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Corporate diversification and shareholder value: the effect of stock illiquidity

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AUTHORIZATION OF THE DIRECTOR OF THE THESIS FOR SUBMISSION

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“If I have seen further it is by standing on the shoulders of giants.”

- Sir Isaac Newton (1675) -

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ACRONYMS AND ABBREVIATIONS

2SLS	=	Two-stage least squares regression
AMEX	=	American Stock Exchange
APT	=	Arbitrage pricing theory
B/M	=	Book to market equity ratio
BP	=	Breusch-Pagan test
BSD	=	Broad spectrum diversification
CAPM	=	Capital asset pricing model
CD	=	Pesaran's CD statistic
CEO	=	Chief executive officer
Chisq	=	Chi-Quadrat-Test
DCF	=	Discounted cash flow
DE	=	Germany
EEA	=	European Economic Area
EFV	=	Excess firm value
EMH	=	Efficient market hypothesis
EPS	=	Earnings per share
F-Stat.	=	F-statistic
GOS	=	Growth on sales
HML	=	High minus low book to market portfolio
i.i.d.	=	independent identically distributed
IBV	=	Institutional-based view
ICB	=	Industrial classification benchmark
JP	=	Japan
MNSD	=	Mean narrow spectrum diversification
NASDAQ	=	National Association of Securities Dealers Automated Quotations
NP	=	Net profits
NSD	=	Narrow spectrum diversification
NYAM	=	New York or American stock exchange
NYSE	=	The New York Stock Exchange
OLS	=	Ordinary least squares
PIN	=	Probability of informed trading
q-ratio	=	Tobin’s Q
REITs	=	Real estate investment trusts

RMSEA	=	Root mean square error of approximation
ROA	=	Return on assets
ROCF	=	Return on cash flows
ROE	=	Return on equity
ROI	=	Return on investment
ROS	=	Return on sales
SDDS	=	Standard deviation of daily stock price changes
SDROA	=	Standard deviation of a firm's return on assets
SDROCF	=	Standard deviation of a firm's return on cash flows
SDROS	=	Standard deviation of a firm's return on sales
SIC	=	Standard Industrial Classification system of the United States Census Bureau
SMB	=	Small minus big portfolio
SML	=	Security market line
SS loadings	=	Sum of squared loadings
SW test	=	Shapiro-Wilk normality test
U.K.	=	United Kingdom
U.S.	=	United States of America

SYMBOLS

a	=	Coefficient relating the independent and mediator variable
AV_{it}	=	Total capital of firm i at time t
b	=	Coefficient relating the mediator and dependent variable adjusted for the effect of X
$BDIV[N]$	=	Diversification dummy based on [N]-digit SIC codes
c	=	Coefficient relating the independent and dependent variable
c'	=	Coefficient relating the independent and dependent variable adjusted for the effect of M
c_{it}	=	Relative illiquidity costs of stock i at time t
c_{Mt}	=	Relative market illiquidity costs at time t
$CAPEX_{it}$	=	Capital expenditure of firm i at time t
CF	=	Cash flow
d_t	=	Unobservable time effects
D_W	=	Extent of diversification based on weighted business count
$D\&A_{it}$	=	Depreciation and amortization expenses of firm i at time t
DIV_{it}	=	Proxy for corporate diversification of firm i at time t
$DIV_{it}10$	=	Level of diversification of firm i at time t when below 10%
$DIV_{it}1025$	=	Level of diversification of firm i at time t when between 10% and 25%
$DIV_{it}25$	=	Level of diversification of firm i at time t when above 25%
DP_{it}	=	Firm i dividend paid out at time t
$E()$	=	Expected value operator
e^{-rt}	=	Continuous compound rate at time t
EFV_{it}	=	Excess firm value of firm i at time t based on either the business count approach or market-implied approach
EFV_{it}^{B}	=	Excess firm value of firm i at time t based on business count approach
EFV_{it}^{m}	=	Excess firm value of firm i at time t based on the market-implied approach
$ETDIV$	=	Degree of diversification based on the Entropy measure
FCE_{it}	=	Flow to equity of firm i at time t
ff_i	=	Free float fraction of firm i

$f(R_i)$	=	Marginal distribution of R_i.
$f(R_i\|\varphi_i)$	=	Distribution of R_i conditional on the information signal φ_i from the information structure η
g_t	=	Economic indicator variable with a value of one if the performance of the EURO STOXX 50 Total Return index is positive and zero otherwise
H[N]DIV	=	Revenue-based Herfindahl index based on [N]-digit SIC codes
HML	=	Expected risk premium on the value factor
$i_1 \dots i_3$	=	Intercepts
$ILLIQ_t$	=	Amihud's (2002) illiquidity ratio at time t
INT_{it}	=	Interest expenses of firm i at time t
$I(V)_{it}$	=	Imputed value of the sum of a firm's segments as stand-alone firms at time t
$I(V)_{it}^{m}$	=	Imputed value of the sum of a firm's segments as stand-alone firms based on market-implied approach at time t
$LR2_t$	=	Liquidity ratio 2 at time t
M	=	Mediator
M_{ijt}	=	Multiple of total capital to sales for the median single-segment firm in segment j's industry at time t
M_{ijt}^{m}	=	Multiple of total capital to sales for the median single-segment firm in segment j's industry based on market-implied approach at time t
MCOUNT	=	Degree of market diversification based on numerical count
MDIV	=	Degree of market implied diversification
MHDIV	=	Degree of market diversification based on Herfindahl weighting scheme
N_δ	=	Number of significant regression coefficients
$N_{\delta t}$	=	Number of significant regression coefficients at time t
n_i	=	Unobservable individual effects
n_i^s	=	Issued shares of firm i
N_P	=	Number of assets in the portfolio
N_{SIC}	=	Number of different SIC categories constituting the corporate portfolio
N_{SIC2}	=	Number of different two-digit SIC categories constituting the corporate portfolio
N_{SIC4}	=	Number of different four-digit SIC categories constituting the corporate portfolio

$N_{SIC,t}$	=	Number of different SIC categories constituting the corporate portfolio at time t
n_T	=	Number of trades in a given time period T
ND_{it}	=	Net debt issuance of firm i at time t
$NOPAT_{it}$	=	Net operating income after tax of firm i at time t
NWC_{it}	=	Net working capital of firm i at time t
$OPEX_{it}$	=	Operational expenditure of firm i at time t
PV	=	Present value of an entitlement to uncertain cash flows
p_i	=	Transaction price of trade i
p_i^{SIC}	=	Share of the i^{th} business relative to the firm as a whole
p_i^{SIC2}	=	Share of the i^{th} industry group relative to the firm as a whole
p_i^{SIC4}	=	Share of the i^{th} industry segment relative to the firm as a whole
$P_{i,t}$		Price of security i at time t
p_t^A	=	Best asked price at time t
p_t^B	=	Best bid price at time t
p_t^M	=	Mid-price at time t
pl_i	=	Probability of liquidation event for stock i
q_i	=	Number of shares of trade i
r	=	Risk-adjusted rate of return
R^2	=	Coefficient of determination
r_f	=	Return on the risk-free asset
r_i	=	Stock price return of asset i
R_i	=	Return on security i in an event period of interest
$R_{i,t+1}$	=	One-period percentage change return of security i
R_j^g	=	Equilibrium gross (market-observed) return
$r_{j,k}^*$	=	Equilibrium net (market-unobserved) return
$r_{t-1,t}$	=	Return from period t - 1 to t
RS_j	=	Relative bid-ask spread
RTV_t	=	Relative transaction volume at time t
RV_{it}	=	Measure of relative firm value of firm i at time t
S_j	=	Multivariate return series of STOXX® EUROPE 600 sector indices
SMB	=	Expected risk premium on the size factor
$S_{rel}^{M_t}$	=	Relative spread calculated with mid-prices
ST_t	=	Stock turnover at time t

SV_{it}	=	Shareholder value of firm i at time t
w_i	=	Assigned weight summed over all of a firm's businesses
X	=	Independent variable
x_{iP}	=	Share of asset i in the portfolio
X_{it}	=	Set of exogenous observable firm characteristics of firm i at time t
x_{jit}	=	Firm-specific control variables of firm i at time t
Y	=	Dependent variable
β_{con}	=	Constant regression coefficients
β_{div}	=	Regression coefficient for diversification term
β_i	=	Sensitivity of returns on the ith asset against movements in the return on the market portfolio
β_{it}	=	Sensitivity of returns on the ith asset against movements in the return on the market portfolio
$\beta_{it}^{L1} \ldots \beta_{i,t}^{L3}$	=	Liquidity betas estimated for firm i at time t
β_{h_i}	=	Sensitivity of returns on asset i against the value factor
β_{s_i}	=	Sensitivity of returns on asset i against the size factor
Δ_J	=	Sum of the absolute regression coefficients
${\delta_{ijt}}^2$	=	Jth squared regression coefficients of firm i at time t
δ_x / δ_i	=	Vector of regression parameters
ϵ_{it}	=	Error term of firm i at time t
λ	=	Risk premium
μ_i	=	Expected return on asset i
u_{it}	=	Stochastic disturbance term of firm i at time t
μ_M	=	Expected return on the market portfolio
μ_P	=	Expected portfolio return
ρ_{ij}	=	Correlation coefficient based on the returns of assets i and j
ρ_{iM}	=	Correlation coefficient between the returns on asset i and the market portfolio
$\sigma_{i/j}$	=	Standard deviation of the returns on asset i / j
σ_{iM}	=	Covariance between the returns on the asset and the market portfolio
σ_M^2	=	Variance of the returns on the market portfolio
σ_j	=	Standard deviation of the returns of assets j
Φ_t	=	Set of available information at time t
φ_i	=	Signal from information structure η announced in the event period that potentially affects security i

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I. INTRODUCTION

> *"**O**F all of the outstanding characteristics of business firms perhaps the most inadequately treated in economic analysis is the diversification of their activities, sometimes called "spreading of production" or "integration", which seems to accompany their growth."*[1]

I.1. RESEARCH MOTIVATION AND RELEVANCE

Although decades have passed since Ansoff's (1957) and Chandler's (1962) observation that firms seek growth[2], the nature of the relationship between corporate portfolio strategy and shareholder value remains a puzzle.[3] Holistically, the corporate portfolio strategy makes statements about a firm's commitment to diversify per se, defines the scope of a firm's business activities, and is a critical engine for attaining competitive advantages through market power advantages or internal market efficiencies.[4] The portfolio configuration directly influences the profitability, both systematic and unsystematic firm risk, as well as the internal culture of the multibusiness firm.[5] Very (1993) concisely summarises the strategic importance of diversification when he states: *"Portfolio diversification is sometimes the only way to achieve growth for a company, or the only way to survive when sales and profitability of the core business are declining […] and will be a strategic option largely used by managers to reach the long-term objectives planned to ensure the future of the firm."*[6]

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[1] Penrose, 2009, p. 79.

[2] Cp. Ansoff, 1957, p. 113ff.; Chandler, 1962, p. 1ff.

[3] Instead of many, see Bausch & Pils, 2009, p. 179; Benito-Osorio et al., 2012, p. 328ff.; Martin & Sayrak, 2003, p. 42ff.; Palich et al., 2000, p. 155.

[4] Cp. Palich et al., 2000, p. 156ff.; Piscitello, 2004, p. 762ff.

[5] Cp. Bettis & Mahajan, 1985, p. 785ff.; Datta et al., 1991, p. 534ff.; Erdorf et al., 2013, p. 189ff.; Zhou, 2011, p. 624ff.

[6] Very, 1993, p. 80.

Though corporate diversification has a rich tradition as a topic of research for almost 50 years, recent meta-analytic reviews of the diversification literature by Benito-Osorio et al. (2012), Erdorf et al. (2013), and Martin and Sayrak (2003) indicate much confusion about the net effects of diversification on shareholder value.[7] The research findings oscillate between the two extremes "Diversification creates shareholder wealth" and "Diversification destroys shareholder wealth" as the prominent position. In the words of Scharfstein and Stein (2000): *"In RECENT YEARS, it has become almost axiomatic among researchers in finance and strategy that a policy of corporate diversification is typically value reducing."*[8] Early research studies by Berger and Ofek (1995) and Lang and Stulz (1994) find that, on average, diversification is a value decreasing activity and that diversified firms sell at mean discounts of approximately 15% and 54% compared to non-diversified firms, respectively.[9] Their seminal contributions have been replicated using various methodologies, periods, and firm samples showing that the diversification discount is a widespread phenomenon.[10]

Previous studies predominately assess differences in future cash flows to explain the different valuations of diversified firms and focused firms. While agency cost arguments explain potential discounts in valuation[11], the benefits of diversification are driven by debt coinsurance effects[12] or operating synergies in the form of economies of scale and scope[13]. An alternative interpretation is that the findings of a diversification discount could be illusory and attributable to factors

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[7] Cp. Benito-Osorio et al., 2012, p. 328f.; Erdorf et al., 2013, p. 192ff.; Martin & Sayrak, 2003, p. 42ff.

[8] Scharfstein & Stein, 2000, p. 2537.

[9] Cp. Berger & Ofek, 1995, p. 50; Lang & Stulz, 1994, p. 1268.

[10] For a detailed review of the diversification literature, see section II.4.2.

[11] Cp. Amihud & Lev, 1981, p. 605ff.; Denis et al., 1997, p. 135ff.; Jensen, 1986, p. 323ff.; Ozbas & Scharfstein, 2010, p. 581ff.; Rajan et al., 2000, p. 35ff.; Shin & Stulz, 1998, p. 531ff.; Stulz, 1990, p. 3ff.

[12] Cp. Hann et al., 2013, p. 1961ff.; Higgins & Schall, 1975, p. 93ff.; Lewellen, 1971, p. 521ff.

[13] Cp. Bailey & Friedlaender, 1982, p. 1026f.; Lubatkin & Chatterjee, 1994, p. 114ff.; Palich et al., 2000, p. 159.

other than corporate diversification such as an endogeneity bias[14], sample selection bias[15], or construct validation bias[16]. Another reason for the inconclusive findings on the net benefits of diversification is a growing confusion on how to best measure corporate diversification.[17] The different findings on the valuation effects of diversification might merely result from the fact that researchers have used various measurement concepts that tap different aspects of the diversification phenomenon.

The disparity in research findings as outlined above not only highlights the complexity surrounding the diversification-performance linkage but also calls for a shift from the "average effect" of diversification to the identification of "moderating effects" that are likely to affect the influence of diversification on the market value of the firm.[18] Among the most often cited factors that might control the influence of diversification on a firm's value are industry affiliation[19], home country environment[20], differences in actual and expected returns[21], and the time period[22].

The focus of this research study, instead, is on the effect of stock liquidity on the diversification-performance relationship. If investor care about stock liquidity and demand higher expected returns for illiquid assets than for otherwise similar

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[14] Cp. Campa & Kedia, 2002, p. 1731ff.; Dimitrov & Tice, 2006, p. 1465ff.; Graham et al., 2002, p. 695ff.; Santarelli & Tran, 2016, p. 31ff.; Villalonga, 2004b, p. 5ff.

[15] Cp. Erdorf et al., 2013, p. 197f.; Maksimovic & Phillips, 2008, p. 673ff.; Mitton & Vorkink, 2010, p. 1367ff.

[16] Cp. Chatterjee & Blocher, 1992, p. 874ff.; Davis & Duhaime, 1992, p. 511ff.; Hoskisson et al., 1993, p. 215ff.; Robins & Wiersema, 2003, p. 39ff.

[17] Cp. Bausch & Pils, 2009, p. 165; Zechser & Rojahn, 2017, p. 458.

[18] Cp. Datta et al., 1991, p. 533f.; de la Fuente & Velasco, 2015, p. 2.

[19] Cp. Grant & Jammine, 1988, p. 333ff.; Jones et al., 1977, p. 195ff.; Santalo & Becerra, 2008, p. 851ff.

[20] Cp. Khanna & Palepu, 1997, p. 41ff.; Kogut et al., 2002, p. 162ff.; Lee et al., 2008, p. 47ff.; Wan & Hoskisson, 2003, p. 27ff.

[21] Cp. Lamont & Polk, 2001, p. 1693ff.; Mitton & Vorkink, 2010, p. 1367ff.

[22] Cp. Basu, 2010, p. 87ff.; Fauver et al., 2003, p. 135ff.; Hubbard & Palia, 1999, p. 1131ff.

liquid assets as predicted by, among others, Amihud and Mendelson (1986)[23], then variations in stock liquidity should affect a firm's stock market value.[24]

To the extent that the potential for agency costs increases with the degree of corporate diversification, either due to an informational advantage of insiders over outside investors or higher costs for acquiring information[25], greater diversification can lead to higher illiquidity premiums and an undervaluation of the issuer's shares. However, there are also opposing studies arguing that corporate diversification might lessen the adverse-selection problem[26] or reduce the inventory holding costs of the liquidity provider by reducing stock market volatility[27].

Despite the intuitive and theoretical appeal of stock illiquidity as a cause for the diversification discount, a great deal remains to be done in applying those ideas to empirical research. Empirical research on the mediating effects of stock liquidity has been proven difficult as liquidity does not lend itself to easy measurement. Consequently, the results of the few research studies available are contradictory showing both lower and higher liquidity scores for equity instruments of diversified firms.[28] Besides, most studies are conducted using information from the real estate investment trust industry that can have very different risk-return profiles compared to corporate firms.

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[23] Cp. Amihud & Mendelson, 1986, p. 225ff.

[24] Cp. Amihud & Mendelson, 2015, p. 160.

[25] Cp. Best et al., 2004, p. 242ff.; Firth et al., 2013, p. 27ff.; Huson & MacKinnon, 2003, p. 487ff.; Rojahn & Zechser, 2017, p. 20ff.

[26] Cp. Habib et al., 1997, p. 159ff.; Hadlock et al., 2001, p. 614f.

[27] Cp. Benston & Hagerman, 1974, p. 354f.

[28] Cp. Capozza & Seguin, 1999, p. 613; Clarke et al., 2004, p. 115ff.; Francis et al., 2004, p. 24ff.; Lamont & Polk, 2001, p. 1705ff.

I.2. RESEARCH OBJECTIVE AND DIFFERENTIATION

This research study contributes to the growing body of literature that analyses the valuation effects of corporate diversification in three aspects: First, to the best of the author's knowledge, so far there has not been any study done on the mediating effects of stock liquidity on the diversification-performance linkage for a sample of European non-financial firms. Given that there is no clear empirical consensus about the impact of stock illiquidity on the diversification effect, the overall objective of this study is to answer the following research question: "*Does stock liquidity mediate the relationship between corporate diversification and shareholder value?*"

Second, the study promotes a new estimator to assess the level of corporate diversification. The widely used business count measures require a somewhat arbitrary decision about the level of refinement that should be used, and the data about these measures is hard to obtain.[29] The proposed market-implied diversification measures utilise stock market data to assign a firm's business activities into homogenous groups instead of relying on an industry classification system. This way, the market-implied measures avoid the limitations inherent in the SIC system and, at the same time, take advantage of the benefits of quantitative measures.[30]

Third, a comprehensive review of the diversification literature reveals that most empirical studies on the diversification-performance linkage are conducted in the U.S. context[31], even though there are strong economic reasons to extend the research to other countries. The reason for the limited number of quantitative studies on the diversification-performance linkage in Europe might be due to differences in the capital market development, regulatory requirements, and legal systems across European countries which at least hamper a consolidated European view.[32] However, it is generally acknowledged that the benefits and costs

[29] For a detailed review of the approaches to measure corporate diversification, see section II.3.

[30] Cp. Zechser & Rojahn, 2017, p. 458.

[31] For an in-depth review of the diversification literature, see section II.4.2.

[32] Cp. Fauver et al., 2003, p. 140ff.

associated with diversification strategies depend upon the ability of the institutional environment of a firm's home country to establish a stable structure that facilitates interactions among market participants.[33] The more pronounced the market imperfections in the external capital markets, product markets, or factor markets, the more valuable is the internalisation of external services into the company's sphere.[34] Benito-Osorio et al. (2012) and Erdorf et al. (2013) present encouraging evidence that the diversification effect might be attributable to country-specific moderator variables including corporate governance systems, legal understandings (e.g. common law vs civil law), and the orientation of the financial system (e.g. bank-based vs market-based).[35] Prior findings for the U.S., therefore, must not generalise to other countries. With its focus on European markets, this study provides further insights into the diversification phenomenon outside of the U.S.; thereby reducing the problem of data snooping[36]. Additionally, this study analyses data from 2007 to 2016, covering both economic up- and downturns.

[33] Cp. Benito-Osorio et al., 2012, p. 331f.; Hoskisson et al., 2000, p. 252ff.

[34] Cp. Fauver et al., 2003, p. 136; Khanna & Palepu, 1997, p. 41ff.; Lee et al., 2008, p. 49.

[35] Cp. Benito-Osorio et al., 2012, p. 332; Erdorf et al., 2013, p. 193f.

[36] For furter reading on the problem of data snooping, instead of many, see Lo & MacKinlay, 1990, p. 431ff.

I.3. OUTLINE OF THE DISSERTATION

The doctoral study is structured in five chapters. Chapter 1 summarises the research topic, its relevance to academic research and corporate management, and presents the overall objectives of the thesis.

The second chapter focuses on the relationship between corporate portfolio strategy and shareholder value which is one of the core topics of this dissertation. By conducting comprehensive literature research, it aims (i) to develop a common understanding of the concept of diversification including a discussion of the advantages and disadvantages of traditional diversification measures based on SIC codes, (ii) to propose a new diversification metric based on stock market data, (iii) to explain the benefits and costs associated with diversification strategies, and (iv) to present the current state of the empirical research on the diversification-performance linkage and its determinants.

The third chapter discusses the effects of liquidity on the pricing process of financial assets. Followed by a thorough definition of stock market liquidity and detailed decoding of the components of trading costs, two alternative valuation models are introduced that are not subject to the neoclassical assumptions. In the first, liquidity is a priced stock characteristic, and in the second, liquidity is priced as a market level (systematic) risk factor. In each case, it should be verified, whether significant valuation effects can be derived using these liquidity-adjusted asset pricing models, which then might translate into a liquidity-induced diversification premium or discount. Finally, familiar liquidity measurement concepts are presented to choose an appropriate liquidity proxy for the empirical analysis.

The fourth chapter presents the descriptive and quantitative findings concerning the core research hypothesis about the mediating impact of stock liquidity on the diversification's effect. The chapter proceeds in three stages: Section IV.1 translates the research objective into two measurable hypotheses. Section IV.2 describes the data and introduces the diversification measures as well as the control variables. Finally, section IV.3 contains the empirical analysis of the valuation effects of corporate diversification both adjusted and un-adjusted for stock market liquidity. The analysis predominately uses stochastic models including two-sample Wilcoxon rank-sum tests, linear regression models, and multilevel mediation analysis.

The fifth and last chapter concludes the dissertation by summarising the main empirical findings and by suggesting avenues for further research.

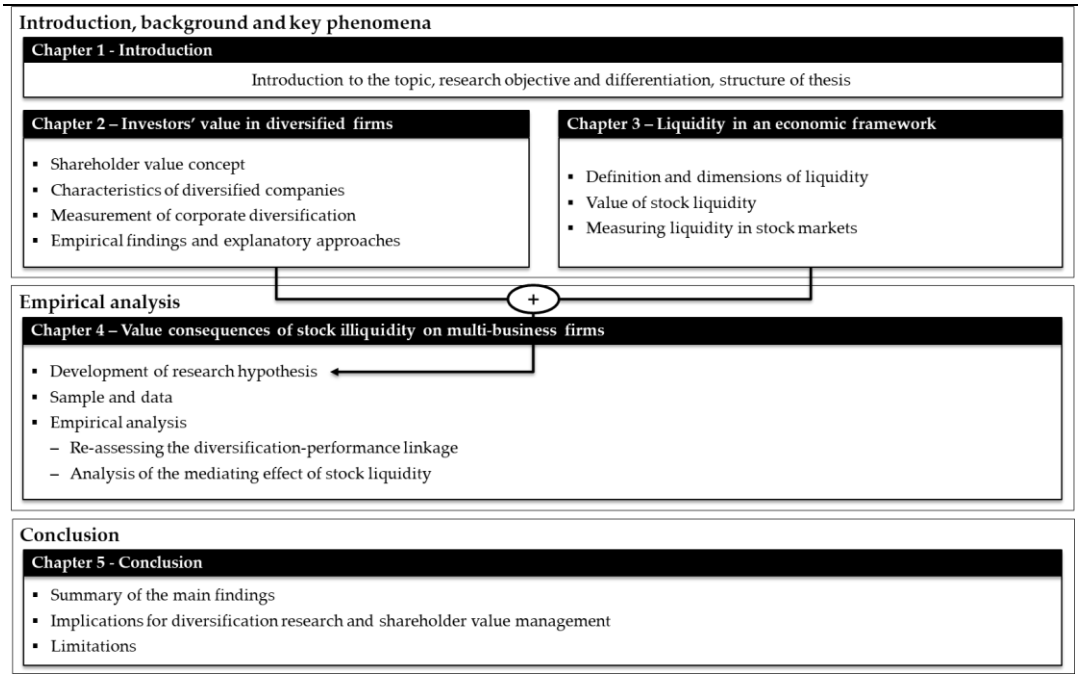

Figure 1: Structure of the thesis[37]

[37] Source: own representation.

II. INVESTORS' VALUE IN DIVERSIFIED FIRMS

II.1. FOUNDATIONS OF CAPITAL MARKETS

II.1.1. EFFICIENT MARKET HYPOTHESIS

Since the work by Fama (1965, 1970)[38], the efficient market hypothesis (EMH) has become one of the primary building blocks of the modern theory of financial economics and, among other features, is an essential element of perfect capital markets.[39] The efficient market hypothesis is the nexus between the cash flows generated by the firm and the returns to shareholders without which the shareholder value concept populated by Rappaport (1981, 1986)[40] would have no practical relevance. EMH can be described as a statement about the effectiveness (or speed) with which financial markets adjust the prices of securities such as stocks and bonds when new information comes to the market.[41] Fama (1970) deems a market to be efficient if prices always fully reflect all available information.[42] Market efficiency can be described notationally as follows:[43]

$$E\left(P_{i,t+1}\middle|\Phi_t\right) = \left[1 + E\left(R_{i,t+1}\middle|\Phi_t\right)\right] * P_{i,t} \qquad (1)$$

where:

$E()$	=	expected value operator
$P_{i,t}$	=	price of security i at time t,
$R_{i,t+1}$	=	one-period percentage change return of security i, and
Φ_t	=	set of available information at time t.

[38] Cp. Fama, 1965, p. 34ff., 1970, p. 383ff.
[39] Cp. Findlay & Williams, 2000, p. 181ff.; Summers, 1986, p. 591ff.
[40] Cp. Rappaport, 1981, p. 139ff., 1986, p. 1ff.
[41] Cp. Hirschey, 2003, p. 30.
[42] Cp. Fama, 1970, p. 383.
[43] Cp. Fama, 1970, p. 384.

Here formula (1) says that the information in Φ_t is fully utilized in deriving equilibrium expected returns and expected asset prices. Depending on the type of information conveyed in Φ_t, Fama (1970) further subdivides the EMH into weak, semi-strong, and strong form efficiency.[44]

Weak-form efficiency requires that all historical information such as past prices and trading volumes be contained in current prices.[45] This form of market efficiency is closely related to the random walk hypothesis used by researchers to characterise a price series in which all subsequent price changes represent random departures from previous prices.[46] As there is no autocorrelation in returns, technical analysis of past return patterns to predict future returns is useless.[47] Consequently, empirical tests of the weak-form of EMH are concerned with the forecasting power of past returns.[48] They include various statistical tools such as runs tests, serial correlation tests, filter tests, augmented Dickey-Fuller tests, and multiple variance ratio tests.[49]

Under *semi-strong efficiency*, all publicly available information (e.g. announcements of annual earnings, stock splits) are instantly capitalised into prices.[50] Thus, fundamental analysis of publicly available information may be regarded as a futile exercise, too, because, as soon as news becomes publicly available, they are reflected in stock prices.[51] Most studies on the semi-strong form efficiency fall into one of two types:[52] The first type follows an event study approach analysing the speed at which stock prices adjust when an event occurs. The other type investigates whether combinations of stocks of particular fundamental characteristics (e.g. size, market to book equity ratio) beat the market over time.

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[44] Cp. Fama, 1991, p. 1576.

[45] Cp. Steiner et al., 2012, p. 39.

[46] Cp. Malkiel, 1989, p. 1313f.; Steiner et al., 2012, p. 40f.

[47] Cp. Malkiel, 1989, p. 1313; Shleifer, 2000, p. 6.

[48] Cp. Fama, 1991, p. 1576.

[49] As an example for a study applying multiple testing procedures, instead of many, see Worthington & Higgs, 2004, p. 59ff.

[50] Cp. Kasper, 1997, p. 15f.

[51] Cp. Steiner et al., 2012, p. 41.

[52] Cp. Findlay & Williams, 2000, p. 191.

Finally, the *strong-form* of EMH states that all public and private information are rapidly mirrored in security prices.[53] In such a world, investors should not expect to consistently gain above the market returns while using technical analysis, fundamental analysis, or private information. The absence of information acquisition costs and trading costs is a necessary condition for a market to be strong-form efficient.[54] For this reasoning, Fama (1991) claims the extreme version of the market efficiency hypothesis to be false.[55] Clearly, a weaker form of EMH is always a subset of a stronger form.

Beginning with the early studies by Fama (1965) and Levy (1971), extensive empirical research provides evidence consistent with the weak notion of efficient markets: Fama (1965) does not find any dependence in the stock-price series that would be regarded as essential for investment strategies.[56] Relatedly, Levy (1971) documents that none of the 32 most used price patterns by chartists produces better than average trading results.[57]

The notion of semi-strong form efficiency has proved far more controversial among finance researchers than weak-form tests. On the one hand, stock markets tend to quickly incorporate new information into security prices leaving little scope for information-driven trading rules.[58] On the other hand, fundamental variables such as company size, the book to market equity, or the debt ratio have been detected to be a reliable estimator for future returns which, if the notion of semi-strong form was true, could not be the case.[59]

However, anomalies do not necessarily imply stock market inefficiencies: First, anomalies in stock prices could be random underreactions or overreactions to special news announcements without a persistent effect on prices. Second,

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[53] Cp. Hasan & Wadud, 2015, p. 237f.

[54] Cp. Grossman & Stiglitz, 1980, p. 405.

[55] Cp. Fama, 1991, p. 1575.

[56] Cp. Fama, 1965, p. 45ff.

[57] Cp. Levy, 1971, p. 316ff.

[58] Cp. Dann et al., 1977, p. 9ff.; Ederington & Lee, 1993, p. 1165ff., 1995, p. 119ff.; Fama et al., 1969, p. 7ff.; Patell & Wolfson, 1984, p. 231ff.

[59] Cp. Banz, 1981, p. 7ff.; Bhandari, 1988, p. 513ff.; Chan et al., 1991, p. 1746ff.; Reinganum, 1981, p. 23ff.; Rosenberg et al., 1985, p. 9ff.

market efficiency is always tested jointly with several auxiliary hypotheses about the conditions of capital markets such as the capital pricing model used to specify equilibrium returns.[60] Anomalies may be treated as indications for misspecified asset pricing models rather than as evidence against the EMH.[61] As Fama (1991) states: *"The joint-hypothesis problem is more serious. Thus, market efficiency per se is not testable. It must be tested jointly with some model of equilibrium, an asset-pricing model. […] As a result, when we find anomalous evidence on the behavior of returns, the way it should be split between market inefficiency or a bad model of market equilibrium is ambiguous."*[62]

Table 1 summarises the various forms of market efficiency and its implications.

Efficient market hypothesis			
Level of efficiency	Weak form	Semi-strong form	Strong form
Information content	Historical	Historical / public	Historical / public / private
Implications	Asset prices move as random walks over time / technical trading will not lead to excess returns / no saisonal effects	Technical trading and fundamental analysis will not lead to excess returns	No excess returns possible
Empirical findings	Largely validated	Mixed results	Empirically falsified

Table 1: Forms of market efficiency and empirical evidence[63]

Following the literature reviews by Fama (1991) and Vollrath (2003)[64], this study adopts efficiency at the semi-strong level. Additionally, it is assumed that investors are rational and value each security for their intrinsic value. When new

[60] Cp. Malkiel, 1989, p. 1315f.
[61] Cp. Summers, 1986, p. 598.
[62] Cp. Fama, 1991, p. 1575f.
[63] Source: own representation.
[64] Cp. Fama, 1991, p. 1601f.; Vollrath, 2003, p. 20ff.

information comes to the market that indicates that the current price of an asset offers a profit opportunity (risk), investors will bid up (down) the price of this asset until the level that corresponds to their intrinsic value. They will incorporate new information into fair prices until the marginal costs from obtaining new information and trading the security exceed the marginal benefits.[65] As a result, security returns provide an appropriate means to decide whether corporate policies such as diversification decisions are in the best interest of shareholders.

II.1.2. ASSET PRICING MODELS

There is a wide range of techniques that can be used to estimate future expected returns and that can be grouped into univariate and multivariate techniques by the number of explanatory variables.[66] In this study, the focus is on the Capital Asset Pricing Model and the Fama-French three-factor model which represent popular univariate and multivariate models, respectively. These models constitute the fundamental basis for assessing differences in the performance of diversified and focused firms. This section also contains an introduction to the modern portfolio theory which not only serves as the basis for convenient asset pricing models but also provides a non-synergistic, financial justification for corporate diversification.

II.1.2.1. Modern portfolio theory: Markowitz (1952)

The modern portfolio theory dates back to the early studies by Markowitz (1952, 1959), who provides the first mathematical formalisation of the asset allocation decision as a choice of the mean and the variance of a portfolio.[67] The core metaphor underlying Markowitz's (1952) portfolio selection model is the desirability to diversification which refers to the possibility to eliminate unsystematic risks by holding a portfolio consisting of preferable securities with

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[65] Cp. Elton et al., 2010, p. 398.

[66] For a detailed discussion of univariate and multivariate asset pricing models, instead of many, see Bruns & Meyer-Bullerdiek, 2013, p. 85ff.; Mondello, 2015, p. 197ff.; Steiner et al., 2012, p. 15ff.

[67] Cp. Elton & Gruber, 1997, p. 1744; Markowitz, 1952, p. 77ff., 1959, p. 1ff.

non-perfectly positively correlated returns.[68] The mean-variance optimisation requires several simplifying assumptions about the investor's portfolio selection behaviour and the characteristics of the underlying capital market:

- **Investor preferences and subjective beliefs.**
- All investors have a one-period investment horizon. They will select an optimal portfolio at the beginning of the planning horizon which will be held unchanged to the terminal date.[69]
- In assessing the benefits of an investment, investors consider only the first two moments of the probability distribution of returns.[70]
- Investors are risk averse and rational trying to maximise their end-of-period wealth.[71] Given the mean portfolio return, they will choose the portfolio with the lowest return volatility and vice versa.[72]
- **Characterisation of capital markets.**
- The mean-variance approach either requires asset returns that follow a joint Gaussian distribution, or the investor's utility function to be maximised is quadratic.[73]
- Capital markets are perfect in several senses: financial assets are infinitely divisible[74]; there are no transaction costs, capital gains tax[75], short sales as well as liability holdings[76].

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[68] Cp. Brealey et al., 2014, p. 171f.; Rubinstein, 2002, p. 1042; Spremann, 2008, p. 178f.

[69] Cp. Fabozzi, 2009, p. 30; Lee, Finnerty, & Chen, 2010, p. 69; Spremann, 2008, p. 173f.

[70] Cp. Constantinides & Malliaris, 1995, p. 14f.; Mondello, 2015, p. 104; Spremann, 2008, pp. 59, 176.

[71] Cp. Albrecht & Maurer, 2008, p. 258; Bruns & Meyer-Bullerdiek, 2013, p. 84.

[72] Cp. Mondello, 2015, p. 104; Perridon et al., 2016, p. 278f.

[73] Cp. Breuer et al., 2010, p. 142; Samuelson, 1970, p. 537.

[74] Cp. Bruns & Meyer-Bullerdiek, 2013, p. 84; Robison & Barry, 1980, p. 41; Steiner et al., 2012, p. 8.

[75] Cp. Albrecht & Maurer, 2008, p. 258; Steiner et al., 2012, p. 8.

[76] Cp. Markowitz, 1952, p. 78; Pogue, 1970, p. 1006.

Given the assumptions outlined above, much in the spirit of Markowitz's (1952) formulation of the portfolio selection problem can be simplified to the following quadratic optimisation task:[77]

$$\text{Min!} \sum_{i=1}^{N_P} \sum_{\substack{j=1 \\ j \neq i}}^{N_P} x_{iP} * x_{jP} * \sigma_i * \sigma_j * \rho_{ij} \tag{2}$$

subject to:

$$\mu_P = \sum_{i=1}^{N} x_{iP} * \mu_i \tag{3}$$

$$\sum_{i=1}^{N} x_{iP} = 1; \quad x_{iP} \geq 0 \tag{4}$$

where:

μ_P	=	expected portfolio return,
μ_i	=	expected return on asset i,
x_{iP}	=	share of asset i in the portfolio,
N_P	=	number of assets in the portfolio,
ρ_{ij}	=	correlation coefficient based on the returns of assets i and j,
σ_i	=	standard deviation of the returns of assets i, and
σ_j	=	standard deviation of the returns of assets j.

The assumption of uncertain future returns is central to the understanding of the portfolio selection behaviour of risk-averse investors. Markowitz (1952) illustrates that given future returns are unknown investors select securities not only because of their ability to increase discounted expected returns but choose mean-variance efficient portfolios that maximise the expected return for a given level of variance or exhibit the lowest variance for a given level of expected return.[78] If corporate diversification affects unsystematic risks, it might also positively influence the investor's willingness to trade the shares of diversified firms, especially if he or she holds an otherwise poorly diversified portfolio.[79]

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[77] Cp. Albrecht & Maurer, 2008, p. 272; Constantinides & Malliaris, 1995, p. 4; Perridon et al., 2016, p. 284.

[78] CP. Constantinides & Malliaris, 1995, p. 2f.; Steiner et al., 2012, p. 6f.

[79] Cp. Levy & Sarnat, 1970, p. 795ff.

The set of mean-variance efficient portfolios comprises an efficient frontier. Given any mean return μ_P, the efficient frontier identifies the set of corresponding minimum variance portfolios.[80] Its shape depends on the extent to which the assets contained in the portfolio fluctuate together.[81] The correlation coefficient ρ_{ij} measures the likelihood of co-movements between the assets in a portfolio and, thus, provides information about the extent to which asset risks are diversifiable.[82] Correlation coefficients range between -1.0 and 1.0, where the benefits of diversification increase the farther away the correlation is from 1.0.[83]

Using the example of two stocks A and B, Figure 2 visualises the influence of the correlation coefficient on the diversification effect. Holding both the returns (e.g. μ_A= 5%, μ_B = 3.5%) and the volatilities (e.g. σ_A = 15%, σ_B = 8%) constant, a lower correlation causes a greater curvature of the efficient frontier. In the rather unrealistic case where the returns are perfectly negatively correlated, a portfolio with zero risk could be constructed.[84]

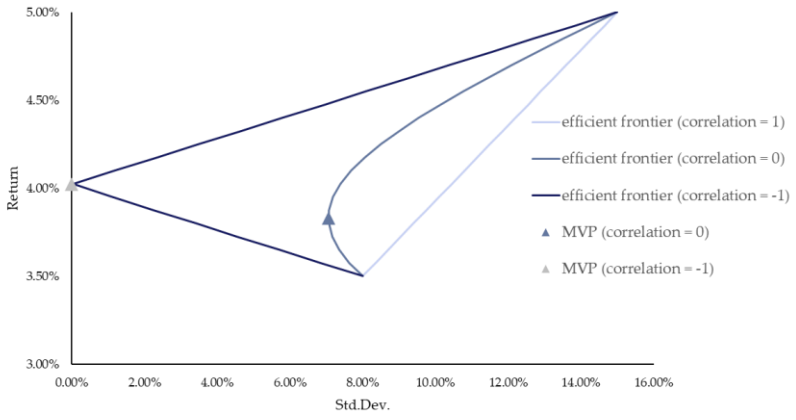

Figure 2: Correlation and shape of the efficient frontier[85]

[80] Cp. Spremann, 2008, p. 179ff.
[81] Cp. Albrecht & Maurer, 2008, p. 259.
[82] Cp. Brealey et al., 2014, p. 175ff.; Volkart, 2008, p. 226.
[83] Cp. Perold, 2004, p. 7.
[84] Cp. Brealey et al., 2014, p. 177; Markowitz, 1952, p. 80ff.
[85] Source: own calculations.

Regardless of its undoubted theoretical soundness, the portfolio selection model has considerable limitations, some of which Markowitz (1952) already mentions in his seminal contribution.[86] Objections aim at the assumption of the quadratic utility function of the investors, the question of timing, and the high data requirements.[87] Besides, well-optimised portfolios often have extreme allocations such that little changes in the input factors (e.g. return, variance, covariance) can cause the investment to be excluded from the portfolio, or vice versa, can be assigned a higher weight.[88]

II.1.2.2. Capital Asset Pricing Model

The capital asset pricing model (CAPM) initially developed by Sharpe (1964)[89], Lintner (1965)[90], and Mossin (1966)[91] constitutes a cornerstone of modern financial theory and is widely used to assess the cost of capital of firms, to measure abnormal returns, and to evaluate the performance of managed funds.[92]

Markowitz's (1952) portfolio selection model forms the foundation of the CAPM. Sharpe (1964) consciously picks up its central tenet: *"Through diversification, some of the risk inherent in an asset can be avoided so that its total risk is obviously not the relevant influence on its price".*[93] The CAPM posits a positive linear relationship between the expected excess return on an asset and the market risk premium with a constant proportionality given by its sensitivity to the market portfolio.[94] In addition to the assumptions underlying the mean-variance optimisation by

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[86] Cp. Markowitz, 1952, p. 89.

[87] For further reading, see Albrecht & Maurer, 2008, p. 294; Bruns & Meyer-Bullerdiek, 2013, p. 84f.; Fabozzi et al., 2002, p. 9ff.; Michaud, 1989, p. 33ff.; Perridon et al., 2016, p. 284f.; Steiner et al., 2012, p. 14.

[88] Cp. Chopra & Ziemba, 2013, p. 6f.; Spremann, 2008, p. 271f.

[89] Cp. Sharpe, 1964, p. 425ff.

[90] Cp. Lintner, 1965, p. 13ff.

[91] Cp. Mossin, 1966, p. 768ff.

[92] Cp. Bettis, 1983, p. 407; Dempsey, 2013, p. 10; Kim et al., 2012, p. 198; Levy, 2010, p. 43.

[93] Sharpe, 1964, p. 426.

[94] Cp. Bollerslev et al., 1988, p. 117; Cuthbertson & Nitzsche, 2004, p. 117.

Markowitz (1952)[95], the CAPM requires two other assumptions about the investors' behaviour and the security markets:

- Investors agree on the joint distribution of asset returns such that they will end up with the same efficient frontier when constructing their portfolios.[96] This implies semi-strong form efficiency of the capital market.[97]
- Investors can lend or borrow money at some risk-free rate of interest through buying or selling a risk-free asset.[98]

Based on these premises, all securities will fall along the security market line (SML) which quantifies the relationship between risk and return in the CAPM:[99]

$$\mu_i = r_f + (\mu_M - r_f) * \beta_i \quad (5)$$

subject to:

$$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2} = \frac{\rho_{iM} * \sigma_i}{\sigma_M} \quad (6)$$

where:

μ_i	=	expected return on asset i,
r_f	=	return on the risk-free asset,
μ_M	=	expected return on the market portfolio,
β_i	=	sensitivity of returns on the ith asset against movements in the return on the market portfolio,
σ_{iM}	=	covariance between the returns on the asset and the market portfolio,
σ_M^2	=	variance of the returns on the market portfolio,
σ_i	=	standard deviation of the returns on asset i, and
ρ_{iM}	=	correlation coefficient between the returns on asset i and the market portfolio.

The capital asset pricing model has several important implications: First, in equilibrium, the expected return on an asset is a linear function of the market price

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[95] For a list of the requirements, see section II.1.2.1.

[96] Cp. Fama & French, 2004, p. 26; Lee, Finnerty, & Wort, 2010, p. 95; Ross, 1978, p. 885.

[97] Cp. Mondello, 2015, p. 238; Steiner et al., 2012, p. 41.

[98] Cp. Mondello, 2015, p. 238; Perridon et al., 2016, p. 290.

[99] For the development of the CAPM, see, among others, Albrecht & Maurer, 2008, p. 310f.; Fama & French, 2004, p. 26ff.; Schwartz, 1991, p. 237ff.

of risk $(\mu_M - r_f)$ and the systematic risk of the individual asset as represented by its beta versus the market portfolio (β_i).[100] The beta coefficient measures the sensitivity of the asset's returns to variations in the market returns and contains information about the securities' contribution to the overall risk of the market portfolio.[101] The market portfolio mimics the market environment perfectly such that its beta is 1.0.[102] If an asset's beta is above (below) 1.0, then the asset is exposed to greater (lower) market risks than the market portfolio.

Second, the return on a risky asset does not depend on its standalone risk.[103] Since specific risks – also called unsystematic or residual risks – can be eliminated through diversification[104], there will be no compensation for specific risks according to the CAPM.[105] As beta is the only reason for asset returns above the risk-free rate, all securities fall along the security market line as visualised in Figure 3. Arbitrage opportunities[106] ensure that the prices of securities not falling on the SML will be adjusted to the point where the CAPM becomes valid again.[107] Consequently, from a neoclassical point of view, shareholders have little economic gains from (unrelated) diversification as they can quickly diversify their portfolio through mean-variance optimisation.[108]

Third, the market portfolio is mean-variance efficient in the sense of Markowitz (1952).[109] It represents a convex combination of all tradeable assets in the market, where each asset is assigned a weight in the same proportion as its

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[100] Cp. Cuthbertson & Nitzsche, 2004, p. 117; Perridon et al., 2016, p. 295; Steiner et al., 2012, p. 25f.

[101] Cp. Lee, Finnerty, & Wort, 2010, p. 95.

[102] Cp. Copeland & Weston, 1988, p. 198; Mondello, 2015, p. 240f.

[103] Cp. Albrecht & Maurer, 2008, p. 312f.

[104] Cp. Brealey et al., 2014, p. 174; Volkart, 2008, p. 229f.

[105] Cp. Bruns & Meyer-Bullerdiek, 2013, p. 89; Khan & Sun, 1997, p. 4229.

[106] Arbitrage refers to the simultaneous buying and selling of the same asset across different markets at different prices.

[107] Cp. Perold, 2004, p. 16.

[108] Cp. Levy & Sarnat, 1970, p. 795ff.

[109] Cp. Fama & French, 1992, p. 427; Ross, 1978, p. 885.

relative value in the market.[110] As the market portfolio is unobservable by nature; it is commonly represented by broad market indices which renders any test of the CAPM meaningless. Observed deviations from the security market line might be simply due to a misspecification of the market portfolio and do not allow for conclusions to be drawn about the validity of the model.[111] As long as the stock market index cannot be considered as a perfect substitute for the market portfolio, any validation of the SML will provide information only to the extent to which the index is mean-variance efficient in the sense of Markowitz (1952).[112] As a consequence of the improper selection of the market portfolio, the estimates on both the asset's beta and the slope of the SML might be distorted.[113]

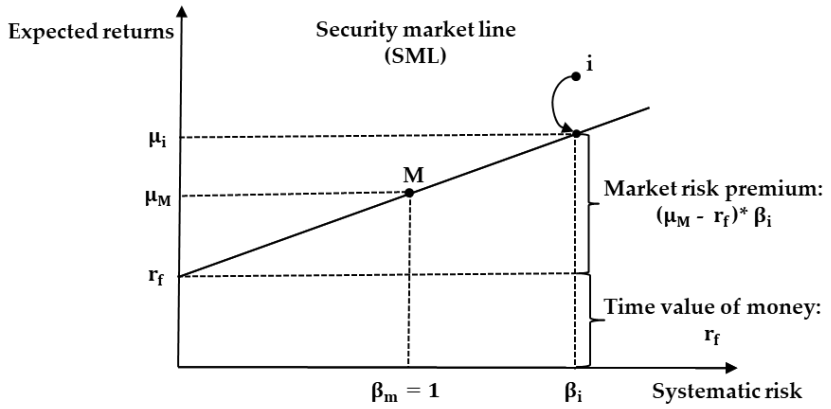

Figure 3: Security market line[114]

Notwithstanding the limited testability of the CAPM, as discussed above, empirical evidence on the CAPM predictions provides mixed results.[115] While

[110] Cp. Copeland & Weston, 1988, p. 197; Fama, 1970, p. 402; Lee, Finnerty, & Wort, 2010, p. 95.

[111] Cp. Roll, 1977, p. 130.

[112] Cp. Steiner et al., 2012, p. 28.

[113] Cp. Reilly & Brown, 2012, p. 232f.

[114] Source: own representation based on Albrecht & Maurer, 2008, p. 311; Alexander, 2008, p. 253; Perridon et al., 2016, p. 296.

[115] Cp. Dempsey, 2013, p. 10f.; Fama & French, 2004, p. 30ff.; Ho et al., 2000, p. 1629.

initial tests carried out during the mid-1960s and early 1970s provide encouraging support for the predictions of the CAPM[116], more recent studies document a variety of CAPM anomalies which point to both recurring seasonal anomalies[117] and other variables besides beta that are said to have a significant impact on the return of an asset.[118] Popular idiosyncratic factors include company size[119], book to market equity ratio[120], financial leverage[121], price earnings ratio[122], and stock illiquidity[123].

II.1.2.3. Fama-French three-factor model

The three-factor model populated by Fama and French (1993) constitutes an empirical approach for determining expected returns on capital assets addressing two of the most prominent anomalies of the CAPM: company size effect and value effect:[124]

The company size effect dates back to Banz' (1981) observation that the smallest 20% of NYSE firms have had risk-adjusted returns that, on average, are 5% above the return on larger capitalisation stocks.[125] The results have been expanded to a variety of sample periods and firm samples showing that the company size effect is a widespread phenomenon.[126] The value effect describes the tendency of value stocks to outperform growth stocks.[127] Value stocks are stocks that are cheap based on one or more fundamental characteristics including the book

[116] Cp. Steiner et al., 2012, p. 28.

[117] For a detailed overview on seasonal anomalies, instead of many, see Vollmer, 2008, p. 71ff.

[118] Cp. Levy, 2010, p. 43ff.; Subrahmanyam, 2010, p. 27ff.

[119] Cp. Banz, 1981, p. 3ff.; Reinganum, 1981, p. 19ff.

[120] Cp. Chan & Chen, 1991, p. 1467ff.; Rosenberg et al., 1985, p. 9ff.

[121] Cp. Bhandari, 1988, p. 507ff.

[122] Cp. Basu, 1983, p. 129ff.

[123] Cp. Amihud & Mendelson, 1986, p. 223ff.; Pástor & Stambaugh, 2003, p. 642ff.

[124] Cp. Fama & French, 1993, p. 3ff.

[125] Cp. Banz, 1981, p. 7ff.

[126] Cp. Blume & Stambaugh, 1983, p. 387ff.; Brown et al., 1983, p. 105ff.; Fama & French, 2008, p. 1653ff.; Horowitz et al., 2000, p. 83ff.; Reinganum, 1981, p. 19ff.

[127] Cp. Zaremba, 2016, p. 162.

to market equity ratio or the ratio of the market price to earnings or cash flows.[128] Among others, Asness et al. (2013), Chan et al. (1991), and Davis (1994) show that the value effect is a pervasive phenomenon, too.[129]

Regarding the study at hand, the two anomalies can be relevant for two reasons: First, since diversified firms typically are large firms, they could have lower ex-post stock market returns compared to focused firms just because of the well-known size effect.[130] Thus, controlling for firm size in the regression models appears compulsory. Second, a popular style of insider trading refers to the simultaneous buying of "value stocks" and selling of "growth stocks".[131] The advantageousness of these insider-based trading strategies depends, among other factors, on firm-specific attributes that determine the strength of the information gap between insiders (e.g. managers) and outsiders (e.g. investors). To the extent that corporate diversification amplifies or attenuates the imbalance of information between various economic agents, there is any possibility of a value premium according to Fama and French (1993).

Fama and French (1993) extend the CAPM by the return of two zero-investment portfolios as shown below:[132]

$$\mu_i - r_f = (\mu_M - r_f) * \beta_i + E(SMB) * \beta_{s_i} + E(HML) * \beta_{h_i} \quad (7)$$

where:

μ_i	=	expected return on asset i,
r_f	=	return on the risk-free asset,
μ_M	=	expected return on the market portfolio,
β_i	=	sensitivity of returns on the ith asset against movements in the return on the market portfolio,
β_{s_i}	=	sensitivity of returns on asset i against the size factor,
β_{h_i}	=	sensitivity of returns on asset i against the value factor,

[128] Cp. Chen & Zhang, 1998, p. 501f.

[129] Cp. Asness et al., 2013, p. 939ff.; Chan et al., 1991, p. 1746ff.; Davis, 1994, p. 1585ff.

[130] Cp. Lang & Stulz, 1994, p. 1253; Marinelli, 2010, p. 33.

[131] Cp. Khan et al., 2016, p. 101.

[132] Cp. Iatridis et al., 2006, p. 4076; Wallmeier, 2000, p. 33.

SMB = expected risk premium on the size factor, and
HML = expected risk premium on the value factor.

In this equation, $(\mu_M - r_f)$ is the difference between the return on a well-diversified market portfolio and the risk-free asset, while SMB (small minus big) and HML (high minus low) stand deputy for the returns of two zero-investment portfolios mimicking the risk factors associated with the company size effect and the value effect. The zero-investment portfolios are designed in such a way as to reflect higher returns on small firms and high book to market equity firms.[133]

More specifically, the SMB portfolio captures the company size risk and is formed by a portfolio of buying small stocks and selling big stocks. Likewise, the HML portfolio is long in high B/M stocks and short in low B/M stocks. The betas correspond to the slopes in the multiple regression model of $\mu_i - r_f$ on $\mu_M - r_f$, SMB, and HML quantifying the asset's sensitivity against the respective factor.

Objections as to the validity of the three-factor model aim at Fama and French's (1993) assumptions about the investors' behaviour and the security markets. For example, value strategies might outperform growth strategies just because investors are overly optimistic about firms which have performed well in the past.[134] An alternative interpretation is that the return on value stocks has nothing to do with the covariance structure of returns but is directly related to the specificity of the asset for reasons of a behavioural bias or liquidity through an information effect.[135] Finally, the company size effect and the value effect might be caused by data-snooping[136] and a survivorship bias in the COMPUSTAT database[137], respectively.

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[133] Cp. Wallmeier, 2000, p. 33.

[134] Cp. Lakonishok et al., 1994, p. 1543.

[135] Cp. Daniel & Titman, 1997, p. 4. For further reading on information induced liquidity premiums or discounts, see section II.4.1.3.

[136] Cp. MacKinlay, 1995, p. 5.

[137] Cp. Kothari et al., 1995, p. 186.

II.1.3. SHAREHOLDER VALUE APPROACH AS A BASIS FOR CORPORATE PORTFOLIO STRATEGY

This research study draws on the insights of the shareholder value approach while assessing the mediating effects of stock liquidity on the diversification-performance linkage for a sample of European non-financial firms. Even though the proposition of value maximisation has its roots in 200 years of research in economics and finance[138], it was not until the 1980s when Rappaport (1981) put the conventional accounting-oriented approaches for assessing the value of the corporate strategy into question[139], that the shareholder value approach became more recognised.[140]

The central tenet underlying the shareholder value approach is that business strategies should be judged by the economic returns they generate for their shareholders.[141] Therefore, managers should make all decisions so as to increase the interests of its shareholders ahead of any other interested parties who might have claims against the firm.[142] The economic returns to shareholders are the sum of dividend payments as well as capital gains from sales of their shares.

According to Rappaport (1981), the shareholder value of a company is determined by the present value of its future cash flows.[143] In his analysis, Rappaport (1981) follows the basic idea underlying most discounted cash flow (DCF) models: The value of a company does not equal the balance of its assets and liabilities but corresponds to the income stream generated by fully utilizing its stock of assets and liabilities, with particular regard to the economies of scale and scope that contribute to the competitive advantage of the firm.[144] Building on the

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[138] Cp. Jensen, 2001, p. 299.

[139] Cp. Rappaport, 1981, p. 139ff.

[140] Cp. Schredelseker, 2003, p. 102.

[141] For a detailed introduction to the shareholder value approach, instead of many, see Vollmar, 2014, p. 51ff.

[142] Cp. Jensen, 2001, p. 299.

[143] Cp. Rappaport, 1981, p. 141.

[144] Cp. Ballwieser, 2011, p. 9.

same theoretical basis as the neoclassical investment theory, much in the spirit of discounted cash flow analysis can be simplified to the following equation:[145]

$$\mathrm{PV} = \sum_{t=1}^{\infty} \frac{CF}{(1+r)^t} \tag{8}$$

where:

PV	=	present value of an entitlement to uncertain cash flows,
CF	=	cash flow, and
r	=	risk-adjusted rate of return

In the above formula, the present value of a risky project refers to the sum of the discounte d future cash flows or profits, where the capitalisation rate expresses the investment risk of the investor and can be obtained using the asset pricing models discussed in section II.1.2.

The literature distinguishes between three DCF approaches to approximate the value of what a company is worth for its shareholders: the entity approach capitalizing the cash flow that is not required for operations or reinvestment (i.e. free cash flow) and subtracting bondholder value, the equity approach assuming pure equity financing and discounting free cash flows after interest expenses (i.e. flow to equity), and the adjusted present value approach that separates the effects of debt financing from the asset value of a firm.[146] Drawing on the same assumptions about the firm's financing strategy, the different approaches are expected to lead to the same shareholder value.[147] By its technical nature, the so estimated shareholder value is also referred to as *fundamental value* or *intrinsic value*.

One advantage of Rappaport's (1986) shareholder value approach is that it illustrates how corporate management can apply decision making in operating, investing, and financing in order to improve up to seven value drivers that have a direct effect on capitalised operating cash flows as visualised in Figure 4. The value

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[145] For a detailed discussion of the methods of company valuation, instead of many, see Reilly, 2000, p. 1ff.; West & Jones, 1999, p. 1ff.

[146] For a detailed introduction to discounted cash flow analysis, instead of many, see Ballwieser, 2011, p. 132ff.; Herrmann, 2002, p. 18ff.

[147] Cp. Vollmar, 2014, p. 73.

network can be used to explore the superiority of alternative business strategies including diversification strategies.[148] Following this logic, the effect of diversification strategies on shareholder value is the difference between the shareholder value before and after the implementation of the strategy.[149] If the difference in shareholder value is positive (negative), corporate diversification creates (destroys) value.

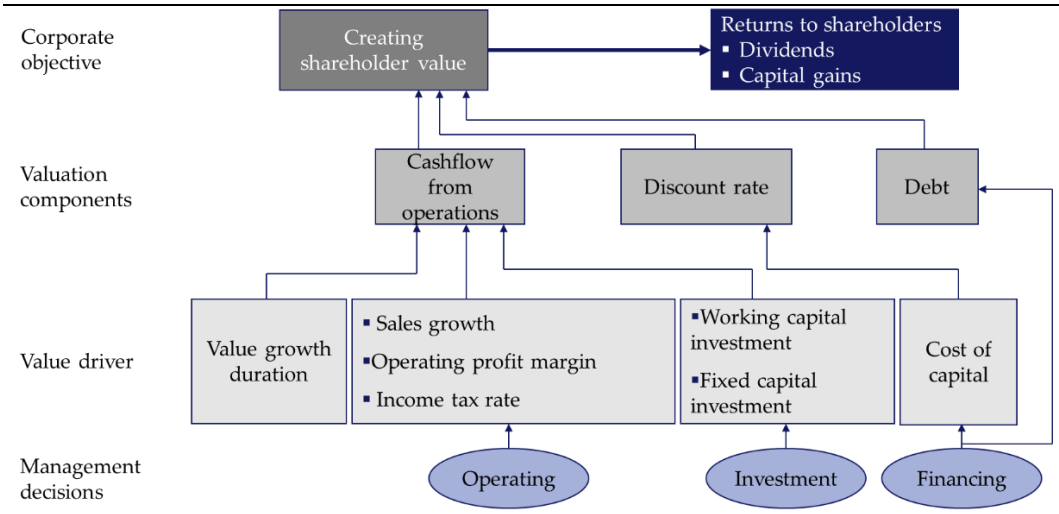

Figure 4: Shareholder value network[150]

Regardless of its undoubted theoretical soundness, Rappaport's (1986) approach has significant limitations. Like every valuation model, the shareholder value approach is criticised for being judgmental in relation to the estimation of future cash flows, capital costs, and value added from synergies.[151] The subjective process cannot be systematically reproduced such that researchers valuing the same firm might end up with very different fundamental values.

Only in perfect capital markets under the Fama (1965, 1970) assumptions about strong-form efficiency, there is an identity of a firm's fundamental value and

[148] Cp. Davis & Stout, 1992, p. 612.

[149] Cp. Ostrowski, 2007, p. 38; Vollmar, 2014, p. 84.

[150] Source: own representation based on Rappaport, 1986, p. 76.

