Profit Shifting of Multinational Entities

Empirical Analysis of Effective Tax Rates, Mergers & Acquisitions and Financing Structures

INAUGURALDISSERTATION

zur Erlangung des akademischen Grades eines Doktors der Wirtschaftswissenschaften der Universität Mannheim

vorgelegt von

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Tag der mündlichen Prüfung: 9. Februar 2018

Acknowledgements

First and foremost, I thank my academic supervisor Professor Dr. Ulrich Schreiber. He has played an integral part in my entire academic education, and his inspiring personality and rigorous research dedication gave me confidence to pursue a Ph.D. in empirical tax research. I am extremely grateful for his continuous encouragement and excellent guidance at all times during my Ph.D. Further, I am deeply indebted to the academic freedom he granted and the supportive research environment he created at his chair.

I am also thankful to Professor Dr. Johannes Voget who provided invaluable methodological input to my research. He was always supportive and his constructive criticism and guidance on my empirical work has substantially improved my papers. Further, I thank him for being the second reviewer of my thesis.

Moreover, I would like to thank my co-authors—Dr. Thomas Belz, Oliver Hahn (M.Sc.), Christoph Harendt (M.Sc.), Fabian Nicolas Pönnighaus (M.Sc.), Axel Prettl (M.Sc.), and Dr. Christian Steffens—for their dedication and contribution to our joint work. It has been a pleasure to work together with them, and I am grateful for the professional and supportive collaboration and working atmosphere we established.

Additionally, I thank my colleagues at the chair and in the Area Accounting & Taxation for the pleasant working environment and fruitful discussions we had over the past four years.

Parts of this thesis received academic and financial support from the Leibniz ScienceCampus "MannheimTaxation" (MaTax) and the Julius Paul Stiegler Memorial Foundation, for which I am very grateful.

Further, I would like to express my deepest gratitude to my family. Words cannot express how thankful I am to my parents for their unconditional support during my entire education. They always stood behind me and encouraged me to take the less travelled road. Finally, yet importantly, I thank Iman for her passionate support during my Ph.D.

Heidelberg, 31st October 2017 *Dominik von Hagen*

Overview

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List of Symbols

For Section 4

$C(\Pi_{Acq})$	Cost function for profit shifting
D_{Acq}	Loan taken up by acquirer
DIV_{Acq}	Dividend payment from target to acquirer
n	Point in time
P_{Acq}	Acquirer reservation price
$P_{Acq}^{Credit,Repatriation}$	Acquirer reservation price if acquirer resides in a country that applies the credit method on foreign dividends, assuming immediate profit repatriation
$P_{Acq}^{Exemption,Repatriation}$	Acquirer reservation price if acquirer resides in a country that applies the exemption method on foreign dividends, assuming immediate profit repatriation
$P_{Acq}^{Credit,IndefiniteRetention}$	Acquirer reservation price if acquirer resides in a country that applies the credit method on foreign dividends, assuming indefinite profit retention in tax haven
$P_{Acq,A}^{fullPS}$	Reservation price of acquirer (A), assuming full profit shifting
$P_{Acq,B}^{fullPS}$	Reservation price of acquirer (B), assuming full profit shifting
PVF	Present value factor
r	Market interest rate
t	Point in time
TAX^{noPS}	*TAX* assuming no profit shifting
TAX_{div}^{noPS}	*TAX* assuming no profit shifting (dividends taxation component)
TAX^{fullPS}	*TAX* assuming full profit shifting
TAX_{div}^{fullPS}	*TAX* assuming full profit shifting (dividends taxation component)
$TAX_{div}^{fullPS,indefinite}$	*TAX* assuming full profit shifting and indefinite profit retention in tax haven (dividends taxation component)
$TAX_{DIV0CG0}^{fullPS}$	*TAX* if acquirer resides in a country that applies the credit method on foreign dividends and taxes capital gains, assuming full profit shifting
$TAX_{DIV0CG1}^{fullPS}$	*TAX* if acquirer resides in a country that applies the credit method on foreign dividends and does not tax capital gains, assuming full profit shifting
$TAX_{DIV1CG0}^{fullPS}$	*TAX* if acquirer resides in a country that applies the exemption method on foreign dividends and taxes capital gains, assuming full profit shifting
$TAX_{DIV1CG1}^{fullPS}$	*TAX* if acquirer resides in a country that applies the exemption method on foreign dividends and does not tax capital gains, assuming full profit shifting
TAX_{CG}	*TAX* (capital gains taxation component)
TVF	Terminal value factor

$\alpha^{A,i}$	$\alpha^{A,i}$ takes the value $\frac{1}{(1-\tau^i)}$ ($\frac{1}{(1-\tau^A)}$) if country A taxes (does not tax) foreign dividends from country *i*
β^j	β^j takes the value 1 (0) if country *j* taxes (does not tax) capital gains
Δ_{Acq}	Synergy
$\Delta_{Acq,A}$	Synergy of acquirer A
$\Delta_{Acq,B}$	Synergy of acquirer B
ε	Target profits
Π_{Acq}	Amount of target profits shifted to tax haven
τ_{Acq}	Total tax burden on dividend payment from target to acquirer
τ_{Acq}^{Credit}	Total tax burden on dividend payment from target to acquirer if acquirer resides in a country that applies the credit method on foreign dividends
$\tau_{Acq}^{Exemption}$	Total tax burden on dividend payment from target to acquirer if acquirer resides in a country that applies the exemption method on foreign dividends
$\tau_{Acq}^{Exemption,WHT}$	Total tax burden on dividend payment from target to acquirer if acquirer resides in a country that applies the exemption method on foreign dividends and target country levies a withholding tax on dividends
$\tau_{Acq}^{Exemption,fullPS}$	Total tax burden on dividend payment from target to acquirer if acquirer resides in a country that applies the exemption method on foreign dividends, assuming full profit shifting
τ^A	STR in country A
$\tau^{A,CG}$	Statutory corporate capital gains tax rate in country A
$\tau^{B,CG}$	Statutory corporate capital gains tax rate in country B
τ^T	STR in country T
τ_{WHT}^T	Withholding tax rate on dividends in country T
τ^{TH}	STR in country TH
τ^{THA}	STR in country TH of acquirer A
τ^{THB}	STR in country TH of acquirer B
ϕ_{Acq}	Non-deductible profit shifting costs
χ_{Acq}^A	Profit shifting costs deductible for tax purposes in country A
χ_{Acq}^T	Profit shifting costs deductible for tax purposes in country T
χ_{Acq}^{TH}	Profit shifting costs deductible for tax purposes in country TH

