this variability $\tau^{2,}$ the effect size ES_i has to be weighted by its inverse variance weight (Hedges & Olkin, 1985). This variance weight consists of two parts: variance within primary studies σ^2 *plus* variance between primary studies τ^2 which is randomly distributed (Lipsey & Wilson, 2006). To estimate the first part of this weight, the variance of Fisher´s z transformation is incorporated (see formula 3-13). For the second part of the variability (between studies), several estimation methods could be applied.[14] Earlier estimation procedures were obtained by (DerSimonian & Laird, 1986) (DL), (Hedges & Olkin, 1983) (HE) and (Schmidt & Hunter, 1977) (HS) by using method of moments that is analogous to ANOVA estimating variance components (Hedges & Vevea, 1998). Under the normal assumption, maximum likelihood and restricted maximum likelihood estimations are applicable. Since maximum likelihood (ML) estimators of τ^2 tend to underestimate the residual heterogeneity, otherwise restricted maximum likelihood (REML) estimations account for that in a better way (Panityakul et al., 2013) For that reason, REML is the default setting in several software packages (STATA, metafor). A conditional restricted maximum likelihood estimator (Rukhin et al., 200) being more robust if the normal assumption does not hold e.g. DerSimoninan (DL), is the Mandel Paule algorithm (Mandel & Paule, 1970; Paule & Mandel, 1982; Morris, 1983; DerSimonian & Kacker, 2007; Borenstein et al., 2009).

DL and REML estimators are biased for small sample sizes, if n > 40 both estimators are unbiased. HE always estimates robust results regardless of the conditions. In addition, HS and ML should be avoided due to their negative bias resulting in misleading results (Viechtbauer, 2005, Marin-Martinez & Sanchez-Meca, 2010).

4.2.4 Which model to choose: fixed vs. random effects

The fixed-effects model starts with the assumption that the true-effect size is the same in all primary studies. By contrast, random-effects models assume the true effects are sampled from a distribution of true effects. So, the mean in a random effect is the mean of a distribution of effect sizes (Borenstein, 2009). Therefore, random-effects models are tied to the process of the selection of primary studies (Overton, 1998). Admittedly, the random-effects model overestimates the variability and yields larger confidence intervals because sometimes they have not been randomly selected from a specific population (Overton, 1998).

In most settings of meta-analyses, the random-effects model fits the objectives of the analysts better because (Borenstein, 2009).

[14] For further investigations see: Casella (1985); Viechtbauer (2005); DerSimonian & Kacker (2007); Panityakul et al. (2013).

- They do fit the sampling distribution better
- No restriction of the common-effect size
- Yields identical results to the fixed-effect model in absence of heterogeneity
- Allows the generalization of results, applying them to a wider array of situations

Furthermore, the interpretation of fixed- and random-effects meta-analysis is subjective (Mengersen et al., 1995), because it is not possible to control further and evident differences between studies.

4.3 Meta-regression analysis

To objectify a multivariate analysis is an alternative to control for differences between studies. Traditional methods of meta-analysis combine results of primary studies in order to obtain a single "summarized" mean-effect size. But the results in primary studies are estimates and therefore yield imprecision. This imprecision is induced by methodological diversity (*internal validity*) or due to different populations, settings and coding (*external validity*) (Thompson, 1994; Thompson & Higgins, 2002; Dias, Sutton et al., 2011).

Meta-analytical data sets consist of real world data, so still some unexplained heterogeneity (imprecision) in the meta-analytical effect-size distribution is in place after calculating the mean-effect sizes according to fixed-effect meta-analysis (Lipsey & Wilson, 2006). Random-effects meta-analyses, however, estimates the grand mean effect size and the standard deviation of the true-effect size (Hedges, 1983). Therefore, random-effects meta-analyses are a more appropriate method to account for this unexplained heterogeneity (variation) by including certain characteristics of primary studies as control variables (e.g. methodological differences in primary studies) (Dias et al., 2011; Ringquist, 2013). Including these characteristics, the random-effects results are then multivariate estimates, a so-called meta-regression analysis (MARA). Primary study estimates are a product of complex multifaceted forces, so MARA is an appropriate method to account for the characteristics at once (Stanley & Doucouliagos, 2012). In sum, MARA is a multivariate method which measures the included primary study characteristics in order to address *external* and *internal validity* (van Houwelingen et al., 2002; Hedges et al., 2010;). Therefore, MARA could address these factors by including them as control variables.

Meta-regression is the short name for weighted least squares regression (WLS) (Bernard & Abrami, 2014). Weighted least squares are a special case of the generalized least squares (GLS) analysis producing sensible unbiased estimates and appropriate standard errors compared to ordinary least squares (OLS) (Raudenbush et al., 1988; Olsson et al., 2000; Nelson & Kennedy, 2009). Using WLS is necessary because meta-analytical data sets are heteroscedasticity by definition (Feld & Heckemeyer, 2011). Heteroscedasticity is an important threat to meta-analytical validity (Chandrashekaran & Walker, 1993), especially in linear and non-linear

regressions (van Houwelingen, 1988). Heteroscedasticity, however, is in place when the variances are not equal, which is the case in meta-analyses because the variances are calculated based on the sample size which differs from primary study to primary study. To overcome those problems, a weighted least squared (WLS) regression analysis is used to assess the relationship between the effect size (Y) and several moderator variables (X). WLS uses the inverse and the between study variance, as analytical weight, giving measures from primary studies with smaller variances a greater influence (Greene, 2003).

The dependent variable (Y) consists of the same extracted coefficients of primary studies like in a classical univariate meta-analysis (Table 4-7). However, the dependent variable in MARA does not represent the expected value of the outcome of interest (Y). But the dependent variable represents the association between the focal predictor and the outcome of interest (e.g. performance and family ownership) if these extracted primary study coefficients stem from observational primary studies.

Moderator variables in MARA should be interpreted as an interaction term of a "standard" OLS regression. The moderator variable in meta-regression moderates the change of the relationship between the focal predictor and the outcome of interest. It does not shift the conditional expectation of the outcome itself (Ringquist, 2013). Furthermore, moderators in meta-regression analyses could be categorical and continuous (Borenstein, 2009). They describe the nature of the primary studies such as: robustness checks (yes/no), endogeneity control (yes/no), functional forms of regressions, sample size, characteristics of the authors, measures of research data and data quality, country, kind of data structure of primary studies (e.g. panel data) etc. (Stanley & Jarrell, 1989).

Likewise to chapter 4.2 fixed- and mixed-/random-effects analyses are possible in meta-regression analyses, too. Again, the effect size distribution must fulfil the normal assumption. Where T_i is the estimate of the coefficients Y_i from k independent primary studies with a known variance σ_i^2 (Hedges & Pigott, 2004).

$$T_i \sim \mathrm{N}(Y_i , \sigma_i^2) \text{ with } \mathrm{i} = 1, \ldots, k. \qquad \text{4-21}$$

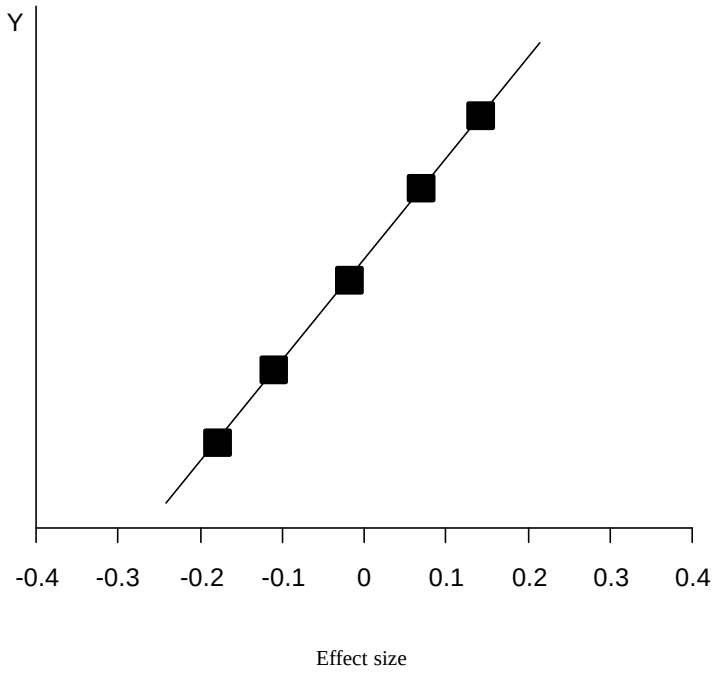
$$Y_i = b_0 + \sum b_i X_{pi} + \mathrm{e}_i \qquad \text{4-22}$$

Where b_0 represents the intercept and the effect sizes Y_i are determined by moderator variables $X_1, \ldots, X_p$ with e_i as the heteroscedastic overall error term. Furthermore, the weights for WLS have the same shape as in formula 3-17.

4.3.1 Fixed-effect regression

The fixed-effect MARA assumes that all included primary studies estimate the same underlying true effect (represent as a cube in Figure 4-3). Any differences in these estimates are due to the pure sampling error (Feld & Heckemeyer, 2011; Hedges & Konstantopoulos, 2009). It is mentionable that the fixed-effect model is weighted with the known within study variance (e.g. variance from Fisher´s z-transformation). A further variant is a fixed-effects regression model using information about differences between primary studies (e.g. characteristics of primary studies) (Hedges & Konstantopoulos, 2009). Therefore, the overall error term e_i , represented in formula (3-19), models the **within primary study error** v_i with variance σ^2. Furthermore, the fixed-effects model has more statistical power compared to fixed-effects HOMA.

Figure 4-3: Fixed-effect regression model



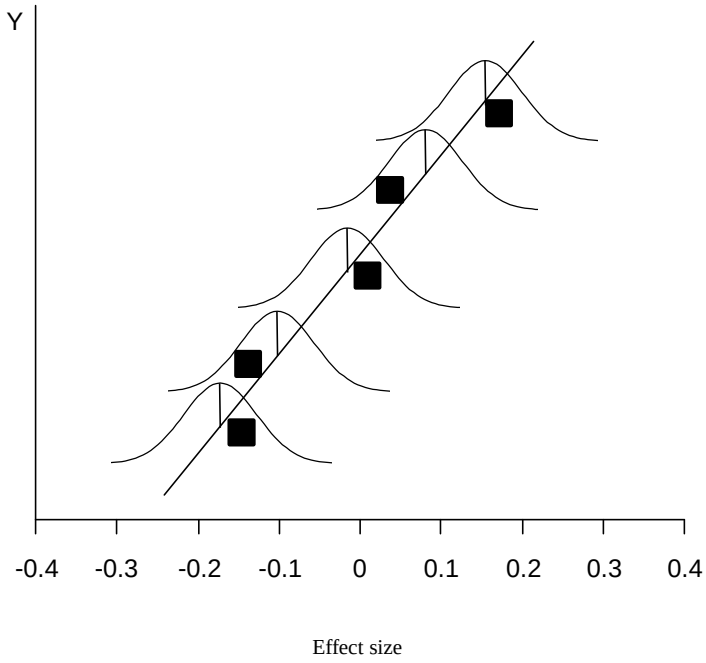
Source: Own illustration. Adapted from Borenstein (2009)

4.3.2 Mixed-/random-effect regression

A second approach combines the random and the fixed-effect approaches in a mixed-effect model (Raudenbush & Bryk 1985 in Kalaian & Raudenbush, 1996). For predicted estimates, in the latter approach, a distribution of effect sizes is assumed (see Figure 4-4) (Borenstein, 2009). This mixed-effects regression model uses moderator variables to link primary study characteristics to study outcomes. Therefore, this mixed-effect regression approach allows controlling the variability between primary studies, like in the variant of the fixed-effects MARA, described above. But additionally, this variability is addressed with random effects. The random effects in this mixed-effects regression model are represented by the residuals. Residuals are in that case deviations between the true-effect sizes and the effect size

predicted by the model (Kalaian & Raudenbush, 1996). This means that the random part of the model accounts for the residual heterogeneity that is not addressed by moderator variables included in the model (Thompson & Sharp, 1999). Since the moderators are added in the model as fixed effects, the random part (residual heterogeneity, between study heterogeneity) must be estimated (Viechtbauer et al., 2014). Henceforth, mixed effects meta-regression models make sense if the number of primary studies is large and the outcomes are affected by non-measurable influences (e.g. country and cultural characteristics). Additionally, this model allows different numbers of effect sizes per primary study (Kalaian & Raudenbush, 1996).-

Figure 4-4: Random-effect regression model



Source: Own illustration. Adapted from Borenstein (2009)

$$Y_i = b_0 + \sum b_i X_i + \mathrm{e}_i \; ; \quad \text{with } \mathrm{e}_i = \nu_i + \zeta_i \qquad \text{4-23}$$

Where b_0 represents the intercept and the effect sizes Y_i are determined by X_1,…, X_p moderator variables with e_i as the heteroscedastic overall error term. This overall error term can be split into the **within-primary-study error** v_i (it is represented by the Fisher´s z variance) and the **between-primary-study error** ζ_i which is represented by the between primary study variance τ^2.

Weights in mixed-/random-effects meta-analysis

The weights in mixed-/random-effects meta-analysis w_i follow formula 4-17 in the univariate analysis chapter 4.2. Again this weight is the sum of the within-primary-study variance σ^2 and the between-primary-study variance τ^2. Weights of formula 4-24 below were found to outperform well in a simulation study (Jackson, 2013).

$$w_i = \frac{1}{6_i + \tau^2} \qquad 4\text{-}24$$

τ^2 is an estimate of an unknown value and must be estimated with different methods. Up to seven different possibilities are discusses in literature to estimate this value, amongst them Maximum Likelihood, Restricted Maximum Likelihood, Empirical Bayes Estimates (Jackson et al., 2014). Attention has to be drawn on the choice of these estimation methods because simulations have shown that the different methods have impact on model coefficients and therefore on the estimated standard errors. So, null hypotheses could be rejected due to the estimation method of the between primary study variance (Viechtbauer et al., 2014). For more information about different estimation methods of weights see chapter 4.2.3 (HOMA).

4.3.3 Which model to choose: fixed- vs. random-effects meta-regression

Meta-regression investigates if moderators could address the heterogeneity in the effect size. It is not the case that all this heterogeneity is addressed by moderator variables and henceforth the statistical analysis has to account for it. Therefore, the appropriate analysis should be the random-effects meta-regression because it considers the potential between primary study heterogeneity (Thompson & Higgins, 2002). Additionally, the meta-regression models should be weighted. A further advantage of random-effects meta-regression analysis over the fixed-effects meta-regression analysis is that the further approach has more evenly distributed weights. So, as opposed to the fixed-effect meta-regression, random-effects meta-analysis assigns more weight to smaller studies. Additionally, random-effects meta-analyses are more conservative regarding the standard errors and hence the related confidence intervals are wider compared to fixed-effects ones (Borenstein, 2009). Another key point to opt for the random-effects meta-regression is that it is possible to include the coefficients derived from multivariate analyses in primary studies (partial correlations). These partial correlations are conditional upon the included moderator and control variables in the analyses of the primary study. Thus, the heterogeneity is induced purely by using such effect sizes in meta-regression analyses. Finally, the external validity is different in fixed- and random-effects meta-regression analysis. In fixed-effects MARA, the external validity relies on the studies included in the sample. In random-effects MARA, the results generalize all studies with nearly the same kind of characteristics (Ringquist, 2013).

In sum, in entrepreneurship, management and family business research the mixed-/random-effects meta-regression (MARA) is preferable to the fixed-effects meta-regression analysis.

Finally, the mixed-/random-effects meta-regression analysis is a special case of a two-level hierarchical model (Raudenbush et al., 1988). That is, mixed-/random-effects meta-analyses show a nested error structure in two or more levels (Feld & Heckemeyer, 2011). This is also the case when using the complete approach proposed by (Bijmolt & Pieters, 2001) where the effect sizes are correlated (Stanley & Jarrell, 1989). This intra-class correlation (ICC) can be addressed by grouping the standard errors at the primary study level.

4.4 Multilevel regression analysis

Several observational and experimental data in science have a hierarchical or clustered structure. A hierarchy in data consists of units grouped in different levels (Goldstein, 2011). This leads to an investigation of relationships between variables characterizing individuals and groups, this approach is addressed as multilevel research. For example, modeling the relationship of individuals and society (within a country or compared with several countries) (Hox, 2010).

The goal of multilevel analysis is to account for variation in the dependent variable, measured at the lowest level of the analysis, by including information from all higher levels of (the) research.[15] Ignoring such multilevel structures in data results in not correct standard errors (Steenbergen & Jones, 2002). Not only the standard errors are of main concern in multilevel analysis but also the *ecological fallacy*. *Ecological fallacy* refers to the interpretations and inferences from grouped (aggregated) data (e.g. country level data) at the individual level (Robinson, 1950). An association of grouped data does not represent an association at individual level observations. The causal relationship of grouped data does not exist in individual data. The analyst treats the aggregated data as if they were individual-level data. That is, applying an OLS regression on country level and relating the results to firm (individual-level) observations. The opposite of the *ecological fallacy* is the *atomistic fallacy*. *Atomistic fallacy* is formulating inferences for higher-level groups based on analyses conducted with data observed at a lower level (e.g. individuals) (Hox, 2010).

Especially in meta-analyses, individual dependencies (correlation or regression coefficients) are aggregated into a primary study and grouped into countries (Table 4-7). Therefore, in this case models of meta-analyses correspond to the higher level in a multilevel analysis (Diez, 2002). This could introduce a classic *atomistic and/or ecological fallacy* which

[15] An alternative to hierarchical linear models or multilevel models are dummy variable models (Steenbergen & Jones, 2002) to address the contextual and subgroup differences by using as many available subgroups as possible. In experimental data with a constant in the model, this is an analysis of covariance (ANCOVA) (Kreft & Leeuw, 2006). Otherwise, one can use an interactive model, which uses subgroup level predictors and interactions amongst them (Boyd & Iversen, 1979). But these approaches are not satisfactory compared to multilevel approaches.

occurs when using standard analysis techniques (e.g. meta-regression analyses) (Reade et al., 2008). These two cases of fallacies are statistically addressed within the framework of a multilevel approach (Vogt, 2014). In the multilevel approach, it is possible to specify a multivariate outcome model which is a straightforward extension (Raudenbush & Bryk, 1985) of the WLS model (see chapter 4.3). With this extension, we could model the implied possibility of dependency of observations. These dependencies can stem from two sources. One source could be the primary study specific unobserved heterogeneity and the other one within primary study correlations of the dependent variable of the analyzed model (Feld & Heckemeyer, 2011). For example, if several performance measures of a primary study are included in the multilevel analysis, it is obvious that they are correlated because of the same underlying data set. To model those dependencies, we stratify the primary data in several ways: panel groups for each primary study, groups based on researchers, or based on data structure (Rosenberger & Loomis, 2000). This means that we have moderators that describe the dependent variable at the lowest level (performance measure dummies), and study, researcher or country characteristics on higher levels (see Table 4-8) (Hox, 2010).[16]

Table 4-8: Example of a data set in multilevel meta-analyses

No. of *ES*	Study	Coefficient of primary study	Fisher´s z effect size estimate	Variance of ES given θ	Characteristic of ES	Characteristic of study (Hirsh factor)	Characteristic of country (Rule of Law)
1	1	θ_1	ES_1	v_1	ROA	3	-2.5
2	1	θ_2	ES_2	v_2	ROE	3	-2.5
1	2	θ_1	ES_1	v_1	MTB	1	1.0
2	2	θ_2	ES_2	v_2	ROA	1	1.0
3	2	θ_3	ES_3	v_3	ROE	1	1.0
4	2	θ_4	ES_4	v_4	ROS	1	1.0
1	3	θ_1	ES_1	v_1	ROA	0	-0.5
1	4	θ_1	ES_1	v_1	ROA	10	2.0
2	4	θ_2	ES_2	v_2	Q	10	2.0
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
p_i	i	θ_{pi}	ES_{pi}	v_{pi}	b_{pi}	c_i	c_i

Source: Own illustration.

These primary study and country characteristics represent the macro level (higher level, level 2 or level 3 units), whereas the characteristics of *ES* are the micro-level units (level 1 unit). Later on, I will refer to macro-level units as level 2, 3 or higher levels and for micro- level units as level 1 units. Further examples for level 1 coefficients are: pupils, children, patients and performance indicators. Examples for level 2 units are: schools, firms, doctors, primary studies and countries (Snijders & Bosker, 1999). As one can see, level 1 coefficients are individual

[16] Experts in multilevel analyses assume that the random effects model (see chapter 4.3.2) is a special case of the multilevel two-stage regression model (Raudenbush & Bryk, 1985 & 2002).

characteristics (Hox, 2010) which can be nested in higher level units. Otherwise (Lazarsfeld & Boudon, 1961) offer a slightly simpler typology. They distinguish between *global, structural and contextual* variables. *Global* variables belong to the level at which they were assigned to and do not refer to other level units (e.g. school size). *Structural* variables, however, refer to sub units at a lower level. That is, they are constructed from lower-level variables (grouped lower-level variables), for example mean intelligence calculated from the intelligence scores of pupils on level 1. *Contextual* variables are super units, so all lower-level variables receive the value of the super unit to which they belong (e.g. study, country, culture etc.). By using contextual variables, the higher-level variables are disaggregated to a larger number of lower-level units (Lazarsfeld & Boudon, 1961). These terminologies are not statistically important, but they clarify which level a variable that has been introduced in the model belongs to (Hox, 2010). Thus, performance and family characteristics could be nested in studies which could be nested in countries. The latter two groups, mentioned beforehand, belong to the super-unit variables and are therefore disaggregated to the performance and family variables. Due to disaggregation, one would lose statistical power if an OLS regression would be applied. Furthermore, a standard OLS regression would treat the disaggregated super units as independent, e.g. country level data assigned to different single performance measure from a primary study. This leads to a higher probability to reject the null hypothesis. Additionally, the previously mentioned *ecological and atomistic fallacy* ignoring multilevel structures are of main concern, too (Hox, 2010).

Such a standard meta-regression model which may cause the above-mentioned problems is presented in chapter 4.3.2. This regression model could be modified to a regression with several levels. The notation below follows (Raudenbush & Bryk, 2002).

Level 1 (within studies) model

The level 1 model is

$$Y_{pi} = \sum b_{qi} X_{qpi} + \nu_{pi} \qquad 4\text{-}25$$

The dependent variable Y_{pi} is a standardized effect measure (with Fisher´s z-transformation), in my case $Y_{pi} = ES_{pi}$ is a performance measure (e.g. ROA, ROE etc.) (see Table 4-7) . This standardized effect measure Y_{pi} is derived from primary study $i = 1, \ldots, I$. Furthermore, each primary study i reports several performance measures Y_{pi} and $p = 1, \ldots P$, with $P < Q$.

For each primary study i exist $q = 1, \ldots, Q$ parameters of estimated $b_{1i}, \ldots, b_{Qi}$.

X_{qpi} describes the dependent variable Y_{pi} more close. X_{qpi} is represented by a dummy variable for the performance measure (e.g. ROA, ROE, etc).

ν_{pi} is the know variance associated of the Fisher´s z-transformed $ES_{pi} = Y_{pi}$. ν_{pi} is assumed to be normal distributed.

Applied to the example data set (see Table 4-7), it consists of *i* primary studies which yield Y_{pi} performance measures per primary study *i*. These performance measures are converted to $Y_{pi} = ES_{pi}$ Fisher´s z-transformed effect sizes with a known variance v_{pi}. These $Y_{pi} = ES_{pi}$ are described by ΣX_{qpi} dummy variables (ROA, ROE, ROS etc.) to estimate the true parameters b_{qi}.

Level 2 (between-studies) model

b_{qi} the true unknown parameters depend on primary study characteristics and the level 2 random error ζ_{qi} .

$$b_{qi} = c_{q0} + \sum_{s=1}^{s_q} c_{qs} W_{si} + \zeta_{qi} \qquad 4\text{-}26$$

c true parameters. Whereas, W_{si} are characteristics of predictor variables.

ζ_{qi} is the level 2 random error for each unit/group *i* which is assumed to be normal distributed $\zeta_{qi} \sim N(0, \tau^2)$ and τ^2 is the between-primary study variance. The substitution of both models (3-25 and 3-26) results in a combined model.

In the combined model, the intercept c_{q0} is interpreted as the expected average value of the dependent variable Y_{pi} , if all independent variables are equal to zero, if this model is derived in an analytical way. If it is estimated by software, it represents the garbage bind of all potential errors of the model which are not accounted for (e.g. omitted variable bias). In my case it represents the expected average value of the Fisher´s z-transformed performance measures plus absorbed errors. A further problem which arises is that the independent variables may never reach the value zero at all because of the coding range. Consequently, the value of the intercept could not be interpreted (Hox, 2010). To derive a possible value of zero in the independent variables, two options could be chosen by a researcher - grand mean and group mean centering.

Grand mean centering refers to centering the independent variables on their specific means in level 1. That means that the overall average of this specific variable is subtracted from every value of an independent variable. Furthermore, it does not change the computational precision of parameters, sampling accuracy of the main effects, simple and interaction effects, or the model overall R^2. But the interpretation of the main effect does change from simple effects (the effects of each variable when the other variables are at zero) to main effects (when the other variables are at their mean values) (Echambadi & Hess, 2007).

The intercept in a grand mean-centered model can be interpreted as the adjusted mean for a specific group in a 2 level model. Furthermore, grand mean-centered dummy variables are then

adjusted for differences among units in the percentages of the contrast group of the dummy variable (e.g. female and males). Grand mean centering is viable if no contextual variables and slopes are fixed (Raudenbush & Bryk, 2002). But grand mean centering does not solve the collinearity problem, because the covariance remains the same compared with raw means (Echambadi & Hess, 2007).

However, group mean centering, centering around the level 2 mean, positions the dependent variables on the mean of a specific group (e.g. countries or primary studies). This centering approach changes the interpretation of the within-group slopes and the intercept. That is, the interpretation changes from the expected change of the individual dependent variable with zero scores of all dependent variables to the expected change of the individual dependent variable at the group average of all predictors (Kreft et al., 1995). Especially in models with random slopes, cross level interactions or investigating contextual effects, it is appropriate to employ group mean centering (Raudenbush & Bryk, 2002).

Both centering “methods” are convenient for exploring cross level interaction effects because the variable must include the value “zero” to remain interpretable. But group mean centering changes the meaning of the whole regression in a more complicated way (Hox, 2010). Cross-level interaction effects support researchers to understand relationships between lower-level variables and higher-level variables. This approach integrates the micro and macro domains to model the potential dependence of a lower level moderator on a higher level moderator variable, the causal heterogeneity (Aguinis et al., 2013; Western, 1998). So, it is a key issue to understand cross-level interaction effects for theory development and testing of theories (Aguinis et al., 2011). The interpretation is based on the methodological principal: if a significant interaction effect is present, the two or more moderator variables building the interaction have to be interpreted as a system (Aiken et al., 1998). One of the two moderator variables is then interpreted as the expected value of the regression slope when the other moderator variable is equal to zero and vice versa (Hox, 2010).

Caution should be exercised to apply cross-level interactions. Some researchers advocate in a two-level model a 30/30 rule of thumb (Kreft, 1996), by introducing cross-level interactions, the groups on level two should be about 50 (Hox, 1998; Hox & Maas, 2004), about 100 (Snijders & Boskers 1993) or the ratio between sample size on level one compared to level two should have the relation 3:2 (Mathieu et al., 2012). Yet, a significant cross-level interaction will be detected even if the sample size in the higher level is relatively small (Steenbergen & Jones, 2002). However, the most relevant sample size must for statistical power is in level one (Raudenbush & Liu, 2000). The statistical power is lower when interaction effects are introduced in the model compared to a model with only direct effects. Because predicting random slopes is more difficult than predicting random intercepts (Raudenbush & Bryk, 2002).

The formerly described approach is based on the assumption of a clear and pure hierarchical or nested structure. However, in some cases a unit can be classified along more dimensions (Goldstein, 2011). For example, several performance measures can be classified by studies and by countries (see Table 4-9).

Table 4-9: Random cross-classifictian at level 2

	Primary study 1	Primary study 2	Primary study 3
Germany	ROA, MTB	ROA, ROE	ROA, ROI
USA	ROA, MTB		
Spain	ROA, MTB	ROA, ROE	
Italy	ROA, MTB		

Source: Adapted from Goldstein (2011).

By applying specifications of pure hierarchical models to cross-classified data introduces serious bias of the standard errors of the regression coefficients (Garson, 2013). Therefore, to account for crossed-random effects, one has to create a further level consisting only of one unit (dummy level). This unit is not nested in lower levels (e.g. countries drawn from a hypothetical population) (Snijders et al., 1999). The different measures of performance in Table 4-9 can be addressed as shown in equation 3-25 (see level 1 above).

In sum two major benefits arise when regressions are estimated with hierarchical structures (Steenbergen & Jones, 2002).

1. The estimation of heterogeneity between contextual measures.
2. Account for the dependence of observations (intra-class correlation).

4.5 Quality and bias of meta-analyses

Quality criteria and biases are of main concern in all different meta-analytical schools. Here, I stress this issue accompanied by the objective to develop criteria for management research.

4.5.1 Quality criteria of meta-analyses

When reporting results in meta-analyses there are some special issues compared to primary studies. At first the researcher has to evaluate if the effect sizes are consistent (Borenstein, 2009).

1. Consistent primary study coefficients will result in a robust summary effect. So focus on the report of one summary effect.
2. If varying primary study coefficients are in place then report the variation of the summary effect I^2.
3. To report the power of the effect size, provide confidence intervals, standard errors and p-values.
4. Report the number of primary coefficients and the sum of the observations yielded in primary studies.

Furthermore, to depict the overall effect size in a more detailed manner, one should provide a sensitivity and subgroup analysis. An important part of the subgroup analysis is the detailed reporting of the different measurement variations of the coefficients in primary studies (e.g. in this case performance measures such as ROA, ROE etc.). This kind of subgroup analysis shows which measures a driving the overall in effect. Additionally, subgroups according primary study characteristics are of relevance. These characteristics could drive the overall effect in a certain way, too (e.g. published vs. non published primary studies).

Sensitivity analyses are based on median split variables into high and low groups to getter deeper insights (e.g. high and low ranked journals or country characteristics). But applying this dichotomization is mostly appropriate if HOMA is applied. In MARA or HiLMMA it is a better choice to avoid artificial dichotomization of variables to gain reliable information about individual differences within the groups. Moreover, one avoids misclassification of some individuals. But dichotomization of independent variables in the latter two estimation approaches makes sense if the independent variable is highly skewed (MacCallum et al., 2002; Altman & Royston, 2006).

On the other hand the further reporting advices concern only the exhibition of results in a brief way. All the decisions made before starting to code and the coding itself should be documented and reported in a good manner. Advices, instructions and reporting standards how a proper documentation should be compiled stems from four research disciplines, namely psychology, evidence based medicine, economics and management. In management (Geyskens et al., 2008) provide a very short reporting but a lengthy decision checklist covering only the analysis itself. A more extensive checklist is provided for meta-regression analyses in the Journal of Economic Surveys by (Stanley et al., 2013) and (Stanley & Doucouliagos, 2012).

However, in psychological research the working group *Journal Article Reporting Standards* (JARS) provide a more general overview of how to report meta-analytical studies in psychology. They crafted an additional checklist of reporting a meta-analysis, so called Meta-analysis Reporting Standards (MARS) (Anon., 2008). MARS was further improved in 2013 by Kepes et al. (2013).

The above-mentioned guidelines and checklists are mostly based on advices stemming from manuals in evidence-based medicine.[17] One of the first published lists was *The Quality of Reporting of Meta-analysis* (QUORUM). Its purpose was to enhance the quality of reporting in clinical randomized trials (Moher et al., 1999). Just one year later the reporting of *Meta-analysis*

[17] *The Cochrane Collaboration* is a network of about 31.000 members in over 120 countries with the aim to support the healthcare decision-making throughout the world. So they promote empirical systematic reviews of primary research by publishing a handbook, offering software for authors and a database (Anon., 2013b). This library reaching an 5-years ISI Journal Citation Report impact factor of 6.512 published by Thomsen Reuters and rank on the 11th position of 151 journals in the "Medicine, General and Internal" category (Anon., 2013a).

Of Observational Studies in Epidemiology (MOOSE) was introduced (Stroup et al., 2000). A more extended evaluation tool was launched in 2007 with the so called *A measurement tool for the 'assessment of multiple systematic reviews'* (AMSTAR) including 11 relatively vague items (Shea et al., 2007). A more appropriate tool is the in 2009 presented *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) (Liberati et al., 2009) an updated QUORUM checklist (Moher et al., 2009).

The following table (Table 4-10) presents an extensive reporting checklist with 35 items for meta-analyses. This list is based on PRISMA[18], MOOSE, AMSTAR, Stanley et al. (2013) and Geyskens et al. (2008). The checkmark in the table represents the source of the item.

[18] *PRISMA* stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Like The Cochrane Collaboration, this initiative refers to the evidence based medicine (Anon., 2013c). The aim is to support authors to improve the reporting of systematic reviews. So 5 organisations amongst them The Cochrane Collaboration and 173 journals endorse PRISMA (Anon., 2013d).