[151] Cp. Ostrowski, 2007, p. 38ff.; Vollmar, 2014, p. 73ff.

its "Wall Street" value.[152] To Rappaport (1986), the "*Wall Street*" value of a firm means the sum of the stock-market values of a firm's traded equity.[153] The market value counterbalances the results of firm valuations carried out daily by all investors, thereby objectifying the process of company valuation.[154] For listed companies, the shareholder value can be determined by multiplying the number of shares outstanding by the stock price.[155]

Figure 5 visualises the difference between the "Wall Street" value and the fundamental value of a firm as an oscillating movement of the "Wall Street" value around the fundamental value. A firm's fundamental value can be different from its stock-market value for many reasons; the most often cited explanation is that capital markets are not strong-form efficient in the sense of Fama (1965, 1970).[156] Since the assumption of zero information acquisition costs and trading costs does not hold under real market conditions; outside investors regularly have access to less information and, therefore, they are less able to estimate the future cash flows and risks of a company as precise as inside managers. To the extent that the potential for an informational advantage of insiders over outside investors increases with the degree of corporate diversification, greater diversification might cause the fundamental value to move further away from its market value.[157] It is this logic that underlies the empirical research of this thesis.

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[152] Cp. Herrmann, 2002, p. 12, and the literature cited therein.

[153] Cp. Rappaport, 1986, p. 32ff.

[154] Cp. Herrmann, 2002, p. 15.

[155] Cp. Ostrowski, 2007, p. 41. Throughout this thesis, the terms "Wall Street" value, shareholder value, stock-market value, and stock-market price are used interchangeably.

[156] Cp. Beckmann, 2006, p. 20. An alternative interpretation is that the findings of a valuation differential are attributable to fundamental characteristics (e.g. reduced growth expectations) or the behavior of investors being distorted by either a cognitive or an emotional bias.

[157] For a detailed discussion, see section II.4.1.1.

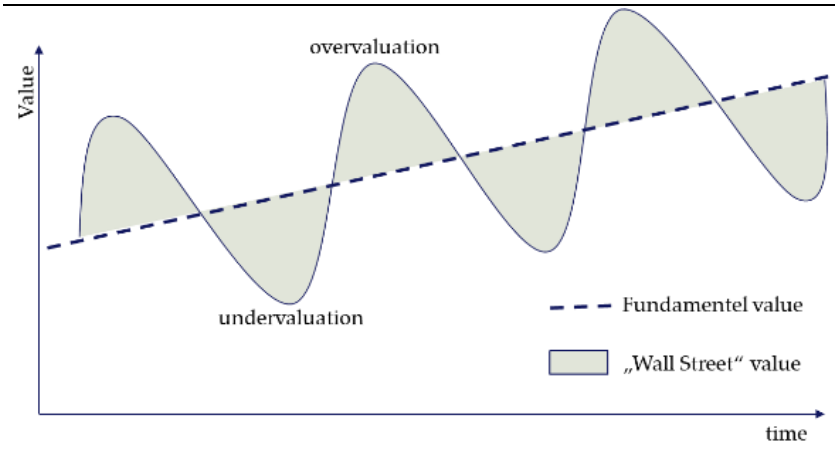

Figure 5: Differences between fundamental value and "Wall Street" value[158]

II.2. DEFINITION AND TYPES OF DIVERSIFICATION

Generally, corporate diversification is defined from two directions – one view based on the diversification move (process-view) and the other based on the resulting diversity (status-view) – each culminating in a wide field of academic research.[159] *Diversification as a process* concentrates on the specific steps a firm undertakes to enter new product-market combinations as defined, among others, by Ansoff (1957) and Rumelt (1974).[160] Researchers defining diversification as a process are interested in uncovering the motives why firms choose to diversify and, for this reason, focus on the path of diversification followed by companies over time.[161] This view also covers the decision on the direction of diversification as well as the selection of the appropriate mode of diversification.[162]

[158] Source: own representation based on Friedrich von den Eichen, 2002, p. 100; Vollmar, 2014, p. 82.

[159] Cp. Beckmann, 2006, p. 15f.; Klier, 2009, p. 10f.; Ramanujam & Varadarajan, 1989, p. 524f.

[160] Cp. Klier, 2009, p. 10; Müller-Stewens & Lechner, 2016, p. 290; Wulf, 2007, p. 7ff.

[161] Cp. Knecht, 2014, p. 52.

[162] Cp. Klier, 2009, p. 10.

Diversification as a status, instead, focuses on the spreading of a firm's business activities at a certain point in time.[163] Researchers propose three criteria to be used to identify distinct businesses: product difference, market discreteness, and resource independence.[164] However, in the prevalent literature, one can find the most different definitions in which either all or only some of these dimensions are considered.[165] To enumerate but some examples, Gort (1962) defines diversification through *"an increase in the heterogeneity of output from the point of view of the number of markets served by that output"*[166], a definition closely related to the central tenet of industrial-organisational theory.[167] To Berry (1971) diversification means an increase in the number of industries in which a firm is active.[168] Finally, Pitts and Hopkins (1982) consider firms to pursue diversification strategies if they simultaneously operate several different businesses.[169]

In his seminal contribution *"Strategies for Diversification"*, Ansoff (1957) provides one of the first conceptualisations of diversification as *"a simultaneous departure from the present product line and the present market structure*."[170] The product line defines the physical and functional characteristics of the end-user product, whereas the market dimension describes the intended use of the product.[171] In sharp contrast to the other growth vectors depicted in Table 2, a diversification move *"[…] invariably leads to physical and organizational changes in the structure of the business […]"*[172] and may require additional tangible and intangible resources. It is this logic that builds the bedrock for the traditional understanding of diversification as product-market diversification.[173]

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[163] Cp. Grant et al., 1988, p. 772.

[164] Cp. Greune, 1997, p. 12f.; Schüle, 1992, p. 7f.; Srivasta et al., 1994, p. 146.

[165] For a detailed overview of the various definitions, see also Fey, 2000, p. 7ff.; Greune, 1997, p. 13; Schüle, 1992, p. 8; Szeless, 2001, p. 26.

[166] Gort, 1962, p. 9.

[167] Cp. Bettis & Hall, 1982, p. 255.

[168] Cp. Berry, 1971, p. 380.

[169] Cp. Pitts & Hopkins, 1982, p. 620.

[170] Cp. Ansoff, 1957, p. 114.

[171] Cp. Ansoff, 1957, p. 113f.

[172] Ansoff, 1957, p. 114.

[173] Cp. Pils, 2009, p. 9.

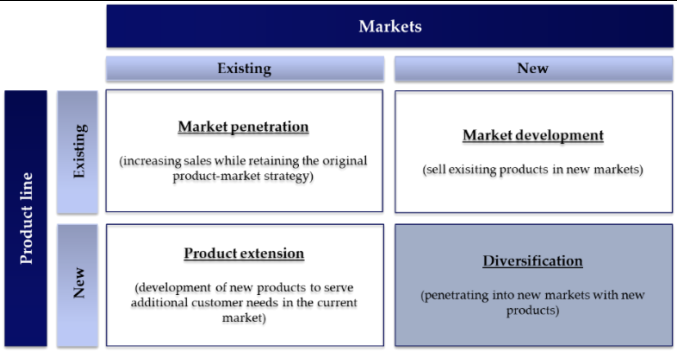

Table 2: Matrix of growth vectors by Ansoff (1957)[174]

In addition to the traditional view on diversification in terms of product-markets, Penrose (1959) and Rumelt (1974) emphasise the importance of the resource endowments required to deliver a product or a service to the market. Penrose (1959) views a firm as diversified if it (i) enters into new markets with new products using the same production base, (ii) offers new products in the current markets that belong to a different area of technology, or (iii) penetrates new markets with new products that require the use of diverse technologies.[175] Rumelt (1974) further refers to diversification as "*its [the firm's] commitment to diversify per se, together with the strengths, skills, or purposes that span this diversity, shown by the way in which business activities are related to one another.*"[176] As a consequence, a diversification move "*requires or implies an appreciable increase in the available managerial competencies within the firm.*"[177] A major difference between the definitions by Ansoff (1957) and those of Penrose (1959) and Rumelt (1974) is the way the authors look at diversification. While the traditional view on diversification represents an "outside-in" perspective looking through the eyes of the customers on products and markets, the resource-based view follows an "inside-out" perspective with a particular interest on the unique resource endowments of a firm.[178]

[174] Source: own representation based on Ansoff, 1957, p. 114.
[175] Cp. Penrose, 1959, p. 110.
[176] Rumelt, 1974, p. 29.
[177] Rumelt, 1974, p. 10.
[178] Cp. Gehrmann, 2014, p. 23.

This study follows the traditional understanding of product diversification by, among others, Pitts and Hopkins (1982) and Ramanujam and Varadarajan (1989) referring to product diversification as the extent to which firms are simultaneously active in many distinct businesses.[179] Defining corporate diversification on the business unit level offers several features: First, simple product line extensions do not qualify as a step towards greater diversity, unless they lead to the creation of a new business with a separate structure, management, and operation.[180] This condition is essential because some of the benefits of corporate diversification such as the co-insurance hypothesis by Lewellen (1971) necessitate the co-existence of multiple business units under a single corporate umbrella.[181]

Second, with its emphasis on the extent of product diversification, the definition follows a continuous rather than a categorical (measurement) approach. Consequently, business count measures or the newly proposed market-implied diversification measures are the preferred choices for operationalising the diversification construct. Finally, the definition takes on a status perspective of diversification with a focus on the current number and variety of a firm's businesses. Consequently, it is not concerned with the steps a firm undertakes to enter new product-market combinations.

The conceptualisation of diversification given above incorporates the concepts of product difference, market discreteness, and resource independence[182], allowing for distinctions between three general forms of diversification: (i) horizontal, vertical, and lateral diversification, (ii) related and unrelated diversification, and (iii) domestic and international diversification:

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[179] Cp. Pitts & Hopkins, 1982, p. 620f.; Ramanujam & Varadarajan, 1989, p. 524f.

[180] Cp. Knecht, 2014, p. 54; Ramanujam & Varadarajan, 1989, p. 525.

[181] Cp. Lewellen, 1971, p. 521ff. For a detailed discussion of the costs and benefits of diversification, see section II.4.1.

[182] Cp. Pitts & Hopkins, 1982, p. 621.

- *Horizontal, vertical, and lateral diversification.* Ansoff (1965) uses the technical affinity of the end-user products and the target customer groups to differentiate between three diversification strategies:[183] Horizontal diversification can be viewed as a strategic approach directed at utilising a firm's current resources and capabilities in technology, finance, or marketing to serve additional product missions of existing customers.[184] As the new and old business units operate on the same level of the value chain[185], the firm increases in size *"without necessarily growing beyond its current business definition"*[186]. Vertical diversification strategies, instead, reach different levels of the value chain.[187] Their primary aim is to seek economic rents through leveraging and transferring core competencies across business units.[188] Finally, lateral diversification describes a firm's move into other businesses that are likely to have little (concentric diversification) or no technological or commercial synergies (conglomerate diversification) in common with the actual product line of the company.[189]
- *Related and unrelated diversification.* The terms related diversification and unrelated diversification refer to the breadth of diversification regarding the interconnectedness of the primary functions of the value chain.[190] Related diversification occurs when a firm diversifies by adding new activities that *"are tangibly related to the collective skills and strengths possessed originally by the firm"*[191]. The nature of relatedness between the segments of a diversified firm can be very different and, among other factors, is determined by the relationships between markets served and distribution systems as well as commonalities in physical assets (e.g. productive factors, raw materials) and non-physical assets (e.g. tacit knowledge, organisational structures). By

[183] Cp. Ansoff, 1957, p. 118; Hungenberg, 2014, p. 467ff.; Wulf, 2007, p. 16.
[184] Cp. Ansoff, 1957, p. 118; Liu & Hsu, 2011, p. 1517.
[185] Cp. Hungenberg, 2014, p. 468.
[186] Cp. Knecht, 2014, p. 50.
[187] Cp. Greune, 1997, p. 21; Jansen, 2006, p. 8.
[188] Cp. Liu & Hsu, 2011, p. 1516.
[189] Cp. Gehrmann, 2014, p. 25.
[190] Cp. Hill & Jones, 2012, p. 192; Johnson et al., 2005, p. 285ff.
[191] Rumelt, 1974, p. 11.

contrast, unrelated diversification refers to a strategy where the distinct business units do not tap a common pool of corporate resources.[192] Potential benefits to unrelated diversification stem primarily from financial synergies such as co-insurance effects[193] or increased efficiency of internal capital markets.[194]

- *Domestic and international diversification.* Empirical studies further discern between domestic diversification and international diversification, thereby referring to a firm's geographical orientation.[195] Domestic diversification refers to an expansion within the borders of a firm's home country, whereas international diversification refers to the spreading of a firm's businesses across multiple global market areas.[196]

Throughout this research study, the terms *"business"*, *"business segment"*, *"business unit"*, and *"division"* are synonymous for a distinct entity within a diversified firm's corporate portfolio that can be operated independently.[197] Furthermore the words *"corporate diversification"*, *"diversity"*, and *"product diversification"* are applied in the same way to describe the extent to which firms are simultaneously active in various businesses. Likewise, the expressions *"focused firm" ("diversified firm")*, *"single-segment firm" (multi-business firm)*, and *"stand-alone firm"* are used interchangeably for firms that are operating a single (multiple) business (es).

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[192] Cp. Hill & Jones, 2012, p. 192.

[193] For further reading on co-insurance effects from corporate diversification, see section II.4.1.2.2.

[194] Cp. Benito-Osorio et al., 2012, p. 328; Palich et al., 2000, p. 160.

[195] Cp. Baldwin et al., 2000, p. 19; Schüle, 1992, p. 12.

[196] Cp. Capar & Kotabe, 2003, p. 345; Funke, 2006, p. 8; Kim et al., 1993, p. 276; Knecht, 2014, p. 51; Tihanyi et al., 2005, p. 272.

[197] Cp. Knecht, 2014, p. 191.

II.3. MEASURING CORPORATE DIVERSIFICATION

II.3.1. CLASSIFICATION OF MEASUREMENT APPROACHES

"Valid measurement is the sine qua non of science".[198] If the measurement approach does not approximate the underlying theoretical concept, then theory testing becomes problematic, and the results cannot be generalised.[199] From the viewpoint of corporate headquarters, without a reliable and valid measurement approach deciding about corporate diversification is not possible.

Due to its multidimensional character, approaches employed to measure diversification are plenty.[200] Over the last three decades, researchers have mainly followed two different approaches: a business count approach and a strategic approach.[201] In the first, firms are positioned on a scale from "not diversified" to "highly diversified" while using objective, secondary data to allocate a firm's reporting units to the Standard Industrial Classification system (SIC).[202] A central tenet of the business count approach is that business units with similar industry classifications share a common pool of corporate resources and capabilities in technology, finance, or marketing. Commonly used measures include multi-segment dummies based on SIC codes, the number of business segments as well as revenue- or asset-based Herfindahl indices.[203] In the second, firms are grouped into discreet diversification categories according to the degree of commonality of strategic resources and capabilities among their businesses.[204] Given their focus on the type of relatedness, they can provide rich insights into the breadth of diversification.[205]

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[198] Peter, 1979, p. 6.

[199] Cp. Lubatkin et al., 1993, p. 433.

[200] Cp. Fey, 2000, p. 181ff.; Pehrsson, 2006b, p. 352ff.; Schüle, 1992, p. 92ff.

[201] Cp. Hall & John, 1994, p. 153; Hoskisson et al., 1993, p. 216; Sambharya, 2000, p. 164.

[202] Cp. Hall & John, 1994, p. 154; Klier, 2009, p. 29ff.

[203] Section II.3.2 includes a detailed description of the various business count measures.

[204] Cp. Hall & John, 1994, p. 153f.; Palepu, 1985, p. 239f.

[205] Cp. Fey, 2000, p. 46f.; Pehrsson, 2006b, p. 355.

Apart from these traditional methods, in the recent past, input-based measures of diversification have been proposed in an attempt to capture relatedness in terms of either intangible technological characteristics or similarities in the human resource profiles between separate business units.[206] However, only a few empirical studies are currently available which rely on input-based measures to investigate the diversification-performance relationship.[207] One reason for the rare application in empirical research could be the requirement of survey data which renders comprehensive time series analysis impractical.[208] Input-based measures cannot control for firm-specific heterogeneity and other forms of endogeneity in the diversification-performance linkage.[209] Moreover, to the best knowledge of the author, there are no comprehensive studies about the (construct) validity of input-based measures available. Consequently, these measures are not taken into account in this thesis.

As far as the construct validity of the business count and categorical approach is concerned, Appendix 3 indicates some degree of convergence between the approaches. Early research studies by Amit and Livnat (1988a) and Montgomery (1982) provide evidence for a high degree of convergent validity between Rumelt's (1974) categorical measure and continuous SIC-based measures. Hoskisson et al. (1993) follow a structural equation modeling approach to test the validity of the entropy index of diversification on a sample of 160 firms that are actively traded on the NYSE or AMEX in 1988.[210] The results of the structural equation model provide encouraging support for the entropy measure concerning convergent validity with Rumelt's (1974) classification, discriminant validity on widely accepted control variables such as size, debt, and research and development expenditure, and predictive validity on firm performance using accounting measures and market measures.[211] While the above-cited studies predominately conclude that business count measures offer a reliable and valid measurement

[206] Cp. Knecht, 2014, p. 189; Nocker et al., 2016, p. 200f.
[207] Cp. Pils, 2009, p. 19.
[208] Cp. Nocker et al., 2016, p. 201.
[209] Cp. Nocker et al., 2016, p. 201.
[210] Cp. Hoskisson et al., 1993, p. 215ff.
[211] Cp. Hoskisson et al., 1993, p. 225ff.

concept, Hall and John (1994) argue that *"entropy and Rumelt's categories do not assess differences between related and unrelated diversity in the same way"*[212]. Likewise, Sambharya (2000) finds only little support for the construct validity of neither the business count approach nor the strategic approach regarding convergence validity, discriminant validity, and predictive validity.[213]

Table 3 provides an overview of frequently used diversification measures separated into business count and strategic measures. To choose the most suitable liquidity measure for the investigation of the mediating effects of stock liquidity on the diversification's effect, the author adopts five quality properties:

- *Reliability* refers to the consistency or stability of a measurement approach.[214] It is the extent to which measures are free from random error and, thus, yield the same results on repeated trials given identical circumstances.[215] Approaches to testing the reliability of a measurement instrument build on correlation coefficients looking for similarities in the source of the random error variance.[216] The greater the correlation between the measured values and the true values, the higher the reliability of the measure.[217] Prominent methods of testing the reliability of an instrument include the test-retest approach and Cronbach's alpha.[218]
- *Content validity* deals with the appropriate degree to which empirical measurement reflects the full range of the underlying concept regarding contextual aspects.[219] To prove the content validity of diversification measures, researchers follow a qualitative approach rather than an empirical

[212] Hall & John, 1994, p. 165.

[213] Cp. Sambharya, 2000, p. 171.

[214] Cp. Bryman & Bell, 2015, p. 169; Carmines & Zeller, 1979, p. 12.

[215] Cp. John & Reve, 1982, p. 520; Schnell et al., 2013, p. 141.

[216] Cp. Maruyama & Ryan, 2014, p. 194; Schermelleh-Engel & Werner, 2012, p. 120f.

[217] Cp. Maruyama & Ryan, 2014, p. 194; Peter, 1979, p. 8.

[218] Cp. Döring & Bortz, 2016, p. 443f.; Peter, 1979, p. 8.

[219] Cp. Hartig et al., 2012, p. 149; Maruyama & Ryan, 2014, p. 212.

approach and rely on a theoretical specification of the nature of the construct and its possible errors.[220]

- *Construct validity* means the extent to which a measure connects with other measures that are deemed suitable for assessing the construct.[221] It involves determining whether the measure has convergent validity and discriminant validity.[222] To check whether a measure exhibits sufficient convergent and discriminant validity, researchers often investigate correlation coefficients and apply general structural equation models.[223]
- *Data availability* enables to construct long time series of diversification measures that are necessary to control for the effects of liquidity on the diversification's effect over time.
- *Comparability* is the possibility to compare the level of corporate diversification across the various sample firms and over time.

Table 3 shows that, to date, there is no silver bullet on how to obtain the "true" level of corporate diversification. Instead, researchers are confronted with a trade-off between objective but unprecise business count measures and strategic measures that might score from high content validity but are judgmental and not available for large data samples. Out of the eleven traditional measures, three business count measures will be considered for the empirical analysis of the mediating effects of stock liquidity on the diversification-performance relationship: Diversification dummy (included for compatibility reasons with prior studies), two mod. Berry-Herfindahl indices.

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[220] Cp. Hoskisson et al., 1993, p. 217; Robins & Wiersema, 2003, p. 44f.

[221] Cp. Hartig et al., 2012, p. 153; Wegener & Fabrigar, 2004, p. 161.

[222] Cp. Cohen et al., 2011, p. 187.

[223] Prominent examples include Hoskisson et al., 1993, p. 215ff.; Lubatkin et al., 1993, p. 433ff.; and Sambharya, 2000, p. 163ff.

Table 3: Selective summary of diversification measures[224]

The table presents eleven diversification metrics proposed over the last three decades of diversification research and that measure different aspects of corporate diversification. The analysis of the quality properties is based on Hall and John (1994), Lubatkin et al. (1993), Montgomery (1982), Nocker et al. (2016), and Sambharya (2000).

Measure	Description	Quality properties					Score
		Reliability	Content validity	Construct validity	Data availability	Comparability	
Business count approach							
Diversification dummy	Assessment of relationship based on objective, secondary data such as the SIC classification	fulfilled	not fulfilled	fulfilled	fulfilled	not fulfilled	3 of 5
Share of largest business		fulfilled	not fulfilled	fulfilled	fulfilled	not fulfilled	3 of 5
Berry-Herfindahl index		fulfilled	not fulfilled	fulfilled	fulfilled	fulfilled	4 of 5
Entropy measure		fulfilled	Not fulfilled	fulfilled	fulfilled	partially fulfilled	3 of 5
Strategic approach (categorical)							
Wrigley (1970)	Assessment of relatedness between adjacent businesses based on individual judgment of researchers	not fulfilled	fulfilled	fulfilled	not fulfilled	not fulfilled	2 of 5
Rumelt (1974)		not fulfilled	fulfilled	fulfilled	not fulfilled	not fulfilled	2 of 5
Input-based measures							
Farjoun (1994)	Similarities among industries based on human skills and expertise	not fulfilled	not fulfilled	n/a	not fulfilled	not fulfilled	0 of 5
Pehrsson (2006a)	Survey approach to identify relatedness classes (top industrial executives)	not fulfilled	fulfilled	n/a	not fulfilled	not fulfilled	1 of 5
Robins and Wiersema (1995)	Resource-based approach to modeling interrelationship based on R&D usage	not fulfilled	not fulfilled	n/a	not fulfilled	not fulfilled	0 of 5
Stimpert and Duhaime (1997)	Survey approach to uncover relatedness as perceived by managers	not fulfilled	fulfilled	n/a	not fulfilled	not fulfilled	1 of 5
Tanriverdi and Venkatraman (2005)	Similarities among businesses determined based on knowledge relatedness across products, markets, and management	not fulfilled	not fulfilled	n/a	not fulfilled	not fulfilled	0 of 5

[224] Source: own representation.

II.3.2. EMPIRICAL BUSINESS COUNT MEASURES OF PRODUCT DIVERSIFICATION

In industrial organisation[225], the total diversity of a firm's business units is commonly estimated using the business count approach.[226] The most straightforward form of the business count measures is a binary variable that takes a value of one if the number of two-, three-, or four-digit SIC categories in which a firm participates at a given point in time exceeds one and is zero otherwise:[227]

$$\mathrm{BDIV[N]} = \begin{cases} 1, & \mathrm{N}_{SIC} > 1 \\ 0, & \mathrm{N}_{SIC} \leq 1 \end{cases} \tag{9}$$

where:

$\mathrm{BDIV[N]}$ = Diversification dummy based on [N]-digit SIC codes, and

N_{SIC} = number of different SIC categories constituting the corporate portfolio.

The multi-segment dummy has the advantage of being the easiest to calculate among all measures of diversity, but it is criticised for its failure to take into consideration differences in the size distribution and the relative importance of various businesses that constitute a firm's scope of activities.[228] Therefore, using the diversification dummy is appropriate only when the goal is to study the effects of being diversified but is almost useless for analysing changes in the degree of diversification. This disadvantage is, however, offset to some degree by Lang and Stulz' (1994) observation that there is only a weak drop in Tobin's Q when increasing the number of segments beyond two.[229] While the multi-segment

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[225] The Industrial Organization Theory focuses on the interaction between market and company and dates back to the early works by Bain (1956, 1968) and Mason (1939).

[226] Cp. Datta et al., 1991, p. 531f.; Perry, 1998, p. 55.

[227] Cp. Rojahn & Zechser, 2017, p. 7.

[228] Cp. Gort, 1962, p. 10; Scherer, 1980, p. 90ff.

[229] Cp. Lang & Stulz, 1994, p. 1261.

dummy enjoys limited popularity in strategic management research[230], it is still frequently applied in the finance literature.[231]

Since the beginning of the 1960s, more comprehensive business count measures have been proposed that reflect the degree to which sales, assets, employees, or income are concentrated among different business segments.[232] Most of these weighted business count measures represent variants of the following general equation:[233]

$$D_W = 1 - \sum_{i=1}^{N_{SIC}} \mathrm{p}_i^{SIC} * w_i \tag{10}$$

where:

D_W	=	extent of diversification based on weighted business count,
p_i^{SIC}	=	share of the ith business relative to the firm as a whole,
w_i	=	assigned weight summed over all of a firm's businesses, and
N_{SIC}	=	the number of different SIC categories constituting the firm's portfolio.

Weighted business count measures have been proposed or employed, among others, by Berry (1971) and Jacquemin and Berry (1979) and include the Berry-Herfindahl index and the Entropy index of diversification.[234] Berry (1971) suggests to measure the extent of diversity as the inverse of the sum of the squared output in the ith business unit as a percentage of the firm's squared total output across all business units:[235]

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[230] Cp. Palepu, 1985, p. 250f.

[231] Popular studies include Berger and Ofek (1995), Campa and Kedia (2002), Glaser and Mueller (2010), Lamont and Polk (2001), Mansi and Reeb (2002), and Servaes (1996).

[232] Cp. Pils, 2009, p. 11; Varadarajan, 1986, p. 44.

[233] Cp. Amit et al., 1989, p. 91; Chatterjee & Blocher, 1992, p. 878.

[234] Cp. Berry, 1971, p. 371ff.; Jacquemin & Berry, 1979, p. 359ff.; Martin & Sayrak, 2003, p. 49f.; Nocker et al., 2016, p. 200.

[235] Cp. Berry, 1971, p. 373.

$$H[N]DIV = 1 - \sum_{i=1}^{N_{SIC}} \mathrm{p}_i^{SIC} * \mathrm{p}_i^{SIC} \quad (11)$$

where:

$H[N]DIV$	=	Revenue-based Herfindahl index based on [N]-digit SIC codes,
p_i^{SIC}	=	share of the ith business relative to the firm as a whole, and
N_{SIC}	=	number of different SIC categories constituting the corporate portfolio.

When a firm occupies only one business, the index attains a value of $D_B = 0$ The value approaches monotonically towards $D_B = 1$ as the number of a firm's SIC involvements with equal shares $p_i = 1/N$ increases.[236] The Berry-Herfindahl index is sensitive to changes in the number and distribution of business units, which gives it great popularity in empirical research.[237] However, by squaring the output figures, the index weights more heavily the values for larger business units bearing the risk of underestimating a firm's total diversity.[238]

The Entropy measure, on the other hand, weights each industry involvement to the firm by the natural logarithm of its reciprocal value $1/p_i$, thereby giving less weight to large business units compared to the Berry-Herfindahl index.[239] The index takes the following functional form:[240]

[236] Cp. Amit et al., 1989, p. 91; Bühner, 1993, p. 111.

[237] Cp. Fey, 2000, p. 128ff.; Wulf, 2007, p. 49ff.

[238] Cp. Fey, 2000, p. 42; Hungenberg, 2014, p. 465.

[239] Cp. Fey, 2000, p. 42f.; Jacquemin & Berry, 1979, p. 36f.; Pitts & Hopkins, 1982, p. 622.

[240] Cp. Jacquemin & Berry, 1979, p. 361; Palepu, 1985, p. 252.

$$ETDIV = \sum_{i=1}^{N_{SIC4}} \mathrm{p}_i^{SIC4} * \ln \frac{1}{\mathrm{p}_i^{SIC4}} \quad (12)$$

where:

$ETDIV$	=	degree of diversification based on the Entropy measure,
p_i^{SIC4}	=	share of the i[th] industry segment relative to the firm as a whole, and
N_{SIC4}	=	number of different four-digit SIC categories constituting the corporate portfolio.

The Entropy index attains a value of $\mathrm{D_{ET}} = 0$ for single-segment firms and approaches $\mathrm{D_{ET}} = \ln(N)$ for highly diversified firms with equal shares $p_i = 1/N$.[241] Going forward, the entropy measure of diversification is not considered because of the missing upper limit which renders comparisons across firms more difficult compared to the Berry-Herfindahl index.

Given their ease of computation and the consideration of objective, secondary data to allocate a firm's reporting units to standardised industry taxonomies like the SIC system[242], business count measures benefit from a high level of objectivity and reliability.[243] The use of well-accepted and standardised industry taxonomies not only helps to make research replicable and cumulative but also allows for the investigation of a broad range of statistical methods applied to large data samples.[244]

However, the use of segment data can reduce the explanatory power significantly and thus may lead to imprecise conclusions about the actual effects of diversification on firm value:[245] Business count measures, such as the number of industries in which a firm operates, require a somewhat arbitrary decision about the level of refinement (i.e., two-digit vs four-digit SIC codes). Furthermore, these

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[241] Cp. Raghunathan, 1995, p. 1001.

[242] Cp. Klier, 2009, p. 29ff.; Szeless, 2001, p. 62.

[243] Cp. Montgomery, 1982, p. 300; Weiss, 2009, p. 58.

[244] Cp. Knecht, 2014, p. 197; Robins & Wiersema, 1995, p. 280.

[245] For a detailed discussion of the downside from using SIC codes and segment data, see section IV.3.1.1.

measures do not accurately account for the dissimilarities of products because they assume equal distances between SIC codes.[246] Also, using segment data may cause distorted results due to strategic accounting: To avoid detailed information disclosures on separate segments in the presence of competitors, a firm may group multiple former independent business segments so that they appear to perform more poorly than single segment firms in the same industry.[247] Alternatively, large reporting units may be created after an acquisition to reduce the danger of future goodwill write-offs.[248]

II.3.3. CONSTRUCTION OF MARKET-IMPLIED MEASURES OF DIVERSIFICATION

It is not the use of a business count measure per se that may lead to decreasing levels of construct validity, but rather the hierarchical logic implied by the SIC classification system. To mitigate the biases resulting from both the SIC system and segment reporting, this thesis applies a series of market-implied diversification measures recently introduced by Zechser and Rojahn (2017). These measures are similar to the business count approach but do use information from stock markets instead of industry classification schemes to identify the business activities that a firm is engaged in. To ensure that the market-implied diversification measure meets the highest academic standards, one section of chapter 4 is devoted to the empirical assessment of the construct validity regarding uniqueness, convergent and predictive validity.[249]

The market-implied diversification measures date back to Barnea and Logue's (1973) contribution "*Stock-Market Based Measures of Corporate Diversification*, in which they consider the degree of diversification to be a direct function of the amount of residual unsystematic variation that remains in a combination of risky assets.[250] In refining Barnea and Logue's (1973) measurement approach, the market

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[246] Cp. Gollop & Monahan, 1991, p. 321.

[247] Cp. Villalonga, 2004a, p. 482.

[248] A more detailed analysis of the validity of the business count approach is included in section IV.3.1.

[249] For a detailed discussion of the construct validity, refer to section IV.3.1.

[250] Cp. Barnea & Logue, 1973, p. 51ff.

implied diversification measures employ a set of ten STOXX® EUROPE 600 sector indices to obtain information on the extent to which equity risks are diversifiable. Barnea and Logue (1973), instead, use a broad market portfolio.

The starting point for constructing the market-implied diversification measures is a multivariate regression model: Let r_i denote the equity return of firm i in year t and let r_i be a linear function of the multivariate return series of ten STOXX® EUROPE 600 sector indices during the period commencing 250 days before and ending on the last trading day prior to the individual firm's fiscal year end:

$$r_i = \delta_i S_j + \epsilon_i \tag{13}$$

where:

r_i	=	stock price return of asset i,
S_j	=	multivariate return series of STOXX® EUROPE 600 sector indices,
δ_i	=	vector of regression parameters, and
ϵ_i	=	error term.

The first and most straightforward form of the market-implied diversification measures then involves numerically counting the number of significant regression coefficients in δ_i. MCOUNT takes a value of one if the number of significant coefficients exceeds one and is zero otherwise:

$$\text{MCOUNT} = \begin{cases} 1, & N_\delta > 1 \\ 0, & N_\delta \leq 1 \end{cases} \tag{14}$$

where:

MCOUNT	=	degree of market diversification based on numerical count, and
N_δ	=	number of significant regression coefficients.

To avoid distortions induced by insignificant regression coefficients, equation (13) is estimated using a forward stepwise regression procedure. The boundaries for the removal and the addition of a sector index are $p \geq .1$ and $p \leq .05$, respectively. Whenever R^2 is used, statistical inferences are based on Huber-White standard errors to correct for heteroscedastic residuals.[251]

[251] Cp. Huber, 1967, p. 221ff.; White, 1980, p. 817ff.

The index is the easiest to calculate among all market-implied diversification measures but falls short in taking into consideration differences in the size distribution and the relative importance of the various industry involvements. In order not to exaggerate the overall significance of diversification by merely counting the significant sector indices, this thesis proposes two more comprehensive diversification measures, MHDIV and MDIV, that reflect the relative strength of each STOXX® EUROPE 600 sector index.

The second measure is an application of the Berry-Herfindahl index and measures the extent of diversity as the inverse of the sum of the squares of each standardised regression coefficient divided by the squared sum of the absolute regression coefficients

$$MHDIV = 1 - \sum_{j=1}^{N_\delta} {\delta_j}^2 * \frac{1}{\Delta_j^2} \quad (15)$$

where:

$MHDIV$	=	degree of market diversification based on Herfindahl weighting scheme,
N_δ	=	number of significant regression coefficients,
Δ_J	=	sum of the absolute regression coefficients, and
δ_j	=	vector of regression parameters.

MHDIV assumes a value of zero for single-business firms and approaches towards one as the number of significant regression coefficients increases. Relying on the market's view about the interrelationships between various industry sectors, MHDIV is robust against distortions resulting from the inherent hierarchy of industry classification systems such as the SIC system.[252] A major disadvantage of MHDIV is that it does not take account of the extent to which equity risks are diversifiable in external capital markets, thereby likely overestimating the level of corporate diversification. For instance, consider the case of three significant indices with homogenous beta-coefficients which according to equation (15) would mean a mid-degree of diversification (66%). Nevertheless, R^2 could be relatively small indicating that the portfolio uses the diversification benefits offered by equity capital markets only to a limited extent.

[252] For a discussion of the limitations of the SIC system as an information source, instead of many, see Robins & Wiersema, 1995, p. 281f.

The third measure integrates the number of significant industry sectors, their relative importance, and the proportion of explained variance into a single diversification measure. More specifically, MDIV is the minimum of the proportion of explained variance (R^2) and the inverse of a Herfindahl index based on standardised regression coefficients resulting from yearly forward stepwise regressions of equation (13):

$$MDIV = \min\left(R^2; 1 - \sum_{j}^{N_\delta} {\delta_j}^2 * \frac{1}{\Delta_J^2}\right) \tag{16}$$

where:

$MDIV$	=	degree of market implied diversification
R^2	=	coefficient of determination,
N_δ	=	number of significant regression coefficients,
Δ_J	=	sum of the absolute regression coefficients, and
δ_j	=	vector of regression parameters.

In this equation, the left-hand side of the minimum function refers to the level of explained variance in the regression model. R^2 determines the extent to which the corporate portfolio makes use of diversification effects offered by external capital markets. The second element of the minimum function equals MHDIV. Analogous to MHDIV, MDIV converges towards one as the firm becomes less focused.

The following example of BASF SE illustrates how the various market-implied measures can be used to obtain the level of corporate diversification. BASF SE is a German multi-national chemical organisation and, is amongst the most abundant chemical producer in the world. The corporate umbrella comprises subsidiaries and joint ventures around the world offering a broad range of products across the business sectors chemicals, plastics, performance products, crop protection products, and oil and gas. According to the market-implied diversification measures, BASF SE is diversified across the industries “Basic Materials” and “Industrials”; thereby making less use of diversification benefits offered by the capital market as indicated by low values of MHDIV and MDIV.

Table 4: Regression results for BASF and fiscal year 2017[253]

	Linear, stepwise regression			
VARIABLES	**Coef.**	**Std. Err.**	**t**	**P>|t|**
STOXX® EUROPE 600 INDUSTRIALS	0.334	0.072	4.650	0.000
STOXX® EUROPE 600 BASIC MATERIALS	0.454	0.073	6.240	0.000
OBSERVATIONS	256			
R-SQUARED.	0.546			
F TEST	116.76***			

$\text{MCOUNT} = 2$

$MHDIV = 1 - \frac{0.334^2 + 0.454^2}{(0.334 + 0.454)^2} = 0.489$

$MDIV = \min(0.546; 0.489) = 0.489$

The estimates of the degree of diversification based on the traditional business count measures show that BASF SE is diversified across industry segments, but, except for one business segment, remains within the industry group chemicals (SIC codes beginning with 28XX). The two approaches therefore lead to different assessments of the portfolio configuration of BASF SE (e.g. MHDIV: 49% << H4DIV: 74%). This can have far-reaching implications for the analysis of the value contribution of diversification as contained in chapter IV.

Table 5: BASF SE reported sales per business unit and fiscal year 2017[254]

Segment description	SIC	Sales	Sales^2
Functional Solutions	2851	20,745,000	430,355,025,000,000
Chemicals	2891	16,331,000	266,701,561,000,000
Performance Products	2865	16,217,000	262,991,089,000,000
Agricultural Products	2879	5,696,000	32,444,416,000,000
Oil & Gas	6221	3,244,000	10,523,536,000,000
Total	**n/a**	**62,233,000**	**1,003,015,627,000,000**

$BDIV4 = 5$

$\text{BDIV2} = 2$

$H4DIV = 1 - \frac{1{,}003{,}015{,}627{,}000{,}000}{62{,}233{,}000^2} = 0.741$

$H2DIV = 1 - \frac{58{,}989{,}000^2 + 3{,}244{,}000^2}{62{,}233{,}000^2} = 0.100$

[253] Source: Own representation.

[254] Source: Worldscope database by Thomson Reuters.

II.4. EMPIRICAL FINDINGS AND EXPLANATORY APPROACHES ON THE DIVERSIFICATION-PERFORMANCE LINKAGE

II.4.1. THEORETICAL PERSPECTIVE ON PRODUCT DIVERSIFICATION

II.4.1.1. An economic model of corporate diversification

There is ample theoretical literature discussing the benefits and costs of diversification strategies.[255] In perfect capital markets under the Modigliani and Miller (1958)[256] assumptions, one would not expect a firm's diversification decision to affect firm value: Shareholders have little economic gains from corporate diversification because they can diversify away unsystematic risks more cheaply by holding a portfolio of investments that have a low correlation among one another and, thus, may not want firms to diversify.[257] Not surprisingly, many of the arguments made about why firms diversify focus on market imperfections.

Following prior research by Capozza and Seguin (1999) and Lamont and Polk (2001)[258], this study refers to the fundamental dividend-discount relationship to uncover the sources of the valuation differences between diversified firms and focused firms. The dividend-discount model posits that a firm is worth the sum of its discounted future dividends:[259]

$$SV_{it} = \int_{t}^{\infty} DP_{it} * e^{-rt} dt \qquad (17)$$

where:

SV_{it} = shareholder value of firm i at time t,
DP_{it} = firm i dividend paid out at time t, and
e^{-rt} = continuous compound rate at time t.

Defining, further, the excess firm value on a diversified firm as the log ratio of the value of a diversified firm and the value of an industry-matched portfolio of focused firms and substituting the Gordon-Growth model in the excess value

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[255] Instead of many, see Erdorf et al., 2013, p. 189ff.; Martin & Sayrak, 2003, p. 39ff.

[256] Cp. Modigliani & Miller, 1958, p. 261ff.

[257] Cp. Levy & Sarnat, 1970, p. 795ff.; Myers, 1984, p. 129.

[258] Cp. Capozza & Seguin, 1999, p. 591ff.; Lamont & Polk, 2001, p. 1695.

[259] Cp. Gordon, 1959, p. 102f.

measure, it follows that, if corporate diversification affects equity value, it can do so through future cash flows (D_{it}) or through future returns (e^{-rt}):

$$RV_{it} = \ln\frac{SV_{it}}{\overline{SV_{it}}} = \int_t^{\infty} DP_{it} * e^{-rt}dt - \int_t^{\infty} \overline{DP_{it}} * e^{-\bar{r}t}dt \quad (18)$$

where:

RV_{it}	=	measure of relative firm value of firm i at time t,
SV_{it}	=	shareholder value of firm i at time t,
DP_{it}	=	firm i dividend paid out at time t,
e^{-rt}	=	continuous compound rate at time t, and

the bar indicating focused firms.

Under the assumption of paying out the income in full, the cash flow which can be distributed among the shareholders D_{it} equals:[260]

$$FCE_{it} = NOPAT_{it} - INT_{it} - CAPEX_{it} - OPEX_{it} + D\&A_{it} - \Delta NWC_{it} + \Delta ND_{it} \quad (19)$$

where:

FCE_{it}	=	flow to equity of firm i at time t,
$NOPAT_{it}$	=	net operating income after tax of firm i at time t,
INT_{it}	=	interest expenses of firm i at time t,
$CAPEX_{it}$	=	capital expenditure of firm i at time t,
$OPEX_{it}$	=	operational expenditure of firm i at time t,
$D\&A_{it}$	=	depreciation and amortization expenses of firm i at time t,
ΔNWC_{it}	=	delta net working capital of firm i at time t, and
ΔND_{it}	=	delta net debt issuance of firm i at time t.

Figure 6 graphically summarises the different channels through which corporate diversification can affect value. With a view to corporate level cash flows, a considerable amount of literature argues that diversified firms may reap benefits in the form of operating synergies[261] and financial synergies such as debt co-insurance effects[262] and an increased allocation efficiency of capital in multi-

[260] Cp. Viebig et al., 2008, p. 29.

[261] Cp. Beckmann, 2006, p. 40ff.; Purkayastha et al., 2012, p. 71; Tanriverdi & Venkatraman, 2005, p. 99ff.

[262] Cp. Hann et al., 2013, p. 1961ff.; Higgins & Schall, 1975, p. 93ff.; Lewellen, 1971, p. 521ff.

business firms[263]. Aside from operating and financial diseconomies[264], the value-destroying effects of corporate diversification are primarily led back to amplifying agency problems causing inefficiencies in the internal capital allocation process due to increasing costs of decision management and control.[265]

Further to the cash flow related arguments, differences in the appropriate discount rates of equity might contribute to the diversification's effect. If the cash flows are held constant at the same time as the discount rate for equity is increased, then diversified firms will have a lower stock market valuation as predicted by equation (18). Lamont and Polk (2001) claim: *"Different securities can have different expected returns for many reasons; explanations include risk, mispricing, taxes, and liquidity."*[266]

Among such factors, this research study stresses the mediating role of liquidity of equity on the diversification-performance linkage; a channel that has received only little attention, albeit its theoretical implications are ambiguous: On the one hand, diversified firms might be exposed to higher information imbalances[267], lowering the liquidity of a firm's traded equity, and leading to substantial reductions in shareholder value. On the other hand, the corporate umbrella might provide an information benefit by diversifying away the adverse impacts of insiders' informational advantage over outsiders that possibly makes large stocks relatively more attractive. Additionally, diversified firms are often large stocks[268] that are less affected by expected and unexpected market-wide liquidity shocks resulting in a "flight to liquidity" effect.[269]

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[263] Cp. Gertner et al., 1994, p. 1211ff.; Hubbard & Palia, 1999, p. 1131ff.; Rajan et al., 2000, p. 35ff.; Stein, 1997, p. 111ff.

[264] For a detailed discussion of diseconomies within the context of corporate diversification, see Vollmar, 2014, p. 113ff.

[265] Cp. Amihud & Lev, 1981, p. 605ff.; Denis et al., 1997, p. 135ff.; Jensen, 1986, p. 323ff.; Ozbas & Scharfstein, 2010, p. 581ff.; Rajan et al., 2000, p. 35ff.; Shin & Stulz, 1998, p. 531ff.; Stulz, 1990, p. 3ff.

[266] Lamont & Polk, 2001, p. 1694.

[267] Cp. Hadlock et al., 2001, p. 613ff.; Harris et al., 1982, p. 604ff.

[268] Cp. Pomfret & Shapiro, 1980, p. 140ff.

[269] Cp. Amihud, 2002, p. 53.

While reviewing the theoretical literature in sections II.4.1.2.1 to II.4.1.3.2, the study adopts the point of view of the shareholders of the diversified firm. Therefore, any judgment on the costs and benefits of corporate diversification is based on whether stockholders would find corporate diversification desirable or not.

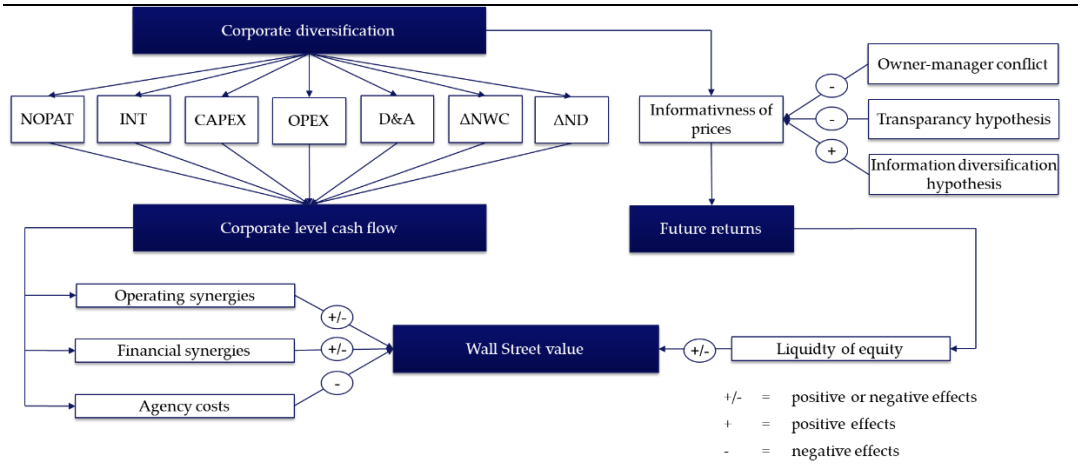

Figure 6: Benefits and costs of diversification[270]

II.4.1.2. Channel I: Corporate level cash flow

From a fundamental perspective, the benefits and costs of corporate diversification can be derived from i) operating synergies in the form of economies of scale and scope (or dissynergies), ii) financial synergies arising from a reduction in corporate risk, a higher debt capacity, and an increased efficiency of internal capital markets (or financial dissynergies), and iii) agency problems causing inefficiencies in the internal capital allocation process.

II.4.1.2.1. Operating synergies

One of the strongest motives for diversification suggests that diversified firms can generate value from transferring, sharing, and leveraging valuable

[270] Source: Own representation based on Capozza & Seguin, 1999, p. 593.

resources among business units that are mutually reinforcing.[271] Provided that the relatedness among the business units is appropriately managed[272], scope economies should result in sub-additive cost synergies that make the combined businesses worth more than they would be on a stand-alone basis.[273] By their nature, such economies are available to related diversified firms more so than to unrelated diversified firms.[274]

On the positive side, the additional value arising from the utilisation of these synergies is derived from economies of scope and economies of scale.[275] Economies of scope refer to the sub-additivity of production costs[276] and exist when *"(…) it is less costly to combine two or more product lines in one firm than to produce them separately."*[277] They arise from inputs that can be shared or utilised to service two or more product lines without complete congestion.[278] Economies of scope have value when they contribute to sources of cost or differentiation advantages over an undiversified rival.[279] Contrarily, economies of scale refer to the cost advantages that firms can gain by using more efficient processes, which lead to an increased speed of operation.[280] A firm is said to exhibit economies of scale if the unit costs of a product (or operation or function that goes into producing a product) decline as the absolute volume per period increases.[281] By using its existing stock of resources

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[271] Cp. Bailey & Friedlaender, 1982, p. 1026; Lubatkin & Chatterjee, 1994, p. 114ff.; Palich et al., 2000, p. 156ff.

[272] Cp. Nayyar, 1992, p. 220ff.

[273] Cp. Goold & Kathleen, 1993, p. 16; John & Harrison, 1999, p. 130; Weston, 1970, p. 70.

[274] Cp. Perry, 1998, p. 11; Robins & Wiersema, 1995, p. 279.

[275] Cp. Ostrowski, 2007, p. 76; Singh & Montgomery, 1987, p. 379; Vollmar, 2014, p. 107.

[276] Cp. Bausch & Pils, 2009, p. 160; Purkayastha et al., 2012, p. 21.

[277] Panzar & Willig, 1981, p. 268.

[278] Cp. Panzar & Willig, 1981, p. 268.

[279] Cp. Hill et al., 1992, p. 502; Markides & Williamson, 1996, p. 342.

[280] Cp. Lubatkin, 1983, p. 219; Singh & Montgomery, 1987, p. 379.

[281] Cp. Porter, 2004, p. 7.

more efficiently, the diversified firm might be able to lower its average cost curve and thus enjoy an advantage over competing firms.[282]

On the negative side, increasing the number and diversity of the business units under one management may narrow the efficient allocation of resources.[283] According to transaction economics, expanding the scope of a firm's business activities would lead to increased costs of both decision management and decision control, which may offset any economies implicit in the production function.[284] Management teams commonly operate under a single dominant logic that can be defined as *"the way in which managers conceptualize the business and make critical resource allocation decisions"*.[285] There is every possibility of X-inefficiencies when corporate managers continue to apply their existing dominant logic to newly integrated strategically different businesses.[286] Likewise, diseconomies of decision control may result from increasing agency costs.[287] Last but not least, there can be a strategic misfit between the individual business units which might lead to diseconomies of scope.[288]

Although operating synergies in the form of scale and scope economies provide significant insights into the diversification-performance linkage, a great deal remains to be done in verifying them as the economic rationale for multi-business firms to exist. There is only a little empirical evidence on the net effects of operating synergies on the diversification-performance linkage in the literature as it is extraordinarily difficult to capture tacit resources such as capabilities and know-how and to retrieve all information necessary such as average cost data.[289] Recently, several authors have made significant steps in this direction by

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[282] Cp. Perry, 1998, p. 11; Singh & Montgomery, 1987, p. 379.

[283] Cp. Lamont, 1997, p. 83ff.; Rajan et al., 2000, p. 35ff.; Scharfstein, 1998, p. 1ff.

[284] Cp. Schipper & Smith, 1983, p. 458.

[285] Cp. Prahalad & Bettis, 1986, p. 490.

[286] Cp. Markides, 1995, p. 26.

[287] For a detailed discussion of agency costs in the context of corporate diversification, refer to section II.4.1.2.3.

[288] Cp. Vollmar, 2014, p. 114f.

[289] Cp. Purkayastha et al., 2012, p. 21; Robins & Wiersema, 1995, p. 279ff.; Shepherd & Shepherd, 2004, p. 161f.; Szeless et al., 2003, p. 150.

developing indirect indicators of business relatedness based on technology flows between the businesses of a firm[290], skill[291] and managerial competencies[292], and the strategic importance of imperfectly tradable assets in different business lines[293].

For instance, Robins and Wiersema (1995) investigate the flows of technology between the business units of 120 U.S. manufacturing firms and find that technological relatedness is positively associated with accounting-based profitability.[294] Farjoun (1998) concludes that synergies resulting from skill-based relatedness can only be realised when the resulting products share similar physical attributes (e.g. raw materials, production processes).[295] Szeless et al. (2003) investigate a European sample of 33 large firms from Germany, Switzerland, and Austria and report a significant positive relationship between technological relatedness and several accounting-based and market-based performance indicators.[296] Tanriverdi and Venkatraman (2005) provide evidence for firms to be more profitable when they can exploit cross-business knowledge synergies across products, customers, and management.[297]

II.4.1.2.2. Financial synergies

Lewellen (1971) provides a pure financial justification for diversification in cases where there exists a positive probability of bankruptcy and risk-adjusted pricing behaviour of lending institutions.[298]

According to the fundamental principles of modern portfolio theory[299], the combination of different business units in a firm's portfolio will reduce the variance of total earnings for the company, whenever the earnings of the individual units

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[290] Cp. Robins & Wiersema, 1995, p. 282ff.

[291] Cp. Farjoun, 1994, p. 189ff., 1998, p. 611ff.

[292] Cp. Ilinitch & Zeithaml, 1995, p. 401ff.

[293] Cp. Markides & Williamson, 1994, p. 149ff., 1996, p. 340ff.; Tanriverdi & Venkatraman, 2005, p. 79ff.

[294] Cp. Robins & Wiersema, 1995, p. 290.

[295] Cp. Farjoun, 1998, p. 620ff.

[296] Cp. Szeless et al., 2003, p. 154ff.

[297] Cp. Tanriverdi & Venkatraman, 2005, p. 108ff.

[298] Cp. Lewellen, 1971, p. 521ff.

[299] For an introduction to modern portfolio theory, see section II.1.2.1.

are not perfectly correlated.[300] This co-insurance effect, by facilitating a greater debt capacity, enhances firm value through an increasing level of optimal leverage and higher tax savings.[301] If in a world of taxes, debt funds are "cheaper" than equity funds due to the tax deductibility of interest expenses, borrowing will increase the value of equity.[302]

Besides the opportunity to utilise interest tax shields arising from debt co-insurance effects as described above, diversified firms may benefit from the asymmetric treatment of gains and losses by tax authorities.[303] As they can contemporaneously offset the losses of some of its businesses against the gains of others, more diversified firms pay less in taxes than their business units would if operated separately.[304] This proposition might even hold under the assumption of tax loss carrybacks or carryforwards.[305] Diversified firms may also lower their tax burdens by conducting tax-efficient intra-firm transactions, where earnings are shifted between foreign subsidiaries to make the most of the differences in tax structures across countries.[306]

Several empirical studies support the co-insurance hypothesis:[307] Kim and McConnell (1977) show that merging firms make greater use of financial leverage after the merger compared to the combined level of financial leverage volume of the individual firms before the merger, which negates windfalls losses for the bondholders of the merging firms.[308] Berger and Ofek (1995) report that diversified firms have a 1% point higher ratio of debt to total assets than their business units would have as separate firms, two-thirds of which is attributable to the debt co-insurance effect.[309] Mansi and Reeb (2002) demonstrate that the diversification

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[300] Cp. Amit & Livnat, 1988b, p. 100f.; Higgins & Schall, 1975, p. 99ff.
[301] Cp. Berger & Ofek, 1995, p. 41; John, 1993, p. 141; Singh et al., 2004, p. 491.
[302] Cp. Lubatkin, 1983, p. 219.
[303] Cp. Berger & Ofek, 1995, p. 41.
[304] Cp. Beckmann, 2006, p. 45.
[305] Cp. Majd & Myers, 1987, p. 345ff.
[306] Cp. Manzon et al., 1994, p. 1903.
[307] Cp. Singhal & Zhu, 2013, p. 1476.
[308] Cp. Kim & McConnell, 1977, p. 362.
[309] Cp. Berger & Ofek, 1995, p. 59.

discount vanishes when correcting for the book value bias of debt.[310] However, the co-insurance hypothesis is not without controversy. Despite its undoubtful theoretical rationale that business segments with a negative correlation of cash flows will stabilise a firm's total earning streams, it can be hard for managers to identify countercyclical businesses and if identified, there is no guarantee that the negative correlation is stable over time. Leland (2007) states that because of decreasing liability protection which, in times of financial distress, shields strongly performing business segments from loss-generating units, the financial synergies generated from combining various businesses units may be negative.[311] Furfine and Rosen (2011) find that after a merger the default risk of the combined firm can be higher because of managerial actions by self-interested managers that outweigh the benefits of product diversification (e. g. option-based compensation plans).[312]

Another financial justification for diversification is the ability to create internal financial markets to steady earnings and to fund deserving business units.[313] Under the assumption of inefficient external capital markets, having an internal source of financing offers several benefits to the firm's owner: Any informational disadvantage of outside investors can lead to credit rationing and underinvestment when individual business units attempt to raise monetary funds on their own in the arm's length external capital market.[314] In efficient internal capital markets, business units might be able to invest in profitable projects that, because of differences in information, incentives, asset specificity, control rights, or transaction costs, would be hard to finance externally.[315] Besides this "more-money" effect offering access to additional financing sources, there is an added advantage of internal capital markets from a "smarter-money" effect. To the extent that corporate managers have information advantages over outside investors in

[310] Cp. Mansi & Reeb, 2002, p. 2177ff.

[311] Cp. Leland, 2007, p. 765ff.

[312] Cp. Furfine & Rosen, 2011, p. 832ff.

[313] Cp. Erdorf et al., 2013, p. 190; Markides, 1995, p. 24.

[314] Cp. Stein, 1997, p. 114ff.

[315] Cp. Arikan & Stulz, 2016, p. 145; Lamont, 1997, p. 85f.; Liebeskind, 2000, p. 59ff.

evaluating and disciplining operating units[316], they may do a better job of shifting a given amount of funding from business units with limited growth opportunities to deserving businesses that are more promising to create value for shareholders.[317]

Thus, internal capital markets seem to be value enhancing[318], in particular, with regard to emerging markets where firms may opt for greater diversification to overcome the market imperfections in the external capital, labour, and product markets.[319] Khanna and Palepu (2000) analyse the performance of divisions of Indian business groups and conclude that group affiliation enhances firm performance by replicating the functions of institutions that are missing in emerging markets.[320] Fauver et al. (2003) study a sample of 35 developed and emerging market countries and suggest that corporate diversification is a value-enhancing strategy in weak institutional environments.[321] Shackman (2007) estimates a negative association between corporate diversification and capital market development for a sample of 1,560 firms from 39 countries, 20 of which belong to the richest countries of the world and the remainder belonging to the poorest countries.[322]

II.4.1.2.3. Agency costs

Agency theory initially developed by Alchian and Demsetz (1972), Ross (1973), and Stiglitz (1974)[323] constitutes a cornerstone of financial economics theory and is widely used to explain why firms pursue diversification strategies that lead

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[316] Cp. Bolton & Scharfstein, 1998, p. 107.

[317] Cp. Markides, 1995, p. 24; Martin & Sayrak, 2003, p. 41; Rajan et al., 2000, p. 38; Stein, 2003, p. 140f.

[318] A discussion of the dark side of internal capital markets follows in section II.4.1.2.3.

[319] Cp. Benito-Osorio et al., 2012, p. 331.

[320] Cp. Khanna & Palepu, 2000, p. 875ff.

[321] Cp. Fauver et al., 2003, p. 137f.

[322] Cp. Shackman, 2007, p. 493ff.

[323] Cp. Alchian & Demsetz, 1972, p. 777ff.; Ross, 1973, p. 134ff.; Stiglitz, 1974, p. 219ff.

to substantial reductions in shareholder value.[324] Ross (1973) defines a relationship of agency as a situation between two (or more) parties where *"one, designated as the agent, acts for, on behalf of, or as representative for the other, designated the principal, in a particular domain of decision problems."*[325] The central feature of this agency relationship is the contractual arrangement between the parties used to specify the rules of the game regarding the agent's rights in the firm, the methods to evaluate the agent's performance, and the resulting compensation to the agent.[326]

Agency theory is predicated on the belief that market imperfections induced by conditions of uncertainty, lack of contracting ability, and information asymmetry lead to second-best outcomes[327] in which the separation of ownership and control and the ensuing conflicts result in agency costs that reduce the value of the firm.[328]

As a result of informational disadvantages, principals cannot control their agents efficiently, thereby giving them the necessary leeway to act opportunistically and increase their own benefits.[329] Depending on the extent and temporal structure of the information asymmetry between the principal and the agent, the management literature differentiates between three forms in which agency problems may take shape:[330] (i) hidden characteristics referring to the risks of selecting an unfavourable agent and bearing the risk of adverse selection[331], (ii) hidden actions that arise when the managerial effort is unobservable after the contractual agreement has been established and/or has a differential value for the principal (leading to moral hazard)[332], and (iii) hidden intention describing a hold

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[324] Cp. Erdorf et al., 2013, p. 189; Martin & Sayrak, 2003, p. 42; Montgomery, 1994, p. 165ff.

[325] Ross, 1973, p. 134.

[326] Cp. Alparslan, 2006, p. 14; Fama & Jensen, 1983, p. 302.

[327] Cp. Darrough & Stoughton, 1986, p. 501.

[328] Cp. Amihud & Lev, 1999, p. 1063ff.; Denis et al., 1999, p. 1072.

[329] Cp. Müller-Stewens & Lechner, 2016, p. 583; Spremann, 1987, p. 6.

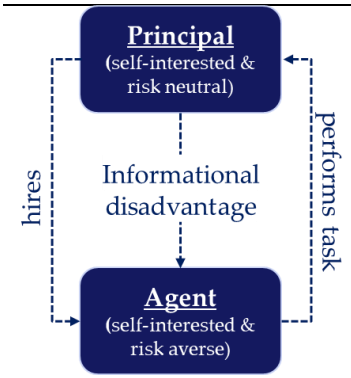
[330] Cp. Beckmann, 2006, p. 50; Picot & Wolff, 1994, p. 220.

[331] Cp. Akerlof, 1970, p. 488ff.

[332] Cp. Hölmstrom, 1979, p. 74ff.

up[333] situation where the principal depends on a continuation of the agency relationship, even so, the agent is likely to behave in an opportunistic manner.