For Section 6

D	Darlehen
D^j	Darlehen der Konzerngesellschaft *j*
EK	Eigenkapital
FE^{BE}	Finanzaufwand der belgischen Tochtergesellschaft
FI^{BE}	Finanzertrag der belgischen Tochtergesellschaft
FK	Fremdkapital
i	Fremdverkehrsüblicher Zinssatz
i^*	Grenzzinssatz
i^j	Zinssatz der Konzerngesellschaft *j*
n	Fiktiver Eigenkapital-Zinssatz
s_K^A	Körperschaftsteuersatz in Staat A
s_K^{BE}	Körperschaftsteuersatz in Belgien
s^j	Steuersatz der Konzerngesellschaft *j*
$s^{Konzern}$	Effektive Konzernsteuerquote
$Steuerersparnis^j$	Steuerersparnis der Konzerngesellschaft *j*
$Steuerersparnis^{Konzern}$	Steuerersparnis im Konzern
$Steuerzahlung^{BE}$	Steuerzahlung der belgischen Gesellschaft
VN	Vortrag für ungenutzten Eigenkapital-Zinsaufwand
VN^{max}	Maximal abzugsfähiger ungenutzter Eigenkapital-Zinsaufwand
$Z\dot{U}_N^A$	Zahlungsüberschuss nach Steuern in Staat A
$Z\dot{U}_N^{BE}$	Zahlungsüberschuss nach Steuern in Belgien

List of Abbreviations

AAA	American Accounting Association
ACE	allowance of corporate equity
AG	Aktiengesellschaft ((German) stock corporation)
APB	Accounting Principles Board
ASC	Accounting Standards Codification
AStG	Außensteuergesetz ((German) Foreign Transactions Tax Act)
ASX	Australian Securities Exchange
AU	Australia
avg.	average
BE	Belgium
belg.	belgisch (Belgian)
BEPS	base erosion and profit shifting
BsGaV	Betriebsstättengewinnaufteilungsverordnung ((German) Ordinance on the Allocation of Profits of Permanent Establishments)
BTD	book-tax differences
BVB	Bursa de Valori Bucuresti (Bucharest Stock Exchange)
bzw.	beziehungsweise (respectively)
CA	Canada
CFC	controlled foreign corporation
CON	capital ownership neutrality
CSMAR	China Stock Market & Accounting Research
CUSIP	Committee on Uniform Security Identification Procedures
DAX	Deutscher Aktienindex (German Stock Index)
DBA	Doppelbesteuerungsabkommen (double taxation convention)
DE	Germany
def.	deferred
DTC	double taxation convention
e.g.	exempli gratia (for example)
EAA	European Accounting Association
EATR	corporate effective average tax rate
EBITDA	earnings before interest, taxes, depreciation, and amortization
ECJ	European Court of Justice
EEA	European Economic Area
ES	Spain
et al.	et alii (and others)
ETR	effective tax rate
EU	European Union
excl.	excluding
FASB	Financial Accounting Standards Board
FDI	foreign direct investment

Finanzierungsges.	Finanzierungsgesellschaft (finance company)
Ford. ggü. verb. Unt.	Forderungen gegenüber verbundenen Unternehmen (loans to affiliated companies)
FR	France
G20	Group of Twenty
GDP	gross domestic product
Ges.	Gesellschaft (company)
GLS	generalized least squares
GNI	gross national income
HGB	Handelsgesetzbuch ((German) Commercial Code)
i.e.	id est (that is)
IAS	International Accounting Standard
IBFD	International Bureau of Fiscal Documentation
IFRS	International Financial Reporting Standard
IIA	independence of irrelevant alternatives
Inc.	Incorporated
incl.	including
IP	intellectual property
IRS	Internal Revenue Service
IT	Italy
JEL	Journal of Economic Literature
JP	Japan
KGaA	Kommanditgesellschaft auf Aktien ((German) limited joint-stock partnership)
M&A	merger and acquisition
MAER-Net	Meta-Analysis of Economics Research-Network
max.	maximum
MDAX	Mid-Cap Deutscher Aktienindex (Mid-Cap German Stock Index)
min.	minimum
Mio.	Million (million)
MNE	multinational entity
Mrd.	Milliarde (billion)
n/a	not applicable; not available
NID	notional interest deduction
NL	Netherlands
no.	number
NZ	New Zealand
obs.	observation
OECD	Organisation for Economic Co-operation and Development

OLS	ordinary least squares
p.	page
PACAP	Pacific-Basin Capital Market Research Center
pp.	pages
PRE	permanently reinvested earnings
R&D	research and development
reg.	regression
ROA	return on assets
SDAX	Small-Cap Deutscher Aktienindex (Small-Cap German Stock Index)
SDC	Securities Data Company
SE	Societas Europaea
SEDOL	Stock Exchange Daily Official List
SFAS	Statement of Financial Accounting Standard
SIC	standard industrial classification
SSRN	Social Science Research Network
std. dev.	standard deviation
STR	statutory corporate income tax rate
TecDAX	Deutscher Technologieindex (German Technology Stock Index)
Tochterges.	Tochtergesellschaft (subsidiary)
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
US	United States
US-GAAP	United States Generally Accepted Accounting Principles
USA	United States of America
USD	United States Dollar
vgl.	vergleiche (confer)
VHB	Verband der Hochschullehrer für Betriebswirtschaft (German Academic Association for Business Research)
vs.	versus (against)
WLS	weighted least squares
z.B.	zum Beispiel (for example)
ZEW	Zentrum für Europäische Wirtschaftsforschung (Centre for European Economic Research)
&	and
€	Euro
§	Paragraph (Section)
%	percent

1 Introduction

1.1 Thesis outline

In recent years, both tax researchers and policy makers have intensely discussed profit shifting of multinational entities (MNEs). The basic idea of profit shifting is to reduce taxable income and tax payments in high-tax subsidiaries by strategically locating debt and/or intellectual property (IP) within MNEs. Several empirical studies provide evidence of profit shifting within MNEs and currently the Organisation for Economic Co-operation and Development (OECD) and the European Union (EU) aim at restraining these strategies. In this thesis, I take three perspectives on profit shifting that have not received much attention in research yet. First, I analyze in detail whether profit shifting related firm characteristics affect firms' effective tax rates (ETRs). Second, I comprehensively evaluate the effect of profit shifting opportunities within acquirer corporate taxation systems on cross-border merger and acquisition (M&A) activity. Third, I approach profit shifting via internal debt financing by performing an extensive case study on Belgian finance companies of German MNEs.