Table 4-10: Quality criteria of reporting meta-analyses (1)

Section/topic	Step #	Checklist item	P	E	G	M	A
TITLE							
Title	1.	Identify the report as a systematic review, meta-analysis, or both.	ü				
ABSTRACT							
Structured summary	2.	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	ü				
INTRODUCTION							
Rationale	3.	Describe the rationale for the review in the context of what is already known.	ü				
Objectives	4.	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design, Problem definitions.	ü			ü	ü
RESEARCH QUESTION		**.**					
Theories, hypotheses	5.	A clear statement of theories, hypothesis.		ü		ü	
Effect sizes	6.	Precise definition of how effect sizes are measured and the related formulas. Furthermore, depict the standardization and/or conversion of the effect sizes.		ü			
CODING							
Information sources	7.	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies, exact key words) in the search and date last searched.	ü				
Search	8.	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	ü	ü		ü	
Eligibility criteria	9.	Specify study characteristics and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale for inclusion and exclusion.	ü	ü			
Study selection	10.	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).		ü		ü	ü
Protocol and registration	11.	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	ü	ü		ü	ü
Data collection process	12.	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	ü	ü		ü	ü
Coder information	13.	Statement, who researches, read and coded the literature. Two or more reviewers should re-check the coding.	ü			ü	ü
Data items	14.	List and define all variables for which data were sought and any assumptions and simplifications made. (e.g. standard error, sample size, economic model, region, market, industry, data types, publication year, publication type, dichotomized of continuous variables, quality).	ü	ü	ü	ü	ü
ANALYSES							
Risk of bias in individual studies	15.	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	ü				
Summary measures	16.	State the principal summary measures (e.g., risk ratio, difference in means, Fisher´s z).	ü	ü			
Synthesis of results	17.	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.		ü	ü	ü	

Table 4-10: Quality criteria of reporting meta-analyses (2)

Section/topic	Step #	Checklist item	P	E	G	M	A
Risk of bias across studies	18.	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	ü				
Descriptive statistics & biases	19.	Statistics of the coded variables (e.g. means, median, standard deviations), Funnel plots, bar charts, forest plots.				ü	
Additional analyses	20.	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression, robustness checks), if done, indicating which were pre-specified.	ü				
Effect size metric	21.	Use bivariate correlations and/or partial correlation coefficients. Transform them according to Fisher´s (single composite measure). Artifact correction is mostly not applicable; address this in MARA with controls. Averaging of the effect sizes warranties for the independence or use multilevel approaches.				ü	
Outlier detection	22.	Use outlier detection techniques (such as plots like Q-Q, or standardized residuals).				ü	
Weights	23.	Use variance or sample size weights to account for heteroscedasticity.					
RESULTS							
Study selection	24.	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	ü				
Study characteristics	25.	For each study, present characteristics for which data were extracted (e.g., study size) and provide the citations.	ü				
Risk of bias within studies	26.	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 16).	ü				
Results of individual studies	27.	For all outcomes considered, present, for each study: (a) simple summary data (b) effect estimates and confidence intervals, ideally with a forest plot. (only applicable for smaller range of included primary studies at max 20).	ü				
Synthesis of results	28.	Present results of each meta-analysis done, including confidence intervals and measures of consistency, standard errors, z values, confidence intervals and heterogeneity measures (e.g. Q, I^2).	ü				
Risk of bias across studies	29.	Present results of any assessment of risk of bias across studies (see Item 18).	ü				
Additional analysis	30.	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression (see Item 20).	ü				
DISCUSSION							
Summary of evidence	31.	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). Consider alternative interpretations.	ü			ü	
Limitations	32.	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	ü				
Conclusions	33.	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	ü	ü	ü		
Future research	34.	Provide guidelines for future research.					
FUNDING							
Funding	35.	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	ü			ü	

P	PRISMA	Moher et al. (2009)	E	Economics	Stanley et al. (2013)	G	Geyskens	Geyskens et al. (2008)
M	MOOSE	Stroup et al. (2000)	A	AMSTAR	Shea et al. (2007)			

Source: Own illustration

4.5.2 Sources of bias in meta-analyses

Several sources of biases are of major concern in meta-analyses such as file drawer problem, selection and treatment of effect sizes, outliers, heterogeneity and heteroscedasticity. These issues ware discusses and addressed in the following section.

4.5.2.1 Selection of primary studies

One of the major issues in meta-analyses is the collection of primary studies (Rosenthal, 1979; Hedges & Olkin, 1985; Beelmann, 1994) and accordingly one of the most discussed biases (Rothstein et al., 2005). In meta-analysis research, this bias is named file drawer problem, publication bias or selection effect. This bias is a major issue because it is believed that meta-analysts prefer to include published, statistically significant results of primary studies in their analyses (Feld & Heckemeyer, 2011). Restricting the eligibility criteria to only published studies will lead to a faulty approximation of the true effect (Chalmers et al., 1997), since in every research field, many studies have been carried out but were never published (Rosenthal, 1979). The above eligibility restriction to only published primary studies is only one source of publication bias. So, Card & Krueger (1995), Egger et al. (1997), Stanley (2005) or Rosenberger & Johnston (2009) identified several sources of publication biases:

1. **Research priority selection:** Perceived importance of particular sources due to research funding, societal awareness, language constraints.
2. **Methodology selection:** If methodological characteristics have a major influence of the shape of results in primary studies. For example by including Pearson and/or partial correlations in a meta-analysis. This issue could be controlled for in meta-regressions. Furthermore, poor methodological analyses or fraud could introduce a publication bias.
3. **Publication selection:** Due to publication standards in different research areas some relevant information for meta-analysis is suppressed in primary studies. Additionally, the choice of the included measure in primary study can introduce a bias.

Solutions to circumvent the publication bias are including unpublished primary studies (Stanley, 2005) and applying a broader eligibility criteria catalog. If the meta-analysis fails to present unpublished studies, the meta-analysis could provide a misleading generalization (Smith, 1980).

To detect a potential publication bias in meta-analyses, even if everything possible is undertaken to avoid it beforehand, two main tests are the convention. One is the funnel plot for

visual inspection (Light & Pillemer, 1984), the other one the trim and fill method (Duval & Tweedie, 2000).[19]

A funnel plot is a plot for each primary study effect size (on x-axis) against a precision measure (on y-axis) (Sutton et al., 2000; Lau et al., 2006). If no publication bias is in place, the plot is shaped like a funnel. This funnel shape is caused because primary studies with smaller samples are more numerous and yield a larger variation in their estimates (Sutton et al., 2000). Sterne & Egger (2001) recommends in their study to use the standard error for y-axis to emphasize that smaller studies are more likely to have biased estimates. Otherwise, the results of funnel plots with sample sizes on the horizontal axis are robust, too (Tang & Liu, 2000). For the horizontal axis, the log odds ratio is less constrained and therefore the best choice in most cases (Sterne & Egger, 2001). If the horizontal line through the peak of the funnel plot has a deviation from zero, a publication bias is in place (Egger et al., 1997). But this deviance from zero should be interpreted with caution because the measures of the horizontal and vertical axes are different in most meta-analyses (Tang & Liu, 2000). Furthermore, the precision of the asymmetry test (Egger test) depends on the number of studies included in the meta-analysis. Because this test is based on a linear regression and therefore it was shown that even 60 studies included in the analysis were not sufficient (Lau et al., 2006). Another test related to Egger´s test is provided by (Stanley & Doucouliagos, 2014). Stanley and Doucouliagos (2014) use the t-value as dependent variable and the inverted standard error as moderator. Sterne & Egger (2001) use the effect size as dependent variable and the standard error as moderator.

Another method is trim and fill to quantify the dimension of a publication bias. The first step of trim and fill is to estimate the number of missing studies depicted in a funnel plot. The second step is the imputation of the missing values. Trim and fill prevents the meta-analysis to derive potential incorrect conclusions from meta-analyses carrying publication bias (Duval & Tweedie, 2000). But this method only works in HOMA analyses because the other characteristics included in MARA describing the primary study more closely are not present.

Including all kinds of primary studies in a meta-analysis could cause the garbage in garbage out problem. But in MARA or HiLMMA one could control for the quality of the included primary studies with corresponding dummy variables (e.g. PhD-, Master's thesis and quality measures such as impact factors for published primary studies).

4.5.2.2 Several effect sizes per primary study

Dependent studies, duplicated effects and non-independent studies are causing threats in meta-analytical validity (Wood, 2007). The first two problems could be solved if a meta- analyst

[19] Another approach to detect the extent of the publication bias is File-Safe N. The number of further primary studies with a zero result must be included in the meta-analysis to affect the overall result negatively (Rosenthal, 1979; Rosenberg, 2005).

pays careful attention whilst searching for studies and coding. The non-independent primary study issue, that is non-independent primary study coefficients, have several sources (Nelson & Kennedy, 2009):

Studies with same data sets (e.g. publicly available data like Doing Business, World Value Survey, Hofstede or Globe cultural variables).

1. Several coefficients drawn from one primary study.
2. Adjustments to primary study coefficients producing an overall effect size.
3. Same observable attribute (e.g. omission of key moderator variables, data from the same region).

Problem one and three could be addressed by including a binary dummy variable in a meta-regression (Nelson & Kennedy, 2009).

Source two occurs if the primary study outcomes coefficient is measured in a different way (e.g. ROA, ROE, Market-to-book ratio) or even in the same way but using different methods of analyses. Otherwise, companies could be included in the analysis at several points in time (Hedges et al., 2010). These sources lead to a several coefficients per primary study included in the meta-analysis. This fact introduces a high correlation between outcome coefficients within a certain primary study (Gurevitch & Hedges, 1999). These coefficients resulting in less precise estimates of the summary effect in meta-analyses (Borenstein, 2009).

Different ways are introduced in the meta-analytical analyses to guarantee the assumption of independence of the coefficients (Bijmolt & Pieters, 2001):

1. Single-value approach (average or median of the coefficient, random selection) (Hunter & Schmidt, 2004; Lipsey & Wilson, 2006)
2. Complete approach includes all outcome coefficients of a primary study in a meta-analysis by treating the coefficients as:
   a. Independent replications (Borenstein, 2009).
   b. Independent weighted replications (Smith & Osborne, 1996; Cheung & Chan, 2004)
   c. Dependent replications with a nested error structure (Raudenbush et al., 1988)

The first approach must rely on pre-defined sampling rules and can be less objective and therefore cause a publication bias. Additionally, this approach reduces the available degrees of freedom in a regression analysis (Feld & Heckemeyer, 2011). On the other hand, one can conduct a meta-analysis for each kind of measurement of the coefficients in primary studies separately (Gurevitch & Hedges, 1999). Nelson & Kennedy (2009) found in their survey about 140 meta-analyses that 40 of them use the single-value approach.

In practical research (Nelson & Kennedy, 2009) observed in their survey about meta-analyses that most meta-analyses use the complete approach (92), mostly assuming the coefficients are independent replications (see 2 a above).

In 2 b, independent weighted coefficients only reduce the problem of heteroscedasticity, but they have no impact on the dependence of coefficients in primary studies (Florax, 2002b).

Normally, for 1, 2 a and b weighted least squares regressions (WLS) are applicable, the so-called meta-regression analysis (MARA).

For statistical reasons, 2 c is preferable (Bijmolt & Pieters, 2001) because meta-analytical data sets have an underlying hierarchical structure (Gurevitch & Hedges, 1999; Florax, 2002b). Another name for a multilevel model is generalized linear mixed model (GLMM). This approach allows to model the dependencies within a primary study variance on level one and on level two the between-primary-study one (Garson, 2013). In sum, the model accounts for the hierarchical structure of the data set and the dependencies of the primary study coefficients with a multilevel model and for the heteroscedasticity with weighted least squares (WLS).

Furthermore, the multilevel approach allows to account for different measures of the dependent performance variable (e.g. ROA, ROE, Market to book), the so-called apple and oranges problem (Sharpe, 1997), by including dummy variables on level one (Raudenbush & Bryk, 2002; Moayyedi, 2004).

Nelson and Kennedy(2009) found in their survey further methods applied in that 140 meta-analyses such as Huber White (sandwich) standard errors (21), Panel regression (38), and multilevel models (7).

4.5.2.3 Outlier in meta-analyses

Almost all data sets contain at least some outlier data points (Gulliksen, 1986; Tukey, 1960; Huffcutt & Arthur, 1995). An outlier is an observation in the data set that is not consistent with the other data. This inconsistency occurs because of coding, computational or unusual characteristics of the observed subject (Viechtbauer & Cheung, 2010). Due to the transcription of the coefficients in primary studies, the coding error should be the predominant reason for outliers in meta-analytical data sets. Table 4-11 gives an overview of methods in use to detect outliers:

Table 4-11: Overview of outlier statistics

Method	Description
Difference-in-fit standardized (DFFITS) statistic (Belsey et al., 1980)	Check for the overall influence of a certain data point by removing it from regression. Afterwards, this method compares results with and without that data point.
Cooks distance (Cook & Weisberg, 1982)	Mahalanobis distance between the predicted values of the whole data set and the predicted value of the one removed observation.
Sample-Adjusted Meta-Analytical Deviancy (SAMD) statistic (Huffcutt & Arthur, 1995)	Based on the assumption of DFFITS, but accounts for the sample size N and uses weighted coefficients.
Studentized residual (Hedges & Olkin, 1985)	Examination of the residuals in relation to their standard errors.

Source: Own illustration

One of first advanced techniques to detect outliers in meta-analytical data sets was the sample-adjusted meta-analytic deviancy (SAMD) statistic of Huffcut and Arthur (1995). But this approach yields some problems. SAMD overidentifies small correlations and leads to a larger estimated population mean. One of the solutions is to transform the coefficients extracted from primary studies to Fisher´s z-values to account for the skewness of the data (Beal et al., 2002).

Otherwise studentized residuals have the property that in a data set with no outliers at least 5% of residuals are larger than $\pm$ 1.96 (Viechtbauer & Cheung, 2010).

Therefore, it is recommended to use of several outlier statistics comparing the outlier analyses results with each other. Additionally, one has to check the *Q*-*Q* plot if the deletion of a potential outlier was successful, avoiding the deletion of a non-outlier data point.

4.5.2.4 Heterogeneity of effect sizes

The investigation of heterogeneity is a very important step in meta-analyses (Hardy & Thompson, 1998). *"Heterogeneity refers to* coefficients (sic! *effect size estimates*) *from primary studies not all estimating the same population effect, which is surely the case in most economic studies"* (Nelson & Kennedy, 2009). Based on this definition, there are two sources of heterogeneity, namely factual and methodological. Factual heterogeneity is in place if differences in coefficients between primary studies occur. That is, if performance of family firms compared to nonfamily firms differs if it is measured only for one year compared to several years. Methodological heterogeneity stems from different designs of the primary studies (Christensen, 2003). For example, some studies provide standard errors or *t*-values in their regression table, whereas others do not. Additionally, some primary studies investigate the focal effect only in a descriptive way, whereas others apply multivariate analyses.

To uncover heterogeneity, tests for heterogeneity must be performed. The common test statistic is the *Q* test (Hardy & Thompson, 1998). The null hypothesis is: All studies examine the same effect. *Q* is the conditional variance weighted deviation of the mean effect size in a meta-analysis and applies to all observations (Florax, 2002b). Significance values are obtained by comparing the *Q* value with a χ^2 distribution with *k-1* degrees of freedom. The power of this test is especially poor in small meta-analyses (Huedo-Medina et al., 2006). The power of the *Q* test is influenced by the extent of the present heterogeneity, the number of *k* studies included in the meta-analyses and the weight assigned to each primary study coefficient (Hardy & Thompson, 1998).

I^2 index overcomes the shortcomings with the *Q* test by measuring the extent of true heterogeneity (Huedo-Medina et al., 2006). But I^2 is based on the *Q* test. I^2 index could be furthermore interpreted as intra-class correlation within clustered studies (Higgins & Thompson, 2002). An evaluation of the I^2 index is straightforward: low (I^2 = 25%), moderate (I^2 = 50%) and high heterogeneity is in place with I^2 = 75%. Additionally, this index can be accompanied by an uncertainty interval, too (Higgins et al., 2006). As mentioned beforehand, the number of studies has an impact on I^2, too. Both tests should be interpreted with caution if $k < 20$.

To investigate if *Q* or I^2 has an explanatory power, the meta-analyst has to check if the assumption of normality holds for the primary study coefficients transformed with Fisher´s z. The easiest way is to use the normal probability plot (e.g. Histogram, Density plot) (Hardy & Thompson, 1998). If this normality assumption holds, a meta-analysis with a large sample size, that is the increasing number of primary studies with relatively few coefficients per primary study, is more efficient (Koetse et al., 2010).

In a univariate analyses (HOMA), a random-effects subgroup analyses could be conducted. A more powerful tool to reduce unintended heterogeneity is to weight each observation according to its variance before applying a multivariate regression analysis (MARA) (Nelson & Kennedy, 2009; Koetse et al., 2010). Especially, in analyses with small samples, it is evident to apply MARA (Koetse et al., 2010). Avoiding omitted variable bias in meta-regression and uncovering sources heterogeneity with subgroup analyses variables such as: sample size, publication quality, sample characteristics of primary studies should be included (Higgins et al., 2002; Koetse et al., 2010). Furthermore, family firm related variables, like ownership, governance, resource and social capital could reduce the residual heterogeneity (Chua et al., 2012).

4.5.2.5 Heteroscedasticity of data

Heteroscedasticity is in place when variances for each observation differ (Chandrashekaran & Walker, 1993). The variance is reflected by the sampling error which depends on primary study sample size, so heteroscedasticity is always in place in meta-analyses (Feld & Heckemeyer, 2011). Non-homogenous variances in primary studies are furthermore in place due to different observations and different empirical analyses (Florax, 2002a; Nelson & Kennedy, 2009). Therefore, heteroscedasticity impairs ordinary least squares regressions by reducing the efficiency and the power of OLS (Chandrashekaran & Walker, 1993). So, the heteroscedasticity in meta-analytical data can be accounted for with analytical known weights in weighted least squared regressions (WLS) (see chapter 4.3) (Nelson & Kennedy, 2009). WLS´ are a derivate of the generalized least squares regression (GLS). In GLS, the variance of the dependent variable is allowed to be unequal (as mentioned above) and/or correlated (Heckman, 1976; Pinheiro & Bates, 2004). Otherwise multilevel models (generalized linear mixed models (GLMM) are a further mean to account for heteroscedasticity (Brouwer et al., 1998).

In sum, a meta-analysis offers a good opportunity to address all biases affecting the whole research field (Ioannidis, 2010).

4.5.3 Summary and development of an analysis process

In this dissertation, I will consider the broader and more common approach in family firm research of Hedges and Olkin (1985) and Rosenthal and Rubin (1986) (RHOMA), and mixed-effects models which are based on generalized least squares regression (meta-analysis regression analysis: MARA). Since various sources of errors are not reported in the family firm research literature. This follows Hunter and Schmidt´s school. Furthermore, Hunter and Schmidt's (2004) approach should be used with caution because it violates conventional expectations as such the law of large numbers. Finding more studies with the same result is less likely due to chance alone. RHOMA results are consistent with this logic, whereas Hunter and Schmidt´s school (2004) is not.[20] In sum, Rubin and Rosenthal´s and Hedges and Olkin type meta-analyses mostly yield the same results even if they were carried out differently. Only Hunter and Schmidt diverge from them (Johnson et al., 1995). But in general, the meta- analyst has to choose, based on the size of the true correlations, the size of the standard deviation of the correlations and the number of studies being combined with the average sample size, if he wants to use Hedges and Olkin or Hunter and Schmidt´s method.

[20] An overview of calculation formulas of the three meta-analytical schools could be seen in Johnson et al. (1995).

5 Sampling of primary studies

This chapter lines the search strategy for primary studies and the related eligibility criteria out. Leading to the eligibility and coding section. Both chapters are the basis for testing the research questions with univariate and multivariate approaches.

5.1 Search strategy

To obtain articles on the performance of family firms, I undertook a comprehensive literature search.

The unit of analysis in meta-analysis is the single study (so called primary study). To obtain relevant articles on the family business and performance association, I accomplished a comprehensive literature search comprehending four search steps which are consistent with prior literature (e.g. Stanley & Doucouliagos, 2012 & 2013; Kepes et al., 2013; Lipsey & Wilson, 2006, Fehrmann & Thomas, 2011; Bays, 2001; Lefebvre,et al., 1982).

1. Ancestry searching
2. Keyword search in electronic databases
3. Issue-by-issue search in relevant journals
4. Corresponding with authors

First, I followed the procedure of ancestry searching (Bays, 2001, Cooper, 1982) and tracked the references of four previously published **meta-analyses** (Liu et al., 2012; O'Boyle et al., 2012; Stewart & Hitt, 2012; van Essen, Carney et al.., 2015) (appendix Table A 1), **review articles** (Basco, 2013; Carney et al., 2013; Stewart & Hitt, 2012) and two highly cited **journal articles** in family firm performance research (Anderson & Reeb, 2003; Villalonga & Amit, 2006) (appendix Table A 2).

Second, I conducted a comprehensive keyword search in different bibliographic electronic databases including Google Scholar, JSTOR, EBSCOhost, and China National Knowledge Infrastructure (http://www.cnki.net). To obtain as many potentially relevant articles as possible, I used broad search terms (Shaw et al., 2004) see appendix Table A 3.[21]

[21] Search terms included families, family business, family control, family corporate governance, family financial performance, family founder, family management, family ownership, family performance, family succession, firm control, firm corporate governance, firm financial performance, firm founder, firm management, firm ownership, firm performance, and firm succession.

Third, I executed a manual issue-by-issue search in scholarly journals covering the research fields of family business (i.e., *Family Business Review, Entrepreneurship Theory and Practice, Journal of Business Venturing, Journal of Family Business Strategy, Journal of Small Business Management, Journal of Management, Strategic Management Journal, Journal of Financial Economics* and *Journal of Finance).*

Fourth, I corresponded with authors who participated in a leading family business conference (The Annual Conference of the International Family Enterprise Research Academy (IFERA) in 2012 and 2014) and sent out emails via mailing lists (e.g., the Academy of Management Entrepreneurship List), explaining the goal of my research endeavor and asking for unpublished or in-press articles on my topic. Additionally, I search in track records of 17 relevant family firm scholars (names can be found in appendix Table A 4). In sum I corresponded with 674 researchers and received answers from 60 colleagues (response rate: 9%).

5.2 Eligibility criteria and coding

Having obtained the journal articles (primary studies), I examined each one for potential inclusion in my study. To be included in my meta-analysis, the journal article had to report either a correlation or a regression coefficient showing the focal relationship between family firm governance and firm performance compared to nonfamily firm performance. Further, the primary study has to provide quantitative information regarding sample size, sample year(s) (see variable description 6.1). Narrowing the inclusion criteria, the primary study needed to include accounting and/or market based performance measures. Based on these broad criteria we examined the respective articles' abstracts for content and considered for inclusion in the meta-analysis. If it was not clear how performance and/or family firm was measured or conceptualized, a full-text examination was carried out to determine if the primary study met my criteria. For details of inclusion and exclusion criteria see Figure 5-1.

Table A 10 and Table A11 in the appendix lists the primary studies which are included in my meta-analysis. The full references of primary studies are made available on the website www.familyfirms.de.

Figure 5-1: Exclusion and inclusion criteria of the meta-analysis

A.	Inclusion criteria for defining family firm, performance and delineating its parameters:
1.	Primary studies showing either correlation or/and regression coefficients between the focal variables.
2.	Family firms were explicitly defined in primary studies and measured by dummy, percentage or self-reported variable.
3.	Studies with a wider definition of family firms including founders were considered and marked with a dummy variable.
4.	Performance is measured in primary studies with ROA, ROE, ROS, stock return, Q, Tobin´s Q and market-to-book-ratio.
5.	We included peer reviewed articles, working paper, PhD-Theses, Master-Theses and unpublished data sets with relevant variables.
6.	No time AND language AND research field AND geographical restrictions were defined.
7.	Primary studies with a public, private and mixed sample were included.
B.	Exclusion criteria by theoretical relevance
1.	Qualitative literature reviews
2.	Just founder oriented studies
3.	Primary studies including only family firms in their sample
4.	Self-reported performance measure were excluded in my analysis

Source: Own illustration

Having identified the relevant articles, I read these studies for coding purposes. Thus, the sample of the primary study had to have governance variables concerning family ownership, control and/or management. My coding approach was as inclusive as possible to extract as much information as feasible from each primary study.

A senior researcher and two junior researchers were involved in coding primary studies and checking extracted information. I created a coding protocol (Lipsey & Wilson, 2006) that detailed how to extract data on relevant information from the primary studies. While constructing the coding protocol, I used the “power” subscale of F-PEC model (Astrachan et al., 2002). This “Power” subscale represents family influences on firms via ownership, governance and management. Thus, the coding protocol differentiated family business into family ownership, control and/or management as is consistent with my theorizing. With regard to performance, the coding protocol distinguished between accounting and/or market based performance measures. Additionally, I considered several additional descriptive characteristics in my coding like quality criteria of the empirical analyses and classification regarding the research field of the publishing journals. Furthermore, the coding included several additional descriptive characteristics like quality criteria of the empirical analyses and classification regarding the research field of the publishing journals. Before starting coding, the junior researchers were trained on how to code based on the coding protocol and what information were needed,

ensuring that the coding was consistent among three coders. The primary studies were carefully coded by the first coder and checked consecutively by the other two coders. Finally, all primary studies yielding the same publications (e.g. already published working papers or studies with exactly the same data set and analyses) were deleted.

Having coded all data, I supplemented the information extracted from the primary studies with additional secondary information obtained from different sources.

6 Data analysis: Synthesis

Based on the literature review, the research questions, the description of the methodologies and variable description, descriptive, univariate and multivariate analyses will be conducted. The purpose is to derive the correlation between family firm involvement and firm performance compared to nonfamily firms.

6.1 Variable description

In economic discourses, mainly on political levels, the focus is on fiscal measures. Less attention is paid on the nuts and bolts holding an economy together (Basu, K. in: The World Bank, 2014). Therefore, I include cultural and contextual variables in my analyses to derive a deeper insight what factors are driving financial performance of family firms compared to nonfamily firms.

The *italic* variable names represent the variables where this information is outlined in the following chapter. These variables are summarized in Table 6-4.

6.1.1 Performance variables

Performance as a dependent variable of primary studies is a good mean to measure the effectiveness of the family firm system compared to nonfamily firms (Combs et al., 2005; Richard et al., 2009). This dependent variable expresses the business and short-term orientation of companies and is frequently used in family business research (Yu et al., 2012). In my dissertation, I use various measures of financial performance, on the one hand accounting-based measures such as *return of assets (ROA), return of equity (ROE), return on sales (ROS), sales growth. ROE* is a hybrid measure between accounting and market-based measures. It is derived from accounting returns but the denominator reflects the firm´s capital structure (Combs et al., 2005). On the other hand, marked-based measures are used as well, such as market-to-book ratio (MTB), Tobin´s Q, Q or stock return. Because these market-based measures are likely to show high correlations with accounting measures (Richard et al., 2009) and therefore could be seen as a common construct to measure financial performance.

The accounting measures and market measures differ in respect of time. Accounting measures look backward, whereas market measures look forward. An equally import issue in accounting and market measures is that accounting measures depend on the accounting standards in place and on accounting quality (Demsetz & Villalonga, 2001). Cascino et al. (2010) showed in a study investigating accounting quality in listed family firms that *"[…] family firms are of higher quality relative to their nonfamily counterparts"*.

In contrast, market measures rely on the feelings and psychology of investors (optimism or pessimism) (Demsetz & Villalonga, 2001). These feelings are introduced especially in the

valuation of intangible assets because the market will value these intangibilities (Himmelberg et al., 1999).

Additionally, I included subjective performance measures[22] because they are widely used, recently shown in a meta-analysis (Rauch et al., 2009). These subjective performance measures are eligible to apply as proxy for performance because they reflect a high correlation with objective performance data (Venkatraman & Ramanujam, 1986).

In this study, I only use the correlations and partial correlations between family involvement variables and firm performance measures of primary study samples yielding family firm and nonfamily firm performance measures. Therefore, I assume an underlying performance construct because I do not directly use performance measures, but statistical coefficients measuring the link between family involvement and firm performance.

6.1.2 Operationalization of family firm – Governance variables

The choice of the family firm variables are based on relevant primary studies (Anderson & Reeb, 2003; Villalonga & Amit, 2006; Jaskiewicz, 2006) and meta-analyses (van Essen et al., 2012; O'Boyle et al., 2012) investigating performance of family firms compared to nonfamily firms. The presence of family involvement in a company can lead to different objectives in a family firm (see chapter 2.2). Therefore, I differentiate between specific levels of family involvement, such as family ownership, family management, family control and a combined family involvement measure (Garcia-Castro & Aguilera, 2014).

The most global measurement of family involvement in companies, applied in primary studies, are dummy variables indicating whether it is a family firm or not (*F.ownership dummy*). This could be measured to indicate that the company is owned by a family without any further description or criteria.[23] A more valid and reliable method to classify companies as family firms with a dummy variable refers to dominant shareholding positions (*F.ownership dummy*) - such as 5%, 10%, 20%, 25% or 50% of the shares are held by a family (Sacristan-Navarro et al., 2011).[24] Furthermore, the percentage of shares itself is classifying the type of firm (*F.ownership percent*).[25] Additionally, in some primary studies, the definition of family firms is very broad - that is: a certain stake of shares held by a family or family control or family management is

[22] Cf. Madison et al. (2014).

[23] Cf. Schulze et al. (2003); Zahra (2003).

[24] 1%: Cf. Lee (2006); Kaleem et al. (2013).
5%: Cf. Miller et al. (2007); Chu (2009); Abdullah A Al Dubai et al. (2014).
10%: Cf. Braun & Sharma (2007); Pindado et al. (2008).
20%: Cf. Villalonga & Amit (2006); King & Santor (2008); Sraer & Thesmar (2007).
25%: Cf. Cronqvist & Nilsson (2003); Barth et al. (2005); Menozzi (2009).
50%: Cf. Ho & Shun Wong (2001); Barontini & Caprio (2006); Westhead & Howorth (2006).

[25] Cf. Andres (2008); Anderson et al. (2009).

necessary to classify a company as a family firm in these primary studies.[26] The relationship between ownership concentrations is predicted as an inverted U-shape (Himmelberg et al., 1999; Liu et al., 2012). Based on that broad definition, I introduce *combined measure* as a family firm variable.

Another class of family involvement variables is grouped as governance variables. In this category, a dummy variable (*F.control*) indicates if at least one family representative is a member of the board of directors.[27] Especially the differentiation between ownership and control is an important issue to explain the survival of organizations (Fama & Jensen, 1983b), particularly to differentiate ownership and control influences in family firms compared to nonfamily firms. Previous studies have shown a relationship of management influences on firm performance based on the amount of shares held by managers. A graphical overview can be found in (Demsetz & Villalonga, 2001). Therefore my studies uncover the relationship of family management influences to performance by applying a dummy variable (*F.management*) if the family is involved in the top management team.[28]

Family firm definitions according to European country can be found in "Overview of Family Business Relevant Issues" (Mandl, 2008a).

6.1.3 Cultural dimensions

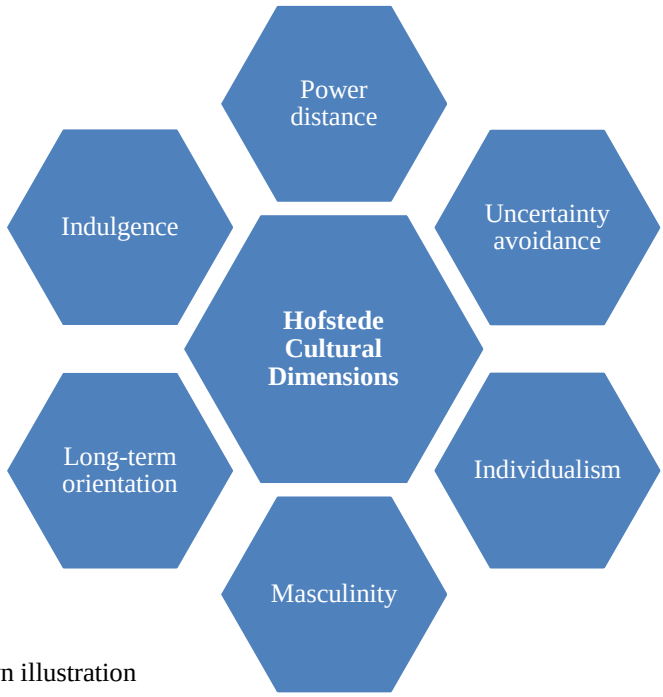
Humans carry patterns of thinking, feeling and potential acting learned through their lifetime. These learned patterns start within the family, continued by the neighborhood, schools, work and the living community (Hofstede et al., 2010). Hofstede´s constructs are widely used in management, marketing, finance and accounting (Shenkar, 2001). Figure 6-1 gives an overview of dimensions derived from surveys amongst IBM employees (Hofstede centre, 2015).

[26] Cf. Uhlaner et al. (2007); Chen et al. (2014); van den Berg (2014).

[27] Cf. Kowalewski et al. (2010); Sacristan-Navarro et al. (2011); Isakov & Weisskopf (2014).

[28] Cf. Maury (2006); Bauguess & Stegemoller (2008); Block et al. (2011).

Figure 6-1: Hofstede´s cultural dimensions (farbe anpassen)



Source: Own illustration

Power distance refers to the acceptance of less powerful members of institutions and organizations that power is unequally distributed.

Uncertainty avoidance catches the perception how a society deals with and feels threatened by an unpredictable future.

Individualism is related to the self-image of the people in a society. Individualistic people look after themselves whereas collectivistic society´s people are loyal in groups.

Masculinity drives competition, achievement and success that is "wanting to be best" contrary to feminine values covering caring for others, linking what you do and quality of life.

Long-term orientation measures how normative a society is. A low score indicates a society which prefers to maintain time-honored traditions and norms, whilst societies scoring high are more pragmatic ones.

Indulgence captures how people try to control their desires and impulses. A low score is called "indulgence", whereas a strong control is called "restraint".

I included Hofstede´s cultural dimensions (Hofstede et al., 2010) to investigate country differences explaining the performance of family firms. Therefore, the cultural dimensions are treated as a global variable to demarcated one group from each other (Tsui et al., 2007). But I assume that nation and culture do not completely overlap, therefore national contexts variables should be included to enable a better theory development and inference of cultural effects (Tsui et al., 2007). Such as economic, political and geographic factors which separate one nation from another (for descriptions of such variables, see below in contextual and institutional variables).

Both cultural dimensions and contextual variables lead to a polycontextual analysis with a multilevel design (Tsui et al., 2007; Shenkar, 2001).

But assumptions and implications made by scholars using Hofstede raise several conceptual and methodological problems (Shenkar, 2001; Ailon 2008):

Conceptual problems:

- Symmetry: Distance is a symmetrical measure, but in the light of cultural measures, there is no evidence that the distance between the USA and Germany or Germany and the USA is the same.
- Stability: Cultures change over time.
- Linearity: This term is related to the distance metaphor. There is no evidence that the height of the distance between two countries leads to later investments and to a worse performance of foreign affiliations.
- Discordance: Differences in culture produce lack of "fit". Because greater distances according to cultural dimension scores lead to lower performance. Maybe these differences are complementary.

Methodological Problems:

- Corporate homogeneity: Hofstede´s measures lack of individual cultural diversity in organizations.
- Spatial homogeneity: Cultural dimensions assume uniformity in societies.

A study examining 121 instruments to measure culture concludes that *"[…] existing measures of culture are fairly consistent in terms of their approach"* (Taras et al., 2009). Furthermore, Hofstede and Schwartz´s measures have comparable explanatory power (Drogendijk & Slangen, 2006). Additionally, Hofstede´s measures are *"about differences between national societies"* which does not measure psychology but belong to anthropology (Hofstede, 2009). Anthropologists believe that *"[…] aspects of social life which do not seem to be related to each other, actually are related"* (Harris, 1981). These country- or society-specific differences are of interest in this dissertation and are complemented by institutional variables. The institutional influence is suggested to be more influential than previously recognized (Tung & Verbeke, 2010).

Another key point is that I do not want to disentangle the psychological values in countries as it is done in marketing research for example to make inferences of customer behavior by using cultural values derived by Schwartz (Schwartz & Sagiv, 1995; Steenkamp et al., 1999; Schwartz et al., 2001; Schwartz & Bardi, 2001; Schwartz, 2012). Variables of the GLOBE project[29] are also not appropriate because they want to investigate leadership and organizations which is not my focus in this investigation (House, 2004). In my opinion meta-analyses investigating differences across countries with no psychological or leadership focus lack psychological or

[29] The GLOBE project covered the years 1994-1997 and was carried out by 170 volunteers interviewing 17,000 manganger and 951 organizations (Hofstede, 2006).

leadership values and are therefore inappropriate to infer about performance of family firms. Because psychic distance is not equal to cultural distance, it includes many more sources of distance compared to cultural ones (Hofstede, 2006; Tung & Verbeke, 2010). Furthermore, a broader conceptual view of the distance concept incorporating cultural and institutional dimensions is recommended because they are complementary (Tung & Verbeke, 2010). Finally, GLOBE only covers answers of managers. Contrary to this (Hofstede et al., 2010) matched groups of employees in seven occupational, two managerial and five non-managerial roles (Hofstede, 2006). This depicts the reality in a more valid and reliable way (Sadler & Hofstede, 1972).