Holistically, there are two approaches to resolving the principal's informational disadvantage and to reducing the resulting agency costs: either through a reduction of information asymmetry or by co-aligning the interests of the principal and the agent.[334] The former approach involves the establishment of control systems that allow for conclusions about the quality of the agent including techniques for signalling, screening or self-selection.[335] The latter approach, instead, aims to co-align the interest between the principal and the agent through compensation schemes that imitate equity ownership.[336] The following table summarises the different forms of information asymmetry:



Asymmetric information			
Agent's scope of action	Pre-contractural	Post-contractural	
Type of asymmetry	Hidden information	Hidden actions	Hidden intention
Principal's information problem	Lack of information on the quality of the products and services offered by the agent	Inability to assess the agent's efforts	True intentions of the agent remain uncovered
Type of risk	Adverse selection	Moral hazard	Hold up
Method of problem solving	Reduction of information asymmetry through signalling, screening, and self-selection / co-alingment of interests	Co-alingment of interests	

Table 6: Agency theory and classification of asymmetric information[337]

[333] Cp. Goldberg, 1976, p. 426ff.

[334] Cp. Denis et al., 1999, p. 1072; Picot & Wolff, 1994, p. 222. For detailed explanations on the possibilities of reducing agency problems, see Alparslan, 2006, p. 28ff.; Arnold et al., 2015, p. 95ff.; Kieser & Walgenbach, 2010, p. 47f.

[335] Cp. Perridon et al., 2016, p. 626f.; Wenzel, 2006, p. 36

[336] Cp. Denis et al., 1997, p. 1072.

[337] Own representation based on Arnold et al., 2015, p. 95; Knecht, 2014, p. 60; Picot & Wolff, 1994, p. 221.

Because all kinds of contractual arrangements (as between employer and employee) contain essential elements of agency[338], agency problems might be present in nearly all corporations. However, they increasingly appear in diversified firms, where there are many complex delegation situations, and information asymmetries are strongly pronounced.[339]

Two types of agency problems are especially relevant for this research study:[340] The owner-manager conflict that is concerned with a divergence of interests between the shareholders and corporate management, and the headquarter-division manager conflict assumes that the corporate headquarter itself is a principal of divisional managers.

Owner-manager conflict. The central tenet underlying the owner-manager conflict is a divergence of interests between the owners and the management of the (diversified) firm.[341] As managers are not full residual claimants, they might engage in top management featherbedding[342] and overinvest in diversification to maximise their utility without the best interest of their shareholders in mind.[343] In general, two benefits accrue to senior managers, but that are not available to the shareholders:[344] First, managers may wish to derive additional private benefits from managing a more diversified firm.[345] Shleifer and Vishny (1989) show that

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[338] Cp. Ross, 1973, p. 134.

[339] Cp. Beckmann, 2006, p. 50; Martin & Sayrak, 2003, p. 42.

[340] Other types of conflicts less relevant for the present study concern (i) the relationship between stockholders and bondholders and suggest reductions in firm value through the problem of risk shifting (Jensen & Meckling, 1976, p. 305ff.) and underinvestment (Myers, 1977, p. 147ff.) and (ii) principal-principal conflicts among shareholders with different ownership stakes (Kuhlmann & Rojahn, 2017, p. 20f.).

[341] Cp. Hill & Jones, 1992, p. 137.

[342] Cp. Myers, 1983, p. 55ff.

[343] Cp. Aggarwal & Samwick, 2003, p. 71; Hill et al., 1992, p. 502; Montgomery, 1994, p. 166; Walsh & Seward, 1990, p. 421.

[344] Cp. Hoskisson & Turk, 1990, p. 463; Vollmar, 2014, p. 117.

[345] Cp Aggarwal & Samwick, 2003, p. 72; Markides, 1995, p. 18.

managers have an incentive to select a diversification strategy that has the highest value under them than under the best alternative manager.[346] Being aware of the firm's dependence on their particular skills[347], diversification provides an opportunity for higher managerial compensation due to the increased complexity of the organisation.[348] Besides the pure pleasure of entrenching themselves, in his contribution *"Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers"* Jensen (1986) describes another specific incentive problem arising from free cash flows and bearing the risk of over-investment.[349] According to this free cash flow hypothesis, managers of firms with greater borrowing power or large free cash flows will not return these funds to the shareholders but invest them as to pursue increasingly far-flung opportunities that increase their power, compensation, and perquisites.[350] As diversified firms may have more available resources as discussed in section II.4.1.2.2, the free cash flow problem might be more severe in multi-business firms than in single-business firms.[351]

Second, diversification provides a means for reducing managerial employment risk which is closely related to the unsystematic risk of the firm.[352] Hoskisson and Turk (1990) define employment risk as *"the risk of job loss, loss of compensation, or loss of managerial reputation."*[353] Lacking the opportunity to diversify their employment risk in other ways (e.g. working as a manager for various firms at the same time), managers are tied to the success of their firms and will wish to invest resources in (unrelated) diversification as to decrease the risk associated with their human capital.[354] As shareholders can efficiently eliminate unsystematic risks

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[346] Cp. Shleifer & Vishny, 1989, p. 123f.

[347] Cp. Barkema & Pennings, 1998, p. 995; Rose & Shepard, 1997, p. 498ff.

[348] Cp. Perry, 1998, p. 20f.

[349] Cp. Jensen, 1986, p. 323ff.

[350] Cp. Markides, 1995, p. 18.

[351] Cp. Choe & Yin, 2009, p. 179.

[352] Cp. Beckmann, 2006, p. 52; Perry, 1998, p. 8.

[353] Hoskisson & Turk, 1990, p. 463.

[354] Cp. Amihud & Lev, 1981, p. 606; Hoskisson & Turk, 1990, p. 463.

by holding a portfolio of investments that have a low correlation among one another, they have little economic gains from (unrelated) diversification.[355]

Headquarter-division manager conflict. The conflict of interest between a firm's corporate headquarter and its divisions can be traced back to Coase (1937) observation that conscious power and influence activities within a hierarchy may adversely lever internal policies of capital allocation.[356] In the bargaining-power models by Meyer et al. (1992), Scharfstein and Stein (2000), and Rajan et al. (2000) unprofitable divisions with better-connected managers may get allocations larger than what is justified by the investment opportunities they provide.[357] Influence activities are costly because the corporate headquarter might try to induce divisional managers not to rent-seek by directing to them an inefficiently large share of the resources over which they have the allocative authority and because the resulting investments may be inefficient.[358] Corporate managers, therefore, might allocate investment funds to business units irrespective of whether the receiving unit offers the best investment opportunities within the diversified firm.[359]

Moreover, winner-picking in a diversified firm amplifies the moral-hazard problem between the corporate headquarter and divisional managers. Since divisional managers have no control over the rents they earn, they are vulnerable to opportunistic behaviour by corporate managers and, thus, have only little ex-ante incentives to keep their division profitable.[360] Managers of divisions with strong future investment opportunities have even lower incentives as they may be able to free-ride on the resources from losing divisions should they fail to produce enough resources themselves.[361]

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[355] Cp. Levy & Sarnat, 1970, p. 795ff.

[356] Cp. Coase, 1937, p. 388.

[357] Cp. Meyer et al., 1992, p. 9ff.; Rajan et al., 2000, p. 35ff.; Scharfstein & Stein, 2000, p. 2537ff.

[358] Cp. Glaser et al., 2013, p. 1578.

[359] Cp. Shin & Stulz, 1998, p. 533.

[360] Cp. Gertner et al., 1994, p. 1212f.

[361] Cp. Gautier & Heider, 2009, p. 622ff.

Several empirical studies suggest that internal capital markets function less efficiently than their external counterparts: Berger and Ofek (1995) observe that inefficient cross-subsidisation might account for at least part of the excess value loss of unrelated diversification.[362] Lamont (1997) observes that oil firms significantly reduce their investments in non-oil segments as a result of the oil-price shock in 1986 which the author deems as an indication for inefficient cross-subsidisation and overinvestment in poorly-performing segments.[363] Ozbas and Scharfstein (2010) document that unrelated segments of diversified firms tend to invest more in low-q industries than they would as stand-alone firms.[364] Rajan et al. (2000) find that diversity in investment opportunities across divisions of a diversified firm can result in greater distortions of investment allocations due to internal power struggles between the divisions.[365]

Table 7 summarises the effects of corporate diversification on corporate level cash flow.

Table 7: Corporate level cash flow and corporate diversification[366]

	Source of valuation difference	Direction	Description	Empirical validation	Major contributions
Corporate level cash flow	**Operating synergies**				
	- Economies of scale - Economies of scope	Premium	Generate value from transferring, sharing, and leveraging valuable across business units.	Mixed results	- Farjoun (1998) - Robins and Wiersema (1995) - Tanriverdi and Venkatraman (2005) - Szeless et al. (2003)
	Financial synergies				
	- Co-insurance effect	Premium	The reduced variance of total earnings leads to an increasing level of optimal leverage and higher tax savings.	Mostly supported	- Berger and Ofek (1995) - Glaser and Mueller (2010)

[362] Cp. Berger & Ofek, 1995, p. 55ff.

[363] Cp. Lamont, 1997, p. 84.

[364] Cp. Ozbas & Scharfstein, 2010, p. 596.

[365] Cp. Rajan et al., 2000, p. 38f.

[366] Source: Own representation based on Beckmann, 2006, p. 72.

	Source of valuation difference	Direction	Description	Empirical validation	Major contributions
					- Kim and McConnell (1977) - Mansi and Reeb (2002)
	- Tax shield	Premium	Asymmetric treatment of gains and losses by tax authorities.	Mostly supported	- Berger and Ofek (1995)
	- Internal capital markets[367]	Premium	Stabilise earnings and fund deserving business units through a "more-money" and a "smarter-money" effect.	Mostly supported	- Billett and Mauer (2003) - Fauver et al. (2003) - Gertner et al. (1994) - Khanna and Palepu (2000) - Shackman (2007) - Stein (1997)
	Agency costs				
	- Owner-manager conflict	Discount	A divergence of interests between the owners and the management of the diversified firm.	Mostly supported	- Shleifer and Vishny (1989) - Jensen (1986) - Amihud and Lev (1981) - Hoskisson and Turk (1990)
	- Headquarter - division manager conflict	Discount	Influence activities within a hierarchy may adversely lever internal policies of capital allocation.	Mostly supported	- Berger and Ofek (1995) - Lamont (1997) - Ozbas and Scharfstein (2010) - Rajan et al. (2000)

II.4.1.3. Channel II: Future returns

From a return-based perspective, the benefits and costs of corporate diversification can be derived from the informativeness of stock prices. On the one hand, diversified firms might benefit from a "flight to liquidity'' that makes large stocks relatively more attractive.[368] On the other hand, increasing agency costs prevent investors from assessing correctly the value of corporate diversification amplifying their potential unwillingness to trade the equity of diversified firms. To

[367] The dark-side of internal capital markets are subsumed under agency costs.

[368] Cp. Amihud, 2002, p. 53. This effect will be discussed in greater detail throughout chapter 0 of this study.

the extent that the potential for agency costs in the form of the owner-manager conflict or an informational advantage of insiders over outside investors increases with the degree of diversification, greater diversification can lead to higher liquidity premiums because dealers price protect against potential losses from trading with better-informed investors by demanding higher bid-ask spreads.[369]

II.4.1.3.1. Informational disparity

Hadlock et al. (2001) develop two competing hypotheses to explaining how corporate diversification affects the exchange of information between the corporate headquarter and external capital markets: an information transparency hypothesis and an information diversification hypothesis.[370]

On the negative side, the transparency hypothesis suggests that diversified firms face more difficulty in raising funds from external capital markets than focused firms due to valuation problems in the presence of asymmetrically distributed information between the corporate headquarter and outside investors.[371] Managers have an incentive to avoid disclosing information on poorly performing segments in order not to expose themselves to higher external scrutiny, and on above-average performing segments to reduce the danger of rival firms entering the market.[372] Thus, the diversified firm's accounting numbers and the quality of the figures reported for each business segment might be less informative compared to the figures issued by focused firms.

Habib et al. (1997) present an information-based model in which breaking up the diversified firm into several focused firms increases the informativeness of the price system.[373] Through a reduction in the investors' uncertainty about the value of the individual divisions, the portfolio of the separately traded focused firms is worse more than the combined firm.[374] Nanda and Narayanan (1999) define an

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[369] Cp. Damodaran, 2005, p. 5; Welker, 1995, p. 802.

[370] Cp. Hadlock et al., 2001, p. 613ff.

[371] Cp. Hadlock et al., 2001, p. 615.

[372] Cp. Bens et al., 2011, p. 420; Berger & Hann, 2007, p. 873f.

[373] Cp. Habib et al., 1997, p. 153ff.

[374] Cp. Habib et al., 1997, p. 159ff.

asymmetric information model where the unobservability of disaggregated information about the cash flows of the individual segments of the diversified firm results in a misevaluation of the firm's securities.[375] In their model, managers trade off the benefits of internal capital markets against diversification-related information costs and are likely to resort to divestitures in order to raise external financing at a fair price.

On the positive side, the information diversification hypothesis argues that corporate diversification might lessen the adverse-selection problem facing equity issuers, also known as Myers and Majluf (1984) problem.[376] Myers and Majluf (1984) develop an equilibrium model of corporate investment according to which managers issue stocks to raise cash to undertake a valuable investment opportunity in the presence of information asymmetries between corporate headquarter and external capital markets.[377]

The information diversification hypothesis assumes that the errors the market makes in forecasting the cash flows of the multiple segments in a diversified firm are imperfectly correlated. The corporate umbrella provides an information benefit by diversifying away the adverse impacts of insiders' informational advantage over outsiders. As a result, the forecast for a diversified firm can be more accurate than the forecast for a focused firm.[378]

A related argument for diversified firms to suffer from less severe information problems than separately traded focused firms can be found in the security design literature. Gorton and Pennacchi (1993) and Subrahmanyam (1991) present models where trading in basket securities (e.g. index future, exchange-traded funds) is subject to less asymmetric information compared to trading individual securities.[379] Informed traders often possess private information about the value of a particular claim but do not have superior knowledge about the entire capital market. In effect, the informational advantages about the value of individual

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[375] Cp. Nanda & Narayanan, 1999, p. 178ff.

[376] Cp. Hadlock et al., 2001, p. 614f.

[377] Cp. Myers & Majluf, 1984, p. 187ff.

[378] Cp. Thomas, 2002, p. 377.

[379] Cp. Gorton & Pennacchi, 1993, p. 8ff.; Subrahmanyam, 1991, p. 20ff.

securities are diversified away across the securities that constitute the basket, so that information asymmetry problems are less severe for the basket than for the individual securities in the basket.[380] To the extent that corporate diversification bundles the claims on individual assets into composite claims, any informational advantage is likely to be offset by changes in the diversified firm's other claims that the informed trader knows less about.[381]

It remains an empirical question which of the views more accurately reflects the informational environment of the diversified firm: In support of the transparency hypothesis, Krishnaswami and Subramaniam (1999) find that firms that engage in spin-offs have higher levels of information asymmetry about their value than non-diversified firms, resulting in information-based capital constraints.[382] Firth et al. (2013) demonstrate that, on average, more-diversified firms have higher probabilities of informed trading which, in turn, lead to reductions in firm value.[383] Rojahn and Zechser (2017) study the effects of corporate diversification on the market price for credit risk.[384] Using a sample of STOXX® EUROPE 600 index members, the authors show that the information disadvantage of outside investors is more severe in diversified firms which in turn provides for an increase in CDS spreads of these firms.[385] Again, there are opposing studies reporting that greater diversification must, on average, not lead to increasing information asymmetries.[386]

II.4.1.3.2. Analyst coverage

The main function of security analysts is to reduce information asymmetries in the relationship between corporate headquarters and investors by providing research reports, earnings forecasts, price targets, and buy-sell recommendations.

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[380] Cp. Thomas, 2002, p. 377.

[381] Cp. Huson & MacKinnon, 2003, p. 484.

[382] Cp. Krishnaswami & Subramaniam, 1999, p. 110.

[383] Cp. Firth et al., 2013, p. 27ff.

[384] Cp. Rojahn & Zechser, 2017, p. 1ff.

[385] Cp. Rojahn & Zechser, 2017, p. 20ff.

[386] Cp. Clarke et al., 2004, p. 107; Thomas, 2002, p. 384ff.

Analysts initiate or increase coverage in a firm while considering a variety of factors such as firm size, ownership structure, stock performance, and the availability as well as the accuracy of financial information.[387]

Among such factors, one stream of research argues that analysts might prefer focused companies to reduce their economic costs of generating information.[388] Security analysts often confine her or his attention to one industrial sector or market, whereas diversified firms tend to spread their activities across multiple industries or markets.[389] Following a diversified firm by nature takes an analyst out of her or his area of expertise, thereby increasing the analyst's career penalties associated with the production of inaccurate forecasts (e.g. lower reputation, risk of job loss).[390] Besides, corporate diversification leads to analysts' propensity to herd together in forecasting and, because analyst herding is synonymous with ineffective analyst coverage, herding can be considered an additional source of undervaluation of diversified firms.[391] Among others, Bhushan (1989), Cai and Zeng (2011), Gilson et al. (2001) report a negative association between a firm's level of diversification and analyst coverage.[392]

Other researchers focus on the forecast accuracy and conclude that the analyst's earnings forecast errors and the dispersions in analysts' forecasts are significantly higher for diversified firms than those for pure plays. Gilson et al. (2001) examine changes in the composition and forecast accuracy of financial analysts for a sample of 103 conglomerate stock breakups undertaken during the period 1990 to 1995 and report a 30% to 50% improvement in analyst forecast accuracy after a breakup event.[393] The authors relate the improvements to the availability of deconsolidated financial statements that contain more value-relevant

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[387] Cp. Beyer et al., 2010, p. 326; Cai & Zeng, 2011, p. 67f.; Zuckerman, 2000, p. 595.

[388] Cp. Brennan & Tamarowski, 2000, p. 27; Cai & Zeng, 2011, p. 76.

[389] Cp. Wen, 2017, p. 2.

[390] Cp. Duru & Reeb, 2002, p. 417f.; Zuckerman, 2000, p. 595.

[391] Cp. Kim & Pantzalis, 2003, p. 69f.

[392] Cp. Bhushan, 1989, p. 268; Cai & Zeng, 2011, p. 74f.; Gilson et al., 2001, p. 567.

[393] Cp. Gilson et al., 2001, p. 567f.

information and the improved ability of industry specialists to utilise their expertise in forecasting the performance of pure plays.[394] Feldman (2016) finds that legacy spinoffs that involve a firm's core business are more likely to induce analysts to revisit and change their earlier coverage decisions than their non-legacy counterparts, leading to considerable improvements in the composition and quality of their analyst coverage.[395]

Research from the security design literature provides two rationales for why a termination of analyst coverage could have a negative impact on the excess value of diversified firms:[396] First, security analysts by monitoring the senior management of a firm can alleviate the adverse effects of agency conflicts between the firm 's ownership and management as described in section II.4.1.2.3. Doukas et al. (2000) show that security analysts serve an important monitoring function like other information intermediaries (e.g. board of directors, rating agencies).[397] Due to specialised knowledge within a particular industry, security analysts possess comparative advantages in analysing and monitoring firms. A termination of analysts' coverage can lead to increased adverse selection costs; thereby making trading diversified firms' equity more costly.[398]

Second, security analysts can reduce the extent of informational asymmetries between corporate headquarters and the external capital market.[399] There is every possibility of misvaluation of equity if there are information asymmetry problems between managers and investors that cannot fully be resolved.[400] A termination of analyst following, therefore, amplifies informational problems, increasing the equity investors' perceived level of risk, and leading to considerable surcharges in the discount rate for equity of diversified firms.[401]

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[394] Cp. Gilson et al., 2001, p. 568.

[395] Cp. Feldman, 2016, p. 1197.

[396] Cp. Beckmann, 2006, p. 57f.

[397] Cp. Doukas et al., 2000, p. 57ff.

[398] Cp. Lipson & Mortal, 2007, p. 344.

[399] Cp. Ferris & Sarin, 2000, p. 110f.

[400] Cp. Healy & Palepu, 2001, p. 407ff.

[401] Cp. Beckmann, 2006, p. 58. Bhushan, 1989, p. 268.

II.4.1.3.3. Stock market liquidity

Generally, the diversification literature, including the explanations in the preceding sections, computes the average valuation effects of corporate diversification under the implicit assumption that the shares of diversified firms are equally liquid compared to the shares of a portfolio of comparable focused firms. Various studies such as Capozza and Seguin (1999), Francis et al. (2004), and Huson and MacKinnon (2003) note that the transaction costs incurred by investors when trading stocks of diversified and focused companies must not be identical.[402]

The theoretical literature on corporate diversification offers conflicting predictions about how diversification affects stock market liquidity.[403] On the positive side, the information diversification hypothesis – in line with the studies on security baskets' liquidity by Gorton and Pennacchi (1993) and Subrahmanyam (1991) – suggests that diversified firms suffer from less severe information problems making the estimates of the conglomerate's value more precise than the separate estimates of the individual segments' values. The reduced adverse selection costs are the starting point for an increase in shareholder value.

As inventory holding costs of the market maker are a positive function of the riskiness of the underlying, corporate diversification might also reduce spreads through an inventory holding cost effect resulting from a lower price risk of diversified firm's stocks.[404] As claimed by Lewellen (1971), the combination of different business units in a firm's portfolio will reduce volatility if their cash flows are not perfectly positively correlated. Likewise, Amihud (2002) finds that the effects of market illiquidity are stronger for small firm stocks than they are for larger firms.[405] Assuming that diversifying firms are larger[406], the "flight to

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[402] Cp. Capozza & Seguin, 1999, p. 587ff.; Francis et al., 2004, p. 1ff.; Huson & MacKinnon, 2003, p. 481ff.

[403] Cp. Lipson & Mortal, 2007, p. 346.

[404] Cp. Benston & Hagerman, 1974, p. 354f.; Guéant et al., 2013, p. 490; Mansi & Reeb, 2002, p. 2170.

[405] Cp. Amihud, 2002, p. 47.

[406] In terms of firm size, Table 18 shows that diversified firms are 1.64 times larger than focused firms.

liquidity" hypothesis provides a rationale for why diversifying firms might be more attractive than focused firms and thus face higher liquidity.

On the negative side, there are also compelling reasons to suspect that diversified firms trade at significant liquidity premiums due to valuation problems in the presence of asymmetrically distributed information or restrictions in the investor base. To the extent that the potential for agency costs increases with the degree of corporate diversification, either due to an informational advantage of insiders over outside investors[407] or higher costs for acquiring information[408], then greater diversification would lead to higher illiquidity premiums and an undervaluation of the issuers' shares because market makers would need to price protect against potential losses from trading with better-informed investors by demanding higher bid-ask spreads. Furthermore, an unwillingness to trade the equity of diversified firms might also stem from characteristics unique to the diversified firm that restricts the investor base of the diversifying firm:[409]

- *Investor Cognizance.* Investors tend to invest in stocks that they "know about".[410] It might, thus, be advantageous for firms to be followed by financial analysts (or brokers) acting as independent information producers. If investors care about their economic costs of generating information and to the extent that fewer analysts follow diversified firms, they might be less attractive for a variety of investors which reduces the level of liquidity prevailing in the (secondary) market.
- *Scope of investment.* Investors often want to invest in a specific industrial sector or market and might be scared off by the plethora of a diversified firm's business activities.[411] A spinoff of the distinct business units might increase the investor base.
- *Ease of diversification.* According to modern finance theory and the predictions of the CAPM, investors are not compensated for bearing unsystematic risks

[407] Cp. Hadlock et al., 2001, p. 613ff.; Harris et al., 1982, p. 604ff.

[408] Cp. Grossman, 1976, p. 573ff.; Ippolito, 1989, p. 1ff.

[409] Cp. Beckmann, 2006, p. 60; Herrmann, 2002, p. 42f.

[410] Cp. Brennan & Hughes, 1991, p. 1666.

[411] Cp. Vijh, 1994, p. 593.

as they can be eliminated by holding a portfolio of investments that have a low correlation among one another.[412] As risk pooling will not reduce systematic risks, managers should not be concerned with managing unsystematic, and, therefore, total risk. Investors will not reward such behavior.[413] Also, there is any possibility that managers might introduce new sources of variance through deficits in implementing and controlling the diversification strategy. In effect, corporate diversification might not fulfil the assumptions of the Markowitz (1952) portfolio selection model.

To summarise, from a conceptual point of view, diversified firms have many characteristics that make them worth more or less than a portfolio of comparable focused firms. These characteristics can affect both the fundamental value (i. e. cash flow related arguments, section II.4.1.2) and the Wall Street value of the diversified firm (i. e. future return related arguments, section II.4.1.3). Table 8 reviews the effect of corporate diversification on future returns.

[412] For further reading on the CAPM, refer to section II.1.2.2.

[413] Cp. Lubatkin & O'Neill, 1987, p. 666ff.; Perry, 1998, p. 13ff.

Table 8: Future returns and corporate diversification[414]

	Source of valuation difference	Direction	Description	Empirical validation	Major contributions
Future returns	**Informational disparity**				
	- Transparency hypothesis	Discount	Valuation problems in the presence of asymmetrically distributed information.	Mixed results	- Firth et al. (2013) - Krishnaswami and Subramaniam (1999) - Rojahn and Zechser (2017)
	- Information diversification hypothesis	Premium	Corporate umbrella provides an information benefit by diversifying away the adverse impacts of insiders' informational advantage.		- Clarke et al. (2004) - Thomas (2002)
	- Analyst coverage	Discount	Security analysts by monitoring the senior management alleviate the adverse effects of agency conflicts.	Mostly supported	- Bhushan (1989) - Cai and Zeng (2011) - Feldman (2016) - Ferris and Sarin (2000) - Gilson et al. (2001)
	Stock market liquidity				
	- Restricted investor base	Discount	Investor preferences reduce demand for diversified firms' stock.	Mostly supported	- Amihud (2002) - Brennan and Hughes (1991) - Levy and Sarnat (1970) - Vijh, 1994
	- Market making	Discount / Premium	Transaction costs incurred by investors when trading stocks of diversified and focused companies are not identical.	Mixed results	- Capozza and Seguin (1999) - Francis et al. (2004) - Huson and MacKinnon (2003) - Lamont and Polk (2001) - Thomas and Fee (2000) - Jiao et al. (2013)

[414] Source: Own representation based on Beckmann, 2006, p. 72.

II.4.2. VALUATION CONSEQUENCES OF CORPORATE DIVERSIFICATION

II.4.2.1. Measures of financial performance

Organisational performance plays a dominant role in strategy research and often is the ultimate dependent variable in diversification research. In a nutshell, organisational performance means *"the fulfilment of the economic goals of the firm"*.[415] Because different fields of study might require different measures of organisational performance, a demarcation of the term is necessary.[416] Throughout this study, the terms *"organisational performance"*, *"financial performance"*, and *"performance"* are deemed to refer to the same construct and will be used interchangeably.

Regarding the measurement of firm performance, Appendix 4 and Appendix 5 - in line with previous meta-analytic reviews by Klier (2009), Perry (1998), and Schüle (1992)[417] - indicate that no consensus exists among strategic management researchers on how to best measure the performance effects of corporate diversification. Instead, approaches range from one-dimensional accounting-based measures (e.g. return on asset, equity, or sales) to two-dimensional financial market-based measures of risk and return (e.g. Jensen's alpha, Sharpe ratio, Treynor ratio,) with two prominent value-based measures, excess firm value (EFV) and Tobin's Q (q-ratio), in between. Table 9 provides a summary of the leading performance indicators.

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[415] Venkatraman & Ramanujam, 1986, p. 803.

[416] Cp. Dalton et al., 1998, p. 274.

[417] Cp. Klier, 2009, p. 35ff.; Perry, 1998, p. 77ff.; Schüle, 1992, p. 102ff.

Table 9: Approaches to measuring firm performance[418]

The table provides a short description of eight well-appreciated performance measures used in previous diversification studies.

Variable		Description
Accounting measure:		
	Return on asset (ROA)	ROA is among the most popular accounting measures of performance and is defined as earnings before interest and tax divided by the firm's total assets. The ratio is an indicator of how effectively a firm generates profits from its assets, before the effects of financing.
	Return on equity (ROE)	ROE is the net operating profit after interest and tax expressed as a percentage of total shareholder's equity. The ratio reflects how successful a firm's management is in increasing the capital entrusted by its owners. Unlike ROA, ROE is sensitive to capital structure differences.
	Return on sales (ROS)	ROS, sometimes called profit margin, is the ratio of net profit after taxes (excluding extraordinary items) to net sales. The measure provides information on how effectively a firm converts sales into profits.
Financial market measure:		
	Jensen's alpha (JA)	Jensen's alpha is the difference between a firm's actual stock market return and the expected return according to the CAPM. That is, the alpha coefficient indicates how much on average a firm's stock price moved when the market was unchanged.
	Sharpe ratio (SR)	The Sharpe ratio, also called return-to-variability-ratio, corresponds to the slope of the capital market line. It equals the excess return of a firm over the risk-free asset per unit of total risk.
	Treynor ratio (TR)	The Treynor ratio refers to the fundamental risk-return relationship of the CAPM. It determines a firm's excess return over the risk-free asset in relation to the market risk associated with the firm.
Value measure:		
	Excess firm value (EFV)	Excess firm value is the natural logarithm of the ratio of a firm's actual value to its imputed value. The imputed value corresponds to the reported accounting value (e.g. assets, sales, or earnings) multiplied by its industry median ratio of capital to that accounting item. Negative (positive) excess values indicate a diversification discount (premium).
	Tobin's Q (q-ratio)	This measure is defined as the ratio of market value to the replacement cost of the firm. In contrast to accounting figures, Tobin's Q is considered a superior means of determining firm rents as it implicitly assumes the correct risk-adjusted discount rate and minimises distortions induced by accounting conventions or strategic accounting.

[418] Source: Own representation based on Fey, 2000, p. 207; Richard et al., 2009, p. 729ff.; Wulf, 2007, p. 116.

Accounting figures provide a readily available means of measuring firm performance and are the primary focus of much of the strategic management research on diversification.[419] Derived from audited financial statements, accounting measures are oriented towards the historical performance of a firm.[420] They reflect the efficacy of diversification efforts from the viewpoint of firm managers who are used to making decisions based on financial statements rather than value-orientated indicators.[421] The most commonly used performance measures in diversification research include return on assets (ROA), on equity (ROE), and on sales (ROS).[422]

Given their ease of computation and the consideration of objective accounting data to determine the profitability of a firm, accounting-based ratios benefit from a high level of objectivity and comparability across firms. At least for publicly traded firms, all data necessary for the calculation of accounting-based ratios is publicly available because of the extensive disclosure requirements set out by stock exchanges and national commercial codes. Despite their popularity and widespread use in strategic management research[423], objections to the accounting-based approach aim primarily at its vulnerability against strategic accounting and its failure to capture the expected future cash flows of a firm's stock of assets.[424] Four issues arise in the use of accounting-based ratios:

- First, to the extent that net operating profit is distorted, so will all therefrom derived profitability ratios be distorted.[425] Profit can be distorted for various reasons; explanations include accounting policies (e.g. undervaluation of assets, systematic differences in accounting rules across national borders),

[419] Cp. Ramanujam & Varadarajan, 1989, p. 540.

[420] Cp. Chakravarthy, 1986, p. 444; Richard et al., 2009, p. 728.

[421] Cp. Hoskisson et al., 1993, p. 221; Ramanujam & Varadarajan, 1989, p. 540.

[422] Cp. Klier, 2009, p. 35; Wulf, 2007, p. 117.

[423] Cp. Fey, 2000, p. 208.

[424] Cp. Dalton et al., 1998, p. 274.

[425] Cp. Perry, 1998, p. 88.

human error, strategic accounting, and deception.[426] Besides, differences in the capital structure across firms can impede the comparability of accounting-based ratios, an issue that applies especially to ROE.[427] This misrepresentation is closely related to the financial leverage effect used by researchers to characterise a situation in which increasing financial leverage enhances the return for the equity shareholders. Given that the return on investment exceeds a firm's borrowing costs, the financial leverage effect predicts a positive linear relationship between ROE and the leverage ratio.[428]

- Second, accounting rates of return are criticised for emphasising historic activity over future performance.[429] Since accounting-based ratios reflect what has happened in the past, they are quite limited in anticipating expectations about future cash flows a firm's stock of assets might generate.[430] In this context, numerous authors point out that the period-based determination of net operating profits can lead to doubtful estimates of a firm's profitability when the firm is invested to a large extent in long-term projects such as diversification.[431] These investments are characterised by high initial costs, which are offset by corresponding returns only in later periods, resulting in an underestimation of the firm's profitability in the early stages of the project and an overvaluation at later stages.
- Third, using accounting-based measures requires controlling for differences in shareholder's risk.[432] That is, diversified firms and focused firms might perform differently merely because the former or the latter have higher risk which, according to traditional asset pricing models, is associated with higher

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[426] Cp. Chakravarthy, 1986, p. 443f.; Fey, 2000, p. 208ff.; Richard et al., 2009, p. 728; Wulf, 2007, p. 118ff.

[427] Cp. Fey, 2000, p. 215f.

[428] Cp. Perridon et al., 2016, p. 562ff.

[429] Cp. Keats, 1988, p. 153ff.

[430] Cp. Richard et al., 2009, p. 728.

[431] Cp. Wulf, 2007, p. 118.

[432] Cp. Fey, 2000, p. 212.

expected returns.[433] Studies by Bettis and Mahajan (1985), Chatterjee and Wernerfelt (1991), Dubofsky and Varadarajan (1987), McDougall and Round (1984), and Nayyar (1993) integrate a firm's business risk and industry sector to obtain a more complete picture of the economic performance of the firm and to make comparisons across firms more reliable.[434]

- Fourth, Glaser and Mueller (2010) and Mansi and Reeb (2002) provide evidence that unadjusted book values of debt may be a downward-biased proxy for the market values of debt, as they ignore the risk effects of diversification[435] and, thus, may lead to a systematic underestimation of the overall firm value of diversified firms relative to focused firms.[436]

Financial market measures based on a firm's stock price performance are the second means to determine the performance effects of corporate diversification. They are the preferred instrument for characterising organisational performance within the economics and finance literature.[437] Researchers relying on financial market measures are concerned with the extent of shareholder wealth creation and portfolio risk reduction achieved by diversification from an investor's, as opposed to a managerial, point of view.[438] The central tenet underlying most of the financial market measures is the efficient market hypothesis used by researchers to characterise a situation where today's stock price fully reflects the market's best estimate of the value of all future profits. Consequently, these kinds of measures can be best described as long-run indicators of the financial performance of a firm.[439] Prominent measures include Jensen's alpha, Sharpe ratio, Treynor ratio.[440]

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[433] Cp. Lang & Stulz, 1994, p. 1252.

[434] Cp. Bettis & Mahajan, 1985, p. 785ff.; Chatterjee & Wernerfelt, 1991, p. 33ff.; Dubofsky & Varadarajan, 1987, p. 597ff.; McDougall & Round, 1984, p. 384ff.; Nayyar, 1993, p. 28ff.

[435] For further reading on the co-insurance effect, see section II.4.1.2.2.

[436] Cp. Glaser & Mueller, 2010, p. 2307ff.; Mansi & Reeb, 2002, p. 2167ff.

[437] Cp. Richard et al., 2009, p. 728.

[438] Cp. Perry, 1998, p. 84; Ramanujam & Varadarajan, 1989, p. 540.

[439] Cp. Datta et al., 1991, p. 533; Richard et al., 2009, p. 728.

[440] Cp. Klier, 2009, p. 37; Wulf, 2007, p. 121.

The greatest strength of financial market measures is that they are forward-looking, representing the value of all future profits and growth that will accrue to that company.[441] The figures are robust against strategic accounting and include intangible assets more effectively than accounting measures.[442] Financial market measures offer a holistic view on firm performance that is not limited to specific information aspects of performance such as sales growth or profits.[443]

There are also considerable limitations to measuring firm performance in this manner. Financial market measures require that capital markets are informational efficient in the sense of Fama (1965, 1970).[444] Therefore, one cannot assess whether diversified firms ceteris paribus earn lower rents because share prices already fully reflect all available information regarding a firm's diversification decision.[445] Moreover, the only stakeholder that, from the viewpoint of financial market measures, matters is the fully diversified investor which runs counter to the notions of strategic management recognising the need for business organisations to be accountable to many stakeholder groups.[446] Finally, they are limited to listed companies and analyse profitability at the divisional level but not on the corporate level.[447]

Value measures are the third means to measure firm performance. As hybrid measures, they combine accounting and stock market data into a single performance indicator. Among the most popular hybrid measures are Tobin's Q (q-ratio) and Berger and Ofek's (1995) excess firm value measure.[448]

Tobin's Q is defined as the ratio of the market value of the sum of a firm's capitalised income streams to the replacement value of its assets.[449] It is a

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[441] Cp. Perry, 1998, p. 89; Richard et al., 2009, p. 728.

[442] Cp. Richard et al., 2009, p. 728.

[443] Cp. Lubatkin & Shrieves, 1986, p. 499.

[444] Cp. Richard et al., 2009, p. 728.

[445] Cp. Montgomery & Wernerfelt, 1988, p. 626.

[446] Cp. Lubatkin & Shrieves, 1986, p. 499.

[447] Cp. Jacobson, 1987, p. 470.

[448] Cp. Berger & Ofek, 1995, p. 60f.; Fey, 2000, p. 204; Tobin, 1969, p. 15ff.

[449] Cp. Jansen, 2006, p. 99; Montgomery & Wernerfelt, 1988, p. 627.

theoretically based measure of the premium (or discount) that the market is willing to pay above (or below) the replacement costs of a firm's assets.[450] Tobin's Q can be used as an indicator for growth opportunities where a value above (below) 1.0 indicates that the firm is underinvested (overinvested).[451]

Berger and Ofek (1995) treat the relative value of diversified firms compared to focused firms as the natural logarithm of the ratio of a firm's actual value to its imputed value. The imputed value corresponds to the reported accounting value (e.g. assets, sales, or earnings) multiplied by its industry median ratio of capital to that accounting item.[452] Negative (positive) excess firm values indicate a diversification discount (premium).

Value measures combine capital market data with accounting data; thereby providing the advantage of balancing differences in systematic risk and costs of capital, primarily ignored by accounting measures, against operational performance issues associated with market measures that capture only changes in firm value, not levels of value.[453] However, the value measures also share some of the downsides with the other approaches such as the assumption of strong-form efficiency and the neglect of the positive effect of corporate diversification on bondholder value.

A common yardstick in adopting Tobin's Q is the estimation of the replacement costs of assets. Researchers often measure the replacement value through the book value of assets[454] which not only introduces the potential for several accounting distortions[455] but also requires assumptions about rates of depreciation and inflation[456]. In its original version, Tobin's Q furthermore fails to adjust for differences in the profitability levels across industries. Diversified firms

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[450] Cp. Perry, 1998, p. 88.

[451] Cp. Lindenberg & Ross, 1981, p. 2; Wulf, 2007, p. 123.

[452] Cp. Berger & Ofek, 1995, p. 60f.

[453] Cp. Montgomery & Wernerfelt, 1988, p. 626f.; Richard et al., 2009, p. 732.

[454] Cp. Funke, 2006, p. 94.

[455] Cp. Richard et al., 2009, p. 732.

[456] Cp. Berger & Ofek, 1995, p. 47; Fey, 2000, p. 205.

might perform worse simply because their corporate portfolio consists of low q businesses.[457]

EFV is vulnerable to strategic reporting when total sales or earnings are used as a multiplier.[458] Moreover, excess value is criticised for assuming that the business units can be separated from another which contradicts with the economic rationale of the multibusiness firm to transfer, share, and leverage valuable resources between formerly distinct businesses.[459]

II.4.2.2. Event studies

Event studies are concerned with the relationship between security prices and economic events.[460] Within the diversification literature, most event studies focus on the behaviour of share prices in order to test whether their behaviour is affected by changes in the corporate portfolio strategy ("diversification event").[461] Based on the premise that stock markets are informationally efficient at assimilating new information about firms into share prices, the general form of the null and alternative hypothesis are as follows:[462]

$$H_N: f(R_i|\varphi_i) - f(R_i) = 0 \;\; for\ all\ \varphi_i$$
$$H_A: f(R_i|\varphi_i) - f(R_i) \neq 0 \;\; for\ at\ least\ one\ \varphi_i \qquad (20)$$

where:

R_i	=	return on security i in an event period of interest,
φ_i	=	signal from information structure η announced in the event period that potentially affects security i,
$f(R_i\|\varphi_i)$	=	distribution of R_i conditional on the information signal φ_i from the information structure η, and
$f(R_i)$	=	marginal distribution of R_i.

[457] Cp. Lang & Stulz, 1994, p. 1263.

[458] Cp. Rajan et al., 2000, p. 53f.

[459] Cp. Fey, 2000, p. 229; Wulf, 2007, p. 124.

[460] Cp. Strong, 1992, p. 533.

[461] For a detailed description and application of the approach to diversification research, instead of many, see Ostrowski, 2007, p. 119ff.; Vollmar, 2014, p. 185ff.

[462] Cp. Strong, 1992, p. 533.

In an efficient capital market, abnormal returns ($f(R_i|\varphi_i) - f(R_i)$) reflect the believes of investors on how the refocusing event might change the firm's future profitability: If abnormal returns are positive, then investors consider corporate diversification a value-increasing strategy, whereas negative abnormal returns are indicative of a value-destroying strategy. Appendix 5 summarises the results of 18 event studies that are concerned with the effect of corporate diversification on the financial market-based performance of firms. Most of the selected studies provide evidence of adding value by refocusing spinoffs, which is especially true for spinoffs where the continuing firm's business units and the spinoff unit belong to different two-digit SIC.[463] The losses to shareholders from non-focus decreasing spinoffs or even diversifying acquisitions comes to a maximum of 5.4% in the short run (-1d to +1d) and up to 11.8% in the long run (>12m). The results are not country-specific. As it is often the case within the diversification literature, there are also some studies documenting no performance differences between diversifying and non-diversifying mergers or even higher net benefits for diversifiers.[464]

The variability in the diversification's effect on firm value based on the event study approach might be attributed to methodological issues as well as differences in sample selection:[465] First, event studies require semi-strong form efficiency to ensure that φ_i is fully utilized by investors in deriving equilibrium expected returns and expected asset prices. As discussed in section II.1.1, the notion of informational efficiency proves a controversial discussion among finance researchers. Relatedly, the market's reaction to firms that are involved in diversifying or re-focusing mergers is always tested jointly with several auxiliary hypotheses about the equilibrium pricing models used to specify the benchmark return and the event window (i.e. joint hypothesis problem).

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[463] Cp. Berger & Ofek, 1999, p. 335; Daley et al., 1997, p. 265; Desai & Jain, 1999, p. 77f.; Morck et al., 1990, p. 42; Morgan et al., 2000, p. 15.

[464] Cp. Akbulut & Matsusaka, 2010, p. 259; Hadlock et al., 2001, p. 627; Hubbard & Palia, 1999, p. 1141.

[465] For a detailed description of the shortcomings of the event study approach to measure the value of diversification strategies, instead of many, see Erdorf et al., 2013, p. 195; Fey, 2000, p. 225ff.

Second, event studies are vulnerable against confounding events introducing a spurious association between the refocusing event and the stock market performance. Since it cannot be ruled out that investors have already become aware of the transaction before the official announcement by the company, it is established practice to determine the stock market performance over several days or month. In this case, however, it is no longer possible to isolate the price movements due to new information from price movements triggered by events other than a diversification decision.[466]

Third, the event study approach is limited both in terms of firms and types of diversification. By way of construction, the event study approach is restricted to publicly listed companies as well as external diversification events. The approach cannot capture the valuation effects of internal diversification due to the missing signal send out to capital investors. For this reasoning, it does not apply to this study.

II.4.2.3. Panel studies

Panel studies do not build on abnormal returns but directly determine the value of diversified firms relative to a portfolio of comparable single-segment firms.[467] By combining longitudinal data and cross-sectional data, panel studies allow for both investigations of the value of corporate diversification over time (within variance) and the value of diversified firms relative to focused firms (between variance). The effect of diversification on firm value is modelled as a linear function of various firm characteristics as shown below:[468]

$$RV_{it} = \beta_{con} + \beta_{div} DIV_{it} + \delta_x X_{it} + \epsilon_{it} \quad (21)$$

where:

RV_{it} = measure of relative firm value of firm i at time t,

X_{it} = set of controlling observable firm characteristics for firm i at time t,

[466] Agrawal et al., 1992, p. 1620.

[467] Cp. Beckmann, 2006, p. 25.

[468] Cp. Campa & Kedia, 2002, p. 1746f.; Gopalan & Xie, 2011, p. 3648; Maksimovic & Phillips, 2007, p. 433f.; Rojahn & Zechser, 2017, p. 12.

DIV_{it} = proxy for corporate diversification of firm i at time t,
β_{con} = constant regression coefficients,
β_{div} = regression coefficient for diversification term,
δ_x = vector of parameters to be estimated, and
ϵ_{it} = error term of firm i at time t.

Given the combination of longitudinal data and cross-sectional data, panel studies benefit from a more accurate estimation of the diversification effect through an increase of the degrees of freedom. Panel regressions are also less negatively affected by multicollinearity biases or an incomplete specification of the regression model.

Major disadvantages of the panel study approach include the sample selection bias and its high data requirements. In contrast to an ordinary specification bias that arises because of missing data, the sample selection bias results from using nonrandomly selected samples to estimate behavioural relationships.[469] For instance, if maturing firms are replaced by new firms that are less likely to be diversified than those firms already in the sample, there will be a bias towards reductions in average diversification even if the individual firms are not altering their diversification status.[470] To avoid sample selection biases, researchers commonly adopt the "same firm approach" (i.e. time series analysis based on the same firms).[471]

For more than half a century, corporate diversification has offered a lively field of research centring around the diversification-performance linkage as the great "enigma" to be solved. The guiding question is whether diversified firms trade at a discount or premium relative to focused firms. Yet, this area of inquiry falls short in establishing causality in the relationship between diversification and value as concisely summarized by Datta et al. (1991) when they state: *Studies which examine the hypothesis that the degree of diversity and profitability are cross-sectionally related […] unfortunately fail to provide generalizable conclusions […].*[472] Their

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[469] Cp. Heckman, 1979, p. 153.

[470] Cp. Comment & Jarrell, 1995, p. 68f.; Denis et al., 2002, p. 1962.

[471] Cp. Comment & Jarrell, 1995, p. 68; Funke, 2006, p. 89.

[472] Datta et al., 1991, p. 534.

conclusion is shared, among others, by Benito-Osorio et al. (2012), Erdorf et al. (2013), and Martin and Sayrak (2003) and it is still valid today.[473]

In summarising the diversification discount literature, this study focuses on five popular themes and linkages:[474] the degree of diversification and performance, breadth of diversification and performance, the influence of home country and period, information asymmetries and diversification discounts, biases in the valuation methodology, and the role of liquidity.

II.4.2.3.1. Degree of diversification and performance

The studies by Lang and Stulz (1994) and Berger and Ofek (1995) have been the template for much of the work on the association between the degree of diversification and performance.[475] Lang and Stulz (1994) conduct a cross-sectional analysis on a sample of 1,468 U.S. firms over the period 1978 to 1990 and find that diversified firms tend to have 27% to 54% lower q-ratios than their single-segment peers.[476] The diversification discount remains significant even after controlling for firm-specific variables such as firm-size and the research and development expenditure. For a sample of 3,659 U.S. firms during the period 1986 to 1991, Berger and Ofek (1995) compute a valuation discount of -15% to -13%.[477]

Appendix 4 - in line with previous literature reviews by Martin and Sayrak (2003) and Erdorf et al. (2013)[478]- is consistent with the early findings by Lang and Stulz (1994) and Berger and Ofek (1995). On average, the sum of a diversified firm's distinct business units is worth 2,8% to 60% of the value of a comparable portfolio of single segment firms. It appears that the market is not going to pay extra for

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[473] Cp. Benito-Osorio et al., 2012, p. 335; Erdorf et al., 2013, p. 210; Martin & Sayrak, 2003, p. 54.

[474] Vollmar (2014) divides the diversification literature in a similar fashion. Cp. Vollmar, 2014, p. 127ff.

[475] Cp. Berger & Ofek, 1995, p. 39ff.; Lang & Stulz, 1994, p. 1248ff.

[476] Cp. Lang & Stulz, 1994, p. 1268.

[477] Cp. Berger & Ofek, 1995, p. 50.

[478] Cp. Erdorf et al., 2013, p. 192ff.; Martin & Sayrak, 2003, p. 42ff.

corporate diversification.[479] It is worth to mention that a few studies are showing no performance differences between diversifying and non-diversifying firms[480] or even higher net benefits for diversifiers[481].

II.4.2.3.2. Breadth of diversification and performance

Influential findings by, among others, Rumelt (1974), Bettis (1981), and Markides and Williamson (1996) suggest that related diversified firms overcome unrelated diversified firms in terms of both accounting-based and market-based returns.[482]

Most of the research in this field has been inspired by the early work of Rumelt (1974) on a sample of 246 Fortune 500 firms between the years 1949 and 1969 in which he observes that firms using constrained strategies are higher performers in terms of the price-earnings ratio, return on equity, and return on capital compared to firms that follow single business strategies or unrelated-passive strategies.[483] Bettis (1981) shows that related-diversifiers are more profitable compared to unrelated diversified firms because of high barriers to entry resulting from tacit resources such as advertising and R&D expenditures.[484]

In contrast to many other studies, Markides and Williamson (1996) do not rely on the classification proposed by Rumelt (1974)[485] but develop their own strategic measure of relatedness based on various indicators that are said to capture the extent to which markets share similar non-tradable, non-substitutable, and hard-to-accumulate assets.[486] Based on their measure, Markides and Williamson

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[479] Cp. Myers, 1984, p. 129.

[480] Cp. Klein, 2001, p. 756; Villalonga, 2004a, p. 492.

[481] Cp. Campa & Kedia, 2002, p. 1754; Dimitrov & Tice, 2006, p. 1482; Hann et al., 2013, p. 1963.

[482] Cp. Bettis, 1981, p. 389; Markides & Williamson, 1996, p. 357ff.; Rumelt, 1974, p. 91f.

[483] Cp. Rumelt, 1974, p. 91f.

[484] Cp. Bettis, 1981, p. 386ff.

[485] Cp. Rumelt, 1974, p. 29ff.

[486] Cp. Markides & Williamson, 1996, p. 348ff.

(1996) notice that related diversification unfolds its entire potential only *"when it allows a business to obtain preferential access to strategic assets – those that are valuable, rare, imperfectly tradable, and costly to imitate."*[487]

Bausch and Pils (2009) meta-analytically employ empirical data from 104 diversification studies published between 1970 and 2005 and find that strategies of related diversification entail positive effects on both accounting- and market-based performance.[488]

II.4.2.3.3. Influence of home country and time period

A central aspect of the institutional-based view (IBV) is that the benefits and costs of corporate diversification depend upon the ability of the institutional environment of a firm's home country to establish a stable structure that facilitates interactions among market participants.[489] Corporates follow a strategy of diversification to deal with the challenges induced by a weak or non-stable home country environment and which relate to arm's length transactions on external capital markets, product markets, or factor markets.[490]

Lins and Servaes (1999) study a sample of firms from Germany, Japan, and the United Kingdom for the years 1992 and 1994.[491] While there is no diversification discount for German multi-business firms, conglomerates from Japan and the United Kingdom trade at significant discounts of 10% and 15%, respectively.[492] In Lins and Servaes (2002), they use a large data sample covering more than 1,000 firms across seven emerging markets including Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand for the fiscal year end closest to December 1995.[493] Lins and Servaes (2002) report that diversified firms in emerging markets trade at significant valuation discounts of approximately 7% compared to

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[487] Cp. Markides & Williamson, 1996, p. 363.

[488] Cp. Bausch & Pils, 2009, p. 170ff.

[489] Cp. Benito-Osorio et al., 2012, p. 331f.; Hoskisson et al., 2000, p. 252ff.

[490] Cp. Nachum, 2004, p. 276.

[491] Cp. Lins & Servaes, 1999, p. 2215ff.

[492] Cp. Lins & Servaes, 1999, p. 2222ff.

[493] Cp. Lins & Servaes, 2002, p. 8ff.

industry-matched focused firms.[494] The lower valuation of diversified firms is found to be driven by two effects:[495] First, the discount is related to membership in industrial groups. Second, firms with management ownership concentration between 10% and 30% are less valued through an entrenchment effect.

Fauver et al. (2003) draw on a sample of 8,000 firms from 35 countries during the first half of the 20th century and document that the valuation effects of corporate diversification depend on the level of capital market development, internal integration, and legal systems.[496] Using a slightly different firm sample, Shackman (2007) supports the findings by Fauver et al. (2003) regarding the negative relationship between corporate diversification and capital market development.[497]

In terms of time periods, there is ample literature including Dimitrov and Tice (2006), Kuppuswamy and Villalonga (2016), Yan (2006), and Yan et al. (2010) acknowledging that the state of the economy in the business cycle influences the value added from diversification.[498] The increase in the relative value of diversified firms during economic downturns might be through the "more-money" effect and the "smarter-money" effect which allow diversified firms to maintain their optimal level of financing even if access to external financing becomes more costly.

Though most studies direct at significant premiums during distressed financial periods, there are prominent exceptions such as de la Fuente and Velasco (2015) and Serafeim et al. (2014).[499] For a panel of Spanish listed firms over the years 1997 to 2012, de la Fuente and Velasco (2015) find that for distressed periods the value of diversification is even lower due to increasing agency costs.[500] Serafeim et al. (2014) study the influence of institutional voids on the value of corporate diversification for a sample of 35,886 firms across 38 countries and report strong

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[494] Cp. Lins & Servaes, 2002, p. 15.

[495] Cp. Lins & Servaes, 2002, p. 5f.

[496] Cp. Fauver et al., 2003, p. 144f.

[497] Cp. Shackman, 2007, p. 493f.

[498] Cp. Dimitrov & Tice, 2006, p. 1465ff.; Kuppuswamy & Villalonga, 2016, p. 905ff.; Yan, 2006, p. 5ff.; Yan et al., 2010, p. 103ff.

[499] Cp. de la Fuente & Velasco, 2015, p. 1ff.; Serafeim et al., 2014, p. 37ff.

[500] Cp. de la Fuente & Velasco, 2015, p. 11.

evidence for a negative association between the excess value measure proposed by Berger and Ofek (1995) and the efficiency of both capital and labour markets.[501]

II.4.2.3.4. Information asymmetries and diversification discounts

Although information asymmetries can be a major determinant in the diversification-performance linkage, empirical work that directly relates information asymmetries to the value of corporate diversification is sparse except for Bardong et al. (2010), Best et al. (2003), Borah et al. (2018), and Thomas and Fee (2000).[502] Bardong et al. (2010) provide evidence for positive stock-market reactions to break-up announcements of U.S. corporate stocks in the period 1995 to 2005 due to reductions in insider-related information asymmetry.[503] Best et al. (2003) study a sample of 27,683 U.S. firm-year observations over the period 1989 to 1998 and find that the diversification discount is reduced by half after controlling for the impact of information asymmetries.[504] In their model, the authors use financial analyst coverage as a measure of information asymmetry. Finally, Thomas and Fee (2000) find that the market value of a diversified firm is at least partly determined by the severity of asymmetric information problems relative to a similarly constructed portfolio of focused firms.[505] Specifically, they document evidence that diversified firms with high levels of information asymmetry trade at a significant discount compared to diversified firms with low levels of information asymmetry. However, only 26% of all conglomerate firm-years are exposed to higher adverse selection costs than they would as stand-alone firms calling into question the net relative information benefits of stock-breakups.[506]

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[501] Cp. Serafeim et al., 2014, p. 49ff.

[502] Cp. Bardong et al., 2010, p. 1ff.; Best et al., 2003, p. 29ff.; Borah et al., 2018, p. 683ff.; Thomas & Fee, 2000, p. 1ff.

[503] Cp. Bardong et al., 2010, p. 18ff.

[504] Cp. Best et al., 2003, p. 31ff.

[505] Cp. Thomas & Fee, 2000, p. 4.

[506] Cp. Thomas & Fee, 2000, p. 25.

II.4.2.3.5. Biases in the valuation methodology

Though diversified firms are systematically different from the typically focused firm as advised by, among others, Campa and Kedia (2002), Hyland and Diltz (2002), and Maksimovic and Phillips (2008)[507], a large part of the standard literature on the diversification discount assumes that firms become conglomerates randomly.[508] If this assumption does not hold, two biases can arise that might explain why researchers observe lower valuations for diversified firms: First, systematic differences in unchangeable attributes of diversified firms and focused firms imply that focused firms might be a noisy benchmark to value conglomerates' business units (i.e. sample selection bias).[509] Hann et al. (2013) report that diversified firms have, on average, lower cost of capital than comparable portfolios of single-segment firms as they are less vulnerable to countercyclical deadweight costs.[510] Lamont and Polk (2001) show that approximately half of the cross-sectional variance of excess values can be explained by the differences in future returns and by the covariance of returns with cash flows.[511] The differences in expected returns will lead to a diversification discount even if all other firm characteristics are equal. Mitton and Vorkink (2010) find that diversified firms, on average, have a positive but lower skewness coefficient than their focused counterparts.[512] Since investors prefer positive skewness in return distributions[513], diversified firms might have to offer higher returns to compensate investors for lack of upwards potential.

Second, any failure of controlling for the endogeneity of the diversification decision by using more advanced econometric techniques than ordinary least squares (OLS) can lead to incorrect inferences about the diversification's effect.[514]

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[507] Cp. Campa & Kedia, 2002, p. 1736ff.; Hyland & Diltz, 2002, p. 65ff.; Maksimovic & Phillips, 2008, p. 688ff.

[508] Cp. Erdorf et al., 2013, p. 198f.; Maksimovic & Phillips, 2007, p. 433f.

[509] Cp. Erdorf et al., 2013, p. 198.

[510] Cp. Hann et al., 2013, p. 1972ff.

[511] Cp. Lamont & Polk, 2001, p. 1709ff.

[512] Cp. Mitton & Vorkink, 2010, p. 1371ff.

[513] Cp. Arditti, 1967, p. 19ff.

[514] Cp. Martin & Sayrak, 2003, p. 45.

Campa and Kedia (2002) and Villalonga (2004b) agree that the same characteristics that cause a firm to choose to diversify may also cause it to be discounted.[515] Graham et al. (2002) claim that the reduction in excess value is an artefact from diversified firms to acquire already discounted firms but not because diversification destroys value.[516] Chevalier (2004), studying a sample of diversifying mergers between 1980 and 1995, demonstrates that observed inefficiencies in the capital allocation of diversified firms are already apparent before these firms undertake diversification moves.[517]

Stand-alone firms, thus, may be a poor benchmark for conglomerate divisions.

II.4.3. CORPORATE DIVERSIFICATION AND THE ROLE OF LIQUIDITY: SOME EMPIRICAL EVIDENCE

To date, there is no consensus among researchers as to whether diversified firms trade with a liquidity premium or a liquidity discount as summarised in Table 10. The main results of the nine research studies controlling for the value of liquidity in the diversification-performance linkage are as follows:

- *Liquidity induced discount.* Most of the selected studies suggest that diversified firms face higher financing costs from external capital markets than comparable focused firms. At least for firms rooted in the real estate investment trust (REIT) industry, corporate diversification can, on average, be considered a value-destroying strategy. In the words of Capozza and Seguin (1999): *"[…] focus affects value indirectly through liquidity. After controlling for this direction of causation, there is no evidence that focus has any additional effect on firm value."*[518] However, there are opposing studies from other industries showing no differences in the liquidity of traded stocks of diversified and non-diversified firms or even higher stock market liquidity for diversifiers (e.g. Lamont and Polk (2001), Thomas and Fee (2000)).[519]

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[515] Cp. Campa & Kedia, 2002, p. 1746ff.; Villalonga, 2004b, p. 6ff.

[516] Cp. Graham et al., 2002, p. 701ff.

[517] Cp. Chevalier, 2004, p. 6ff.

[518] Cp. Capozza & Seguin, 1999, p. 613.

[519] Cp. Lamont & Polk, 2001, p. 1709; Thomas & Fee, 2000, p. 23ff.

- *Methodological issues.* The variability in the contribution of liquidity to the diversification-performance linkage might be attributed to methodological issues as well as differences in sample selection: First, many research studies are rooted in the real estate investment trust industry. As there are unique regulatory rules for REITs, which fluctuate across countries, a generalisation of research findings can be problematic. Likewise, the risk-return profile of REITs can be very different from that of a corporate firm. Second, only three out of the nine research studies (e.g. Thomas and Fee (2000), Danielsen and Harrison (2007), and Boulton et al. (2013)) employ the same estimator for stock liquidity, and even their results are contradictory. Again, a generalisation of the research findings is not possible as the various measures might tap different dimensions of liquidity. Third, the most recent sample period ends in 2006 meaning that there is no research covering the latest stock market crash starting in 2007. The more pronounced the market imperfections in the external capital markets, the more valuable might be the internalisation of external services into the company's sphere (e.g. costs for seasoned equity offerings vs internal capital markets).

Table 10: Effect of illiquidity on the diversification-performance relationship[520]

The table summarises the results of nine research studies that control for the value of illiquidity in the diversification-performance linkage. Definition of diversification measures: 4D means four-digit SIC code and so forth. "L-Discount" and "L-Premium" indicate whether diversified firms are traded with a liquidity induced discount or premium, respectively.