In my first perspective (see Figure A 1 in Appendix to Section 1), I consider profit shifting related determinants of firm ETRs. The ETR is a commonly used measure to detect profit shifting, and I focus on two ETR determinants with a particular relation to profit shifting: research and development (R&D) intensity and firm size. A firm's R&D intensity can serve as a proxy for a firm's IP, which is a main profit shifting tool. This reasoning suggests a negative relation between R&D intensity and ETR. However, depending on ETR definition, a tax accounting effect may have a further negative effect, which is due to a potentially earlier recognition of R&D expenses in the tax accounts than in the financial accounts. Applying weighted least squares (WLS) meta-regression analysis on a large meta-data set from 1975–2012, I confirm a negative relation between R&D intensity and ETR and find that the R&D profit shifting effect on the ETR is twice as much as the R&D tax accounting effect on the ETR. In addition, I detect that 10% of the profit shifting effect is due to R&D tax credits.

The effect of firm size on ETR is well-discussed in accounting research with some studies also arguing from a profit shifting perspective. However, in the past decades, empirical studies have provided evidence for two opposing theories on the size-ETR relation: the political power theory, suggesting a negative relation, and the political cost theory, suggesting a positive relation. I quantitatively summarize these studies in a meta-regression analysis and find evidence for the political cost theory. Further, I detect that profit shifting opportunities, society- and governance-related elements affect the size-ETR relation.

In my second perspective (see Figure A 2 in Appendix to Section 1), I study the corporate taxation system in the acquiring MNE's ultimate parent country and determine the effect of profit shifting opportunities on cross-border M&A activity. I apply logit and ordinary least squares (OLS) regression models on a large cross-border M&A data set from 2002–2014 provided by SDC Platinum. First, I analyze whether profit shifting opportunities have an effect on M&A prices. This analysis is performed via a simple theoretical model capturing various characteristics of the acquirer's taxation system. The model incorporates the joint effect of three major components of an acquirer's taxation system on M&A prices: foreign dividends and capital gains taxation, and controlled foreign corporation (CFC) rule characteristics that proxy for MNE-wide profit shifting opportunities. In the empirical application of the theoretical model, I show that foreign dividends taxation in the acquirer country negatively affects M&A prices. In addition, profit shifting opportunities positively affect M&A prices if the target country does not apply anti profit shifting measures. Second, I analyze the effect of CFC rules on M&A activity and show that the probability of acquiring a low-tax target decreases if CFC rules are potentially applicable to this target's income. Correspondingly, I find that CFC rules distort target location choice. Finally, I detect that CFC rules negatively affect M&A direction, i.e., countries with CFC rules are less likely to attract parent firms in a newly created MNE following a cross-border M&A.

In my third perspective (see Figure A 3 in Appendix to Section 1), I consider one particular profit shifting channel: the use of finance companies to strategically allocate debt within MNEs. In particular, I investigate the Belgian notional interest deduction (NID) regime, which makes it attractive for an MNE to locate its finance company in Belgium. In an extensive case study approach on a hand-collected data set consisting of all majority-owned Belgian subsidiaries of DAX and MDAX MNEs from 2011–2014, I detect 14 Belgian finance companies; seven of these subsidiaries seem to be also operationally active. Further, I estimate the amount of profits shifted to Belgium by these MNEs to be around one billion Euro annually, which translates into saved tax payments of up to 242 million Euro by these MNEs due to applying the NID regime. Finally, I approximate Belgium's tax revenue loss due to the NID regime to be up to 36 million Euro per year for this data set.

The remainder of this thesis proceeds as follows. The following two subsections present the research contribution of this thesis and the analyzed data. Sections 2 and 3 contain the meta-regression analyses on the relation between R&D intensity and ETR and the size-ETR relation. Sections 4 and 5 contain the analyses on the effect of acquirer corporate taxation systems on cross-border M&A activity. Section 6 presents the case study analyzing whether large German MNEs use the Belgian NID regime as a tax planning tool within their groups. Finally, Section 7 sets forth the main conclusions of this thesis.

1.2 Research contribution

This thesis contributes to literature on profit shifting within MNEs by taking three perspectives on this topic that have not yet received much attention in research. I provide several insights into understanding how firm characteristics affect ETRs (Sections 2 and 3), how corporate taxation systems affect cross-border M&A activity (Sections 4 and 5), and how German MNEs make use of Belgian finance companies (Section 6). These insights are of interest for both the research community and policy makers. In the following, I provide a concise review of essential empirical literature on the respective topic and summarize my key research contributions obtained in each perspective.

1.2.1 Profit shifting related determinants of ETRs

The first perspective (see Figure A 1 in Appendix to Section 1) investigates two profit shifting related determinants of firm ETRs: R&D intensity and firm size. Several studies consider R&D intensity a proxy for IP that facilitates profit shifting (e.g., Desai et al. (2006), Overesch and Schreiber (2010)). Given that the ETR is a common measure for the degree of tax planning in general (e.g., Mills et al. (1998), Phillips (2003)) and for the degree of profit shifting in particular (e.g., Rego (2003), Markle and Shackelford (2012)), it is plausible to expect a negative relation between R&D intensity and ETR. Indeed, all primary studies of my meta-data set (see Section 1.3.1) report at least one negative coefficient of this relation, and the median and mean across all estimates is negative; however, there is some variation in reported coefficients, for example, about half of the primary studies report at least one positive coefficient (see Table 5 and Figure 7 in Section 2). The meta-regression analyses in Section 2 not only quantitatively summarize these coefficients but also bring to light significant sources of bias and variation in existing empirical studies, two aspects that have not been investigated in empirical research yet and may help to improve future empirical models on ETR determinants.