6.1.4 Contextual and institutional variables

World Bank: Doing Business

The World Bank "*Doing Business*" project documents measures of business regulations and their enforcement in 189 economies. It belongs to the four flagship reports of the World Bank. The data are used in 2,024 research articles in scientific journals and in more than 5,098 working papers.

In 2002, this project was started to screen domestic small and medium-sized companies. The purpose of the project is to provide quantitative data comparing business environments across economies over time. Furthermore, it stresses the importance of the role of governments and their related policies. The "*Doing Business*" report is designed for policy makers and researchers to benchmark the regulatory regimes and for a better understanding of the role of business regulations in certain economies (Anon., 2015a; Anon., 2015b; The World Bank, 2014; Anon., 2015d).

The report provides two types of indicators, the complexity and costs of processes and the strength of legal institutions, split into 11 areas of business regulations (Anon., 2015a):

Table 6-1: What Doing Business measures

Complexity of regulatory processes	Strength of legal institutions
Starting a business	Getting credit
Dealing with construction permits	Protecting minority investors
Getting electricity	Enforcing contracts
Registering property	Resolving insolvency
Paying taxes	Labor market regulation
Trading across borders	

Source: Own illustration

The selection of the 11 sets is based on items of the *World Bank Enterprise Surveys*. Otherwise the *Doing Business* report has some shortcomings and does not measure: Security, prevalence of bribery and corruption, market size, macroeconomic stability, state of the financial

system, level of training and skills of the labor force, reliability of electricity supply, availability of credits for firms, export and import tariffs and subsidies. Additionally, some methodological limitations, as shown by all aggregated data sets, are in place (Anon., 2015a):

Table 6-2: Advantages and limitations of the Doing Business methodology

Feature	Advantages	Limitations
Use of standardized case scenarios	Makes the data comparable across economies and the methodology transparent	Reduces the scope of the data and means that only regulatory reforms in the areas measured can be systematically tracked
Focus on largest business city*	Makes the data collection manageable (cost-effective) and the data comparable	Reduces the representativeness of the data for an economy if there are significant differences across locations
Focus on domestic and formal sector	Keeps the attention on where regulations are relevant and firms are most productive – the formal sector	Fails to reflect reality for the informal sector – important where it is large – or for foreign firms where they face a different set of constraints
Reliance on expert responses	Ensures that the data reflect the knowledge of those with the most experience in conducting the types of transactions measured	Results in indicators that do not measure the variation in experiences among entrepreneurs
Focus on the law	Makes the indicators "actionable" – because the law is what policy makers can change	Fails to reflect the reality that regulatory changes may not achieve the full desired results where systematic compliance with the law is lacking.

Source: Own illustration

*In economies with a population of more than 100 million. Doing business covers business regulations in both the largest business city and the second largest one.

Despite of the limitations, the advantages and the uniqueness of the project prevail the methodological shortcomings. In this dissertation, I base my arguments on the institution- based view and therefore use the *investor protection index.*

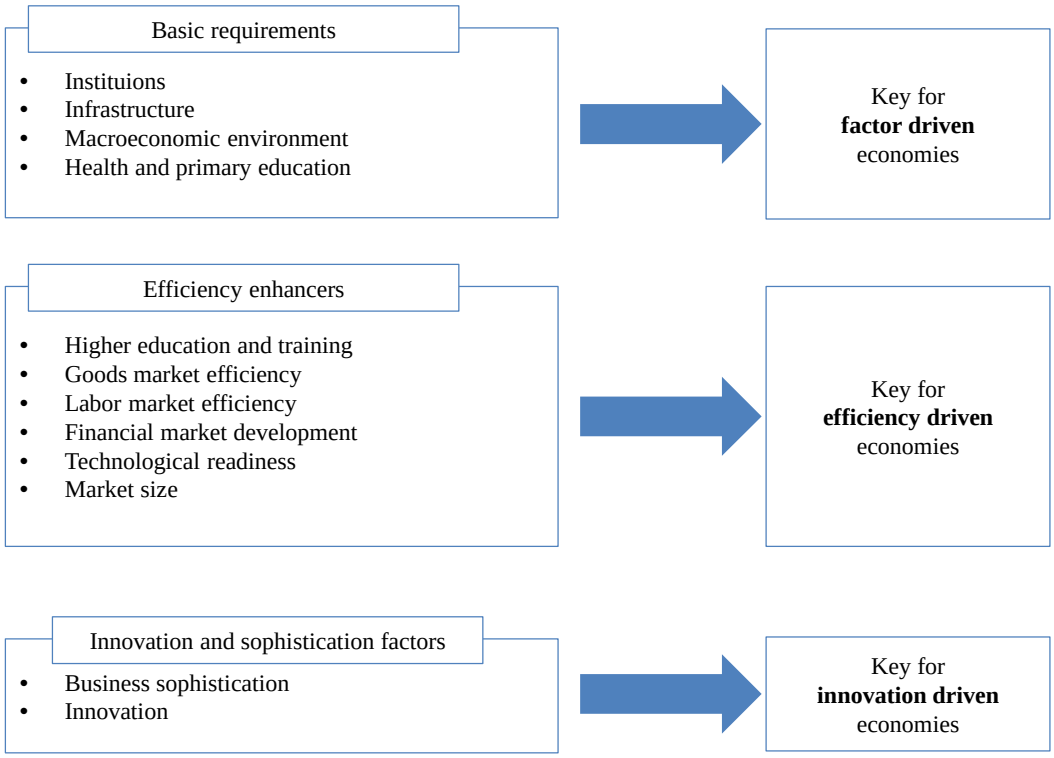
The *Investor protection index* measures how well minority shareholders are protected from conflicts of interests. It is the average of conflict of interests and shareholder governance indices of this project. This index is important because it was found that according to legal differences, the protection of minority shareholders and creditors is systematically different (Djankov et al., 2008).

Global Competitiveness Index (GCI)

The *Global competitiveness report* is issued by the *World Economic Forum*. The latter intuition aims to *"[…] improve the state of the world through public private cooperation"*. It was established in 1971 as not-for-profit foundation based in Geneva Switzerland (Anon., 2015f). Therefore, this foundation provides the *Global Competitiveness Report* to assess the

competitiveness landscape of about 144 economies (Anon., 2015e). This report is based on 12 pillars of competitiveness. See Figure 6-2 (Sala-i-Martin et al., 2010):

Figure 6-2: Twelve pillars of competitiveness



Source: Adapted from: Sala-i-Martin, X: (2010): The Competitivenes Report 2010-2011, p. 9.

They defined competitiveness as a *"[…] set of institutions, policies, and factors that determine the level of productivity of a country."* Even though the 12 pillars are reported independently, they tend to reinforce each other. So a weakness in one of the three factors has the same shape in at least one other (Sala-i-Martin et al., 2014). Therefore, I only use an extract in my dissertation, namely: *minority shareholder protection* (Sala-i-Martin et al., 2014). All these variables are derived through the *Executive Opinion Survey questionnaire* of the *World Economic Forum.* Some other variables are derived from third-party databases such as *Doing Business*.

Minority shareholder protection yields the answer of the question of the Executive Opinion Survey in 2011-2012: "*In your country, to what extent are the interests of minority shareholders protected by the legal system*?"

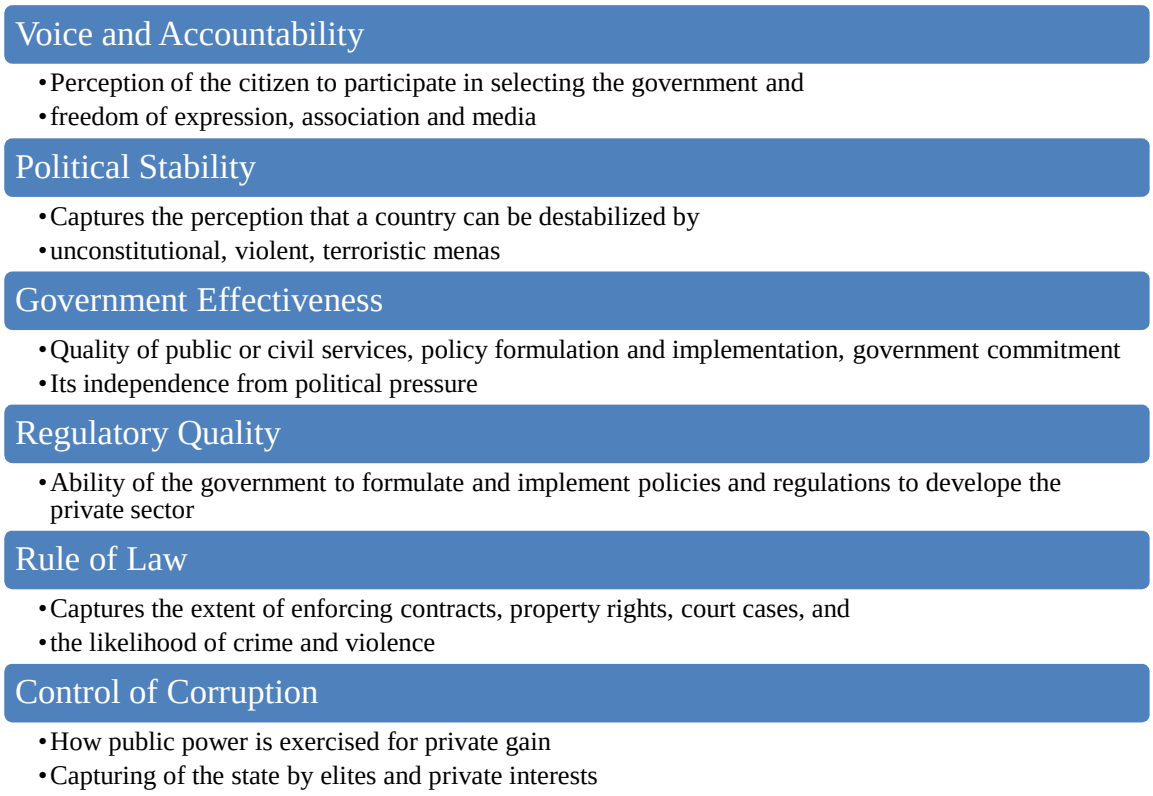
The Worldwide Governance Indicators project

Governance is based on traditions and institutions exercising and executing authority in countries. These governance indicators cover 215 economies from 1996 till 2013. Six dimensions are summarizing the opinions of companies, citizen and experts returning the surveys. These six dimensions are based on 32 different data sources such as: Surveys of households and firms (9 data sources), Commercial business information providers (four data

sources), Nongovernmental organizations (11 data sources), and public sector organizations (eight data sources) (Anon., 2014).[30] These six dimensions are described in Figure 6-3 (Kaufmann et al., 2009).

To derive the six dimensions, the unobserved components model is applied. This method recognizes the different data sources as imperfect signals and accounts for them by assuming the observed score is a linear function of the unobserved governance in a country. Furthermore, it is assumed that the world average is the same in each year. So, the researcher can observe the relative position per country in a given year. This leads to maintaining the cardinal information stemming from the underlying data (Kaufmann et al., 2010).

Figure 6-3: Six dimensions of the Worldwide Governance Indicators project



Source: Own illustration

In my dissertation, I am going to avoid overlapping data sources. Therefore, I just focus on *Governance Effectiveness*, *Regulatory Quality* and *Rule of Law* (for an explanation of the single variables, see Figure 6-3). Below, I list the data sources concerning the three of the six dimensions.

[30] Examples of data sources: Afrobarometer surveys, Gallup World Poll, Global competitiveness Report, Economist Intelligence Unit.

Table 6-3: Data sources of the Worldwide Governance Indicators project

Representative sources	Non-representative sources
Economist intelligence unit riskwire & democracy index	African Development Bank Country policy and institutional assessments
Global competitiveness report	Afrobarometer
Gallup world poll	Asian Development Bank Country policy and institutional assessments
Heritage foundation index of economic freedom	Business enterprise environment survey
Institutional profiles database	Bertelsmann transformation index
Political risk services international country risk guide	Freedom House *Countries at the Crossroads*
Global insight business conditions and risk indicators	Freedom House
	European Bank for Reconstruction and Development *Transition Report*
	Transparency International *Global Corruption Barometer Survey*
	Global Integrity Index
	IFAD rural sector performance assessment
	Latinobarometer
	Political economic risk consultancy corruption in Asia survey
	Vanderbilt University Americas barometer
	World Bank Country policy and institutional assessment
	Institute of Management and Development *World Competitiveness Yearbook*
	World Justice Project Rule of Law Index

Source: Own illustration

But this project is under critique. So, (Kurtz & Schrank, 2007b) pose the question how growth and governance are linked. In their article, they try to prove that growth and development drive the development of governance. Furthermore, they suggest that the World Bank Governance variables are partly misleading and claim for better governance measures which do not rely on surveys. Kaufmann et al. (2007b) replied to this article by replicating (Kurtz & Schrank, 2007b) regressions and by uncovering some omitted variable bias and some specifications of the regressions which impose that they are not comparable with existing literature. Additionally, Kurtz & Schrank (2007b) did overlooked strategies in existing literature which try to sort out the causality problem by using far more advanced empirical techniques to uncover the direction of good governance towards growth. Again, Kurtz & Schrank (2007a) replied to the article of (Kaufmann et al., 2007b). Finally, in (Kaufmann et al., 2007a) they addressed eleven critiques by several authors. So, scholars using these indicators in empirical works should be aware of the limitations of the aggregation methodology, e.g. the indicators are somewhat correlated to each other (Apaza, 2009).

Characteristics of primary studies

To depict a clear picture of the results, they should never be influenced by specific characteristics of the primary studies. But there is no concluding list of primary study characteristics which could be applied. I introduced several dummy variables describing the primary study more closely (see variable description Table 6-4). These variables cover, amongst other characteristics, publication status, quality of the scientific journal, applied empirical methodologies, and research area of the primary study, etc.

Table 6-4: Variable definition (1)

Variables	Definition
Firm performance	Effect size reported in the primary study concerning the relation between family firms and performance
Performance measures	
Market measures	Dummy is 1 if the dependent variable coefficient is one of the market measures below.
MTB	Dummy is 1 if the primary study uses market-to-book value or Tobin's Q as performance measure.
Stock return	Dummy is 1 if the primary study uses stock market returns as performance measure
Accounting measures	Dummy is 1 if the dependent variable coefficient is one of the accounting measures below.
ROA	Dummy is 1 if the dependent variable effect size is return on assets (ROA); return is measured either through earnings before interests and tax (EBIT), earnings before interest tax depreciations, and amortization (EBITDA), or net income (NI).
ROE	Dummy is 1 if the primary study uses return on equity (ROE) as performance measure.
ROS	Dummy is 1 if the primary study uses return on sales (ROS) or profit margin as performance measure.
Sales growth	Dummy is 1 if the primary study uses sales growth as performance measure.
Type of sample in primary study	
Mixed sample	Dummy is 1 if the primary study uses either a mixed sample (both public and private firms..
SMEs	Dummy is 1 if the primary study uses a sample of only small and medium-sized firms (SMEs).
Public firms	Dummy is 1 if the primary study uses a sample of only publicly-listed firms.
Technology firm sample	Dummy is 1 if the primary study uses a sample of only technological firms.
Manufacturing firm sample	Dummy is 1 if the primary study uses a sample of only producing firms.
Family involvement	
F. ownership	Dummy is 1 if a family ownership is a dummy or measures in percent.
F. ownership dummy	Dummy is 1 if a family ownership dummy is used in the primary study.

Table 6-4: Variable definition (2)

Variables	Definition
F. ownership percent	Dummy is 1 if a family ownership is measured in percent in the primary study.
F. management	Dummy is 1 if a family management measure is used in the primary study.
F. combined measure	Dummy is 1 if a combined measure based on ownership, management, and/or control is used in the primary study.
F. self-reported	Dummy is 1 if a self-reported family measure is used in the primary study.
Informal institutions	
Individualism low/high	If the Hofstede values are from countries which score greater (smaller) than the median of the Hofstede value on individualism of all included primary studies.
Masculinity low/high	If the Hofstede values are from countries which score greater (smaller) than the median of the Hofstede value on masculinity of all included primary studies.
Uncertainty avoidance low/high	If the Hofstede values are from countries which score greater (smaller) than the median of the Hofstede value on uncertainty avoidance of all included primary studies.
Long-term orientation low/high	If the Hofstede values are from countries which score greater (smaller) than the median of the Hofstede value on long term orientation of all included primary studies.
Power distance low/high	If the Hofstede values are from countries which score greater (smaller) than the median of the Hofstede value on power distance of all included primary studies.
Formal institutions	
Regions	
North America	Dummy is 1 if the sample in the primary study is from a country which was assigned to that region.
Europe	Dummy is 1 if the sample in the primary study is from a country which was assigned to that region.
South America	Dummy is 1 if the sample in the primary study is from a country which was assigned to that region.
Asia	Dummy is 1 if the sample in the primary study is from a country which was assigned to that region.
Other regions	Dummy is 1 if the sample in the primary study is from a country which was not assigned to that region before.
Law systems	
Common law	Dummy is 1 if the sample in the primary study is from a country which applies common law according to the CIA world fact book.
Civil law	Dummy is 1 if the sample in the primary study is from a country which applies civil law according to the CIA world fact book.
Religious law	Dummy is 1 if the sample in the primary study is from a country which applies religious law according to the CIA world fact book.
Inconsistent law	Dummy is 1 if the sample in the primary study is from a country or a mixed sample where a law system is not assignable.

Table 6-4: Variable definition (3)

Variables	Definition
Rule of law logic	It is a newly created, mean-centered and scaled variable using principal component analysis. Logic: low to high. This variable consists of: La Porta et al. (1999): Rule of law, [0;6] Kaufmann et al. (2010):Governance effectiveness, [-2.5;2.5] Kaufmann et al. (2010): Rule of law, [-2.5;2.5] Kaufmann et al. (2010): Regulatory quality, [-2.5;2.5] Kaiser-Meyer-Olkin: 0.843 Cronbach-alpha: 0.864
Investor protection logic	It is a newly created, mean-centered and scaled variable using principal component analysis. Logic: low to high. This variable consists of: The World Bank (2014): Investor protection index, [0;10] Sala-i-Martin et al. (2014): GCI investor protection index, [1;7] Kaiser-Meyer-Olkin: 0.50 Cronbach-alpha: 0.9974
Controls for article attributes	
Time period in sample (sum period) low/high	Sum of sampling period of performance variables in primary studies
Treatment of dependent variable	
Var. lagged	Dummy is 1 if the primary study's dependent variable is logged
…Var. logged	Dummy is 1 if the primary study's dependent variable is lagged.
Endogeneity check	Dummy is 1 if the primary study's analysis includes an endogeneity check.
Panel regression	Dummy is 1 if the primary study´s analysis is a panel regression.
Correlation coefficient yes/no	Dummy is 1 if the primary study's analysis is a bivariate association, shown by a correlation table.
GDP per capita low/high	Logarithm of the gross domestic product (GDP) average per capita is greater (smaller) than the median of the values of all included primary studies. These values are derived from World Bank data base covering the years 1961-2013. GDP of Taiwan is derived from International Monetary Fund database covering the years 1980-2015.
Type of publication	
Journal article	Dummy is 1 if the primary study is published in a journal.
Working paper	Dummy is 1 if the primary study is published as working paper.
PhD thesis	Dummy is 1 if the primary study is published as doctoral manuscript.
Master thesis (thesis)	Dummy is 1 if the primary study is published as a graduation manuscript.
Type of research focus	
Performance paper	Dummy is 1 if the primary study´s objective was to investigate the difference of family firms and nonfamily firms according to firm performance.
Non performance paper	Dummy is 0 if the primary study´s objective was NOT to investigate the difference of family firms and nonfamily firms according to firm performance.
Management paper	Dummy is 0 if the primary study data stem from a study conducted in the research fields of management.
Finance economics paper	Dummy is 1 if the primary study data stem from a study conducted in the research fields of finance or economics.

Source: Own illustration

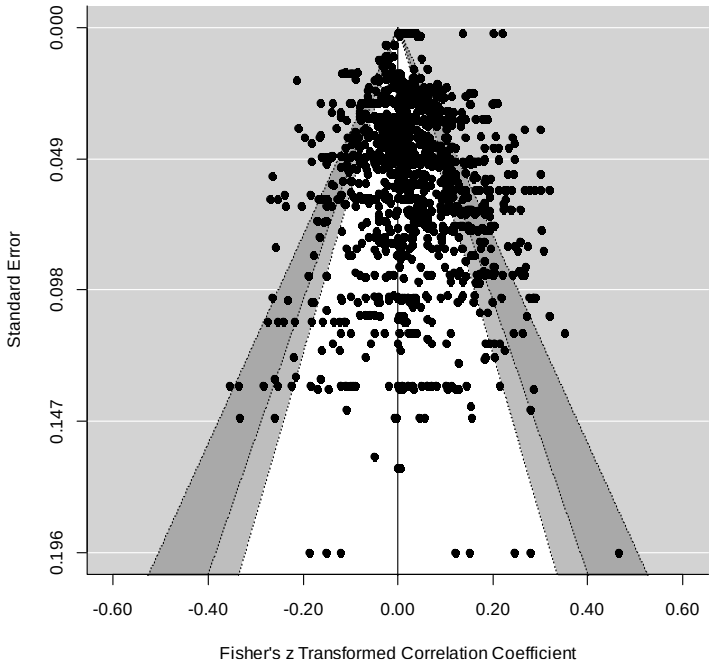
6.2 Descriptive statistics

After outlining the search strategy for primary studies, the eligibility criteria for inclusion of relevant primary studies, the treatment of my data, and the variable description, now follows the chapter that presents descriptive statistics to derive advanced insights of my data and the empirical analyses, respectively.

6.2.1 Descriptive statistics of the meta-analytical sample

In my dissertation, I include 270 primary studies, after an outlier analyses, yielding 1,351 effect sizes. Relevant effect sizes are bivariate correlations and partial correlation coefficients. Partial correlation coefficients are transformed regression coefficients (see formula 3-7). To overcome the publication bias, I created a composite effect size consisting of partial and bivariate correlations. In Figure 6-4, a funnel plot depicts visually that there is no publication bias because one can see that the effect sizes are distributed over the whole area. Additionally to the visual test for publication bias, the Egger test (Egger et al., 1997) gives multivariate empirical evidence that there is no publication bias (t= -0.136; p= 0.89). The applied Egger test is a weighted regression with multiplicative dispersion assuming a linear relationship of the effect size with standard error. Furthermore, weighting the standard errors accounts for potential heteroscedasticity (Moreno et al., 2009).

Figure 6-4: Funne plot testing publication bias



Source: Own illustration

The 1,351 effect sizes can be split up into 578 effect sizes derived from bivariate correlation tables and 773 effect sizes from regression tables in primary studies. Skewness and the kurtosis are within the ranges of the rules of thumb [-0.8; 0.8] for skewness and [-3.0; 3.0] for kurtosis, respectively (see Table 6-5). This supports my assumption to create a composite effect size to avoid publication bias and therefore I will not lose any relevant information of the analyses in primary studies.

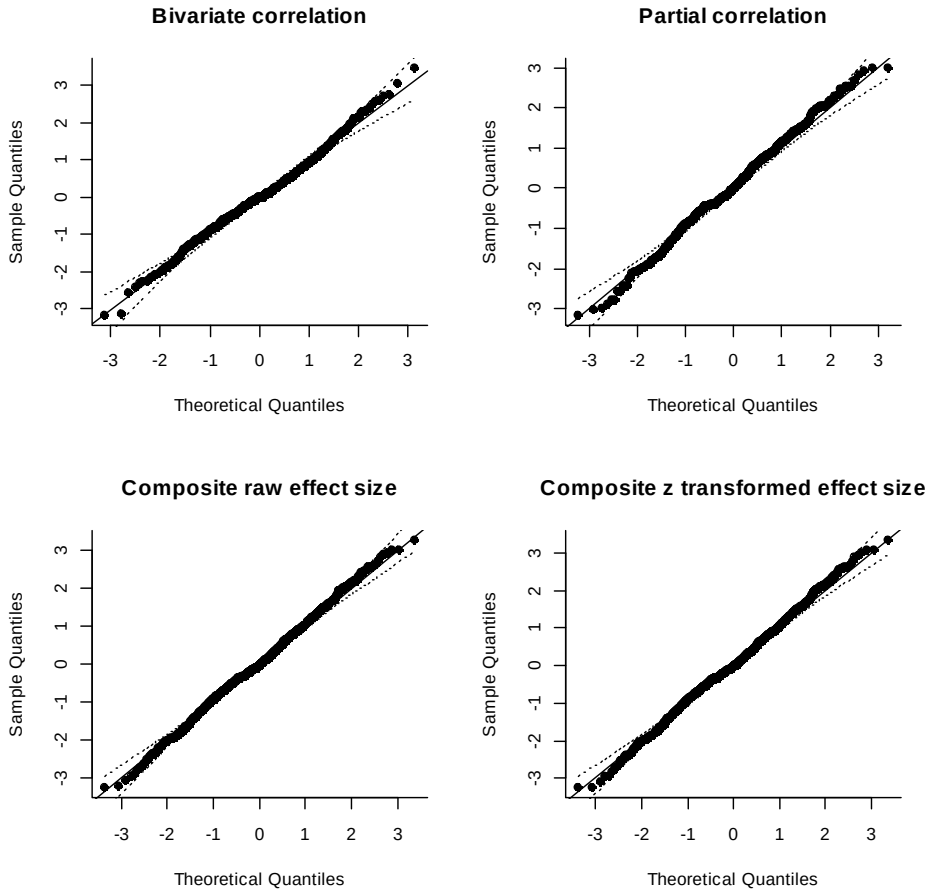
Table 6-5: Itemized overview of effect sizes

Effect size	No.	mean	min	max	median	skew	kurtosis
Correlation	578	0.02	-0.27	0.29	0.02	-0.05	0.34
Partial correlation	773	0.04	-0.34	0.43	0.03	-0.09	0.73
Composite effect size	1351	0.03	-0.34	0.43	0.02	-0.02	0.64
z-transformed effect size	1351	0.03	-0.35	0.46	0.02	0.00	0.78

Source: Own illustration

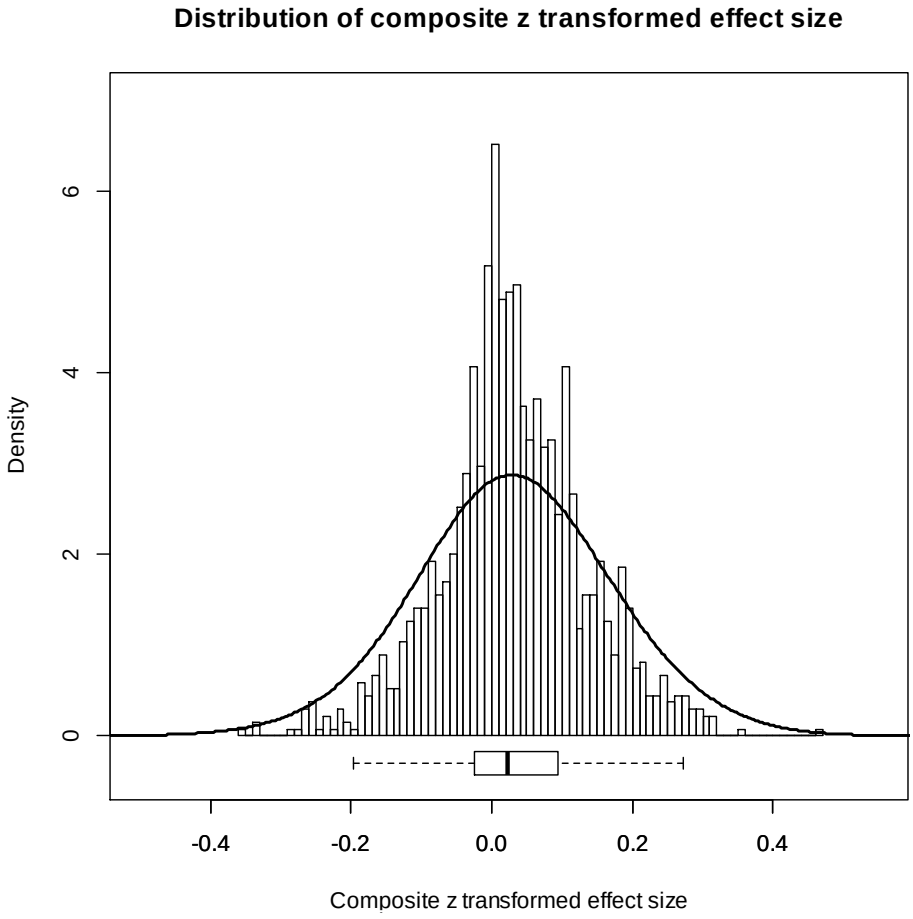
Additionally, the Q-Q-Plots (Figure 6-5), an appropriate tool to carry out a visual inspection in meta-analyses (Wang & Bushman, 1998) if the normal assumption holds, supports my assumption in creating a composite effect size and proves the normal distribution of the dependent variable.

Figure 6-5: Quantile-Quantile Plots for effect sizes



Furthermore, Figure 6-6 supports the Q-Q plots in Figure 6-5 that the coefficients are normal distributed. The very narrow interval of [-0.4;0.4] of the Fisher´s z-transformed effect size is going to have an impact on the model quality measures of the multilevel analyses. This narrow interval will lead to negative quality measures (e.g. AIC, BIC).

Figure 6-6: Histogram with normal curve and box plot for the composite effect size

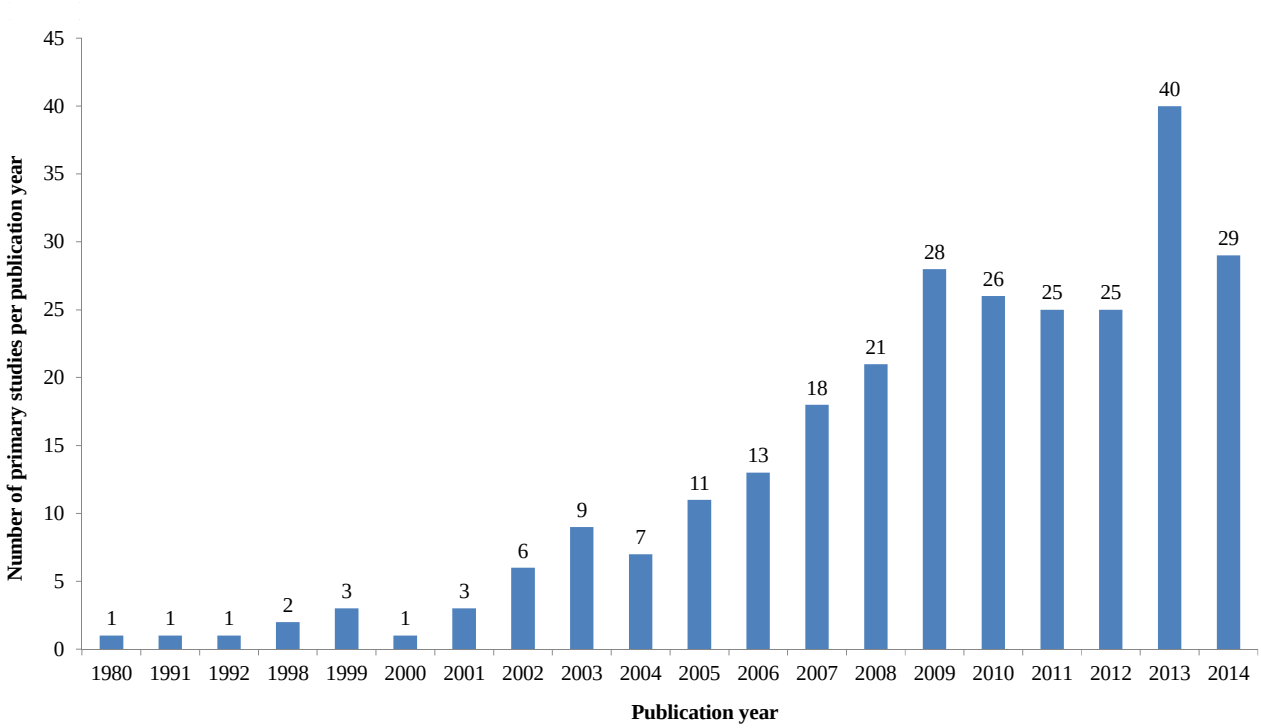


Source: Own illustration

After testing if any major biases are in the data, the next tables and figures will give an overview of characteristics of primary studies and the related data.

Figure 6-7 provides an overview of primary studies´ publication years. The number of publications covering the topic performance of family firms increases every year. Between the years 2000 and 2009, primary studies investigating performance of family firms are published with a yearly growth rate of about 40%. Between the years 2010 and 2012, there is a more or less constant publication rate according to total counts. In the year 2013, primary studies are reaching the peak with 40 primary studies researching performance of family firms. The drop to only 29 primary studies, in year 2014, is due to the stop of coding and starting the analyses of my dissertation.

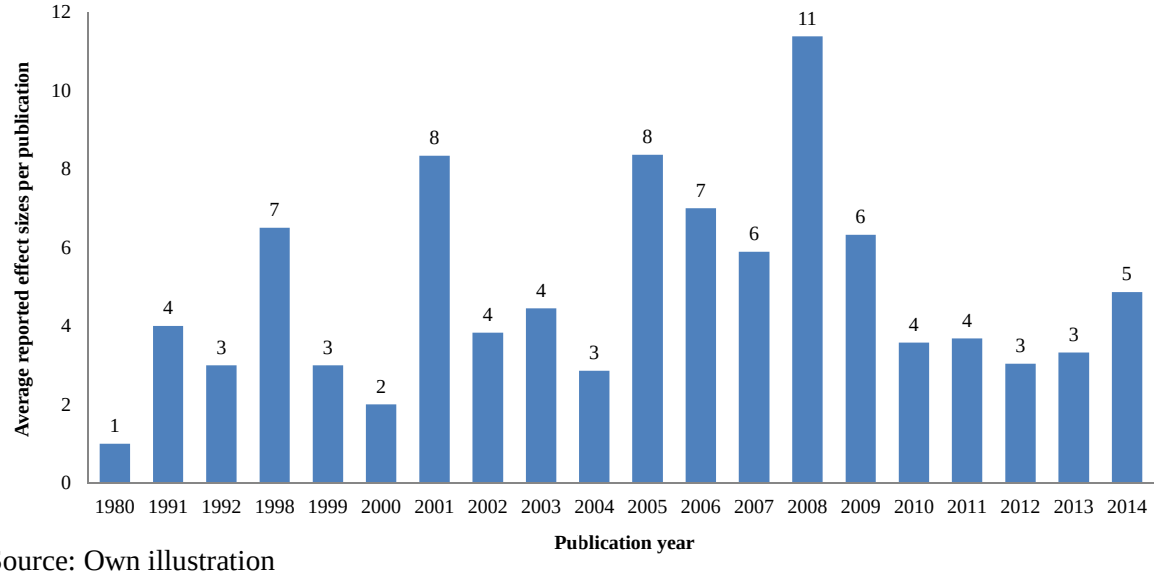
Figure 6-7: Publication trend of family firm performance studies



Source: Own illustration

In contrast to the former figure, the next Figure 6-8 depicts a heterogenic picture. This figure shows the average number of effect sizes per primary study in a certain year. No clear number of effect sizes per primary study could be investigated. Only in 2008, eleven effect sizes per year and primary study were coded. So, no systematic or convention in this research stream was developed over time.