Study	Sample (obs.) and period	Diversification measure	Liquidity measure	Effect of illiquidity
Capozza and Seguin (1999)	75 U.S. REITs; 1985-1992	Herfindahl indices based on product line and regional location	Dollar trading volume	**L-Premium:** After controlling for the indirect effects of diversification on firm value via liquidity, there remains no statistically significant diversification effect.
Thomas and Fee (2000)	3,477 U.S. firms; 1993-1995	Numerical count	Quoted spreads	**L-Premium:** Diversified firms have significantly smaller quoted spreads relative to separately traded focused firms.
Lamont and Polk (2001)	2,390 U.S. firms; 1979-1997	Multi-segment dummy (4D)	Dollar trading volume	**Inconclusive:** No statistically convincing evidence that stock illiquidity influences excess stock market returns.
Huson and MacKinnon (2003)	84 U.S. spinoffs; 1984-1994	Multi-segment dummy (2D)	Relative effective bid-ask spread	**L-Discount:** The relative bid-ask spread increases following focusing spinoffs while it remains unchanged for non-focusing spinoffs.
Francis et al. (2004)	2,390 U.S. firms; 1979-1997	Multi-segment dummy	Liquidity beta	**L-Premium**: Liquidity betas for diversified firms are significantly smaller in magnitude than the betas for a matching portfolio of focused firms.
Brounen and Laak (2005)	72 European property shares; 2002	Herfindahl index based on property type sector	Free float	**L-Discount:** A firm's focus on property types is significant and negative associated with its discount to asset values. Also, free-float is negatively related to the discount in net asset value.
Danielsen and Harrison (2007)	151 U.S. REITs 1993-1995	Herfindahl index based on property type sector	Quoted spread, effective spread	**L-Discount:** REITs that diversify along various property type sectors are exposed to reduced stock market liquidity and are more complicated to value.
Boulton et al. (2013)	5,307 IPOs; 1982-2005	Multi-segment dummy (2D-4D)	Quoted spread	**L-Premium:** Diversified firms are less underpriced. The average quoted spread is a monotonically decreasing function of the number of reported segments.
Jiao et al. (2013)	6.879 U.S. firms; 1980-2006	Multi-segment dummy (4D)	Trading turnover	**L-Discount:** Diversified firms have a lower share trading turnover.

[520] Source: Own representation.

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III. LIQUIDITY IN AN ECONOMIC FRAMEWORK

III.1. OPERATIONALIZATION OF LIQUIDITY BY TRANSACTION COSTS

III.1.1. DEFINITION OF STOCK MARKET LIQUIDITY

From a neoclassical point of view, any investor can buy or sell significant quantities of a security without moving the price against him or her.[521] In assessing the benefits of an investment, investors consider only the systematic risk and the return of the financial asset. However, the introduction of various market imperfections such as real frictions affecting all market participants alike (e.g. deficits in the market organisation) or informational frictions that shift wealth between market participants[522], might lead to conclusions otherwise and might motivate investors to estimate and incorporate the impact of trading costs accurately.[523]

Stock market liquidity determines the markets ability to absorb the flow of buying and selling orders smoothly.[524] In liquid capital markets, investors can place large security orders without moving the price against them. If a lack of liquidity reflects a non-diversifiable risk, it may be considered a significant determinant in valuing illiquid securities.[525]

While there is a great deal of variation in the way stock liquidity is defined in the finance literature[526], traditional understandings of the term have a common denominator. To enumerate but some examples, to Keynes (1930) an asset is liquid if *"it is more certainly realizable at short notice without a loss."*[527] Bernstein (1987),

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[521] Cp. Kempf, 1999, p. 14.
[522] Cp. Stoll, 2000, p. 1481ff.
[523] Cp. Bessembinder & Venkataraman, 2010, p. 184.
[524] Cp. Shen & Starr, 2002, p. 53.
[525] Cp. Sauerbier, 2006, p. 7; Schwartz & Peng, 2006, p. 630.
[526] Cp. Kindermann, 2005, p. 9ff.; Wyss, 2004, p. 5f.
[527] Keynes, 1930, p. 67.

Kempf (1998), and Schmidt and Iversen (1991) declare securities as liquid if they can be bought and sold promptly with minimal impact on the securities' price.[528] And, Campbell et al. (1997) define liquidity as *"the ability to buy or sell significant quantities of a security quickly, anonymously, and with relatively little price impact."*[529] To summarise, the core point of the concept of liquidity is the possibility to exchange a given asset in an arm's length transaction with minimal impact on the prevailing market price, even if the transaction volume is high.

These and the majority of other definitions draw on a concept of liquidity that has somewhat been inspired by the early work of Garbade (1982) in which he describes the multi-dimensional character of liquidity along three dimensions: depth, breadth, and resiliency.[530] *Market depth* is a measure for the amount of an asset or lot size that can be bought or sold without influencing the quoted price.[531] In a low depth market, trading large quantities can cause slippage and drive down (up) the executable price of a sell order (buy order). Various methods can approximate the value of market depth; common measures include the order ratio, the trading volume, the flow ratio, and the bid-ask spread.[532] In depth markets, bid-ask spreads are tighter. *Market breadth* means that sufficient interest exists on both the sell side and the buy side for traders to buy and to sell large positions of an asset in the close neighbourhood of the best-quoted price.[533] Measures for market breadth often include various spread measures.[534] *Market resiliency* means that temporary price changes due to order imbalances are quickly abated by countervailing order flows that restore the market equilibrium.[535] The concept takes into account the elasticity of liquidity supply and demand, i.e. the speed of adjusting the share price to its true value.[536] Common measures of resiliency are

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[528] Cp. Bernstein, 1987, p. 54; Kempf, 1998, p. 299; Schmidt & Iversen, 1991, p. 2010.

[529] Campbell et al., 1997, p. 99f.

[530] Cp. Garbade, 1982, p. 420ff.

[531] Cp. Kindermann, 2005, p. 15.

[532] Cp. Wyss, 2004, p. 5.

[533] Cp. Schwartz, 1991, p. 127.

[534] Cp. Harris, 1991, p. 3.

[535] Cp. Bernstein, 1987, p. 55; Sauerbier, 2006, p. 8.

[536] Cp. Wyss, 2004, p. 6.

intraday returns, variance ratios, or liquidity ratios. Market depth, breadth, and resiliency jointly form the price dimension of liquidity.

Above and beyond the price dimension, some authors consider "*immediacy*" as an additional dimension of liquidity.[537] Immediacy refers to the ability to execute a transaction immediately at the prevailing price, thereby introducing a time dimension to the concept of liquidity. Technically, immediacy measures the time until an asset is exchanged for money.[538] Figure 7 visualises both the time dimension and the price dimension of liquidity.

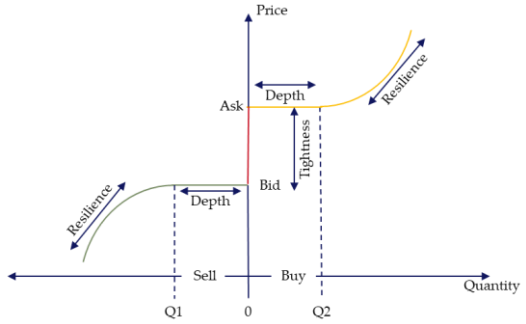

Figure 7: Dimensions of stock market liquidity[539]

This study follows the traditional understanding of liquidity by Bernstein (1987), Garbade (1982), and Keynes (1930) referring to liquidity as the ability to liquidate securities infinitely fast without causing adverse price effects.[540] Focusing on the price dimension of liquidity simplifies the operationalisation of the liquidity concept: First, there are strong reasons to suggest a negative relationship between both dimensions as investors might be able to increase the willingness of market makers to trade by placing orders in the market that are far away from the actual price. Second, measuring immediacy requires information about the time until the

[537] Cp. Sauerbier, 2006, p. 8.

[538] Cp. Lippman & McCall, 1986, p. 43.

[539] Source: own representation based on Kerry, 2008, p. 182.

[540] To keep the concept of liquidity focused, this study acknowledges but does not explicitly distinguish between persistent and transitory price impacts. Cp. Kindermann, 2005, p. 31ff.

next trading opportunity which is hard to obtain as market systems usually record transactions only.[541]

III.1.2. COMPONENTS OF TRADING COSTS

The concept of liquidity does not lend itself to easy conceptualisation and measurement as liquidity, in contrast to stock prices, is inherently unobservable. Because the level of liquidity prevailing in the secondary market is closely related to the costs of executing a transaction[542], liquidity is commonly approximated by transaction costs.[543] While the brokerage commission might be the only cost investors explicitly pay; Figure 8 concisely shows that there are other costs that they incur in the course of trading including a bid-ask spread and a price concession.

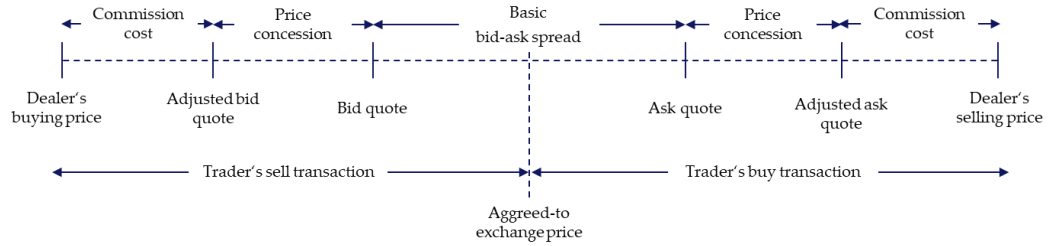

Figure 8: Components of transaction costs[544]

First, there is the basic bid-ask spread which is considered an implicit cost component reflecting the difference between the ask (dealer's selling /traders' buying) quote and the bid (dealers' buying/traders' selling) quote.[545] Bagehot (1971) distinguishes between three groups of agents who confront the market maker: Informed traders possessing pertinent information that are not currently reflected in a stock's price, liquidity traders who face cash needs and merely reallocate

[541] Cp. Kempf, 1998, p. 300.

[542] Cp. Amihud & Mendelson, 1991, p. 56.

[543] Cp. Jang et al., 2007, p. 2329ff.; Lesmond et al., 1999, p. 1113ff.; Loeb, 1983, p. 39ff.

[544] Source: own representation based on Kumar, 2004, p. 87; Loeb, 1983, p. 41.

[545] Cp. Kumar, 2004, p. 87.

wealth or implement an investment strategy using the stock of information inherent in the stock price, and traders acting on some residual piece of information that they believe has not yet been fully reflected in the market price.[546] Dealers and liquidity-motivated traders are equally well-informed vis-à-vis each other but less informed compared to information-driven traders. As the dealer cannot discern the trader's motivation, he will set the spreads in such a way that the gains from liquidity traders offset the losses from trades with informed traders.[547] The dealer always gains by trades with liquidity-motivated traders.

Second is the price concession. The dealer may extract price concessions from an investor by either reducing the bid quote or by increasing the ask quote when the dealer is asked to buy or sell beyond the best bid and ask prices.[548] The larger the order, the greater the price impact that the trader faces for immediate implementation of her buy or sell decision which is often the case for information motivated trades. For instance, Stephen and Thomas (1990) use quoted bid-ask spreads to show that costs associated with a conventional liquidity-seeking program trade are up to twice the costs of a patient trading strategy.[549]

The third is the brokerage commission which is charged explicitly to the negotiated transaction and is assessed by the dealer for handling the sale transaction.[550] The brokerage commission is much smaller than the basis bid-ask spread including the price concession and often is ignored when measuring trading costs.[551] This assumption can be justified by the background of an on-going institutionalisation of the capital markets as well as the progressive automation of securities trading.[552]

Above and beyond the cost components outlined above, Collins and Fabozzi (1991) consider opportunity costs in the form of search and delay costs as an

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[546] Cp. Bagehot, 1971, p. 13.

[547] Cp. Kumar, 2004, p. 87f.

[548] Cp. Amihud & Mendelson, 1991, p. 57; Loeb, 1983, p. 40.

[549] Cp. Stephen & Thomas, 1990, p. 38f.

[550] Cp. Loeb, 1983, p. 40.

[551] Cp. Collins & Fabozzi, 1991, p. 27f.; Loeb, 1983, p. 40.

[552] Cp. Keim & Madhavan, 1998, p. 51.

additional cost of transacting securities.[553] Opportunity costs represent hidden costs of trading that arise when a trader delays the execution of a transaction opting for better trading terms such as a smaller price impact or lower bid-ask spread.[554] Hence, investors face a trade-off between immediacy and the uncertainty of a more favourable future price.[555]

The following section addresses the vital role of the bid-ask spread in assessing the performance of a securities market. The bid-ask spread is of particular interest because it represents a large proportion of transaction costs and serves as the leading measure for assessing the level of stock market liquidity in the empirical analysis contained in chapter IV.

III.1.3. CONCEPTUAL FOUNDATIONS OF THE BID-ASK SPREAD

As first noticed by Demsetz (1968), a fundamental issue in trading is related to the predictable immediacy of exchange in organised markets.[556] The asynchronous arrival of buy and sell orders creates uncertainty as to both the amount of time that will be required to find a counterparty and the prevailing price at the time when the counterparty is located.[557] To reduce these opportunity costs, organised exchanges appoint liquidity suppliers[558] that maintain an appropriate level of liquidity, and that stand ready to trade with the incoming orders of those who demand immediate servicing of their orders. This delegation of liquidity services is necessary because individual market participants cannot continuously analyse market conditions and provide supply and demand curves for each

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[553] Cp. Collins & Fabozzi, 1991, p. 29.

[554] Cp. Amihud & Mendelson, 1991, p. 57.

[555] Cp. Kumar, 2004, p. 88.

[556] Cp. Demsetz, 1968, p. 35f.

[557] Cp. Bessembinder & Venkataraman, 2010, p. 184.

[558] Throughout this thesis, the terms “liquidity provider“, “dealer“, and “market maker“ are used interchangeably to characterize an exchange specialist in the case of listed securities standing ready to transact with anyone who comes to the market.

financial asset.[559] Dealers need to be compensated for their endogenous costs of operating liquidity services which, besides order-processing costs, include inventory holding costs and adverse selection costs.[560] Dealers recover these costs by quoting different prices for purchases from the dealer (dealer's ask price) and selling assets to the dealer (dealer's bid price). The difference between the two is the basic bid-ask spread.

Order-processing cost models assume that there are fixed costs in providing "predictable immediacy" for the exchange of ownership titles.[561] Order-processing costs represent a fee for matching buying and selling orders and may include administration expenses, royalty fees in respect to the subscription of electronic trading systems and information systems, as well as the cost of acquiring qualified personnel and a name in the market. As a high proportion of these costs are fixed, dealers might be able to derive additional value from economies of scale by lowering its average cost curve and enjoy an advantage over competing dealers.[562] As a result, spreads should decrease when stocks are frequently traded.[563]

Inventory holding cost models argue that the bid-ask spread reimburses dealers for accumulating undesired inventory.[564] While hoarding an inventory of stocks increases the price risk and might run against diversification benefits; less inventory holdings increase the probability of costly short sells.[565] The inventory holdings costs of the dealer are driven by the risk aversion of the liquidity provider[566] and the uncertainty about when future transactions will occur[567]. As

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[559] Cp. Biais et al., 2005, p. 218.

[560] Cp. Gregoriou et al., 2005, p. 1802; Hartmann, 1999, p. 803ff.; Stoll, 1978, p. 1144.

[561] CP. Stoll, 2000, p. 1481f.

[562] Cp. Hartmann, 1999, p. 804.

[563] Cp. Lipson & Mortal, 2007, p. 345.

[564] Cp. Hartmann, 1999, p. 804; Kumar, 2004, p. 88ff.; Madhavan, 2000, p. 213ff.

[565] Cp. Damodaran, 2005, p. 4f.

[566] Cp. Stoll, 1978, p. 1135f.

[567] Cp. Ho & Stoll, 1981, p. 47.

part of their optimal pricing policy, dealers can, to a certain extent, influence the probabilities of buying and selling by offering a better bid or ask price.[568]

Information cost models emphasize the distribution of information amongst market participants. Under this view, the spread compensates liquidity suppliers for the risk of trading against more timely or better-informed investors regarding the security value.[569] As dealers, in an anonymous market, on average lose money on transactions with informed traders; they need to price protect against such losses by raising bid-ask spreads.[570] Due to the negative elasticity of demand for immediacy, an expansion of the spread is only possible to a certain extent to keep liquidity traders motivated to trade with the dealer.[571]

Researchers expend much effort in investigating how spreads are set by market makers arriving at an estimator of the individual components of the bid-ask spread. There are two general classes of spread decomposition models:[572] (i) covariance models that rely on the serial correlation of observed transaction prices caused by the bid-ask bounce effect [573], and (ii) trade indicator regression models[574] which express the spread components through a linear function of signed order flow.[575]

Table 11 - by no means exhaustive - reveals considerable variability in their estimates on the different spread components. Some part of the variability in the spread estimates might be explained by differences in methodology, periods, and firm samples. There are some doubts about whether adverse selection estimates from spread decomposition models measure information asymmetry. Van Ness et al. (2001) benchmark the performance of the adverse selection component of five

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[568] Cp. Amihud & Mendelson, 1982, p. 52.

[569] Cp. Stoll, 2000, p. 1482.

[570] Cp. Bagehot, 1971, p. 13; Glosten & Harris, 1988, p. 124; Stoll, 2003, p. 566.

[571] Cp. Wolff, 2003, p. 83.

[572] Cp. Frijns et al., 2008, p. 228; Wolff, 2003, p. 55.

[573] Cp. George et al., 1991, p. 623ff.; Roll, 1984, p. 1127ff.; Stoll, 1989, p. 115ff.

[574] Cp. Glosten & Harris, 1988, p. 123ff.; Huang & Stoll, 1997, p. 995ff.

[575] Cp. Hachmeister, 2007, p. 40f.; Kumar, 2004, p. 91f.; Rudy De & Christophe, 2003, p. 96.

different spread decomposition models against other well-appreciated information asymmetry metrics including stock volatility, volume, leverage, analyst earnings forecast error, and market-to-book equity ratio. Using a sample of stocks listed on the NYSE from April 1999 to June 1999, the authors conclude that *"the adverse selection models we study might not be capturing other costs of trading."*[576] Rudy De and Christophe (2003) underpin the results by Ness et al. (2001) using other information asymmetry metrics and a more recent period.[577]

Table 11: Selected studies on the components of the bid-ask spread[578]

The table compares the components of the bid-ask spread in eight well-known research papers. In this table, GH (1988), GKN (1991), and HS (1997) mean the empirical spread decomposition models developed by Glosten and Harris (1988), George et al. (1991), and Huang and Stoll (1997). N/A indicates that the information is not available in the respective framework.

Study	Market and time period	Method	Empirical estimates of cost components		
			Order-processing	Inventory holding	Adverse selection
Glosten and Harris (1988)	NYSE (daily); Dec. 1981-Jan. 1983	GH (1988)	n/a	64.0%	36.0%
Stoll (1989)	NASDAQ (daily); Oct. 1984-Dec. 1984	Stoll (1989)	47.0%	10.0%	43.0%
George et al. (1991)	NASDAQ (daily); Jan. 1983-Dec. 1987	GKN (1991)	96.4%	n/a	3.6%
	NASDAQ (weekly); Jan. 1983-Dec. 1987		70.1%	n/a	29.9%
Foster and Viswanathan (1993)	NYSE; Jan. 1988-Dec. 1988	Foster and Viswanathan (1993)	88%	n/a	12%
Affleck-Graves et al. (1994)	NASDAQ / NMS; Mar 1985-Apr. 1985	Stoll (1989)	47.0%	17.0%	36.0%
	NYSE / AMEX; Mar 1985-Apr. 1985		1.0%	48.0%	50.0%
	NASDAQ / NMS; Mar 1985-Apr. 1985	GKN (1991)	90.3%	n/a	9.7%
	NYSE / AMEX; Mar 1985-Apr. 1985		70.6%	n/a	29.4%
Jones and Lipson (1995)	NASDAQ to NYSE (before switch) 1990-1992	GKN (1991)	94%	n/a	6%
	NASDAQ to NYSE (after switch) 1990-1992	GKN (1991)	57%	n/a	43%
Huang and Stoll (1997)	NYSE; Jan. 1992-Dec. 1992	HS (1997) two-way decomposition of the spread.	88.6%	11.4%	
		HS (1997) three-way decomposition of the	61.7%	28.7%	9.6%

[576] Van Ness et al., 2001, p. 96.

[577] Cp. Rudy De & Christophe, 2003, p. 127ff.

[578] Source: Own representation.

Study	Market and time period	Method	Empirical estimates of cost components		
			Order-processing	Inventory holding	Adverse selection
		spread (induced serial correlation)			
		HS (1997) three-way with portfolio approach to inventory holding	68.9%	9.6%	21.5%

III.2. VALUE OF STOCK LIQUIDITY

Over the last three decades, researchers have examined the liquidity effect on stock returns using two different approaches:[579] In the first, liquidity is a priced stock characteristic, and the premium for this characteristic compensates investors in efficient markets for bearing the transaction costs of trading in the security.[580] Here, the expected premium added on to the discount rates exclusively depends on the stock's liquidity level. Prominent research in this field includes Amihud (2002), Amihud and Mendelson (1986), Brennan et al. (1998), Brennan and Subrahmanyam (1996), and Eleswarapu and Reinganum (1993).[581]

In the second, liquidity is priced as a market level (systematic) risk factor, associated with the sensitivity of the stock returns to shocks in market liquidity.[582] The pricing of liquidity-related systematic risk is based on the idea that, because liquidity varies over time and because there is a commonality in liquidity, liquidity exposures may not be diversifiable for which investors will command a premium.[583] Important representatives of this mindset are Acharya and Pedersen (2005), Korajczyk and Sadka (2008), Pástor and Stambaugh (2003), and Sadka (2006).[584]

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[579] Cp. Amihud & Mendelson, 2015, p. 151; Foran & O'Sullivan, 2017, p. 261.

[580] Cp. Hasbrouck, 2009, p. 1446.

[581] Cp. Amihud, 2002, p. 31ff.; Amihud & Mendelson, 1986, p. 223ff.; Brennan et al., 1998, p. 345ff.; Brennan & Subrahmanyam, 1996, p. 441ff.; Eleswarapu & Reinganum, 1993, p. 373ff.

[582] Cp. Ben-Rephael et al., 2015, p. 198; Bradrania & Peat, 2014, p. 79.

[583] Cp. Acharya & Pedersen, 2005, p. 376.

[584] Cp. Acharya & Pedersen, 2005, p. 375ff.; Korajczyk & Sadka, 2008, p. 45ff.; Pástor & Stambaugh, 2003, p. 642ff.; Sadka, 2006, p. 309ff.

III.2.1. LIQUIDITY AS A STOCK CHARACTERISTIC

The notion of liquidity as a priced characteristic dates back to the early work by Amihud and Mendelson (1986).[585] The core metaphor of Amihud and Mendelson's (1986) model is that the equilibrium value of an asset is associated with the investor's expected cost of exiting from an investment.[586] Subsequently, the basic model is discussed first, before significant extensions are considered.[587]

In Amihud and Mendelson's (1986) model, there are $i = 1,2 \dots, I$ different investor types trading $N + 1$ securities indexed by j= $0,1,2 \dots, N$. Investors are risk neutral and randomly enter the market with wealth W_i used to purchase capital assets from the market maker at the ask price. Short sales as well as liability holdings are not permitted. Furthermore, investors are subject to a random arrival of a need to liquidate their portfolio by selling it to the market maker at the bid price. The probability of a liquidation event pl_i varies across investors but is constant over time. Because market makers earn a spread S_j for providing liquidity services to the market, investors incur a loss when liquidating their portfolios.

Rational investors will a priori to investing in a security consider how much it will cost them to divest in the future and demand compensation for bearing the costs of holding illiquid securities.[588] Consequently, in equilibrium, the price effects of illiquidity are first order and the asset return to an individual investor equals its gross return minus the expected costs of liquidation:[589]

$$R_j^g = r_{j,k}^* + pl_i * RS_j \tag{22}$$

where:

R_j^g = equilibrium gross (market-observed) return,
$r_{j,k}^*$ = equilibrium net (market-unobserved) return,
pl_i = probability of liquidation event for stock i, and

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[585] Cp.Amihud & Mendelson, 1986, p. 223ff.

[586] Cp. Amihud & Mendelson, 1986, p. 228.

[587] The following derivation of the basic model is based on Amihud & Mendelson, 1986, p. 225, 2015, p. 151ff.; Sauerbier, 2006, p. 49f.

[588] Cp. Amihud et al., 2005, p. 279.

[589] Cp. Amihud & Mendelson, 1986, p. 227.

RS_j = relative bid-ask spread.

If investors differ in their expected holding periods, then the clientele effect posits that the positive relationship between expected asset returns and illiquidity costs is concave.[590] The clientele effect is used by researchers to describe a situation where, in equilibrium, investors with long expected holding periods hold less liquid assets because they can effectively amortise their liquidity costs over a longer period.[591] While all investors prefer assets with low transaction costs, they are especially beneficial to short term investors who frequently incur transaction costs. As long-term investors bear the costs of trading illiquid securities less frequently, they can earn a liquidity premium more than their expected trading costs. This additional value to long-term investors results from the fact that short term investors punish less liquid securities by heavily discounting them.

Most variants of Amihud and Mendelson's (1986) model refer to the motives why investors buy and sell securities.[592] While Amihud and Mendelson (1986) create trading motives through the assumptions of different expected holding periods, other researchers model the time horizon as an endogenous variable. Constantinides (1986) formulates an intertemporal portfolio selection model showing that investors tend to equalise transaction costs by adjusting their trading frequency.[593] The author defines the liquidity premium on the risky asset in the presence of proportional transaction costs *"as the decrease in the risky asset's mean return "which, combined with the elimination of transaction costs, leaves unchanged the investor's expected utility"*.[594] For risk-averse investors that face proportional transaction costs, Constantinides (1986) finds that a no-trade region characterises the optimal investment policy and that an investor's demand for an asset being sensitive to the net effects of rebalancing.[595] While rebalancing means transaction costs, it provides the investor with additional gains from holding an optimal portfolio.

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[590] Cp. Amihud & Mendelson, 2015, p. 152.

[591] Cp. Amihud et al., 2005, p. 282; Atkins & Dyl, 1997, p. 309f.

[592] Cp. Sauerbier, 2006, p. 51.

[593] Cp. Constantinides, 1986, p. 842ff.

[594] Constantinides, 1986, p. 854.

[595] Cp. Constantinides, 1986, p. 843f.

Other researchers create trading motives by introducing background risks such as labour income risk, investor life-cycle, and time-varying return volatility. Heaton and Lucas (1996) examine numerically the effect of idiosyncratic and uninsurable labour income risk on equilibrium expected returns while considering both transaction costs and no transaction costs on the riskless and equity assets.[596] The authors conclude that an asset can have a significantly lower return because of precautionary demand induced by higher consumption variability. Vayanos (1998) study the effects of transaction costs on asset prices in an overlapping generations economy.[597] In Vayanos' (1998) model, investors have a life cycle motive for trading and sell stocks as they get older because of increasing risk aversion in old age.[598] Lynch and Tan (2011) investigate the association between labour income and multiplicative wealth shocks on liquidity premia and numerically produce per-annum liquidity premia that are the same order of magnitude as the transaction cost spread.[599] Finally, Jang et al. (2007) arithmetically show that when the assumption of a constant investment opportunity set is released, transaction costs can have a first-order effect on liquidity premia.[600]

Table 12 summarises the results of 18 empirical research studies that link liquidity to asset characteristics. Most of the selected studies direct at a significant liquidity premium in the order of 0.22% to 6.75%.[601] The variability in the liquidity effect on excess returns might be attributed to both methodological issues as well as differences in sample selection. In terms of methodology, the selected studies employ various diversification measures, thereby potentially taping different aspects of liquidity construct. For instance, Eleswarapu and Reinganum (1993) and Brennan and Subrahmanyam (1996) provide evidence of a seasonal phenomenon

[596] Cp. Heaton & Lucas, 1996, p. 443ff.

[597] Cp. Vayanos, 1998, p. 1ff.

[598] Cp. Vayanos, 1998, p. 10.

[599] Cp. Lynch & Tan, 2011, p. 1330.

[600] Cp. Jang et al., 2007, p. 2333ff.

[601] Although Table 12 is - by no means – exhaustive, it mirrors the conventional wisdom that investors care about stock illiquidity to the extent that they will pay less for illiquid assets than for otherwise liquid assets. Cp. Amihud & Mendelson, 2015, p. 160.

in the return-illiquidity relation and that the bid-ask spread might proxy for a risk variable associated with price level or firm size rather than the costs of transacting, respectively.[602] Additionally, some of the measures (e. g. dollar volume) are in breach with the minimum requirements of liquidity measures as set out in section III.3.1. As far as sample selection is concerned, there is some evidence for NASDAQ firms to suffer from a reduced liquidity / higher illiquidity premium compared to firms traded at either NYSE or AMEX.

Table 12: Empirical evidence on the pricing of illiquidity as a characteristic[603]
The table summarises the results of 12 empirical research studies that link liquidity to asset characteristics. "Discount" means that investors command a higher premium for illiquid assets than for otherwise identical liquid assets, thereby reducing shareholder value. Definition of stock exchanges: NYSE means "The New York Stock Exchange", AMEX means "American Stock Exchange", NYAM means "New York or American stock exchange", and NASDAQ means "National Association of Securities Dealers Automated Quotations". "ILLIQ" is Amihud's (2002) illiquidity ratio.

Study	Sample selection			Liquidity measure	Valuation effect
	Exchange	Period	Sample size		
Amihud and Mendelson (1986)	NYSE	1961-1980	619-900	Relative bid-ask spread	**Discount:** 1% increase in the spread is associated with a 2.53%*** increase in the per annum risk-adjusted excess return.
Amihud and Mendelson (1989)	NYSE	1960-1981	NR	Relative bid-ask spread	**Discount:** 1% increase in the bid-ask spread is associated with an increase in the annual expected return of 0.22%-0.26%***.
Eleswarapu and Reinganum (1993)	NYSE	1961-1990	654-929	Relative bid-ask spread	**Insignificant:** Both, the liquidity premium and the beta-risk premium are reliably positive only during January.
Brennan and Subrahmanyam (1996)	NYSE / AMEX	1984-1991	1,629-1,784	Proportional spreads	**Insignificant:** The spread is a proxy for a risk variable associated with the reciprocal of the price variable.
Eleswarapu (1997)	NASDAQ	1976-1990	657-2,161	Relative bid-ask spread	**Discount:** A 1% increase in the spread raises the expected yearly return by 0.34% to 0.42%[NR].
Brennan et al. (1998)	NYSE / AMEX / NASDAQ	1966-1995	2,457	Dollar volume	**Discount:** A one standard deviation increase in log. dollar volume reduces excess returns of NYSE / AMEX and NASDAQ stocks by 1.32%p.a.*** and 3.48%p.a.***, respectively.
Datar et al. (1998)	NYSE	1962-1991	880	Share turnover	**Discount:** Illiquid stocks earn an excess return over liquid assets of about 3.25% p.a.

[602] Cp. Brennan & Subrahmanyam, 1996, p. 441ff.; Eleswarapu & Reinganum, 1993, p. 373ff.

[603] Source: Own representation.

Study	Sample selection			Liquidity measure	Valuation effect
	Exchange	Period	Sample size		
Amihud (2002)	NYSE	1963-1997	NR	ILLIQ	**Discount:** 1% increase in ILLIQ is associated with a 1.944%*** increase in expected yearly stock returns.
Easley et al. (2002)	NYSE	1983-1998	1,311-1,846	Relative opening spread, PIN	**Insignificant:** Spreads do not affect asset returns, whereas the probability of informed trading (PIN) does. A 10%-points increase in PIN is associated with a 2.5%*** increase in the per annum expected return of the stock.
Brennan et al. (2013)	NYAM / NASDAQ	1971-2009	1,597-2,166	ILLIQ	**Discount:** A one-standard deviation change in the log-transformed ILLIQ ratio raises expected yearly excess returns by 4.27%*** (6.75%***) for NYAM stocks (NASDAQ stocks).
Amihud et al. (2015)	World	1990-2011	39,764	ILLIQ	**Discount:** Across countries, the risk-adjusted illiquidity premium is, respectively, 0.82%, 0.45%, or 0.73% after controlling for six common global and regional risk factors and using return weighted, value weighted, and volume-weighted portfolio returns.
Ben-Rephael et al. (2015)	NYSE / AMEX / NASDAQ	1931-2011	2,897-6,166	ILLIQ, Roll's (1984) effective spread, dollar volume	**Insignificant:** For NYSE stocks the characteristic premium declined from 1.3% in 1964 – 1975 to insignificant levels in 2000 - 2011. There is also evidence of a size factor in characteristic liquidity. Similar trends are observed for AMEX and NASDAQ stocks.

III.2.2. PRICING OF SYSTEMATIC LIQUIDITY RISK

An alternative interpretation for the liquidity effect is based on the discovery of commonality in liquidity by, among others, Chordia et al. (2000), Hasbrouck and Seppi (2001), and Huberman and Halka (2001)[604] and states that fluctuations in liquidity constitute a type of undiversifiable risk that augments the standard CAPM beta risk factor.[605] Acharya and Pedersen (2005) derive a liquidity-adjusted CAPM, showing that in equilibrium liquidity fluctuations are priced to the extent that they are either correlated across assets or exacerbate fundamental covariance risk.[606] The central result of their theoretical asset pricing model is that the CAPM in the imagined frictionless economy holds for net returns in an economy with liquidity costs.[607] Rewriting the one-beta CAPM in net returns in terms of gross returns, Acharya and Pedersen (2005) introduce three liquidity betas β^{L1}, β^{L2}, and β^{L3} that complement the standard CAPM beta as shown below:[608]

$$\mathrm{E}\left(R_{it}^{g}\right) = r_{ft} + \mathrm{E}(c_{it}) + \lambda(\beta_{it} + \beta_{it}^{L1} - \beta_{it}^{L2} - \beta_{it}^{L3}) \tag{23}$$

$$\lambda = E(r_{Mt} - c_{Mt} - r_{ft}) \tag{24}$$

$$\beta_{it} = \frac{cov_t(r_{it}, r_{Mt})}{var_t(r_{Mt} - c_{Mt})} \tag{25}$$

$$\beta_{it}^{L1} = \frac{cov_t(c_{it}, c_{Mt})}{var_t(r_{Mt} - c_{Mt})} \tag{26}$$

$$\beta_{it}^{L2} = \frac{cov_t(r_{it}, c_{Mt})}{var_t(r_{Mt} - c_{Mt})} \tag{27}$$

$$\beta_{it}^{L3} = \frac{cov_t(c_{it}, r_{Mt})}{var_t(r_{Mt} - c_{Mt})} \tag{28}$$

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[604] Cp. Chordia et al., 2000, p. 3ff.; Hasbrouck & Seppi, 2001, p. 383ff.; Huberman & Halka, 2001, p. 161ff.

[605] Cp. Amihud & Mendelson, 2015, p. 159; Bradrania & Peat, 2014, p. 79.

[606] Cp. Favero et al., 2010, pp. 109,111.

[607] Cp. Amihud & Mendelson, 2015, p. 159; Amihud et al., 2005, p. 288.

[608] Cp. Acharya & Pedersen, 2005, p. 381.

where:

$E(R_{it}^{g})$	=	expected gross stock return,
r_{ft}	=	return on the risk-free asset,
λ	=	risk premium,
β_{it}	=	sensitivity of returns on the ith asset against movements in the return on the market portfolio at time t,
$\beta_{it}^{L1} \ldots \beta_{i,t}^{L3}$	=	liquidity betas estimated for firm i at time t,
c_{Mt}	=	relative market illiquidity costs at time t, and
c_{it}	=	relative illiquidity costs of stock i at time t.

In this equation, the expected gross stock return $E(R_{it})$ is a linear combination of the expected relative illiquidity costs $E(c_{it})$ plus four covariances times the risk premium λ. As in the standard CAPM framework[609], the expected return on an asset is linearly related to the market risk premium with a constant proportionality given by its sensitivity to the market portfolio as measured by β_{it}.

Then, equation (23) yields three additional liquidity-related beta factors: The first liquidity beta β_{it}^{L1} reflects the sensitivity of the stock's liquidity to market-wide liquidity shocks. For most securities, β_{it}^{L1} yields a positive sign due to commonality in liquidity meaning that investors want to be compensated for holding a security that becomes illiquid when the market becomes illiquid.[610] The second liquidity beta β_{it}^{L2}, which measures the sensitivity of the stock's return to market-wide liquidity shocks, affects required returns negatively because investors are willing to accept a lower return on an asset with a high return in times of market illiquidity.[611] Finally β_{it}^{L3} means the covariation between a security's illiquidity and the market return. The negative effect stems from the willingness of investors to accept a discounted return on stocks with low illiquidity costs, provided that these securities remain tradeable in states of poor market return.

To date, the evidence on liquidity as a priced risk factor is at best mixed: While studies by Acharya and Pedersen (2005), Chen (2005), Foran and O'Sullivan (2014), and Pástor and Stambaugh (2003) provide evidence of a premium for

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[609] For further reading on the CAPM, see section II.1.2.2.

[610] Cp. Amihud et al., 2005, p. 288.

[611] Cp. Acharya & Pedersen, 2005, p. 382.

systematic liquidity risk[612], other studies by Chordia et al. (2000), Coughenour and Saad (2004), Hasbrouck and Seppi (2001), and Karolyi et al. (2012) do not support the notion of commonality in liquidity[613].

There are also some empirical studies that attempt to combine the views about the liquidity effect on asset pricing by simultaneously examining the relationship between liquidity as a characteristic and liquidity as an undiversifiable source of market risk. Again, the results of these studies are inconclusive: Bradrania and Peat (2014) use a triple-sort portfolio formation technique developed by Daniel and Titman (1997)[614] to isolate the variation in liquidity-related co-variation from the changes in liquidity level for 3,035 NYSE stocks from January 1926 to December 2008.[615] Bradrania and Peat (2014) find that systematic liquidity risk is priced irrespective of illiquidity level.[616] For a sample of NYSE-listed stocks over the period January 1983 through December 1992, Korajczyk and Sadka (2008) obtain a premium in the absolute level of liquidity characteristic after controlling for across-measure systematic liquidity risks while using the Amihud (2002) ratio and stock turnover as liquidity measures.[617] Liu (2010) reports that liquidity risk carries a significant premium, whereas there is little evidence for liquidity as a firm characteristic.[618] Finally, Watanabe and Watanabe (2008) declare that "*the illiquidity premium is delivered primarily in the form of beta risk premium with respect to the liquidity factor during periods of high preference uncertainty*".[619]

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[612] Cp. Acharya & Pedersen, 2005, p. 375ff.; Chen, 2005, p. 1ff.; Foran & O'Sullivan, 2014, p. 178ff.; Pástor & Stambaugh, 2003, p. 642ff.

[613] Cp. Chordia et al., 2000, p. 3ff.; Coughenour & Saad, 2004, p. 37ff.; Hasbrouck & Seppi, 2001, p. 383ff.; Karolyi et al., 2012, p. 82 ff.

[614] Cp. Daniel & Titman, 1997, p. 1ff.

[615] Cp. Bradrania & Peat, 2014, p. 78ff.

[616] Cp. Bradrania & Peat, 2014, p. 93.

[617] Cp. Korajczyk & Sadka, 2008, p. 47.

[618] Cp. Liu, 2010, p. 7ff.

[619] Cp. Watanabe & Watanabe, 2008, p. 2452.

III.3. MEASURING LIQUIDITY IN STOCK MARKETS

III.3.1. CLASSIFICATION

Obtaining accurate measures of trading costs and assessing the reasons for their systematic behaviour is vital to individual investors, portfolio managers, and policymakers. While investors and portfolio managers need to base their decisions conditioned on the anticipated trading costs to avoid shortfalls in investment performance, policymakers are concerned with the impacts of regulatory reforms on trading mechanisms, thereby determining the attractiveness and profitability of a regulated market.[620]

Previous market microstructure literature has adopted more than 60 different measures to proxy for market liquidity.[621] To date, there is little agreement on the best measure to use and, as the different measures have a low correlation to each other[622], researchers likely end up with conflicting results about the liquidity of a financial market when using different measures. As Amihud (2002) state: *"These measures of liquidity […] can be regarded as empirical proxies that measure different aspects of illiquidity. It is doubtful that there is one single measure that captures all its aspects".*[623]

Liquidity measures are commonly distinguished along (i) the number of dimensions they cover and (ii) the capital market data used to calculate them.[624] One classification dates back to Wyss (2004) and Kindermann (2005) who separate liquidity measures into one-dimensional and two-dimensional ones.[625] One-dimensional liquidity measures only take into account one liquidity dimension at

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[620] Cp. Bessembinder, 2003, p. 233f.; Bessembinder & Venkataraman, 2010, p. 184; Chordia, Roll, et al., 2001, p. 501.

[621] Cp. Aitken & Comerton-Forde, 2003, p. 46

[622] Cp. Aitken & Comerton-Forde, 2003, p. 51. For a correlation analysis on U.S. treasury notes, see Fleming, 2003, p. 96f.

[623] Amihud, 2002, p. 35.

[624] Cp. Hachmeister, 2007, p. 24.

[625] Cp. Kindermann, 2005, p. 46; Wyss, 2004, p. 9.

a time and provide a direct measure of the spread, the volume traded, or the time between subsequent trades.[626] Instead, two-dimensional measures explicitly model the relationship between the various liquidity dimensions. They combine properties of different one-dimensional liquidity measures as it is the case for "quote slope" that has the spread in the numerator (breadth dimension) and the volume in the denominator (depth dimension).

Collins and Fabozzi (1991) introduce another classification of liquidity measures into pre-trade measures and post-trade measures.[627] Pre-trade measures utilise information about quotes and trading interest that is already available before the execution of a trade.[628] The central idea behind pre-trade measures is that the quote function of the open order book contains information on the willingness of market participants to trade, thereby determining the price at which they are prepared to buy or sell a stock.[629] Consequently, pre-trade measures, such as quoted spreads or order-book depth, indicate the cost of completing a round trip (buy and sell at the same time).[630] A major disadvantage of pre-trade measures is that, by construction, they do not capture the resilience dimension of liquidity.[631] Post-trade liquidity measures, such as the "Amivest Liquidity Ratio", are calculated based on transaction prices[632] and, therefore, indicate what people have traded in the past[633]. Their strengths lies in the consideration of the open interest of traders who are willing to trade but who do not want to appear in the order book prior to a trade.[634] Also, the history of past transaction prices reveals information about the resilience

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[626] Cp. Wyss, 2004, p. 9.

[627] Cp. Collins & Fabozzi, 1991, p. 31. Aitken and Comerton-Forde (2003) choose a similar approach and differentiate between trade-based measures and order-based measures. In their classification, trade-based measures are expost rather than ex ante measures. Cp. Aitken & Comerton-Forde, 2003, p. 47f.

[628] Cp. Kindermann, 2005, p. 46f.

[629] Cp. Kempf, 1998, p. 300f.

[630] Cp. Aitken & Comerton-Forde, 2003, p. 47.

[631] Cp. Kindermann, 2005, p. 47.

[632] Cp. Hachmeister, 2007, p. 26; Kindermann, 2005, p. 62.

[633] Cp. Aitken & Comerton-Forde, 2003, p. 47.

[634] Cp. Kindermann, 2005, p. 26f.

dimension of a market.[635] Other researchers, however, argue that post-trade measures fail to measure opportunity costs and, therefore, do not accurately reflect the implicit cost of not being able to implement the desired investment strategy, that is, the level of liquidity is systematically overestimated.[636] The notion is based on the premise that investors care about the level of liquidity prevailing in the secondary market when making buying and selling decisions. Therefore, transactions could be omitted due to a lack of liquidity.

Table 13 provides an overview on frequently used liquidity measures separated first into one-dimensional and two-dimensional ones, then into pre-trade and post-trade measures.[637] To choose the most suitable liquidity measure for the investigation of the mediating effects of stock liquidity on the diversification's effect, the author follows Kindermann (2005) and Kuhlmann (2018) in adopting three quality properties:[638]

- *Symmetry* means that the liquidity metric should lead to the same conclusion about the liquidity of a market or financial asset irrespective of whether it is applied by a buyer or a seller. The central tenet underlying the symmetry property is that trading is a zero-sum game meaning that the sum of the market impact costs of all market participants (e.g. buyers, sellers, dealers) must be zero to prohibit free lunch configurations.[639] Liquidity measures based on discrete returns such as quoted spreads often fail to meet the symmetry property when not transformed by the natural logarithm.[640]
- *Data availability* ensures that the liquidity measure is available for a sufficiently long period of time.[641] Due to their high data requirements (e.g. intraday trading data), some measures are more elaborate in their determination than others.

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[635] Cp. Kindermann, 2005, p. 71.

[636] Cp. Collins & Fabozzi, 1991, p. 32.

[637] For further reading on the various measures, instead of many, see Alexandros et al., 2011, p. 6ff.

[638] Cp. Kindermann, 2005, p. 39ff.; Kuhlmann, 2018, p. 98f.

[639] Cp. Berkowitz et al., 1988, p. 100.

[640] Cp. Kindermann, 2005, p. 40f.

[641] Cp. Fleming, 2003, p. 85.

- *Comparability* refers to the possibility to compare the liquidity situation of stocks with no regards to the price level of the stocks in question.[642]

With particular attention paid to the aforementioned quality criteria, the following statements on liquidity measures are limited to four key figures, among them are relative spreads, turnover ratio, illiquidity ratio, and liquidity ratio 2.

[642] Cp. Wyss, 2004, p. 13.

Table 13: Selective summary of liquidity measures[643]

The table presents 23 liquidity metrics proposed in the early stages of the market microstructure literature and that measure different aspects of illiquidity. The last three columns indicate whether the liquidity metrics fulfil the quality properties introduced above.

Type	Measure	Quality properties			Score
		Symmetry	Data availability	Comparability	
One-dimensional liquidity measures: depth dimension					
Pre-trade / order-based					
	Quoted spread	if log	fulfilled	not fulfilled	2 of 3
	Relative spreads	if log	fulfilled	fulfilled	3 of 3
	Average spreads	if log	fulfilled	not fulfilled	2 of 3
	Round trip costs	not fulfilled	not fulfilled	not fulfilled	0 of 3
	Relative round trip costs	not fulfilled	not fulfilled	fulfilled	1 of 3
Post-trade / trade-based					
	Market impact	not fulfilled	not fulfilled	not fulfilled	0 of 3
	Price impact	fulfilled	not fulfilled	fulfilled	2 of 3
	Depth of price impact	fulfilled	not fulfilled	fulfilled	2 of 3
One-dimensional liquidity measures: breadth dimension					
Pre-trade / order-based					
	Quantity depth	if log	not fulfilled	not fulfilled	1 of 3
	Dollar depth	Not fulfilled	not fulfilled	fulfilled	1 of 3
Post-trade / trade-based					
	Trading volume	fulfilled	fulfilled	not fulfilled	2 of 3
	Turnover ratio	fulfilled	fulfilled	fulfilled	3 of 3
One-dimensional liquidity measures: time dimension					
Post-trade / trade-based					
	Number of transactions	fulfilled	not fulfilled	not fulfilled	1 of 3
	Trading latency	fulfilled	not fulfilled	not fulfilled	1 of 3
	Zeros	fulfilled	fulfilled	not fulfilled	2 of 3
Two-dimensional liquidity measures: price and volume					
Pre-trade / order-based					
	Quote slope	if log	not fulfilled	not fulfilled	1 of 3
	Composite liquidity	not fulfilled	not fulfilled	not fulfilled	0 of 3
	Order ratio	not fulfilled	not fulfilled	not fulfilled	0 of 3
Post-trade / trade-based					
	ILLIQ	fulfilled	fulfilled	fulfilled	3 of 3
	Liquidity ratio 1	if log	fulfilled	not fulfilled	2 of 3
	Liquidity ratio 2	if log	fulfilled	fulfilled	3 of 3
	Liquidity ratio 3	if log	fulfilled	not fulfilled	2 of 3
Two-dimensional liquidity measures: price and time					
Post-trade / trade-based					
	Flow ratio	fulfilled	not fulfilled	not fulfilled	1 of 3

[643] Source: Own representation based on Hachmeister, 2007, p. 24ff.; Kindermann, 2005, p. 112; Kuhlmann, 2018, p. 100; Sarr & Lybek, 2002, p. 8ff.; Wyss, 2004, p. 9ff.

III.3.2. ONE-DIMENSIONAL MEASURES

The relative spread is among the most frequently used measures of market liquidity[644] and gives an approximation of the cost that an investor must incur in order to trade immediately[645]. The spread calculated using mid-prices is as follows:[646]

$$S_{rel}^{M_t} = \frac{p_t^A - p_t^B}{p_t^M} \tag{29}$$

$$p_t^M = \frac{p_t^A + p_t^B}{2} \tag{30}$$

where:

$S_{rel}^{M_t}$ = relative spread calculated with mid-prices,
p_t^A = best asked price at time t,
p_t^B = best bid price at time t, and
p_t^M = mid-price at time t.

On the positive side, the relative spread can be calculated quickly with readily available data and does not require any trading activity. By calculating the cost of a round-trip as a percentage of the stock price, the relative spread can be used to compare the liquidity across stocks. To achieve better distributional properties, some researchers employ log prices to calculate the relative spread or even calculate log relative spread of log prices.[647] On the negative side, relative spread measures are criticised for not considering differences in the order volume so that for large investors the true cost of trading might be underestimated.[648] Also, many transactions take place within the quoted spread, thereby overstating the cost of trading.[649] Quoted spreads should widen with the variability in price returns as

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[644] Cp. Amihud & Mendelson, 1986, p. 223f.; Fleming, 2003, p. 85.

[645] Cp. Aitken & Comerton-Forde, 2003, p. 47.

[646] Cp. Kadlec & McConnell, 1994, p. 628; Wyss, 2004, p. 14.

[647] Cp. Wyss, 2004, p. 15.

[648] Cp. Aitken & Comerton-Forde, 2003, p. 47.

[649] Cp. Stoll, 2000, p. 1486.

dealers demand compensation for inventory carrying costs which themselves are a positive function of the riskiness of the underlying.[650]

The turnover ratio is a common post-trade measure of liquidity indicating the number of times the outstanding volume changes hands. In contrast to the relative spread introduced above, it can be best considered as a proxy for volume (or breadth) rather than market depth. The turnover ratio is defined as the dollar value of shares traded scaled by the fraction of outstanding value traded:[651]

$$RTV_t = \sum_{i=1}^{n_T} \frac{q_i}{n_i^s * ff_i} \tag{31}$$

where:

RTV_t	=	relative transaction volume at time t,
n_T	=	number of trades in a given time period T,
q_i	=	number of shares of trade i,
n_i^s	=	issued shares of firm i, and
ff_i	=	free float fraction of firm i.

The advantage of using the relative turnover rate of a stock as a proxy for its liquidity is two-fold. First, it is relatively easy to calculate, and data availability is less of an issue. Second, the turnover ratio has a strong theoretical and empirical appeal. By the clientele effect, investors with long expected holding periods hold less liquid assets, which in turn, implies that asset returns are a decreasing function of the turnover rate.[652] Among others, Chordia, Subrahmanyam, et al. (2001) and Datar et al. (1998) find that cross-sectionally stock returns are a decreasing function of the turnover rates which confirms the idea of a negative relationship between expected returns and liquidity.[653]

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[650] For further reading, see section III.1.3.

[651] Cp. Ajinkya & Jain, 1989, p. 334; Amihud, 2002, p. 34f.; Datar et al., 1998, p. 205.

[652] Cp. Amihud, 2002, p. 35; Datar et al., 1998, p. 206.

[653] Cp. Chordia, Subrahmanyam, et al., 2001, p. 4; Datar et al., 1998, p. 205.

III.3.3. TWO-DIMENSIONAL MEASURES

The first two-dimensional approach, developed by Amihud (2002) and known as „ILLILQ", reflects the „*daily price response associated with one dollar of trading volume*".[654] The illiquidity of a specific stock is defined as the daily ratio of the absolute stock return as a fraction of the stock's dollar volume:[655]

$$ILLIQ_t = \frac{|r_{r_{t-1,t}}|}{ST_t} = \frac{|r_{r_{t-1,t}}|}{\sum_{i=1}^{n_T} p_i * q_i} \quad (32)$$

where:

$ILLIQ_t$	=	Amihud's (2002) illiquidity ratio at time t,
n_T	=	number of trades in a given time period T,
p_i	=	transaction price of trade i,
q_i	=	number of shares of trade i,
ST_t	=	stock turnover at time t, and
$r_{t-1,t}$	=	return from period t - 1 to t.

A high value for ILLIQ is taken to indicate that only a few shares were traded with high price movements and, hence, means lower liquidity of stocks. Using a sample of NYSE stocks during the years 1964 – 1997, Amihud (2002) empirically documents that ILLIQ has a positive and highly significant effect on expected returns.[656] The main advantage of Amihud's (2002) measure is that it relies on the full availability of data on stock returns and volume for its computation. Thus, the index allows for the investigation of long times series. A disadvantage of ILLIQ, however, is the assumption of a linear relationship between price changes and changes in turnover so that the influence of lagers-than-average trades remains uncovered.[657] Additionally, ILLIQ fails to distinguish between transitory and permanent liquidity shortfalls.[658] A market can display high price variability for various reasons without high volumes of trading; explanations include the arrival of new but ambiguous information or mispricing.

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[654] Amihud, 2002, p. 32.

[655] Cp. Wyss, 2004, p. 19.

[656] Cp. Amihud, 2002, p. 32.

[657] Cp. Grossman & Miller, 1988, p. 630.

[658] Cp. Kindermann, 2005, p. 71f.

The second two-dimensional liquidity measure has been proposed by Ranaldo (2000) as a slight modification of ILLIQ. In this version of the liquidity ratio, the stock turnover is adjusted by the free float of the firm:[659]

$$LR2_t = \frac{ST_t/ff_i}{|r_{t-1,t}|} = \frac{\sum_{i=1}^{n_{iT}} p_i * q_i/ff_i}{|r_{t-1,t}|} \quad (33)$$

where:

$LR2_t$	=	Liquidity ratio 2 at time t,
n_T	=	number of trades in a given time period T,
p_i	=	transaction price of trade i,
q_i	=	number of shares of trade i,
ST_t	=	stock turnover at time t,
$r_{t-1,t}$	=	return from period t - 1 to T, and
ff_i	=	free float fraction of firm i.

As in most related research studies, this thesis employs a series of alternative liquidity measures to reduce estimation error. However, only the relative spread measure and the turnover ratio will be considered in the empirical analysis. The reasons are twofold: First, while relative spreads and turnover are relatively easy to calculate and to interpret, ILLIQ and LR2 are not. Second, ILLIQ and LR2 are not consistent with the liquidity concept introduced in section III.1.1, as they are exclusively aimed at the relationship between transaction volume and transaction price change. Third, as with every post-trade measure, ILLIQ and LR2 tend to overvalue liquidity systematically because they do not account for transactions not executed due to lack of liquidity.[660]

The selection of relative spread is supported by the fact that they are not based on transaction data. In conjunction with the turnover ratio as a post-trade measure, estimation biases can be reduced while ensuring high comparability with previous studies.

[659] Cp. Ranaldo, 2000, p. 80.

[660] Cp. Rojahn, 2008, p. 90.

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IV. VALUE CONSEQUENCES OF STOCK ILLIQUIDITY ON MULTI-BUSINESS FIRMS

IV.1. DEVELOPMENT OF RESEARCH HYPOTHESIS

Ever since Ansoff's (1957) and Chandler's (1962) observation that firms seek growth, there has been a long tradition of research on the relationship between product diversification and firm performance in the strategy and finance fields. From a conceptual point of view, increasing levels of diversification should provide additional shareholder value through operating synergies[661] and financial synergies such as debt coinsurance effects[662] and an increased allocation efficiency of capital in multi-business firms[663]. However, product diversification is not a costless process, and diversified firms might have to cope with growing agency problems causing inefficiencies in the internal capital allocation process.[664]

Concerning shareholder value, much literature reports evidence that the costs of diversification outweigh its benefits, leading to substantial reductions in shareholder value and supporting an earlier notion by Myers (1984): *"Investors who want to diversify do so on their own. Corporate diversification is redundant; the market will not pay extra for it."*[665] On average, the sum of a diversified firm's distinct business units is worth 2,8% to 60% of the value of a comparable portfolio single segment firms as indicated by Appendix 4. The literature review covers research studies

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[661] Cp. Beckmann, 2006, p. 40ff.; Purkayastha et al., 2012, p. 18ff.; Tanriverdi & Venkatraman, 2005, p. 99ff.

[662] Cp. Hann et al., 2013, p. 1961ff.; Higgins & Schall, 1975, p. 93ff.; Lewellen, 1971, p. 521ff.

[663] Cp. Gertner et al., 1994, p. 1211ff.; Hubbard & Palia, 1999, p. 1131ff.; Rajan et al., 2000, p. 35ff.; Stein, 1997, p. 111ff.

[664] Cp. Amihud & Lev, 1981, p. 605ff.; Denis et al., 1997, p. 135ff.; Jensen, 1986, p. 323ff.; Ozbas & Scharfstein, 2010, p. 581ff.; Rajan et al., 2000, p. 35ff.; Shin & Stulz, 1998, p. 531ff.; Stulz, 1990, p. 3ff.

[665] Myers, 1984, p. 129.

using various methodologies, periods, and firm samples; thereby confirming that the diversification discount is a widespread phenomenon.

Hence, it is a priori likely that diversified European firms trade with significant discounts, too. Therefore, the following two hypotheses seem to be a reasonable starting point for assessing the diversification effect across European firms:[666]

H1.1: *There are significant valuation differences between European non-financial focused firms and diversified firms.*

H1.2: *On average, the valuation difference is negative meaning that diversified firms trade at a discount.*

Generally, the diversification literature computes the average valuation effects of corporate diversification under the implicit assumption that future returns are the same for diversified firms and focused firms.[667] Equation (18) shows that even if cash flows are held constant, diversified firms and focused firms might have different Wall Street values due to variations in the appropriate discount rate for equity. Different securities might have different expected returns for many reasons; among such factors, this study focuses on stock market liquidity.

The ability to buy or sell significant quantities of a security without moving the price against him or her (i.e. perfect liquidity) is an essential element of perfect capital markets without which Neoclassical asset pricing models such as the CAPM or APT would be without practical use. However, the assumption of perfect liquidity regularly does not hold under real market conditions and, because the lack of liquidity reflects a non-diversifiable risk, it should be considered a significant determinant in valuing illiquid securities. As liquidity, in contrast to stock prices, is inherently unobservable, it is common practice to specify the level of liquidity by transaction costs.

In a nutshell, transaction costs are the dealers' compensation for standing ready to trade with the incoming orders of those who demand immediate servicing of their orders. The endogenous costs of operating liquidity services include order-

[666] Please note that all research hypotheses are formulated in the style of an alternative hypothesis H1. For simplicity reasons, the null hypothesis is not listed separately.

[667] Cp. Lamont & Polk, 2001, p. 1694.

processing costs, inventory holding costs, and adverse selection costs. Dealers recover these costs by quoting different prices for purchases from the dealer and selling assets to the dealer.

To date, little attention has been paid to the effect of stock illiquidity on the diversification-performance linkage[668], albeit its theoretical implications are ambiguous: On the one hand, greater diversification can lead to higher illiquidity premiums and an undervaluation of the issuer's shares through an information effect. Information asymmetries might be more severe in diversified firms, leading to considerable surcharges in the costs of trading the equity instrument of diversified firms.[669] If diversified firms are less transparent relative to focused firms as outlined in section II.4.1.2.3, then from the viewpoint of a market maker, the risk of losses from trades with informed traders is higher for firms with more severe information asymmetries, leading to increased transaction costs (bid-ask spreads). As investors expect a certain level of liquidity and are only willing to buy less liquid securities if they are compensated for by a liquidity premium to indemnify for the additional risk taken, the equity premium is likely to be higher for diversified firms than for otherwise identical focused firms.

On the other hand, corporate diversification might lessen the adverse-selection problem facing equity issuers through an information diversification effect stating that the errors the market makes in forecasting the cash flows of the multiple segments in a diversified firm are imperfectly correlated. The cash flow forecast for a diversified firm can, thus, be more accurate than the forecast for a focused firm. Above and beyond, diversified firms might have lower illiquidity risk premiums through a size effect that makes large stocks relatively more attractive ("flight to liquidity").

Empirical evidence on the net effects of liquidity of traded equity on the diversification-performance linkage is scare and is mostly rooted in the real estate investment trust (REIT) industry. As these results must not generalise to other

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[668] For empirical evidence on the effect of stock liquidity on the diversification performance linkage, refer to section II.4.3.

[669] For an introduction to the operationalization of liquidity by transaction costs, see section III.1.

industries such as non-financial firms, in the fourth chapter the following two contradictory hypotheses will be tested:

H2.1: *The relationship between corporate diversification and firm value is mediated by stock liquidity, such that the more that diversification enhances liquidity, the higher the excess firm value.*

H2.2: *The relationship between corporate diversification and firm value is mediated by stock liquidity, such that the more that diversification reduces liquidity, the lower the excess firm value.*

IV.2. SAMPLE AND DATA

IV.2.1. SAMPLE DEFINITION

The investigation of the impact of stock illiquidity on the diversification effect in Europe covers the years 2007 to 2016, with at least one year falling on the outbreak of the financial crisis.[670] The initial sample consists of all firms that have been a member of the STOXX® EUROPE 600 index during the nine-year time window. To avoid survivorship and newness bias, firms will be added to the sample in the year they first enter the index and will remain a part of the relevant firm sample unless they cease their business activity during the investigation period. Reason for firms to leave the sample are plenty and include bankruptcy, mergers, or going private. The STOXX® EUROPE 600 index consists of the 600 largest companies located across 18 countries in Europe; thereby representing firms with high importance for the European area. Firms are elected to be part of the index based on several criteria including free float and market capitalisation.