The basic research contribution of this perspective is that it brings forth a negative consensus estimate on the effect of R&D intensity on the ETR and allows an understanding of which factors are driving this estimate in the sample of 21 primary studies. Besides a negative profit shifting effect of R&D intensity on the ETR (e.g., Desai et al. (2006), Overesch and Schreiber (2010)), there is also a negative tax accounting effect of R&D intensity on the ETR. The latter effect is present if R&D expenses are immediately incurred in the tax accounts but capitalized and deferred in the financial accounts (e.g., Gupta and Newberry (1997), Armstrong et al. (2012)). However, the relative importance of each effect is unclear and has not been addressed in empirical literature yet. In my work, I go beyond such a basic meta-regression analysis. My meta-data set characteristics and the meta-

regression analysis allow me to clearly investigate both effects and, thereby, to contribute to this open research question.

Firm size is another determinant of ETRs and accounting research has been discussing the size-ETR relation for more than 40 years. Proponents of the political power theory assume a negative relationship by arguing that larger firms have more possibilities to influence the political process in their favor, to engage in international tax planning, and to organize their activities to achieve optimal tax savings (e.g., Siegfried (1972), Rego (2003)). Proponents of the political cost theory assume a positive relationship by arguing that larger firms are subject to larger public visibility, which causes them to be exposed to greater regulatory actions by the government or to be expected to take more social responsibility (e.g., Zimmerman (1983), Omer et al. (1993)). A first look into empirical studies reveals that they report significantly positive and significantly negative size-ETR relations as well as insignificant results (see Table A 1 in Appendix to Section 3).

Similar to the meta-regression analysis on the effect of R&D intensity on ETR, I contribute to the literature by providing a meta-regression analysis on the size-ETR relation. I calculate a positive consensus estimate on the size-ETR relation across 49 primary studies and address significant sources of bias and variation in primary studies. Again, I perform an analysis beyond these findings by investigating whether the size-ETR relation depends on further characteristics. In particular, I find that tax planning elements seem to affect this relation. For example, in line with a recent study by Dyreng et al. (2017), I find that the size-ETR relation responded to the introduction of the check-the-box rule, which is presumed to simplify profit shifting of United States (US) MNEs. Further, I find that society- and governance-related elements seem to affect the size-ETR relation. For example, the Hofstede Power Distance Index explains variation in the size-ETR relation between countries.

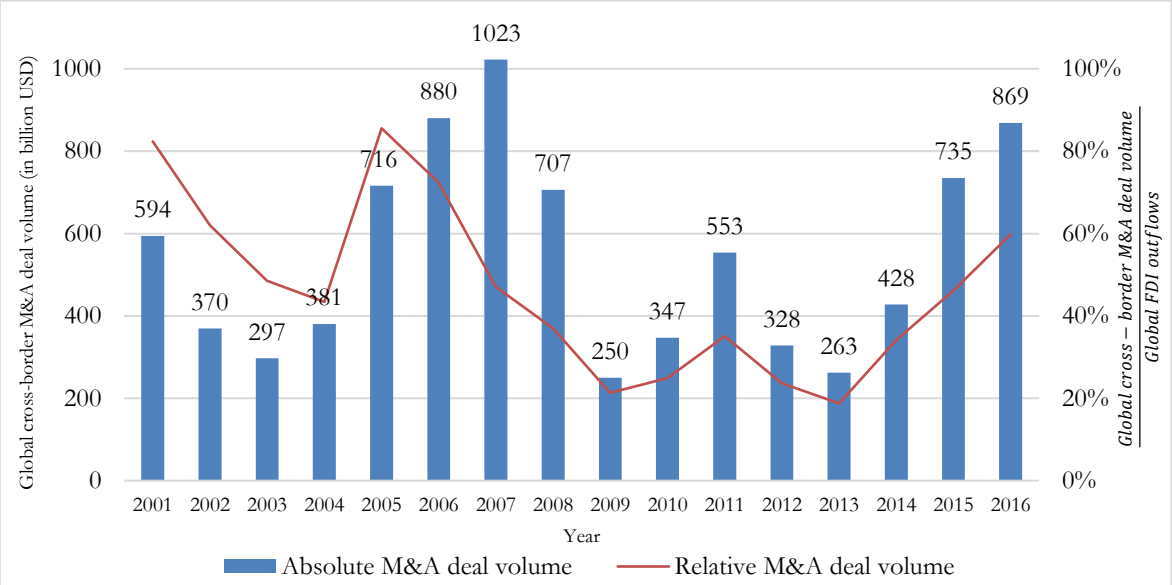
Taken together, the meta-regression analyses on profit shifting related determinants of ETRs in Sections 2 and 3 provide consensus estimates based on a rigorous research method and point out factors driving these estimates. In additional analyses, I explore profit shifting related characteristics that potentially influence the effect of R&D intensity and firm size on ETRs.

1.2.2 Cross-border M&A activity and corporate taxation systems

The second perspective (see Figure A 2 in Appendix to Section 1) investigates cross-border M&A activity in the context of profit shifting opportunities within acquirer corporate taxation systems. Figure 1 shows that global cross-border M&A deal volume is substantial both in absolute terms, with a yearly average of 546 billion USD, and in relative terms, with an average share of 46% of total foreign direct investment (FDI). These numbers suggest

that cross-border M&As are economically as important as foreign greenfield investment, the other form of FDI. Due to this importance, my empirical analyses on distortionary effects of acquirer corporate taxation systems on cross-border M&A activity are highly relevant not only for the business world but for tax policy makers as well.

Figure 1. Development of global cross-border M&A deal volume (2001–2016).



This figure provides a graph of the development of global cross-border M&A deal volume from 2001–2016. The absolute M&A deal volume is on the left *y*-axis and is illustrated with blue bars. The relative M&A deal volume (global cross-border M&A deal volume divided by global FDI outflows) is on the right *y*-axis and is illustrated with the red line. Years are on the *x*-axis. Sources: UNCTAD (2007), UNCTAD (2011), UNCTAD (2016), UNCTAD (2017a)).