Figure 6-8: Average numbers of effect sizes per primary study and publication year



Source: Own illustration

Digging deeper to investigate the sources of primary studies and the related publication sources, the table below shows this in detail (see Table 6-6). My data set yields about three times more studies published in scientific magazines compared to working papers. Otherwise, working

papers on average have 4.80 effect sizes per study compared to 4.15 effect sizes per journal article. But the most effect sizes per primary study yield PhD theses with about 16.23 followed by master's theses with an average of 7.56 effects sizes.

Table 6-6: Overview of publication sources of primary studies

Item	No.
Journals	182
Working papers	66
Doctoral theses	13
Master's theses	9
Countries	42
Ø Authors	2.48
Effect sizes	1,351
Effect sizes source:	
Journal article	756
Working paper	316
Doctoral thesis	211
Master thesis	68

Source: Own illustration

After presenting the period of time and the primary study source, I will present more information about regions and nations of the primary study origins.

Interestingly, about 45% of the effect sizes are from primary studies using samples from European countries (see Table 6-7), followed by North America consisting of the USA and Canada. Other regions are covering countries such as Israel, Ghana or Australia. Only six effect sizes were not assignable to a region.

Table 6-7: Overview of the regions included in the data

Region	No. of effect sizes	Percent of effect sizes in sample
Europe	605	44.75
North America	322	23.82
Asia	264	19.53
South America	65	4.81
Arabia	13	0.96
Other	76	5.62
Mixed country samples not assignable	6	0.52
Total number of effect sizes	1,351	100.00

Source: Own illustration

The following Table 6-8 fragments the regional description to country level. The 1,351 effect sizes of the primary studies are derived from 42 different countries. The most examined country according to effect sizes of performance of family firms are the United States of

America (USA). Primary studies related to the USA provide 280 effect sizes, which covers about 20.71% of the whole data set. The USA are followed by Germany with 187 effects which is 13.83% of the total effects. It is important to mention that 121 effects, about 8.95%, stem from primary studies with a mixed country sample which was not further specified, so the effect sizes were not assignable to a specific country.

Table 6-8: Effect sizes per country (1)

Country	No. of effect sizes	Percent
USA	280	20.71%
Germany	187	13.83%
Mixed country sample	121	8.95%
China	73	5.40%
Taiwan	61	4.51%
Italy	55	4.07%
Norway	49	3.62%
Spain	46	3.40%
Hong Kong	44	3.25%
Denmark	42	3.11%
Canada	42	3.11%
Switzerland	40	2.96%
Peru	33	2.44%
Korea	33	2.44%
Poland	30	2.22%
France	27	2.00%
Sweden	26	1.92%
Australia	23	1.70%
Japan	17	1.26%
Malaysia	15	1.11%
Netherlands	12	0.89%
Chile	10	0.74%
Finland	10	0.74%
Mexico	10	0.74%
Pakistan	10	0.74%
Saudi Arabia	8	0.59%
Colombia	6	0.44%
Dominican Republic	6	0.44%
Belgium	5	0.37%
United Kingdom	5	0.37%
Greece	4	0.30%
Nigeria	4	0.30%
Portugal	4	0.30%
Ghana	3	0.22%
Bangladesh	2	0.15%
United Arab Emirates	2	0.15%

Table 6-8: Effect sizes per country (2)

Country	No. of effect sizes	Percent
India	1	0.07%
Indonesia	1	0.07%
Iran	1	0.07%
Lebanon	1	0.07%
Thailand	1	0.07%
Tunisia	1	0.07%
Turkey	1	0.07%

Source: Own illustration

In Table 6-9, the former two tables (Table 6-7 and Table 6-8) are aggregated showing regions and the included countries.

Table 6-9: Regions and countries

Region	Countries	Region	Countries
Europe	Belgium	Asia	Bangladesh
	Denmark		China
	Finland		Hong Kong
	France		India
	Germany		Indonesia
	Greece		Japan
	Italy		Korea
	Mixed country sample		Malaysia
	Netherlands		Pakistan
	Norway		Mixed country sample
	Poland		Taiwan
	Portugal		Thailand
	Spain		
	Sweden	Arabia	Iran
	Switzerland		Lebanon
	Turkey		Saudi Arabia
	United Kingdom		Tunisia
			United Arab Emirates
South America	Chile	North America	Canada
	Colombia		USA
	Dominican Republic		
	Mexico	Other regions	Australia
	Peru		Ghana
			Mixed country sample
			Nigeria

Source: Own illustration

Table 6-10 below relates the number of effect sizes to specific scientific journals. This table shows that different research areas and streams are interested in the comparison of the

performance of family firms and nonfamily firms. The majority of the effect sizes (211) were derived from 23 finance and accounting journals, followed by 14 management journals providing 128 effect sizes. The research area economics is represented by 12 journals yielding 118 effect sizes. Empirical studies in family business research provides 111 effect sizes from two different scientific journals (Family Business Review, Journal of Family Business Strategy). Even five entrepreneurship journals contribute with 34 effect sizes to my meta-analysis.

Table 6-10: Primary effect sizes per scientific journal (1)

Journal name	No. of effect sizes
Family Business Review	85
Journal of Corporate Finance	66
Small Business Economics	37
Corporate Governance: An International Review	36
Journal of Business Finance & Accounting	28
Journal of Family Business Strategy	26
Journal of Banking & Finance	24
Asia Pacific Journal of Management	23
Pacific-Basin Finance Journal	22
Organization Science	20
Journal of Financial Economics	18
Strategic Management Journal	18
Journal of International Financial Management	18
Journal of Business Venturing	17
Asian Pacific Economic Literature	17
Academy of Management Journal	15
The Journal of Finance	13
Journal of Management Studies	13
Review of Financial studies	13
Management International Review	11
International Journal of Research in Marketing	11
European Financial Management	10
Entrepreneurship Theory and Practice	10
Cuadernos de Administración	10
Journal of European Economic Association	10
Business & Society	10
The Quarterly Journal of Economics	10
Journal of Business Research	9
Review of Financial Economics	9
Asian Social Science	8
Journal of Small Business Management	7
Zeitschrift für KMU und Entrepreneurship	6
International Review of Finance	6
Cuadernos de Gestión	6
Journal of Management and Governance	5
Journal of Business Ethics	5
China Journal of Accounting Research	4
The Journal of Financial and Quantitative Analysis	4
The American Economic Review	4
Journal of Accounting and Public Policy	4
Management Research Review	4
International Journal of Economics and Finance	4
Research Policy	4
Spanish Accounting Review	4
Journal of Agricultural and Applied Economics	4
Emerging Markets Review	4
Journal of Financial Reporting & Accounting	4

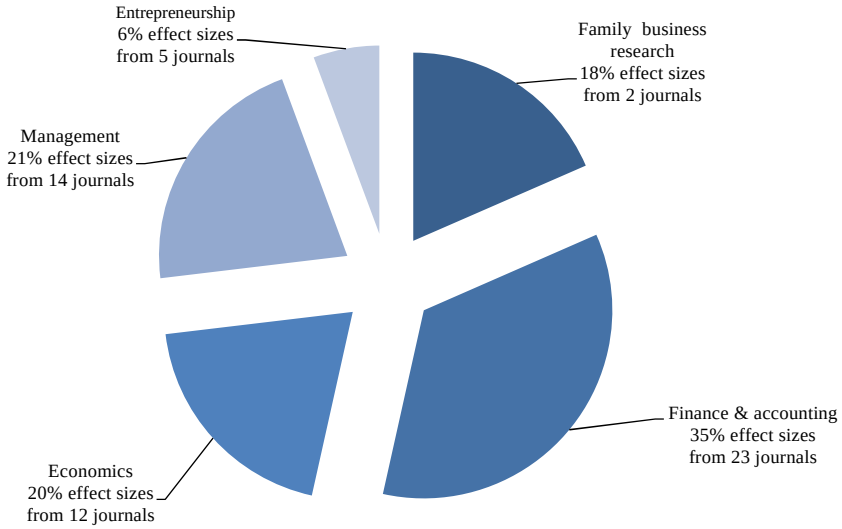
Table 6-10: Primary effect sizes per scientific journal (2)

Journal name	No. of effect sizes
Managerial Finance	4
Finance Controle Stratégie	3
Journal of International Business Studies	3
Accounting and Finance Research	3
Journal of Empirical Finance	3
Businesss Strategy and the Environment	3
Science International	3
Journal of Law and Economics	3
European Accounting Review	3
International Journal of Managerial Finance	2
International Journal of Production Research	2
International Journal of Business Governance and Ethics	2
International Business Research	2
Review of Managerial Science	2
International Review of Business Papers	2
Corporate Governance	2
European Economic Review	1
Journal of Accounting and Economics	1
Journal of Product Innovation	1
International Journal of Banking and Finance	1
Journal of Basic and Applied Scientific Research	1
Journal of World Business	1
Journal of International Accounting, Auditing & Taxation	1
A Journal of Accounting, Finance and Business Studies	1
Advances in Accounting	1
Annals of Finance	1
Journal of Management	1
International Journal of Hospitality Management	1
ILR Review	1
Entrepreneurship & Regional Development	1
British Journal of Management	1
Journal of Accounting Research	1
International Strategic Management Review	1
Revista de Estudios Empresariales. Segunda Época	1
International Business Review	1

Source: Own illustration

The next Figure 6-9 shows a graphical representation of the proportional contribution of the different scientific research streams to my meta-analysis. The vast majority of effect sizes (35%) are derived from finance and accounting followed by management (21%), economics (20%), family business research (18%), and entrepreneurship (6%).

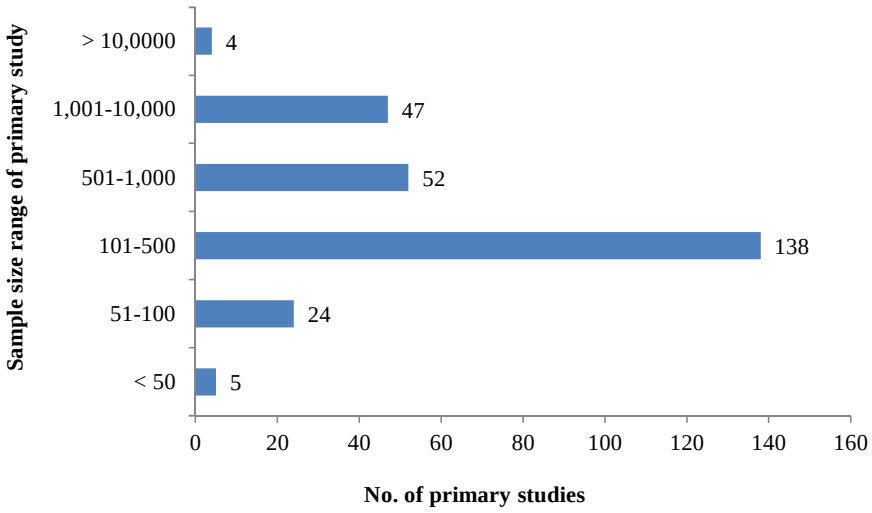
Figure 6-9: Overview of research areas investigating family firm performance



Source: Own illustration

Figure 6-10 gives an overview of the distribution of the sample size of the primary studies. The sample size is measured as number of firms, in my case. 138 primary studies cover sample sizes from 101 to 500 companies in their analyses. Only five primary studies cover less then 50 firms in their sample. As opposed to the aforementioned primary studies, four primary studies analyze very large data sets with more than 10,000 observations, respectively firms. 99 primary studies yield more than 500 and less than 10,000 observations.

Figure 6-10: Sample sizes of primary studies

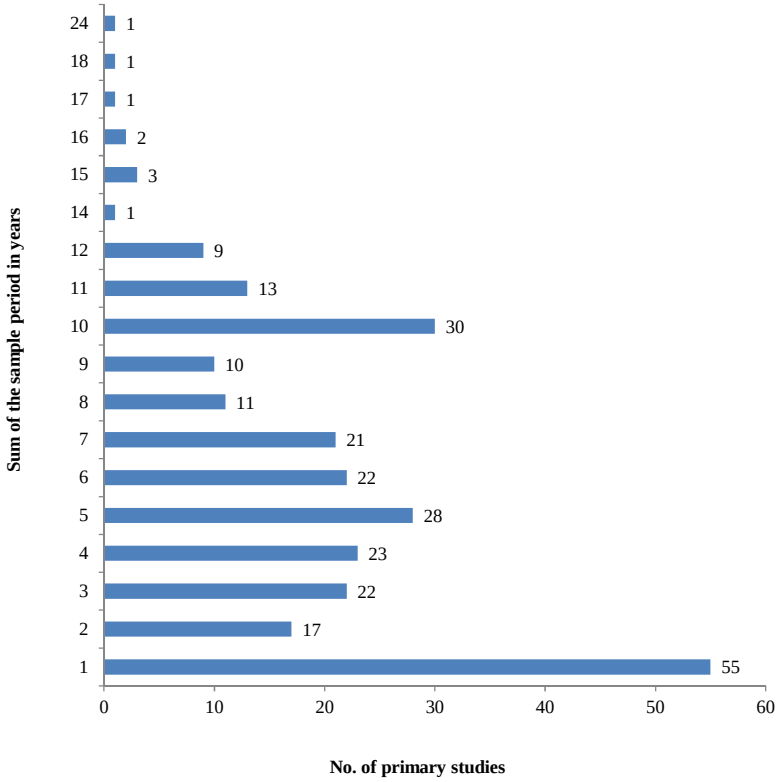


Source: Own illustration

The meta-analysis covers a total of 723,832 firms and the average primary study analyzes 2,682 firms. The smallest analysis covers 29 firms, otherwise the largest primary study analyzes 225,683 firms. About 50% of the primary studies include less than 403 firms in their analyses.

In most instances, the researchers sample only one year and conduct their analyses in primary studies. 209 primary studies, however, sample between one and nine years. Only 61 primary studies cover between ten and 24 years in their sample. A more detailed overview is given in Figure 6-11.

Figure 6-11: Sum of the sampling period of primary studies



Source: Own illustration

6.2.2 Descriptive statistics of main and moderator variables

In the following chapter, I describe the different measures of the dependent variables (performance variables) and the different family involvement measures (moderator variables).

Dependent variable (financial performance measures)

The two most dominating measures in this research area are the accounting (668 effect sizes) and market measures (with 444 effect sizes). The accounting measure Return on Assets (*ROA*) alone contributes with 391 effect sizes (see Table 6-11). *ROA* would have the same value as Return on Equity (*ROE*) if no liabilities (debt) were held by the companies in my sample. But the mean and the median of *ROE* are larger compared to *ROA*. This implies that the companies in the sample take the advantage of financial leverage. But these results of *ROE* and *ROA* in this meta-analysis cannot be used to investigate the effectiveness of the management because these key performance indicators stem from different primary studies NOT companies! The profitability is measured as Return on Sales (*ROS*) or profit margin. The average of this indicator is quite large and implies that the companies included in primary studies are growing healthily,

which introduces a positive bias. In only 14 studies *liquidity* is used and refers to the sum of cash and cash equivalents. Another performance measure is *sales growth* which shows the growth of the sales compared to the previous year. Only a few studies use the price earnings ratio to investigate performance of family firms compared to nonfamily firms.

Market-to-book ratio (*MTB*), however, additionally carries the pessimistic feelings of the market and is therefore lower than the accounting measures. Contrary to this, the stock return measure is larger, which includes the paid dividends and is only relevant for publicly listed companies.

A more qualitative measure compared to market and accounting measures are the *self-reported* performance comparisons. As it was shown above, it is a good proxy for performance. But on average, this value is negative, and even the median is negative, too.

The variable *other* covers ratios and indicators such as the debt-to-total-assets ratio, the gross profit margin, return on investment and so on and so forth.

Furthermore, *survival* and *productivity* are of minor importance - only two studies investigate this performance measure. *Survival* investigates the effect of family ownership on survival usually with a cox hazard regression. *Productivity* is based on a production function in the primary study.

Table 6-11: Performance variables

Performance influence	Primary studies	Effect sizes	Mean of performance	Median of performance	Positive effects of performance
ROA	146	391	0.0374	0.0310	72%
ROE	44	179	0.0417	0.0445	75%
ROS/Profit margin	18	98	0.0406	0.0482	74%
Liquidity	14	21	0.0163	0.0070	67%
Sales growth	38	60	0.0154	0.0005	53%
PE ratio	3	3	0.0614	0.0046	67%
MTB	119	392	0.0293	0.0200	63%
Stock return	21	49	0.0442	0.0054	61%
Self reported	27	59	-0.0312	-0.0271	31%
Other	25	89	0.0380	0.0517	67%
Survival	2	3	0.1373	0.2010	67%
Productivity	2	7	0.0252	-0.1001	43%

The primary studies do not sum to 270 because several performance variables can be yielded in one primary study
Source: Own illustration

Moderator variables

Defining a company to be a family firm is a very challenging task because there is no consensus of the definition of a family firm (Howorth et al., 2010). An extensive overview can be found in (Mandl, 2008b). She identified two important elements for defining family firms all over Europe. The first element is ownership, this element can be defined by a mere statement that the investigated company is a family firm. Furthermore, there are several cutoffs according to shares held by a family: 10%, 25% and 50% of the shares must be in the hands of a family in Europe. The second element is strategic/management control which can be split up into soft and hard criteria to define family control. Such as: major family influence or CEO and at least one family member must be in the management team. At the very end, she identified 92 different criteria which help to identify family firms in Europe. The lack of consensus makes the comparisons between countries and studies difficult (Howorth et al., 2010). Therefore, I opt to aggregate the various family firm definitions to just a few variables, such as: *ownership in percent, ownership dummy, ownership total, family management, family control, and combined measure*. Definition of the former mentioned variables can be found in table Table 6-12. Most effect sizes (623) stem from the ownership definition stream. Another investigated topic is family management and contributes to my study with 325 effect sizes. The means and medians are about the same. Only the variable family management shows lower values. Most variables show more than 60% positive effects according to family firm performance.

Table 6-12: Influence of family definition on performance

Family influence	Primary studies	Effect sizes	Mean of performance	Median of performance	Positive effects of performance
Ownership in %	87	228	0.0380	0.0300	61%
Ownership dummy	113	395	0.0370	0.0295	70%
Ownership total	179	623	0.0380	0.0300	66%
Family management	88	325	0.0200	0.0079	58%
Family control	47	157	0.0270	0.0235	64%
Combined measure	71	246	0.0370	0.0335	68%

The primary studies do not sum to 270 because several family influence variables can be yielded in one primary study.
Source: Own illustration

The size of the companies does contribute to the heterogeneity of the financial performance indicators of the dependent variable. Therefore, I coded the shape of the sample according to size in primary studies. *Publicly listed* companies contribute with the 68% of the

effect sizes to my data set. *Mixed samples*, samples in primary studies investigating publicly listed and non-listed companies, contribute with 317 effect sizes to my data set. Both *publicly listed* and *mixed samples* result in about the same mean of the performance variable and have nearly the same count of positive effects. The fewest effect sizes stem from small and medium-sized companies (*SME*). The definition of *SMEs* in my study relies on the definition of primary studies. These definitions are based inter alia on the European Commission definition of small and medium-sized companies[31], the Canadian definition, or the author's own definition.

Table 6-13: Performance of primary studies´ sample characteristics

Sample characteristic	Primary studies	Effect sizes	Mean of performance	Median of performance	Positive effects of performance
SME	36	117	0.0052	0.0043	54%
Publicly listed firms	172	917	0.0355	0.0227	67%
Mixed sample	66	317	0.0320	0.0332	69%

The primary studies do not sum to 270 because 4 primary studies analyze public and non-public firms separately
Source: Own illustration

Remarkably, the means of Europe and South America are lower than the median. Contrary to this, in North America, Asia and other regions, the mean is larger than the median financial performance of family firms compared to nonfamily firms. This indicates that the further regional performance measures are kind of left skewed. The performance measures of the latter regions are somewhat right skewed.

Table 6-14: Performance of primary studys´ according to regions

Region	Primary studies	Effect sizes	Mean of performance	Median of performance	Positive effects of performance
Europe	102	605	0.0382	0.0390	72%
North America	81	322	0.0507	0.0300	71%
South America	8	65	0.0061	0.0141	62%
Asia	59	264	0.0140	0.0019	56%
Other region	23	95	-0.0020	-0.0042	46%

The primary studies do not sum to 270 because 4 primary studies analyses separately public and non-public firms
Source: Own illustration

Common law is a specifically English invention based on statutes, but cases are more important. Contrary to this, the *civil law* systems, based on Roman Law, try to cover all eventualities (Anon., 2013e). *Civil law* systems are more widespread than common law as the CIA World Factbook shows (Anon., 2015g), and this is reflected in the data set as well. *Other*

[31] For further investigation see: Anon. (2005); (Commission recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises)

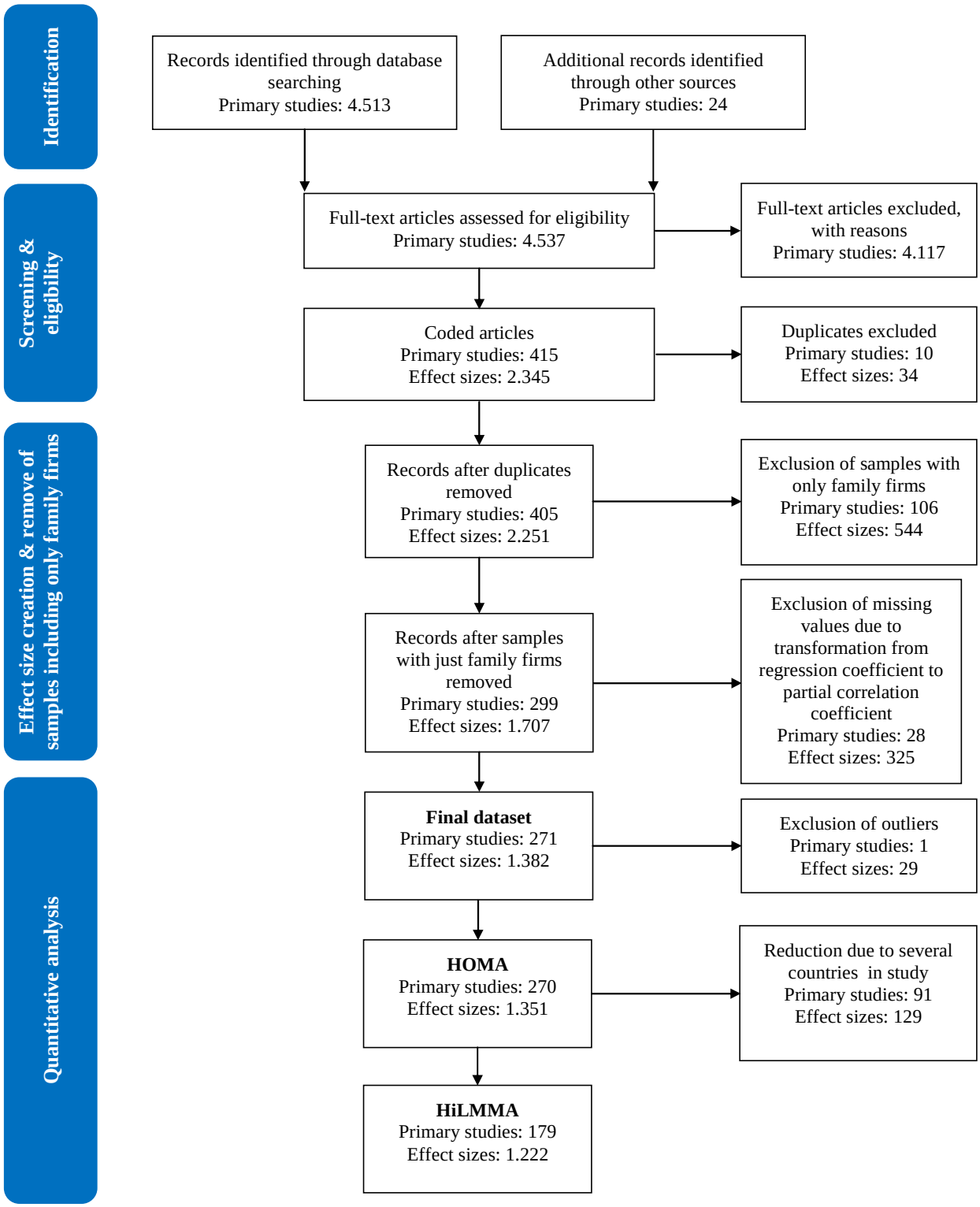
law is in place if the legal system is not clearly assignable to either common law or civil law. It covers religious laws, for example.

Table 6-15: Performance in different law systems

Law system	Primary studies	Effect sizes	Mean of performance	Median of performance	Positive effects of performance
Civil law	127	754	0.0314	0.0359	67%
Common law	89	361	0.0447	0.0228	68%
Other law	56	236	0.0150	0.0014	59%

The primary studies do not sum to 270 because in 2 primary studies we can assign laws to the related countries
Source: Own illustration

Figure 6-12: Overview of the development of the data set



Source: Own investigation, adapted from Moher et al. (2009)

7 Univariate meta-analysis

This section is based on the idea of O'Boyle et al. (2012) and extends the manuscript by adding some further variables to depict a more sound picture. Because this chapter follows an approach developed by other researchers, the chapter of descriptive statistics does not fit perfectly. Therefore, this chapter presents own descriptive statistics.

7.1 Single coefficients univariate meta-analysis

This chapter is based on[32]

The remainder of this paper is organized as follows: The next section introduces my data set of primary studies, variables, and the specific meta-analysis method employed. The section that follows shows my results, which are then discussed in the final section.

7.1.1 Preparation of the data set for single measures analysis

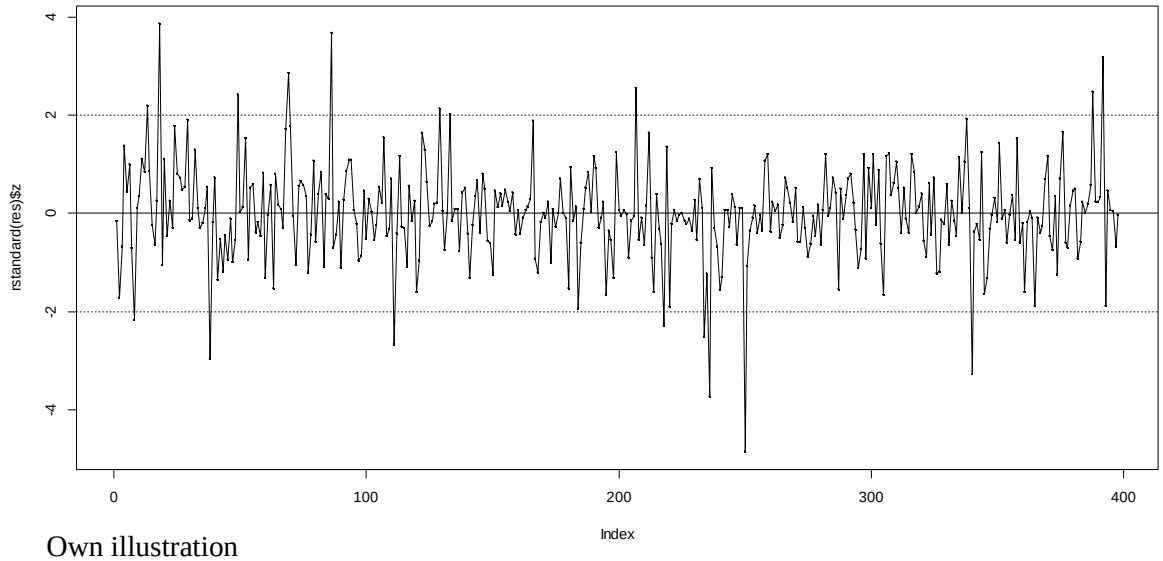
My focal measures in the primary studies were correlation and regression coefficients. To compare regression and correlation coefficients, I converted the former into partial correlations using the (Peterson & Brown, 2005) formula. In my meta-analysis, I follow the empirical guidelines of Hedges & Olkin (1985), Lipsey & Wilson (2006), Borenstein et al. (2009), Geyskens et al. (2008), Hox (2010), Feld & Heckemeyer (2011), and Stanley et al. (2013).

To justify the aggregation of these coefficients into a composite variable, I conducted a t-test. It revealed no significant difference between the correlations and partial correlations (t=-0.41, p=0.68). Thus the aggregation was justified (O'Boyle et al., 2012). Because some primary studies reported multiple effect sizes, I followed Hunter and Schmidt (2001) and averaged these to compute the general mean effect size per study to achieve independence among effect sizes for different studies. In a final step, I transformed effect sizes into Fisher´s z-measures to reduce the skewness of the distribution.

Afterwards, I ran an outlier analysis, first for z-transformed correlations and the partial correlations. The analyses consisted of standardized residuals (standardized z values) to identify outliers. I kept values in the interval of [-2; 2] (Viechtbauer, 2010; Viechtbauer & Cheung, 2010) and removed 19 effect sizes lying outside this interval (Viechtbauer & Cheung, 2010), which are shown above and below the dotted horizontal lines of the next figure.

[32] Wagner et al. (2015) in Journal of family business strategy.

Figure 7-1: Outlier plot for Fisher´s z-transformed correlations



Own illustration

To check for publication, selection or availability bias, I computed a funnel plot presented in Figure 7-2. Such biases exist when authors have a preference for statistically significant results or when the primary studies included are a biased sample of all existing studies of this topic (Stanley, 2005; Hunter & Schmidt, 2004). In the absence of publication bias, the effect sizes from small primary studies with small sample sizes are spread at the bottom of Figure 7-2. Otherwise, effect sizes of primary studies with a large sample size narrow towards the peak. The heterogeneity in the funnel plot, however, shows that such biases are unlikely, and suggests appropriate conditions for conducting a meta-analysis (Geyskens et al., 2008).

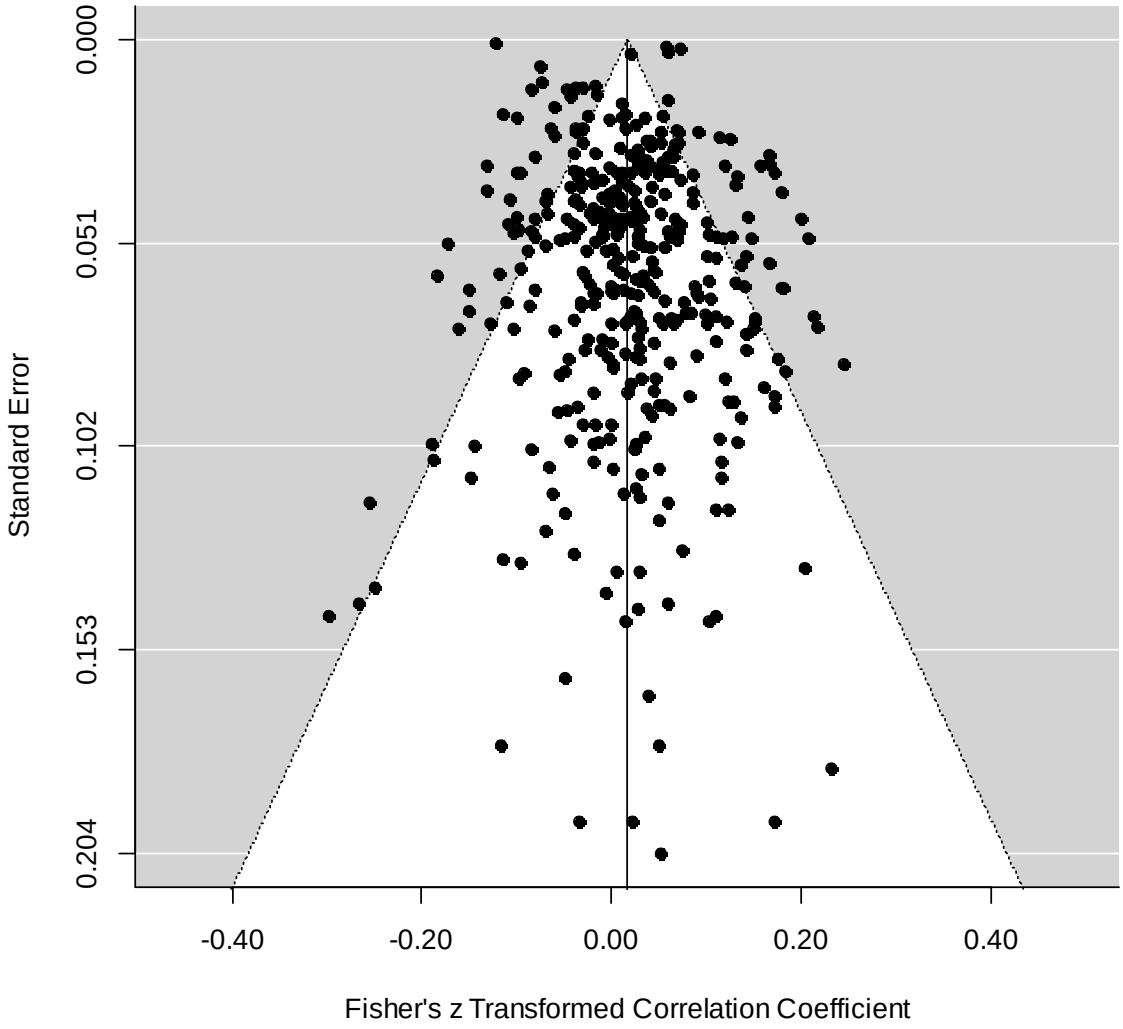
7.1.2 Method using independent weighted single measures

I employed the Hedges and Olkin meta-analysis technique (HOMA), opting for a random-effect analysis to estimate the mean effect size of a distribution of effects (Borenstein, 2009). However, the fixed-effect meta-analysis assumes that all studies are estimating the same effect and the variation only stems from sampling (Riley et al., 2011). But there is no reason to assume in my study that the measures extracted from primary studies are identical because of real world data in primary studies. Therefore, the use of the fixed-effect meta-analysis is implausible for this data (Borenstein et al., 2010). Hence, I employed for the random-effect meta-analysis which wants to estimate the mean effect size of a distribution of effects (Borenstein et al., 2009). This allows me to make a probably more realistic unconditional inference (general conclusion) about an average effect size of a population of studies that is larger than the set of my sampled studies (Hedges & Vevea, 1998; Field, 2001; Viechtbauer, 2010).

In addition, I addressed the possible variation in the mean effect size of my random-effect meta-analysis with subgroup and sensitivity analyses based on my moderator variables. The residual heterogeneity is accounted for by the restricted maximum likelihood estimator.

Although the random-effects model overestimates variability and yields larger confidence intervals, it represents the more conservative approach (Overton, 1998) as its estimators are approximately unbiased and efficient (Viechtbauer, 2005; Raudenbush, 2009).