The initial sample includes 7,686 firm-year observations across nine-years, with yearly observations ranging from 600 firms in 2007 to 941 firms in 2016. Thus, 341 firms newly entered the STOXX® EUROPE 600 index since 2007. In the first step, 2,052 firm-year observations from the financial industry according to the industry classification benchmark (ICB) have been eliminated. These firms are subject to industry-specific regulations introducing spurious effects to the excess value measure and the independent variables. For instance, the study controls for

[670] Cp. Acharya & Schnabl, 2010, p. 38.

the influence of the leverage ratios which is most likely to be distorted when financial firms are not excluded.[671] In a second step, 2,963 firm-year observations are excluded due to the absence of information on one or more predictor variables such as total capital, firm sales, segment level sales or Altman's Z score. After these deductions, a sample of 2,671 firm-year observations is left. In contrast to assets or earnings, sales are usually entirely allocated among business segments.

To check for plausibility, the study requires that the sum of the segment sales falls within 1 per cent of the total sales of the firm, leading to a deduction of further 253 firm-year observations.[672] In a final step, 437 observations are qualified as extreme observations concerning excess firm value as the dependent variable, where extreme is defined as observations with an actual value being either more than four times of the imputed value or less than one-fourth of the imputed value.[673]

Altogether, these modifications lead to a final sample of 1,981 firm observations across nine years corresponding to 343 firms (unbalanced panel). Table 14 summarises the sample generation process.

Table 14: Sample selection process[674]

		2007-2016	% of basis population
Basic population: firms included in the STOXX® EUROPE 600 index between the years 2007 to 2016		7,686	100.00%
	Financials or unknown sector	-2,052	-26.70%
	Lack of data	-2,963	-38.55%
	Sum of segment sales (1% rule)	-253	-3.29%
	Outlier excess firm value	-437	-5.69%
Sample population: firms included in the regression analysis		1,981	25.77%
	Thereof diversified (business count, BDIV)	1,427	72.03%
	Thereof diversified (market implied, MCOUNT)	1,525	76.98%

The data items required for this research study are primarily sourced from one of the world's largest data providers *Thompson Reuters*. All fundamental data

[671] Cp. Rojahn & Zechser, 2017, p. 6.

[672] Cp. Berger & Ofek, 1995, p. 43; Graham et al., 2002, p. 699.

[673] Cp. Berger & Ofek, 1995, p. 61.

[674] Source: Own representation.

such as accounting numbers and industry classifications are taken from "Datastream/Worldscope", which are considered as the most comprehensive databases for academic research related to corporate samples.[675] Likewise, information about the world's capital markets including the sample firms' stock market performance is drawn from "Thomson Reuters Eikon".

IV.2.2. MEASURES OF CORPORATE DIVERSIFICATION

Prior research suggests multiple dimensions along which distinct businesses may be interlinked within a corporate portfolio.[676] As in most related research studies, this thesis employs a set of alternative diversification measure to reduce estimation errors and to provide a high level of comparability with previous studies.[677] The choice of the diversification measures is fundamentally based on recent studies by Ataullah et al. (2014), Kuppuswamy and Villalonga (2016); Rojahn and Zechser (2017), and Zechser and Rojahn (2017)[678] and includes three business count measures and three market-implied diversification measures, each of which has been discussed in greater detail throughout section II.3: First, the diversified firm dummy (BDIV) is a binary variable that equals unity if the number of different four-digit SIC codes for a firm's segment revenues assigned by the Worldscope database exceeds one and zero otherwise.

Second and third, the study considers two revenue-based Herfindahl indices that reflect the degree to which sales are concentrated among industry groups (H2DIV) and industry segments (H4DIV). Industry segments are identified according to two-digit SIC codes, while industry segments are based on four-digit SIC codes. These Herfindahl indices are calculated for each fiscal year, and sample

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[675] Cp. Klier, 2009, p. 116.

[676] Cp. Greune, 1997, p. 12f.; Schüle, 1992, p. 7f.; Srivasta et al., 1994, p. 146; Weiss, 2009, p. 28.

[677] Cp. Bausch & Pils, 2009, p. 165ff.; Ramanujam & Varadarajan, 1989, p. 540.

[678] Cp. Ataullah et al., 2014, p. 228ff.; Kuppuswamy & Villalonga, 2016, p. 905ff.; Rojahn & Zechser, 2017, p. 1ff.; Zechser & Rojahn, 2017, p. 457ff.

firm is as the inverse of the sum of the squared output in the i^{th} business unit as a percentage of the firm's squared total output across all business units.[679]

The estimation of the business count measures is subject to the following modifications: First, for reasons of data availability, the two Herfindahl indices are calculated using revenue figures only. The reason is that reliable information on both segment assets and segment income are not available to the author. Second, revenues reported for sic code "9999 Non-classifiable establishments" are neglected following prior research studies in this field.[680] Third, if a firm does not report segment information, it will be treated as focused. However, due to our sample selection process, this conversion does not apply.

Fourth, the multi-index dummy MCOUNT is a binary variable that takes a value of one if the number of different and significant regression coefficients obtained from estimating equation (13) exceeds one and is zero otherwise.

Fifth, this thesis employs a beta-based Herfindahl index that reflects the degree to which the performance of a firm on the global capital markets is spread across broad market indices. MHDIV is an application of the Berry-Herfindahl index and is calculated as the inverse of the sum of the squares of each standardised regression coefficient obtained from equation (13) divided by the squared total regression coefficients.

Finally, the market-implied diversification measure is the minimum of the proportion of explained variance and the inverse of a Herfindahl index based on standardised regression coefficients resulting from yearly forward stepwise regressions of equation (13).

The Herfindahl indices H2DIV and H4DIV as well as the market-implied diversification measures MHDIV and MDIV converge towards one as the number of a firm's SIC involvements increases.

Table 15 presents descriptive data for the six diversification measures applied in this research study. The weighted business count measures vary from a minimum of zero (single-segment firm) to a maximum of 0.778 and 0.851 (high degree of diversification) for H2DIV and H4DIV, respectively, indicating a wide range of different diversification strategies among the sample firms. The results are

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[679] For further reading on Herfindahl indices, see section II.3.2.

[680] Cp. Klier, 2009, p. 125.

comparable to the market-implied indices of corporate diversification, which deviate from a minimum of zero to a maximum of 0.778 and 0.851 for MDIV and MHDIV, respectively. For all diversification metrics except the dummy variables, the null hypothesis of the Shapiro–Wilk normality test (SW test), "The data are normally distributed", is rejected at the 0.01 level. By construction, the diversified firm dummies do not follow a normal distribution.

Table 15: Sample descriptive statistics on diversification measures over the period 2007–2016[681]
The table presents summary statistics across all diversification measures and over the whole sample period. "NR" indicates that the information is not reported. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Diversification measure	Mean	Max	Min	SD	Skewness	Kurtosis	Shapiro-Wilk Test
BDIV	0.720	1.000	0.000	0.449	-0.982	1.964	NR
H2DIV	0.205	0.778	0.000	0.233	0.613	1.885	10.171***
H4DIV	0.329	0.851	0.000	0.263	-0.028	1.551	10.585***
MCOUNT	0.770	1.000	0.000	0.421	-1.282	2.643	NR
MHDIV	0.409	0.851	0.000	0.256	-0.539	2.001	11.929***
MDIV	0.305	0.778	0.000	0.206	-0.222	1.946	9.782***

To mitigate the adverse effects of non-normally distributed variables, H2DIV is transformed using the square-root transformation method.[682] As the square-root transformation is useful for more positively skewed data, the left tailed distributions of MHDIV and MDIV are first turned into a positively skewed distribution by subtracting each data point from the largest data point and adding one. After turning the negatively skewed distribution into positive, the standard square-root transformation can also be applied to MHDIV and MDIV. However, please note that the ranking has changed as indicated in the simplified example below (i.e. the smallest value becomes the largest and vice versa):

[681] Source: Own representation.

[682] Cp. De Muth, 2014, p. 114f.

Table 16: Illustration of the transformation technique[683]

Value before transformation	transformation	Value after transformation
-10	10-(-10)+1	21
5	10-5+1	6
10	10-10+1	1
Skewness: -1.293		Skewness: 1.293

From here on, the thesis refers to the transformed diversification measures as $H2DIV^{0.5}$, $MHDIV^{0.5}$, and $MDIV^{0.5}$. H4DIV as well the binary variables BDIV and MCOUNT are not transformed. Table 17 summarises the predicted signs of the six diversification measures under the assumption that corporate diversification is a value-destroying strategy:

Table 17: Predicted regression signs for diversification measures
The table includes a brief description of the diversification measures used in the empirical analysis of this thesis. It also shows the expected signs of the coefficients of the diversification measures in the regression models contained in sections IV.3.2.2 and IV.3.2.3 assuming that corporate diversification is a value-destroying strategy.

Variable	Description	Predicted sign*
BDIV	Binary variable that takes a value of one if the number of different four-digit SIC codes for a firm's segment revenues a exceeds one and zero otherwise.	-
$H2DIV^{0.5}$	Square root of a revenue-based Herfindahl index that reflects the degree to which revenues are concentrated among industry groups (i.e. two-digit SIC codes).	-
H4DIV	Transformed square root of a revenue-based Herfindahl index that reflects the degree to which revenues are concentrated among industry groups (i.e. two-digit SIC codes).	-
MCOUNT	Binary variable that takes a value of one if the number of significant regression coefficients obtained from estimating equation (13) exceeds one and is zero otherwise.	-
$MHDIV^{0.5}$	Transformed square root of the inverse of the sum of the squares of each standardised regression coefficient obtained from equation (13) divided by the squared total regression coefficients.	+
$MDIV^{0.5}$	Transformed square root equal to the minimum of the proportion of explained variance and the inverse of a Herfindahl index based on standardised regression coefficients resulting from yearly forward stepwise regressions of equation (13).	+

[683] Source: Own representation.

IV.2.3. ENDOGENOUS AND CONTROL VARIABLES

Independent variables. As a proxy for the valuation effects of corporate diversification, this thesis employs the traditional Berger and Ofek (1995) excess value measure as defined in section II.4.2.1. The excess value measure compares the market value of a firm with an imputed value that reflects the value of its segments on a stand-alone basis.[684] A firm's imputed value corresponds to the reported accounting value (e.g. assets, sales, or earnings) multiplied by its industry median ratio of total capital to that accounting item. Negative (positive) excess values indicate a diversification discount (premium). More formally, excess firm value and imputed value are calculated for each year t and firm i as follows:[685]

$$EFV_{it}^{B} = \ln \frac{AV_{it}}{I(V)_{it}} \tag{34}$$

subject to:

$$\mathrm{I(V)}_{it} = \sum_{j=1}^{N_{SIC,t}} AI_{ijt} * M_{ijt} \tag{35}$$

$$AV_{it} = \text{market value of common equity}_{it} + \text{book value of debt}_{it} \tag{36}$$

where:

EFV_{it}^{B}	=	excess firm value of firm i at time t based on business count approach,
AV_{it}	=	total firm capital of firm i at time t,
$\mathrm{I(V)}_{it}$	=	imputed value of the sum of a firm's segments as stand-alone firms at time t,
AI_{ijt}	=	segment j's value of sales used in the valuation multiple of firm i at time t,
M_{ijt}	=	multiple of total capital to sales for the median single-segment firm in segment j's industry at time t, and
$N_{SIC,t}$	=	number of different SIC categories constituting the corporate portfolio at time t.

Entity multipliers are selected as they account for differences in the capital structure of the sample firms and the resulting cost of equity. Following the entity

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[684] Cp. Berger & Ofek, 1995, p. 48; Glaser & Mueller, 2010, p. 2309.

[685] Cp. Beckmann, 2006, p. 96; Berger & Ofek, 1995, p. 60f.

approach, a firm's total capital equals the market value of equity and the market value of debt. However, obtaining reliable estimates for the market value of a firm's debt is associated with an unjustified effort. Thus, following most other studies in this field, the book value of debt is considered.[686]

The use of entity multiples requires as a multiple of total capital a performance measure for which the claims of the lenders have not yet been settled (i.e. performance measures before interest payments). From the set of common multiples, this study relies on sales multipliers.[687] The reason is twofold: First, firm sales are subject to less accounting distortions and strategic accounting problems compared to other reporting figures.[688] Second, reliable information on both segment assets and segment operating income were just not available to the author. Thus, including multipliers based on these fundamental figures would have led to a large reduction in the sample population. The industry median ratios for the sales multiplier are based on the narrowest SIC grouping. However, the use of a sales multiple instead of other frequently used multiples such as EBIT or EBITDA multiples is not costless. The main disadvantages of sales multiples are that they do not allow any statement about the profitability of a company and that they do not explicitly account for growth or risk of a firm.[689]

The computation of the excess firm values using the market implied approach is subject to the same principles as the determination of the excess value based on the business count approach. However, instead of using segment information, a firm's imputed value in the market-implied approach corresponds to the relative importance of a sector index multiplied by the industry median ratio of total capital to sales. More formally, excess firm value based on the market-implied approach for firm i and fiscal year t is defined as follows:[690]

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[686] Cp. Hoechle et al., 2012, p. 44. Prominent exceptions that explicetly model the market value of debt include Glaser & Mueller, 2010, p. 2307ff.; Mansi & Reeb, 2002, p. 2167ff.; Rojahn & Zechser, 2017, p. 1ff.

[687] For a review of common equity value and entity value multiples, instead of many, see Schreiner, 2007, p. 38ff.

[688] Cp. Beckmann, 2006, p. 93; Schreiner, 2007, p. 42.

[689] Cp. Geddes, 2003, p. 83.

[690] Cp. Beckmann, 2006, p. 96; Berger & Ofek, 1995, p. 60f.

$$EFV_{it}^{m} = \ln \frac{AV_{it}}{I(V)_{it}^{m}} \quad (37)$$

subject to:

$$I(V)_{it}^{m} = \sum_{j=1}^{N_{\delta t}} \frac{{\delta_{ijt}}^{2}}{\sum_{j=1}^{N_{\delta t}} {\delta_{ijt}}^{2}} * M_{ijt}^{m} \quad (38)$$

$$AV_{it} = \text{market value of common equity}_{it} + \text{book value of debt}_{it} \quad (39)$$

where:

EFV_{it}^{m}	=	excess firm value of firm i at time t based on the market-implied approach,
AV_{it}	=	total firm capital of firm i at time t,
$I(V)_{it}^{m}$	=	imputed value of the sum of a firm's segments as stand-alone firms based on market-implied approach at time t,
${\delta_{ijt}}^{2}$	=	j[th] squared regression coefficients of firm i at time t,
M_{ijt}^{m}	=	multiple of total capital to sales for the median single-segment firm in segment j's industry based on market-implied approach at time t, and
$\mathrm{N}_{\delta t}$	=	number of significant regression coefficients at time t.

Firm-specific control variables. The scope of this thesis is to assess whether the liquidity of traded equity mediates the diversification-performance relationship. Among other econometric techniques, this thesis relies on regression-based analysis. A fundamental problem associated with this kind of analysis is the specification problem.[691] The specification problem describes a situation where omitted variables appear only in the error term and potentially cause spurious relationships between the explanatory variables and excess firm value.

Put differently, the gain or loss in excess firm value must not merely be due to diversification. To reduce the specification bias, this thesis includes both non-diversification specific variables and the determinants of the diversification discount. Following Billett and Mauer (2003), Campa and Kedia (2002) Glaser and

[691] Cp. Hsiao, 2014, p. 313ff.

Mueller (2010), Hyland and Diltz (2002), and Rojahn and Zechser (2017), the control variables include:[692]

1. *ALTMAN's Z:* Used as an aggregated measure for the operational and financial difficulties within a firm. The Z-score is calculated from accounting information and the method proposed by Altman (1968).[693] Because the financial performance of a firm increases with higher z-scores, a positive relationship is between Altman's Z and excess firm value assumed.
2. *CAPEX:* The ratio of capital expenditures to total assets is a proxy for the growth opportunities and, along with R&D, is used to test for the importance of the internal capital market hypothesis. A positive relation between EFV and CAPEX is anticipated because firms could be investing in their current operations to achieve future growth.
3. *CASH:* The relationship between the cash ratio, defined as the sum of cash and marketable security to total assets, and the traditional Berger and Ofek (1995) excess value measure is ambiguous. On the positive side, cash holdings not only reduce the likelihood of financial distress but allow firms to pursue their optimal investment policy which should result in higher profitability. On the negative side, Jensen (1986) argues that firms use available cash to pursue increasingly far-flung opportunities that increase their power, compensation, and perquisites; thereby reducing the overall firm value.
4. *CFTA*: The ratio of free cash flow to total assets is used to control for the operating performance of a firm. The higher the operating performance, the more valuable the firm. Building on the winner's course hypothesis of internal capital markets and following prior research such as Servaes (1996)[694], a positive relationship is expected.

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[692] Cp. Billett & Mauer, 2003, p. 1182; Campa & Kedia, 2002, p. 1746ff.; Glaser & Mueller, 2010, p. 2310; Hyland & Diltz, 2002, p. 65ff.; Rojahn & Zechser, 2017, p. 10f.

[693] Cp. Altman, 1968, p. 589ff.

[694] Cp. Servaes, 1996, p. 1216ff.

5. *DEBT*: The debt ratio is defined as the sum of short – and long-term debt scaled by the sum of the financial debt and book equity. Following Williamson (1988), debt can serve as a monitoring device helping to discourage managers' overinvestment of free cash flow[695] and to diversify their operations[696] which calls for a positive effect of debt on excess firm value.
6. *R&D:* The measure of research and development intensity, computed as R&D scaled by net sales, is used to control for firm-specific knowledge. A positive relationship is expected as firm-specific know-how could be contributing to sources of cost or differentiation advantages over rival firms.
7. *RELS*. Prior research reveals that investors are only willing to buy less liquid securities if they are compensated by a liquidity premium to indemnify for the additional risk taken (e. g. Amihud and Mendelson (1986)).[697] To control for this liquidity premium, the relative bid-ask spread of the *i*-th sample firms' traded common equity is employed. To derive an undistorted liquidity measure, the spread is averaged daily and over the last month before the financial year-end. Because liquidity increases with lower bid-ask spreads, a negative relationship is assumed.
8. *SIZE*. A firm's total assets are used as a proxy for both the size of a firm and its capital market access. A positive impact of SIZE on excess firm value is expected because large and diversified firms can compete more effectively in the markets than otherwise smaller firms and emphasises the potential benefits of diversification arising from market power.[698] Likewise, the danger of default is reduced with increasing size, which should lead to decreasing risk premiums; thereby increasing shareholder value.
9. *STDRET*. The residual volatility is applied to control for value-relevant information reserved for a firm's management. When a company's managers and external investors are equally well informed about systematic factors affecting shareholder value, residual volatility reflects the amount of value-

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[695] Cp. Williamson, 1988, p. 567ff.

[696] Cp. Hyland & Diltz, 2002, p. 65.

[697] Cp. Amihud & Mendelson, 1986, p. 223ff.

[698] Cp. Pils, 2009, p. 22; Purkayastha et al., 2012, p. 21; Ramanujam & Varadarajan, 1989, p. 535.

relevant information reserved for management. Because the investors' perceived level of risk is higher for less transparent firms, a negative relationship between residual volatility and excess firm value is to be expected.

10. *TANG*. The asset structure is defined as the ratio of fixed tangible assets divided by the total assets of the firm. A positive relationship is expected as the valuation of capital-intensive firms is easier than the valuation of firms with a high ratio of intangible assets for which there is usually no active market. Relatedly, tang can be considered a proxy for the presence of information asymmetries.
11. *TURNOVER*. Along with RELS, TURNOVER is used as a proxy for the level of liquidity prevailing in the secondary market. TURNOVER equals the dollar value of shares traded scaled by the fraction of outstanding value traded. Because liquidity increases with turnover, a positive relationship is expected.

Panel (B) of Table 18 provides descriptive statistics for the controlling variables in our sample. The table shows that the average firm has got an Altman's (1986) Z-score of 9.801. As the financial performance is a positive function of z-scores, focused firms (z-score: 4.388) seem to be healthier than their diversified counterparts (z-score: 3.950). The difference in z-scores in favour of focused firms is statistically significant at the 5% level.

The ratio of capital expenditures to total assets varies strongly from a minimum of zero to 28.3%. On median, the sample firms spend 3.4% of their total assets for capital expenditure. Again, there is a statistically significant difference in CAPEX for diversified firms (3.5%) and focused firms (3.2%).

Moreover, the table highlights that the average firm operates with an cash ratio of 8.8%. There is no statistically significant difference in cash holdings for diversified and focused firms. In terms of cash flows, the summary statistics support prior findings that diversified firms not necessarily have an competitive advantage in generating cash flows. While focused firms have a cash flow to asset ratio of approximately 5.3%, diversified firms only come to a value of 3.9%.

The average firm run a debt ratio of approximately 37.3%. Diversified firms, on average, have a 2.20%-points higher debt ratio than focused firms; thereby confirming the idea of the risk reduction hypothesis of corporate diversification as

suggested by Lewellen (1971). Above and beyond, 2.36% of the yearly observations belong to predominately equity-financed firms (less than 2.5% of debt), of which 45% follow a focused strategy.

Firm size waffles between a minimum of EUR 0.183 bn. and EUR 376 bn., with the smallest (biggest) firms belonging to the technology sector (utility sector). On average, diversified firms are 1.64 times larger than focused firms.

The ratio of tangible assets to total assets averages 20.2% and is more than 2.5% points higher for diversified firms than for otherwise similar focused firms. In terms of liquidity, the difference in relative spreads of traded equity of diversified and focused firms is statistically significant on the 0.01 level. The absolute difference in median values, however, is rather small (diversified firms: 0.0013 vs focused firms: 0.0014).

Finally, no statistically significant differences are estimated for the median R&D expenditures, and residual volatilities and share turnovers.

As with the diversification metrics, the data on the controlling variables do not follow a normal distribution. Following the diversification metrics, controlling variables with a right-skewed (left tailed) distribution will be transformed using the square-root procedure. As the square root of a negative number is not defined within the range of real numbers, the distribution of CFTA is first shifted to positive values by subtracting the minimum value. This procedure does not apply to size which, by definition, is transformed by the natural logarithm. By the designation of the diversification measures, this thesis refers to square-root transformed variables as $X^{0.5}$ and to size as ln X.

Table 18: Sample descriptive statistics on the firm-specific and liquidity-specific control variables[699]

The table presents summary statistics on the firm-specific and liquidity specific control variables. Diversity is measured using a binary variable based on four-digit SIC codes. Differences in the median are assessed using a two-sample Wilcoxon rank-sum test. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Variable	Mean	Median				Max	Min	SD	Skewness	Kurtosis	Shapiro Wilk Test
		All firms	Diversified firms	Focused firms	Ho: diff = 0						
Panel (A): dependent variable											
EFV_{it}	-0.122	-0.036				1.384	-1.386	0.525	-0.057	2.873	6.423***
EFV_{it}^{m}	0.015	0.001				1.383	-1.383	0.575	-0.029	2.504	4.565***
Panel (B): firm-specific and liquidity-specific control variables											
$ALTMAN's\ Z_{it}$	9.801	4.045	3.950	4.388	2.201**	269.668	0.819	24.359	6.683	55.405	16.179***
$CAPEX_{it}$	0.043	0.034	0.035	0.032	-2.599***	0.283	0.000	0.031	2.109	10.216	12.811***
$CASH_{it}$	0.114	0.088	0.089	0.087	0.394	0.890	0.002	0.091	2.008	9.283	12.874***
$CFTA_{it}$	0.041	0.043	0.039	0.053	2.421**	1.835	-0.508	0.125	2.315	36.475	12.469***
$DEBT_{it}$	0.377	0.373	0.380	0.358	-2.028**	1.261	0.007	0.192	0.510	4.013	7.796***
$R\&D_{it}$	0.038	0.019	0.021	0.016	-0.669	1.078	0.000	0.064	6.273	75.285	15.21***
$RELS_{it}$	0.002	0.001	0.001	0.001	2.822***	0.033	0.000	0.003	4.850	34.775	15.224***
$SIZE_{it}$ (bn. €)	20.400	6.011	7.371	4.498	-8.059***	376.000	0.183	38.600	4.267	26.461	15.339***
$STDRET_{it}$	0.252	0.215	0.215	0.215	0.029	1.881	0.006	0.158	2.279	13.835	12.655***
$Tang_{it}$	0.235	0.202	0.207	0.178	-2.979***	0.880	0.009	0.155	1.006	3.753	10.778***
$TURNOVER_{it}$	0.004	0.003	0.003	0.003	0.738	0.101	0.000	0.005	7.411	95.129	15.237***

[699] Source: Own representation.

IV.3. EMPIRICAL ANALYSIS

IV.3.1. THE RELATIONSHIP BETWEEN MARKET-IMPLIED AND SIC-BASED DIVERSIFICATION MEASURES

Before investigating the diversification-performance linkage, this section examines the construct validity of the market-implied approach to the measurement of the diversification strategy. The validity of a construct refers to the extent to which it accurately reflects a specific domain of content without being confounded from other systematically varying constructs.[700] A construct describes the initial concept or hypothesis and often cannot be directly observed. The construct needs to be inferred indirectly through observable measures, also called indicators. In the words of Carmines and Zeller (1979): *"An indicator of some abstract concept is valid to the extent that it measures what it purports to measure."*.[701] It is worth mentioning that it is rather the *"interpretation of data arising from a specified procedure"* that is validated than a property of a test.[702] Put differently, validity gives the "truthfulness" of a construct about the purposes for which it is being used.[703]

In validating the market implied diversification measures, this thesis concentrates on three dimensions of validity: content, construct, and criterion validity.

IV.3.1.1. Content validity

Content validity – also called face validity of an indicator – deals with the appropriate degree to which empirical measurement reflects the full range of the underlying concept regarding contextual aspects.[704] Content validity is a qualitative type of validity which must be addressed primarily through theory rather than

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[700] Cp. Hoskisson et al., 1993, p. 217; Venkatraman & Grant, 1986, p. 78.

[701] Carmines & Zeller, 1979, p. 12.

[702] Cp. Cronbach, 1971, p. 447.

[703] Cp. Döring & Bortz, 2016, p. 446; Hartig et al., 2012, p. 144.

[704] Cp. Carmines & Zeller, 1979, p. 78; Hartig et al., 2012, p. 149; Maruyama & Ryan, 2014, p. 212.

empirical tests.[705] As there is no standard methodology for evaluating face validity, this thesis follows an earlier study in this field by focusing on two traditional domains of interest and the correspondence between these domains and the various diversification measures.[706] The two domains are (i) the level of diversification and (ii) the type of diversification.

As far as the face validity of business count measures is concerned, one would expect that the more SIC categories associated with a particular firm, the higher the level of diversification.[707] However, business count measures have considerable limitations.[708] Objections to the business count approach aim primarily at the SIC system that underlies most business count measures and their dependence on segment data.[709] Three issues arise in the use of SIC codes:[710]

The first relates to the inherent hierarchy of the SIC system and its limitations as an information source for identifying competitive interrelationships. The SIC system has been developed to facilitate the collection of data on the activity of the U.S. economy by the U.S. Bureau of the Census.[711] The SIC system shall provide a precise representation of the economy and, therefore, rests on production data such as similarities in product-market attributes or patterns in the raw material usage.[712] These industry level differences, however, may provide an incomplete picture of the nature and the extent of strategic interrelationships inherent in a firm's corporate portfolio.[713] It is criticised that the classification procedure is not uniformly and consistently applied to all industries inducing a considerable amount of subjectivity and arbitrariness.[714]

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[705] Cp. Bollen, 1989, p. 185.

[706] Cp. Hoskisson et al., 1993, p. 217.

[707] Cp. Hoskisson et al., 1993, p. 217.

[708] Cp. Jansen, 2006, p. 103ff.; Wulf, 2007, p. 15.

[709] Cp. John & Harrison, 1999, p. 134f.; Nayyar, 1992, p. 223; Robins & Wiersema, 1995, p. 280f.; Zechser & Rojahn, 2017, p. 458.

[710] Cp. Nocker et al., 2016, p. 200.

[711] Cp. Hall & John, 1994, p. 154; Pitts & Hopkins, 1982, p. 621.

[712] Cp. Montgomery, 1982, p. 299f.; Nocker et al., 2016, p. 200.

[713] Cp. Davis & Duhaime, 1992, p. 521; Davis & Thomas, 1990, p. 17; Markides & Williamson, 1994, p. 149.

[714] Cp. Montgomery, 1982, p. 300; Robins & Wiersema, 1995, p. 281.

The second issue concerns the internal consistency of the SIC system. In constructing the measure of relatedness, the taxonomy treats two-, three-, or four-digit SIC levels as an underlying scale of relatedness with equal distances between adjacent SIC levels.[715] This procedure requires two problematic assumptions which, in the case of non-compliance, cast doubt as to the validity of the business count measures:[716] i) industries are considered homogenous within their respective categories and ii) the arithmetic values assigned to the distances between the SIC levels accurately reflect distinctions between these industry categories.[717] Martin and Sayrak (2003) argue that the assumption about equal dissimilarity does not correctly reflect strategic interrelationships by using SIC industry levels 2600 (Paper and Allied Products industry), 2700 (Printing and Publishing), and 2800 (Chemicals and Allied Products).[718] Although they are treated as if they were equidistant from one another, SIC codes 2600 and 2700 on the surface seem closely related, whereas SIC 2800 seems unrelated to the other industries. Likewise, the system might not accurately discriminate between different types of diversification (e.g. horizontal diversification versus vertical diversification).[719]

The third issue associated with the use of business count measures refers to the failure of industrial classifications to adapt to new or emerging industries proactively.[720] They are unable to determine the degree of diversification of companies that concurrently penetrate into new markets with new products since these activities have not been observed in the economy before.[721] Consequently, SIC-based diversification measures fall short of capturing an essential element of diversification (i.e. penetration into new product-markets).

Aside from the criticism which aims directly at the use of industrial taxonomies, business count measures are further criticised for their reliance on

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[715] Cp. Hall & John, 1994, p. 154; Nayyar, 1992, p. 223.
[716] Cp. Robins & Wiersema, 1995, p. 280.
[717] Cp. Knecht, 2014, p. 198; Rumelt, 1982, p. 360.
[718] Cp. Martin & Sayrak, 2003, p. 50.
[719] Cp. Fan & Lang, 2000, p. 630.
[720] Cp. Nocker et al., 2016, p. 200.
[721] Cp. Fey, 2000, p. 183f.

business line reporting.[722] Building on segment data, they are likely to be exposed to the risk of strategic accounting.[723] A firm may group multiple former independent business segments to avoid detailed information disclosures on separate business units in the presence of competitors so that they appear to perform more poorly than single segment firms in the same industry. Changes in segment reporting which represent non-substantive reporting changes rather than diversification events are an indication of this.[724]

The market-based approach goes beyond the limitations of physical measures of diversification including, but not limited, to business count measures:

First, the market-implied diversification measures employ secondary data and are based on a highly reliable approach which is free from human judgements. The objective process can be systematically reproduced such that researchers studying the same data sample will most likely end up with the same classifications.

Second, market-implied measures incorporate interaction effects between different lines of operations caused by the existence of common production factors, some of which might be unobservable by nature (e.g. management skills). Notably, they do not require a somewhat arbitrary decision about how and where to separate activities (i.e., two-digit vs four-digit SIC codes).

Third, data on traditional diversification measures is hard to obtain and might be distorted by strategic accounting causing spurious relations between the level and type of diversification. To avoid detailed information disclosures on separate segments in the presence of competitors, a firm may group multiple former independent business segments so that they appear to perform more poorly than single segment firms in the same industry. Alternatively, large reporting units may be created after an acquisition to reduce the danger of future goodwill write-offs. Such effects are implicitly controlled when decomposing the Wall Street return to broad sector indices.

Forth, market-implied measures determine the level and type of the diversification strategy already at the corporate level, whereas traditional measures

[722] Cp. Erdorf et al., 2013, p. 199f.; Martin & Sayrak, 2003, p. 51f.

[723] Cp. Villalonga, 2004a, p. 482.

[724] Cp. Denis et al., 1997, p. 151f.; Hyland & Diltz, 2002, p. 58.

need to be aggregated to form an appropriate measure of corporate diversification. This requires two problematic assumptions – an algorithm to aggregate business level data and the certainty that top-level managers reveal their firm's lines of business in the annual report in the same way as they perceive and manage the business lines.

IV.3.1.2. Construct validity

Construct validity refers to the extent to which a measure connects with other measures that are deemed suitable for assessing the construct.[725] It involves determining whether the measure has convergent validity and discriminant validity.[726] To check whether a measure exhibits sufficient convergent and discriminant validity, this thesis investigates correlation coefficients and applies general structural equation models as in Hoskisson et al. (1993), Lubatkin et al. (1993), and Sambharya (2000).[727] The data underlying these tests are based on the sample derived in section IV.2.1

Table 19 reports summary statistics and Spearman rank correlation coefficients among the three business count measures (BDIV, H2DIV, H4DIV) and the three market-implied diversification measures (MCOUNT, MHDIV, MDIV). If the various diversification variables are measures of the same dimension, they should be strongly correlated with each other.[728]

Following other studies in this field, the correlations within the measures of the same approach are strong and have a high level of statistical significance. By contrast, the correlation coefficients across the two approaches are around zero, and for most correlation coefficients p-values are not low enough to reject the null hypothesis of zero correlation; thereby suggesting a rather low level of convergent validity.

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[725] Cp. Hartig et al., 2012, p. 153; Wegener & Fabrigar, 2004, p. 161.

[726] Cp. Cohen et al., 2011, p. 187.

[727] Cp. Hoskisson et al., 1993, p. 215ff.; Lubatkin et al., 1993, p. 433ff.; Sambharya, 2000, p. 163ff.

[728] Cp. Keats, 1988, p. 154.

Table 19: Convergent validity – Spearman rank correlations[729]

Variable	P50	max	min	sd	BDIV	H2DIV	H4DIV	MCOUNT	MHDIV	MDIV
BDIV	1.000	1.000	0.000	0.449	1.000					
H2DIV	0.081	0.778	0.000	0.233	0.608***	1.000				
H4DIV	0.383	0.851	0.000	0.263	0.777***	0.704***	1.000			
MCOUNT	1.000	1.000	0.000	0.421	0.033	0.033	0.038*	1.000		
MHDIV	0.478	0.851	0.000	0.256	0.037	-0.012	0.011	0.734***	1.000	
MDIV	0.339	0.778	0.000	0.206	0.081***	0.086***	0.095***	0.733***	0.741***	1.000

[729] Source: Own representation.

To underpin the results from the Spearman rank correlation coefficients, factor analysis is performed on all continuous measures of diversification to test for unidimensionality.[730] Table 20 presents the results from a factor analysis indicating a two-factor solution from a Promax rotation which accounts for 76.7% of the variance. The number of relevant factors is extracted using the Very Simple Structure Criterion (VSS). The VSS terminology is used to refer to the idea of reproducing the original correlation matrix by a simplified pattern matrix, in which only the highest loading for each item is retained, all other loadings are suppressed to zero.[731] The Tucker-Lewis fit index is 0.992 and the RMSEA =0.047 indicating a good fit of the model.

The first factor includes the market-implied diversification measures. Among them, MDIV has the lowest commonality which might indicate that MDIV comprises information that is not included in MCOUNT and MHDIV such as information about the degree to which equity risks are diversifiable in the capital market (r-squared). The second factor is formed by the business count measures BDIV, H2DIV, and H4DIV. Amongst them, H2DIV has got the lowest commonality which might be because the other two measures rely on four-digit SIC levels, whereas H2DIV refers to the two-digit SIC level. Again, there is no evidence for unidimensionality.

[730] Cp. Venkatraman & Grant, 1986, p. 79.

[731] Cp. Revelle & Rocklin, 1979, p. 403ff.

Table 20: Results of factor analysis for three SIC-based continuous measures and three market-implied measures[732]

Variable	Factor 1	Factor 2	Uniqueness
BDIV		0.831	0.308
H2DIV		0.742	0.451
H4DIV		0.936	0.124
MCOUNT	-0.910		0.174
MHDIV	0.945		0.110
MDIV	0.873		0.232
SS loadings	2.481	2.121	
Proportion Var	0.414	0.353	
Cumulative Var	0.414	0.767	
RMSEA	0.047		
Tucker-Lewis	0.992		
Likelihood Chi-Square	21.33***		

IV.3.1.3. Criterion validity

Criterion validity concerns the relationship between the results being determined by the measure in question and some form of external criterion that is deemed to be another measure of the same variable.[733] By the temporal availability of the external criteria, researchers distinguish between two subtypes of criterion validity. Concurrent validity concerns the measure's ability to predict criteria obtained at the same point in time, whereas predictive validity is the measure's ability to predict the future performance of the construct.[734] As shareholder value or equivalently financial performance is the dominant criterion, using multiple measures of a performance construct might be a sufficient way to address the criterion validity of diversification measures.[735]

Following prior research in this field (Hall and John (1994), Hoskisson et al. (1993), Keats (1990)), accounting-based performance is measured using three

[732] Source: Own representation.

[733] Cp. Carmines & Zeller, 1979, p. 17f.; Schnell et al., 2013, p. 145

[734] Cp. Hoskisson et al., 1993, p. 220; Thyer, 2010, p. 56.

[735] Cp. Lubatkin et al., 1993, p. 436; Sambharya, 2000, p. 171.

different indicators: return on assets, on equity, and on sales.[736] In addition to the accounting-based figures, three market-based performance measures are considered: the Sharpe and Treynor measures and Jensen's alpha.[737] As negative values for both the Sharpe ratio and the Treynor ratio cannot be interpreted meaningful, the ratios are floored at zero. All necessary fundamental firm data and required market data such as stock market returns and interest rates (necessary to calculate the Sharpe and Treynor measures) are collected from Thomson Reuters Eikon, Datastream and the Worldscope database.

Table 21 shows the results of Spearman rank correlations between the diversification indices and firm performance measured both in terms of accounting-based performance and market-based performance. Prior research such as Hoskisson and Hitt (1990)[738] suggests that diversification strategies harm financial performance. However, Table 21 finds only weak support for the predictive validity of all performance measures. Only three business count measures have a negative and significant relationship with one of the six performance measures. All other measures have mostly non-significant relationships, and their signs are often inverted.

Table 22 presents the panel regression results for all diversification measures. As far as the traditional business count measures are concerned, a significant relationship is found only for the combination of H2DIV and ROS as well as H4DIV and Jensen's alpha, in both cases indicating lower returns for diversified firms. The findings for the series of market-implied diversification measures are ambiguous and includes positive relationships as between MDIV and ROS, BDIV and Treynor index as well as Jensen index and negative relationships as between MHDIV and MDIV and the Treynor and Jensen indices. To summarise, there is only weak support for the predictive validity of the diversification measures.[739]

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[736] Cp. Hall & John, 1994, p. 155; Hoskisson et al., 1993, p. 223f.; Keats, 1990, p. 65.

[737] For further reading on performance indicators, please see section II.4.2.1.

[738] Cp. Hoskisson & Hitt, 1990, p. 461ff.

[739] The low predictive validity is not a specific feature of this work but has already been established for other investigation periods and markets. See among others, Sambharya, 2000, p. 171.

Table 21: Predictive validity – Spearman rank correlations[740]

The table presents the results of the correlations between the diversification measures and performance. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

					Spearman					
Variable	**P50**	**max**	**min**	**sd**	**BDIV**	**H2DIV**	**H4DIV**	**MCOUNT**	**MHDIV**	**MDIV**
ROA	0.000	0.603	-0.355	0.068	-0.010	0.013	0.012	0.017	0.014	0.030
ROE	-0.015	13.097	-2.244	0.509	0.011	0.028	0.021	0.041*	0.031	0.064***
ROS	0.002	15.876	-0.821	1.920	-0.068***	-0.045*	-0.0560**	0.012	-0.001	0.012
Sharpe	2.390	53.332	0.000	9.892	0.012	0.028	0.010	-0.032	-0.011	-0.043*
Treynor	0.094	29.548	0.000	1.641	0.003	0.015	0.004	-0.030	-0.005	-0.058**
Jensen	0.047	1.412	-3.305	0.331	0.006	0.008	0.003	-0.011	0.008	-0.024

[740] Source: Own representation.

Table 22: Predictive validity – Fixed effects regression[741]

The table summarises the results of two-way fixed effects regressions regressing the performance measures, each over one for the diversification measures as well as the debt ratio and firm size as control variables. The panel regression models have been fitted by "within estimation". Robust standard errors are in parentheses (Huber–White sandwich estimators).*, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel regression					
Performance variable	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
Return on asset (ROA)	0.000	0.001	0.001	-0.000	0.004	-0.013
	(0.005)	(0.007)	(0.009)	(0.003)	(0.013)	(0.017)
Hausman Test						
F-Stat.	5.812***	5.789***	5.819***	5.783***	5.795***	5.814***
within R^2	0.077	0.077	0.077	0.077	0.0771	0.077
Return on asset (ROE)	-0.063	-0.088	-0.162	0.008	-0.023	-0.141
	(0.068)	(0.075)	(0.153)	(0.013)	(0.051)	(0.087)
Hausman Test						
F-Stat.	2.018**	1.941**	1.960**	1.965**	1.956**	2.173***
within R^2	0.017	0.018	0.019	0.015	0.015	0.016
Return on asset (ROS)	0.064	-0.344**	-0.017	-0.113	0.329	1.018*
	(0.139)	(0.170)	(0.230)	(0.116)	(0.493)	(0.558)
Hausman Test						
F-Stat.	2.974***	2.975***	2.969***	2.970***	2.960***	2.972***
within R^2	0.151	0.152	0.150	0.151	0.151	0.152
Sharpe index	0.595	1.459	-0.603	0.201	-2.212	-1.688
	(0.866)	(1.267)	(1.619)	(0.518)	(2.275)	(2.869)
Hausman Test						
F-Stat.	51.480***	50.340***	50.980***	50.870***	50.510***	50.510***
within R^2	0.229	0.230	0.229	0.229	0.229567	0.229
Treynor index	-0.050	-0.050	-0.069	0.032*	-0.205**	-0.213**
	(0.033)	(0.033)	(0.053)	(0.018)	(0.083)	(0.106)
Hausman Test						
F-Stat.	23.790***	23.470***	23.380***	23.520***	23.480***	24.000***
within R^2	0.228	0.227	0.227	0.228006	0.230137	0.229
Jensen index	-0.135	-0.079	-0.408*	0.154*	-0.688*	-0.384
	(0.109)	(0.162)	(0.215)	(0.091)	(0.359)	(0.404)
Hausman Test						
F-Stat.	16.520***	16.440***	16.570***	16.680***	16.480***	16.780***
within R^2	0.228	0.091	0.092	0.092	0.092	0.091

[741] Source: Own representation.

IV.3.2. RE-ASSESSING THE DIVERSIFICATION-PERFORMANCE LINKAGE

IV.3.2.1. Univariate results

If corporate diversification affects a firm's market valuation, significant differences in the traditional Berger and Ofek (1995) excess value measure for diversified and focused firms are to be expected. It should be noted that an excess value can be calculated for focused firms, too. The approach to estimating an excess firm value for focused firms is like the procedure applied to diversified firms except that that focused firms do only have one segment. In order to make a general statement about the impact of diversification on the Wall Street value, the differences in the mean excess value of diversified and focused firms are assessed using a Wilcoxon rank-sum test. For all diversification proxies but the multi-segment dummies, the groups will be split by median.

To back up hypothesis H1.1 and H1.2 with data, the excess value for diversified firms must be significantly lower than the excess value for focused firms. Table 23 presents the median values for the excess value of diversified and focused firms. Besides, it contains the number of observations of each group and the results of a Wilcoxon rank-sum test. The focus is on the median instead of arithmetic means because the median is more reliable when the negative average values are capped at -100%. For all business count measures H_0, "the two subsamples are drawn from the same population", is rejected at least at the 0.1 level. On average, a multi-business firm is worth 13.7% to 19.1% less than a portfolio of comparable single segment firms.

By contrast, MHDIV and MDIV imply a small but marginally significant diversification premium in favour of diversified firms. This can be an early indication that estimates based on the business count approach are downward biased.[742] The coefficient of MCOUNT is not significant.

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[742] For further reading on the validity of the business count approach to diversification measurement, see section IV.3.1.

Table 23: Descriptive statistics on excess firm values for focused and diversified firms[743]
The table presents the median values for the excess firm values of diversified and focused firms. Excess value is based on sales multiplier. The differences in the median are assessed using a two-sample Wilcoxon rank-sum test. For all proxies except the diversified firm dummies BDIV and MCOUNT, the groups have been split by the median. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Excess firm value	N	Median	Max	Min	SD	Skewness	Kurtosis	Ho: diff = 0
Panel (A): diversified firms								
BDIV	1,427	-0.152	1.384	-1.386	0.578	0.105	2.458	4.937***
H2DIV	990	-0.137	1.384	-1.386	0.590	0.096	2.402	1.809*
H4DIV	990	-0.191	1.384	-1.386	0.563	0.184	2.552	5.961***
MCOUNT	1,525	0.022	1.383	-1.383	0.590	-0.050	2.378	0.034
MHDIV	990	0.054	1.383	-1.383	0.606	-0.045	2.284	-1.839*
MDIV	990	0.004	1.363	-1.383	0.585	-0.028	2.351	1.842*
Panel (B): focused firms								
BDIV	554	0.000	1.138	-1.285	0.341	-0.819	5.914	
H2DIV	991	-0.002	1.285	-1.366	0.450	-0.324	3.593	
H4DIV	991	0.000	1.362	-1.347	0.477	-0.306	3.571	
MCOUNT	456	0.000	1.342	-1.299	0.525	0.081	3.034	
MHDIV	991	0.000	1.363	-1.299	0.542	-0.041	2.769	
MDIV	991	0.000	1.383	-1.361	0.564	-0.021	2.667	

Table 24 shows the yearly allocation of the sales-based excess firm value across the six diversification proxies. Notwithstanding a lack of significance of the yearly differences in median, the business count measure mostly direct at a valuation discount raging between 32.33% (H4DIV, 2008) and 4.28% (H2DIV, 2010). Over the observation period, the discount decreases from 18.52% to 6.43%. The standard deviation is similar to prior studies on the diversification discount.[744] By contrast, the diversification premia and discounts using the market-implied diversification measures report are in balance. While the diversification discounts fall mostly in the first half of the observation period, the premia are detected from 2013 onwards. Although not explicitly reported, the quota of diversified firms trading at a discount is relatively stable over time.

[743] Source: Own representation

[744] For instance, Beckmann (2006) reports an average standard deviation of 68% for a German firm sample over the period 1998 to 2002. Cp. Beckmann, 2006, p. 99.

Table 24: Yearly allocation of diversification discount[745]

The table presents summary statistics across all diversification measures and broken down by years. Excess value is based on sales multiplier. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

EFV [%]		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
BDIV												
	Median	-19.86**	-29.79***	-27.12**	-7.33	-10.09	-15.07	-10.00	-13.54	-12.18*	-6.43	-15.14
	Min	-134.31	-132.71	-136.58	-138.56	-127.22	-122.29	-126.75	-134.55	-126.03	-133.63	-131.26
	Max	128.53	106.88	101.17	136.23	98.63	116.04	126.90	126.15	123.31	138.36	120.22
	SD	54.59	55.32	57.74	57.70	58.95	56.42	56.25	58.69	56.58	62.48	57.47
H2DIV												
	Median	-19.29	-26.63**	-27.12	-4.28	-12.42	-6.40	-9.27	-13.94	-12.21	-6.43	-13.80
	Min	-134.31	-132.71	-134.66	-138.56	-127.22	-122.29	-126.68	-134.55	-125.51	-133.63	-131.01
	Max	117.03	106.88	101.17	136.23	98.63	116.04	125.43	126.15	123.31	138.36	118.92
	SD	55.30	58.96	57.76	58.28	61.43	60.18	55.74	58.70	58.21	63.32	58.79
H4DIV												
	Median	-16.42	-32.33***	-29.96**	-25.84***	-23.64***	-15.21	-10.00	-14.99	-15.55***	-6.43	-19.04
	Min	-134.31	-130.49	-136.58	-138.56	-127.22	-122.29	-126.75	-130.14	-126.03	-132.39	-130.48
	Max	105.58	106.88	101.17	87.63	88.21	102.08	125.43	126.15	123.31	138.36	110.48
	SD	53.64	54.02	56.16	56.12	58.36	54.16	53.55	58.65	54.86	61.18	56.07
MCOUNT												
	Median	9.97	-0.91	-10.80	-0.42	-0.19	-8.31	4.73	16.26	-4.05	19.48	2.58
	Min	-134.83	-121.39	-128.68	-131.44	-138.32	-129.16	-136.08	-116.94	-130.63	-133.77	-130.12
	Max	138.06	134.58	133.06	131.73	127.69	138.28	136.31	135.09	129.67	130.34	133.48

[745] Source: Own representation.

EFV [%]		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
	SD	61.57	60.10	57.06	55.47	56.91	62.25	57.37	54.69	59.18	59.55	58.41
MHDIV												
	Median	12.78	7.40	-4.16	1.21	-0.19	-4.13	6.55	25.91**	-1.33	19.90	6.39
	Min	-134.83	-111.07	-128.68	-131.44	-138.32	-123.96	-136.08	-88.10	-130.63	-133.77	-125.69
	Max	138.06	134.58	133.06	131.73	110.32	138.28	116.23	135.09	129.67	130.34	129.74
	SD	68.66	61.86	57.03	56.05	56.77	63.99	59.29	54.74	63.13	57.99	59.95
MDIV												
	Median	7.83	-7.59	-9.19	-11.93	1.60	-10.12	4.81	19.26	-8.52	19.48	0.56
	Min	-134.83	-121.39	-128.68	-131.44	-138.32	-129.16	-97.57	-56.64	-112.88	-133.77	-118.47
	Max	132.58	134.58	133.06	122.12	127.69	123.28	136.31	128.25	129.67	130.34	129.79
	SD	65.47	59.32	56.50	55.99	57.06	61.82	54.31	46.94	57.25	59.27	57.39

IV.3.2.2. Multivariate results

So far, the effect of diversification has been investigated in isolation without considering alternative explanatory approaches. When included, omitted variables can dramatically change the findings from research hypothesis H1.1 and H1.2 in different ways: The omitted variable could a) modify the direction or intensity of the relationship between diversification and excess value, or b) make an additional contribution to the diversification effect, or c) be the true explanatory variable itself. To further separate the impact of corporate diversification on the Wall Street value, several panel regression models are estimated. The next three steps guide through the analysis of the performance effects of corporate diversification using panel regression techniques.

Panel regression analysis is performed to test hypothesis H1.1 and H1.2 while controlling for the influence of firm-specific variables. More specifically, EFV_{it} is modeled as a linear function of L different firm-specific variables (x_{jit}) other than diversification and a proxy for diversification:

$$EFV_{it} = \begin{cases} \beta_{con} + \sum_{j=1}^{L} \beta_j * x_{jit} + \beta_{10} * \sqrt{DIV_{it}} + d_t + n_i + u_{it}, & DIV_{it} = H2DIV, MHDIV, MDIV \\ \beta_{con} + \sum_{j=1}^{L} \beta_j * x_{jit} + \beta_{10} * DIV_{it} + d_t + n_i + u_{it}, & DIV_{it} = BDIV, H4DIV, MCOUNT \end{cases} \quad (40)$$

where:

EFV_{it}	=	Excess firm value of firm i at time t based on either the business count approach or market-implied approach,
β_{con}	=	constant regression coefficients,
x_{jit}	=	firm-specific control variables of firm i at time t,
DIV_{it}	=	proxy for corporate diversification of firm i at time t,
d_t	=	unobservable time effects,
n_i	=	unobservable individual effects, and
u_{it}	=	stochastic disturbance term of firm i at time t.

As the analysis can include observations for one and the same firm for different years, the error term is likely driven by unobservable time and individual effects, which are denoted by d_t and n_i, respectively. u_{it} is the remainder stochastic

disturbance term, which may include both unobserved time and individual effects. It is set to have a mean of zero and a constant volatility ($u_{it} \sim IID(0, \sigma^2)$).[746]

The selection of the appropriate diversification measures follows the guidelines and discussions in section II.3 and includes BDIV, H2DIV, and H4DIV as representatives of the business count approach and MCOUNT, MHDIV, and MDIV as measures of the market-implied approach. The regressions include all firm-specific variables discussed in section IV.2.3 and summarised in Table 25. The final sample consists of 1,981 yearly-observations on European non-financial firms between the years 2007 to 2016. The sample selection procedure is outlined in section IV.2.1. All calculations are performed in STATA 13.

For the panel regression models to derive at the best linear unbiased estimators (BLUE) for the individual regression coefficients, the Gauss-Markov assumptions must be met.[747] For this reason, the explanatory variables should not be highly correlated with each other, the error terms should have a constant variance, and the error terms should be both serially independent and cross-sectionally independent. The testing procedures are briefly explained below.

- *Multicollinearity*. Multicollinearity refers to a non-negligible, but not perfect, relationship between two or more explanatory variables.[748] Although this does not negatively affect the reliability and predictive power of the regression model (no violation of the Gauss-Markov assumptions), multicollinearity likely increases the standard error of the estimates of the individual regression coefficient.[749] In such a situation, predictors may be declared as insignificant, though they have a high impact on the criterion variable or vice versa. Testing for multicollinearity involves looking at

[746] For further reading on panel data models, instead of many, see Hsiao, 2014, p. 1ff.

[747] Cp. Poddig et al., 2003, p. 245ff.; Wooldridge, 2016, p. 89ff.

[748] Cp. Brooks, 2008, p. 170f.

[749] Cp. Poddig et al., 2003, p. 377ff.

correlation coefficients or the estimation of variance inflation factors (VIF).[750] Multicollinearity is most likely to occur if the VIF exceeds ten.[751]

- *Heteroscedasticity*. The panel regression model given by equation (40) assumes that the disturbances are homoscedastic with the same variance across time and individuals, in which case $Var(u_{it}|x_{1it}, \dots, x_{jit}) = const \; \forall \; i, t$.[752] A lack of constancy in variance, also called heteroscedasticity, does not affect the consistency of the estimators[753] but can lead to grossly deflated standard errors and inflated t-statistics.[754] Various tests have been proposed to determine the presence of heteroskedasticity in the data, among the most popular methods is the Lagrange multiplier test by Breusch and Pagan (1979).[755] The Breusch-Pagan test builds on an auxiliary regression where the squared residuals of the original model are regressed on the explanatory variables and a constant. The central idea behind the auxiliary regression is that if the regression coefficients of the control variables are equal, then the error term must have a constant variance. Under the null hypothesis, the Breusch-Pagan test asymptotically follows a chi-squared distribution with J degrees of freedom.[756] In order to overcome the problem of heteroskedasticity, robust standard errors such as Huber-White or Driscoll-Kraay (1998) standard errors, can be employed.[757]

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[750] Cp. Backhaus et al., 2018, p. 52f.; Verbeek, 2008, p. 43.

[751] Cp. Albers, 2009, p. 225.

[752] Cp. Auer & Rottmann, 2010, p. 516ff.; Baltagi, 2005, p. 79.

[753] Cp. Auer & Rottmann, 2010, p. 519; Wooldridge, 2013, p. 268f.

[754] Cp. Poddig et al., 2003, p. 323ff.; Verbeek, 2008, p. 86f.

[755] Cp. Breusch & Pagan, 1979, p. 1287ff.

[756] Cp. Auer & Rottmann, 2010, p. 523ff.; Verbeek, 2008, p. 99.

[757] Cp. Driscoll & Kraay, 1998, p. 549ff.; Huber, 1967, p. 221ff.; White, 1980, p. 817ff.

Table 25: Definition of variables and predicted signs[758]
Unless otherwise stated, the variables are calculated for each firm and year and allow for different fiscal year-end dates.

Variable	Description	Predicted sign
EFV_{it}^{B}	Traditional Berger and Ofek (1995) value measure for sample firm i based on business count approach.	
EFV_{it}^{M}	Traditional Berger and Ofek (1995) value measure for sample firm i based on the market-implied approach.	
$\sqrt{ALTMAN's\ Z_{it}}$	Square root of Altman's (1968) Z-score.	+
$\sqrt{CAPEX_{it}}$	Square root of a firm's capital expenditures over total assets.	+
$\sqrt{CASH_{it}}$	Square root of cash plus marketable securities scaled by total assets.	+/-
$\sqrt{CFTA_{it}}$	Square root of the flow to equity scaled by total assets.	+
$\sqrt{DEBT_{it}}$	Square root of the sum of the short- and long-term financial debt scaled by the sum of the financial debt and book equity.	+
$\sqrt{R\&D_{it}}$	Square root of research and development expenditure over net sales.	+
$\ln SIZE_{it}$	Natural logarithm of the total assets as reported in the balance sheet.	+
$\sqrt{STDRET}$	Square root of the residual volatility which remains left when predicting a company's stock returns by a well-diversified market portfolio. The calculation is based on 125 trading days.	-
$\sqrt{TANG}$	Square root of the ratio of tangible assets to total assets.	+

- *Serial correlation*. The regression model further assumes that the regression error terms are serially uncorrelated with one another over time, formally: $corr\ (u_t|u_s) = 0\ for\ all\ t \neq s$.[759] If consecutive residuals terms in a linear regression model are correlated, a phenomenon called autocorrelation, then standard errors can be underestimated which inflates significance tests and

[758] Source: own representation.

[759] Cp. Wooldridge, 2013, p. 353

confidence intervals.[760] To detect serial correlation, this study employs the Breusch-Godfrey / Wooldridge, which is an Lagrange multiplier test of the null hypothesis of no autocorrelation versus the alternative that u_t follows an AR(p) or MA(p) process.[761] As for heteroskedasticity, robust standard errors can be used to control for the negative influence of serially correlated disturbances including Huber-White or Driscoll-Kraay (1998) standard errors.[762]

- *Cross-sectional correlation.* Aside from the unobserved firm effect (serial correlation), the disturbances of a given year may be correlated across different firms (time effect).[763] Though many panel studies exhibit complex patterns of mutual dependence between the cross-sectional units, the problem of cross-sectional correlation is often neglected.[764] In the presence of a time effect, standard ordinary least squares estimations do no longer produce unbiased standard errors and correctly sized confidence intervals. Driscoll and Kraay (1998) are among a few researchers who propose a method to obtain standard errors that are robust to both violations of the assumption of homoskedasticity and various forms of spatial and temporal dependence.[765]

Table 26 presents summary statistics about the model assumptions and reveals that heteroscedasticity, serial correlation of errors, and cross-sectional correlation of errors are present in the data but no multicollinearity biases. To account for these violations of the BLUE properties, the significance tests of the regression coefficients rely on Driscoll and Kraay robust standard errors.[766] Aside from the tests of model assumptions, a joint F-test of the year dummies shows that time fixed effects are not required when applying business count measures.

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[760] Cp. Auer & Rottmann, 2010, p. 540f.

[761] Cp. Breusch, 1978, p. 334ff.; Godfrey, 1978, p. 1293ff.; Wooldridge, 2013, p. 422.

[762] Cp. Knecht, 2014, p. 251.

[763] Cp. Petersen, 2009, p. 435.

[764] Cp. Hoechle, 2007, p. 281f.

[765] Cp. Driscoll & Kraay, 1998, p. 549ff.

[766] Cp. Driscoll & Kraay, 1998, p. 549ff.; Hoechle, 2007, p. 281ff.

Table 26: Test of the model assumptions of the panel regressions[767]

The table presents the results of the various tests of the model assumptions.

	Method of testing	Result
Multicollinearity	▪ Test using variance inflation factors (VIF).	▪ The variance inflation factors do not indicate critical multicollinearity which would most likely occur at values of $VIF_{max} \gg 10$. ▪ Maximum VIFs for the business count approach and market-implied approach are 2.439 and 2.433, respectively.
Heteroscedasticity	▪ Breusch-Pagan test ▪ Null hypothesis (H0): Homoskedasticity	▪ The null hypothesis of homoskedasticity is rejected on a high level of significance for all diversification measures ▪ Breusch-Pagan test: - BDIV: BP = 123.45, df = 10, p<0.0001; H2DIV: BP = 64.497, df = 10, p<0.0001; H4DIV: BP = 61.401, df = 10, p<0.0001 - MCOUNT: BP = 41.709, df = 10, p<0.0001; MHDIV: BP = 43.955, df = 10, p<0.0001; MDIV: BP = 39.824, df = 10, p<0.0001)
Serial independence of errors	▪ Breusch-Godfrey / Wooldridge test for serial correlation in panel models ▪ Null hypothesis (H0): No serial correlation	▪ Null hypothesis of no serial correlation in idiosyncratic errors is rejected on a high level of significance. ▪ Breusch-Godfrey / Wooldridge test: - BDIV: chisq = 117.400, df = 1, p<0.0001; H2DIV: chisq = 117.480, df = 1, p<0.0001; H4DIV: chisq = 116.950, df = 1, p<0.0001 - MCOUNT: chisq = 3.210, df = 1, p <= 0.0732; MHDIV: chisq = 3.050, df = 1, p-value <= 0.0808; MDIV: chisq = 2.902, df = 1, p <= 0.0885
Cross-sectional independence of errors	▪ Pesaran's test of cross-sectional independence of errors. ▪ Null hypothesis (H0): cross-sectional independence	▪ Null hypothesis is not rejected for both samples. Thus, cross-sectional dependence is not present. ▪ Pesaran's test: - BDIV: CD = 2.0861, p <= 0.0370; H2DIV: CD = 2.0962, p <= 0.0361; H4DIV: CD = 2.029, p <= 0.0425 - MCOUNT: CD = -2.2132, p = 0.02689; MHDIV: CD = -2.3237, p <= 0.0201; MDIV: CD = -2.323, p <= 0.0202
Time fixed effects	▪ F-test for time individual effects.	▪ Null hypothesis of no time fixed effects is rejected on a high level only for the market implied diversification measures - MCOUNT: F(9,342) = 9.319, p<0.0001; MHDIV: F(9,342) = 9.400, p<0.0001; MDIV: F(9,342) = 9.051, p<0.0001 ▪ No time fixed effects are needed when applying business count measures - BDIV: F(9,342) = 1.046, p>0.3744; H2DIV: F(9,342) = 1.083, p>0.4027; H4DIV: F(9,342) = 1.074, p>0.3815

[767] Source: Own representation.