Empirical research has extensively analyzed the sensitivity of FDI to host country tax rates. In this context, the meta-regression analysis by Feld and Heckemeyer (2011) summarizes 45 primary studies and finds that an increase of one percentage point in host country corporate income tax rate reduces FDI in the respective country by around three percentage points. However, those studies deal with the effect of taxes on FDI in general and typically do not distinguish between foreign greenfield investment and cross-border M&As. In a cross-border M&A setting, the studies by Hebous et al. (2011), Herger et al. (2016) and Arulampalam et al. (2017) find that the corporate income tax rate of a potential target has a negative effect on actual acquisition of this target. For example, Hebous et al. (2011) calculate that a 1% increase in host country corporate income tax rate reduces the probability of receiving an M&A investment by 0.3%. However, empirical research on the sensitivity of cross-border M&A activity to acquirer corporate taxation systems is scarce. In the following, I summarize three studies in this context.

Huizinga and Voget (2009) investigate the direction and volume of cross-border M&A activity by analyzing whether the prospect of international double taxation of foreign dividends in the acquiring country affects the parent-subsidiary-structure following cross-border M&As. They calculate that a one percentage point higher double taxation rate on foreign dividends results in a nine percentage points lower probability of being the acquiring firm, i.e., countries with higher international double taxation are less likely to attract parent firms in cross-border M&As. In a further analysis, they simulate that, if the United States of America (USA) changes its taxation system from taxing to exempting foreign dividends, the proportion of US parent firms would increase from 51% to 58%. Finally, the authors consider the effect of international double taxation of foreign dividends on aggregate country-level M&A activity and find that a one percentage point higher double taxation rate in the residence country results in a 1.7% lower number of cross-border M&As.

Voget (2011) investigates whether additional taxation in the residence country upon repatriation of foreign dividends affects the probability of headquarters relocations away from that country. He finds that an increase in a country's dividend repatriation tax rate by ten percentage points increases the share of relocations of headquarters by two percentage points. In addition, he detects that the presence of CFC rules positively affects headquarters relocations.

Feld et al. (2016a) investigate whether taxation (credit method) or non-taxation (exemption method) of foreign dividends affects the probability of a successful bid for a foreign target. They find evidence that the credit method impedes cross-border M&A activity and that a country's change from the credit to the exemption method increases its cross-border M&A number. In a further analysis, the authors calculate the gain in efficiency, in the form of additional synergies, generated by the change from the credit to the exemption method in Japan and the United Kingdom in 2009. For Japan (United Kingdom), this change generated 109 million USD (4 million USD) additional annual synergies. For the USA, they simulate this synergy gain to be 537 million USD were the USA to change from the credit to the exemption method for foreign dividends.

To my knowledge, although there is extensive empirical evidence on profit shifting activities within MNEs (e.g., Huizinga and Laeven (2008), Weichenrieder (2009), Grubert (2012), Dharmapala and Riedel (2013)), no empirical study besides Voget (2011) investigates cross-border M&A activity in light of profit shifting opportunities within an acquirer corporate taxation system.

In Sections 4 and 5, I contribute to empirical literature by analyzing whether acquirer corporate taxation systems affect cross-border M&A activity. In particular, Section 4 investigates whether international double taxation of dividends of foreign targets affects M&A prices, which to my knowledge has not been considered yet. In addition, I analyze

the effect of acquirer corporate capital gains taxation on M&A prices, which so far has only been studied for the seller side (e.g., Ayers et al. (2007), Feld et al. (2016b)) or the individual shareholder level (e.g., Ayers et al. (2003), Huizinga et al. (2017)). Finally, I examine whether profit shifting opportunities affect M&A prices. I proxy such profit shifting opportunities by CFC rules, which are found to significantly affect MNE-wide profit shifting opportunities (e.g., Altshuler and Hubbard (2003), Ruf and Weichenrieder (2012)).[1] The effect of CFC rules within an acquirer corporate taxation system are analyzed in more detail in Section 5. In particular, I consider the effect of CFC rules on low-tax target acquisition and on cross-border M&A direction, which empirical research has not addressed yet.

Taken together, by analyzing the effect of acquirer corporate taxation systems on cross-border M&A activity, I contribute to a strand of literature where little research has been undertaken so far. In addition, my analysis also has two relevant tax policy implications. First, my finding that CFC rules lead to a competitive disadvantage on the cross-border M&A market is interesting in light of current tax policy developments, as the OECD suggests effective CFC rule implementation (OECD/G20 (2015a)) and the EU even requires its member states to implement CFC rules by 2019 (European Council (2016)). Hence, firms residing in the EU, as well as OECD and G20 member states that implement CFC rules, may face disadvantages on the cross-border M&A market. Second, my finding that exempting foreign dividends from taxation has a positive impact on cross-border M&A prices is interesting in light of current proposals to change US tax law (United States Department of the Treasury (2017)). I calculate that the proposed change from taxation to non-taxation of foreign dividends repatriation to the USA increases cross-border M&A prices with US acquirers by up to 38.5%.

1.2.3 Belgian finance companies of German MNEs

The third perspective (see Figure A 3 in Appendix to Section 1) investigates whether large German MNEs implement a particular profit shifting channel—internal debt shifting—by establishing Belgian finance companies that make use of the Belgian NID regime and provide debt to affiliates. A large body of empirical research already documents internal debt shifting within MNEs (e.g., Desai et al. (2004), Mintz and Weichenrieder (2005), Buettner et al. (2009), Overesch and Wamser (2010), Ruf (2010), Buettner et al. (2012), Buettner and Wamser (2013)). Feld et al. (2013) conduct a meta-regression analysis on the tax sensitivity of firm leverage and summarize that a ten percentage points tax rate increase leads to a three percentage points increase in leverage. However, this is a rather small effect. One explanation for this small effect may be that debt shifting is not the main profit shifting

[1] In short, if CFC rules are enacted in the MNE's parent country, they lead to an immediate taxation of low-tax subsidiaries' income in the parent country, even if no repatriation takes place. Thereby, MNE-wide profit shifting to low-tax subsidiaries becomes largely ineffective.

channel, as concluded from the meta-regression analysis by Heckemeyer and Overesch (2017). Another explanation may be that tax planning opportunities of firms in the analyzed data sets are very heterogeneous, for example, due to the presence of loss firms (Feld et al. (2013)) or the presence of small MNEs, which may engage to a smaller degree in profit shifting (Rego (2003)).