Figure 7-2: Funnel plot of Fisher´s z-transformed correlations



Own illustration

Our descriptive statistics give an early indication for the performance consequences of family firms. They show, for example, that 61 % of the primary studies included in my sample reported a positive family firm performance effect. This number reduces to 55% when a management-based family firm definition is used, and it reduces to 51% when the primary study uses a sample consisting only of *SME*s. By contrast, using *ROA* as a performance measure increases the share of primary studies with a positive family firm performance effect to 74%.

To obtain more detailed findings, I compiled a meta-analysis incorporating both main effects and conceptually derived and study-specific moderating factors. Table A 10 in the Appendix lists all included studies.

7.1.3 Results of univariate meta-analysis with single measures

Table 7-1 presents the results of the meta-analysis. The findings show that overall family firms outperform nonfamily firms. The mean effect size (ES) is 0.017. The 95% confidence interval (CI) does not include the zero, and hence the effect is statistically significant (Hedges & Olkin, 1985). This evidence is based on k=380 studies, including N=1,561,622 firms. The Q-statistic displays the homogeneity of the effect size. Its highly significant value suggests that it is likely that moderators exist to explain the great variability in effect sizes. Thus, I tested for conceptual and study-specific moderators.

Table 7-1: Results of univariate meta-analysis of single measures

	k	N	ES		s.e.	z	-95% CI	+95% CI	Q-test		I^2	z-test	p-value	
Firm performance	380	1,561,622	0.0167	***	0.0040	4.2	0.0089	0.0246	12,199	***	90.71			
Conceptual moderators														
Family firm measure														
F. ownership	221	727,253	0.0330	***	0.0062	5.3	0.0209	0.0451	1,548	***	93.47	reference category		
F. management	55	36,697	-0.0001		0.0140	0.0	-0.0275	0.0273	213	***	81.56	2.16	0.03	**
F. combined measure	75	792,044	0.0084		0.0121	0.7	-0.0154	0.0321	1,306	***	94.22	1.81	0.07	*
F. self-reported	22	14,661	0.0127		0.0116	1.1	-0.0100	0.0354	30	*	34.17	1.54	0.12	
Performance measure														
ROA	137	432,394	0.0439	***	0.0076	5.8	0.0290	0.0587	743	***	91.39	reference category		
ROE	23	22,138	0.0118		0.0148	0.8	-0.0172	0.0409	68	***	72.54	1.93	0.05	*
ROS/profit margin	8	6,778	-0.0181		0.0411	-0.4	-0.0986	0.0625	24	***	80.62	1.48	0.14	
Sales growth	25	254,861	0.0016		0.0121	0.1	-0.0221	0.0252	210	***	80.77	2.96	0.00	***
MTB	90	77,919	0.0105		0.0139	0.8	-0.0167	0.0377	1,452	***	91.63	2.11	0.04	**
Listed on stock market														
Public firms	209	141,825	0.0241	***	0.0056	4.3	0.0131	0.0351	812	***	69.83			
Private and mixed	171	1,419,797	0.0077		0.0056	1.4	-0.0033	0.0187	11,207	***	93.87	2.07	0.04	**
Firm size														
SMEs	63	218,894	0.0010		0.0079	0.1	-0.0144	0.0164	254	***	58.24			
Large firms	317	1,342,728	0.0202	***	0.0046	4.4	0.0112	0.0291	9,620	***	91.12	-2.10	0.04	**

k	Number of effect sizes
N	Total sample size is based on number of firms in primary studies.
ES	All effect sizes (ES) were variance weighted. Significance is based on a z-test.
s.e.	Standard error of ES
CI	Confidence interval
Q-test	Homogeneity analysis: chi-squared statistic indicating whether the heterogeneity variance is greater than zero; Based on z-transformation (see Hedges & Olkin (1985), p. 235)
I^2	Ratio of the study variance due to heterogeneity; Low < 0.25; middle < 0.50; strong < 0.75. If Q<df I^2 = 0
	* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Table 6-1 continued: Results of univariate meta-analysis of single measures

	k	N	ES		s.e.	z	-95% CI	+95% CI	Q-test		I^2	z-test	p-value	
Country culture														
Individualism														
low	158	794,776	0.0117	*	0.0065	1.8	-0.0010	0.0244	1,605	***	75.87			
high	185	188,787	0.0211	***	0.0057	3.7	0.0099	0.0322	558	***	73.34	-1.09	0.28	
Power distance														
low	197	908,014	0.0216	***	0.0056	3.9	0.0107	0.0326	3,449	***	85.04			
high	146	80,859	0.0101		0.0066	1.5	-0.0029	0.0231	391	***	61.19	1.33	0.18	
Masculinity														
low	251	221,351	0.0165	***	0.0050	3.3	0.0067	0.0263	721	***	71.30			
high	92	762,212	0.0182	**	0.0082	2.2	0.0021	0.0344	1,138	***	77.26	-0.18	0.86	
Uncertainty avoidance														
low	183	182,305	0.0250	***	0.0057	4.4	0.0137	0.0362	510	***	72.73			
high	160	801,258	0.0069		0.0063	1.1	-0.0055	0.0193	1,556	***	76.03	2.13	0.03	**
Study-specific moderators														
Publication status														
Published	267	873,463	0.0169	***	0.0050	3.4	0.0070	0.0268	2,948	***	79.69			
Unpublished	113	688,159	0.0165	***	0.0065	2.5	0.0038	0.0292	1,031	***	91.95	0.05	0.96	
Year of publication														
Before 2008	95	55,297	0.0306	***	0.0083	3.7	0.0144	0.0468	264	***	64.56	reference category		
2008-2009	63	34,951	0.0225	**	0.0109	2.1	0.0010	0.0439	204	***	69.34	0.59	0.55	
2010-2012	109	385,484	0.0165	**	0.0073	2.3	0.0023	0.0308	1,006	***	88.32	1.28	0.20	
After 2012	112	1,085,490	0.0037		0.0068	0.5	-0.0097	0.0171	6,833	***	92.92	2.51	0.01	***
Journal quality														
Low Hirsh	72	34,641	0.0186	**	0.0096	1.9	-0.0002	0.0373	158	***	57.34			
High Hirsh	87	53,146	0.0243	***	0.0093	2.6	0.0061	0.0425	305	***	72.43	-0.43	0.67	

k	Number of effect sizes
N	Total sample size is based on number of firms in primary studies.
ES	All effect sizes (ES) were variance weighted. Significance is based on a z-test.
s.e.	Standard error of ES
CI	Confidence interval
Q-test	Homogeneity analysis: chi-squared statistic indicating whether the heterogeneity variance is greater than zero; Based on z-transformation (see Hedges & Olkin (1985) p. 235)
I^2	Ratio of the study variance due to heterogeneity; Low < 0.25; middle < 0.50; strong < 0.75. If Q<df I^2 = 0
	* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Source: Own illustration

First, I moderated for different measures of family firms, differentiating among various family firm definitions: *family ownership, family management, a combination of the two,* and *self-reported* classification. My findings reveal that using an *ownership-based* definition has a significant effect on performance (ES=0.033, p<0.01), whereas a *management* based definition (ES=-0.000), a definition based on a *combined measure* (ES=0.008), and a *self-reported* classification (ES=0.013) does not yield significant results. Furthermore, a z-test indicates that using an *ownership-based definition* has a significantly stronger effect on performance than a *management-based* definition (z=2.16; p<0.05) or a definition based on a *combined measure* (z=1.81; p<0.10), whereas the effect is not significantly different between an *ownership-based* definition and a *self-reported family* firm classification (z=1.54; p=0.12).

Distinguishing the overall effect (Firm performance) between different types of performance, I find a significant impact for *ROA* (ES=0.044, p<0.01) but no significant impact on performance measured by *ROE* (ES=0.012), ROS (ES=-0.018), sales growth (ES=0.002), or market to book (ES=0.011). The difference in effect size is statistically significant between *ROA* and *ROE* (z=1.93; p=0.05), sales growth (z=2.96; p<0.01) and market-to-book value (z=2.11; p<0.05). The meta-analytic findings do not indicate a significant difference between *ROA* and *ROS* (z=1.48; p=0.14) (note: *ROS* is only used by eight studies in my sample).

I also distinguished studies according to whether the firm was *publicly listed*. The association with performance is significant in samples of *public firms* (ES=0.024, p<0.01) and insignificant in samples of *private and mixed firms* (ES=0.008); the difference in these effect sizes is significant (z=2.07; p<0.05).

In distinguishing between *SMEs* and large firms, I find an insignificant impact of family firms on performance for *SMEs* (ES=0.001) and a significant impact for large firms (ES=0.020, p<0.01), and the difference between the two effect sizes is significant (z=-2.10; p<0.05).

Using Hofstede's national culture variables, I moderated for the impact of *individualism, power distance, masculinity and uncertainty avoidance.* I find a significant impact of family firms on performance in countries with low levels of *individualism* (ES=0.012, p<0.10) as well as in those with high levels of *individualism* (ES=0.021, p<0.01); the difference in effect size is insignificant (z=-1.09; p=0.28). The relationship between family firms and performance is significant in low *power distance* countries (ES=0.022) and insignificant in *high power distance* countries (ES=0.010); however, the difference between

the two effect sizes is insignificant (z=1.33; p=0.18). I find the association between family firms and performance to be significant in countries with *low masculinity* scores (ES=0.017, p<0.01) as well as those with *high masculinity* scores (ES=0.018, p<0.05); again the variations do not significantly differ (z=-0.18; p=0.86). In countries with low *uncertainty avoidance*, firm performance is positively influenced by family governance (ES=0.025, p<0.01), whereas this is not the case in countries with high *uncertainty avoidance* (ES= 0.007). Here the difference in effect sizes is statistically significant (z=2.13; p<0.05).

I also considered study-specific moderators to account for differences in publication status (*published versus unpublished*), year of publication split into quantiles within my data (before 2008, 2008-2009, 2010-2012, and after 2012) and journal quality (low versus high *Hirsh Index*). I find a significant effect for both *published* (ES=0.017, p<0.01) and *unpublished* (ES=0.017, p<0.01) papers and the difference is insignificant (z=0.05; p=0.96). Studies published before 2008 (ES=0.031, p<0.01), between 2008 and 2009 (ES=0.023, p<0.05) as well as between 2010 and 2012 (ES=0.017; p<0.05) show a positive and significant influence of family firms on performance. However, studies published after 2012 (ES=0.007) show a positive but insignificant effect. The difference in effect size is significant between studies published before 2008 and studies published after 2012 (z=2.51; p=0.01). Finally, studies published in lower-ranked (ES=0.019, p<0.05) as opposed to higher-ranked journals (ES=0.024, p<0.01) both find a significant effect of family firms on performance; the difference in effect sizes is not statistically significant (z=-0.43; p=0.67).

To render my meta-analysis comparable to prior studies on the topic (e.g., O'Boyle et al., 2012), I did not exclude primary studies using samples consisting only of family firms. When I excluded these, my sample size reduced from 380 to 279 firms. However, the reduced sample yields similar results to those reported above: The overall family-performance relationship becomes slightly stronger (ES=0.020, p<0.01 vs. ES=0.017, p<0.01). Also, the moderator analyses show similar results. I find, for example, that family firms show the highest performance when a family ownership definition (ES=0.031, p<0.01), an ROA performance measure (ES=0.039, p<0.01), and a sample of public (ES=0.028, p<0.01) and large firms (ES=0.022, p<0.01) is used. The detailed results using the reduced sample are available from the corresponding author. Another robustness check concerns the outliers that were removed as a result of the outlier diagnostics. When including the 19 outliers in my sample, I obtained an ES of 0.018 (p<0.01) for the overall relation, which is very similar to my main result (ES=0.017, p<0.01).

7.2 Multiple coefficients univariate meta-analysis

Multiple coefficients meta-analyses are the advancement of the further approach of only one coefficient per primary study. This chapter is based on the descriptive statistics chapter and the derived research questions.

7.2.1 Preparation of the data set for multiple-measures analysis

To foster the empirical power of my meta-analysis, I use the *complete approach*, which includes all focal measurements of the primary studies (Nelson & Kennedy, 2009). This leads to more powerful tests because of the larger sample and more accurate effect sizes compared to a test where only one primary study is represented by one effect size, proven by a Monte Carlo simulation (Bijmolt & Pieters, 2001; Feld & Heckemeyer, 2011) (see chapter 4.5).

It is important to note that each primary study could have reported several effect sizes. Within primary studies, some coefficients are based on the same or different dependent and independent variables (e.g. *ROE* or *ROA*, *family management* or *family control*). Sometimes there is an overlap in terms of the definition of variables within a given article. But the majority of coefficients do not share measures and constructs. Therefore, it would not be appropriate to aggregate the coefficients within articles (Aguinis et al., 2010). I deleted all primary studies yielding the same publications (e.g. already published working papers). Afterwards, I conducted a manual search for data sets in primary studies used for more than one time and excluded them as well.

My focal measurements in primary studies for coding were bivariate correlation coefficients (Lipsey & Wilson, 2006; Hunter & Schmidt, 2004; Borenstein, 2009) and regression coefficients (Stanley & Doucouliagos, 2012). To derive an effect size from regression coefficient, I converted them to partial correlations based on t-statistics and degrees of freedom (Greene, 2003; Doucouliagos & Ulubaşoğlu, 2008; Peterson & Brown, 2005) see formula 4-6 and 4-7 respectively in chapter 4.1.3.

Meta-analysis techniques can be used to create a composite effect size consisting of partial correlation coefficients (Aloe & Thompson, 2013). In my case, I create a composite effect size yielding partial correlations derived from regression coefficients and bivariate correlations. Bivariate correlations are a special case of partial regression coefficients. Both partial and bivariate correlations model a linear relationship between variables. Therefore, the bivariate correlation is a partial correlation between two variables (Bortz & Schuster, 2010) in the single predictor case of a linear regression model and vice versa. So, the bivariate correlation could be expressed as the slope of the linear regression with one predictor (Bortz & Schuster, 2010).

Afterwards, I converted the composite effect size to Fisher´s z-measures (Fisher, 1928) to account for the skewness in my effect size distribution (Hedges & Olkin, 1985) see formula 4-12 in chapter 4.1.3. All included studies can be seen in Table A 11 in the Appendix.

7.2.2 Method using independent weighted replications

My analysis uses real world data to analyze the relationship between a set of moderator and control variables (X) and firm performance (Y). Because fixed-effect meta-analyses assume that all studies estimate the same effect and any variation will stem from sampling (Riley et al., 2011), this approach is implausible for my data (Borenstein et al., 2010). In consequence, I opted for the random-effect meta-analysis which estimates the mean effect size of a distribution of effects (Borenstein et al., 2009). This allows me to make a more realistic unconditional inference (general conclusion) about an average effect size of a population of studies that is larger than the set of my sampled studies (Hedges & Vevea, 1998; Field, 2001; Viechtbauer, 2010). Admittedly, the random-effects model overestimates the variability and yields larger confidence intervals, but this conservative approach is more appropriate for my data (Overton, 1998). To account for the higher variability, I weight the effect size by their inverse variance weight (Hedges & Olkin, 1985). The variance weight consists of two parts: variance within primary studies plus variance between primary studies, which is randomly distributed (Lipsey & Wilson, 2006). To estimate the first part of the weight, I incorporate the variance of Fisher's z, represented by inverse sample size of the primary study. For the second part of the variability (between studies), I use the restricted maximum likelihood estimator (REML) (Viechtbauer, 2010).

7.2.3 Results of univariate meta-analysis with multiple measures

Table 7-2 reports the univariate meta-analytical results based on a composite effect size compiled from bivariate correlation and partial correlation coefficients. In addition to the meta-analytical mean (*ES*), I report the number of effect sizes derived from primary studies (*k*), the sum of companies included in the primary studies (*N*), the standard error (*s.e.*), and the related z-value (*z*). Furthermore, this table provides credibility intervals (*low CR* and *high CR*). These *CR* intervals predict the potential coefficient derived by a further, not yet added, primary study with a probability of 95%. Besides these kinds of intervals, 95% confidence intervals around the meta-analytical mean are shown *(-95% CI* and *+95% CI*). Furthermore, the Hedges and Olkin (1985) chi-squared test for heterogeneity (*Q* and I^2) and the related significance levels are represented. I^2 yields the percentage of variation attributable to unexplained effect size heterogeneity (Ringquist, 2013). Finally, the results of the *z*-test between the subgroups of certain sensitivity analyses and the *p*-values, respectively, are displayed.

Research question 1 assumes a better financial performance of family firms compared to nonfamily firms by using all different financial performance measures together. Table 7-2 reports that family firms perform better compared to nonfamily firms (ES= 0.029; p< 0.1).

The result of Table 7-2 investigates *Research question 2* in a naïve[33] way showing that market and accounting based measures differ significantly (z= -1.76; p= 0.08). Both measures differ significantly from zero and show that family firms perform better compared to nonfamily firms in a financial way (*Market measures* ES=0.028, p< 0.1; *Accounting measures* ES= 0.038, p< 0.1). The 95% confidence interval (CI) does not include zero, and hence, the effects are both statistically significant. This evidence is based on k=441 effect sizes including N= 334,308 firms for market measures and k= 668 effect sizes yielding N= 3,060,399 firms. Both homogeneity measures Q and I^2 suggest that there are potential moderators because of their great variability. This can be investigated more closely with univariate sensitivity and later on with multivariate analyses techniques. The sensitivity analyses of different performance measures support and show the robustness of the related overall result according to accounting and market measures, all different performance measures show a positive significant value.

[33] Naïve means here that I ignore potential non-independence of coefficients in primary studies, conditional expectations (regressions coefficients) and therefore, no control variables are considered. But it is allowed to assume that all coefficients of a primary study are independent replications.

Table 7-2: Univariate meta-analysis (1)

	k	N	ES		s.e.	z	low CR	up CR	-95% CI	+95% CI	Q test		I^2	z-test		
Firm performance	1,351	6,199,805	0.0293	***	0.0025	12.0	-0.1113	0.1700	0.0245	0.0341	21,044	***	95.82			
Performance measures																
Market measures	441	334,308	0.0279	***	0.0047	6.0	-0.1305	0.1864	0.0188	0.0371	1,894	***	82.94	Reference		
MTB	392	276,042	0.0272	***	0.0050	5.5	-0.1333	0.1878	0.0175	0.0370	1,717	***	82.21			
Stock return	49	58,266	0.0325	**	0.0130	2.5	-0.1121	0.1772	0.0071	0.0580	163	***	85.26			
Accounting measures	668	3,972,996	0.0378	***	0.0031	12.2	-0.0777	0.1534	0.0318	0.0439	4,671	***	95.18	-1.76	0.08	*
ROA	391	2,520,974	0.0359	***	0.0043	8.3	-0.0938	0.1655	0.0274	0.0444	3,652	***	96.33			
ROE	179	82,761	0.0436	***	0.0062	7.1	-0.0685	0.1558	0.0316	0.0557	452	***	59.30			
ROS	98	1,369,261	0.0338	***	0.0055	6.1	-0.0353	0.1028	0.0230	0.0446	409	***	93.66			
Type of sample in primary study																
Mixed sample	317	3,060,399	0.0275	***	0.0045	6.1	-0.0938	0.1489	0.0187	0.0364	1,568	***	97.19	Reference		
SME	117	2,537,697	0.0028		0.0070	0.4	-0.1278	0.1334	-0.0108	0.0165	12,481	***	98.90	-2.97	0.00	***
Publicly listed firms	917	586,760	0.0344	***	0.0031	10.9	-0.1135	0.1823	0.0282	0.0405	3,361	***	78.24	1.26	0.21	
Technology	44	39,415	0.0279	*	0.0155	1.8	-0.1543	0.2100	-0.0025	0.0582	449	***	88.01	0.02	0.98	
Manufacturing	62	32,780	0.0395	***	0.0140	2.8	-0.1309	0.2100	0.0122	0.0669	275	***	79.18	0.82	0.41	

k	Number of effect sizes
N	Total sample size based on number of firms in primary study
ES	All effect sizes were variance weighted. Significance based on a Z-test
s.e.	Standard error of ES
CI	Confidence interval
Q test	Homogeneity analysis: It is a chi-squared statistic that indicates whether the heterogeneity variance is greater than zero. Based on z-transformation Hedges & Olkin 1985 p. 235.
I^2	Quantifies the ratio of the study variance due to heterogeneity. Low < 0.25; middle < 0.50; strong < 0.75. If Q<df $I^2 = 0$

* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Table 7-2: Univariate meta-analysis (2)

	k	N	ES		s.e.	z	low CR	up CR	-95% CI	+95% CI	Q test		I^2	z-test		
Family involvement																
F. Ownership	623	3,958,338	0.0340	***	0.0036	9.5	-0.0693	0.0655	0.0269	0.0410	15,251	***	96.90	Reference		
F. Ownership dummy	395	3,854,171	0.0347	***	0.0044	7.9	-0.1051	0.1745	0.0261	0.0261	14,468	***	97.93			
F. Ownership percent	228	104,167	0.0326	***	0.0062	5.2	-0.1106	0.1757	0.0204	0.0448	736	***	70.48			
F. Management	325	1,870,870	0.0180	***	0.0049	3.6	-0.1221	0.1581	0.0083	0.0277	1,100	***	96.35	2.63	0.01	***
F. Control	157	85,840	0.0284	***	0.0065	4.4	-0.0879	0.1448	0.0157	0.0412	455	***	65.09	0.75	0.45	
F. Combined measure	246	269,808	0.0338	***	0.0061	5.5	-0.1198	0.1874	0.0218	0.0458	1,283	***	86.64	0.03	0.98	
Institutional context variables																
North America	322	205,443	0.0475	***	0.0052	9.2	-0.1032	0.1982	0.0374	0.0577	1,191	***	78.84	Reference		
Europe	605	2,993,200	0.0360	***	0.0036	10.0	-0.0965	0.1685	0.0290	0.0430	13,569	***	95.53	1.82	0.07	*
South America	65	10,427	0.0080		0.0169	0.5	-0.1803	0.1963	-0.0251	0.0411	157	***	157.41	2.23	0.03	**
Asia	264	169,948	0.0133	**	0.0052	2.6	-0.1221	0.1487	0.0031	0.0235	1,082	***	75.22	4.65	0.00	***
Other regions	95	2805838	-0.0145	**	0.0059	-2.4	-0.1069	0.0779	-0.0261	-0.0028	961	***	98.38	7.88	0.00	***
Informal institutional variables																
Individualism																
high	606	424,628	0.0335	***	0.0040	8.4	-0.1254	0.1925	0.0257	0.0414	2,732	***	82.03	Reference		
low	617	291,976	0.0275	***	0.0035	7.8	-0.1013	0.1563	0.0206	0.0344	1,859	***	66.92	1.13	0.26	

k	Number of effect sizes
N	Total sample size based on number of firms in primary study
ES	All effect sizes were variance weighted. Significance based on a Z-test
s.e.	Standard error of ES
CI	Confidence interval
Q test	Homogeneity analysis: It is a chi-squared statistic that indicates whether the heterogeneity variance is greater than zero. Based on z-transformation Hedges & Olkin 1985 p. 235.
I^2	Quantifies the ratio of the study variance due to heterogeneity. Low < 0.25; middle < 0.50; strong < 0.75. If Q<df $I^2 = 0$

* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Table 7-2: Univariate meta-analysis (3)

	k	N	ES		s.e.	z	low CR	up CR	-95% CI	+95% CI	Q test		I^2	z-test		
Informal institutional variables																
Masculinity																
high	423	245,212	0.0500	***	0.0039	12.8	-0.0725	0.1726	0.0424	0.0577	1,373	***	69.16	Reference		
low	800	471,392	0.0177	***	0.0035	5.1	-0.1358	0.1713	0.0109	0.0246	3,119	***	78.18	6.16	0.00	***
Uncertainty avoidance																
high	609	243,354	0.0383	***	0.0037	10.3	-0.0944	0.1709	0.0310	0.0456	1,719	***	64.39	Reference		
low	614	473,250	0.0234	***	0.0037	6.3	-0.1278	0.1747	0.0161	0.0307	2,835	***	81.98	2.85	0.00	***
Long-term orientation																
high	501	292,087	0.0223	***	0.0041	5.5	-0.1192	0.1637	0.0143	0.0302	1,884	***	75.01	Reference		
low	627	405,275	0.0398	***	0.0036	11.0	-0.1023	0.1818	0.0327	0.0468	2,513	***	77.08	-3.21	0.00	***
Power distance																
high	507	240,755	0.0150	***	0.0042	3.6	-0.1232	0.1532	0.0068	0.0231	1,717	***	70.00	Reference		
low	716	475,849	0.0398	***	0.0034	11.6	-0.1065	0.1861	0.0331	0.0465	2,908	***	78.59	-4.59	0.00	***

k	Number of effect sizes
N	Total sample size based on number of firms in primary study
ES	All effect sizes were variance weighted. Significance based on a Z-test
s.e.	Standard error of ES
CI	Confidence interval
Q test	Homogeneity analysis: It is a chi-squared statistic that indicates whether the heterogeneity variance is greater than zero. Based on z-transformation Hedges & Olkin 1985 p. 235.
I^2	Quantifies the ratio of the study variance due to heterogeneity. Low < 0.25; middle < 0.50; strong < 0.75. If Q<df $I^2 = 0$

* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Table 7-2: Univariate meta-analysis (4)

	K	N	ES		s.e.	z	low CR	up CR	-95% CI	+95% CI	Q test		I^2	z-test		
Formal institutional variables																
Law systems																
Common Law	361	292,663	0.0381	***	0.0050	7.6	-0.1180	0.1943	0.0284	0.0479	1,813	***	83.57	Reference		
Civil Law	754	385,420	0.0301	***	0.0035	8.7	-0.1152	0.1754	0.0233	0.0369	2,667	***	73.56	-1.31	0.19	
Religious law	6	572	0.0530		0.0786	0.7	-0.2982	0.4043	-0.1011	0.2072	17	***	70.32	0.19	0.85	
Inconsistent law	109	40,633	-0.0019		0.0062	-0.3	-0.0693	0.0655	-0.0139	0.0102	166	***	29.68	-5.02	0.00	***
Rule of Law logic																
high	529	383,809	0.0325	***	0.0044	7.4	-0.1318	0.1967	0.0239	0.0410	2,450	***	83.45	Reference		
low	574	245,596	0.0276	***	0.0036	7.7	-0.0945	0.1497	0.0206	0.0346	1,556	***	62.12	-0.86	0.39	
Investor protection logic																
high	584	332,130	0.0317	***	0.0040	8.0	-0.1160	0.1794	0.0239	0.0395	1,950	***	76.16	Reference		
low	638	386,558	0.0281	***	0.0036	7.8	-0.1157	0.1720	0.0211	0.0352	2,697	***	76.39	-0.67	0.50	
Controls for article attributes																
Time period in sample (sum period)																
high	538	5,500,443	0.0435	***	0.0041	10.6	-0.1041	0.1910	0.0355	0.0515	17,079	***	98.24	Reference		
low	813	684,413	0.0203	***	0.0030	6.8	-0.1127	0.1532	0.0144	0.0261	3,282	***	79.29	4.57	0.00	***

k	Number of effect sizes
N	Total sample size based on number of firms in primary study
ES	All effect sizes were variance weighted. Significance based on a Z-test
s.e.	Standard error of ES
CI	Confidence interval
Q test	Homogeneity analysis: It is a chi-squared statistic that indicates whether the heterogeneity variance is greater than zero. Based on z-transformation Hedges & Olkin 1985 p. 235.
I^2	Quantifies the ratio of the study variance due to heterogeneity. Low < 0.25; middle < 0.50; strong < 0.75. If Q<df I^2 = 0

* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Table 7-2: Univariate meta-analysis (5)

	K	N	ES		s.e.	z	low CR	up CR	-95% CI	+95% CI	Q test		I^2	z-test		
Controls for article attributes																
Treatment of dependent variable																
Lagged	37	27,449	0.0323	*	0.0176	1.8	-0.1525	0.2171	-0.0021	0.0668	326	***	86.13			
Logged	82	43,807	-0.0091		0.0104	-0.9	-0.1580	0.1398	-0.0296	0.0113	238	***	74.64			
Endogeneity check	65	428,543	0.0654	***	0.0108	6.1	-0.0781	0.2090	0.0443	0.0866	328	***	95.69			
Panel regression	114	65,743	0.0179	**	0.0089	2.0	-0.1329	0.1686	0.0004	0.0354	437	***	76.79			
Correlation coeffictiens																
Yes	578	300,573	0.0195	***	0.0038	5.1	-0.1202	0.1592	0.0120	0.0270	2,034	***	72.29	Reference		
No	773	5,884,283	0.0360	***	0.0032	11.3	-0.1056	0.1777	0.0298	0.0423	18,917	***	97.47	-3.32	0.00	***
GDP per capita																
High	477	311,425	0.0358	***	0.0046	7.9	-0.1272	0.1988	0.0269	0.0448	1,943	***	81.71	Reference		
Low	745	407,263	0.0256	***	0.0033	7.9	-0.1076	0.1589	0.0192	0.0320	2,698	***	71.44	1.80	0.07	*
Type of publication																
Published	756	471,505	0.0302	***	0.0035	8.7	-0.1208	0.1813	0.0234	0.0371	3,160	***	78.58	Reference		
Working paper	316	5,558,285	0.0257	***	0.0045	5.7	-0.0953	0.1468	0.0168	0.0346	16,629	***	98.48	0.79	0.43	
PhD Thesis	211	125,057	0.0400	***	0.0051	7.9	-0.0736	0.1536	0.0300	0.0500	673	***	66.25	-1.58	0.11	
Master Thesis	68	30,009	-0.0053		0.0141	-0.4	-0.2004	0.1898	-0.0330	0.0223	299	***	80.07	2.44	0.01	***
Type of research focus																
Performance paper	961	3,349,800	0.0345	***	0.0030	11.6	-0.1109	0.1798	0.0287	0.0403	16,526	***	94.83	Reference		
Non performance papter	390	2,835,056	0.0167	***	0.0043	3.9	-0.1109	0.1444	0.0083	0.0252	1,602	***	96.63	3.39	0.00	***
Management paper	871	3,295,762	0.0291	***	0.0032	9.1	-0.1179	0.1760	0.0228	0.0353	3,565	***	95.26	Reference		
Finance/Ecomics paper	480	2,889,094	0.0293	***	0.0038	7.8	-0.1018	0.1605	0.0219	0.0367	14,626	***	96.23	-0.04	0.97	

k	Number of effect sizes
N	Total sample size based on number of firms in primary study
ES	All effect sizes were variance weighted. Significance based on a Z-test
s.e.	Standard error of ES
CI	Confidence interval
Q test	Homogeneity analysis: It is a chi-squared statistic that indicates whether the heterogeneity variance is greater than zero. Based on z-transformation Hedges & Olkin 1985 p. 235.
I^2	Quantifies the ratio of the study variance due to heterogeneity. Low < 0.25; middle < 0.50; strong < 0.75. If Q<df $I^2 = 0$

* significant at 10% level; ** significant at 5% level; *** Significant at 1% level

Research question 3a-e examines if the overall effect is driven by differences based on sample compositions in primary studies. For that purpose, I distinguished between *mixed samples*, only small and medium-sized firms (*SME*), only *publicly listed firms and* samples including only *technological* or *manufacturing* firms. My findings show that in *mixed samples* consisting of privately held and publicly listed firms, family firms perform better compared to nonfamily firms (ES= 0.08; p< 0.1). The same directions are found in samples compiled from only *publicly listed* firms (ES= 0.034; p< 0.01), only *technological* firms (ES= 0.028; p< 0.10) and only *manufacturing* firms (ES= 0.040; p< 0.01). Accordingly, the group difference z-test leads to a nonsignificant difference compared with *mixed primary* samples. But if I compare only *small and medium-sized* family firms with *small and medium* nonfamily firms I find a nonsignificant effect (ES= 0.007; p> 0.10) and a significantly different performance value compared to *mixed primary study samples* (z=-2.97; p< 0.01) and *publicly listed* companies. Furthermore, *small and medium-sized* family firms show a significantly reduced performance compared to *publicly listed* family firms (z= 4.14; p< 0.01).

To underpin these results and test if positive or negative effects of differences in family involvement emerge (*Research question 4*) *family management*, *family control* and *combined involvement* (management and/or control) are investigated. All family measures are significantly different from zero and therefore confirm the overall effect of better financial performance of family firms. The group difference z-test suggests that compared to *family ownership*, *family management* reduces the financial performance significantly (z= 2.63; p< 0.01). *Family control* (z= 0.75; p>= 0.45) and the *combined measures* (z=0.03; p>= 0.98) do not differ significantly from *family ownership*.

To investigate if institutions (*Research question 5a-d*) such as formal and informal institutions are influencing family firm performance, I start to test if regional contexts are introducing a significant variance to my results (*Research question 5a*). Only in South American countries, family firms do not outperform nonfamily firms (ES= 0.008; p> 0.10). In Europe, North America and Asia, family firms seem to experience a significantly better financial performance. But among these regions, the group difference test proves that in Europe (z= 1.92; p< 0.07), South America (z=2.23; p< 0.05 and Asia (z=4.65; p< 0.01) family firms underperform North American family firms. Despite of South America, in all other regions family firms outperform nonfamily firms, but amongst each other, regions differ as regards the purpose of the financial performance of family firms. Therefore, to present a clearer picture which particular institutions influence the financial performance of family firms, *Research question 5b* predicts an influence of informal institutions. Hofstede´s cultural dimensions are used to conduct a sensitivity analysis to analyze informal institutional influences. In sum, all median-split cultural dimensions differ significantly

from zero and support the overall effect size. Comparing countries with a larger cultural dimension value and countries below the median, I use the group difference test again. This test shows no significant difference between countries scoring high or low on *individualism* (z= 1.13; p> 0.26). In contrast, in countries scoring higher on the *masculinity* dimension, family firms have a significantly higher financial performance (z= 6.16; p< 0.01) compared to family firms in countries scoring lower on the *masculinity* dimension. In countries with a higher *uncertainty avoidance* score, family firms perform significantly better (z= 2.85; p<0.00) compared to countries with lower scores. Societies with a relatively high *long-term orientation* have significantly underperforming family firms (z= -3.21; p< 0.00) compared with those scoring low in this dimension. Countries with a lower *power distance* provide an environment where family firms (z= -4.59; p< 0.01) perform better than in countries with a high *power distance.*

The *Research question 5c-d* shows the influences of formal institutions on family firms' financial performance. *Research question 5c* investigates the impact of legal systems on family firms' performance. *Common law* and *civil law* based countries foster the financial performance positively. Opposing countries with *Religious law* and inconsistent law systems seem to have no performance differences between family firms and nonfamily firms. But the performance values do not differ significantly amongst each other, besides countries with inconsistent law systems yield family firms with a significantly lower performance compared to c*ommon law* countries (z= - 5.02; p< 0.01). The next *Research question 5e* predicts a positive influence of *rule of law* and *investor protection logic*. These logics measure the assertiveness of laws. Both logics show positive significant performance results, but in sensitivity analyses, there is no group difference. So a prediction if a high or low *rule of law logic(s)* influences the family firm performance is still not possible.