The results of the panel regression models are summarised in Table 27. The first column presents the base model (M0) which includes only the control variables and EFV_{it}^{B}. The remaining columns (M1 to M6) correspond to the six models of regressing the standard Berger and Ofek (1995) excess firm value measure, each over one for the diversification measures and the control variables.

The Hausman specification tests are rejected on a high level for all regression models suggesting a significant relationship between the individual effects and the remainder error term. The panel regression models are, thus, consistently estimated using the "within" transformation. They are overall highly significant with F-values raging between $F = 6.663$, $p < 0.001$ to $F = 8.378$, $p<0.001$. The regressions M0 to M3 explain approximately half of the variance in the excess firm value measures (adjusted R^2 between 0.540 and 0.541), while models M4 to M6 accounts for more than two-half of the variation in excess firm value (adjusted R^2 between 0.670 and 0.671).

After controlling for influences other than diversification, a marginally significant relationship remains for all diversification measures but $MDIV^{0.5}$ (model M6). However, their signs are inconclusive: According to the business count approach, corporate diversification may be considered a value increasing strategy, whereas an inverse relationship applies for MCOUNT and $MHDIV^{0.5}$.[768] Notwithstanding the lack of significance, the sign of MDIV directs at a diversification discount, too. As the regression results are considered more robust, there are strong reasons to suggest that, at best, corporate diversification does not lead to substantial reductions in excess firm value (three positive signs vs two negative signs); thereby rejecting hypotheses H1.1 and H1.2.

In view of the control variables, the signs of the regression coefficients for the firm-specific variables mostly meet the theoretical implications. Table 27, for instance, shows that an increase in the square-root of Altman's Z, CAPEX, and CASH, as well as the natural logarithm of SIZE is associated with higher excess firm values ($p < 0.1$, two-tailed), which is consistent with theory. Furthermore, the square root of STDRET is negatively related to the excess firm value which, again, is consistent with the predictions derived in section IV.2.3.

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[768] For an overview on the predicted signs on the diversification variables when corporate diversification is an value-decreasing strategy, see Table 17.

Table 27: Determinants of excess value – fixed effects regressions[769]

The table presents the results of the panel regression models. Robust standard errors are in parentheses (Driscoll and Kraay robust standard errors). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel regression						
VARIABLES	M0	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
DIV_{it}		0.032*	0.093**	0.083**	-0.043*	0.147*	0.121
		(0.016)	(0.034)	(0.035)	(0.021)	(0.078)	(0.101)
$\sqrt{ALTMAN's\ Z_{it}}$	0.037*	0.037*	0.036*	0.036*	0.035**	0.035**	0.035**
	(0.019)	(0.019)	(0.019)	(0.019)	(0.012)	(0.012)	(0.012)
$\sqrt{CAPEX_{it}}$	0.568***	0.553***	0.539***	0.553***	0.123	0.120	0.113
	(0.147)	(0.143)	(0.151)	(0.145)	(0.236)	(0.238)	(0.238)
$\sqrt{CASH_{it}}$	0.257**	0.252**	0.247**	0.255**	0.427***	0.429***	0.426***
	(0.093)	(0.094)	(0.093)	(0.090)	(0.111)	(0.109)	(0.110)
$\sqrt{CFTA_{it}}$	-0.060	-0.058	-0.061	-0.059	-0.251**	-0.251**	-0.253**
	(0.062)	(0.063)	(0.063)	(0.064)	(0.105)	(0.106)	(0.106)
$\sqrt{DEBT_{it}}$	0.024	0.017	0.013	0.017	0.186	0.185	0.184
	(0.170)	(0.172)	(0.172)	(0.174)	(0.228)	(0.229)	(0.228)
$\sqrt{R\&D_{it}}$	0.393	0.352	0.343	0.347	0.611	0.600	0.595
	(0.322)	(0.337)	(0.325)	(0.331)	(0.415)	(0.406)	(0.410)
$\ln SIZE_{it}$	0.113**	0.110**	0.101*	0.105*	0.184***	0.182***	0.182***
	(0.046)	(0.046)	(0.046)	(0.048)	(0.034)	(0.034)	(0.035)
$\sqrt{STDRET}$	-0.393***	-0.391***	-0.384***	-0.392***	-0.393**	-0.393**	-0.387**
	(0.050)	(0.051)	(0.050)	(0.051)	(0.135)	(0.135)	(0.134)
$\sqrt{TANG}$	-0.767**	-0.770**	-0.767**	-0.781**	-0.479**	-0.485**	-0.487**
	(0.308)	(0.308)	(0.318)	(0.313)	(0.167)	(0.167)	(0.165)
CONSTANT	-1.684*	-1.651*	-1.500	-1.569	-2.607***	-2.786***	-2.754***
	(0.840)	(0.850)	(0.861)	(0.885)	(0.771)	(0.773)	(0.803)
FIRM FIXED EFFECTS	YES	YES	YES	YES	YES	YES	YES
YEAR FIXED EFFECTS	NO	NO	NO	YES	YES	YES	YES
OBSERVATIONS	1,981	1,981	1,981	1,981	1,981	1,981	1,981
NUMBER OF ID	343	343	343	343	343	343	343
R-SQUARED	0.621	0.621	0.622	0.622	0.731	0.731	0.730
ADJ. R-SQUARED	0.540	0.540	0.541	0.540	0.671	0.671	0.670
F-TEST	7.385***	6.663***	6.897***	6.718***	8.378***	8.298***	8.193***
HAUSMAN	46.733***	52.773***	53.111***	58.238***	76.631***	78.613***	74.958***

[769] Source: Own representation.

IV.3.2.3. Robustness checks

To further reinforce the results of the univariate and multivariate regression models, robustness checks concerning the time-varying impacts of diversification on excess value, linearity assumptions, and endogeneity biases are conducted.

Among others, Dimitrov and Tice (2006), Kuppuswamy and Villalonga (2016), Yan (2006), and Yan et al. (2010) acknowledge that the state of the economy in the business cycle significantly influences the intrinsic value of corporate diversification.[770] There are strong reasons to believe that diversified firms benefit from their relatively lower cash flow volatility during times of economic crisis ('more-money' effect), which enables them to maintain their desired level of external financing.[771] As the sample period covers the recent financial crisis, controlling for the economic environment can provide additional insights into the diversification-performance linkage. To assess whether excess firm values respond asymmetrically to changes in the economic environment, equation (40) is modified in the following way:

$$EFV_{it} = \begin{cases} \beta_0 + \sum_{j=1}^{L} \beta_j * x_{jit} + \beta_{10} * \sqrt{DIV_{it}} * g_t + \beta_{11} * \sqrt{DIV_{it}} * (1 - g_t) + d_t + n_i + u_{it} \\ \qquad for\ DIV_{it} = H2DIV, MHDIV, MDIV \\ \beta_0 + \sum_{j=1}^{L} \beta_j * x_{jit} + \beta_{10} * DIV_{it} + \beta_{11} * DIV_{it} * (1 - g_t) + d_t + n_i + u_{it} \\ \qquad for\ DIV_{it} = BDIV, MCOUNT, H4DIV \end{cases} \tag{41}$$

[770] Cp. Dimitrov & Tice, 2006, p. 1465ff.; Kuppuswamy & Villalonga, 2016, p. 905ff.; Yan, 2006, p. 5ff.; Yan et al., 2010, p. 103ff.

[771] Rojahn & Zechser, 2017, p. 17.

where:

EFV_{it}	=	Excess firm value of firm i at time t based on either the business count approach or market-implied approach,
β_{con}	=	constant regression coefficients,
x_{jit}	=	firm-specific control variables of firm i at time t,
DIV_{it}	=	proxy for corporate diversification of firm i at time t,
g_t	=	Economic indicator variable with a value of one if the performance of the EURO STOXX 50 Total Return index is positive and zero otherwise.
d_t	=	unobservable time effects,
n_i	=	unobservable individual effects, and
u_{it}	=	stochastic disturbance term of firm i at time t.

The results of the adjusted panel regression model as shown in Table 28 mostly confirm previous findings by, among others Dimitrov and Tice (2006) and Kuppuswamy and Villalonga (2016), who argue that corporate diversification is (most) effective when the market conditions worsen as it gives firms both financing and investment advantages.[772] The level of the regression coefficient on $H2DIV^{0.5}$ is higher when market conditions are negative in terms of market returns than when they are positive. Likewise, the levels of the regression coefficients for $MHDIV^{0.5}$ and $MDIV^{0.5}$ are lower in falling markets than in rising markets. Although the results for H4DIV point in principle to an increase in value through diversification, the estimates are reliable only in a positive market environment. By contrast, MCOUNT directs at a significant and negative association of diversification on performance in falling markets.

In terms of the diversification-performance linkage, the findings do not allow for a more differentiated view on the net effects of corporate diversification on excess firm value compared to the panel regression models discussed in the previous chapter.[773] Again, the regression coefficients of the business count approach suggest an overall positive relationship, whereas the opposite is true for the market-implied diversification measures.

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[772] Cp. Dimitrov & Tice, 2006, p. 1465ff.; Kuppuswamy & Villalonga, 2016, p. 905ff.

[773] For an overview about the findings of the panel regression models on the diversification-performance linkage, see Table 27.

Table 28: Interaction effects – corporate diversification and macroeconomic conditions[774]
The panel regression models have been fitted by "within estimation". Robust standard errors are in parentheses (Driscoll and Kraay robust standard errors). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel regression					
VARIABLES	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
$DIV_{it} * g$	0.028	0.081*	0.084**	-0.034	0.157**	0.188***
	(0.016)	(0.038)	(0.033)	(0.022)	(0.060)	(0.058)
$DIV_{it} * (1 - g)$	0.044	0.133**	0.077	-0.063**	0.133**	0.167**
	(0.037)	(0.059)	(0.073)	(0.028)	(0.053)	(0.060)
$\sqrt{ALTMAN's\ Z_{it}}$	0.037*	0.037*	0.036*	0.031**	0.031**	0.031**
	(0.018)	(0.018)	(0.018)	(0.012)	(0.012)	(0.012)
$\sqrt{CAPEX_{it}}$	0.550***	0.538***	0.554***	0.547***	0.543**	0.536**
	(0.140)	(0.152)	(0.142)	(0.168)	(0.168)	(0.171)
$\sqrt{CASH_{it}}$	0.251**	0.243**	0.255**	0.249**	0.258**	0.255**
	(0.093)	(0.094)	(0.092)	(0.084)	(0.084)	(0.086)
$\sqrt{CFTA_{it}}$	-0.055	-0.058	-0.060	-0.286*	-0.290*	-0.291*
	(0.060)	(0.063)	(0.062)	(0.135)	(0.136)	(0.134)
$\sqrt{DEBT_{it}}$	0.023	0.023	0.016	0.197	0.192	0.191
	(0.163)	(0.162)	(0.168)	(0.237)	(0.237)	(0.237)
$\sqrt{R\&D_{it}}$	0.370	0.369	0.343	0.601	0.574	0.576
	(0.338)	(0.328)	(0.331)	(0.344)	(0.358)	(0.363)
$\ln SIZE_{it}$	0.112**	0.102**	0.105*	0.097***	0.096***	0.098***
	(0.042)	(0.043)	(0.047)	(0.029)	(0.029)	(0.028)
$\sqrt{STDRET}$	-0.410***	-0.410***	-0.388***	-0.187***	-0.183**	-0.179**
	(0.075)	(0.065)	(0.073)	(0.057)	(0.057)	(0.059)
$\sqrt{TANG}$	-0.764**	-0.763**	-0.782**	-0.824***	-0.824***	-0.825***
	(0.296)	(0.307)	(0.307)	(0.156)	(0.154)	(0.154)
CONSTANT	-1.688*	-1.530*	-1.564	-1.275*	-1.472**	-1.540**
	(0.760)	(0.793)	(0.855)	(0.601)	(0.592)	(0.579)
FIRM FIXED EFFECTS	YES	YES	YES	YES	YES	YES
YEAR FIXED EFFECTS	NO	NO	NO	NO	NO	NO
OBSERVATIONS	1,981	1,981	1,981	1,981	1,981	1,981
NUMBER OF ID	342	342	342	342	342	342
R-SQUARED	0.622	0.623	0.622	0.716	0.716	0.716
ADJ. R-SQUARED	0.539	0.541	0.540	0.654	0.654	0.654
F-TEST	6.113***	6.380***	6.111***	5.237***	5.301***	5.276***

[774] Source: Own representation.

As a second robustness check, the influence of a non-linear relationship between corporate diversification and excess firm value is investigated. Therefore, the thesis allows the slopes of the regression model to change at three different points:

$$DIV10_{it} = \begin{cases} DIV_{it}, & DIV_{it} < 0.10 \\ 0.10, & DIV_{it} \geq 0.10 \end{cases} \tag{42}$$

$$DIV1025_{it} = \begin{cases} 0, & DIV_{it} < 0.10 \\ DIV_{it} - 0.10, & 0.10 \leq DIV_{it} < 0.25 \\ 0.15, & DIV_{it} > 0.25 \end{cases} \tag{43}$$

$$DIV25_{it} = \begin{cases} 0, & DIV_{it} < 0.25 \\ DIV_{it} - 0.25, & DIV_{it} \geq 0.25 \end{cases} \tag{44}$$

For instance, when the level of corporate diversification as determined by H2DIV equals 0.27, then one would have H2DIV10 = 0.10, H2DIV1025=0.15, and H2DIV25 = 0.02. The theoretical justification for these cutoff points is rather weak and is inspired by the international financial reporting standard (IFRS) 8 that requires an entity to report separate information about an operating segment when the segment has 10% or more of the combined assets of all operating segments.

Analogous to the other variables in this study, the slope variables are transformed using the square-root procedure. As H2DIV10, H4DIV10, H4DIV1025, MHDIV10, MHDIV1025, MDIV10, MDIV1025 are negatively skewed, their distribution is turned to positive skew before applying the square root transformation. Due to the displacement of the distribution function, the expected signs are reversed as for $MHDIV^{0.5}$ and $MDIV^{0.5}$. The binary variables are excluded from the regression analysis as they, by construction, do not allow to distinguish between different levels of diversification.

The estimated coefficients for the various diversification levels and their heteroskedasticity-consistent standard errors are shown in Table 29. For reasons of simplicity, only the coefficients for the diversification measures are printed. Again, they do not support the hypothesis of a negative influence of corporate diversification on firm value because they all lack significance except for H2DIV10 and MDIV25, both indicating significant gains to diversification up to a level of least 10% and above 25%, respectively.

Overall, the coefficient of determination R^2 increases only marginally due to the building of three diversification classes which underpins the notion that, at best, corporate diversification does not influence the market value of a firm.

Table 29: Determinants of excess value – non-linear relationship[775]

The table presents the results of the panel regression models with different slope points of the diversification measures. Robust standard errors are in parentheses (Driscoll and Kraay robust standard errors). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel regression			
VARIABLES	M2 (H2DIV)	M3 (H4DIV)	M5 (MHDIV)	M6 (MDIV)
$DIV_{it}10$	-3.178***	-1.435	0.053	0.546
	(0.771)	(1.511)	(2.062)	(0.787)
$DIV_{it}1025$	-0.096	-0.572	0.358	0.525
	(0.157)	(1.230)	(1.278)	(0.601)
$DIV_{it}25$	-0.131	-0.098	-0.031	0.066*
	(0.104)	(0.071)	(0.056)	(0.034)
CONTROL VARIABLES	YES	YES	YES	YES
FIRM FIXED EFFECTS	YES	YES	YES	YES
YEAR FIXED EFFECTS	NO	NO	YES	YES
OBSERVATIONS	1,981	1,981	1,981	1,981
NUMBER OF ID	343	343	343	343
R-SQUARED	0.624	0.623	0.731	0.731
ADJ. R-SQUARED	0.542	0.540	0.671	0.671
F-TEST	6.30***	5.78***	7.60***	7.600***

To investigate further, this thesis refers to the observation in Campa and Kedia (2002) and Villalonga (2004b) that the same characteristics that cause a firm to choose to diversify may also cause it to be discounted – a phenomenon often called "endogeneity bias" in the literature.[776] Given that the remainder disturbance term and the diversification dummy are not independent of each other (endogeneity bias: cov(x,u_it)≠0), commonly used panel estimators, such as a within-transformation are no longer suitable. Any failure to control for the

[775] Source: Own representation.

[776] Cp. Campa & Kedia, 2002, p. 1746ff.; Villalonga, 2004b, p. 6ff.

endogeneity of the diversification decision can lead to incorrect inferences about the effect of corporate diversification on excess firm value.[777]

To control for potential endogeneity bias, regression model (40) is re-estimated using a two-stage least squares instrumental variable regression that removes the unobserved variable from the error term by introducing instruments to the regression problem.[778] The selection of an appropriate set of instrument variables is not an easy task as the natural instruments for the diversification proxies in terms of observed firm characteristics are already included in the excess firm value equation, causing the system to be unidentified. Following Campa and Kedia (2002) favourable instrument variables are not correlated with the remainder error term u_{it} but have a significant relationship with the diversification proxy.[779] If the instruments exhibit only a poor correlation with the endogenous diversification regressor, the instrumental variable estimator can be very poor in the sense that standard errors are misleading and hypothesis tests are unreliable.[780] Aside from any firm characteristic that might affect a firm's decision to diversify, the natural logarithms of both the annual volume of completed mergers and acquisitions as well as the number of completed transactions are used as instrument variables.[781] These variables are deemed to capture the overall attractiveness of a given industry to diversification.

The results of the two-stage least squares instrumental variable regression are summarised in Table 30 showing that the panel regression results presented in Table 27 are not subject to an endogeneity bias. At first glance, the set of instrument variables appears to be valid because they are appropriately uncorrelated with the disturbance process as indicated by Hansen J statistic (orthogonality condition). However, a more general approach for testing the relevance of the instrument variables suggested by Kleibergen and Paap (2006) implies that the matrix is rank deficient meaning that the equation is underidentified.[782] In this study, a slightly

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[777] Cp. Martin & Sayrak, 2003, p. 45; Verbeek, 2008, p. 140.

[778] Cp. Verbeek, 2008, p. 154f.

[779] Cp. Campa & Kedia, 2002, p. 1747.

[780] Cp.Verbeek, 2008, p. 156.

[781] Cp. Rojahn & Zechser, 2017, p. 18.

[782] Cp. Kleibergen & Paap, 2006, p. 97ff.

modified version of Kleibergen-Paap (2006) test procedure is used to account for non-independent identically distributed (i.i.d.) errors (hereafter Kleibergen-Paap statistic). The null hypothesis of the Kleibergen-Paap statistic is that the equation is underidentified and cannot be rejected at convenient significance levels (10%, 5%, and 1%) for all but two of the instrument variable regressions. Notwithstanding the limited power of the instrument variables, the endogeneity test reveals that the diversification variables can be treated as exogenous in order to derive consistent estimates.

Table 30: Two-stage least squares instrumental variable regression – determinants of corporate diversification[783]

The table presents the results of the two-stage least squares instrumental variable regression. Robust standard errors are in parentheses (Huber–White sandwich estimators). *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Panel regression					
VARIABLES	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
DIV_{it}	-0.767	-1.512	-1.475	-0.296	1.532	1.316
	(0.599)	(1.337)	(1.170)	(0.911)	(3.817)	(3.997)
$\sqrt{ALTMAN's\ Z_{it}}$	0.034***	0.044***	0.041***	0.034***	0.034***	0.034***
	(0.013)	(0.015)	(0.013)	(0.012)	(0.012)	(0.012)
$\sqrt{CAPEX_{it}}$	0.920*	1.030*	0.826*	0.228	0.265	0.189
	(0.480)	(0.597)	(0.457)	(0.499)	(0.521)	(0.409)
$\sqrt{CASH_{it}}$	0.355*	0.416	0.289	0.424**	0.447**	0.414**
	(0.196)	(0.259)	(0.188)	(0.166)	(0.176)	(0.169)
$\sqrt{CFTA_{it}}$	-0.109	-0.042	-0.071	-0.228	-0.215	-0.233*
	(0.136)	(0.159)	(0.136)	(0.141)	(0.154)	(0.131)
$\sqrt{DEBT_{it}}$	0.204	0.208	0.148	0.187	0.175	0.165
	(0.219)	(0.260)	(0.196)	(0.146)	(0.154)	(0.163)
$\sqrt{R\&D_{it}}$	1.364	1.196	1.211	0.759	0.737	0.689
	(0.881)	(0.937)	(0.809)	(0.657)	(0.574)	(0.502)
$\ln SIZE_{it}$	0.178**	0.312*	0.251**	0.207**	0.204**	0.206**
	(0.074)	(0.184)	(0.121)	(0.098)	(0.080)	(0.093)
$\sqrt{STDRET}$	-0.442***	-0.544***	-0.423***	-0.461*	-0.499	-0.444**
	(0.100)	(0.172)	(0.095)	(0.256)	(0.305)	(0.205)
$\sqrt{TANG}$	-0.706*	-0.766*	-0.530	-0.463	-0.516	-0.538
	(0.386)	(0.431)	(0.414)	(0.364)	(0.384)	(0.403)
FIRM FIXED EFFECTS	YES	YES	YES	YES	YES	YES
YEAR FIXED EFFECTS	NO	NO	NO	YES	YES	YES
OBSERVATIONS	1,934	1,934	1,934	1,934	1,934	1,934
NUMBER OF ID	296	296	296	296	296	296
AIC	1774.097	2285.284	1803.566	1069.286	1183.479	1020.196
BIC	1829.771	2340.958	1859.239	1175.066	1289.259	1125.976
KLEIBERGEN-PAAP LM STATISTIC	6.670**	3.155	6.303**	1.170	1.098	1.706
HANSEN J STATISTIC	0.284	0.181	0.314	0.069	0.004	0.072
MOD. DURBIN WATSON STATISTIC	2.271	2.420	2.282	0.104	0.169	0.116

[783] Source: Own representation.

IV.3.3. DOES LIQUIDITY INFLATE THE DIVERSIFICATION-PERFORMANCE RELATIONSHIP?

So far, the relationship between corporate diversification and excess firm value has been modeled using a one-stage regression approach between a set of independent firm-specific and liquidity-specific variables (X) on the one hand and excess firm value (Y) on the other hand, including conditions under which X can be considered a possible cause of Y.[784] The standard mediation approach in social science represents the addition of a mediator variable M in the causal sequence between X and Y, whereby X causes M which in turn causes Y.[785] Mediators can provide substantive interpretations of the nature of the relationship between X and Y even if X and Y are not associated.[786]

Figure 9 shows a standard three-variable non-recursive causal model, where rectangles represent the variables X, M, and Y and the arrows characterise the relationship between them. In the language of path analysis, c' quantifies the direct effect of X on Y adjusted for M, whereas a and b refer to the relation of X on M and M on Y adjusted for X, respectively. The total effect of X on Y is the sum of the direct effect c' and the indirect effect a*b. The indirect effect means "*the amount by which two cases who differ by one unit on X are expected to differ on Y through X's effect on M, which in turn affects Y.*"[787]

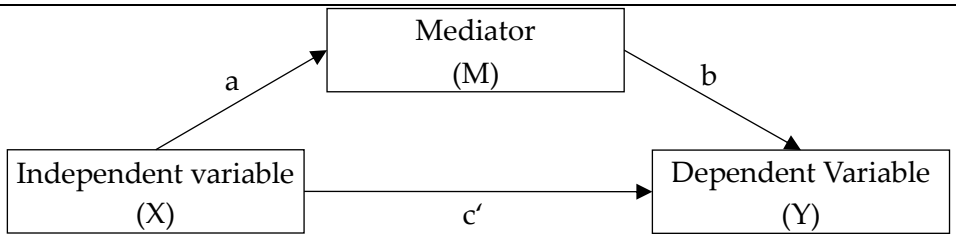

Figure 9: Simple mediation model.[788]

[784] Cp. equation (40).

[785] Cp. MacKinnon et al., 2007, p. 595.

[786] Cp. Hayes, 2009, p. 413; Zhao et al., 2010, p. 199f. For a dinstinction between indirect and mediating relationships, see Mathieu & Taylor, 2006, p. 1037ff.

[787] Hayes, 2009, p. 409.

[788] Source: own representation based on Fritz & MacKinnon, 2007, p. 234; MacKinnon et al., 2007, p. 595.

The most widely-used method to testing intervening variable effects is the causal steps approach outlined in the classical work "*The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations*" by Baron and Kenny (1986).[789] Their causal steps approach is based on the sequential estimation of a series of relationships among the independent variable, the mediator, and the dependent variable:[790]

$$M = i_3 + aX + \varepsilon_3 \quad (45)$$

$$Y = i_1 + cX + \varepsilon_1 \quad (46)$$

$$Y = i_2 + c'X + bM + \varepsilon_2 \quad (47)$$

where:

$i_1 \dots i_3$	=	intercepts,
c	=	coefficient relating the independent and dependent variable,
c'	=	coefficient relating the independent and dependent variable adjusted for the effect of M,
b	=	coefficient relating the mediator and dependent variable adjusted for the effect of X,
a	=	coefficient relating the independent and mediator variable,
X	=	independent variable,
Y	=	dependent variable, and
M	=	mediator.

To establish that an independent variable affects a distal dependent variable through a mediator, it must now hold that (i) the independent variable X significantly affects the hypothesized mediator M in the first equation, (ii) the independent variable X significantly relates to the dependent variable Y in the second equation, and (iii) the mediator has a significant effect on the dependent

[789] Cp. Baron & Kenny, 1986, p. 1173ff.

[790] Cp. MacKinnon et al., 2007, p. 598.

variable in the third equation while the effect of the independent variable on the dependent variable must be substantially less than in the second effect.[791]

Regardless of its widespread use in social science and psychological research,[792] the causal steps approach is criticised heavily on multiple grounds.[793] Objections aim primarily at the low statistical power of the causal steps approach (or equivalently the requirement for large data samples)[794] and the use of the Sobel (1982, 1986) z-test to infer the existence of an indirect effect[795]. The major drawback of Sobel's (1982, 1986) z-test is that for an accurate estimation of the standard error of the mediated effect, the distribution of the indirect effect needs to be normal.[796] However, the sampling distribution tends to be positively skewed with a shorter, fatter tail to the left.[797]

This study deviates from the causal steps approach in three aspects: First, it explicitly acknowledges that for stock liquidity to mediate the effect of diversification on firm value, all that matters is that the indirect effect is significant. Second, to avoid making assumptions about the shape of the sampling distribution of the indirect effect, this study follows the advice by, among others, Hayes (2009) and Zhao et al. (2010) and implements a bootstrap test instead of using the Sobel z-test to make statistical inferences about the indirect effect.[798] The number of bootstrap resamples is set to 5,000. Third, the assumption that equations (45) to (47) are independent is rejected in favour of a structural equation approach (SEM) fitted by 'maximum likelihood' using the gsem command in STATA 13.[799]

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[791] Cp. Baron & Kenny, 1986, p. 1176f.

[792] As of December 2018, the Baron and Kenny's (1986) article has been cited more than 35,000 times according to the Web of Science Core Collection index.

[793] Cp. Hayes, 2009, p. 410f.; Zhao et al., 2010, p. 198ff.

[794] Cp. Fritz & MacKinnon, 2007, p. 237; MacKinnon et al., 2002, p. 94ff.

[795] Cp. Zhao et al., 2010, p. 202.

[796] Cp. Zhao et al., 2010, p. 202.

[797] Cp. Bollen & Stine, 1990, p. 129ff.; Stone & Sobel, 1990, p. 343ff.

[798] Cp. Hayes, 2009, p. 411f.; Zhao et al., 2010, p. 204.

[799] For further reading on structural equation models to test for mediating patterns, instead of many, see Iacobucci, 2008, p. 17ff.

To answer liquidity hypothesis H.2 "The relationship between corporate diversification and firm value is mediated by stock liquidity", twelve multilevel mediation models ('1-1-1' multilevel mediation model), one for each diversification measure and liquidity measure (bid-ask spread: M1 to M6, turnover: M7 to M12) are estimated. By contrast to the standard panel models, STDRET is deliberately omitted. Based on the explanations in the third chapter, it is expected that the effects of information availability will be expressed implicitly through the liquidity of traded equity. The primary results and conclusions, however, are robust to this modification as indicated in Appendix 1 and Appendix 2.

The results of the basic multilevel mediation models are summarised in Table 31 and Table 32. In the first step, the results of models M1 to M6 are discussed. Because increasing bid-ask spreads approximate decreasing liquidity, negative coefficients for path a and path b indicate a higher liquidity level and a higher firm valuation, respectively. Please note that due to variable transformation, an inverse relationship holds for models M5 and M6.

After controlling for the mediating effects of liquidity, the mean indirect effect from bootstrapping is significant and positive for all models.[800] As hypothesised by the information-diversification hypothesis, information asymmetries between outside investors and the management of the firm are less severe in diversified firms, as indicated by the highly significant regression coefficients for the path a ($EFV_{it} \leftarrow \ln RELS_{it}$), which in turn provide for an increase in firm value through a liquidity effect (path b: $\ln RELS_{it} \leftarrow DIV_{it}$).

For models M1 (BDIV) and M3 (H4DIV), the direct effects are also highly significant at the 1 percent level. Their negative coefficients suggest that adjusted for the effects of liquidity, diversified firms have a lower market valuation than their focused counterparts. The remaining and significant direct effects can be an indicator for omitted mediators in the direct path, some of which are discussed in section II.4 (e.g. corporate level cash flows). Notwithstanding a lack of significance, the coefficients for the market-implied diversification measures suggest a diversification premium after adjusting for stock liquidity.

[800] A negative sign for models M5 and M6 means a positive effect due to transformation.

Table 31: Mediating effects of bid-ask spreads on the diversifications effect with asymmetry[801]
The multilevel mediation models (1-1-1) have been fitted by 'maximum likelihood' using the gsem command in STATA 13. Robust standard errors are in parentheses (Huber–White sandwich estimators). Bootstrap results for indirect effects based on 5000 simulations. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Multilevel mediation model (1-1-1)					
Path coefficient	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
Direct effect (c′)	-0.066***	-0.036	-0.178***	0.011	-0.172	-0.100
	(0.022)	(0.036)	(0.04)	(0.028)	(0.114)	(0.15)
Indirect effect (a*b)	0.007*	0.015***	0.012*	0.029***	-0.106***	-0.220***
	(0.004)	(0.005)	(0.006)	(0.007)	(0.026)	(0.039)
Total effect (c′+a*b)	-0.059***	-0.020	-0.166***	0.040	-0.278**	-0.320**
	(0.022)	(0.036)	(0.041)	(0.029)	(0.115)	(0.153)
Path a: $\ln RELS_{it} \leftarrow DIV_{it}$						
	-0.002*	-0.004***	-0.003*	-0.006***	0.021***	0.044***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.004)	(0.005)
Path b: $EFV_{it} \leftarrow \ln RELS_{it}$						
	-3.546***	-3.552***	-3.559***	-5.040***	-4.975***	-5.019***
	(0.567)	(0.568)	(0.565)	(0.620)	(0.620)	(0.621)
Control variables: $\ln EFV_{it} \leftarrow X_{it}$						
$\sqrt{\text{ALTMAN's } Z_{it}}$	0.061***	0.062***	0.060***	0.090***	0.090***	0.090***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
$\sqrt{CAPEX_{it}}$	-0.605**	-0.615**	-0.650***	-0.304	-0.313	-0.307
	(0.242)	(0.243)	(0.242)	(0.263)	(0.263)	(0.263)
$\sqrt{CASH_{it}}$	-0.314***	-0.313***	-0.327***	-0.262**	-0.259**	-0.262**
	(0.104)	(0.104)	(0.104)	(0.111)	(0.111)	(0.111)
$\sqrt{CFTA_{it}}$	0.355***	0.364***	0.355***	0.586***	0.582***	0.589***
	(0.099)	(0.099)	(0.099)	(0.105)	(0.105)	(0.105)
$\sqrt{DEBT_{it}}$	0.143	0.147	0.133	-0.051	-0.054	-0.051
	(0.138)	(0.138)	(0.137)	(0.147)	(0.146)	(0.147)
$\sqrt{R\&D_{it}}$	0.225**	0.227**	0.206*	0.709***	0.715***	0.713***
	(0.109)	(0.109)	(0.109)	(0.116)	(0.116)	(0.116)
$\ln SIZE_{it}$	-0.051***	-0.054***	-0.049***	-0.062***	-0.062***	-0.063***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
$\sqrt{TANG}$	0.201*	0.197*	0.201*	-0.038	-0.045	-0.039
	(0.108)	(0.108)	(0.107)	(0.116)	(0.116)	(0.116)

[801] Source: Own representation.

In view of total effects, for models M1 and M3, the benefits arising from lower liquidity costs are not strong enough to overcompensate the negative direct effects (path c') of corporate diversification on firm value, causing the total effects to be statistically significant and negative. By contrast, for models M5 and M6 significant and positive total effects are obtained, again showing that corporate diversification should not per se be considered a value-reducing strategy. This proposition should especially hold when the positive liquidity effects are properly managed by the firm (e.g. through an optimisation of the shareholder structure[802]). The remaining models M2 and M4 do not show significant total effects.

With a view to the control variables, the results of the multilevel mediation model are in a qualified sense comparable to the results of the fixed effects regressions contained in Table 27. While the influence of some control variable has been strengthened (e. g. Altman's Z, R&D), other receive an opposite sign in the mediating models (e. g. CAPEX; CASH, TANG). The differences could be based on the deviating estimation procedures (1-1-1 sem model vs "within estimator").

Table 32 shows the results of the mediation models M7 to M12, which differ from models M1 to M6 only in terms of the liquidity estimator. Instead of the bid-ask spread, the models M7 to M12 use the relative turnover ratio as introduced in section III.3. As the level of liquidity is a positive function of turnover, positive coefficients on the indirect path (a*b) suggest positive liquidity effects from diversification and vice versa. Again, due to variable transformation, an inverse relationship applies to models M11 and M12.[803]

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[802] Common methods of optimizing the shareholder structure include, among other instruments, share buybacks, dividend distributions, dual listings, and investor relations. For an analysis of the various recommendations, see Rojahn, 2008, p. 191 ff.

[803] For a description of the transformation procedure, see section IV.2.3.

Table 32: Mediating effects of stock-turnover on the diversifications effect[804]

The multilevel mediation models (1-1-1) have been fitted by 'maximum likelihood' using the gsem command in STATA 13. Robust standard errors are in parentheses (Huber–White sandwich estimators). Bootstrap results for indirect effects based on 5000 simulations. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Multilevel mediation model (1-1-1)					
Path coefficient	M7 (BDIV)	M8 ($H2DIV^{0.5}$)	M9 (H4DIV)	M10 (MCOUNT)	M11 ($MHDIV^{0.5}$)	M12 ($MDIV^{0.5}$)
Direct effect (c′)	-0.065***	-0.027	-0.176***	0.031	-0.257**	-0.221
	(0.022)	(0.036)	(0.041)	(0.029)	(0.115)	(0.153)
Indirect effect (a*b)	0.000	0.000	0.000	0.002	-0.006	-0.006
	(0.001)	(0.001)	(0.002)	(0.002)	(0.008)	(0.008)
Total effect (c′+a*b)	-0.065***	-0.027	-0.176***	0.032	-0.263**	-0.227
	(0.022)	(0.036)	(0.041)	(0.029)	(0.115)	(0.153)
Path a: $\sqrt{\text{TURNOVER}_{it}} \leftarrow \text{DIV}_{it}$						
	-0.002	-0.001	-0.006**	0.004***	-0.017**	-0.017**
	(0.002)	(0.002)	(0.003)	(0.002)	(0.007)	(0.009)
Path b: $\text{EFV}_{it} \leftarrow \sqrt{\text{TURNOVER}_{it}}$						
	-0.044	-0.023	-0.080	0.394	0.368	0.375
	(0.370)	(0.371)	(0.370)	(0.397)	(0.397)	(0.397)
Control variables: $\ln \text{EFV}_{it} \leftarrow \text{X}_{it}$						
$\sqrt{\text{ALTMAN's Z}_{it}}$	0.062***	0.063***	0.061***	0.093***	0.093***	0.093***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$\sqrt{\text{CAPEX}_{it}}$	-0.629**	-0.642**	-0.672***	-0.302	-0.313	-0.306
	(0.250)	(0.250)	(0.249)	(0.266)	(0.266)	(0.266)
$\sqrt{\text{CASH}_{it}}$	-0.330***	-0.330***	-0.343***	-0.303***	-0.298***	-0.302***
	(0.105)	(0.105)	(0.105)	(0.113)	(0.113)	(0.113)
$\sqrt{\text{CFTA}_{it}}$	0.338***	0.348***	0.337***	0.565***	0.559***	0.572***
	(0.100)	(0.100)	(0.100)	(0.107)	(0.107)	(0.107)
$\sqrt{\text{DEBT}_{it}}$	0.187	0.192	0.177	0.009	0.003	0.008
	(0.139)	(0.139)	(0.139)	(0.149)	(0.149)	(0.149)
$\sqrt{\text{R\&D}_{it}}$	0.250**	0.254**	0.230**	0.753***	0.760***	0.761***
	(0.110)	(0.110)	(0.110)	(0.118)	(0.118)	(0.118)
$\ln \text{SIZE}_{it}$	-0.035***	-0.038***	-0.034***	-0.039***	-0.039***	-0.041***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
$\sqrt{\text{TANG}}$	0.172	0.169	0.171	-0.096	-0.105	-0.097
	(0.110)	(0.110)	(0.109)	(0.117)	(0.117)	(0.117)

[804] Source: Own representation.

The results presented in Table 32 are far less clear and only partially support the hypothesis of liquidity as a mediator in the diversification-performance linkage: As far as the indirect effects of the turnover ratio are concerned, none of the tested models shows a statistically significant regression coefficient. Apart from the lack of statistical significance, the market-implied diversification measures show a small positive effect while the regression coefficients of the indirect paths for models M7 to M9 are near to zero.[805]

Related to the direction and height of the direct effects, there is only one major change between models M1 to M6 and M7 to M12. Again, the regression coefficients for BDIV (M7) and H4DIV (M9) show that after controlling for the mediating effects of liquidity, destroys shareholder value. By contrast to model M5 ($MHDIV^{0.5)}$, the regression coefficient for the direct effect of model M11 ($MHDIV^{0.5}$) turns out to be significantly negative, revealing that corporate diversification, in fact, can generate additional value adjusted for liquidity effects.

Regarding total effects as well as the control variables, the results of both mediation models are comparable among themselves, so that a separate analysis is not required here.

[805] Please note that the pure regression coefficient must not be a good indicator for the effect size of the indirect effect (e.g. because of divergent variabe scales). For further reading, see Preacher & Kelley, 2011, p. 93ff.

V. SUMMARY AND IMPLICATIONS

V.1. SUMMARY

Although corporate diversification has a rich tradition as a topic of research in the fields of strategic management and finance for almost 50 years, meta-analytical reviews of the diversification literature by Benito-Osorio et al. (2012), Erdorf et al. (2013), and Martin and Sayrak (2003) point to considerable confusion about the net impacts of diversification on shareholder value.[806]

Drawing on the insights from the dividend growth model as populated by Gordon (1959), there are two channels through which corporate diversification can affect shareholder value: by influencing either corporate level cash flows or capitalisation rates.[807] With a view to corporate level cash flows, a large fraction of the literature explains the findings of the valuation discount by focusing on the ability of a diversified firm vis-à-vis a focused firm to generate cash flows: While the benefits of diversification are driven by the efficiency of internal capital markets or debt coinsurance effects, the most prominent argument put forth against diversification is that it amplifies existing agency problems which cause inefficiencies in the capital allocation process. Other studies, however, doubt the existence of a diversification discount and argue that the loss in shareholder value is the result of factors other than diversification strategies including an endogeneity bias, sample selection bias, or construct validation bias.[808]

Besides the effect of divergent corporate-level cash flows, differences in the capitalisation rates of diversified firms and focused firms might contribute to the finding of a valuation difference between diversified firms and focused firms. If, all

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[806] Cp. Benito-Osorio et al., 2012, p. 328f.; Erdorf et al., 2013, p. 192ff.; Martin & Sayrak, 2003, p. 42ff.

[807] Section II.4.1.1 describes the economic framework surrounding the diversification-performance linkage in greater detail.

[808] For an introduction on the influence of corporate level cash flows on the diversification-performance linkage, see section II.4.1.2.

else equal, the required rate of return shareholders expect to receive is higher for diversified firms than for a portfolio of otherwise similar but focused firms, then they might be less valued.[809] Different securities can have different returns for various reasons; Among such factors, this research study stresses the mediating role of liquidity of equity.[810]

Analysing the impact of corporate diversification on the shareholder value adjusted for stock market liquidity, the theoretical implications are equivocal:[811] On the one hand, diversified firms might benefit from a "flight to liquidity''. It is often argued that diversified firms are less affecting by expected and unexpected market-wide liquidity shocks compared to focused firms due to a size effect which might call for corporate diversification from an equity investors' point of view. Above and beyond, looking at diversified firms as a collection of focused firms, they may be less subject to information asymmetries. Informed investors often possess private information about the value of a particular business segment but do not have superior knowledge about all business segments that form the corporate umbrella. In effect, any informational advantage with respect to a distinct business segment is likely to be offset by changes in the value of the diversified firm's other business segments that the informed trader knows less about. As adverse selection costs are an integral part of the liquidity premium, less severe information asymmetries reduce liquidity costs, and ceteris paribus lead to substantial increases in shareholder value.[812]

On the other hand, increasing agency costs may prevent investors from assessing the value of corporate diversification correctly, amplifying their potential unwillingness to trade the equity of diversified firms. The aggregate nature of the diversified firm's accounting numbers, as well as the quality of the figures reported for each business segment, might be distorted by the managers' incentive to avoid

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[809] For an introduction to corporate valuation, see section II.1.3.

[810] For a discussion of the valuation effects of stock market liquidity, see section III.2.

[811] For a detailed discussion of the theoretical and empirical implications of stock liquidity on the diversification effect, see sections II.4.1.3 and II.4.3, respectively.

[812] For further reading on the components of transaction costs, see section III.1.

disclosing information on poorly performing segments.[813] Therefore, research analysts might prefer focused firms to reduce their economic costs of generating information.[814] Following a diversified firm can increase the analyst's career penalties associated with the production of inaccurate forecasts (e.g. lower reputation, risk of job loss).[815] To the extent that the potential for an informational advantage of insiders over outside investors increases with the degree of diversification, greater diversification can lead to higher liquidity premiums because dealers price protect against potential losses from trading with better-informed investors by demanding higher bid-ask spreads.[816] The difference between the prices for purchases from the dealer (dealer's ask price) and selling assets to the dealer (dealer's bid price) is referred to as the bid-ask spread. It is a well-accepted liquidity measure.

In this study, various panel regression techniques and multilevel mediation models are applied to reach conclusions about the relationship between corporate diversification, stock market liquidity, and the traditional Berger and Ofek (1995) excess firm value measure. The final firm sample consists of 1,981 firm observations across the years 2007 to 2016 corresponding to 343 European non-financial firms. The present study thus not only extends the country focus from the U.S. to Europe but also includes different economic cycles ranging from the foothills of the financial market crisis to pronounced bullish markets.

The operationalisation of diversification takes a vital role when analysing its effects on shareholder value. Due to the multi-dimensional character, the diversification construct does not lend itself to easy conceptualisation. In effect, researchers using different measurement concepts might end up with very different results even if they build on the same sample. Thus, as in other diversification studies, this research employs a series of diversification measures including a binary variable based on four-digit SIC codes and two revenue-based Herfindahl indices, one relying on two-digit SIC codes and the other on four-digit SIC codes. To mitigate the problems of traditional diversification measures based

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[813] Cp. Bens et al., 2011, p. 420; Berger & Hann, 2007, p. 873f.

[814] Cp. Brennan & Tamarowski, 2000, p. 27; Cai & Zeng, 2011, p. 76.

[815] Cp. Duru & Reeb, 2002, p. 417f.; Zuckerman, 2000, p. 595.

[816] Cp. Damodaran, 2005, p. 5; Welker, 1995, p. 802.

on accounting information, analyses are also conducted using a newly developed market-implied measurement approach that exclusively utilises stock market data. More specifically, the market-implied diversification measures are estimated by forward stepwise regressions within which a firm's stock market return series is regressed against a set of ten STOXX® EUROPE 600 sector indices. Because of their novelty, the market-implied diversification measures are subjected to detailed validity tests.

Using the different proxies for corporate diversification and controlling for commonly accepted firm-specific and diversification-specific factors, the results of the empirical analysis suggest that corporate diversification, at best, does not influence excess firm values. The results of the various panel regression models are inconclusive: While the business count measures suggest a positive relationship between diversification and excess value, an inverse relationship applies for the market-implied diversification measures. Consequently, hypotheses H1.1 and H1.2 that, on average, diversified firms trade at a significant discount, are not fully supported.

To further reinforce the results of the univariate and multivariate regression models, robustness checks with respect to the time-varying impacts of diversification on excess value, linearity assumptions, and endogeneity biases are conducted. The tests also refuse that diversification negatively affects shareholder value and, thus, support the findings from the panel regression models.

Table 33: Summary statistics of diversification's effect on firm value[817]
The table summarises the findings on research hypothesis H1.1 and H1.2.

Research question		Results support hypothesis
H1.1: "There are significant valuation differences between European non-financial focused firms and diversified firms."		
	Wilcoxon rank-sum test	Yes (for 5 out of 6 measures, section IV.3.2.1)
	Fixed effects regressions	Yes (for 5 out of 6 measures, section IV.3.2.2)
	Interaction effects	Yes (for 8 out of 12 measures, section IV.3.2.3)
	Non-linear diversification measures	No (for 10 out of 12, section IV.3.2.3)
	Endogeneity (two-stage least squares instrumental variable regression)	No (for 6 out of 6 measures, section IV.3.2.3)
H1.2: "On average, the valuation difference is negative meaning that diversified firms trade at a discount."		
	Wilcoxon rank-sum test	Yes (for 3 out of 6 measures, section IV.3.2.1)
	Fixed effects regressions	No (for 4 out of 6 measures, section IV.3.2.2)
	Interaction effects	No (for 3 out of 6 models, section IV.3.2.3)
	Non-linear diversification measures	No (4 out of 4 models, section IV.3.2.3)
	Endogeneity (two-stage least squares instrumental variable regression)	No (for 6 out of 6 measures, section IV.3.2.3)

Above and beyond, multilevel mediation analysis is applied to show (i) whether focus affects the liquidity of traded equity of non-financial firms and (ii) if stock liquidity mediates the relationship between corporate diversification and shareholder value. In the mediation analyses, liquidity is measured using bid-ask

[817] Source: Own representation.

spreads and turnover ratios as representatives for the class of pre-trade and post-trade liquidity measures, respectively. The multi-level mediation models follow a structural equation approach (SEM) and are fitted by 'maximum likelihood' procedure using the gsem command in STATA 13. Sobel's (1982, 1986) z-test which allows for statistical inferences about the direct, indirect, and total effect of stock liquidity, is rejected in favour of a bootstrap test.

Table 34 summarises the main findings of the mediating models: In terms of indirect effects, the results imply that diversified firms have higher liquidity scores compared to portfolios of otherwise similar focused firms, which, in turn, leads to increasing firm values. However, these findings hold only for bid-ask spreads, whereas there is no significant indirect effect of diversification on excess firm value via stock turnover. As far as the direct effect of stock liquidity is concerned, a significant and negative association remains for the binary variable (BDIV) and the four-digit Herfindahl measure (H4DIV) across both liquidity measures, whereas MHDIV directs at significant gains from diversification when liquidity is operationalised through turnover ratios. The results on the other diversification measures lack statistical significance. Finally, with a view on total effects, only the path coefficients for models M1, M3, M5, M6, M7, M9, and M11 are significant. However, their signs are inconclusive. While the traditional measures (M1, M3, M7, and M9) support the notion of the value-destroying character of corporate diversification, whereas the market-implied diversification measures find a significant positive effect revealing that the gains of corporate diversification in terms of a higher liquidity dominate.

All in all, this work shows that empirical diversification research in Europe is only just beginning and that much more research is needed to decipher the mystery of the impacts of corporate diversification on firm value.

Table 34: Summary statistics of mediating effects[818]

The table summarises the main findings of the 12 mediation models. "*Neg*" and "*pos*" indicate a negative or positive relationship between the independent variable and excess firm value corrected for inverted relationships in case of $MHDIV^{0.5}$ and $MDIV^{0.5}$, respectively. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Direct effect (c')	**Indirect effect (a*b)**	**Total Effect (c'+a*b)**	**Hypothesized mediator**	**Type of mediation**
H2.1: "The relationship between corporate diversification and firm value is mediated by stock liquidity, such that the more that diversification enhances liquidity, the higher the excess firm value."					
Panel (A): bid-ask spread					
M1: BDIV	neg***	pos*	neg***	yes	complementary
M2: $H2DIV^{0.5}$	neg	pos***	neg	yes	indirect only
M3: H4DIV	neg***	pos*	neg***	yes	complementary
M4: MCOUNT	pos	pos***	pos	yes	indirect only
M5: $MHDIV^{0.5}$	pos	pos***	pos**	yes	indirect only
M6: $MDIV^{0.5}$	pos	pos***	pos**	yes	indirect only
Panel (B): stock turnover					
M7: BDIV	neg***	pos	neg***	no	direct only
M8: $H2DIV^{0.5}$	neg	pos	neg	no	no effect
M9: H4DIV	neg***	pos	neg***	no	direct only
M10: MCOUNT	pos	pos	pos	no	no effect
M11: $MHDIV^{0.5}$	pos**	pos	pos**	no	direct only
M12: $MDIV^{0.5}$	pos	pos	pos	no	no effect

[818] Source: Own representation.

V.2. LIMITATIONS

As with most empirical research, this study has considerable limitations. Objections aim primarily at the sample selection process, the appropriateness of the dependent and independent variables, and the models employed.

First and foremost, the sample firms are not randomly selected but are chosen because they have been a member of the STOXX® EUROPE 600 index between 2007 and 2016. Therefore, the study places a high weight on developed countries and large firms. Additionally, certain types of corporations have been left out (e.g. financial institutions). Thus, the empirical results can be influenced by the institutional environment of the firm's home country such as the information efficiency on national capital markets, corporate governance systems, law system, or economic indicators such as interest rates or GDP growth rates. Future research might gain additional insights into the contribution of liquidity to the diversification effect by including small and mid-sized companies and firms from emerging market countries.

Second, the financial performance of firms does not lend itself to easy conceptualisation and measurement. This thesis solely builds on the traditional Berger and Ofek (1995) excess firm value measure to operationalise the valuation effects of corporate diversification. Among other downsides, the excess firm value measure requires semi-strong-form efficiency, neglects the positive effect of corporate diversification on bondholder value as suggested by Glaser and Mueller (2010) and Mansi and Reeb (2002)[819], and must not necessarily reflect the efficacy of diversification efforts from the viewpoint of a firm's senior management who are used to making decisions based on financial statements rather than value-orientated indicators. Since to date, there is no silver bullet on how to best measure the performance effects of corporate diversification as stressed by Klier (2009), Perry (1998), and Schüle (1992)[820], using other performance indicators such as pure accounting-based or market-based ratios might lend further support to the findings of this thesis.

Third, the gain or loss in excess firm value must not merely be due to diversification. To reduce the specification bias, this thesis includes both non-

[819] Cp. Glaser & Mueller, 2010, p. 2307ff.; Mansi & Reeb, 2002, p. 2167ff.

[820] Cp. Klier, 2009, p. 35ff.; Perry, 1998, p. 77ff.; Schüle, 1992, p. 102ff.

diversification specific variables and variables that are ought to capture the likelihood of diversification. However, some control variables have been missed out simply because they could not be obtained in the primary databases used for this investigation. A prominent example of an omitted variable is "ownership structure".[821] For instance, managers with higher equity ownership face higher idiosyncratic risk and therefore might diversify their firms more to lower their employment risk. The weak instrument issue in the two-stage least squares regression might be an artefact of missing independent variables (instrument variables).

Fourth, since there is no single measure that captures all aspects of stock liquidity, different results might be obtained when using other indicators of liquidity. The measures used in this research study notably fail to distinguish between transitory and permanent price movements and, therefore, are vulnerable against persistent price movements that result from information flow.

Finally, as with any new invention or measurement concept, a great deal remains to be done in applying the new measurement concept to empirical research. Besides further validity studies, it would be interesting to rerun prior empirical diversification research using the market-implied diversification measures. Also, linking the measure to distinctive characteristics such as related vs unrelated diversification might provide a better understanding of the diversification phenomenon.

V.3. IMPLICATIONS FOR RESEARCH AND PRACTICE

The focus of this research is on the relationship between the type and scope of corporate diversification as well as stock market liquidity on the one hand and shareholder value on the other. At the theoretical level, central explanatory approaches for the success of diversification and its impact on stock liquidity are discussed throughout sections II and 0. For future research work, several starting points both in terms of content and methodology can be highlighted.

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[821] Cp. Aggarwal & Samwick, 2003, p. 71ff.; Denis et al., 1997, p. 135ff.; Hyland & Diltz, 2002, p. 51ff.

The first link to future diversification research concerns the operationalisation of corporate diversification without which (i) researchers cannot investigate the diversification-performance linkage and (ii) managers cannot decide about diversification. The review of the diversification literature has shown that, to date, there is no generally accepted measurement concept. In this respect, the study contributes to the growing body of literature by developing and applying a new estimator to assess the level of corporate diversification. The theoretical arguments for the newly developed diversification measures as well as the validity tests suggest that the market-implied approach offers a valuable alternative to the well-founded business-count measures. However, the results also demonstrate that there is a need for further investigations. For instance, the causes for the low correlation coefficients between traditional business count measures and market-implied diversification measures yet remains a puzzle.

The second implication for future diversification research concerns the influence of ownership identity on the diversification-performance linkage. In particular, it could be interesting to enhance the agency view on corporate diversification with a finer grained and institutionally conditioned view of ownership. The various ownership types (e.g. family ownership, state ownership, financial institution ownership) are characterized by different motivations (e.g. firm survival, economic policy, effectiveness of business strategy) and capabilities (e.g. strong local networks, institutional networks, expertise in mergers and acquisitions); thereby likely not only affecting the value of diversification but also the level of stock market liquidity.[822] Above and beyond the pure ownership identity, the investors' country can be considered a further determinant of the propensity to diversify and the gains and losses associated with a greater / lower level of diversification.

Finally, diversification research might benefit from the application of more advanced machine learning techniques including classification trees, random forests, and support vector machines. While parametric methods such as linear regression techniques are often easy to fit and their coefficients have simple interpretations, they make strong assumptions about the functional form f(x) (e.g. linear relationship). In contrast, non-parametric methods do not prejudice any

[822] Cp. Rojahn, 2017, p. 349ff.

nature about the association of the independent and dependent variables; thereby providing a more flexible and more accurate approach for assessing relationships.

In addition to the implications for diversification research, the results of this study provide recommendations for corporate practice. The study chiefly reveals implications for the design of a company's business portfolio. First and foremost, it shows that corporate diversification is not per se a value-reducing strategy. The results of the market-implied diversification measures point to positive diversification premiums up to 5%. Moreover, the mean total effect from bootstrapping in the mediation models is positive, although not always statistically significant, for the market-implied diversification measures. Thus, diversification should not be categorically excluded when deciding about the long-term objectives planned to ensure the future of the firm.

Second, the valuation difference between a diversified firm and an industry-matched portfolio of focused firms cannot be attributed exclusively to a difference between the fundamental value and the market value of diversified firms as often claimed by senior managers.[823] Instead, the results of the mediation analysis call for a shift from a pure cash flow-oriented view of diversification to an integrated view considering both future cash flows and liquidity premiums as part of future returns. To unleash the full potential of corporate diversification in the sense of value-oriented management, senior managers should (i) reduce its downsides on future cash flows (e. g. cross-subsidisation, fringe benefits) and (ii) continue to support the positive liquidity effect. There are countless ways that companies can take to increase the liquidity of their traded equity instruments including stock splits, dividend payments, and seasoned equity offerings.[824]

[823] Cp. Young & Sutcliffe, 1990, p. 20.

[824] For a detailed overview, see Rojahn, 2008, p. 191ff.

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APPENDIX

Appendix 1: Mediating effects of bid-ask spreads on the diversifications effect with STDRET[825]
The multilevel mediation models (1-1-1) have been fitted by 'maximum likelihood' using the gsem command in STATA 13. Robust standard errors are in parentheses (Huber–White sandwich estimators). Bootstrap results for indirect effects based on 5000 simulations. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Multilevel mediation model (1-1-1)					
Path coefficient	M1 (BDIV)	M2 ($H2DIV^{0.5}$)	M3 (H4DIV)	M4 (MCOUNT)	M5 ($MHDIV^{0.5}$)	M6 ($MDIV^{0.5}$)
Direct effect (c′)	-0.066***	-0.031	-0.177***	0.007	-0.130	-0.138
	(0.022)	(0.035)	(0.040)	(0.028)	(0.130)	(0.148)
Indirect effect (a*b)	0.006*	0.013***	0.010*	0.024***	-0.090***	-0.183***
	(0.004)	(0.005)	(0.006)	(0.006)	(0.023)	(0.035)
Total effect (c′+a*b)	-0.060***	-0.018	-0.167***	0.031	-0.220*	-0.322**
	(0.022)	(0.036)	(0.040)	(0.028)	(0.113)	(0.150)
Path a: $\ln RELS_{it} \leftarrow DIV_{it}$						
	-0.002**	-0.004***	-0.003*	-0.006***	0.021***	0.044***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.004)	(0.005)
Path b: $EFV_{it} \leftarrow \ln RELS_{it}$						
	-2.998***	-3.004***	-3.013***	-4.233***	-4.184***	-4.181***
	(0.581)	(0.583)	(0.580)	(0.624)	(0.623)	(0.625)
Control variables: $\ln EFV_{it} \leftarrow X_{it}$						
$\sqrt{ALTMAN's\ Z_{it}}$	0.053***	0.054***	0.053***	0.076***	0.076***	0.076***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
$\sqrt{CAPEX_{it}}$	-0.534**	-0.545**	-0.579**	-0.262	-0.269	-0.265
	(0.242)	(0.242)	(0.242)	(0.260)	(0.260)	(0.260)
$\sqrt{CASH_{it}}$	-0.293***	-0.293***	-0.307***	-0.192*	-0.190*	-0.191*
	(0.104)	(0.104)	(0.103)	(0.110)	(0.110)	(0.110)
$\sqrt{CFTA_{it}}$	0.305***	0.315***	0.305***	0.485***	0.482***	0.489***
	(0.100)	(0.100)	(0.099)	(0.105)	(0.105)	(0.105)
$\sqrt{DEBT_{it}}$	0.083	0.088	0.074	-0.173	-0.175	-0.174
	(0.138)	(0.138)	(0.138)	(0.145)	(0.145)	(0.145)
$\sqrt{R\&D_{it}}$	0.222**	0.226**	0.204*	0.698***	0.703***	0.705***
	(0.109)	(0.109)	(0.108)	(0.114)	(0.114)	(0.114)

[825] Source: Own representation.

$\ln SIZE_{it}$	-0.056***	-0.058***	-0.054***	-0.073***	-0.073***	-0.075***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
$\sqrt{STDRET}$	-0.336***	-0.333***	-0.334***	-0.730***	-0.726***	-0.733***
	(0.086)	(0.086)	(0.085)	(0.096)	(0.096)	(0.096)
$\sqrt{TANG}$	0.202*	0.198*	0.201*	0.002	-0.004	-0.000
	(0.107)	(0.108)	(0.107)	(0.115)	(0.115)	(0.114)

Appendix 2: Mediating effects of stock-turnover on the diversifications effect with STDRET[826]

The multilevel mediation models (1-1-1) have been fitted by 'maximum likelihood' with the gsem command in STATA 13. Robust standard errors are in parentheses (Huber–White sandwich estimators). Bootstrap results for indirect effects based on 5000 simulations. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Multilevel mediation model (1-1-1)					
Path coefficient	M7 (BDIV)	M8 ($H2DIV^{0.5}$)	M9 (H4DIV)	M10 (MCOUNT)	M11 ($MHDIV^{0.5}$)	M12 ($MDIV^{0.5}$)
Direct effect (c′)	-0.064***	-0.021	-0.172***	0.018	-0.175	-0.220
	(0.01)	(0.036)	(0.040)	(0.028)	(0.115)	(0.151)
Indirect effect (a*b)	-0.001	-0.000	-0.002	0.005*	-0.017*	-0.017
	(0.022)	(0.001)	(0.003)	(0.002)	(0.010)	(0.011)
Total effect (c′+a*b)	-0.065***	-0.021	-0.174***	0.023	-0.192*	-0.237
	(0.022)	(0.036)	(0.040)	(0.279)	(0.115)	(0.151)
Path a: $\sqrt{\mathbf{TURNOVER_{it}}} \leftarrow \mathbf{DIV_{it}}$						
	-0.002	-0.001	-0.006**	0.004***	-0.017**	-0.017**
	(0.002)	(0.002)	(0.003)	(0.002)	(0.007)	(0.009)
Path b: $\mathbf{EFV_{it}} \leftarrow \sqrt{\mathbf{TURNOVER_{it}}}$						
	0.342	0.365	0.302	1.037***	1.010**	1.009**
	(0.367)	(0.368)	(0.367)	(0.397)	(0.397)	(0.397)
Control variables: $\ln \mathbf{EFV_{it}} \leftarrow \mathbf{X_{it}}$						
$\sqrt{\text{ALTMAN's } Z_{it}}$	0.054***	0.055***	0.053***	0.078***	0.078***	0.078***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$\sqrt{CAPEX_{it}}$	-0.548**	-0.558**	-0.592**	-0.203	-0.212	-0.208
	(0.244)	(0.244)	(0.243)	(0.262)	(0.262)	(0.262)
$\sqrt{CASH_{it}}$	-0.305***	-0.305***	-0.318***	-0.236**	-0.233**	-0.234**
	(0.104)	(0.105)	(0.104)	(0.111)	(0.111)	(0.111)
$\sqrt{CFTA_{it}}$	0.280***	0.290***	0.280***	0.457***	0.454***	0.464***
	(0.100)	(0.100)	(0.100)	(0.106)	(0.106)	(0.106)
$\sqrt{DEBT_{it}}$	0.100	0.106	0.091	-0.152	-0.155	-0.154
	(0.139)	(0.139)	(0.139)	(0.147)	(0.147)	(0.147)
$\sqrt{R\&D_{it}}$	0.248**	0.253**	0.229**	0.745***	0.750***	0.754***
	(0.109)	(0.110)	(0.109)	(0.116)	(0.116)	(0.116)
$\ln SIZE_{it}$	-0.043***	-0.046***	-0.042***	-0.053***	-0.054***	-0.057***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
$\sqrt{STDRET}$	-0.459***	-0.458***	-0.456***	-0.878***	-0.870***	-0.881***
	(0.086)	(0.086)	(0.085)	(0.096)	(0.096)	(0.096)
$\sqrt{TANG}$	0.184*	0.182*	0.184*	-0.051	-0.057	-0.053
	(0.108)	(0.108)	(0.108)	(0.115)	(0.115)	(0.115)

[826] Source: Own representation.