Based on this argumentation, I intentionally focus on internal debt shifting within the largest German MNEs and profitable firms. In particular, I develop a case study, which allows a detailed analysis of balance sheets and profit and loss statements of single potential finance companies. This case study approach further allows (a) identification of specific German MNEs with Belgian finance companies, (b) a check as to whether these finance companies are also operationally active, (c) calculation of approximate tax savings of German MNEs due to Belgian finance companies, and (d) calculation of approximate tax revenue gains or losses of Belgium within the data set due to the NID regime. Besides the fact that, to my knowledge, no such case study has been conducted, I contribute to empirical studies that find that the introduction of the Belgian NID regime triggered a decrease in leverage of Belgian firms (e.g., Princen (2012), Panier et al. (2015), Schepens (2016)). Further, I give some practical insights into how equity of a typical finance company in an NID country is potentially used within the MNE. Thereby, I contribute to the results from Hebous and Ruf (2017), who find two interesting results for subsidiaries that are located in an NID regime country and belong to a German MNE. First, such subsidiaries report an up to five percentage points lower leverage than subsidiaries in non-NID countries. Second, such subsidiaries show a significant increase in passive investments after the introduction of an NID regime.

Taken together, the case study on internal debt shifting in Section 6 provides a detailed analysis of Belgian finance companies of large German MNEs. In addition, I estimate the volume of internal debt shifting for these finance companies and approximate whether the NID regime leads to tax revenue gains or losses for Belgium within the data set.

1.3 Data

In any empirical study, a proper understanding of the analyzed data is essential. In the following, I provide detailed information on the underlying data analyzed in this thesis. This information extends the data description in each section.

1.3.1 ETR meta-data

The ETR meta-data set analyzed in Sections 2 and 3 is a hand-collected data set that fulfills the reporting guidelines of the Meta-Analysis of Economics Research-Network (MAER-

Net).[2] In a first step, I identified relevant primary studies by extensively searching through several online journal databases such as ProQuest or ScienceDirect for published studies and the Social Science Research Network (SSRN) for working papers. Additionally, I performed Internet research via Google Scholar. I used central keywords such as "effective tax rate", "R&D intensity" or "firm size", among others, to identify empirical studies that examine determinants of ETR or factors explaining variation in ETR across firms. I compiled a sample of 49 primary studies; the last sample update was in January 2017. In a second step, I collected the data from the primary studies.

In line with the reporting guidelines of MAER-Net, I sampled the following data: the two estimated effect sizes of interest (i.e., the coefficients of R&D intensity and firm size),[3] their standard errors, the sample size, several dummy variables for the econometric specification as well as for the inclusion of theoretically relevant variables and their definition, the empirical setting (such as considered period and country), the database used, and whether the primary study is published or unpublished. Further, in any meta-regression analysis, it is decisive that the effect size of interest is comparable across the underlying primary studies (Stanley (2001)). This prerequisite is met in the meta-data set: R&D intensity is calculated by scaling a firm's total R&D expenses either by its total assets or by its total sales; firm size is calculated by taking the natural logarithm of a firm's total assets, total sales, or market value. Thus, primary effect sizes are comparable and do not have to be standardized or converted to a common metric. For summary statistics on the effect sizes and meta-regressor variables, see Table 4 and Table 5 in Section 2 for the R&D intensity analysis and Table 8 and Table 9 in Section 3 for the firm size analysis.

The final meta-data set has data on 393 primary regressions from 49 studies for the firm size analysis and 153 primary regressions from 21 studies for the R&D intensity analysis. The decrease occurs as only a fraction of primary regressions includes R&D intensity as an explanatory variable. Figure 2 provides an overview of the geographical coverage and shows that countries from Asia[4] and Europe[5] as well as Australia, New Zealand, and the USA are present in the meta-data set.

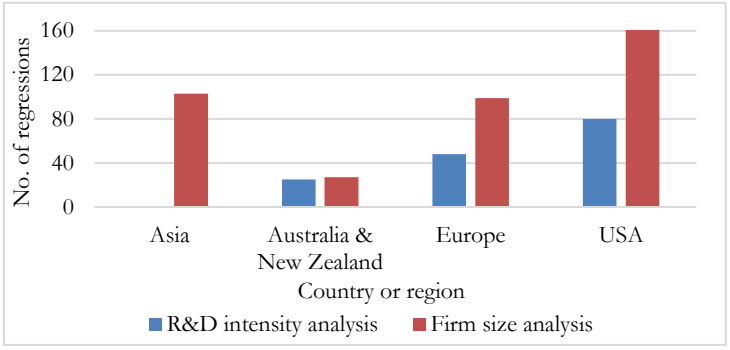
[2] For information on the reporting guidelines of MAER-Net, see Stanley et al. (2013).

[3] To capture within-study variation and avoid subjective decisions on which estimates to use, I sampled all firm size and R&D intensity coefficients from each study. If the sample size of a primary study's subsample was smaller than 35 observations, I did not include these coefficients in the meta-data set, since statistical inference on small samples can lead to spurious results. In robustness analyses, I address the issue of undue weight of primary studies due to varying regression numbers per study; I find that this issue does not bias the results.

[4] The countries from Asia are China, Hong Kong, India, Malaysia, Republic of Korea, Russian Federation, Taiwan, and Thailand.

[5] The countries from Europe are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Romania, Spain, Sweden, the Netherlands, and the United Kingdom.