Finally, I conduct further sensitivity analyses to check the robustness of the results. The purpose is to see if the specification of the primary study itself has an impact of the overall result. I found that the *time period of sampling* in the primary study supports the overall relation. But if I compare the median-split variable primary studies with a sampling period below the median has a significantly lower performance of measure compared to primary studies with longer sampling periods (z= 4.57; p< 0.01). The treatment of the dependent variables might influence the effect size as well. Two common options for the treatment of the dependent variables in primary studies were coded: *lagged* and *logged* dependent variables. These analyses result in a positive significant effect of the *lagged* variables (ES= 0.0323; p< 0.10). But there is no impact of *logged* dependent variables in primary studies. Primary studies with *logged* dependent variables do not find any significant difference between family and nonfamily firm performance (ES= -0.0091, p> 0.10). As stated above, my dependent performance variable consists of *correlations* and *partial*

correlations. With this in mind, I investigate if one of each have an impact on my overall variable. *Correlations* and *partial correlations* are both significantly different from zero, both variables drive the overall relation in the same direction. But comparing those two measures, *partial correlation* coefficients yield significantly higher values compared to "pure" correlations coefficients ($z= -3.32$; $p< 0.01$). Another impact on firms' financial performance could be the *Gross Domestic Product per Capita* (*GDP*) of the country, so that the financial performance of the firms in a certain country is bound to the efficiency of the citizen. Again, the median- split *GDP* per capita confirms the overall relationship. Primary studies conducted in higher efficiency countries according to *GDP* per capita show significantly higher performance values ($z=1.80$; $p< 0.10$). A further characteristic of a primary study is the way how it is published, as: *journal article*, *working paper*, *PhD thesis* or *master thesis*. The first three types of publications yield significant higher performance values compared to *master theses* ($z=2.44$; $p< 0.01$). A further major concern was whether the objective of the primary study had an influence on my results. The direction could have been if it is a *performance study* of family firms compared to nonfamily firms or the relevant relationship is only of minor concern in the primary study because it focuses on other research questions. I found that primary studies focusing on the *financial performance* of family firms yield significantly higher values compared to primary studies without the relevant research focus ($z= 3.39$; $p< 0.01$). Otherwise I was concerned that other research disciplines compared to *strategic management* research could have found different results. But this was not the case, all research disciplines found nearly the same results und did not differ significantly ($z= -0.04$; $p> 0.10$). In sum, all these influences mentioned in the very last paragraph are not yet used as controls for a more fine-grained multivariate investigation. I use these variables, amongst others, as control variables in my multilevel estimations to reduce the variance related to these variables.

8 Multivariate meta-analysis with multiple measures

To proof the robustness of the further univariate meta-analysis, this chapter investigates the research questions in a multivariate empirical way. Multivariate meta-analytical approaches can address some statistical issues more appropriately compared to univariate approaches. Finally, further research questions are multivariate tested, which cannot be addressed in a univariate way.

8.1 Procedure using multilevel analysis

Because my data set consists of real world data, some unexplained heterogeneity in the effect size distribution will be in place after calculating the mean effect sizes with the classical approach (HOMA) (Lipsey & Wilson, 2006). Furthermore, meta-analytical data sets are heteroscedastic by definition (Feld & Heckemeyer, 2011), which is a possible threat to meta-analytical validity (Chandrashekaran & Walker, 1993). Heteroscedasticity occurs when the variances of primary studies are not equal which is given in my study because the variances are calculated based on sample size, which differs by study. To overcome this problem, I use the Weighted Least Squared (WLS) regression analysis to assess the relationship between the effect sizes of firm performance (Y) and several moderator variables (X) in a multilevel framework.

This WLS – or mixed effects meta-analysis – is a special case of the Generalized Least Squares (GLS) analysis producing sensible, unbiased estimates, and appropriate standard errors when compared to Ordinary Least Squares (OLS) (Olsson et al., 2000; Nelson & Kennedy, 2009). WLS uses the inverse of variance and the between study variance as analytical weight, giving a greater influence to measures from primary studies with smaller variances (Greene, 2003). My measures from primary studies are partial correlations ($r_{xy.z}$) controlling for endogeneity and a possible omitted variable bias (Stanley & Jarrell, 1989).

Several performance measures were coded per primary study, increasing the potential correlation amongst each other. The solution to this problem in classical meta-WLS-analysis is to carry out an analysis for each performance variable (Gleser & Olkin, 2009). But in a multi-level approach, it is possible to specify a multivariate outcome model that is a straightforward extension (Raudenbush & Bryk, 1985) of the WLS model. So, I modeled the implied possibility of dependency of observations resulting from a primary study's specific unobserved heterogeneity and its correlations of performance measures (Feld & Heckemeyer, 2011). To model those dependencies, we stratified the primary data based on panel groups for each primary study (Rosenberger & Loomis, 2000).

Due to the two-fold sources of the data in my sample – primary study data on the organizational level and secondary data on the country level – I consider the data structure as

hierarchical (Hox, 2010). All effect sizes estimates were weighted by the inverse variance weight *w* (Hedges & Olkin, 1985). Accordingly, I included controls of performance measures of the dependent variable in a first step (Raudenbush & Bryk, 2002). In a second step, I added moderator variables and especially the focal moderators pertaining to family firm management and board control. In a third and final step, I added country level variables. To test if a further country level is statistically necessary, I conducted a log likelihood ratio test, comparing the model grouping only on primary study level and a second model grouping on country level. This test was not significant using maximum likelihood estimated models as the basis for this test (LRT= 1.47, p= 0.23). Therefore, I have to opt for the reduced, three-level model controlling only for primary study dependencies. To control for country level variability, I include the logged *GDP per capita* variable and other variables on country level.

Furthermore, some moderator and control variables (see variable description for details) were mean centered to set a zero point on indices which lack such values (Enders & Tofighi, 2007). In my case, only level two predictors were mean centered which results in a grand mean centering (Kreft et al., 1995). But mean centering does not alleviate collinearity problems (Echambadi & Hess, 2007).

I use $r_{xy.z}$ as effect size and the restricted maximum likelihood (REML) algorithm, assessing the relationship between the effect sizes and moderator variables in my hierarchical estimations. Hierarchical regressions match well with the mixed effect models, allowing me to vary randomly the regression coefficients across groups (Nelson & Kennedy, 2009).

8.2 Results of multivariate meta-analysis with multiple measures

The following chapter shows the multilevel results based on the composite effect size. Model 1 investigates the overall effect derived in research question 2. Model 2 displays the results for *Research question* 1, *Research question* 3 and *Research question* 4. Model 3 throughout Model 6 test *Research question* 5 with mixed effects multilevel estimations.

Table 8-1 shows the correlation coefficients of the independent variables, called fixed effects in multilevel models (Hox, 2010). This table yields lower correlations amongst the fixed effects, only journal articles and working papers show a more highly significant correlation (0.62; p< 0.01) Therefore, working paper is used as a reference category. Because all other variables correlate below 0.50, they are of minor concern according to multicollinearity. This fact is confirmed by variance inflation factors (Vif) in model 2. The largest Vif is 1.6, but of minor concern because it is smaller than 10.0 (Chatterjee & Hadi, 2015).

Table 8-1: Correlation coefficients of moderator and control variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	
(1) MTB																					
(2) Stock return	-0.12***																				
(3) SME	-0.2***	-0.06**																			
(4) Public firms	0.29***	0.1***	-0.45***																		
(5) Technology	0.01	-0.04	-0.03	0.07***																	
(6) Manufacturing	0.02	-0.02	0	-0.03	0.36***																
(7) F.management	-0.02	0.06**	-0.03	-0.08***	-0.03	-0.02															
(8) F.control	-0.01	-0.06***	-0.04	0.02	-0.07***	0.01	-0.2***														
(9) F.Combined	-0.04	-0.04	0.13***	-0.07**	-0.02	-0.08***	-0.27***	-0.17***													
(10) Sum period	0	-0.05*	-0.16***	0.11***	0.1***	0.01	0.03	-0.12***	-0.03												
(11) Var.lagged	-0.05*	-0.03	-0.05*	0.04	0.51***	0.29***	-0.04	-0.06**	0.03	0.07***											
(12) Var.logged	0.07**	-0.05*	0.09***	-0.16***	-0.01	0	0.08***	-0.01	-0.1***	0.09***	-0.04										
(13) Endogeneity	-0.01	-0.03	-0.03	-0.02	-0.02	-0.02	0.04	-0.01	-0.02	0.06***	-0.04	-0.03									
(14) Panel regression	0.05*	-0.04*	-0.07***	0.09***	-0.03	-0.02	-0.03	-0.05*	0.02	0.18	-0.05**	0.19***	-0.07**								
(15) Correlation	-0.09***	0.02	0.01	0.06**	0.18***	0.14***	-0.06**	0.02	0	-0.01	0.13***	-0.11***	-0.19***	-0.26***							
(16) Log (GDP pc)	0.01	0.06**	0.07**	-0.23***	0.08***	-0.03	0.09***	-0.12	0.12***	0.03	0.12***	0.13***	0	-0.03	-0.06**						
(17) Journal article	0.05**	0.04	0.01	0.11***	0.11***	0.06**	-0.05*	-0.05*	-0.04	-0.07**	0.09***	-0.14***	0.09***	-0.12***	0.12***	0.12***					
(18) Working paper	0.06**	0.02	0.1***	0.08***	-0.04	0.04	0.02	0.01	-0.02	-0.01	-0.06**	0.04	-0.05*	0.12***	-0.03	-0.24***	-0.62***				
(19) Dissertation	-0.11***	-0.05**	-0.1***	-0.17***	-0.08***	-0.09***	0.02	0.1***	0.1***	0.03	-0.03	-0.08***	-0.04	-0.12***	-0.07**	0	-0.48***	-0.24***			
(20) Thesis	-0.06**	-0.04*	-0.05*	-0.12***	-0.04	-0.05**	0.04	-0.08***	-0.09***	0.12***	-0.04	0.38***	-0.05*	0.25***	-0.09***	0.17***	-0.26***	-0.13***	-0.1***		
(21) Performance paper	0.01	-0.08**	0.06**	-0.14***	-0.26***	-0.2***	0.03	0	0.05*	-0.15***	-0.19***	0.06**	0.12***	0.03	-0.41***	0.04	-0.1***	-0.08***	0.15***	0.13***	
(22) Finance economics paper	0.14***	0.01	-0.01	0.14***	-0.09***	-0.1***	-0.09***	-0.15***	0.03	0.03	-0.04	-0.06**	0.1***	0.13***	-0.28***	0.2***	0.19***	0.05**	-0.32***	-0.01	0.15***

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. N = 1,351 (effect sizes)

Source: Own illustration

Model 1 supports *Research question 1* that family firms have a better financial performance compared to nonfamily firms (β= 0.0213; p< 0.01) and confirms the naïve overall mean effect size in a multivariate way with random effects.

Research question 2 states that market and accounting based measures differ. The correlation between these aggregated measures has a slightly positive significance and is in line with (Gentry & Shen, 2010) - see Table 8-2. But Model 2 investigates both market-based measures, market-to-book and stock return individually and compared them with all accounting measures (reference category). In Model 2, a significant negative coefficient of the market-based measure (*MTB*) (β= -0.0248; p< 0.01) and a not significant value of stock return is estimated. This indicates that *MTB* is significantly lower compared to all accounting measures and stock return does not differ from accounting-based measures, in my case.

The type of sample in primary study could have an influence on the results in primary studies (*Research question 3a-d*). Model 2 displays only small and medium-sized enterprises (*SME*). Samples show a significantly smaller value compared to mixed samples of primary studies (β= -0.0357; p< 0.05). Samples consisting of only *publicly listed firms, technological* or *manufacturing* firms do not influence the dependent variable of family firm performance compared to nonfamily firm performance.

The competing *Research question 4 a* and *b* predict either a positive influence of family firm management on firm performance compared to nonfamily firms or a negative one. The moderator family management reduces the dependent performance variable by 2% (β= -0.0234; p< 0.01). This result is robust throughout Model 2 till Model 6b.

Table 8-2. Correlations of performance measures

Variables		(1)	(2)
(1)	Market measures		
(2)	Accounting measures	0.1970***	

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. N= 1,351

Source: Own illustration

Table 8-3: Null model of multilevel analysis

	Model 1		Model 2	
Variables		(SE)	(SE)	Vif
Performance measures				
MTB			-0.0248***	0.0059	1.193
Stock return			0.0011	0.0159	1.049
Type of sample in primary study				
SME			-0.0357**	0.0172	1.394
Public firms			-0.0065	0.0096	1.646
Technology			0.0034	0.0241	1.548
Manufacturing			0.0327	0.0232	1.278
Family involvement				
F.management			-0.0234***	0.006	1.249
F.control			-0.0023	0.0076	1.206
F.Combined			-0.0022	0.0078	1.278
Controls for primary study attributes				
Sum period			0.0025*	0.0014	1.199
Var.lagged			-0.0389*	0.02	1.448
Var.logged			-0.0094	0.0138	1.331
Endogeneity			0.019	0.012	1.096
Panel regression			-0.0125	0.0097	1.268
Correlation			-0.0127*	0.0073	1.476
Log(GDP pc)			0.0086	0.0058	1.307
Journal article			-0.005	0.0115	1.261
Thesis			-0.0026	0.0278	1.415
Performance paper			0.0159	0.0113	1.381
Financ economics paper			-0.0039	0.0113	1.339
Constant	0.0213***	0.0048	-0.0524	0.0578	
N	1,351		1,222		
Countries	43		41		
Adjusted-R^2 in %	2.34		26.34		
σ^2_1	0.0042		0.0044		
σ^2_2	0.0018		0.0018		
ICC	0.70		0.71		
AIC	-2,937.827		-2,563.096		

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own illustration

Several control variables are included in model 2 and the following models later on. In model 2, the sum of the sampling period per primary study is driving the dependent variable slightly in a positive way. That is, if the sample period is increased by one year, the value describing the connection of family firm performance and nonfamily firm performance increases by 0.25% (β= 0.0025; p< 0.10). Otherwise, if panel data are investigated in primary studies, the lagging of the dependent variable in primary studies leads to a decrease of nearly 4% (β= -0.0389;

p< 0.10) of the value describing the connection of family firm performance and nonfamily firm performance. A good indicator is the negative significant correlation dummy (β= -0.0127; p< 0.10) - this proofs that the whole research field investigating family firm performance has no structural bias due to suppressor variables.

Model 1 yields an I^2 of 93.58%, indicating that roughly 94 percent of the variation in effect sizes cannot be accounted for by sampling error. That is, 94 percent of the effect size variance is attributable to variation in study effect size. The I^2 from the conditional multilevel model 2 is 68.93%. Therefore, the controls in model 2 have reduced systematic variations in effect sizes by 26.34% compared with the I^2 of Model 1 ((93.58-68.93) / 93.58). Simultaneously, this reduction can be seen as adjusted R^2 (Anderson et al., 2013). In my case, the I^2 indicates a moderate goodness of fit (Higgins et al., 2003). According to (Hox, 2010), the independent variables represent the fixed part and σ^2 the random part of the multilevel model. Whereas σ^2_1 is the variance component of the corresponding grouping variable and σ^2_2 represents the variance component of the corresponding level which is nested within the grouping variable. This model allows the underlying true effects to be correlated within primary studies. This can be proved by the intra-class correlation (*ICC*). *ICC* can be derived from σ^2 in the related model. Therefore, the underlying true effects within primary studies are quite strongly correlated (*ICC*= 0.70). Besides the adjusted R^2, the Akaike information criterion (*AIC*) is a means for model selection and shows the quality of the model. In my case, the *AIC* is very negative, indicating a very good model fit because it measures the information loss. So, a negative *AIC* is a sign for less information loss than a positive *AIC* (Baguley, 2012, p. 402). A negative *AIC* can be due to the very narrow continuous probability density function of the dependent variable (see Figure 6-6).

Research question 5a predicts an institutional influence of regions on family firm performance. The following Table 8-4 shows the negative significant relationships amongst regions. North America and Asia are negatively correlated with Europe. In model 3, these results are underpinned with a multivariate estimation. European family firms underperform (β= -0.0219; p< 0.01) compared to nonfamily firms in North America significantly.

Table 8-4: Correlations of regions

Variables		(1)	(2)	(3)	(4)
(1)	Europe				
(2)	North America	-0.5***			
(3)	South America	-0.2***	-0.13***		
(4)	Asia	-0.44***	-0.28***	-0.11***	
(5)	Other regions	-0.22***	-0.14***	-0.05**	-0.12***

Source: Own illustration

Table 8-5: Multilevel analysis with regions as moderators

	Model 3		
Variables		(SE)	Vif
Performance measures			
MTB	-0.0253***	0.0059	1.228
Stock return	-0.0012	0.016	1.069
Type of sample in primary study			
SME	-0.037**	0.018	1.629
Public firms	-0.0093	0.0098	1.759
Technology	0.0003	0.0246	1.589
Manufacturing	0.0298	0.0238	1.339
Family involvement			
F.management	-0.0237***	0.0061	1.289
F.control	-0.0025	0.0076	1.225
F.Combined	-0.0031	0.0078	1.387
Formal institutional variables			
Europe	-0.0219*	0.0123	2.032
South America	-0.0079	0.0343	1.938
Asia	-0.0186	0.0186	2.687
Other regions	-0.0029	0.0402	1.565
Controls for primary study attributes			
Sum period	0.0025*	0.0014	1.230
Var.lagged	-0.038*	0.02	1.457
Var.logged	-0.0091	0.0138	1.338
Endogeneity	0.0192	0.012	1.132
Panel regression	-0.0124	0.0097	1.292
Correlation	-0.0126*	0.0074	1.494
Log (GDP pc)	0.0063	0.0084	2.871
Journal article	-0.0085	0.0118	1.358
Thesis	0.0002	0.028	1.427
Performance paper	0.016	0.0114	1.455
Finance economics paper	-0.0032	0.0116	1.491
Constant	-0.0127	0.0865	
N	1222		
Countries	41		
Adjusted-R^2 in %	27.06		
σ^2_1	0.0044		
σ^2_2	0.0018		
ICC	0.71		
AIC	-2551.9349		

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own illustration

Model 3 investigates formal and informal institutions all at once (*Research question 5a*). To depict a clearer picture, I investigate informal and formal institutions separately. *Research question 5b* assumes an influence of informal institutions such as culture. *Long-term orientation*

and *power distance* are highly negative correlated with *individualism*; otherwise *power distance* is positively correlated with *long-term orientation* (Table 8-6). The multivariate analyses (Model 4a) show that countries characterized by a higher level of *masculine-dominated* societies support family firm performance compared to nonfamily firm performance positively (β= 0.0009; p< 0.01). This result is robust if all of Hofstede's cultural dimensions are included (Model 4b) and missing value imputation does not change the results either (Model4c).

Table 8-6: Correlations of Hofstede´s cultural dimensions

Variables		(1)	(2)	(3)	(4)
(1)	Individualism				
(2)	Masculinity	0.11***			
(3)	Uncertainty avoidance	-0.24***	0.14***		
(4)	Long-term orientation	-0.78***	0.04	-0.25***	
(5)	Power distance	-0.73***	0.18***	0.22***	0.67***

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. N= 1,223

Source: Own illustration

Table 8-7: Multilevel analysis with Hofstede´s cultural dimension as moderators

	Model 4a			Model 4b			Model 4c		
Variables		(SE)	Vif		(SE)	Vif		(SE)	Vif
Performance measures									
MTB	-0.0247***	0.0058	1.193	-0.0215***	0.006	1.231	-0.025***	0.0059	1.219
Stock return	-0.0003	0.0157	1.050	0.0009	0.016	1.069	-0.0007	0.016	1.068
Type of sample in primary study									
SME	-0.0382**	0.0173	1.385	-0.0453**	0.018	1.437	-0.0377*	0.0172	1.477
Public firms	-0.0085	0.0095	1.683	-0.0089	0.0098	1.976	-0.0076	0.0096	1.871
Technology	0.0035	0.0236	1.553	0.0034	0.0235	1.569	0.0026	0.0237	1.562
Manufacturing	0.0342	0.0228	1.287	0.0353	0.0245	1.431	0.0344	0.0235	1.405
Family involvement									
F.management	-0.0247***	0.006	1.257	-0.0248***	0.0061	1.283	-0.0244***	0.0061	1.267
F.control	-0.0027	0.0075	1.209	-0.0036	0.0076	1.215	-0.0029	0.0076	1.216
F.Combined	-0.0023	0.0077	1.279	-0.0033	0.0078	1.339	-0.0026	0.0078	1.303
Informal institutional variables									
Masculinity	0.0009***	0.0003	1.474	0.0008**	0.0004	1.924	0.0007*	0.0004	1.815
Individualism				0.0005	0.0005	7.372	0.0007	0.0005	8.413
Uncertainty avoidance				0.0001	0.0005	2.988	0.0002	0.0004	2.768
Long term orientation				0.0003	0.0005	6.901	0.0004	0.0005	6.948
Power distance				0.0002	0.0007	6.476	-0.0001	0.0006	5.451
Controls for primary study attributes									
Sum period	0.0024*	0.0013	1.212	0.002	0.0014	1.343	0.0025*	0.0014	1.336
Var.lagged	-0.0379*	0.0197	1.467	-0.0371*	0.0197	1.484	-0.0381*	0.0199	1.480
Var.logged	-0.0188	0.0141	1.347	-0.0197	0.0142	1.374	-0.0085	0.0138	1.353
Endogeneity	0.0186	0.0119	1.096	0.019	0.0119	1.124	0.0187	0.012	1.117
Panel regression	-0.0118	0.0096	1.273	-0.0089	0.0099	1.270	-0.0122	0.0097	1.280
Correlation	-0.0135*	0.0072	1.501	-0.0119	0.0077	1.596	-0.0123*	0.0073	1.535
Log (GDP pc)	0.0089	0.0058	1.330	0.0044	0.0124	5.021	-0.0017	0.0102	4.485
Journal article	-0.0012	0.0114	1.313	-0.0044	0.012	1.409	-0.0023	0.0115	1.393
Thesis	0.0254	0.0289	1.791	0.0255	0.0319	2.101	0.0207	0.0296	2.016
Performance paper	0.0195*	0.0112	1.388	0.026**	0.0116	1.475	0.0199*	0.0112	1.385
Financ economics paper	-0.0044	0.0111	1.340	-0.0038	0.0115	1.426	-0.0033	0.0113	1.407
Constant	-0.0578	0.0581		-0.0123	0.1211		0.0436	0.1011	
N	1215			1128			1222		
Countries	39			39			41		
Adjusted-R^2 in %	27.66			27.19			27.43		
σ^2_1	0.0042			0.004			0.0042		
σ^2_2	0.0017			0.0017			0.0018		
ICC	0.71			0.70			0.70		
AIC	-2577.257			-2294.672			-2553.961		

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own illustration

Research question 5c enlightens the influence of formal institutions represented as law regimes. It is remarkable that *civil law* and *common law* systems are correlated highly negatively. But in the multivariate analysis, no law regime has a significant influence on family firm performance (Table 8-9).

Table 8-8: Correlations of laws

Variables		(1)	(2)	(3)
(1)	Civil law			
(2)	Common law	-0.68***		
(3)	Religious law	-0.08***	-0.04	
(4)	Inconsistent law	-0.39***	-0.20***	-0.02

Source: Own illustration

Table 8-9: Multilevel analysis with law systems as moderators

		Model 5	
Variables		(SE)	Vif
Performance measures			
MTB	-0.025***	0.0059	1.217
Stock return	-0.001	0.016	1.070
Type of sample in primary study			
SME	-0.037**	0.0172	1.440
Public firms	-0.0072	0.0097	1.706
Technology	0.0035	0.0242	1.563
Manufacturing	0.0285	0.0235	1.372
Family involvement			
F.management	-0.0238***	0.006	1.275
F.control	-0.0025	0.0076	1.229
F.Combined	-0.0028	0.0078	1.296
Formal institutional variables			
Civil law	-0.011	0.0113	1.747
Religious law	-0.012	0.0662	1.107
Inconsistent law	-0.0296	0.0206	1.407
Controls for primary study attributes			
Sum period	0.0024*	0.0014	1.201
Var.lagged	-0.0391*	0.02	1.468
Var.logged ed	-0.0086	0.0138	1.339
Endogeneity	0.0189	0.012	1.106
Panel regression	-0.0124	0.0097	1.276
Correlation	-0.0123*	0.0073	1.484
Log (GDP pc)	0.0049	0.0064	1.507
Journal article	-0.0062	0.0116	1.319
Thesis	-0.0026	0.0279	1.431
Performance paper	0.0164	0.0113	1.384
Financ economics paper	-0.0014	0.0115	1.415
Constant	-0.0065	0.0677	
N	1222		
Countries	41		
Adjusted-R^2 in %	26.69		
σ^2_1	0.0044		
σ^2_2	0.0044		
ICC	0.71		
AIC	-2553.7396		

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own illustration

More important than the law regimes is the ability of countries to enforce their laws and policies. This is tested in *Research question 5d* stating family firm performance is positively influenced by stronger rule of law. The multivariate analyses, as opposed to the previous, analyses, do not include *GDP per capita* because it is highly correlated with the newly created rule

of law logic variable and causes high multicollinearity. The multivariate analyses in model 6a and 6b show a positive relationship between family firm performance and better rule of law environments.

Table 8-10: Correlations of formal institution logic

Variables		(1)	(2)
(1)	Rule of Law logic		
(2)	Investor protection logic	0.11***	
(3)	GDP per capita	0.25***	0.83***

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01. N= 1,103

Source: Own illustration

Table 8-11: Multilevel analysis with rule of law logic as moderator

	Model 6a			Model 6b		
Variables		(SE)	Vif		(SE)	Vif
Performance measures						
MTB	-0.0188***	0.0062	1.201	-0.0191***	0.0062	1.215045
Stock return	0.0005	0.0149	1.049	-0.0002	0.0149	1.054346
Type of sample in primary study						
SME	-0.0445**	0.0175	1.373	-0.0422**	0.0176	1.373918
Public firms	-0.0123	0.0093	1.639	-0.0135	0.0093	1.670109
Technology	0.0026	0.0239	1.561	0.0029	0.0239	1.561564
Manufacturing	0.0362	0.0238	1.303	0.0344	0.0238	1.317215
Family involvement						
F.management	-0.0323***	0.0061	1.263	-0.0324***	0.0061	1.263727
F.control	-0.0025	0.0083	1.214	-0.0026	0.0083	1.215397
F.Combined	-0.0062	0.0075	1.292	-0.0064	0.0075	1.294074
Formal institutional variables						
Rule of Law logic	0.008**	0.0037	1.336	0.0071*	0.0038	1.365563
Investor protection logic			1.189	0.0040	0.0035	1.274629
Controls for primary study attributes						
Sum period	0.0026*	0.0014	1.453	0.0027**	0.0014	1.194166
Var.lagged	-0.0391**	0.019	1.340	-0.0388**	0.019	1.454106
Var.logged	-0.0228*	0.0132	1.082	-0.0225*	0.0132	1.339997
Endogeneity	0.0137	0.012	1.299	0.0136	0.012	1.082787
Panel regression	-0.0127	0.0095	1.501	-0.0128	0.0095	1.304063
Correlation	-0.0221***	0.0072	1.294	-0.0225**	0.0072	1.503118
Journal article	-0.0064	0.012	1.479	-0.0083	0.0121	1.389219
Thesis	-0.0034	0.0277	1.429	-0.0028	0.0277	1.481411
Performance paper	0.0145	0.0116	1.392	0.0116	0.0116	1.446777
Financ economics paper	-0.0101	0.0116	1.201	-0.0105	0.0116	1.391921
Constant	0.0462**	0.0184		0.0458**	0.0184	
N	1103			1103		
Countries	32			32		
Adjusted-R^2 in %	28.93			28.97		
σ^2_1	0.0045			0.0045		
σ^2_2	0.0012			0.0012		
ICC	0.79			0.79		
AIC	-2357.7791			-2355.171		

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own illustration

9 Discussion of results: Implications for theory and practice

I contribute to the strategic management and entrepreneurship literature. Strategic management research focuses on value creation and entrepreneurship research emphasizes value appropriation (Shane, 2000; Zahra & Dess, 2001). Both objectives, value creation and appropriation (Weber, 1922) emerge in families owning a firm. Depending on environmental settings, value creation and appropriation are given more or rather a different weight. Especially, nonfinancial goals play an important role in family firms and therefore have an influence on the performance of family firms compared to nonfamily firms. Therefore, estimating family firm performance equals the search for the Holy Grail (Gomez-Mejia et al., 2011). Family firm research, however, is based on the assumption that family firms are different from other firms. This influence is assumed to matter and have an impact on the performance differences of family firms (Gedajlovic et al., 2012). The dominating Agency theory accompanied by the Resource-Based View, Stewardship Theory and Institution Theory imply that these differences mentioned beforehand have either a positive or negative impact on family firms' financial performance.

In this study, the overall effect, comparing family firms' and nonfamily firms' financial performance, the impact of family management involvement and institutional influences on performance is investigated.

9.1 Antecedents of firm performance

Capon et al. (1990) investigated with a meta-analytical approach determinants of firm performance and identified industry concentration, growth, market share, size, capital investment- and marketing intensity as positive drivers for financial firm performance. Later on, a further meta-analysis (Kirca et al., 2005) advanced this former, more general meta-analysis by focusing on top management factors, interdepartmental factors, organizational systems, different performance measures and cultural dimensions as drivers of financial performance of companies.

With my present study - family firms compared to nonfamily firms and their related financial performance, I thereby extend and challenge literature by differentiating companies according to their stakeholder and shareholder background as drivers and sources for financial performance. In opposition to the two former meta-analyses, I applied multilevel meta-analytical techniques to avoid potential alpha and beta errors in testing research questions. Additionally, I included more primary study characteristics such as composition of the sample, market and accounting based performance measures to avoid biases and wrong identification of antecedents of financial performance of firms.

9.2 Research on performance of family firms

While prior meta-analyses do not differentiate between family firms and nonfamily firms, the overall effect of this study shows that family firms outperform nonfamily firms. My research pursues and contributes to previous results on family firm performance. These results matter and impact practical and scholarly interests (Gomez-Mejia et al., 2011; Gedajlovic et al., 2012; van Essen et al., 2015). Prior research on primary study level found either positive (Audretsch et al., 2013) or negative (Lauterbach & Vaninsky, 1999) associations of family firm performance compared to nonfamily financial performance. Results of former meta-analyses (see chapter 3.1) found mostly positive connections between family firms' financial performance and nonfamily firm performance. Contrary to former research, I do not focus on primary studies covering only a certain country (van Essen et al., 2015) or region. In this study, publications and manuscripts from all over the world were included, forming a larger sample according to effect sizes and primary studies. My overall result (*Research question 1*), the superior financial performance of family firms over nonfamily firms, confirms former meta-analyses. Reaching a conclusion from my result and the former ones, this study yields important implications for theory on family firm performance.

Agency, Behavioral Agency Theory, Stewardship Theory and Resource-Based View explain all the different theoretical effects of the efficiency of family firms leading to a superior performance of family firms. I suppose a multi-theory approach could foster the understanding of family firms' processes and strategies (Miller et al., 2014; Duran et al., 2015). So, I follow the notion of Duran et al. (2015) that levels of family ownership, concentration of family wealth, the informal communication processes, the differences in value creation and appropriation influence strategies. Therefore, these factors are influencing the financial performance of firms. Family wealth concentration influences the risk attitudes of owners and executives in family firms. Higher concentrations of ownership and therefore control lead to shorter and easier communication processes which support the reduction of monitoring costs and moral hazards. Both a higher level of control and more intensive communication leads to specific superior management of capabilities of employees (steward behavior due to higher commitment) and availing of specific resources within the family firm.

In sum, family firms face significantly reduced monitoring costs and families as shareholders (Daily & Dollinger, 1992) act more stewardly with regard to emotional investment because of shared goals (Carney, 2005; Miller & Le Breton-Miller, 2006). So, the overall financial performance is positively influenced (*Research question 1*). Furthermore, not only do reduced agency costs contribute to a competitive advantage of family firms, but also to the better exploitation and management of resources, such as social capital (Habbershon & Williams, 1999). Therefore, the overall objective of family firms in practice should be to yield the majority stake of

shares (depends on laws in countries) to leverage the positive effects of reduced monitoring costs and shared goals.

The finding that family firms outperform nonfamily firms challenges the knowledge of financial analysts who underrate family firms because of personal attitudes, experience and reduced transparency in financial statements of publicly listed family firms (García-Meca & Sánchez-Ballesta, 2006). Furthermore, family firms publish less earnings forecasts but more earnings warnings compared to nonfamily firms (Chen et al., 2008; Chau & Gray, 2010). This evidence is proved in a significant negative value of the market-to- book ratio variable (*Research question 2*). So, the identified factors in former studies are "double-edged swords" because financial firm performance is influenced by the company´s status (family firm vs. nonfamily firm) and corporate form (publicly listed and therefore judged by analysts). On the other hand, the company structure, publicly listed or SME, of family firms has a significant influence on financial performance.

Small and medium-sized family firms underperform small and medium-sized nonfamily firms (*Research question 3a*). Again, agency, Behavioral Agency Theory and Stewardship Theory are used as theoretical frameworks. The competitive advantage of reduced agency costs expires due to the nonfinancial goals, especially these fact concern smaller family firms on behalf of nonfamily stakeholders (Gómez-Mejía et al., 2007; Zellweger et al., 2013). Furthermore, adverse selection, nepotism, altruism and moral hazard play an important role in family firms and offset the advantages of the alignment of ownership or commitment (Schulze et al., 2001; Gomez-Mejia et al., 2001). All these negative effects seem to arise where external, nonfamily control is lacking. Additionally, a potential earnings management of SMEs (Burgstahler et al., 2006) does not positively affect performance of SME family firms (*Research question 3e, f*) and my results do not support (Akguc et al., 2013) findings. So, family firm owners could implement a specifically designed governance system to avoid negative agency and behavioral agency conflicts to enhance the financial performance of the firm. Besides, such a system of externally recruited professional managers could support the compliance of such frameworks. These managers could therefore act as stewards of the family firm (Chandler, 1978). Furthermore, professional managers could focus on the complex tasks which arise due to public listing. Summing up these findings lead to the practical recommendations for analysts to value external, professional management and advanced governance system influences in their assessments of family firm SMEs. Additionally, analysts could judge publicly listed family firms equally to publicly listed nonfamily firms in a certain legal environment.

Otherwise, the impact of family managers on financial performance will be investigated further in the next chapter.