Appendix 3: Empirical studies on diversification measures[827]

The table summarizes the results of six research studies that assess the construct validity of various diversification measures. Definition of performance measures: ROA, ROCF, ROE, ROS mean return on assets, on cash flows, on equity, on sales, respectively. SDROS and SDROCF stand for standard deviation of return on sales and on cash flows, respectively. SDDS identifies the standard deviation of daily stock price changes. Definition of performance measures: NSD, BSD, and MNSD mean narrow spectrum diversification, broad spectrum diversification, and mean narrow spectrum diversification, respectively N/A indicates that the information is not available

study	Sample and period	Performance indicator	Diversification measure	Finding
Montgomery (1982)	128 U.S. firms; 1974-1977	n/a	Berry-Herfindahl index (2-, 3-, 4-digit level), Rumelt's (1974) classification	High degree of correspondence between business count measures and categorical measures.
Amit and Livnat (1988a)	400 U.S. firms; 1977-1984	ROA, ROCF, SDROA, SDROCF	Berry-Herfindahl index (2-, 3-, 4-digit level), Entropy index, Rumelt's (1974) classification	High degree of correspondence between Rumelt's (1974) classification and various business count measures. Conglomerate diversification reduces the variability of profits at the expense of lower profitability.
Hoskisson et al. (1993)	160 U.S. firms: 1988-1989	ROA, ROE, ROS; Sharpe index, Treynor index	Entropy index, Rumelt's (1974) classification	The construct validity of the diversification measures seems to be strong. Both measures show strong and negative relationships with accounting performance.
Lubatkin et al. (1993)	286 U.S. firms; 1980-1987	ROE, cash flow growth, SDDS	NSD, BSD, MNSD, Rumelt's (1974) classification	A high degree of correspondence between the two unweighted product-count measures (NSD, BSD) and Rumelt's categorical measure in terms of convergent and predictive validity. The results are not as supportive for MNSD.
Hall and John (1994)	205 U.S. firms; 1987-1989	ROA, ROE, ROS	Berry-Herfindahl index (2-, 3-, 4-digit level), Entropy index, Rumelt's (1974) classification	Business count measures do not predict the same performance relationships as categories developed using Rumelt's (1974) classification rules.
Sambharya (2000)	54 U.S. firms; 1985	ROA, ROE, ROS	Berry-Herfindahl index (4-digit level), Entropy index, Rumelt's (1974) classification	Low degree of correspondence between diversification measures along all dimensions: convergence, discriminant, and predictive validity.

[827] Source: Own representation.

Appendix 4: Evidence on the diversification-performance linkage from selected cross-sectional studies[828]

The table summarizes the results of 44 cross-sectional studies that assess the effect of corporate diversification on the financial performance of exchange-listed firms. Definition of diversification measures: 4D means four-digit SIC code and so forth. Definition of performance measures: ROA, ROE, ROI, ROS mean return on assets, equity, investment, and sales, respectively, EPS means earnings per share, GOS means growth on sales, and SDROS is the standard deviation of ROS. "NR" indicates that the information is not reported. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Study	Sample selection			Diversification measure	Performance measure	Finding
	Country	Period	Sample size			
Anderson et al. (2000)	U.S.	1985-1994	199	Multi-segment dummy (2D)	Excess firm value	**Discount:** 14%*** Low stock ownership of CEOs does not explain the discount.
Beckmann (2006)	DE	1998-2002	488	Multi-segment dummy (4D)	Excess firm value	**Discount:** 17% to 23%***
Berger and Ofek (1995)	U.S.	1986-1991	3,659	Multi-segment dummy (2D)	Excess firm value	**Discount:** 13% to 15%***
Best et al. (2003)	U.S.	1989-1998	27,683	Multi-segment dummy (4D)	Excess firm value	**Discount:** 7,04%***. Analyst coverage explains half of the discount.
Bettis (1981)	U.S.	1973-1977	80	Rumelt (1974)	ROA	**Related diversification is superior.** Industry-specific entry barriers are the main driver for the difference in profitability.
Bettis and Mahajan (1985)	U.S.	1973-1977	80	Rumelt (1974)	ROA, SDROS	**Related diversification is superior.** Related diversified firms benefit from a better risk-return tradeoff.
Billett and Mauer (2003)	U.S.	1990-1998	921	Numerical count (2D)	Excess firm value	**Discount:** 6% to 11.4%[n.r.] Internal capital markets do not cause the discount.
Borah et al. (2018)		1977-2011	14,908	Multi-segment dummy	Excess firm value	**Discount:** 7.46%*** to 26.59%*** for low and high tech firms.
Braakmann and Wagner (2011)	DE	1999-2000	12,387	Berry-Herfindahl index (4D)	ROA	**Discount:** 0.468%***-points reduction in profitability for every 20%-points increase in product diversification.
Campa and Kedia (2002)	U.S.	1978-1996	8,815	Multi-segment dummy (2D)	Excess firm value	**Premium:** 19%*** when controlling for the endogeneity of

[828] Source: Own representation.

Study	Sample selection			Diversification measure	Performance measure	Finding
	Country	Period	Sample size			
						the diversification decision.
Çolak (2010)	U.S.	1989-1998	6,233	Multi-segment dummy (4D)	Excess firm value	**Discount:** 13%*** due to simultaneity bias, no discount with 2SLS.
Colpan (2008)	JP	1982-2001	71	Rumelt (1974)	ROS	**Related diversification is superior.** Related-diversified firms enjoy performance advantages in the order of 5.9% to 7.3%.
Denis et al. (2002)	U.S.	1984-1997	7,520	Multi-segment dummy (4D)	Excess firm value	**Discount:** 5.6% to 20%***
Dimitrov and Tice (2006)	U.S.	1978-1996	20,542	Multi-segment dummy (4D)	Sales growth	**Premium:** 4.4% to 5.1%***
Dubofsky and Varadarajan (1987)	U.S.	51	1975-1981	Rumelt (1974)	ROA, Jensen index, Sharpe index, Treynor index	**Unrelated diversification is superior.** Unrelated diversifiers earn higher market-based returns than related diversifiers.
Fauver et al. (2003)	World	1991-1995	8,000	Multi-segment dummy (2D)	Excess firm value	**Inconclusive:** -8.57% to 8.41%** contingent on financial / legal / regulatory conditions.
Ferris and Sarin (2000)	U.S.	1991	1,964	Various business count measures	Excess firm value	**Discount:** Decrease in analyst following by 0.62*** for each new segment. One additional analyst increase excess value by 0.018***.
Glaser and Mueller (2010)	DE	1998-2002	488	Multi-segment dummy (4D)	Excess firm value	**Discount:** Correcting for the book value bias reduces the discount from 14.7%*** to 5.1%**.
Gopalan and Xie (2011)	U.S.	1986-2008	56,547	Multi-segment dummy (3D)	Tobin's Q	**Discount:** 21.2%$^{n.r.}$ but is reduced by approx. 65% in years of financial distress.
Grass (2010)	U.S.	1984-2005	7,660	Multi-segment dummy (4D)	Excess firm value	**Discount:** 9% to 12.6%***
Grinyer et al. (1980)	U.K.	1969-1973	48	Wrigley (1970)	NP, ROI	**Inconclusive.**
Hann et al. (2013)	U.S.	1988-2006	30,554	Number of segments (4D)	Cost of capital	**Premium:** Value gain of approximately 5%** when moving from the highest to the lowest cash flow correlations quintile.
Hoechle et al. (2012)	U.S.	1996-2005	4,071-4,250	Multi-segment dummy (3D)	Excess firm value	**Discount:** 7.6% to 12%***
Khanna and Palepu (2000)	IND	1993	1,309	Multi-segment dummy (2D)	Tobin's Q	**Inconclusive:** -9% to + 20%** (quadratic

Study	Sample selection			Diversification measure	Performance measure	Finding
	Country	Period	Sample size			
						pattern with the worst performance for intermediate diversifiers)
Klein (2001)	U.S.	1966-1974	36	Multi-segment dummy (4D)	Tobin's Q	**Inconclusive:** -20% to 36%* (depending on time period)
Kuppuswamy and Villalonga (2016)	U.S.	2005-2009	4,370	Multi-segment dummy (4D)	Excess firm value	**Discount:** 10.3% to 24.7%*** but discount decrease by seven percentage points during economic downturns.
Laeven and Levine (2007)	U.S.	1998-2002	3,415	Asset diversity, Income diversity	Tobin's Q	**Discount:** 6%*** (banks)
Lamont and Polk (2001)	U.S.	1979-1997	2,390	Multi-segment dummy (4D)	Excess firm value	**Discount:** 30% to -5%[n.r.]. Slightly half of the cross-sectional variance of excess values can be explained by the differences in future returns and by covariance of returns with cash flow.
Lamont and Polk (2002)	U.S.	1979-1997	1,987	Multi-segment dummy (2D)	Tobin's Q	**Discount:** 2.8%***. Investment diversity explains more than 40% of the discount.
Lang and Stulz (1994)	U.S.	1978-1990	1,158-1,468	Multi-segment dummy (3D)	Tobin's Q	**Discount:** 27% to -54%[n.r.]
Lins and Servaes (1999)	DE JP U.K.	1992,1994	174-227 778-808 341-391	Multi-segment dummy (2D)	Excess firm value	**Discount:** 8.3% to 15.5%*** for JP and UK firms. No discount for DE firms.
Lins and Servaes (2002)	EM	1995	1,025	Multi-segment dummy (2D)	Excess firm value	**Discount:** 5.9% to 16.3%* depening on ownership concentration and industrial group membership.
Lubatkin and Rogers (1989)	U.S.	1940-1970	144	Rumelt (1974)	Jensen index	**Related diversification is superior.** Firms using constrained strategies have risk-adjusted returns that are 35 percent higher over a 60-month period than those of other firms in the market.
Mansi and Reeb (2002)	U.S.	1988-1999	2,856	Multi-segment dummy (4D)	Excess firm value	**Discount:** 4.5%*** After adjusting for the book-value bias, excess value is insignificantly related to diversification.

Study	Sample selection			Diversification measure	Performance measure	Finding
	Country	Period	Sample size			
Markides and Williamson (1996)	U.S.	1986-1988	132	Own measure	ROS	**Related diversification is superior.** If based on preferential access to strategic assets, related-diversification strategies can generate superior returns.
Michel and Shaked (1984)	U.S.	1975-1981	51	Rumelt (1974)	ROA, Jensen index, Sharpe index, Treynor index	**Unrelated diversification is superior.**
Miller (2006)	U.S.	1990	531	Multi-segment dummy (3D)	Log of market value	**Discount:** 11.3% to 13.6%*
Rumelt (1974)	U.S.	1949-1969	246	Rumelt (1974)	EPS, ROE, ROI	**Related diversification is superior.** Firms using constrained strategies (DC, RC) are higher performers than firms using other strategies.
Santalo and Becerra (2008)	U.S.	1993-2001	24,330	Multi-segment dummy (2D)	Excess firm value	**Discount:** 12%*** Net effects depend on industry
Servaes (1996)	U.S.	1961-1976	266-518	Multi-segment dummy (2D)	Tobin's Q	**Disocunt:** 10% to 60%**
Thomas and Fee (2000)	U.S.	1992-1994	1,435	Number of segments	Excess firm value	**Discount:** 5,76%*** due to hig levels of information asymmetry.
Varadarajan and Ramanujam (1987)	U.S.	1980-1984	216	Broad and mean narrow spectrum diversity	EPS, GOS, ROE, ROI	**Related diversification is superior.** On average, related diversifiers tend to overcome unrelated diversifiers. No performance differential between extremely low levels and extremely high levels of diversity.
Villalonga (2004a)	U.S.	1989-1996	12,708	Multi-segment dummy (SIC code & BITS code)	Tobin's Q	**Inconclusive:** -18%* for segment data to +28%* for BITS data
Yan (2006)	U.S.	1984-1997	7,836	Multi-segment dummy (4D)	Excess firm value	**Discount:** 5.7%$^{n.r.}$ but when capital market conditions become more unfavorable, the value of bank-dependent diversified firms increases relative to their focused counterparts.
Yan et al. (2010)	U.S.	1985-1997	7,889	Multi-segment dummy (4D)	Market value	**Premium:** Reduced exposure to negative changes in the capital market conditions

Appendix 5: Evidence on the diversification-performance linkage from selected short- and long-term event studies[829]

The table summarizes the results of 18 event studies that are concerned with the effect of corporate diversification on the financial market-based return of firms. Definition of diversification measures: 4D means four-digit SIC code and so forth. Definition of event window: d, m, and y mean days, month, and years, respectively. "NR" indicates that the information is not reported. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Study	Sample selection			Diversification measure	Specifications	Findings
	Country	Period	Sample size			
Bühner (1990)	DE	1973-1985	90	NR	Abnormal return; -24m to +24m	**Discount:** 9.38%[n.r]
Morck et al. (1990)	US	1975-1987	326	Multi-segment dummy (4D)	Abnormal return; -2d to +1d	**Discount:** 1.89%*
Agrawal et al. (1992)	US	1955-1987	765	Multi-segment dummy (4D)	Abnormal return; +49m to +60m	**Discount:** 8.6%
Kaplan and Weisbach (1992)	US	1971-1982	271	Multi-segment dummy (3D)	Abnormal return; -5d to +5d	**Discount:** 1.46% (diversifying acquistions) and 1.56% related acquistions).
Daley et al. (1997)	US	1975-1991	85	Multi-segment dummy (2D)	Abnormal return; -1d to 0d	**Discount**: 4.3%***
Berger and Ofek (1999)	US	1984-1993	107	Multi-segment dummy (2D)	Abnormal return; -1d to +1d	**Discount:** 4.4%***
Desai and Jain (1999)	US	1975-1991	155	Sales based Herfindahl index (2D)	Abnormal return; -1d to +1d	**Discount**: 3.84%***
Hubbard and Palia (1999)	US	1961-1970	392	Multi-segment dummy (2D)	Abnormal return; -5d to +5d	**Premium:** 0.21%***
Hyland and Diltz (2002)	US	1978-1992	173	Multi-segment dummy (4D)	Tobin's q -1y to 0y	**Discount:** 17%***
Graham et al. (2002)	US	1980-1995	356	Multi-segment dummy (4D)	EFV -1y to +1y	**Discount:** 12.10%***
Burch and Nanda (2003)	US	1979-1996	106	Own measure	EFV -1y to +1y	**Discount**: 6.1%[n.r.]
Kirchmaier (2003)	EEA	1989-1999	48	Multi-segment dummy (2D)	Abnormal return; -1d to +1d	**Discount:** 5.4%***
Chevalier (2004)	US	1980-1995	289	Multi-segment dummy (2D)	Abnormal return; -5d to +5d	**Discount:** 1.92%[n.r.]
Veld and Veld-Merkoulova (2004)	EU	1987-2000	156	Multi-segment dummy (2D)	Abnormal return; -1d to +1d	**Discount:** 2.62%***
Dos Santos et al. (2008)	US	1990-2000	150	Multi-segment dummy (2D)	EFV -1y to +1y	**Discount:** 11.8%**
Veld and Veld-Merkoulova (2008)	US	1995-2002	91	Multi-segment dummy (2D)	Abnormal return; -1d to +1d	**Discount:** 3.07%***
Akbulut and Matsusaka (2010)	US	1950-1980	4,764	Multi-segment dummy (2D,3D)	Abnormal return; -1d to +1d	**Premium:** 0.89%***
Vollmar (2014)	EU	2000-2012	83	Multi-segment dummy (2D)	Abnormal return; -1d to +1d	**Discount:** 4.86%***

[829] Source: Own representation based on Akbulut & Matsusaka, 2010, p. 247f.; Beckmann, 2006, p. 30; Vollmar, 2014, p. 144f.

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BIBLIOGRAPHY

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of Financial Economics, 77*(2), 375-410. doi:10.1016/j.jfineco.2004.06.007

Acharya, V. V., & Schnabl, P. (2010). Do Global Banks Spread Global Imbalances? Asset-Backed Commercial Paper during the Financial Crisis of 2007–09. *IMF Economic Review, 58*(1), 37-73. doi:10.1057/imfer.2010.4

Affleck-Graves, J., Hegde, S. P., & Miller, R. E. (1994). Trading Mechanisms and the Components of the Bid-Ask Spread. *The Journal of Finance, 49*(4), 1471-1488. doi:10.1111/j.1540-6261.1994.tb02462.x

Aggarwal, R. K., & Samwick, A. A. (2003). Why Do Managers Diversify Their Firms? Agency Reconsidered. *The Journal of Finance, 58*(1), 71-118.

Agrawal, A., Jaffe, J. F., & Mandelker, G. N. (1992). The Post-Merger Performance of Acquiring Firms: A Re-Examination of an Anomaly. *The Journal of Finance, 47*(4), 1605-1621. doi:10.2307/2328956

Aitken, M., & Comerton-Forde, C. (2003). How should liquidity be measured? *Pacific-Basin Finance Journal, 11*(1), 45-59. doi:10.1016/S0927-538X(02)00093-8

Ajinkya, B. B., & Jain, P. C. (1989). The behavior of daily stock market trading volume. *Journal of Accounting and Economics, 11*(4), 331-359. doi:10.1016/0165-4101(89)90018-9

Akbulut, M. E., & Matsusaka, J. G. (2010). 50+ Years of Diversification Announcements. *The Financial Review, 45*(2), 231-262. doi:10.1111/j.1540-6288.2010.00245.x

Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics, 84*(3), 488-500. doi:10.2307/1879431

Albers, S. (2009). *Methodik der empirischen Forschung* (3rd rev. ed.). Wiesbaden, Germany: Gabler.

Albrecht, P., & Maurer, R. (2008). *Investment- und Risikomanagement* (3rd rev. ed.). Stuttgart, Germany: Schäffer-Poeschel Verlag für Wirtschaft Steuern Recht GmbH.

Alchian, A. A., & Demsetz, H. (1972). Production, Information Costs, and Economic Organization. *The American Economic Review, 62*(5), 777-795.

Alexander, C. (2008). *Market Risk Analysis* (Vol. 1). Chichester, England: John Wiley & Sons, Ltd.

Alexandros, G., Massimiliano, M., & Paolo, Z. (2011). *Measuring market liquidity: An introductory survey*. Retrieved from SSRN Electronic Journal: https://mpra.ub.uni-muenchen.de/35829/

Alparslan, A. (2006). *Strukturalistische Prinzipal-Agent-Theorie eine Reformulierung der Hidden-Action-Modelle aus der Perspektive des Strukturalismus.* Doctorial dissertation. Universitat Duisburg-Essen, Campus Essen, 2005. Essen, Germany.

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance, 23*(4), 589-609. doi:10.2307/2978933

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets, 5*(1), 31-56. doi:10.1016/S1386-4181(01)00024-6

Amihud, Y., Hameed, A., Kang, W., & Zhang, H. (2015). The illiquidity premium: International evidence. *Journal of Financial Economics, 117*(2), 350-368. doi:10.1016/j.jfineco.2015.04.005

Amihud, Y., & Lev, B. (1981). Risk reduction as a managerial motive for conglomerate mergers. *The Bell Journal of Economics, 12*(2), 605-617. doi:10.2307/3003575

Amihud, Y., & Lev, B. (1999). Does Corporate Ownership Structure Affect Its Strategy towards Diversification? *Strategic Management Journal, 20*(11), 1063-1069.

Amihud, Y., & Mendelson, H. (1982). Asset Price Behavior in a Dealership Market. *Financial Analysts Journal, 38*(3), 50-59.

Amihud, Y., & Mendelson, H. (1986). Asset pricing and the bid-ask spread. *Journal of Financial Economics, 17*(2), 223-249. doi:10.1016/0304-405X(86)90065-6

Amihud, Y., & Mendelson, H. (1989). The Effects of Beta, Bid-Ask Spread, Residual Risk, and Size on Stock Returns. *The Journal of Finance, 44*(2), 479-486. doi:10.2307/2328600

Amihud, Y., & Mendelson, H. (1991). Liquidity, Asset Prices and Financial Policy. *Financial Analysts Journal, 47*(6), 56-66.

Amihud, Y., & Mendelson, H. (2015). The Pricing of Illiquidity as a Characteristic and as Risk. *Multinational Finance Journal, 19*(3), 149-168.

Amihud, Y., Mendelson, H., & Pedersen, L. H. (2005). Liquidity and Asset Prices. *Foundations and Trends® in Finance, 1*(4), 269-364. doi:10.1561/0500000003

Amit, R., & Livnat, J. (1988a). A Concept of Conglomerate Diversification. *Journal of Management, 14*(4), 593-604. doi:10.1177/014920638801400409

Amit, R., & Livnat, J. (1988b). Diversification Strategies, Business Cycles and Economic Performance. *Strategic Management Journal, 9*(2), 99-110. doi:10.1002/smj.4250090202

Amit, R., Livnat, J., & Zarowin, P. (1989). The Mode of Corporate Diversification: Internal Ventures versus Acquisitions. *Managerial and Decision Economics, 10*(2), 89-100. doi:10.1002/mde.4090100202

Anderson, R. C., Bates, T. W., Bizjak, J. M., & Lemmon, M. L. (2000). Corporate Governance and Firm Diversification. *Financial Management, 29*(1), 5-22. doi:10.2307/3666358

Ansoff, H. I. (1957). Strategies for Diversification. *Harvard Business Review, 35*(5), 113-124.

Arditti, F. D. (1967). Risk and the Required Return on Equity. *The Journal of Finance, 22*(1), 19-36. doi:10.2307/2977297

Arikan, A. M., & Stulz, R. M. (2016). Corporate Acquisitions, Diversification, and the Firm's Life Cycle. *The Journal of Finance, 71*(1), 139-194. doi:10.1111/jofi.12362

Arnold, P., Helmut, D., Egon, F., & Marina, F. (2015). *Organisation : Theorie und Praxis aus ökonomischer Sicht* (7th rev. ed.). Stuttgart, Germany: Schäffer Poeschel.

Asness, C. S., Moskowitz, T. J., & Pedersen, L. H. (2013). Value and Momentum Everywhere. *The Journal of Finance, 68*(3), 929-985. doi:10.1111/jofi.12021

Ataullah, A., Davidson, I., Le, H., & Wood, G. (2014). Corporate Diversification, Information Asymmetry and Insider Trading. *British Journal of Management, 25*(2), 228-251. doi:10.1111/j.1467-8551.2012.00846.x

Atkins, A. B., & Dyl, E. A. (1997). Transactions Costs and Holding Periods for Common Stocks. *The Journal of Finance, 52*(1), 309-325. doi:10.1111/j.1540-6261.1997.tb03817.x

Auer, B., & Rottmann, H. (2010). *Statistik und Ökonometrie für Wirtschaftswissenschaftler eine anwendungsorientierte Einführung*. Wiesbaden, Germany: Gabler.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2018). *Multivariate Analysemethoden: Eine anwendungsorientierte Einführung* (15th ed.). Berlin, Germany: Springer Berlin Heidelberg.

Bagehot, W. (1971). The Only Game in Town. *Financial Analysts Journal, 27*, 12-17.

Bailey, E. E., & Friedlaender, A. F. (1982). Market Structure and Multiproduct Industries. *Journal of Economic Literature, 20*(3), 1024-1048.

Bain, J. S. (1956). *Barriers to new competition their character and consequences in manufacturing industries*. Cambridge, MA: Harvard University Press.

Bain, J. S. (1968). *Industrial organization* (2nd ed.). New York: Wiley.

Baldwin, J. R., Beckstead, D., Gellatly, G., & Peters, A. (2000). *Patterns of Corporate Diversification in Canada: An Empirical Analysis*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=244523 or http://dx.doi.org/10.2139/ssrn.244523

Ballwieser, W. (2011). *Unternehmensbewertung Prozess, Methoden und Probleme* (3rd rev. ed.). Stuttgart, Germany: Schäffer-Poeschel Verlag.

Baltagi, B. H. (2005). *Econometric analysis of panel data* (3rd ed.). Chichester, England: John Wiley & Sons Ltd.

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics, 9*(1), 3-18. doi:10.1016/0304-405X(81)90018-0

Bardong, F., Bartram, S. M., & Yadav, P. K. (2010). *Corporate Break-ups and Information Asymmetry: A Market Microstructure Perspective*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=1343807 or http://dx.doi.org/10.2139/ssrn.1343807

Barkema, H. G., & Pennings, J. M. (1998). Top Management Pay: Impact of Overt and Covert Power. *Organization Studies, 19*(6), 975-1003. doi:10.1177/017084069801900604

Barnea, A., & Logue, D. E. (1973). Stock-Market Based Measures of Corporate Diversification. *The Journal of Industrial Economics, 22*(1), 51-60. doi:10.2307/2098184

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51*(6), 1173-1182. doi:10.1037//0022-3514.51.6.1173

Basu, N. (2010). Trends in corporate diversification. *Financial Markets and Portfolio Management, 24*(1), 87-102. doi:10.1007/s11408-009-0123-0

Basu, S. (1983). The relationship between earnings' yield, market value and return for NYSE common stocks. *Journal of Financial Economics, 12*(1), 129-156. doi:10.1016/0304-405X(83)90031-4

Bausch, A., & Pils, F. (2009). Product diversification strategy and financial performance: meta-analytic evidence on causality and construct multidimensionality. *Review of Managerial Science, 3*(3), 157-190. doi:10.1007/s11846-009-0027-4

Beckmann, P. (2006). *Der Diversification Discount am deutschen Kapitalmarkt: Eine empirische Untersuchung des Bewertungsunterschieds zwischen fokussierten und diversifizierten Unternehmen und seiner Einflussfaktoren.* Doctorial dissertation. Universität Dortmund, 2005. Dortmund, Germany.

Ben-Rephael, A., Kadan, O., & Wohl, A. (2015). The Diminishing Liquidity Premium. *Journal of Financial and Quantitative Analysis, 50*(1-2), 197-229. doi:10.1017/S0022109015000071

Benito-Osorio, D., Guerras-Martín, L. Á., & Zuñiga-Vicente, J. Á. (2012). Four decades of research on product diversification: a literature review. *Management Decision, 50*(2), 325-344. doi:10.1108/00251741211203597

Bens, D. A., Berger, P. G., & Monahan, S. J. (2011). Discretionary Disclosure in Financial Reporting: An Examination Comparing Internal Firm Data to Externally Reported Segment Data. *The Accounting Review, 86*(2), 417-449. doi:10.2308/accr.00000019

Benston, G. J., & Hagerman, R. L. (1974). Determinants of bid-asked spreads in the over-the-counter market. *Journal of Financial Economics, 1*(4), 353-364. doi:10.1016/0304-405X(74)90014-2

Berger, P. G., & Hann, R. N. (2007). Segment Profitability and the Proprietary and Agency Costs of Disclosure. *The Accounting Review, 82*(4), 869-906. doi:10.2308/accr.2007.82.4.869

Berger, P. G., & Ofek, E. (1995). Diversification's effect on firm value. *Journal of Financial Economics, 37*(1), 39-65. doi:10.1016/0304-405X(94)00798-6

Berger, P. G., & Ofek, E. (1999). Causes and Effects of Corporate Refocusing Programs. *The Review of Financial Studies, 12*(2), 311-345.

Berkowitz, S. A., Logue, D. E., & Noser, E. A. J. (1988). The Total Cost of Transactions on the NYSE. *The Journal of Finance, 43*(1), 97-112. doi:10.2307/2328325

Bernstein, P. L. (1987). Liquidity, Stock Markets, and Market Makers. *Financial Management, 16*(2), 54-62. doi:10.2307/3666004

Berry, C. H. (1971). Corporate Growth and Diversification. *The Journal of Law & Economics, 14*(2), 371-383.

Bessembinder, H. (2003). Issues in assessing trade execution costs. *Journal of Financial Markets, 6*(3), 233-257. doi:10.1016/S1386-4181(02)00064-2

Bessembinder, H., & Venkataraman, K. (2010). Bid-ask spreads: Measuring trade execution costs in financial markets. In R. Cont (Ed.), *Encyclopedia of quantitative finance* (pp. 184-190). West Sussex, England: John Wiley & Sons, Ltd.

Best, R. W., Hodges, C. W., & Lin, B. X. (2003). Analyst Coverage And The Diversification Discount. *Journal of Business & Economics Research, 1*(8), 29-36. doi:10.19030/jber.v1i8.3035

Best, R. W., Hodges, C. W., & Lin, B. X. (2004). Does information asymmetry explain the diversification discount? *The Journal of Financial Research, 27*(2), 235-249. doi:10.1111/j.1475-6803.2004.t01-1-00081.x

Bettis, R. A. (1981). Performance Differences in Related and Unrelated Diversified Firms. *Strategic Management Journal, 2*(4), 379-393. doi:10.1002/smj.4250020406

Bettis, R. A. (1983). Modern Financial Theory, Corporate Strategy and Public Policy: Three Conundrums. *Academy of Management Review, 8*(3), 406-415. doi:10.5465/amr.1983.4284379

Bettis, R. A., & Hall, W. K. (1982). Diversification Strategy, Accounting Determined Risk, and Accounting Determined Return. *The Academy of Management Journal, 25*(2), 254-264. doi:10.2307/255989

Bettis, R. A., & Mahajan, V. (1985). Risk/Return Performance of Diversified Firms. *Management Science, 31*(7), 785-799. doi:10.1287/mnsc.31.7.785

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics, 50*(2), 296-343. doi:10.1016/j.jacceco.2010.10.003

Bhandari, L. C. (1988). Debt/Equity Ratio and Expected Common Stock Returns: Empirical Evidence. *The Journal of Finance, 43*(2), 507-528. doi:10.2307/2328473

Bhushan, R. (1989). Firm characteristics and analyst following. *Journal of Accounting and Economics, 11*(2), 255-274. doi:10.1016/0165-4101(89)90008-6

Biais, B., Glosten, L., & Spatt, C. (2005). Market microstructure: A survey of microfoundations, empirical results, and policy implications. *Journal of Financial Markets, 8*(2), 217-264. doi:10.1016/j.finmar.2004.11.001

Billett, M. T., & Mauer, D. C. (2003). Cross-Subsidies, External Financing Constraints, and the Contribution of the Internal Capital Market to Firm Value. *The Review of Financial Studies, 16*(4), 1167-1201.

Blume, M. E., & Stambaugh, R. F. (1983). Biases in computed returns. *Journal of Financial Economics, 12*(3), 387-404. doi:10.1016/0304-405X(83)90056-9

Bollen, K. A. (1989). *Structural Equations with Latent Variable*. New York, NY: John Wiley & Sons, Inc.

Bollen, K. A., & Stine, R. (1990). Direct and Indirect Effects: Classical and Bootstrap Estimates of Variability. *Sociological Methodology, 20*, 115-140. doi:10.2307/271084

Bollerslev, T., Engle, R. F., & Wooldridge, J. M. (1988). A Capital Asset Pricing Model with Time-Varying Covariances. *Journal of Political Economy, 96*(1), 116-131. doi:10.1086/261527

Bolton, P., & Scharfstein, D. S. (1998). Corporate Finance, the Theory of the Firm, and Organizations. *The Journal of Economic Perspectives, 12*(4), 95-114.

Borah, N., Pan, L., Park, J. C., & Shao, N. (2018). Does corporate diversification reduce value in high technology firms? *Review of Quantitative Finance and Accounting, 51*(3), 683-718. doi:10.1007/s11156-017-0685-2

Boulton, T. J., Smart, S. B., & Zutter, C. J. (2013). Industrial Diversification and Underpricing of Initial Public Offerings. *Financial Management, 42*(3), 679-704.

Braakmann, N., & Wagner, J. (2011). Product Diversification and Profitability in German Manufacturing Firms *Jahrbücher für Nationalökonomie und Statistik* (Vol. 231, pp. 326).

Bradrania, M. R., & Peat, M. (2014). Characteristic liquidity, systematic liquidity and expected returns. *Journal of International Financial Markets, Institutions & Money, 33*, 78-98. doi:10.1016/j.intfin.2014.07.013

Brealey, R. A., Myers, S. C., & Allen, F. (2014). *Principles of corporate finance* (11th ed.). Maidenhead, England: McGraw-Hill Education.

Brennan, M., Huh, S.-W., & Subrahmanyam, A. (2013). An Analysis of the Amihud Illiquidity Premium. *The Review of Asset Pricing Studies, 3*(1), 133-176. doi:10.1093/rapstu/ras017

Brennan, M. J., Chordia, T., & Subrahmanyam, A. (1998). Alternative factor specifications, security characteristics, and the cross-section of expected stock returns. *Journal of Financial Economics, 49*(3), 345-373. doi:10.1016/S0304-405X(98)00028-2

Brennan, M. J., & Hughes, P., J. (1991). Stock Prices and the Supply of Information. *The Journal of Finance, 46*(5), 1665-1691. doi:10.2307/2328568

Brennan, M. J., & Subrahmanyam, A. (1996). Market microstructure and asset pricing: On the compensation for illiquidity in stock returns. *Journal of Financial Economics, 41*(3), 441-464. doi:10.1016/0304-405X(95)00870-K

Brennan, M. J., & Tamarowski, C. (2000). INVESTOR RELATIONS, LIQUIDITY, AND STOCK PRICES. *Journal of Applied Corporate Finance, 12*(4), 26-37. doi:10.1111/j.1745-6622.2000.tb00017.x

Breuer, W., Gürtler, M., & Schuhmacher, F. (2010). *Portfoliomanagement* (3rd rev. ed.). Wiesbaden, Germany: Gabler.

Breusch, T. S. (1978). TESTING FOR AUTOCORRELATION IN DYNAMIC LINEAR MODELS*. *Australian Economic Papers, 17*(31), 334-355. doi:10.1111/j.1467-8454.1978.tb00635.x

Breusch, T. S., & Pagan, A. R. (1979). A Simple Test for Heteroscedasticity and Random Coefficient Variation. *Econometrica, 47*(5), 1287-1294. doi:10.2307/1911963

Brooks, C. (2008). *Introductory econometrics for finance* (2nd ed.). Cambridge, England: Cambridge University Press.

Brounen, D., & Laak, M. (2005). Understanding the Discount: Evidence from European Property Shares. *Journal of Real Estate Portfolio Management, 11*(3), 241-251. doi:10.5555/repm.11.3.d8p375n8p8q8r60l

Brown, P., Keim, D. B., Kleidon, A. W., & Marsh, T. A. (1983). Stock return seasonalities and the tax-loss selling hypothesis: Analysis of the arguments and Australian evidence. *Journal of Financial Economics, 12*(1), 105-127. doi:10.1016/0304-405X(83)90030-2

Bruns, C., & Meyer-Bullerdiek, F. (2013). *Professionelles Portfoliomanagement: Aufbau, Umsetzung und Erfolgskontrolle strukturierter Anlagestrategien* (5th rev. ed.). Stuttgart, Germany: Schäffer-Poeschel Verlag.

Bryman, A., & Bell, E. (2015). *Business research methods* (4th ed.). New York, NY: Oxford University Press.

Bühner, R. (1990). Reaktionen des Aktienmarktes auf Unternehmenszusammenschlüsse: Eine empirische Untersuchung. *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung: ZfbF, 42*(4), 295-316.

Bühner, R. (1993). *Strategie und Organisation Analyse und Planung der Unternehmensdiversifikation mit Fallbeispielen* (2nd rev. ed.). Wiesbaden, Germany: Gabler.

Burch, T. R., & Nanda, V. (2003). Divisional diversity and the conglomerate discount: evidence from spinoffs. *Journal of Financial Economics, 70*(1), 69-98. doi:10.1016/S0304-405X(03)00142-9

Cai, W., & Zeng, C. (2011). Do security analysts follow diversified firms?: Empirical analysis based on behavioral decision-making process. *Nankai Business Review International, 2*(1), 64-78. doi:10.1108/20408741111113501

Campa, J. M., & Kedia, S. (2002). Explaining the Diversification Discount. *The Journal of Finance, 57*(4), 1731-1762. doi:10.1111/1540-6261.00476

Campbell, J. Y., Lo, A. W., & MacKinlay, A. C. (1997). *The econometrics of financial markets*. Princeton, NJ: Princeton University Press.

Capar, N., & Kotabe, M. (2003). The Relationship between International Diversification and Performance in Service Firms. *Journal of International Business Studies, 34*(4), 345-355.

Capozza, D. R., & Seguin, P. J. (1999). Focus, Transparency and Value: The REIT Evidence. *Real Estate Economics, 27*(4), 587-619. doi:10.1111/1540-6229.00785

Carmines, E. G., & Zeller, R. A. (1979). *Reliability and validity assessment*. Beverly Hills, CA: Sage Publications.

Chakravarthy, B. S. (1986). Measuring Strategic Performance. *Strategic Management Journal, 7*(5), 437-458. doi:10.1002/smj.4250070505

Chan, K. C., & Chen, N.-F. (1991). Structural and Return Characteristics of Small and Large Firms. *The Journal of Finance, 46*(4), 1467-1484. doi:10.2307/2328867

Chan, L. K. C., Hamao, Y., & Lakonishok, J. (1991). Fundamentals and Stock Returns in Japan. *The Journal of Finance, 46*(5), 1739-1764. doi:10.2307/2328571

Chandler, A. D. (1962). *Strategy and structure: Chapters in the History of the Industrial Enterprise*. Cambridge, MA: M.I.T. Press.

Chatterjee, S., & Blocher, J. D. (1992). Measurement of Firm Diversification: Is It Robust? *The Academy of Management Journal, 35*(4), 874-888.

Chatterjee, S., & Wernerfelt, B. (1991). The Link between Resources and Type of Diversification - Theory and Evidence. *Strategic Management Journal, 12*(1), 33-48. doi:10.1002/smj.4250120104

Chen, J. (2005). Pervasive liquidity risk and asset pricing. *Unpublished Working Paper, Columbia University*.

Chen, N.-f., & Zhang, F. (1998). Risk and Return of Value Stocks. *The Journal of Business, 71*(4), 501-535. doi:10.1086/209755

Chevalier, J. (2004). What Do We Know About Cross-subsidization? Evidence from Merging Firms. *The B.E. Journal of Economic Analysis & Policy, 4*(1), 1-27. doi:10.2202/1538-0637.1218

Choe, C., & Yin, X. (2009). Diversification discount, information rents, and internal capital markets. *The Quarterly Review of Economics and Finance, 49*(2), 178-196. doi:10.1016/j.qref.2007.10.003

Chopra, V. K., & Ziemba, W. T. (2013). The Effect of Errors in Means, Variances, and Covariances on Optimal Portfolio Choice. In L. C. MacLean & W. T. Ziemba (Eds.), *Handbook of the Fundamentals of Financial Decision Making. Part 1* (pp. 365-373). Singapore: World Scientific Publishing Co. Pte. Ltd.

Chordia, T., Roll, R., & Subrahmanyam, A. (2000). Commonality in liquidity. *Journal of Financial Economics, 56*(1), 3-28. doi:10.1016/S0304-405X(99)00057-4

Chordia, T., Roll, R., & Subrahmanyam, A. (2001). Market Liquidity and Trading Activity. *The Journal of Finance, 56*(2), 501-530.

Chordia, T., Subrahmanyam, A., & Anshuman, V. R. (2001). Trading activity and expected stock returns. *Journal of Financial Economics, 59*(1), 3-32. doi:10.1016/S0304-405X(00)00080-5

Clarke, J. E., Fee, C. E., & Thomas, S. (2004). Corporate diversification and asymmetric information: evidence from stock market trading characteristics. *Journal of Corporate Finance, 10*(1), 105-129. doi:10.1016/S0929-1199(02)00050-0

Coase, R. H. (1937). The Nature of the Firm. *Economica, 4*(16), 386-405. doi:10.1111/j.1468-0335.1937.tb00002.x

Cohen, L., Manion, L., Morrison, K., & Bell, R. (2011). *Research methods in education* (7th ed.). Routledge, NY: Abingdon.

Çolak, G. (2010). Diversification, Refocusing and Firm Value. *European Financial Management, 16*(3), 422-448. doi:10.1111/j.1468-036X.2008.00472.x

Collins, B. M., & Fabozzi, F. J. (1991). A Methodology for Measuring Transaction Costs. *Financial Analysts Journal, 47*(2), 27-44.

Colpan, A. M. (2008). Are strategy-performance relationships contingent on macroeconomic environments? Evidence from Japan's textile industry. *Asia Pacific Journal of Management, 25*(4), 635-665. doi:10.1007/s10490-007-9069-9

Comment, R., & Jarrell, G. A. (1995). Corporate focus and stock returns. *Journal of Financial Economics, 37*(1), 67-87. doi:10.1016/0304-405X(94)00777-X

Constantinides, G. M. (1986). Capital Market Equilibrium with Transaction Costs. *Journal of Political Economy, 94*(4), 842-862.

Constantinides, G. M., & Malliaris, A. G. (1995). Chapter 1 Portfolio theory. *Handbooks in Operations Research and Management Science, 9*, 1-30. doi:10.1016/S0927-0507(05)80045-3

Copeland, T. E., & Weston, J. F. (1988). *Financial theory and corporate policy* (3rd ed.). Reading, MA: Addison-Wesley.

Coughenour, J. F., & Saad, M. M. (2004). Common market makers and commonality in liquidity. *Journal of Financial Economics, 73*(1), 37-69. doi:10.1016/j.jfineco.2003.05.006

Cronbach, L. J. (1971). Test validation. In R. L. Thorndike (Ed.), *Educational measurement* (2 ed., pp. 443-507). Washington, D.C.: American Council on Education.

Cuthbertson, K., & Nitzsche, D. (2004). *Quantitative financial economics : stocks, bonds and foreign exchange* (2nd ed.). Chichester, England: John Wiley & Sons, Ltd.

Daley, L., Mehrotra, V., & Sivakumar, R. (1997). Corporate focus and value creation evidence from spinoffs. *Journal of Financial Economics, 45*(2), 257-281. doi:10.1016/S0304-405X(97)00018-4

Dalton, D. R., Daily, C. M., Ellstrand, A. E., & Johnson, J. L. (1998). Meta-Analytic Reviews of Board Composition, Leadership Structure, and Financial Performance. *Strategic Management Journal, 19*(3), 269-290.

Damodaran, A. (2005). *Marketability and Value: Measuring the Illiquidity Discount*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=841484 or http://dx.doi.org/10.2139/ssrn.841484

Daniel, K., & Titman, S. (1997). Evidence on the Characteristics of Cross Sectional Variation in Stock Returns. *The Journal of Finance, 52*(1), 1-33. doi:10.1111/j.1540-6261.1997.tb03806.x

Danielsen, B., & Harrison, D. (2007). The Impact of Property Type Diversification on REIT Liquidity. *Journal of Real Estate Portfolio Management, 13*(4), 329-344. doi:10.5555/repm.13.4.k548565353m14402

Dann, L. Y., Mayers, D., & Raab, R. J. (1977). Trading rules, large blocks and the speed of price adjustment. *Journal of Financial Economics, 4*(1), 3-22. doi:10.1016/0304-405X(77)90034-4

Darrough, M. N., & Stoughton, N. M. (1986). Moral Hazard and Adverse Selection: The Question of Financial Structure. *The Journal of Finance, 41*(2), 501-513. doi:10.2307/2328450

Datar, V. T., Y. Naik, N., & Radcliffe, R. (1998). Liquidity and stock returns: An alternative test. *Journal of Financial Markets, 1*(2), 203-219. doi:10.1016/S1386-4181(97)00004-9

Datta, D. K., Rajagopalan, N., & Rasheed, A. M. A. (1991). Diversification and Performance - Critical-Review and Future-Directions. *Journal of Management Studies, 28*(5), 529-558. doi:10.1111/j.1467-6486.1991.tb00767.x

Davis, G. F., & Stout, S. K. (1992). Organization Theory and the Market for Corporate Control: A Dynamic Analysis of the Characteristics of Large Takeover Targets, 1980-1990. *Administrative Science Quarterly, 37*(4), 605-633. doi:10.2307/2393474

Davis, J. L. (1994). The Cross-Section of Realized Stock Returns: The Pre-COMPUSTAT Evidence. *The Journal of Finance, 49*(5), 1579-1593. doi:10.2307/2329263

Davis, R., & Duhaime, I. M. (1992). Diversification, Vertical Integration, and Industry Analysis: New Perspectives and Measurement. *Strategic Management Journal, 13*(7), 511-524. doi:10.1002/smj.4250130704

Davis, R., & Thomas, L. G. (1990). How do we measure synergy? Diversity and performance in the US.pharmaceutical industry. *Academy of Management Proceedings, 1990*(1), 17-21. doi:10.5465/ambpp.1990.4978125

de la Fuente, G., & Velasco, P. (2015). The effect of the financial crisis on the value of corporate diversification in Spanish firms. *Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad, 44*(1), 1-23. doi:10.1080/02102412.2014.982385

De Muth, J. E. (2014). *Basic statistics and pharmaceutical statistical applications* (3rd ed.). Boca Raton, FL: CRC Press.

Dempsey, M. (2013). The Capital Asset Pricing Model (CAPM): The History of a Failed Revolutionary Idea in Finance? *Abacus, 49*, 7-23. doi:10.1111/j.1467-6281.2012.00379.x

Demsetz, H. (1968). The Cost of Transacting. *The Quarterly Journal of Economics, 82*(1), 33-53. doi:10.2307/1882244

Denis, D. J., Denis, D. K., & Sarin, A. (1997). Agency Problems, Equity Ownership, and Corporate Diversification. *The Journal of Finance, 52*(1), 135-160. doi:10.2307/2329559

Denis, D. J., Denis, D. K., & Sarin, A. (1999). Agency Theory and the Influence of Equity Ownership Structure on Corporate Diversification Strategies. *Strategic Management Journal, 20*(11), 1071-1076.

Denis, D. J., Denis, D. K., & Yost, K. (2002). Global Diversification, Industrial Diversification, and Firm Value. *The Journal of Finance, 57*(5), 1951-1979. doi:10.1111/0022-1082.00485

Desai, H., & Jain, P. C. (1999). Firm performance and focus: long-run stock market performance following spinoffs. *Journal of Financial Economics, 54*(1), 75-101. doi:10.1016/S0304-405X(99)00032-X

Dimitrov, V., & Tice, S. (2006). Corporate Diversification and Credit Constraints: Real Effects across the Business Cycle. *The Review of Financial Studies, 19*(4), 1465-1498. doi:10.1093/rfs/hhj028

Döring, N., & Bortz, J. (2016). *Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften* (5th rev. ed.). Berlin, Germany: Springer-Verlag Berlin Heidelberg.

Dos Santos, M. B., Errunza, V. R., & Miller, D. P. (2008). Does corporate international diversification destroy value? Evidence from cross-border mergers and acquisitions. *Journal of Banking & Finance, 32*(12), 2716-2724. doi:10.1016/j.jbankfin.2008.07.010

Doukas, J. A., Chansog, K., & Pantzalis, C. (2000). Security Analysis, Agency Costs, and Company Characteristics. *Financial Analysts Journal, 56*(6), 54-63.

Driscoll, J. C., & Kraay, A. C. (1998). Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *The Review of Economics and Statistics, 80*(4), 549-560. doi:10.1162/003465398557825

Dubofsky, P., & Varadarajan, P. R. (1987). Diversification and Measures of Performance: Additional Empirical Evidence. *The Academy of Management Journal, 30*(3), 597-608. doi:10.2307/256018

Duru, A., & Reeb, D. M. (2002). International Diversification and Analysts' Forecast Accuracy and Bias. *The Accounting Review, 77*(2), 415-433. doi:10.2308/accr.2002.77.2.415

Easley, D., Hvidkjaer, S., & O'Hara, M. (2002). Is Information Risk a Determinant of Asset Returns? *The Journal of Finance, 57*(5), 2185-2221.

Ederington, L. H., & Lee, J. H. (1993). How Markets Process Information: News Releases and Volatility. *The Journal of Finance, 48*(4), 1161-1191. doi:10.2307/2329034

Ederington, L. H., & Lee, J. H. (1995). The Short-Run Dynamics of the Price Adjustment to New Information. *The Journal of Financial and Quantitative Analysis, 30*(1), 117-134. doi:10.2307/2331256

Eleswarapu, V. R. (1997). Cost of Transacting and Expected Returns in the Nasdaq Market. *The Journal of Finance, 52*(5), 2113-2127. doi:10.2307/2329477

Eleswarapu, V. R., & Reinganum, M. R. (1993). The seasonal behavior of the liquidity premium in asset pricing. *Journal of Financial Economics, 34*(3), 373-386. doi:10.1016/0304-405X(93)90032-7

Elton, E. J., & Gruber, M. J. (1997). Modern portfolio theory, 1950 to date. *Journal of Banking & Finance, 21*(11–12), 1743-1759. doi:10.1016/S0378-4266(97)00048-4

Elton, E. J., Gruber, M. J., Brown, S. J., & Goetzmann, W. N. (2010). *Modern portfolio theory and investment analysis* (8th ed.). Hoboken, NJ: J. Wiley & Sons.

Erdorf, S., Hartmann-Wendels, T., Heinrichs, N., & Matz, M. (2013). Corporate diversification and firm value: a survey of recent literature. *Financial Markets and Portfolio Management, 27*(2), 187-215. doi:10.1007/s11408-013-0209-6

Fabozzi, F. J. (2009). *Institutional investment management equity and bond portfolio strategies and applications*. Hoboken, N.J.: John Wiley & Sons, Inc.

Fabozzi, F. J., Gupta, F., & Markowitz, H. M. (2002). The legacy of modern portfolio theory. *The Journal of Investing, 11*(3), 7-22.

Fama, E. F. (1965). The Behavior of Stock-Market Prices. *The Journal of Business, 38*(1), 34-105.

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, 25*(2), 383-417. doi:10.2307/2325486

Fama, E. F. (1991). Efficient Capital Markets: II. *The Journal of Finance, 46*(5), 1575-1617. doi:10.1111/j.1540-6261.1991.tb04636.x

Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). The Adjustment of Stock Prices to New Information. *International Economic Review, 10*(1), 1-21. doi:10.2307/2525569

Fama, E. F., & French, K. R. (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance, 47*(2), 427-465. doi:10.2307/2329112

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3-56. doi:10.1016/0304-405X(93)90023-5

Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence. *The Journal of Economic Perspectives, 18*(3), 25-46. doi:10.1257/0895330042162430

Fama, E. F., & French, K. R. (2008). Dissecting Anomalies. *The Journal of Finance, 63*(4), 1653-1678.

Fama, E. F., & Jensen, M. C. (1983). Separation of Ownership and Control. *The Journal of Law & Economics, 26*(2), 301-325.

Fan, J. P. H., & Lang, L. H. P. (2000). The Measurement of Relatedness: An Application to Corporate Diversification. *The Journal of Business, 73*(4), 629-660. doi:10.1086/209657

Farjoun, M. (1994). Beyond Industry Boundaries: Human Expertise, Diversification and Resource-Related Industry Groups. *Organization Science, 5*(2), 185-199. doi:10.1287/orsc.5.2.185

Farjoun, M. (1998). The Independent and Joint Effects of the Skill and Physical Bases of Relatedness in Diversification. *Strategic Management Journal, 19*(7), 611-630.

Fauver, L., Houston, J., & Naranjo, A. (2003). Capital Market Development, International Integration, Legal Systems, and the Value of Corporate Diversification: A Cross-Country Analysis. *The Journal of Financial and Quantitative Analysis, 38*(1), 135-157. doi:10.2307/4126767

Favero, C., Pagano, M., & von Thadden, E.-L. (2010). How Does Liquidity Affect Government Bond Yields? *The Journal of Financial and Quantitative Analysis, 45*(1), 107-134.

Feldman, E. R. (2016). Corporate spinoffs and analysts' coverage decisions: The implications for diversified firms. *Strategic Management Journal, 37*(7), 1196-1219. doi:10.1002/smj.2397

Ferris, S. P., & Sarin, A. (2000). Security Analysis and Corporate Diversification. In M. Hirschey, K. John, & A. K. Makhija (Eds.), *Recent issues in corporate finance and investments* (Vol. 5, pp. 105-137). UK: Emerald Group Publishing Limited.

Fey, A. (2000). *Diversifikation und Unternehmensstrategie: Zur Insuffizienz der Analyse des Diversifikationserfolges in der empirischen Diversifikationsforschung.* Doctorial dissertation. Dissertation Fernuniversität Hagen, 1999. Hagen, Germany.

Findlay, M. C., & Williams, E. E. (2000). A Fresh Look at the Efficient Market Hypothesis: How the Intellectual History of Finance Encouraged a Real "Fraud-on-the-Market". *Journal of Post Keynesian Economics, 23*(2), 181-199.

Firth, M., Jin, M., & Zhang, Y. (2013). Information Asymmetry and the Diversification Discount: Evidence from Listed Firms in China. In D.

Cumming, A. Guariglia, W. Hou, & E. Lee (Eds.), *Developing China's Capital Market: Experiences and Challenges* (pp. 8-41). London, England: Palgrave Macmillan UK.

Fleming, M. J. (2003). Measuring Treasury Market Liquidity. *Federal Reserve Bank of New York Economic Policy Review, 9*(3), 83-108.

Foran, J., & O'Sullivan, N. (2014). Liquidity risk and the performance of UK mutual funds. *International Review of Financial Analysis, 35*, 178-189. doi:10.1016/j.irfa.2014.09.001

Foran, J., & O'Sullivan, N. (2017). Mutual fund skill in timing market volatility and liquidity. *International Journal of Finance & Economics, 22*(4), 257-273. doi:10.1002/ijfe.1580

Foster, F. D., & Viswanathan, S. (1993). Variations in Trading Volume, Return Volatility, and Trading Costs: Evidence on Recent Price Formation Models. *The Journal of Finance, 48*(1), 187-211. doi:10.1111/j.1540-6261.1993.tb04706.x

Francis, B. B., Hasan, I., & Hunter, D. M. (2004). *The Diversification Discount: It's All Cash Flows*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=586507

Friedrich von den Eichen, S. A. (2002). *Kräftekonzentration in der diversifizierten Unternehmung: Eine ressourcenorientierte Betrachtung der Desinvestition*. Wiesbaden, Germany: Deutscher Universitäts-Verlag.

Frijns, B., Gilbert, A., & Tourani-Rad, A. (2008). INSIDER TRADING, REGULATION, AND THE COMPONENTS OF THE BID–ASK SPREAD. *The Journal of Financial Research, 31*(3), 225-246. doi:10.1111/j.1475-6803.2008.00238.x

Fritz, M. S., & MacKinnon, D. P. (2007). Required Sample Size to Detect the Mediated Effect. *Psychological Science, 18*(3), 233-239. doi:10.1111/j.1467-9280.2007.01882.x

Funke, A. (2006). *Konglomeratsabschlag und Transaktionskostentheorie: Theoretische Erklärung und empirische Befunde in Europa.* Doctorial dissertation. Universität Freiburg i.Br., 2006. Freiburg i.Br., Germany.

Furfine, C. H., & Rosen, R. J. (2011). Mergers increase default risk. *Journal of Corporate Finance, 17*(4), 832-849. doi:10.1016/j.jcorpfin.2011.03.003

Garbade, K. D. (1982). *Securities markets*. New York, NY: McGraw-Hill.

Gautier, A., & Heider, F. (2009). The Benefit and Cost of Winner-Picking: Redistribution versus Incentives. *Journal of Institutional and Theoretical Economics JITE, 165*(4), 622-649. doi:10.1628/093245609789919603

Geddes, S. (2003). *IPOs and equity offerings*. Oxford: Elsevier Butterworth-Heinemann.

Gehrmann, K. (2014). *Diversifikationsmanagement in Dienstleistungsnetzwerken: Theoretische Fundierung und empirische Analyse.* Doctorial dissertation. Universität Münster, 2013. Münster, 2013.

George, T. J., Kaul, G., & Nimalendran, M. (1991). Estimation of the Bid-Ask Spread and its Components: A New Approach. *The Review of Financial Studies, 4*(4), 623-656.

Gertner, R. H., Scharfstein, D. S., & Stein, J. C. (1994). Internal Versus External Capital Markets. *The Quarterly Journal of Economics, 109*(4), 1211-1230. doi:10.2307/2118361

Gilson, S. C., Healy, P. M., Noe, C. F., & Palepu, K. G. (2001). Analyst Specialization and Conglomerate Stock Breakups. *Journal of Accounting Research, 39*(3), 565-582. doi:10.1111/1475-679X.00028

Glaser, M., Lopez-De-Silanes, F., & Sautner, Z. (2013). Opening the Black Box: Internal Capital Markets and Managerial Power. *The Journal of Finance, 68*(4), 1577-1631. doi:10.1111/jofi.12046

Glaser, M., & Mueller, S. (2010). Is the diversification discount caused by the book value bias of debt? *Journal of Banking & Finance, 34*(10), 2307-2317. doi:10.1016/j.jbankfin.2010.02.017

Glosten, L. R., & Harris, L. E. (1988). Estimating the components of the bid/ask spread. *Journal of Financial Economics, 21*(1), 123-142. doi:10.1016/0304-405X(88)90034-7

Godfrey, L. G. (1978). Testing Against General Autoregressive and Moving Average Error Models when the Regressors Include Lagged Dependent Variables. *Econometrica, 46*(6), 1293-1301. doi:10.2307/1913829

Goldberg, V. P. (1976). Regulation and Administered Contracts. *The Bell Journal of Economics, 7*(2), 426-448. doi:10.2307/3003265

Gollop, F. M., & Monahan, J. L. (1991). A Generalized Index of Diversification: Trends in U.S. Manufacturing. *The Review of Economics and Statistics, 73*(2), 318-330. doi:10.2307/2109523

Goold, M., & Kathleen, L. (1993). Why Diversify? Four Decades of Management Thinking. *The Academy of Management Executive (1993-2005), 7*(3), 7-25.

Gopalan, R., & Xie, K. (2011). Conglomerates and Industry Distress. *The Review of Financial Studies, 24*(11), 3642-3687.

Gordon, M. J. (1959). Dividends, Earnings, and Stock Prices. *The Review of Economics and Statistics, 41*(2), 99-105. doi:10.2307/1927792

Gort, M. (1962). *Diversification and integration in American industry*. Princeton, NJ: Princeton University Press.

Gorton, G. B., & Pennacchi, G. G. (1993). Security Baskets and Index-Linked Securities. *The Journal of Business, 66*(1), 1-27.

Graham, J. R., Lemmon, M. L., & Wolf, J. G. (2002). Does Corporate Diversification Destroy Value? *The Journal of Finance, 57*(2), 695-720. doi:10.1111/1540-6261.00439

Grant, R. M., & Jammine, A. P. (1988). Performance Differences between the Wrigley/Rumelt Strategic Categories. *Strategic Management Journal, 9*(4), 333-346.

Grant, R. M., Jammine, A. P., & Thomas, H. (1988). Diversity, Diversification, and Profitability among British Manufacturing Companies, 1972-84. *The Academy of Management Journal, 31*(4), 771-801. doi:10.2307/256338

Grass, G. (2010). The impact of conglomeration on the option value of equity. *Journal of Banking & Finance, 34*(12), 3010-3024. doi:10.1016/j.jbankfin.2010.07.004

Gregoriou, A., Ioannidis, C., & Skerratt, L. (2005). Information Asymmetry and the Bid-Ask Spread: Evidence From the UK. *Journal of Business Finance & Accounting, 32*(9-10), 1801-1826. doi:10.1111/j.0306-686X.2005.00648.x

Greune, M. (1997). *Der Erfolg externer Diversifikation im Handel: Eine theoretische und empirische Untersuchung.* Doctorial Thesis. Universität Köln, 1997. Köln, Germany.