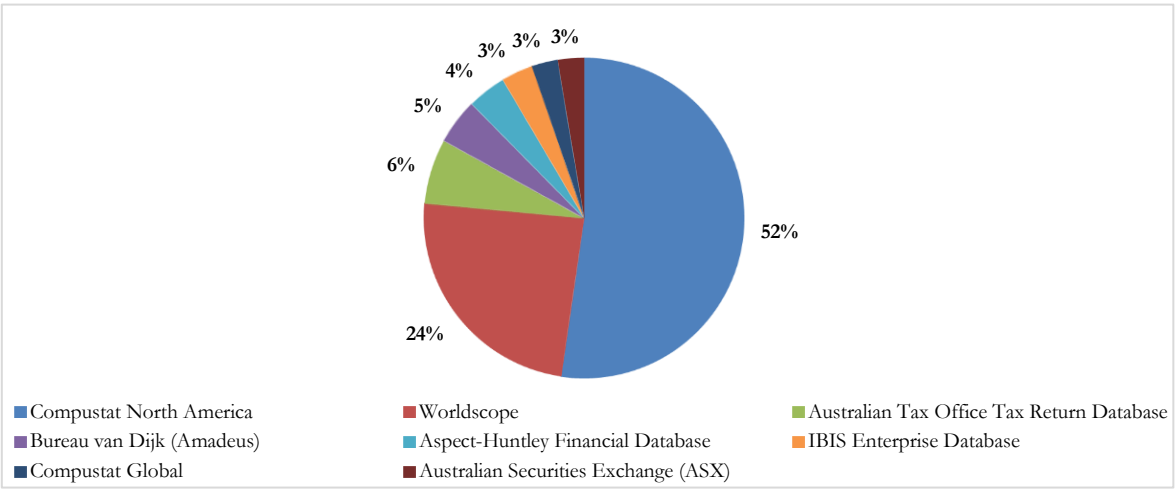
Figure 2. Covered regions in ETR meta-data set.



For information on the Asian and European countries, see footnotes 4 and 5. Source: ETR meta-data set.

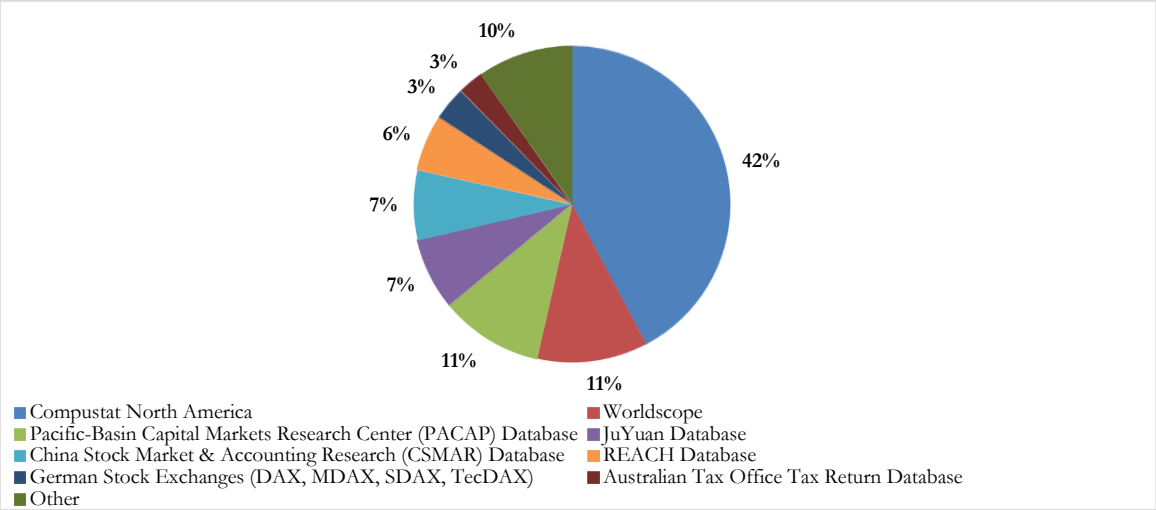
Figure 3 and Figure 4 show the databases analyzed in the primary regressions. Compustat North America is the dominating database in the R&D intensity and firm size analysis. A substantial number of primary regressions are also based on the Worldscope database and—in the firm size analysis—on the Pacific-Basin Capital Market Research Center (PACAP) database. In total, the R&D intensity (firm size) analysis considers 8 (16) different databases. These databases bring variation into the meta-data set as they differ, for example, regarding firm types represented (listed vs. non-listed) or geographic coverage. To account for unobserved database fixed effects, I include a dummy variable for each database in the meta-regression analyses.

Figure 3. Covered databases in ETR meta-data set (R&D intensity analysis).



Source: ETR meta-data set.

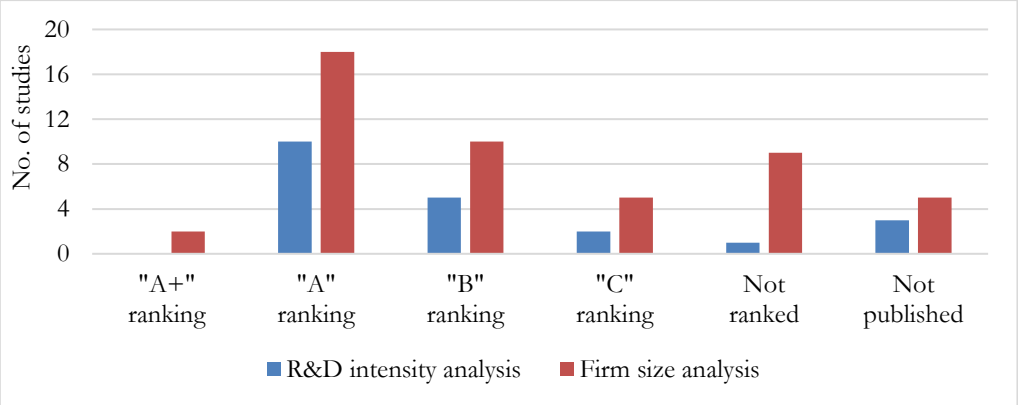
Figure 4. Covered databases in ETR meta-data set (firm size analysis).



Other databases contribute fewer than ten primary regressions. These databases are the Aspect-Huntley Financial Database, Amadeus, Compustat Global, Datex New Zealand Business Information Database, IBIS Enterprise Database, Prowess Corporate Database, Australian Securities Exchange (ASX), and Bucharest Stock Exchange (BVB). Source: ETR meta-data set.

Finally, Figure 5 gives an overview of the VHB-JOURQUAL ranking[6] of the journals in which the primary studies are published. The majority of the underlying primary studies are published in highly ranked peer-reviewed journals, and only a small number of primary studies are not published.

Figure 5. Ranking of journals in ETR meta-data set.



The journal ranking in which primary studies of ETR meta-data set are published is based on the VHB-JOURQUAL ranking (see footnote 6). Source: ETR meta-data set.