9.3 Research on family firm involvement

Research on either the positive or negative impact of family managers in family firms is embedded in the research stream of family firm involvement (Chrisman et al., 2012). Positive aspects of family management can be the reduced agency costs, better management of resources or higher commitment to the firm (Anderson & Reeb, 2003; Sirmon & Hitt, 2003; Gómez-Mejía et al., 2007). The negative aspects can be traced back to nonfinancial goals, leading to altruistic and nepotistic behavior resulting in an underperformance of family-managed firms (Berrone et al., 2010; Chrisman et al., 2012). There is still no consensus in the ongoing discussion if family management is beneficial for the financial performance of family firms (Duran et al., 2015). However, my results in the univariate (HOMA) and multivariate (HiLMMA) analyses support the negative view of family managers according to financial performance (*Research question 4b*). By reason of Rathenau´s (1918) conclusions that private entrepreneurs (Privatunternehmer: family managers) see their business as an independent creature so, growth and power of this creature please the entrepreneur more than revenues; it lives as an end in itself. The business nourishes the owner and his family as a side effect, but that is mostly not the main issue. A competent entrepreneur will restrict his family's consumption in favor of the business for its strengthening and growth (Rathenau, 1918). In publicly listed companies, the same attitudes towards performance prevail. These managers try to retain the revenues in the company even to the detriment of themselves (Rathenau, 1918). This utopian notion of the altruistic behavior is the result of the discussion from 1931 till 1957 of Berle and Dodd, as well (in Wagner, 1997) and supports Rathenau´s notion. But on the other side of the coin, less risky investment decisions will be made by family managers. They want to retain their power therefore the investments are less backed up by bank loans to avoid more influence from outside the company. Thus, the leverage effect of external money is left out and increases the opportunity costs. This leads to a nepotistic behavior of family managers maintaining the altruistic strategy. Consequently, family firm principals surrender their socioemotional wealth as financial loss and accept threats to the financial performance of the firm. Importantly, this phenomenon of retaining revenues in companies, observed by Walther Rathenau, is still crucial as it can be seen in the recent contract of the G20 against Base Erosion and Profit Shifting (Anon., 09.10.2015).

In sum, this strategy of family managers is clearly the emphasis on value appropriation of Max Weber and does not enhance and contribute to the public welfare by balancing the strategy to value appropriation (nourishing the family) and creation (producing, innovation and creating jobs). Therefore, the family managers should pay attention, in practice, if their decisions support value appropriation or value creation and which is more beneficial for the company in the long run.

A further external force should be environmental influences to force family managers to adapt their behavior and strategy. These influences can be induced, regulated and controlled by institutions.

9.4 Research on institutional factors for family firm performance

The interest in influences of institutions is rapidly growing and several meta-analyses investigate different forms of institutions (Heugens et al., 2009; van Essen et al., 2012; Melin et al., 2014). Family firms' financial performance compared to nonfamily firms' financial performance depends on institutional factors (La Porta et al., 1998; Carney & Gedajlovic, 2002; Gilson, 2007; van Essen et al., 2012). Therefore, different factors influence family firms' performance in a positive and negative way (Carney et al., 2011).

However, cross-national studies investigating not only private family firms' financial performance are very rare (Carney et al., 2013), but also studies comparing family firm performance with nonfamily firm performance including institutional aspects have not been published yet. So, I started with a more general investigation by using region dummies absorbing all institutional factors to proof that institutions play a role. My investigations clearly show that the overall effect is driven by regional differences, too (*Research question 5a*). My results show that European family firms have a significantly lower financial performance compared to northern American (USA and Canada) family firms. In practice companies following an international growth strategy should analyze their institutional environment and go into markets which are "knitted" almost in the same way as their domestic institutional environment.

But the analysis by regions is a bit too general because institutions can be split up into formal and institutional factors. Therefore, cross-national studies (van Essen et al., 2015) recognizing these formal and informal institutional factors can peel the major institutional drivers influencing performance of family firms. Such informal institutions are: culture, norms or family (Peng et al., 2009; O'Boyle et al., 2012) did not investigate the impact of all of Hofstede's cultural dimensions and in particular left masculinity aside. Furthermore, the literature is lacking cross-country primary studies and therefore cultural dimensions are not possible to investigate on this level. I included all of Hofstede's cultural dimensions and found a significant impact of masculinity on family firms' financial performance. That is, family itself forms and develops their own culture and norms based on the predominant ones in society, especially if the company nourishes a wider range of members in the family. Family members and related families, as involved in enterprises, and group of social actors, use norms as means for attaining goals. If actors want to achieve a goal, they rely on general norms but aim to provide own statements specifying how family members are expected to act in interaction situations (Homans, 1974; Opp, 2001). Otherwise, in certain regions and countries, the family can be the predominant form of

social capital (Fukuyama, 1995). However, amongst other forms of social capital, trust is an important one, especially in families that have to trust each other in their private and professional lives. To preserve trust to prevail, those families develop their own norms according to work, cooperation and distribution (Elster, 1989). Mainly in masculine- dominated societies norms such as: work prevails over family, men are more assertive and competitive. Furthermore, in those societies, cooperation and distribution of goods are normed and characterized by clearly distinguished roles of women and men (Hofstede, 2011). This leads to a positive impact of masculinity on family firms' financial performance compared to nonfamily firms (*Research question 5b*). Therefore, family firms need to plan succession in masculine countries compared to more feminine countries in another way to avoid possible principal-principal conflicts. Additionally, unique resources of family firms according to corporate governance systems must be carefully evaluated in the sense of masculinity. Of course these adaption's must be within the framework of law regimes in these countries.

Economists assume that law regimes are part of institutions and have a significant impact on economic growth which is driven by companies (La Porta et al., 1999). Law regimes can be grouped into families, such as common and civil law. Civil law is representative as aggregated group for French, German and Scandinavian law. These law-families can be extended to former Belgian, Spanish, French and Dutch colonies. The major distinction of those law regimes in practice is that in common law, the countries' judges make legal rules. Contrary to this, in civil law regimes are made by legislature and judges have to stick to the statutes (La Porta et al., 2000). Additionally, La Porta et al. (1997) found a stronger investor protection in common law countries. During their further research, they identified a better financial performance of companies in common law countries (La Porta et al., 1999; La Porta et al., 2002). In contrast, Andersson et al. (2014) found that Taiwan, a civil law country, outperforms Hon Kong relying on common law regime.

In my case, I subsumed those law regimes of former colonies as "inconsistent law" because they often borrow from common and civil law regimes. Additionally, I included religious law regimes in my analyses. Contrary to other cross-country primary studies, I do not find a significant impact of law regimes on financial performance at all (*Research question 5c*). Although if common law countries are more market oriented (La Porta et al., 1999), my results are counterintuitive. Furthermore it is assumed that common law systems create better market-enhancing environments (Fligstein & Choo, 2005), e.g. through their better adaptability (Levine, 2005). But the worldwide classification of law regimes into civil and common law is not very useful in an econometrical sense and more detailed variables should be used instead (Siems, 2007). So, the enforcement of legal rules is more important for companies than only written ones (La Porta et al., 2000).

Rule of law or enforcement of the laws in place strongly depends on legitimacy. This legitimacy is reduced in populations where the implementation of institutions is forced (Berkowitz et al., 2003). Two very common investigated institutional logics are investor protection and rule of law logic. La Porta et al. (2000) argue investor protection is a *"[…] more fruitful way to describe differences in corporate governance regimes across countries […]"*. van Essen et al. (2012) empirically analyzed investor protection, but only the effect on executive compensation, not on family firm performance. More commonly, the rule of law logic is used in empirical studies. During the financial crisis 2007-2009 with a sample on European firms, van Essen et al. (2013) found a positive relationship between Kaufmann's Rule of Law and firm performance, this relationship was intensified if the company was a family firm. Another study of van Essen et al. (2015) investigated with a meta-analytical approach a positive relationship with private family firms performance. Again, the intra-class correlation was not incorporated in the meta-analytical regression analysis. Both studies show empirically questionable results on family firm performance according to the influence of investor protection and rule of law logic.

In my study, the correlations amongst the primary study results are accounted for by a multilevel approach leading to a positive relationship with financial family firm performance but only for the rule of law logic, not for minority shareholder protection (*Research question 5d*). My result on shareholder protection does not support the findings of (Djankov et al., 2008) The reason is that the authors do not account for correlations within their variables and cause potential alpha errors in their OLS regression analysis.[34] Otherwise, my results do not show any evidence that shareholder protection diminishes financial firm performance. Minority shareholders do not play an opportunistic role and force family firms to implement a defensive strategy (Belloc, 2013). Otherwise, it is argued that the power of shareholder can harm shareholder value because they follow their private interests (Gordon, 1991; Anabtawi, 2005; Anabtawi & Stout, 2008). My nonsignificant results suggest that the levels of shareholder protection plays no role in family firms. Therefore, principal-principal conflicts between family and minority shareholders have no significant impact on financial performance of family firms compared to nonfamily firms. So, family firms should be aware that minority shareholders do not play a negative role according to financial performance but they can support the professionalization of the company, in practice.

In contrast, rule of law logic leverages family firm performance in a positive way in my study. This is not a surprising result because an economics study clearly shows that GDP and the Kaufmann rule of law have a positive association and a significant impact on each other (Rodrik et al., 2004; Glaeser et al., 2004), so all companies are positively affected by a good, enforced legal system and contribute positively to the country's GDP. Further support for the evidence of my

[34] The evidence of my evaluation can be clearly seen in figure 11 on p. 34 (Djankov et al., 2008).

results is the finding that family firms face reduced debt costs in environments with a higher rule of law quality (Ellul et al., 2007). Furthermore, family firms are not so massively confronted with credit constrains in financial crises (Crespí & Martín-Oliver, 2015). In practice, family firms investment opportunities are higher in countries with a better rule of law efficiency.

10 Limitations and avenues for further research

A major drawback of meta-analyses is the file drawer problem. Meta-analyses are based on already conducted studies. Nonsignificant findings, however, are sometimes not published; therefore, unpublished work remains unconsidered in my study. While file drawer problems and therefore a publication bias in meta-analyses cannot be fully addressed, the funnel plot and Egger test of this meta-analysis, clearly show that this bias is of minor concern but still remains, like in every meta-analysis.

A further potential source of bias is the heterogeneity of family firm definitions in primary studies. I addressed this problem by grouping these different definitions into four categories. These categories were separately analyzed in my univariate analyses, proving that the main effect and the related interpretation are valid. All four categories show a higher performance of family firms compared to nonfamily firms. Furthermore, family control, family management and the category for mixed definitions are included as controls in my multilevel analyses addressing the heterogeneity of definitions in primary studies. Future research is encouraged to develop a more harmonic category spectrum capturing different family firm characteristics besides my already applied categories of family involvement. These systems should be a bit more applicable, compared to F-PEC, to large professional data sets and financial statements of companies.

The aforementioned problems concerning definitions of family firms are intensified because boards play diverse roles in different law systems. In addition, boards depend not only on laws but also on corporate governance systems and on other external shareholders. This universe of shareholders is not addressed even e.g. banks or unions are important mood makers and influence, hence, strategic decisions. Coupled with the fact in my study that not enough variation was amongst primary studies to split up civil law into French, Scandinavian and German law, origin must be addressed in future research. These issues should be addressed in studies about family firms especially in studies in the research area of entrepreneurship and (strategic) management, in future.

The extensive amount of different performance measures in primary studies of the financial performance of family firms makes it difficult to compare primary studies with each other in a univariate way. Only multivariate analyses are able to control for such differences in measurement of performance. These market or accounting measures do not capture the nonfinancial goals of family firms which seem to have a major impact on strategic decisions (Cabrera-Suárez et al., 2014). An avenue for further research would be the identification of valid performance measures capturing financial and nonfinancial (e.g. ability of management of resources) efficiency. This newly designed performance indicator should include the fact that market measures seem to underrate the performance of family firms (see in my study the market-to-book ratio dummy).

My study is based on the calls for cross-country studies investigating institutional influences on family firms' financial performance (van Essen et al., 2015; van Essen et al., 2015). By using a dummy variable for small and medium-sized samples, I control for sample size differences according to financial performance. Therefore, I recommend conducting further studies, especially on primary study level, investigating the differences according to size of the firms. Mostly, publicly listed samples consisting of only private firms or studies with mixed samples compare family with nonfamily firms. Thus, scholars and researchers could compile a representative sample (matched samples) within a certain region consisting of publicly listed and private family firms and nonfamily firms. These analyses depict clearly the drivers of the dependent variables. It is especially to explore whether SME family firms really underperform SME nonfamily firms or whether this is the evidence driven by less earnings management of SME family firms compared to SME nonfamily firms. Furthermore, it could show differences of publicly listed family firms and nonfamily firms and private family firms and nonfamily firms at once. All these studies should conduct endogeneity checks which is not a prerequisite in getting published in the family firm research area, yet.

Additionally to my study, a cross-country meta-analysis investigating performance and the related factors in small- and medium-sized family and nonfamily firms is not yet performed. These factors can be compared to publicly listed family firms' meta-analyses to derive recommendations for executives and family members to enhance the financial performance of the related firm. Especially the cross-country studies should investigate difference impact of formal and informal institutions. For example Hofstede (2011) found in masculine-dominated countries (e.g. Germany) women are a bit more assertive compare to countries which are more feminine (e.g. France). It would be interesting to investigate which impact on family firms these differences in attitudes of women according to assertiveness have. These investigations can be accompanied by the identification of the impact of "son bias" in this related society (OECD, 2015). Furthermore, Hofstede found that from one country to another, female values do not differ as strongly as male values; maybe only the gender creates differences in family firm management. Furthermore, trust is identified as a societal driver (Fukuyama, 1995). So, in formal institutions from a non-expert driven opinion, trust in family and state should be closely investigated. Additionally, indulgence (free to enjoy life) and restraint (controlling gratification of needs) influences societies and thus family firms. The drawback of all these data is the high correlation with a country´s GDP (Siems, 2007).

Further meta-analyses have to account for the high correlations within a group (intra- class correlation). This should be either done by a model-based approach (multilevel model) or a design-based approach (generalized estimating equation, GEE).

A drawback from a statistical point of view is that sometimes only one primary study with only one coefficient per country was available, leading to a not optimal grouping and a not significant log likelihood ration test. So, grouping on country level was not an option because it would have introduced beta errors in the multivariate analyses, whereas a GEE approach would be a good choice.

Furthermore, most primary studies are based on cross-sectional analyses, even a longitudinal data set was available. These cross-sectional analyses do not account for economic regressions and revivals. Hence, a longitudinal data set should be analyzed with the more appropriate empirical approaches.

11 Executive summary

My meta-analysis clearly shows that family management is a curse and not a blessing according to financial performance of family firms compared to nonfamily firms.

Based on a univariate and multivariate meta-analysis of 270 studies from 42 countries, I addressed the main objective of my dissertation to investigate the financial performance of family firms compared to nonfamily firms. My first robust finding proves that family firms outperform nonfamily firms financially (*Research question 1*). This result endorses former meta-analyses and the majority of primary studies. My second finding (*Research question 2*) supports the finance research stream differentiating in market and accounting based measures. So, the market, represented by analysts, assumes that family firms do not outperform family firms. Contrary to what family firms report and document in their financial statements with accounting measures as my findings show. A third finding (*Research question 3*) is that the composition of primary studies samples, consisting of only publicly listed companies, only manufacturing or technological firms, do not influence the overall results. However, small and medium-sized companies report smaller financial performance indices and therefore reduce the dependent variable. The majority of SME´s in almost all countries possesses less market power and therefore achieves smaller revenues (Cressy & Olofsson, 1997). The forth result (*Research question 4*) shows that the engagement of family management leads to a significant drop in financial performance of family firms and therefore family firms underperform nonfamily firms. Family managers in family firms, however, preserve the wealth of all family members and therefore the financial performance indices are not always the key. Again, nonfinancial goals should be drawn into conclusion in empirical analyses.

My second objective to investigate the influence of institutional factors is addressed by a multivariate analysis revealing the associations among family firms, financial performance is sensitive to institutional factors (*Research question 5*): in Europe, the financial performance of family firms is lower compared to North America. That is, European publicly listed companies are mainly underrated compared to North America (Caldwell, 07.06.2014). Furthermore, in a society with high masculinity, family firms reveal a better financial performance compared to nonfamily firms. Masculinity is associated with male assertiveness, ambition, acquisition of wealth, and clearly distinct gender roles. But law regimes do not influence firm performance at all. Additional evidence comes from the investigation of the rule of law logic. A high rule of law excels the performance of family firms because they get a discount on their debt costs. The following table gives an overview of my empirical analyses results comparing HOMA and HiLLMA. A tick confirms the research question; a cross declines the assumption behind the question. Additionally, the HiLMMA result is superior to the HOMA result and should be the focal point of interpretation.

Table 11-1: Overview of empricial results

	Research question	Bivariate analysis	p-Value	Multilevel analysis	p-Value
1	Do family firms show a better financial performance compared to nonfamily firm?	✔	p< 0.01	✔	p< 0.01
2	Is the direction of market-based measures different from accounting-based measures comparing family firms' and nonfamily firms' financial performance?	✔	p< 0.10	✔	p< 0.01
3a	Do small and medium family firms show a different financial performance compared to small and medium nonfamily firms?	✘	n.s.	✘	p< 0.01
3b	Do publicly listed family firms show a different financial performance compared to publicly listed nonfamily firms?	✔	p< 0.01		
3c	Do technological family firms show a different financial performance compared to technological nonfamily firms?	✔	p< 0.10		
3d	Do manufacturing family firms show a better financial performance compared to manufacturing nonfamily firms?	✔	p< 0.01		
3e	In primary study samples consisting of only small and medium- sized enterprise: Do family firms have a positive financial performance compared to those family firms in primary study samples with only publicly listed samples?	✘	p< 0.01		
3f	In primary study samples consisting of only small and medium-sized enterprises: Do family firms have a positive financial performance compared to those in mixed primary study samples?	✘	p< 0.01	✘	p< 0.05
4a	Do owner managers of family firms impact firm performance positively?	✘	p< 0.01	✘	p< 0.01
4b	Do owner managers of family firms impact firm performance negatively?	✔	p< 0.01	✔	p< 0.01
5a	How is family firm performance influenced by regional institutional contexts?	✔	p< 0.10	✔	p< 0.10
5b	How is family firm performance influenced by informal institutional contexts?	✔	p< 0.01	✔	p< 0.01
5c	How is family firm performance influenced by legal origin?	✘	n.s.	✘	n.s.
5d	How is family firm performance positively influenced by more efficient legal environments?	✘	n.s.	✔	p< 0.05

Source: Own illustration

Hereby, I illustrate with my meta-analyses that in more competitively oriented societies (higher masculinity) combined with a high validity of rules and regulations (rule of law), family firms outperform nonfamily firms.

Furthermore, connecting the results, they explain possibilities for value creation and appropriation. Therefore, integrating these two views (Hitt et al., 2001) advanced these concepts to “strategic entrepreneurship”. So, family firms have to find a balance of value creation and appropriation. Thus, an important contribution is that scholars should view strategic entrepreneurship through both lenses.

Finally, politics should enhance the economic growth by elevating the reliability and validity of the rules, regulations and laws.

Appendix

Table A 1: Relevant meta-analyses for ancestry searching

Authors	Year	No. study
Liu, W.; Yang, H.; Zhang, G.	2012	27
O´Boyle, E. H.; Pollack, J. M.; Rutherford, M. W.	2012	95
Stewart, A.; Hitt, M.A.	2012	59
van Essen, M.; van Oosterhout, J.; Carney, M.	2012	86
van Essen, M; Carney, M.; Gedajlovic, E. R.; Heugens, P.	2011	55

Table A 2: Journal articles for ancestry searching

Authors	Year	Citations: google scholar[35]	Relevant study	Coded
Anderson, R.C.; Reeb D.M.	2003	1987	34	7
Villalonga, B.; Amit, R.	2006	1287	135	22

Table A 3: List of key words

Key words
Family
Families
Family business
Family control
Family corporate governance
Family financial performance
Family founder
Family management
Family ownership
Family performance
Family succession
Firm
Firm control
Firm corporate governance
Firm financial performance
Firm founder
Firm management
Firm ownership
Firm performance
Firm succession

[35] Retrieved: 04.09.2013; 12:58h GMT.

Table A 4: Names of scholars

Names of scholars			
Berrone,Pascual	Cheng, Qiang	Chua, Jess	Gedajlovic, Eric
Kellermanns, F.W.	Ku Nor Izah Ku Ismail	Le Breton-Miller	Mazzola, P.
Minichilli, A.	Morck, R.	Noor AfzaAmran	Phan,Phillip
Sciascia, S	Sharma, P.	Uhlaner, Lorraine	Zellweger, T.
María Jesús Nieto			

Figure A 5: Parametrization plot Null model

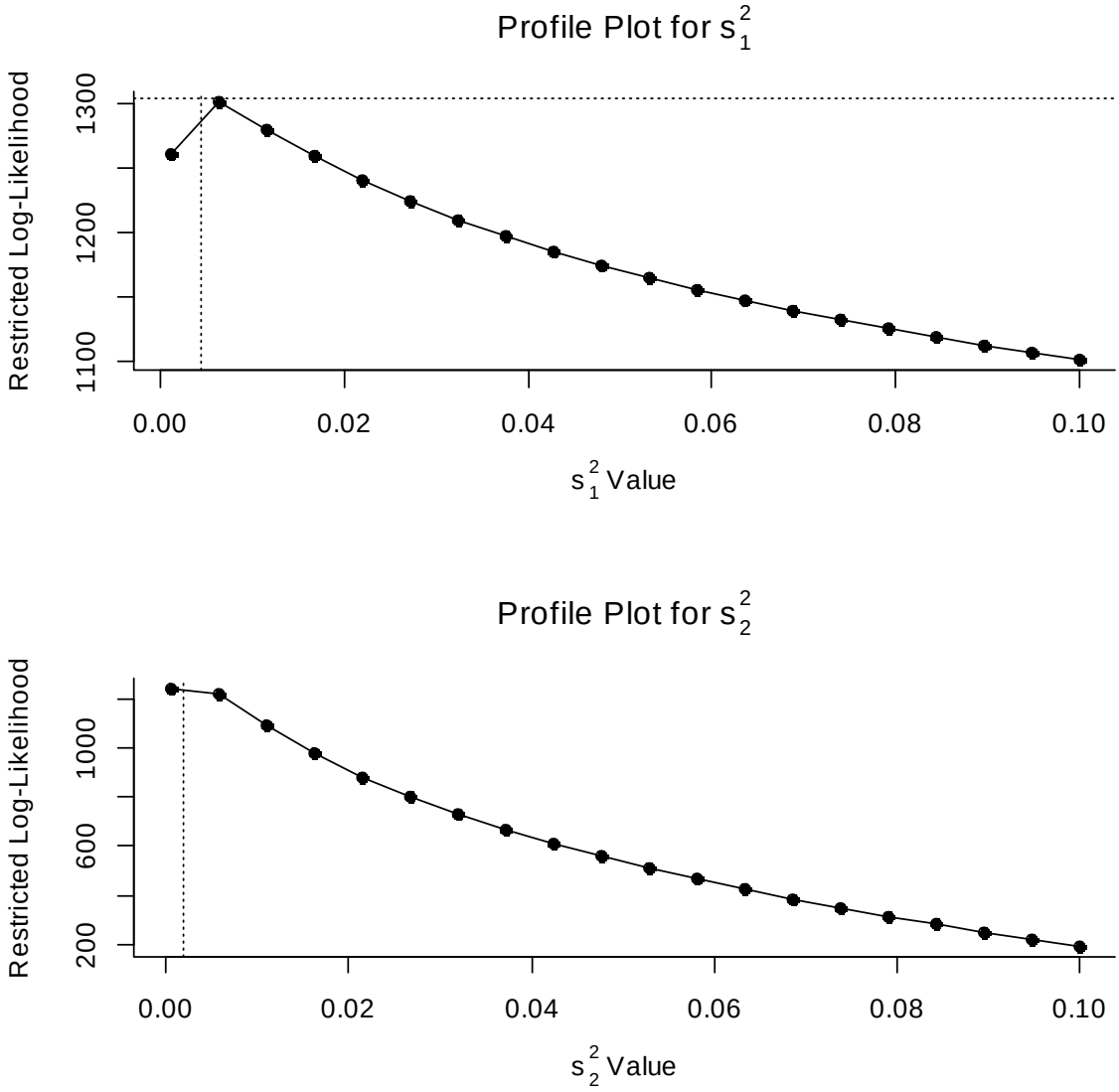


Figure A 6: Parametrization plot for moderator region

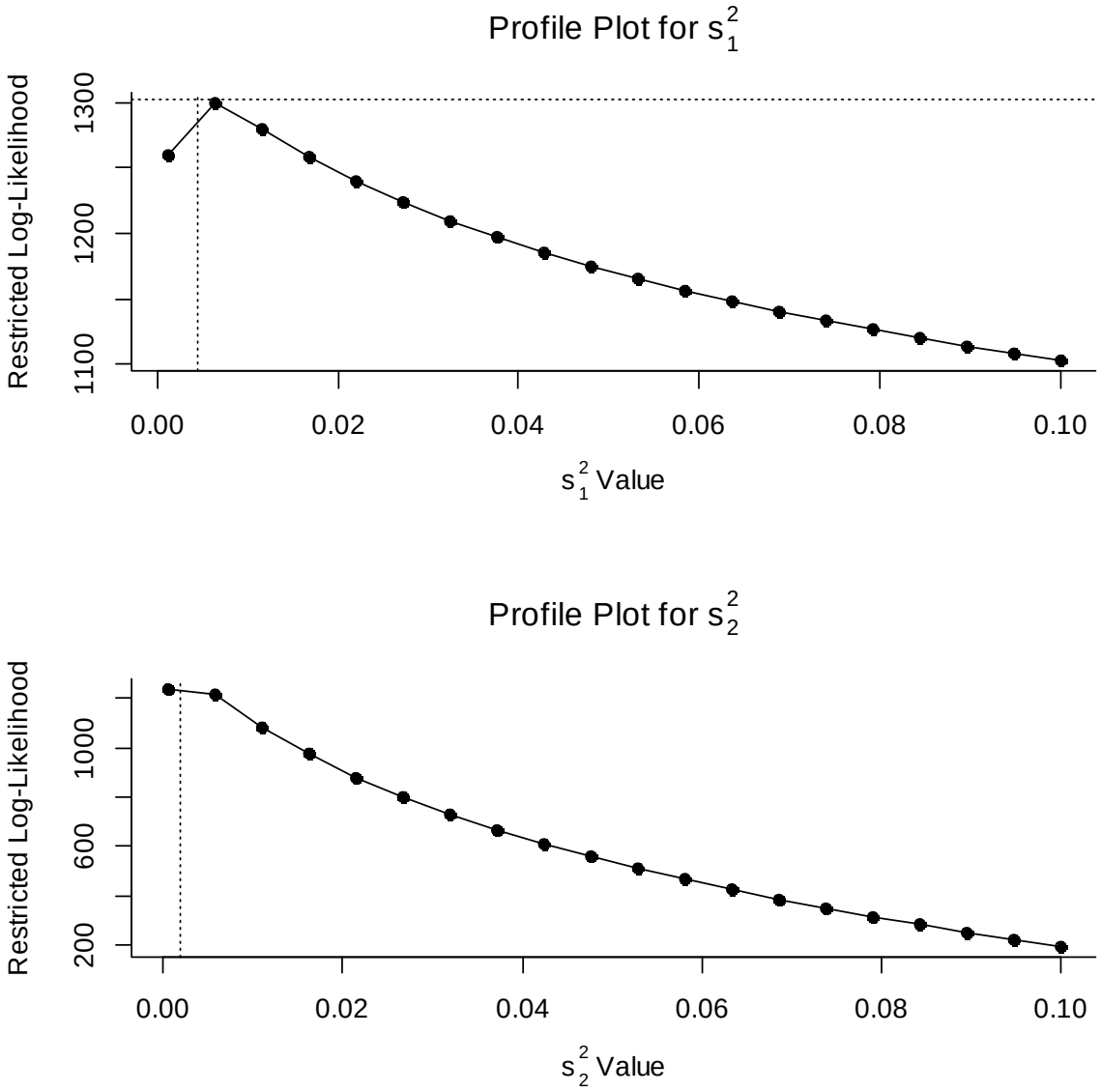


Figure A 7: Parametrization plot for law moderators

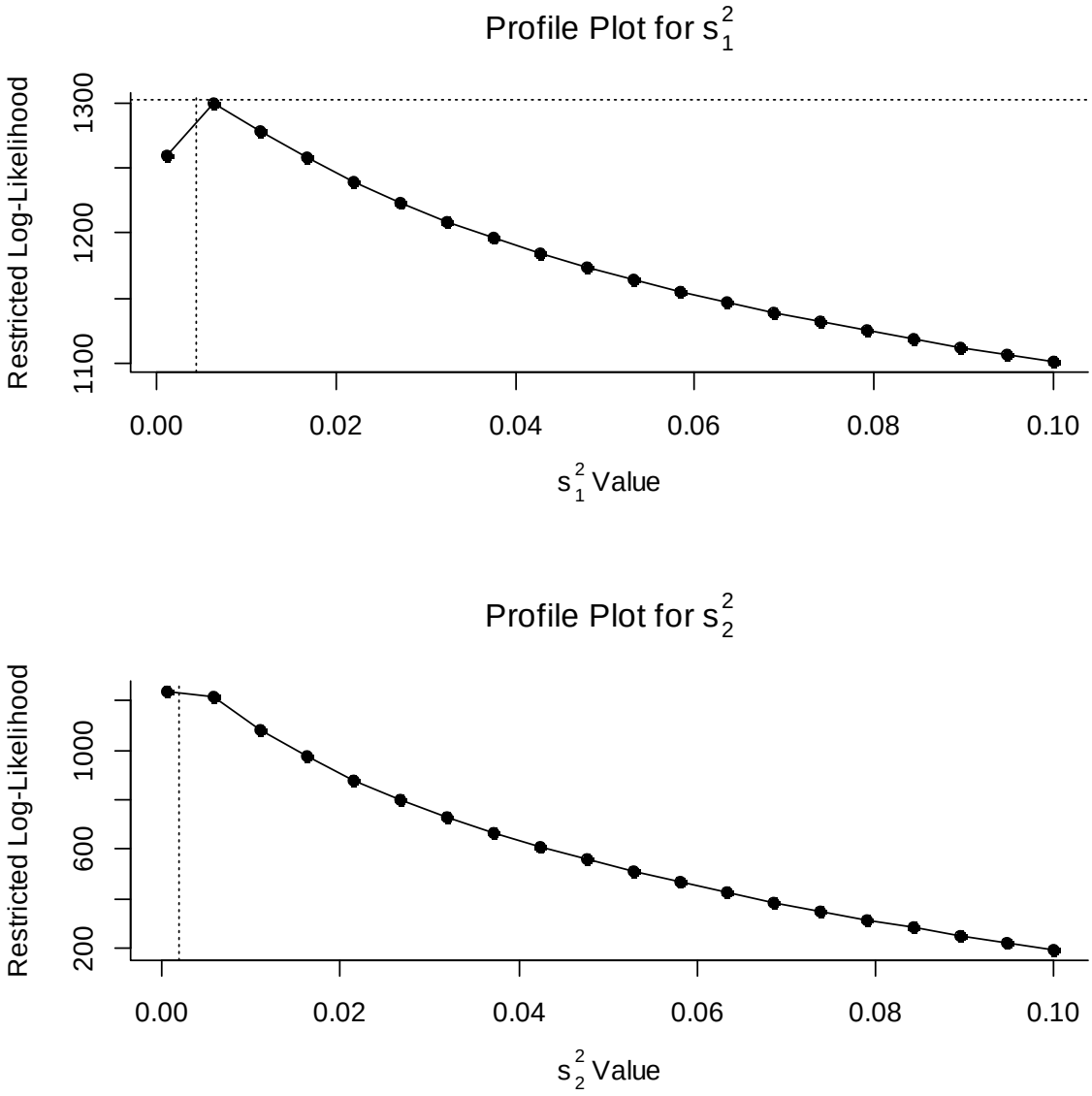


Figure A 8: Parametrization plot for cultural moderators

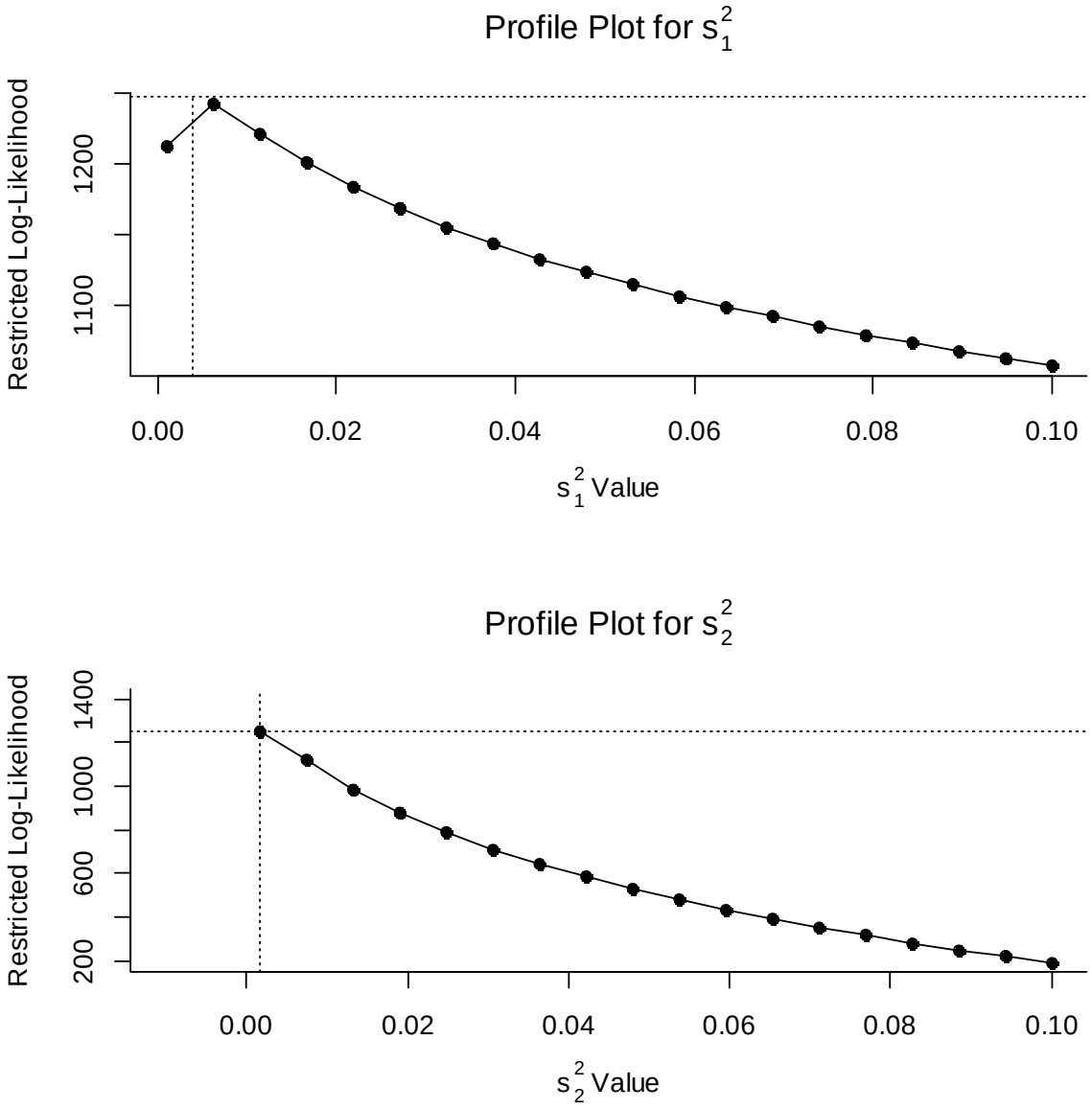


Figure A 9: Parametrization plot for formal institutions

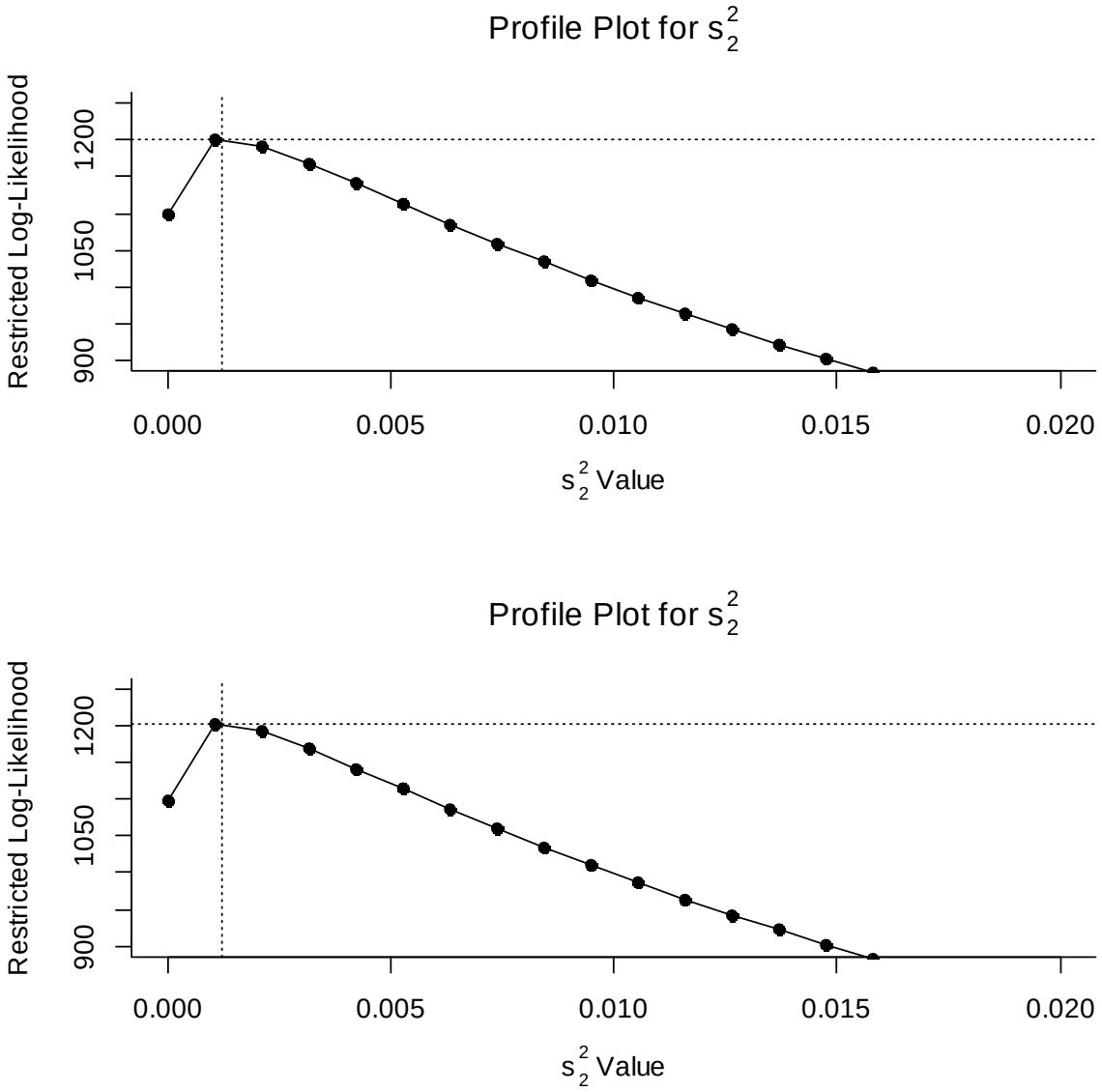


Table A 10: Primary studies in meta-analysis of chapter 7.1 (1)

Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published
Abdullah et al.	2012	841	Malaysia	No	Bhaumik et al.	2009	777	India	Yes	Chu	2009	341	Taiwan	Yes
Abor & Biekpe	2007	120	Ghana	Yes	Binacci & Peruffo	2013	92	USA	No	Chu	2011	786	Taiwan	Yes
Achleitner et al.	2014	402	Germany	Yes	Bjuggren & Palmberg	2010	110	Sweden	Yes	Chung	2012	35	Taiwan	Yes
Acquaah & Amoako-Gyampah	2011	122	Ghana	Yes	Black et al.	2012	665	Korea	No	Claessens	2002	908	Several countries	Yes
Adams et al.	2005	336	USA	Yes	Blanco-Mazagatos	2007	654	Spain	Yes	Corstjens & Preyer	2005	1,446	France	No
Ahrens	2013	290	Germany	No	Block	2010	414	USA	Yes	Corstjens et al.	2004	227	France	No
Al-Dubai et al.	2014	75	Saudi Arabia	Yes	Block	2012	154	USA	Yes	Craig	2013	250	USA	Yes
Alestalo	2010	196	Finland	No	Block	2009	243	USA	No	Cruz & Justo	2008	537	Dominican Republic	No
Ali	2007	500	USA	Yes	Block & Wagner	2013	286	USA	Yes	Cruz et al.	2012	392	Dominican Republic	Yes
Amore & Minichilli	2013	923	Italy	No	Block et al.	2013	248	USA	Yes	Cruz et al.	2014	598	Several countries	Yes
Ampenberger et al.	2013	660	Germany	Yes	Block et al.	2011	419	USA	Yes	Cucculelli et al.	2014	204	Italy	No
Amran	2011	888	Malaysia	No	Bocatto & Rialp	2010	29	Spain	Yes	D'Aurizio et al.	2014	1,833	Italy	No
Amran & Ahmad	2009	896	Malaysia	Yes	Boland et al.	2008	40	USA	Yes	Davis & Stout	1992	500	USA	Yes
Amran & Ahmad	2010	975	Malaysia	Yes	Bona Sanchez et al.	2008	90	Spain	Yes	De Massis et al.	2014	787	Italy	Yes
Anderson	2003	403	USA	Yes	Bona Sanchez et al.	2009	102	Spain	Yes	De Massis et al.	2013	199	Switzerland	Yes
Anderson & Duru	2008	2,000	USA	No	Bonilla & Carvajal	2010	260	Chile	Yes	De Massis et al.	2013	494	Italy	Yes
Anderson & Reeb	2010	2,000	USA	No	Bouzgarrou	2013	239	France	Yes	Deephouse & Jaskiewicz	2013	194	Several countries	Yes
Anderson & Reeb	2003	319	USA	Yes	Bozec & Laurin	2008	400	Canada	Yes	Dehlen	2013	884	Germany	No
Anderson & Reeb	2004	403	USA	Yes	Calbrò et al.	2013	342	Norway	Yes	Dekker et al.	2013	523	Belgium	Yes
André et al.	2014	215	Canada	Yes	Campopiano et al.	2014	130	Italy	Yes	Delgado-Garcia et al.	2010	59	Spain	Yes
Andres	2008	275	Germany	Yes	Carrasco-Hernández & Sánchez-Marín	0	400	Spain	No	Din & Javid	2011	29	Pakistan	No
Arosa & Iturralde	2010	369	Spain	Yes	Casillas & Moreno	2010	449	Spain	Yes	Ding & Zhang	2008	1,011	China	Yes
Astrachan & Kolenko	1994	581	USA	Yes	Chaganti & Damanpour	1991	80	USA	Yes	Ducassy & Prevot	2010	207	France	Yes
Attig & El Ghoul	2011	2,723	Several countries	No	Chakraborty & Sheikh	2008	137	USA	No	Eddelston & Kellermans	2007	60	USA	Yes
Audretsch et al.	2013	386	Germany	Yes	Chang et al.	2012	700	Taiwan	Yes	Eddleston et al.	2012	179	Switzerland	Yes
Averstad & Rova	2007	600	Sweden	No	Chang	2003	419	Korea	Yes	Ehrhardt et al.	2006	124	Germany	No
Azoury et al.	2010	27	Lebanon	Yes	Che & Langli	2014	70,000	Norway	No	Eklund et al.	2010	256	Sweden	No
Bagnoli & Liu	2011	500	USA	Yes	Chen & Jaggi	2000	87	Hong Kong	Yes	Elderink	2014	80	Netherlands	No
Banalieva & Eddelston	2011	202	Several countries	Yes	Chen & Hsu	2013	77	Taiwan	Yes	Escriba-Esteve et al.	2009	295	Spain	Yes
Banogli & Liu	2008	415	USA	No	Chen & Hsu	2009	369	Taiwan	Yes	Espinoza Aguiló & Espinoza Aguiló	2012	101	Mexico	Yes
Barbera & Moores	2013	3,364	Australia	Yes	Chen et al.	2014	6,950	Several countries	Yes	Fahlenbrach	2009	361	USA	Yes
Barnett et al.	2009	121	USA	Yes	Chen & Chen	2007	1,311	USA	Yes	Favero et al.	2006	128	Italy	No
Barontini	2006	675	Several countries	Yes	Chen	2010	1,003	USA	Yes	Feito-Ruiz & Menéndez-Requejo	2010	124	Several countries	Yes
Barth & Gulbrandsen	2005	438	Norway	Yes	Chen & Chen	2008	1,204	USA	No	Fernando et al.	2013	295	Several countries	Yes
Baschieri et al.	2014	182	Italy	No	Chen et al.	2013	1,204	USA	Yes	Fernando et al.	2012	500	Spain	No
Bassanini et al.	2013	1,870	France	Yes	Chen & Dagupta	2010	1,500	USA	No	Filatotchev & Lien	2005	228	Taiwan	Yes
Basu	2009	103	USA	Yes	Chen et al.	2005	412	Hong Kong	Yes	Filatotchev et al.	2011	447	Hong Kong	Yes
Bauguess & Stegemoller	2008	498	USA	Yes	Chen et al.	2007	1,145	USA	Yes	Fitó & Moya	2013	52	Spain	Yes
Bauweraerts	2013	219	Belgium	Yes	Cheung et al.	2005	412	Hong Kong	Yes	Franks & Mayer	2010	1,911	Several countries	No
Belenzon	2011	101,816	Several countries	No	Ching et al.	2002	236	Hong Kong	No	Gallo & Vilaseca	1998	104	USA	Yes
Belenzon et al.	2014	225,683	Several countries	No	Chirico & Salvato	2014	199	Switzerland	Yes	Gallucci & D'Amato	2007	114	Italy	Yes
Belenzon & Zarutskie	2011	183,537	Several countries	No	Chirico et al.	2011	199	Switzerland	Yes	Galve Górriz & Fumás	2005	53	Spain	No
Ben Ali & Lesage	2014	1,097	USA	No	Chirico	2014	199	Switzerland	Yes	Galve-Górriz & Salas-Fumas	2010	51	Spain	No
Ben-Amar	2006	232	Canada	Yes	Choi et al.	2007	464	South Korea	Yes	Gama & Rodrigues	2010	208	Italy	Yes
Benavides et al.	2009	59	Peru	No	Choi & Yoo	2005	443	South Korea	No	Garcia-Castro & Aguilera	2014	6,592	Several countries	Yes
Bennedsen & Nielsen	2007	4,692	Denmark	Yes	Chrisman & Patel	2012	964	USA	Yes	Ghorbani & Zavareh	2012	141	Iran	Yes
Berent-Braun & Uhlaner	2012	64	Several countries	Yes	Chrisman & Chua	2004	1,141	USA	Yes	Giovanni	2009	56	Italy	Yes
Berrone & Cruz	2010	194	USA	Yes	Chrisman et al.	2012	1,060	USA	Yes	Goh et al.	2013	141	Malaysia	Yes
Berrone & Gomez-Mejia	2009	469	USA	Yes	Chrisman et al.	2007	208	USA	Yes	Gomez-Mejia & Larrazza-Kintana	2014	219	Spain	No
Bertrand et al.	2008	586	Thailand	Yes	Chrisman et al.	2009	505	USA	Yes	Gomez-Mejia & Campbell	2013	610	USA	Yes

Note: The full references are available on the website www.familyfirms.de.

Table A 10 continued: Primary studies in meta-analysis of chapter 7.1 (2)

Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published
Gomez-Mejia & Makri	2010	360	USA	Yes	Kraiczy et al.	2014	63	Germany	Yes	Michiels et al.	2013	529	USA	Yes
Gomez-Mejia & Makri	2003	253	Several countries	No	Kuan et al.	2011	1,164	Taiwan	Yes	Miller & Lester	2010	898	USA	Yes
Gonzalez et al.	2012	523	Colombia	Yes	Kunze et al.	2014	69	Germany	No	Miller & Lester	2010	898	USA	Yes
Graves & Shan	2013	4,217	Australia	Yes	Kuo & Hung	2012	1,115	Taiwan	Yes	Miller & Le Breton-Miller	2007	863	USA	Yes
Guizani	2010	42	Tunisia	No	La Rocca & Montalto	2011	231	Italy	No	Miller et al.	2009	170	Korea	Yes
Guzman & Gonzales	2010	523	Colombia	No	Lam & Lee	2008	128	Hong Kong	Yes	Miller & Le Breton-Miller	2013	898	USA	Yes
Hadani	2007	430	USA	Yes	Lappalainen	2014	621	Finland	No	Miller & Minichilli	2013	911	Italy	Yes
Han An & Naughton	2006	509	Korea	No	Lappalainen & Niskanen	2012	600	Finland	Yes	Miller & Minichilli	2013	893	Italy	Yes
Haniffa & Cooke	2002	167	Malaysia	Yes	Lee	2004	29	Korea	Yes	Miller & Scholnick	2008	464	Canada	Yes
Hashim & Devi	2007	280	Malaysia	No	Lee	2006	403	USA	Yes	Miller et al.	2011	898	USA	Yes
He et al.	2007	100	China	Yes	Leitterstorf & Rau	2014	153	Germany	Yes	Minichilli & Corbetta	2010	92	Italy	Yes
Ho, Simon & Wong	2001	98	Hong Kong	Yes	Li	2013	1,585	USA	No	Minichilli et al.	2014	161	Italy	Yes
Huang	2014	673	Taiwan	Yes	Li	2010	264	China	Yes	Miralles-Marcelo et al.	2014	55	Portugal	Yes
Hufft Jr.	1999	735	USA	No	Liang et al.	2013	902	China	Yes	Mishra et al.	2001	120	Norway	Yes
Huse	1994	75	Several countries	No	Lien & Li	2013	205	Taiwan	Yes	Molly et al.	2010	504	Belgium	Yes
Hwang & Kim	2009	93	USA	Yes	Liew et al.	2011	375	Malaysia	No	Mukherjee & Padgett	2005	199	United Kingdom	No
Hybrechts et al.	2013	555	Belgium	Yes	Lin	2010	6,090	Taiwan	Yes	Munari et al.	2010	1,000	Several countries	Yes
Hybrechts	2011	110	Belgium	No	Lin & Hu	2007	50	Taiwan	Yes	Muñoz-Bullón & Sánchez-Bueno	2012	2,596	Several countries	Yes
Ibrahim & Samad	2011	290	Malaysia	Yes	Lin et al.	2014	364	Taiwan	Yes	Muñoz-Bullón & Sánchez-Bueno	2011	736	Canada	Yes
Isakov & Weisskopf	2009	178	Switzerland	No	Ling & Kellermanns	2009	86	USA	Yes	Muttakin & Khan	2012	141	Bangladesh	No
Isakov & Weisskopf	2014	185	Switzerland	Yes	Lins et al.	2012	8,584	Several countries	No	N.N.	2013	160	Malaysia	No
Isakov & Weisskopf	2014	185	Switzerland	Yes	Lotto	2013	455	United Kingdom	Yes	N.N.	2009	535	United Kingdom	No
Jabeen & Kaleem	2012	62	Pakistan	Yes	Luo & Liu	2014	263	China	Yes	N.N.	2014	203	Germany	No
Jacquemin & Ghellinck	1980	103	France	Yes	Luo & Chung	2012	737	Taiwan	Yes	N.N.	2014	3,890	Spain	No
Jaggi et al.	2009	269	Hong Kong	Yes	Luo & Chung	2012	573	Taiwan	No	Nagar et al.	2002	2,713	USA	No
Jang et al.	2005	1,538	Korea	No	Luo & Chung	2009	801	Several countries	Yes	Naldi & Cennamo	2013	1,008	Italy	Yes
Jaskiewicz	2006	175	Germany	No	Lv & Lin	2008	202	Taiwan	Yes	Naldi et al.	2008	217	Sweden	No
Jaskiewicz et al.	2005	99	Several countries	Yes	MacKay	2012	194	Canada	No	Niskanen et al.	2010	476	Finland	Yes
Jesus Nieto & Fernandez	2013	1,500	Spain	Yes	Madision et al.	2014	377	USA	Yes	Olejnik	2013	497	Germany	No
Ji et al.	2006	433	Hong Kong	Yes	Madison	2014	77	USA	No	Oswald & Muse	2000	2,631	USA	Yes
Jo & Harjoto	2011	2,493	USA	Yes	Mahto & Khanin	2013	1,740	USA	Yes	Pandey et al.	2010	131	India	No
Jones & Makri	2008	203	Several countries	Yes	Majumar &Varadarajan	2013	61	United Arab Emirates	Yes	Patel & Chrisman	2014	847	USA	Yes
Jungwook & Oksmuro	2011	1,202	Japan	Yes	Majumar &Varadarajan	2013	61	United Arab Emirates	Yes	Patel et al.	2010	663	USA	No
Kammerlander	2013	1,354	Switzerland	No	Mannarino	2013	2,795	Italy	No	Pazzaglia & Mengoli	2013	101	Italy	Yes
Kammerlander	2013	155	Switzerland	No	Mansi et al.	2014	277	India	No	Peng & Jiang	2006	151	Hong Kong	No
Kellermanns & Eddleston	2007	51	USA	Yes	Markin	2004	251	Canada	No	Peng & Jiang	2010	634	Several countries	Yes
Kellermanns & Eddleston	2006	74	USA	Yes	Martikainen et al.	2009	159	USA	Yes	Perez-Gonzalez	2006	335	USA	Yes
Kellermanns et al.	2012	33	USA	Yes	Martínez & Stöhr	2007	175	Chile	Yes	Perrini & Rossi	2008	297	Italy	Yes
Kersten Leiber	2008	807	Germany	No	Masayuki	2008	5,000	Japan	No	Pindado et al.	2008	262	Several countries	No
Khan	2003	420	USA	No	Master	2012	167	Netherlands	No	Plötzl	2013	303	Germany	No
Khan et al.	2013	100	Pakistan	Yes	Masulis et al.	2011	22,380	Several countries	No	Prencipe et al.	2011	135	Italy	Yes
Kholmurodova & Bartholdy	2009	245	Denmark	No	Matho & Davis	2013	2,168	USA	Yes	Price et al.	2013	293	Several countries	Yes
Kim & Gao	2013	158	China	Yes	Maury	2006	1,672	Several countries	Yes	Pukthuanthong & Walkter	2013	158	Canada	Yes
Kim & Lee	2008	253	South Korea	Yes	Mazzola et al.	2013	294	Italy	Yes	Randoy et al.	2003	141	Several countries	No
King & Santor	2008	613	Canada	Yes	McConaughy & Phillips	1999	147	USA	Yes	Randøy & Goel	2003	72	Norway	Yes
Klein & Shapiro	2005	263	Canada	Yes	McGuire & Dow	2012	473	USA	Yes	Randøy et al.	2009	98	Sweden	Yes
Kortelainen	2007	416	Norway	No	Memili et al.	2013	2,019	USA	Yes	Sacristán-Navarro et al.	2011	118	Spain	Yes
Kotlar & De Massis	2012	1,540	Spain	Yes	Memili et al.	2010	163	Switzerland	Yes	Sacristán-Navarro & Gómez-Ansón	2011	53	Spain	Yes
Kotlar & Frattini	2013	437	Spain	No	Menéndez-Requejo	2006	6,094	Spain	Yes	Sacristán-Navarro & Gómez-Ansón	2006	86	Spain	Yes
Kowalewski & Talavera	2010	217	Poland	Yes	Menozzi et al.	2014	327	Italy	No	Saito	2007	1,818	Japan	No

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Table A 10 continued: Primary studies in meta-analysis of chapter 7.1 (3)

Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published	Author	Publishing Year	N firms in sample	Country	Published
Salvatore et al.	2012	1,035	USA	Yes	van Essen et al.	2013	1,112	Several countries	No	Wilson et al.	2013	711,624	Germany	Yes
Sanches & Rodriguez	2009	2,759	Several countries	Yes	Su & Lee	2012	314	Taiwan	Yes	Wiwattanakantang	2001	270	Thailand	Yes
Sanchez-Bueno & Usero	2013	892	Several countries	Yes	Sundelius & Magnussen	2011	7,073	Norway	No	Wong & Chang	2010	249	Taiwan	Yes
Sanda et al.	2014	89	Nigeria	No	Tang	2008	110	China	No	Wu	2013	503	Taiwan	Yes
Schmid et al.	2013	641	Germany	Yes	Taufil-Mohd & Md-rus	2013	190	Malaysia	Yes	Xve	2012	121	China	No
Schmid	2013	286	USA	Yes	Tinaikar	2009	420	USA	No	Yang	2012	864	China	No
Schmid & Kappes	2013	701	Germany	Yes	Tong	2008	500	USA	Yes	Yasser	2011	132	Pakistan	Yes
Schulze et al.	2001	1,376	USA	Yes	Tsao & Chen	2009	688	Taiwan	Yes	Yeh	2005	146	Taiwan	Yes
Schulze et al.	2003	883	USA	Yes	Uhlaner	2004	916	Netherlands	No	Yeh et al.	2001	193	Taiwan	Yes
Schwens	2012	256	Germany	Yes	Uhlaner & Floren	2007	233	Netherlands	Yes	Yi & Peng	2011	744	Several countries	Yes
Schwens	2014	148	Germany	Yes	Van den Berg	2014	50	Netherlands	No	Yoo et al.	2014	444	Korea	Yes
Sciascia & Mazzola	2008	620	Italy	Yes	Vandekerkhof et al.	2014	145	Belgium	Yes	Yoshikawa & Rasheed	2010	210	Japan	Yes
Sciascia et al.	2014	233	Italy	Yes	Vandemaele & Vancauteren	2013	501	Belgium	Yes	Young et al.	2008	492	Taiwan	Yes
Sciascia et al.	2012	199	Switzerland	Yes	Veliyath	2000	122	India	Yes	Yu	2008	115	China	Yes
Serrasqueiro et al.	2011	614	Portugal	No	Venanzi & Morresi	2010	119	Italy	No	Zahra	2008	248	USA	Yes
Shen	2008	465	Taiwan	No	Vieira	2014	35	Portugal	Yes	Zahra	2003	409	USA	Yes
Sherif & Iordanis	2009	258	Greece	No	Villalonga	2006	508	USA	Yes	Zahra	2005	209	USA	Yes
Shi	2009	1,210	China	Yes	Volpin	2002	1,989	Italy	Yes	Zahra	2010	741	USA	Yes
Shi	2008	1,233	China	No	Wall	1998	383	USA	Yes	Zahra et al.	2012	1,289	China	Yes
Shivdasani & Yermack	1999	341	USA	Yes	Wallevik	2009	167	Norway	No	Zahra et al.	2007	209	USA	Yes
Silva & Majluf	2008	165	Chile	Yes	Wang	2014	316	Several countries	No	Zattoni & Gnan	2012	488	Norway	Yes
Singal	2014	100	USA	Yes	Wei et al.	2011	1,486	China	Yes	Zellweger	2006	958	Switzerland	No
Sirmon & Hitt	2008	2,531	France	Yes	Weismeier-Sammer	2011	413	Austria	Yes	Zellweger	2007	358	Switzerland	Yes
Srear & Thesmar	2007	595	France	Yes	Welsh et al.	2014	89	Japan	Yes	Zellweger et al.	2010	523	Switzerland	No
Srinivasan	2005	409	USA	Yes	Werner et al.	2013	1,870	Germany	No	Zellweger et al.	2012	82	Switzerland	Yes
Stavrou & Kassinis	2007	204	USA	Yes	Wesley	2010	268	USA	No	Zellweger et al.	2012	179	Switzerland	No
Stockmans & Lybaert	2013	79	Belgium	Yes	Westhead & Howorth	2006	214	United Kingdom	Yes					

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Table A 11: Primary studies in meta-analysis of chapter 7.2 (1)

Author	Publishing Year	No. firms in sample		Published	Author	Publishing Year	No. firms in sample	Country	Published	Author	Publishing Year	No. firms in sample	Country	Published
Acquaah & Amoako-Gyampah	2011	122	Ghana	Yes	Chen & Jaggi	2000	87	Hong kong	Yes	Hybrechts	2011	110	Belgium	No
Ali	2007	500	USA	Yes	Chen et al.	2005	412	Hong kong	Yes	Hybrechts et al.	2013	555	Belgium	Yes
Ampenberger et al.	2013	660	Germany	Yes	Cheung et al.	2005	412	Hong kong	Yes	Ibrahim & Samad	2011	290	Malaysia	Yes
Anderson	2003	403	USA	Yes	Ching et al.	2002	236	Hong kong	No	Isakov & Weisskopf	2009	178	Switzerland	No
Anderson & Duru	2008	2000	USA	No	Choi & Yoo	2005	443	Korea	No	Isakov & Weisskopf	2014	185	Switzerland	Yes
Anderson & Reeb	2010	2000	USA	No	Chrisman & Chua	2004	1141	USA	Yes	Jabeen & Kaleem	2012	62	Pakistan	Yes
Anderson & Reeb	2004	403	USA	Yes	Chrisman et al.	2009	505	USA	Yes	Jacquemin & Ghellinck	1980	103	France	Yes
Andres	2008	275	Germany	Yes	Chrisman et al.	2012	1060	USA	Yes	Jaggi et al.	2009	269	Hong Kong	Yes
Audretsch et al.	2013	386	Germany	Yes	Chu	2009	341	Taiwan	Yes	Jaskiewicz	2006	175	Germany	No
Averstad & Rova	2007	600	Sweden	No	Chu	2011	786	Taiwan	Yes	Jesus Nieto & Fernandez	2013	1500	Spain	Yes
Bagnoli & Liu	2011	500	USA	Yes	Claessens	2002	908	several countries	Yes	Ji et al.	2006	433	Hong Kong	Yes
Banogli & Liu	2008	415	USA	No	Corstjens & Preyer	2005	1446	France	No	Jo & Harjoto	2011	2493	USA	Yes
Barbera & Moores	2013	3364	Australia	Yes	Corstjens et al.	2004	227	France	No	Jungwook & Oksmuro	2011	1202	Japan	Yes
Barontini	2006	675	several countries	Yes	Cruz & Justo	2008	537	Dominican Republic	No	Kersten Leiber	2008	807	Germany	No
Barth & Gulbrandsen	2005	438	Norway	Yes	Cruz et al.	2012	392	Dominican Republic	Yes	Khan	2003	420	USA	No
Bassanini et al.	2013	1870	France	Yes	Davis & Stout	1992	500	USA	Yes	Khan et al.	2013	100	Pakistan	Yes
Bauweraerts	2013	219	Belgium	Yes	De Massis et al.	2014	787	Italy	Yes	Kholmurodova & Bartholdy	2009	245	Denmark	No
Belenzon	2011	101816	several countries	No	Deephouse & Jaskiewicz	2013	194	several countries	Yes	Kim & Lee	2008	253	Korea	Yes
Belenzon & Zarutskie	2011	183537	several countries	No	Dehlen	2013	884	Germany	No	Kortelainen	2007	416	Norway	No
Ben-Amar	2006	232	Canada	Yes	Delgado-Garcia et al.	2010	59	Spain	Yes	Kotlar & De Massis	2012	1540	Spain	Yes
Benavides et al.	2009	59	Peru	No	Ding & Zhang	2008	1011	China	Yes	Kotlar & Frattini	2013	437	Spain	No
Bennedsen & Nielsen	2007	4692	Denmark	Yes	Ducassy & Prevot	2010	207	France	Yes	Kowalewski & Talavera	2010	217	Poland	Yes
Bennedsen & Nielsen	2007	4692	Sweden	Yes	Ehrhardt et al.	2006	124	Germany	No	Kuo & Hung	2012	1115	Taiwan	Yes
Bennedsen et al.	2010	4096	several countries	Yes	Eklund et al.	2010	256	Sweden	No	Lappalainen & Niskanen	2012	600	Finland	Yes
Berrone & Cruz	2010	194	USA	Yes	Escriba-Esteve et al.	2009	295	Spain	Yes	Lee	2004	29	Korea	Yes
Berrone & Gomez-Mejia	2009	469	USA	Yes	Espinoza Aguiló & Espinoza Aguiló	2012	101	Mexico	Yes	Lee	2006	403	USA	Yes
Bhaumik et al.	2009	777	India	Yes	Favero et al.	2006	128	Italy	No	Lee	2004	29	Thailand	Yes
Black et al.	2012	665	Korea	No	Fernando et al.	2012	500	Spain	No	Li	2010	264	China	Yes
Blanco-Mazagatos	2007	654	Spain	Yes	Filatotchev & Lien	2005	228	Taiwan	Yes	Li & Srinivasan	2011	1500	USA	Yes
Block	2010	414	USA	Yes	Filatotchev et al.	2011	447	Hong Kong	Yes	Liang et al.	2013	902	China	Yes
Block	2012	154	USA	Yes	Franks & Mayer	2010	1911	several countries	No	Lien & Li	2013	205	Taiwan	Yes
Block	2009	243	USA	No	Gallucci & D'Amato	2007	114	Italy	Yes	Lin & Hu	2007	50	Taiwan	Yes
Block & Wagner	2013	286	USA	Yes	Galve Górriz & Fumás	2005	53	Spain	No	Lins et al.	2012	8584	several countries	No
Block et al.	2011	419	USA	Yes	Gama & Rodrigues	2010	208	Italy	Yes	Luo & Chung	2012	737	Taiwan	Yes
Block et al.	2013	248	USA	Yes	Ghorbani & Zavareh	2012	141	Iran	Yes	Luo & Chung	2012	573	Taiwan	No
Bosworth & Loundes	2002	3569	Australia	No	Gomez-Mejia & Makri	2010	360	USA	Yes	Luo & Chung	2009	801	several countries	Yes
Casillas & Moreno	2010	449	Spain	Yes	Graves & Shan	2013	4217	Australia	Yes	MacKay	2012	194	Canada	No
Chaganti & Damanpour	1991	80	USA	Yes	Guzman & Gonzales	2010	523	Colombia	No	Mannarino	2013	2795	Italy	No
Chang	2003	419	Korea	Yes	Hadani	2007	430	USA	Yes	Markin	2004	251	Canada	No
Chang et al.	2012	700	Taiwan	Yes	Han An & Naughton	2006	509	Korea	No	Martikainen et al.	2009	159	USA	Yes
Chen	2010	1003	USA	Yes	Haniffa & Cooke	2002	167	Malaysia	Yes	Martínez & Stöhr	2007	175	Chile	Yes
Chen & Chen	2007	1311	USA	Yes	Hashim & Devi	2007	280	Malaysia	No	Martínez & Stöhr	2007	175	Finland	Yes
Chen & Chen	2008	1204	USA	No	Ho, Simon & Wong	2001	98	Hong Kong	Yes	Masulis et al.	2011	22380	several countries	No
Chen & Dagupta	2010	1500	USA	No	Hufft Jr.	1999	735	USA	No	Maury	2006	1672	several countries	Yes
Chen & Hsu	2013	77	Taiwan	Yes	Hwang & Kim	2009	93	USA	Yes	McConaughy & Phillips	1999	147	USA	Yes

Table A 11 continued: Primary studies in meta-analysis of chapter 7.2 (2)

Author	Publishing Year	No. firms in sample	Country	Published	Author	Publishing Year	No. firms in sample	Country	Published
McConaughy & Walker	1998	218	USA	Yes	Villalonga	2006	508	USA	Yes
McGuire & Dow	2012	473	USA	Yes	Villalonga & Amit	2009	515	USA	Yes
Miller & Le Breton-Miller	2007	863	USA	Yes	Volpin	2002	1989	Italy	Yes
Miller & Le Breton-Miller	2013	898	USA	Yes	Wall	1998	383	USA	Yes
Miller & Scholnick	2008	464	Canada	Yes	Wallevik	2009	167	Norway	No
Miller et al.	2011	898	USA	Yes	Wei et al.	2011	1486	China	Yes
Miller et al.	2009	170	Korea	Yes	Wesley	2010	268	USA	No
Muñoz-Bullón & Sánchez-Bueno	2012	2596	several countries	Yes	Wong & Chang	2010	249	Taiwan	Yes
Muttakin & Khan	2012	141	Bangladesh	No	Yoshikawa & Rasheed	2010	210	Japan	Yes
N.N.	2013	160	Malaysia	No	Zahra	2003	409	USA	Yes
Naldi & Cennamo	2013	1008	Italy	Yes	Zattoni & Gnan	2012	488	Norway	Yes
Olejnik	2013	497	Germany	No	Zellweger	2006	958	Switzerland	No
Perez-Gonzalez	2006	335	USA	Yes	Zellweger	2007	358	Switzerland	Yes
Perrini & Rossi	2008	297	Italy	Yes					
Prabowo & Simpson	2011	152	Indonesia	Yes					
Pukthuanthong & Walkter	2013	158	Canada	Yes					
Randøy & Goel	2003	72	Norway	Yes					
Randoy et al.	2003	141	several countries	No					
Randøy et al.	2009	98	Sweden	Yes					
Sacramento Santos et al.	2013	1066	several countries	Yes					
Sacristán-Navarro & Gómez-Ansón	2011	53	Spain	Yes					
Sacristán-Navarro & Gómez-Ansón	2006	86	Spain	Yes					
Sacrístán-Navarro et al.	2011	118	Spain	Yes					
Saito	2007	1818	Japan	No					
Salloum et al.	2013	75	Lebanon	Yes					
Salvatore et al.	2012	1035	USA	Yes					
Schmid	2013	286	USA	Yes					
Schmid & Kappes	2013	701	Germany	Yes					
Schmid et al.	2013	641	Germany	Yes					
Sciascia & Mazzola	2008	620	Italy	Yes					
Shen	2008	465	Taiwan	No					
Shivdasani & Yermack	1999	341	USA	Yes					
Silva & Majluf	2008	165	Chile	Yes					
Singal	2014	100	USA	Yes					
Sirmon & Hitt	2008	2531	France	Yes					
Srear & Thesmar	2007	595	France	Yes					
Srinivasan	2005	409	USA	Yes					
Stavrou & Kassinis	2007	204	USA	Yes					
Sundelius & Magnussen	2011	7073	Norway	No					
Tinaikar	2009	420	USA	No					
Tong	2008	500	USA	Yes					
Tsao & Chen	2009	688	Taiwan	Yes					
Uhlaner	2004	916	Netherlands	No					
Uhlaner & Floren	2007	233	Netherlands	Yes					
Venanzi & Morresi	2010	119	Italy	No					

Note: The full references are available on the website www.familyfirms.de.

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