Grinyer, P. H., Yasai-Ardekani, M., & Al-Bazzaz, S. (1980). Strategy, Structure, the Environment, and Financial Performance in 48 United Kingdom Companies. *Academy of Management Journal, 23*(2), 193-220. doi:10.2307/255427

Grossman, S. (1976). On the Efficiency of Competitive Stock Markets Where Trades Have Diverse Information. *The Journal of Finance, 31*(2), 573-585. doi:10.2307/2326627

Grossman, S. J., & Miller, M. H. (1988). Liquidity and Market Structure. *The Journal of Finance, 43*(3), 617-633. doi:10.2307/2328186

Grossman, S. J., & Stiglitz, J. E. (1980). On the Impossibility of Informationally Efficient Markets. *The American Economic Review, 70*(3), 393-408.

Guéant, O., Lehalle, C.-A., & Fernandez-Tapia, J. (2013). Dealing with the inventory risk: a solution to the market making problem. *Mathematics and Financial Economics, 7*(4), 477-507. doi:10.1007/s11579-012-0087-0

Habib, M. A., Johnsen, D. B., & Naik, N. Y. (1997). Spinoffs and Information. *Journal of Financial Intermediation, 6*(2), 153-176. doi:10.1006/jfin.1997.0212

Hachmeister, A. (2007). *Informed traders as liquidity providers: Evidence from the German Equity Market.* Doctorial dissertation. European Business School Oestrich-Winkel, 2007. Oestrich-Winkel, Germany.

Hadlock, C., Ryngaert, M., & Thomas, S. (2001). Corporate Structure and Equity Offerings: Are There Benefits to Diversification? *The Journal of Business, 74*(4), 613-635. doi:10.1086/321940

Hall, E. H., & John, C. H. S. (1994). A methodological note on diversity measurement. *Strategic Management Journal, 15*(2), 153-168. doi:10.1002/smj.4250150206

Hann, R. N., Ogneva, M., & Ozbas, O. (2013). Corporate Diversification and the Cost of Capital. *The Journal of Finance, 68*(5), 1961-1999. doi:10.1111/jofi.12067

Harris, L. E. (1991). *Liquidity, trading rules and electronic trading systems*. New York, NY: New York University Salomon Center.

Harris, M., Kriebel, C. H., & Raviv, A. (1982). Asymmetric Information, Incentives and Intrafirm Resource Allocation. *Management Science, 28*(6), 604-620. doi:10.1287/mnsc.28.6.604

Hartig, J., Frey, A., & Jude, N. (2012). Validität. In H. Moosbrugger & A. Kelava (Eds.), *Testtheorie und Fragebogenkonstruktion* (pp. 143-171). Berlin, Heidelberg: Springer Berlin Heidelberg.

Hartmann, P. (1999). Trading volumes and transaction costs in the foreign exchange market: Evidence from daily dollar–yen spot data. *Journal of Banking & Finance, 23*(5), 801-824. doi:10.1016/S0378-4266(98)00115-0

Hasan, M. A., & Wadud, M. A. (2015). Testing Semi-Strong Form Efficiency of Dhaka Stock Exchange. *Journal of Business & Economics, 7*(2), 235-257.

Hasbrouck, J. (2009). Trading Costs and Returns for U.S. Equities: Estimating Effective Costs from Daily Data. *The Journal of Finance, 64*(3), 1445-1477.

Hasbrouck, J., & Seppi, D. J. (2001). Common factors in prices, order flows, and liquidity. *Journal of Financial Economics, 59*(3), 383-411. doi:10.1016/S0304-405X(00)00091-X

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical Mediation Analysis in the New Millennium. *Communication Monographs, 76*(4), 408-420. doi:10.1080/03637750903310360

Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics, 31*(1-3), 405-440. doi:10.1016/S0165-4101(01)00018-0

Heaton, J., & Lucas, D. J. (1996). Evaluating the Effects of Incomplete Markets on Risk Sharing and Asset Pricing. *Journal of Political Economy, 104*(3), 443-487.

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica, 47*(1), 153-161. doi:10.2307/1912352

Herrmann, V. (2002). *Marktpreisschätzung mit kontrollierten Multiplikatoren.* Doctorial dissertation. Privatuniversität Witten-Herdecke, 2002. Witten-Herdecke, Germany.

Higgins, R. C., & Schall, L. D. (1975). Corporate Bankruptcy and Conglomerate Merger. *The Journal of Finance, 30*(1), 93-113. doi:10.2307/2978433

Hill, C. W. L., Hitt, M. A., & Hoskisson, R. E. (1992). Cooperative Versus Competitive Structures in Related and Unrelated Diversified Firms. *Organization Science, 3*(4), 501-521. doi:10.1287/orsc.3.4.501

Hill, C. W. L., & Jones, G. R. (2012). *Essentials of strategic management* (3rd. ed.). Mason, OH: Cengage Learning.

Hill, C. W. L., & Jones, T. M. (1992). STAKEHOLDER-AGENCY THEORY. *Journal of Management Studies, 29*(2), 131-154. doi:10.1111/j.1467-6486.1992.tb00657.x

Hirschey, M. (2003). What caused the tech bubble? In M. Hirschey (Ed.), *Tech Stock Valuation* (pp. 29-49). San Diego, U.S.A.: Academic Press.

Ho, T., & Stoll, H. R. (1981). Optimal dealer pricing under transactions and return uncertainty. *Journal of Financial Economics, 9*(1), 47-73. doi:10.1016/0304-405X(81)90020-9

Ho, Y.-W., Strange, R., & Piesse, J. (2000). CAPM anomalies and the pricing of equity: evidence from the Hong Kong market. *Applied Economics, 32*(12), 1629-1636. doi:10.1080/000368400419014

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *Stata Journal, 7*(3), 281-312.

Hoechle, D., Schmid, M., Walter, I., & Yermack, D. (2012). How much of the diversification discount can be explained by poor corporate governance? *Journal of Financial Economics, 103*(1), 41-60. doi:10.1016/j.jfineco.2011.03.025

Hölmstrom, B. (1979). Moral Hazard and Observability. *The Bell Journal of Economics, 10*(1), 74-91. doi:10.2307/3003320

Horowitz, J. L., Loughran, T., & Savin, N. E. (2000). The disappearing size effect. *Research in Economics, 54*(1), 83-100. doi:10.1006/reec.1999.0207

Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. (2000). Strategy in Emerging Economies. *Academy of Management Journal, 43*(3), 249-267. doi:10.2307/1556394

Hoskisson, R. E., & Hitt, M. A. (1990). Antecedents and Performance Outcomes of Diversification: A Review and Critique of Theoretical Perspectives. *Journal of Management, 16*(2), 461-509. doi:10.1177/014920639001600210

Hoskisson, R. E., Hitt, M. A., Johnson, R. A., & Moesel, D. D. (1993). Construct Validity of an Objective (Entropy) Categorical Measure of Diversification Strategy. *Strategic Management Journal, 14*(3), 215-235. doi:10.1002/smj.4250140305

Hoskisson, R. E., & Turk, T. A. (1990). Corporate Restructuring: Governance and Control Limits of the Internal Capital Market. *The Academy of Management Review, 15*(3), 459-477. doi:10.2307/258018

Hsiao, C. (2014). *Analysis of panel data* (3rd ed.). New York, NY: Cambridge University Press.

Huang, R. D., & Stoll, H. R. (1997). The Components of the Bid-Ask Spread: A General Approach. *The Review of Financial Studies, 10*(4), 995-1034. doi:10.1093/rfs/10.4.995

Hubbard, R. G., & Palia, D. (1999). A Reexamination of the Conglomerate Merger Wave in the 1960s: An Internal Capital Markets View. *The Journal of Finance, 54*(3), 1131-1152.

Huber, P. (1967). *The behavior of the maximum likelihood estimates under nonstandard conditions*. Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, (1). University of California Press

Huberman, G., & Halka, D. (2001). SYSTEMATIC LIQUIDITY. *Journal of Financial Research, 24*(2), 161-178. doi:10.1111/j.1475-6803.2001.tb00763.x

Hungenberg, H. (2014). *Strategisches Management in Unternehmen: Ziele - Prozesse - Verfahren* (8th rev. ed.). Wiesbaden, Germany: Springer Fachmedien Wiesbaden.

Huson, M. R., & MacKinnon, G. (2003). Corporate spinoffs and information asymmetry between investors. *Journal of Corporate Finance, 9*(4), 481-503. doi:10.1016/S0929-1199(02)00056-1

Hyland, D. C., & Diltz, J. D. (2002). Why Firms Diversify: An Empirical Examination. *Financial Management, 31*(1), 51-81. doi:10.2307/3666321

Iacobucci, D. (2008). *Mediation analysis*. Los Angeles, CA: Sage Publications, Inc.

Iatridis, G., Messis, P., & Blanas, G. (2006). FAMA - FRENCH THREE-FACTOR MODEL VERSUS ARBITRAGE PRICING THEORY ON ESTIMATING THE EXPECTED RETURNS ON VALUE STRATEGIES: Evidence from the Athens Stock Market. *International Journal of Finance, 18*(3), 4073-4204.

Ilinitch, A. Y., & Zeithaml, C. P. (1995). Operationalizing and Testing Galbraith's Center of Gravity Theory. *Strategic Management Journal, 16*(5), 401-410.

Ippolito, R. A. (1989). Efficiency With Costly Information: A Study of Mutual Fund Performance, 1965-1984. *The Quarterly Journal of Economics, 104*(1), 1-23. doi:10.2307/2937832

Jacobson, R. (1987). The Validity of ROI as a Measure of Business Performance. *The American Economic Review, 77*(3), 470-478.

Jacquemin, A. P., & Berry, C. H. (1979). Entropy Measure of Diversification and Corporate Growth. *The Journal of Industrial Economics, 27*(4), 359-369. doi:10.2307/2097958

Jang, B.-G., Keun Koo, H., Liu, H., & Loewenstein, M. (2007). Liquidity Premia and Transaction Costs. *The Journal of Finance, 62*(5), 2329-2366. doi:10.1111/j.1540-6261.2007.01277.x

Jansen, A. (2006). *3D-Diversifikation und Unternehmenserfolg: Die Erfolgswirkung der horizontalen, geografischen und vertikalen Diversifikation deutscher Aktiengesellschaften.* Doctorial dissertation. Kath. Universitat Eichstatt-lngolstadt, 2005. Eichstatt-lngolstadt, Germany.

Jensen, M. C. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review, 76*(2), 323-329.

Jensen, M. C. (2001). Value Maximisation, Stakeholder Theory, and the Corporate Objective Function. *European Financial Management, 7*(3), 297-317. doi:10.1111/1468-036X.00158

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. doi:10.1016/0304-405X(76)90026-X

Jiao, J., Qiu, B., & Yan, A. (2013). Diversification and heterogeneity of investor beliefs. *Journal of Banking & Finance, 37*(9), 3435-3453. doi:10.1016/j.jbankfin.2013.04.028

John, C. H. S., & Harrison, J. S. (1999). Manufacturing-Based Relatedness, Synergy, and Coordination. *Strategic Management Journal, 20*(2), 129-145.

John, G., & Reve, T. (1982). The Reliability and Validity of Key Informant Data from Dyadic Relationships in Marketing Channels. *Journal of Marketing Research, 19*(4), 517-524. doi:10.2307/3151724

John, T. A. (1993). Optimality of Spin-Offs and Allocation of Debt. *The Journal of Financial and Quantitative Analysis, 28*(1), 139-160. doi:10.2307/2331155

Johnson, G., Scholes, K., & Whittington, R. (2005). *Exploring corporate strategy [text and cases]* (7th ed.). London, England: Prentice Hall.

Jones, C. M., & Lipson, M. L. (1995). *Continuations, Reversals, and Adverse Selection on the NASDAQ and Nyse/Amex*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=6258

Jones, J. C. H., Laudadio, L., & Percy, M. (1977). Profitability and Market Structure: A Cross-Section Comparison of Canadian and American Manufacturing Industry. *The Journal of Industrial Economics, 25*(3), 195-211. doi:10.2307/2098191

Kadlec, G. B., & McConnell, J. J. (1994). The Effect of Market Segmentation and Illiquidity on Asset Prices: Evidence from Exchange Listings. *The Journal of Finance, 49*(2), 611-636. doi:10.2307/2329165

Kaplan, S. N., & Weisbach, M. S. (1992). The Success of Acquisitions: Evidence from Divestitures. *The Journal of Finance, 47*(1), 107-138. doi:10.2307/2329092

Karolyi, G. A., Lee, K.-H., & van Dijk, M. A. (2012). Understanding commonality in liquidity around the world. *Journal of Financial Economics, 105*(1), 82-112. doi:10.1016/j.jfineco.2011.12.008

Kasper, L. J. (1997). *Business valuations : advanced topics*. Westport, CT: Quorum Books.

Keats, B. W. (1988). The Vertical Construct Validity of Business Economic Performance Measures. *The Journal of Applied Behavioral Science, 24*(2), 151-160. doi:10.1177/0021886388242002

Keats, B. W. (1990). Diversification and Business Economic Performance Revisited: Issues of Measurement and Causality. *Journal of Management, 16*(1), 61-72. doi:10.1177/014920639001600105

Keim, D. B., & Madhavan, A. (1998). The Cost of Institutional Equity Trades. *Financial Analysts Journal, 54*(4), 50-69.

Kempf, A. (1998). Was messen Liquiditätsmaße? *Die Betriebswirtschaft: DBW, 85*(3), 299-311.

Kempf, A. (1999). *Definition und Quantifizierung von Wertpapierliquidität*. Wiesbaden, Germany: Deutscher Universitätsverlag.

Kerry, W. (2008). Measuring financial market liquidity. *Journal of Risk Management in Financial Institutions, 1*(2), 181-190.

Keynes, J. M. (1930). *A treatise on money*. New York, NY: Harcourt, Brace and Company.

Khan, M. A., & Sun, Y. (1997). The capital-asset-pricing model and arbitrage pricing theory: A unification. *Proceedings of the National Academy of Sciences of the United States of America, 94*(8), 4229-4232.

Khan, M. H., Fraz, A., & Hassan, A. (2016). The Diversification Puzzle: The Role of Asymmetric Information and Insider Trading in Pakistan. *The Lahore Journal of Economics, 21*(2), 97-119.

Khanna, T., & Palepu, K. (1997). Why Focused Strategies May Be Wrong for Emerging Markets. *Harvard Business Review, 75*(4), 41-51.

Khanna, T., & Palepu, K. (2000). Is Group Affiliation Profitable in Emerging Markets? An Analysis of Diversified Indian Business Groups. *The Journal of Finance, 55*(2), 867-891.

Kieser, A., & Walgenbach, P. (2010). *Organisation* (6th rev. ed.). Stuttgart, Germany: Schäffer-Poeschel.

Kim, C., & Pantzalis, C. (2003). Global/Industrial Diversification and Analyst Herding. *Financial Analysts Journal, 59*(2), 69-79.

Kim, E. H., & McConnell, J. J. (1977). Corporate Mergers and the Co-Insurance of Corporate Debt. *The Journal of Finance, 32*(2), 349-365. doi:10.2307/2326767

Kim, S.-H., Kim, D., & Shin, H.-S. (2012). Evaluating asset pricing models in the Korean stock market. *Pacific-Basin Finance Journal, 20*(2), 198-227. doi:10.1016/j.pacfin.2011.09.001

Kim, W. C., Hwang, P., & Burgers, W. P. (1993). Multinationals' Diversification and the Risk-Return Trade-Off. *Strategic Management Journal, 14*(4), 275-286.

Kindermann, S. (2005). *Liquiditäts- und Effizienzmessung im Aktienhandel.* Doctorial thesis. Universität Hamburg, 2004. Hamburg, Germany.

Kirchmaier, T. (2003). *The Performance Effects of European Demergers*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=432000 or http://dx.doi.org/10.2139/ssrn.432000

Kleibergen, F., & Paap, R. (2006). Generalized reduced rank tests using the singular value decomposition. *Journal of Econometrics, 133*(1), 97-126. doi:10.1016/j.jeconom.2005.02.011

Klein, P. G. (2001). Were the Acquisitive Conglomerates Inefficient? *The RAND Journal of Economics, 32*(4), 745-761. doi:10.2307/2696391

Klier, D. O. (2009). *Managing Diversified Portfolios What Multi-Business Firms Can Learn from Private Equity.* Doctorial dissertation. Technische Universität Dortmund, 2008. Dortmund, Germany.

Knecht, M. (2014). *Diversification, Industry Dynamism, and Economic Performance: The Impact of Dynamic-related Diversification on the Multi-business Firm.* Doctorial dissertation. Universität Erlangen-Nürnberg, 2013. Erlangen-Nürnberg, Germany.

Kogut, B., Walker, G., & Anand, J. (2002). Agency and Institutions: National Divergences in Diversification Behavior. *Organization Science, 13*(2), 162-178.

Korajczyk, R. A., & Sadka, R. (2008). Pricing the commonality across alternative measures of liquidity. *Journal of Financial Economics, 87*(1), 45-72. doi:10.1016/j.jfineco.2006.12.003

Kothari, S. P., Shanken, J., & Sloan, R. G. (1995). Another Look at the Cross-Section of Expected Stock Returns. *The Journal of Finance, 50*(1), 185-224. doi:10.2307/2329243

Krishnaswami, S., & Subramaniam, V. (1999). Information asymmetry, valuation, and the corporate spin-off decision. *Journal of Financial Economics, 53*(1), 73-112. doi:10.1016/S0304-405X(99)00017-3

Kuhlmann, S. (2018). *The Influence of Stock Market Liquidity on Dividend Changes in Europe.* Doctorial dissertation. Universidad Católica de Murcia, 2018. Murcia, Spain.

Kuhlmann, S., & Rojahn, J. (2017). The impact of ownership concentration and shareholder identity on dividend payout probabilities: New evidence from

the German stock market. *Corporate Ownership & Control, 15*(1), 18-32. doi:10.22495/cocv15i1art2

Kumar, P. C. (2004). Bid-Ask Spreads in U. S. Equity Markets. *Quarterly Journal of Business and Economics, 43*(3/4), 85-111.

Kuppuswamy, V., & Villalonga, B. (2016). Does Diversification Create Value in the Presence of External Financing Constraints? Evidence from the 2007–2009 Financial Crisis. *Management Science, 62*(4), 905-923. doi:10.1287/mnsc.2015.2165

Laeven, L., & Levine, R. (2007). Is there a diversification discount in financial conglomerates? *Journal of Financial Economics, 85*(2), 331-367. doi:10.1016/j.jfineco.2005.06.001

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1994). Contrarian Investment, Extrapolation, and Risk. *The Journal of Finance, 49*(5), 1541-1578. doi:10.2307/2329262

Lamont, O. A. (1997). Cash Flow and Investment: Evidence from Internal Capital Markets. *The Journal of Finance, 52*(1), 83-109. doi:10.2307/2329557

Lamont, O. A., & Polk, C. (2001). The Diversification Discount: Cash Flows versus Returns. *The Journal of Finance, 56*(5), 1693-1721.

Lamont, O. A., & Polk, C. (2002). Does diversification destroy value? Evidence from the industry shocks. *Journal of Financial Economics, 63*(1), 51-77. doi:10.1016/S0304-405X(01)00089-7

Lang, L. H. P., & Stulz, R. M. (1994). Tobin's q, Corporate Diversification, and Firm Performance. *Journal of Political Economy, 102*(6), 1248-1280.

Lee, C.-F., Finnerty, J. E., & Chen, H.-Y. (2010). Risk-Aversion, Capital Asset Allocation, and Markowitz Portfolio-Selection Model. In C.-F. Lee, A. C. Lee, & J. Lee (Eds.), *Handbook of Quantitative Finance and Risk Management* (pp. 69-92). Boston, MA: Springer US.

Lee, C.-F., Finnerty, J. E., & Wort, D. H. (2010). Capital Asset Pricing Model and Beta Forecasting. In C.-F. Lee, A. C. Lee, & J. Lee (Eds.), *Handbook of Quantitative Finance and Risk Management* (pp. 93-109). Boston, MA: Springer US.

Lee, K., Peng, M. W., & Lee, K. (2008). From diversification premium to diversification discount during institutional transitions. *Journal of World Business, 43*(1), 47-65. doi:10.1016/j.jwb.2007.10.010

Leland, H. E. (2007). Financial Synergies and the Optimal Scope of the Firm: Implications for Mergers, Spinoffs, and Structured Finance. *The Journal of Finance, 62*(2), 765-807.

Lesmond, D. A., Ogden, J. P., & Trzcinka, C. A. (1999). A New Estimate of Transaction Costs. *The Review of Financial Studies, 12*(5), 1113-1141. doi:10.1093/rfs/12.5.1113

Levy, H. (2010). The CAPM is Alive and Well: A Review and Synthesis. *European Financial Management, 16*(1), 43-71. doi:10.1111/j.1468-036X.2009.00530.x

Levy, H., & Sarnat, M. (1970). Diversification, Portfolio Analysis and the Uneasy Case for Conglomerate Mergers. *The Journal of Finance, 25*(4), 795-802. doi:10.2307/2325416

Levy, R. A. (1971). The Predictive Significance of Five-Point Chart Patterns. *The Journal of Business, 44*(3), 316-323.

Lewellen, W. G. (1971). A Pure Financial Rationale for the Conglomerate Merger. *The Journal of Finance, 26*(2), 521-537. doi:10.2307/2326063

Liebeskind, J. P. (2000). Internal Capital Markets: Benefits, Costs, and Organizational Arrangements. *Organization Science, 11*(1), 58-76.

Lindenberg, E. B., & Ross, S. A. (1981). Tobin's q Ratio and Industrial Organization. *The Journal of Business, 54*(1), 1-32.

Lins, K., & Servaes, H. (1999). International Evidence on the Value of Corporate Diversification. *The Journal of Finance, 54*(6), 2215-2239. doi:10.1111/0022-1082.00186

Lins, K. V., & Servaes, H. (2002). Is Corporate Diversification Beneficial in Emerging Markets? *Financial Management, 31*(2), 5-31. doi:10.2307/3666220

Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics, 47*(1), 13-37. doi:10.2307/1924119

Lippman, S. A., & McCall, J. J. (1986). An Operational Measure of Liquidity. *The American Economic Review, 76*(1), 43-55.

Lipson, M. L., & Mortal, S. (2007). Liquidity and firm characteristics: Evidence from mergers and acquisitions. *Journal of Financial Markets, 10*(4), 342-361. doi:10.1016/j.finmar.2006.09.004

Liu, H. Y., & Hsu, C. W. (2011). Antecedents and consequences of corporate diversification: A dynamic capabilities perspective. *Management Decision, 49*(9), 1510-1534. doi:10.1108/00251741111173961

Liu, W. (2010). *Liquidity Risk and Asset Pricing: Evidence from Daily Data Over 1926 to 2008*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=1571724 or http://dx.doi.org/10.2139/ssrn.1571724

Lo, A. W., & MacKinlay, A. C. (1990). Data-Snooping Biases in Tests of Financial Asset Pricing Models. *The Review of Financial Studies, 3*(3), 431-467.

Loeb, T. F. (1983). Trading Cost: The Critical Link between Investment Information and Results. *Financial Analysts Journal, 39*(3), 39-44.

Lubatkin, M. (1983). Mergers and the Performance of the Acquiring Firm. *The Academy of Management Review, 8*(2), 218-225. doi:10.2307/257748

Lubatkin, M., & Chatterjee, S. (1994). Extending Modern Portfolio Theory into the Domain of Corporate Diversification: Does It Apply? *The Academy of Management Journal, 37*(1), 109-136. doi:10.2307/256772

Lubatkin, M., Merchant, H., & Srinivasan, N. (1993). Construct validity of some unweighted product-count diversification measures. *Strategic Management Journal, 14*(6), 433-449. doi:10.1002/smj.4250140604

Lubatkin, M., & O'Neill, H. M. (1987). Merger Strategies and Capital Market Risk. *The Academy of Management Journal, 30*(4), 665-684. doi:10.2307/256154

Lubatkin, M., & Rogers, R. C. (1989). Diversification, Systematic Risk, and Shareholder Return: A Capital Market Extension of Rumelt's 1974 Study. *The Academy of Management Journal, 32*(2), 454-465. doi:10.2307/256370

Lubatkin, M., & Shrieves, R. E. (1986). Towards Reconciliation of Market Performance Measures to Strategic Management Research. *Academy of Management Review, 11*(3), 497-512. doi:10.5465/amr.1986.4306197

Lynch, A. W., & Tan, S. (2011). Explaining the Magnitude of Liquidity Premia: The Roles of Return Predictability, Wealth Shocks, and State-Dependent Transaction Costs. *The Journal of Finance, 66*(4), 1329-1368. doi:10.1111/j.1540-6261.2011.01662.x

MacKinlay, A. C. (1995). Multifactor models do not explain deviations from the CAPM. *Journal of Financial Economics, 38*(1), 3-28. doi:10.1016/0304-405X(94)00808-E

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annu Rev Psychol, 58*, 593-614. doi:10.1146/annurev.psych.58.110405.085542

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological methods, 7*(1), 83-104.

Madhavan, A. (2000). Market microstructure: A survey. *Journal of Financial Markets, 3*(3), 205-258. doi:10.1016/S1386-4181(00)00007-0

Majd, S., & Myers, S. C. (1987). Tax Asymmetries and Corporate Tax Reform. In M. Feldstein (Ed.), *The Effects of Taxation on Capital Accumulation* (pp. 343-376). Chicago, U.S.A.: University of Chicago Press.

Maksimovic, V., & Phillips, G. (2007). Conglomerate Firms and Internal Capital Markets. In E. B. Eckbo (Ed.), *Handbook of Empirical Corporate Finance* (pp. 423-479). San Diego, U.S.A.: Elsevier.

Maksimovic, V., & Phillips, G. (2008). The Industry Life Cycle, Acquisitions and Investment: Does Firm Organization Matter? *The Journal of Finance, 63*(2), 673-708. doi:10.1111/j.1540-6261.2008.01328.x

Malkiel, B. G. (1989). Is the Stock Market Efficient? *Science, 243*(4896), 1313-1318. doi:10.1126/science.243.4896.1313

Mansi, S. A., & Reeb, D. M. (2002). Corporate Diversification: What Gets Discounted? *The Journal of Finance, 57*(5), 2167-2183.

Manzon, G. B., Sharp, D. J., & Travlos, N. G. (1994). An Empirical Study of the Consequences of U.S. Tax Rules for International Acquisitions by U.S. Firms. *The Journal of Finance, 49*(5), 1893-1904. doi:10.2307/2329276

Marinelli, F. (2010). *The shareholder value and diversification puzzle*. IESE Business School. University of Navarra

Markides, C. C. (1995). *Diversification, refocusing, and economic performance*. Cambridge, MA: The MIT Press.

Markides, C. C., & Williamson, P. J. (1994). Related Diversification, Core Competencies and Corporate Performance. *Strategic Management Journal, 15*, 149-165.

Markides, C. C., & Williamson, P. J. (1996). Corporate Diversification and Organizational Structure: A Resource-Based View. *The Academy of Management Journal, 39*(2), 340-367. doi:10.2307/256783

Markowitz, H. M. (1952). Portfolio Selection. *The Journal of Finance, 7*(1), 77-91. doi:10.1111/j.1540-6261.1952.tb01525.x

Markowitz, H. M. (1959). *Portfolio selection efficient diversification of investments*. New York, N.Y.: Wiley.

Martin, J. D., & Sayrak, A. (2003). Corporate diversification and shareholder value: a survey of recent literature. *Journal of Corporate Finance, 9*(1), 37-57. doi:10.1016/S0929-1199(01)00053-0

Maruyama, G., & Ryan, C. S. (2014). *Research methods in social relations* (8th ed.). Chichester, England: John Wiley & Sons Ltd.

Mason, E. S. (1939). Price and Production Policies of Large-Scale Enterprise. *The American Economic Review, 29*(1), 61-74.

Mathieu, J. E., & Taylor, S. R. (2006). Clarifying conditions and decision points for mediational type inferences in Organizational Behavior. *Journal of Organizational Behavior, 27*(8), 1031-1056. doi:10.1002/job.406

McDougall, F. M., & Round, D. K. (1984). A Comparison of Diversifying and Nondiversifying Australian Industrial Firms. *The Academy of Management Journal, 27*(2), 384-398. doi:10.2307/255931

Meyer, M., Milgrom, P., & Roberts, J. (1992). Organizational Prospects, Influence Costs, and Ownership Changes. *Journal of Economics & Management Strategy, 1*(1), 9-35. doi:10.1111/j.1430-9134.1992.00009.x

Michaud, R. O. (1989). The Markowitz Optimization Enigma: Is 'Optimized' Optimal? *Financial Analysts Journal, 45*(1), 31.

Michel, A., & Shaked, I. (1984). Does Business Diversification Affect Performance? *Financial Management, 13*(4), 18-25. doi:10.2307/3665297

Miller, D. J. (2006). Technological Diversity, Related Diversification, and Firm Performance. *Strategic Management Journal, 27*(7), 601-619.

Mitton, T., & Vorkink, K. (2010). Why Do Firms with Diversification Discounts Have Higher Expected Returns? *Journal of Financial and Quantitative Analysis, 45*(6), 1367-1390. doi:10.1017/S0022109010000566

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review, 48*(3), 261-297.

Mondello, E. (2015). *Portfoliomanagement: Theorie und Anwendungsbeispiele* (2nd ed.). Wiesbaden, Germany: Springer Fachmedien Wiesbaden.

Montgomery, C. A. (1982). The Measurement of Firm Diversification: Some New Empirical Evidence. *Academy of Management Journal, 25*(2), 299-307. doi:10.2307/255992

Montgomery, C. A. (1994). Corporate Diversification. *The Journal of Economic Perspectives, 8*(3), 163-178.

Montgomery, C. A., & Wernerfelt, B. (1988). Diversification, Ricardian Rents, and Tobin's q. *The RAND Journal of Economics, 19*(4), 623-632. doi:10.2307/2555461

Morck, R., Shleifer, A., & Vishny, R. W. (1990). Do Managerial Objectives Drive Bad Acquisitions? *The Journal of Finance, 45*(1), 31-48. doi:10.2307/2328808

Morgan, A., Nail, L. A., & Megginson, W. L. (2000). *Changes in corporate focus, ownership structure, and long-run merger returns*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=250993

Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica, 34*(4), 768-783. doi:10.2307/1910098

Müller-Stewens, G., & Lechner, C. (2016). *Strategisches Management: Wie strategische Initiativen zum Wandel führen* (5th. rev. ed.). Stuttgart, Germany: Schäffer-Poeschel Verlag.

Myers, C. A. (1983). SMR Forum: Top Management Featherbedding? *Sloan Management Review, 24*(4), 55.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 147-175. doi:10.1016/0304-405X(77)90015-0

Myers, S. C. (1984). Finance Theory and Financial Strategy. *Interfaces, 14*(1), 126-137.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187-221. doi:10.1016/0304-405X(84)90023-0

Nachum, L. (2004). Geographic and Industrial Diversification of Developing Country Firms*. *Journal of Management Studies, 41*(2), 273-294. doi:10.1111/j.1467-6486.2004.00432.x

Nanda, V., & Narayanan, M. P. (1999). Disentangling Value: Financing Needs, Firm Scope, and Divestitures. *Journal of Financial Intermediation, 8*(3), 174-204. doi:dx.doi.org/10.1006/jfin.1999.0265

Nayyar, P. R. (1992). On the Measurement of Corporate Diversification Strategy: Evidence from Large U.S. Service Firms. *Strategic Management Journal, 13*(3), 219-235.

Nayyar, P. R. (1993). Performance Effects of Information Asymmetry and Economies of Scope in Diversified Service Firms. *Academy of Management Journal, 36*(1), 28-57. doi:10.2307/256511

Nocker, E., Bowen, H. P., Stadler, C., & Matzler, K. (2016). Capturing Relatedness: Comprehensive Measures based on Secondary Data. *British Journal of Management, 27*(1), 197-213. doi:10.1111/1467-8551.12124

Ostrowski, O. (2007). *Erfolg durch Desinvestitionen: Eine theoretische und empirische Analyse.* Doctorial dissertation. Universität Gießen, 2007. Gießen, Germany.

Ozbas, O., & Scharfstein, D. S. (2010). Evidence on the Dark Side of Internal Capital Markets. *Review of Financial Studies, 23*(2), 581-599. doi:10.1093/rfs/hhp071

Palepu, K. (1985). Diversification Strategy, Profit Performance and the Entropy Measure. *Strategic Management Journal, 6*(3), 239-255.

Palich, L. E., Cardinal, L. B., & Miller, C. C. (2000). Curvilinearity in the Diversification-Performance Linkage: An Examination of over Three Decades of Research. *Strategic Management Journal, 21*(2), 155-174.

Panzar, J. C., & Willig, R. D. (1981). Economies of Scope. *The American Economic Review, 71*(2), 268-272.

Pástor, Ľ., & Stambaugh, Robert F. (2003). Liquidity Risk and Expected Stock Returns. *Journal of Political Economy, 111*(3), 642-685. doi:10.1086/374184

Patell, J. M., & Wolfson, M. A. (1984). The intraday speed of adjustment of stock prices to earnings and dividend announcements. *Journal of Financial Economics, 13*(2), 223-252. doi:10.1016/0304-405X(84)90024-2

Pehrsson, A. (2006a). Business Relatedness and Performance: A Study of Managerial Perceptions. *Strategic Management Journal, 27*(3), 265-282.

Pehrsson, A. (2006b). Business relatedness measurements: State-of-the-art and a proposal. *European Business Review, 18*(5), 350-363. doi:10.1108/09555340610686949

Penrose, E. T. (1959). *The theory of the growth of the firm*. Oxford, U.K.: Blackwell.

Penrose, E. T. (2009). *The theory of the growth of the firm* (4th ed.). Oxford, New York: Oxford Univ. Press.

Perold, A. F. (2004). The Capital Asset Pricing Model. *Journal of Economic Perspectives, 18*(3), 3-24. doi:10.1257/0895330042162340

Perridon, L., Steiner, M., & Rathgeber, A. W. (2016). *Finanzwirtschaft der Unternehmung* (17th rev. ed.). München, Germany: Verlag Franz Vahlen GmbH.

Perry, S. R. (1998). *A meta-analytic review of the diversification-performance relationship: Aggregating findings in strategic management.* Doctorial dissertation. Florida Atlantic University, 1988. Boca Raton, FL.

Peter, J. P. (1979). Reliability: A Review of Psychometric Basics and Recent Marketing Practices. *Journal of Marketing Research, 16*(1), 6-17. doi:10.2307/3150868

Petersen, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *The Review of Financial Studies, 22*(1), 435-480. doi:10.1093/rfs/hhn053

Picot, A., & Wolff, B. (1994). Institutional Economics of Public Firms and Administrations: Some Guidelines for Efficiency-Oriented Design. *Journal of Institutional and Theoretical Economics (JITE) / Zeitschrift für die gesamte Staatswissenschaft, 150*(1), 211-232.

Pils, F. (2009). *Diversification, Relatedness, and Performance.* Doctorial dissertation. Jacobs University Bremen, 2008. Bremen, Germany.

Piscitello, L. (2004). Corporate diversification, coherence and economic performance. *Industrial and Corporate Change, 13*(5), 757-787. doi:10.1093/icc/dth030

Pitts, R. A., & Hopkins, H. D. (1982). Firm Diversity: Conceptualization and Measurement. *The Academy of Management Review, 7*(4), 620-629. doi:10.2307/257229

Poddig, T., Dichtl, H., & Petersmeier, K. (2003). *Statistik, Ökonometrie, Optimierung Methoden und ihre praktischen Anwendungen in Finanzanalyse und Portfoliomanagement* (3rd rev. ed.). Bad Soden am Taunus, Germany: Uhlenbruch.

Pogue, G. A. (1970). An Extension of the Markowitz Portfolio Selection Model to Include Variable Transactions' Costs, Short Sales, Leverage Policies and Taxes. *The Journal of Finance, 25*(5), 1005-1027. doi:10.2307/2325576

Pomfret, R., & Shapiro, D. (1980). Firm Size, Diversification, and Profitability of Large Corporations in Canada. *Journal of Economic Studies, 7*(3), 140-150. doi:10.1108/eb002515

Porter, M. E. (2004). *Competitive strategy techniques for analyzing industries and competitors*. New York, NY: Free Press.

Prahalad, C. K., & Bettis, R. A. (1986). The dominant logic: A new linkage between diversity and performance. *Strategic Management Journal, 7*(6), 485-501. doi:10.1002/smj.4250070602

Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological methods, 16*(2), 93-115. doi:10.1037/a0022658

Purkayastha, S., Manolova, T. S., & Edelman, L. F. (2012). Diversification and Performance in Developed and Emerging Market Contexts: A Review of the Literature*. *International Journal of Management Reviews, 14*(1), 18-38. doi:10.1111/j.1468-2370.2011.00302.x

Raghunathan, S. P. (1995). A Refinement of the Entropy Measure of Firm Diversification: Toward Definitional and Computational Accuracy. *Journal of Management, 21*(5), 989-1002. doi:10.1177/014920639502100510

Rajan, R., Servaes, H., & Zingales, L. (2000). The Cost of Diversity: The Diversification Discount and Inefficient Investment. *The Journal of Finance, 55*(1), 35-80. doi:10.1111/0022-1082.00200

Ramanujam, V., & Varadarajan, P. (1989). Research on Corporate Diversification: A Synthesis. *Strategic Management Journal, 10*(6), 523-551. doi:10.1002/smj.4250100603

Ranaldo, A. (2000). *Intraday Trading Activity on Financial Markets: The Swiss Evidence.* Doctorial dissertation. University of Fribourg, 2000. Fribourg, Switzerland.

Rappaport, A. (1981). Selecting strategies that create shareholder value. *Harvard Business Review, 59*(3), 139-149.

Rappaport, A. (1986). *Creating shareholder value : the new standard for business performance*. New York, NY: Free Press.

Reilly, F. K., & Brown, K. C. (2012). *Investment analysis & portfolio management* (10th ed.). Mason, OH: South-Western Cengage Learning.

Reilly, R. F. (2000). *Handbook of advanced business valuation*. New York, NY: McGraw-Hill.

Reinganum, M. R. (1981). Misspecification of capital asset pricing. *Journal of Financial Economics, 9*(1), 19-46. doi:10.1016/0304-405X(81)90019-2

Revelle, W., & Rocklin, T. (1979). Very Simple Structure: An Alternative Procedure For Estimating The Optimal Number Of Interpretable Factors. *Multivariate Behavioral Research, 14*(4), 403-414. doi:10.1207/s15327906mbr1404_2

Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring Organizational Performance: Towards Methodological Best Practice. *Journal of Management, 35*(3), 718-804. doi:10.1177/0149206308330560

Robins, J. A., & Wiersema, M. F. (1995). A Resource-Based Approach to the Multibusiness Firm: Empirical Analysis of Portfolio Interrelationships and

Corporate Financial Performance. *Strategic Management Journal, 16*(4), 277-299.

Robins, J. A., & Wiersema, M. F. (2003). The Measurement of Corporate Portfolio Strategy: Analysis of the Content Validity of Related Diversification Indexes. *Strategic Management Journal, 24*(1), 39-59. doi:10.1002/smj.282

Robison, L. J., & Barry, P. J. (1980). Portfolio Theory and Asset Indivisibility: Implications for Analysis of Risk Management. *North Central Journal of Agricultural Economics, 2*(1), 41-46. doi:10.2307/1349269

Rojahn, J. (2008). *Liquidität und Bewertung: Messung und Management des Illiquiditätsabschlags am deutschen Aktienmarkt.* Doctorial dissertation. Universität Duisburg-Essen, 2008. Duisburg, Germany.

Rojahn, J. (2017). Wertpapierliquidität und Kontrolle durch institutionelle Anleger. In B. Kaluza, K. D. Braun, H. Beschorner, & B. Rolfes (Eds.), *Betriebswirtschaftliche Fragen zu Steuern, Finanzierung, Banken und Management* (pp. 349-362). Wiesbaden, Germany: Springer Fachmedien Wiesbaden.

Rojahn, J., & Zechser, F. (2017). The effect of corporate diversification on credit risk: new evidence from European credit default swap spreads. *Accounting & Finance*, 1 ff. doi:10.1111/acfi.12306

Roll, R. (1977). A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory. *Journal of Financial Economics, 4*(2), 129-176. doi:10.1016/0304-405X(77)90009-5

Roll, R. (1984). A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market. *The Journal of Finance, 39*(4), 1127-1139. doi:10.1111/j.1540-6261.1984.tb03897.x

Rose, N. L., & Shepard, A. (1997). Firm Diversification and CEO Compensation: Managerial Ability or Executive Entrenchment? *The RAND Journal of Economics, 28*(3), 489-514. doi:10.2307/2556026

Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive evidence of market inefficiency. *The Journal of Portfolio Management, 11*(3), 9-16.

Ross, S. A. (1973). The Economic Theory of Agency: The Principal's Problem. *The American Economic Review, 63*(2), 134-139.

Ross, S. A. (1978). The Current Status of the Capital Asset Pricing Model (CAPM). *The Journal of Finance, 33*(3), 885-901. doi:10.2307/2326486

Rubinstein, M. (2002). Markowitz's "Portfolio Selection": A Fifty-Year Retrospective. *The Journal of Finance, 57*(3), 1041-1045.

Rudy De, W., & Christophe, M. (2003). A comparison of alternative spread décomposition models on Euronext Brussels. *Brussels Economic Review, 46*(4), 91-136.

Rumelt, R. P. (1974). *Strategy, structure, and economic performance*. Cambridge, MA: Harvard University Press.

Rumelt, R. P. (1982). Diversification Strategy and Profitability. *Strategic Management Journal, 3*(4), 359-369. doi:10.1002/smj.4250030407

Sadka, R. (2006). Momentum and post-earnings-announcement drift anomalies: The role of liquidity risk. *Journal of Financial Economics, 80*(2), 309-349. doi:10.1016/j.jfineco.2005.04.005

Sambharya, R. B. (2000). Assessing the Construct Validity of Strategic and SIC-Based Measures of Corporate Diversification. *British Journal of Management, 11*(2), 163-173. doi:10.1111/1467-8551.t01-1-00158

Samuelson, P. A. (1970). The Fundamental Approximation Theorem of Portfolio Analysis in terms of Means, Variances and Higher Moments. *The Review of Economic Studies, 37*(4), 537-542. doi:10.2307/2296483

Santalo, J., & Becerra, M. (2008). Competition from Specialized Firms and the Diversification-Performance Linkage. *The Journal of Finance, 63*(2), 851-883.

Santarelli, E., & Tran, H. T. (2016). Diversification strategies and firm performance in Vietnam. *Economics of Transition, 24*(1), 31-68. doi:10.1111/ecot.12082

Sarr, A., & Lybek, T. (2002). *Measuring Liquidity in Financial Markets*. Unpublished manuscript. Retrieved from eoh database. International Monetary Fund, Washington, DC.

Sauerbier, P. (2006). *Liquiditätsspreads im Gleichgewicht auf illiquiden Anleihemärkten.* Doctorial dissertation. Universitat Mannheim, 2006. Mannheim, Germany.

Scharfstein, D. S. (1998). The Dark Side of Internal Capital Markets II: Evidence from Diversified Conglomerates. *National Bureau of Economic Research Working Paper Series, No. 6352*. doi:10.3386/w6352

Scharfstein, D. S., & Stein, J. C. (2000). The Dark Side of Internal Capital Markets: Divisional Rent-Seeking and Inefficient Investment. *The Journal of Finance, 55*(6), 2537-2564. doi:10.1111/0022-1082.00299

Scherer, F. M. (1980). *Industrial market structure and economic performance* (2nd ed.). Boston, MA: Houghton Mifflin.

Schermelleh-Engel, K., & Werner, C. S. (2012). Methoden der Reliabilitätsbestimmung. In H. Moosbrugger & A. Kelava (Eds.), *Testtheorie und Fragebogenkonstruktion* (pp. 119-141). Berlin, Heidelberg: Springer Berlin Heidelberg.

Schipper, K., & Smith, A. (1983). Effects of recontracting on shareholder wealth: The case of voluntary spin-offs. *Journal of Financial Economics, 12*(4), 437-467. doi:10.1016/0304-405X(83)90043-0

Schmidt, H., & Iversen, P. (1991). Geld-Brief-Spannen deutscher Standardwerte in IBIS und MATIS. *Zeitschrift für Bankrecht und Bankwirtschaft, 3*(4), 209-226. doi:10.15375/zbb-1991-0403

Schnell, R., Hill, P. B., & Esser, E. (2013). *Methoden der empirischen Sozialforschung* (10th rev. ed.). München, Germany: Oldenbourg.

Schredelseker, K. (2003). Zwölf Missverständnisse zum Shareholder Value aus finanzwirtschaftlicher Sicht. In K. Matzler, H. Pechlaner, & B. Renzl (Eds.), *Werte schaffen: Perspektiven einer stakeholderorientierten Unternehmensführung* (pp. 99-123). Wiesbaden, Germany: Gabler Verlag.

Schreiner, A. (2007). *Equity valuation using multiples: An empirical investigation.* Doctorial dissertation. Universität St. Gallen (HSG), 2006. St. Gallen, Switzerland.

Schüle, F. M. (1992). *Diversifikation und Unternehmenserfolg: Eine Analyse empirischer Forschungsergebnisse*. Wiesbaden, Germany: Gabler.

Schwartz, R. A. (1991). *Reshaping the equity markets : a guide for the 1990s*. New York, NY: Harper Business.

Schwartz, R. A., & Peng, L. (2006). Market Liquidity. In C.-F. Lee & A. C. Lee (Eds.), *Encyclopedia of Finance* (pp. 630-633). Boston, MA: Springer US.

Serafeim, G., Kuppuswamy, V., & Villalonga, B. (2014). The Effect of Institutional Factors on the Value of Corporate Diversification. In B. Villalonga (Ed.), *Finance and Strategy* (Vol. 31, pp. 37-68). Bingley, England: Emerald Group Publishing Limited.

Servaes, H. (1996). The Value of Diversification During the Conglomerate Merger Wave. *The Journal of Finance, 51*(4), 1201-1225. doi:10.1111/j.1540-6261.1996.tb04067.x

Shackman, J. D. (2007). Corporate Diversification, Vertical Integration, and Internal Capital Markets: A Cross-Country Study. *MIR: Management International Review, 47*(4), 479-504. doi:10.1007/s11575-007-0027-z

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance, 19*(3), 425-442. doi:10.2307/2977928

Shen, P., & Starr, R. M. (2002). Market-makers' supply and pricing of financial market liquidity. *Economics Letters, 76*(1), 53-58. doi:10.1016/S0165-1765(02)00029-0

Shepherd, W. G., & Shepherd, J. M. (2004). *The economics of industrial organization* (5th ed.). Long Grove, IL: Waveland Press.

Shin, H.-H., & Stulz, R. M. (1998). Are Internal capital Markets Efficient? *The Quarterly Journal of Economics, 113*(2), 531-552. doi:10.1162/003355398555676

Shleifer, A. (2000). *Inefficient markets an introduction to behavioral finance*. Oxford, NY: Oxford University Press.

Shleifer, A., & Vishny, R. W. (1989). Management entrenchment. *Journal of Financial Economics, 25*(1), 123-139. doi:10.1016/0304-405X(89)90099-8

Singh, H., & Montgomery, C. A. (1987). Corporate Acquisition Strategies and Economic Performance. *Strategic Management Journal, 8*(4), 377-386.

Singh, M., Mathur, I., & Gleason, K. C. (2004). Governance and Performance Implications of Diversification Strategies: Evidence from Large U.S. Firms. *Financial Review, 39*(4), 489-526. doi:10.1111/j.0732-8516.2004.00086.x

Singhal, R., & Zhu, Y. (2013). Bankruptcy risk, costs and corporate diversification. *Journal of Banking & Finance, 37*(5), 1475-1489. doi:10.1016/j.jbankfin.2011.11.019

Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. *Sociological Methodology, 13*, 290-312. doi:10.2307/270723

Sobel, M. E. (1986). Some New Results on Indirect Effects and Their Standard Errors in Covariance Structure Models. *Sociological Methodology, 16*, 159-186. doi:10.2307/270922

Spremann, K. (1987). Agent and Principal. In G. Bamberg & K. Spremann (Eds.), *Agency Theory, Information, and Incentives* (pp. 3-37). Berlin, Heidelberg: Springer Berlin Heidelberg.

Spremann, K. (2008). *Portfoliomanagement* (4th rev. ed.). München, Germany: Oldenbourg.

Srivasta, A., Nargundkar, S., & Green, R. F. (1994). An empirical evaluation of the equivalence of categorical and continuous measures of diversity. *Journal of Business Research, 29*(2), 145-149. doi:10.1016/0148-2963(94)90018-3

Stein, J. C. (1997). Internal Capital Markets and the Competition for Corporate Resources. *The Journal of Finance, 52*(1), 111-133. doi:10.2307/2329558

Stein, J. C. (2003). Agency, Information and Corporate Investment. *Handbook of the Economics of Finance, 1*, 111-165. doi:10.1016/S1574-0102(03)01006-9

Steiner, M., Bruns, C., & Stöckl, S. (2012). *Wertpapiermanagement Professionelle Wertpapieranalyse und Portfoliostrukturierung* (10th rev. ed.). Stuttgart, Germany: Schäffer-Poeschel Verlag.

Stephen, G. B., & Thomas, E. Q. (1990). Does Patient Program Trading Really Pay? *Financial Analysts Journal, 46*(3), 35-42.

Stiglitz, J. E. (1974). Incentives and Risk Sharing in Sharecropping. *The Review of Economic Studies, 41*(2), 219-255. doi:10.2307/2296714

Stimpert, J. L., & Duhaime, I. M. (1997). In the Eyes of the Beholder: Conceptualizations of Relatedness Held by the Managers of Large Diversified Firms. *Strategic Management Journal, 18*(2), 111-125.

Stoll, H. R. (1978). The Supply of Dealer Services in Securities Markets. *The Journal of Finance, 33*(4), 1133-1151. doi:10.2307/2326945

Stoll, H. R. (1989). Inferring the Components of the Bid-Ask Spread: Theory and Empirical Tests. *The Journal of Finance, 44*(1), 115-134. doi:10.1111/j.1540-6261.1989.tb02407.x

Stoll, H. R. (2000). Friction. *The Journal of Finance, 55*(4), 1479-1514. doi:10.1111/0022-1082.00259

Stoll, H. R. (2003). Chapter 9 - Market Microstructure. In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), *Handbook of the Economics of Finance* (Vol. 1, pp. 553-604). Amsterdam, Netherland: Elsevier.

Stone, C. A., & Sobel, M. E. (1990). The robustness of estimates of total indirect effects in covariance structure models estimated by maximum. *Psychometrika, 55*(2), 337-352. doi:10.1007/bf02295291

Strong, N. (1992). MODELLING ABNORMAL RETURNS: A REVIEW ARTICLE. *Journal of Business Finance & Accounting, 19*(4), 533-553. doi:10.1111/j.1468-5957.1992.tb00643.x

Stulz, R. M. (1990). Managerial discretion and optimal financing policies. *Journal of Financial Economics, 26*(1), 3-27. doi:10.1016/0304-405X(90)90011-N

Subrahmanyam, A. (1991). A Theory of Trading in Stock Index Futures. *The Review of Financial Studies, 4*(1), 17-51.

Subrahmanyam, A. (2010). The Cross-Section of Expected Stock Returns: What Have We Learnt from the Past Twenty-Five Years of Research? *European Financial Management, 16*(1), 27-42. doi:10.1111/j.1468-036X.2009.00520.x

Summers, L. H. (1986). Does the Stock Market Rationally Reflect Fundamental Values? *The Journal of Finance, 41*(3), 591-601. doi:10.2307/2328487

Szeless, G. (2001). *Diversifikation und Unternehmenserfolg: Eine empirische Analyse deutscher, schweizerischer und österreichischer Unternehmen.* Doctorial dissertation. Hochschule St. Gallen für Wirtschafts-, Rechts- und Sozialwissenschaften, 2001. St. Gallen, Switzerland.

Szeless, G., Wiersema, M., & Müller-Stewens, G. (2003). Portfolio Interrelationships and Financial Performance in the Context of European Firms. *European Management Journal, 21*(2), 146-163. doi:10.1016/S0263-2373(03)00010-0

Tanriverdi, H., & Venkatraman, N. (2005). Knowledge Relatedness and the Performance of Multibusiness Firms. *Strategic Management Journal, 26*(2), 97-119.

Thomas, S. (2002). Firm diversification and asymmetric information: evidence from analysts' forecasts and earnings announcements. *Journal of Financial Economics, 64*(3), 373-396. doi:10.1016/S0304-405X(02)00129-0

Thomas, S., & Fee, C. E. (2000). *Corporate diversification, asymmetric information, and firm value: Evidence from stock market trading characteristics*. Retrieved from SSRN Electronic Journal: https://ssrn.com/abstract=204908. or http://dx.doi.org/10.2139/ssrn.204908

Thyer, B. A. (2010). *The handbook of social work research methods* (B. A. Thyer Ed. 2nd ed.). Los Angeles, LA: SAGE.

Tihanyi, L., Griffith, D. A., & Russell, C. J. (2005). The effect of cultural distance on entry mode choice, international diversification, and MNE performance: a meta-analysis. *Journal of International Business Studies, 36*(3), 270-283. doi:10.1057/palgrave.jibs.8400136

Tobin, J. (1969). A General Equilibrium Approach To Monetary Theory. *Journal of Money, Credit and Banking, 1*(1), 15-29. doi:10.2307/1991374

Van Ness, B. F., Van Ness, R. A., & Warr, R. S. (2001). How Well Do Adverse Selection Components Measure Adverse Selection? *Financial Management, 30*(3), 77-98. doi:10.2307/3666377

Varadarajan, P. R. (1986). Product Diversity and Firm Performance: An Empirical Investigation. *Journal of Marketing, 50*(3), 43-57. doi:10.2307/1251584

Varadarajan, P. R., & Ramanujam, V. (1987). Diversification and Performance: A Reexamination Using a New Two-Dimensional Conceptualization of Diversity in Firms. *The Academy of Management Journal, 30*(2), 380-393. doi:10.2307/256281

Vayanos, D. (1998). Transaction Costs and Asset Prices: A Dynamic Equilibrium Model. *The Review of Financial Studies, 11*(1), 1-58.

Veld, C., & Veld-Merkoulova, Y. V. (2004). Do spin-offs really create value? The European case. *Journal of Banking & Finance, 28*(5), 1111-1135. doi:10.1016/S0378-4266(03)00045-1

Veld, C., & Veld-Merkoulova, Y. V. (2008). An Empirical Analysis of the Stockholder-Bondholder Conflict in Corporate Spin-Offs. *Financial Management, 37*(1), 103-124. doi:10.1111/j.1755-053X.2008.00006.x

Venkatraman, N., & Grant, J. H. (1986). Construct Measurement in Organizational Strategy Research: A Critique and Proposal. *Academy of Management Review, 11*(1), 71-87. doi:10.5465/amr.1986.4282628

Venkatraman, N., & Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. *The Academy of Management Review, 11*(4), 801-814. doi:10.2307/258398

Verbeek, M. (2008). *A guide to modern econometrics* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Very, P. (1993). Success in Diversification: Building on Core Competences. *Long Range Planning, 26*(5), 80-92. doi:10.1016/0024-6301(93)90080-Y

Viebig, J., Varmaz, A., & Poddig, T. (2008). *Equity Valuation: Models from Leading Investment Banks*. Chichester, England: John Wiley & Sons Ltd.

Vijh, A. M. (1994). The Spinoff and Merger Ex-Date Effects. *The Journal of Finance, 49*(2), 581-609. doi:10.2307/2329164

Villalonga, B. (2004a). Diversification Discount or Premium? New Evidence from the Business Information Tracking Series. *The Journal of Finance, 59*(2), 479-506. doi:10.1111/j.1540-6261.2004.00640.x

Villalonga, B. (2004b). Does Diversification Cause the "Diversification Discount"? *Financial Management, 33*(2), 5-27.

Volkart, R. (2008). *Corporate Finance : Grundlagen von Finanzierung und Investition* (4th ed.). Zürich, Switzerland: Versus-Verlag.

Vollmar, J. (2014). *Spin-offs, Diversifikation und Shareholder Value: Eine theorie- und hypothesengeleitete empirische Analyse europäischer Unternehmensabspaltungen*. Wiesbaden, Germany: Springer Fachmedien Wiesbaden.

Vollmer, R. (2008). *Rechnungslegung auf informationseffizienten Kapitalmärkten.* Doctorial dissertation. Ruhr-Universität Bochum, 2008. Bochum, Germany.

Vollrath, R. (2003). *Indikatoren der Kursentwicklung von Wachstumsunternehmen: eine theoretische und empirische Analyse auf der Basis von Emissionsprospekten*. Bad Soden am Taunus, Germany: Uhlenbruch.

Wallmeier, M. (2000). Determinanten erwarteter Renditen am deutschen Aktienmarkt — Eine empirische Untersuchung anhand ausgewählter Kennzahlen. *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung, 52*(1), 27-57. doi:10.1007/bf03372607

Walsh, J. P., & Seward, J. K. (1990). On the Efficiency of Internal and External Corporate Control Mechanisms. *The Academy of Management Review, 15*(3), 421-458. doi:10.2307/258017

Wan, W. P., & Hoskisson, R. E. (2003). Home Country Environments, Corporate Diversification Strategies, and Firm Performance. *Academy of Management Journal, 46*(1), 27-45. doi:10.2307/30040674

Watanabe, A., & Watanabe, M. (2008). Time-Varying Liquidity Risk and the Cross Section of Stock Returns. *The Review of Financial Studies, 21*(6), 2449-2486. doi:10.1093/rfs/hhm054

Wegener, D. T., & Fabrigar, L. R. (2004). Constructing & Evaluating Quantitative Measures for Social Psychological Research: Conceptual Challenges & Methodological Solutions. In C. Sansone, C. C. Morf, & A. T. Panter (Eds.),

The SAGE Handbook of Methods in Social Psychology (pp. 145-172). Thousand Oaks, California: SAGE Publications, Inc.

Weiss, M. (2009). *Aufbau eines Konzeptes zur ressourcenorientierten Messung des Diversifikationsgrades* (1st. ed.). Berlin, Germany: Pro Business.

Welker, M. (1995). Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets*. *Contemporary Accounting Research, 11*(2), 801-827. doi:10.1111/j.1911-3846.1995.tb00467.x

Wen, Y. (2017). Firm opacity and informed trading around spinoffs. *The Journal of Risk Finance*. doi:10.1108/JRF-01-2017-0008

Wenzel, A. (2006). *Kapitalstrukturpolitik in Wachstumsunternehmen: Eine empirische Untersuchung deutscher Unternehmen auf Basis von Jahresabschlussinformationen*. Bad Soden, Deutschland: Uhlenbruch Verlag GmbH.

West, T. L., & Jones, J. D. (1999). *Handbook of business valuation* (2nd ed.). New York, NY: John Wiley & Sons, Inc.

Weston, J. F. (1970). The Nature and Significance of Conglomerate Firms. *St. John's Law Review, 44*(5), 66-80.

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica, 48*(4), 817-838. doi:10.2307/1912934

Williamson, O. E. (1988). Corporate Finance and Corporate Governance. *The Journal of Finance, 43*(3), 567-591. doi:10.2307/2328184

Wolff, J. (2003). *Eine Intermarket-Analyse der Komponenten der Geld-Brief-Spanne.* Doctorial dissertation. Wissenschaftliche Hochschule für Unternehmensführung Vallendar, 2002. Vallendar, Germany.

Wooldridge, J. M. (2013). *Introductory econometrics a modern approach* (5th ed.). Mason, OH: South-Western Cengage Learning.

Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach* (6th ed.). Boston, MA Cengage Learning.

Worthington, A. C., & Higgs, H. (2004). Random walks and market efficiency in European equity markets. *Global Journal of Finance and Economics, 1*(1), 59-78.

Wrigley, L. (1970). *Divisional autonomy and diversification.* Unpublished doctorial dissertation. Harvard University. Boston, MA.

Wulf, T. (2007). *Diversifikationserfolg: Eine top-management-orientierte Perspektive.* Post doctorial thesis. Universität Erlangen-Nürnberg, 2005. Erlangen-Nürnberg, Germany.

Wyss, R. v. (2004). *Measuring and Predicting Liquidity in the Stock Market.* Doctorial dissertation. Universität St. Gallen, 2004. St. Gallen, Switzerland.

Yan, A. (2006). Value of Conglomerates and Capital Market Conditions. *Financial Management, 35*(4), 5-30. doi:10.1111/j.1755-053X.2006.tb00157.x

Yan, A., Yang, Z., & Jiao, J. (2010). Conglomerate investment under various capital market conditions. *Journal of Banking & Finance, 34*(1), 103-115. doi:10.1016/j.jbankfin.2009.07.006

Young, D., & Sutcliffe, B. (1990). Value gaps—Who is right?—The raiders, the market or the managers? *Long Range Planning, 23*(4), 20-34. doi:10.1016/0024-6301(90)90149-X

Zaremba, A. (2016). A Performance Evaluation Model for Global Macro Funds. *International Journal of Finance & Banking Studies, 3*(1), 161-172.

Zechser, F., & Rojahn, J. (2017). *A market-implied approach to measuring corporate diversification*. Paper presented at the The 11th Professor Aleksander Zelias International Conference on Modelling and Forecasting of Socio-Economic Phenomena. http://pliki.konferencjazakopianska.pl/proceedings_2017/pdf/Zechser_Rojahn.pdf

Zhao, X., Lynch, J. J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. *Journal of Consumer Research, 37*(2), 197-206. doi:10.1086/651257

Zhou, Y. M. (2011). SYNERGY, COORDINATION COSTS, AND DIVERSIFICATION CHOICES. *Strategic Management Journal, 32*(6), 624-639.

Zuckerman, E. W. (2000). Focusing the Corporate Product: Securities Analysts and De-diversification. *Administrative Science Quarterly, 45*(3), 591-619. doi:10.2307/2667110