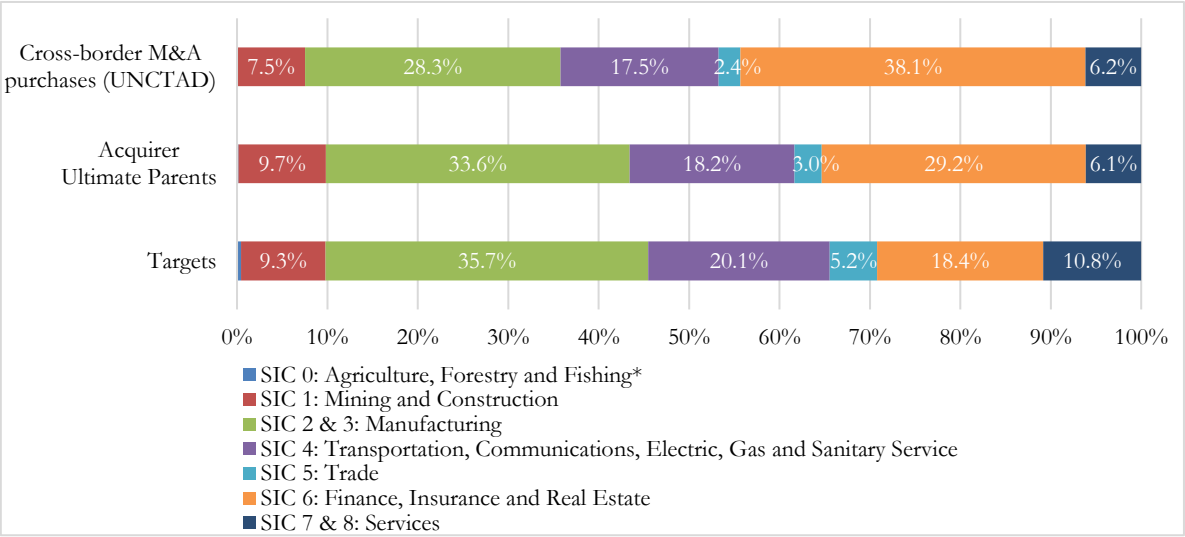
[6] For further information, see http://vhbonline.org/vhb4you/jourqual/vhb-jourqual–3/teilrating-steu.

1.3.2 Cross-border M&A and corporate taxation system data

The M&A data analyzed in Sections 4 and 5 are obtained from SDC Platinum, which contains global M&A activity and provides information on the acquirer ultimate parent, direct acquirer, target ultimate parent, and direct target (in the following: "four involved firms"). I downloaded all completed M&A deals from 1990–2014. The minimum requirement is that the M&A year and countries of the four involved firms are given, which leaves a sample of around 254,000 observations. I further require that the acquirer ultimate parent holds the majority of shares in the target after the M&A and that the industry sector of the four involved firms is known. These restrictions leave a sample of around 169,000 observations. Finally, since I put the focus on analyzing cross-border M&As, I require that the acquirer ultimate parent and the target reside in different countries, which leaves a sample of around 49,000 observations.

Figure 6 illustrates that 81% of acquirer ultimate parents and 74% of targets in this sample come from three industry sectors: manufacturing, transportation, and finance. This dominance is confirmed in data on cross-border M&A purchases provided by UNCTAD (2017b), which report a share of 84% of these three industry sectors. Around 60% (40%) of observations in my sample are horizontal (vertical) M&As. Table 1 shows the origin of the acquirer ultimate parents and targets in this sample. In line with prior research (e.g., di Giovanni (2005)), countries with the largest financial markets have most observations. This M&A data set serves as the basis for the analyses in Sections 4 and 5; data restrictions on firm and country control variables may decrease sample size in these analyses.

Figure 6. Relative deal volume of industry sectors of involved M&A firms in the sample compared to UNCTAD data (1990–2014).



This figure shows the relative deal volume of main industry sectors (according to SIC code) of the acquirer ultimate parents and targets in my cross-border M&A data set in comparison to data on cross-border M&A purchases from UNCTAD (2017b). The percentage numbers are the average share from 1990–2014. Sources: Cross-border M&A data set and UNCTAD (2017b).
*Agriculture, forestry, and fishing account for less than 0.5% in each group.

Table 1. Countries of acquirer ultimate parents and targets (1990–2014).

Country	No. of acquirer ultimate parents	No. of targets	Country	No. of acquirer ultimate parents	No. of targets
Australia	1,807	2,422	Italy	793	980
Austria	302	199	Japan	1,627	517
Bahrain	112	10	Kuwait	61	11
Bailiwick of Jersey	76	45	Luxembourg	206	112
Belgium	487	510	Malaysia	704	430
Bermuda	395	91	Mexico	191	532
Brazil	171	889	Netherlands	1,342	1,134
British Virgin Islands	148	154	New Zealand	193	565
Canada	4,349	2,808	Norway	641	634
Cayman Islands	78	37	Philippines	68	154
Chile	114	306	Poland	106	511
China	726	1,655	Portugal	135	186
Colombia	73	187	Republic of Korea	336	334
Cyprus	168	53	Russian Federation	219	353
Denmark	463	557	Saudi Arabia	63	20
Finland	466	451	Singapore	1,243	688
France	2,052	2,164	South Africa	441	420
Germany	1,848	2,308	Spain	814	1,120
Greece	154	88	Sweden	1,306	1,119
Guernsey	148	43	Switzerland	1,093	546
Hong Kong	1,340	962	Taiwan	219	207
Iceland	81	11	Thailand	128	248
India	609	564	United Arab Emirates	136	90
Indonesia	84	400	United Kingdom	8,054	6,026
Ireland	899	472	United States	10,614	10,541
Isle of Man	67	35	Other	899	4,153
Israel	472	269	**Sum**	**49,321**	**49,321**

The corporate taxation system data analyzed in Sections 4 and 5 are hand-collected from various sources.[7] For the 49 OECD, EU, and G20 member states, information is collected on statutory corporate income tax rate (STR), corporate capital gains tax rate, dividend withholding tax rate, anti profit shifting measures such as CFC rules, thin capitalization or interest stripping rules, and transfer pricing documentation rules as well as on the unilateral methods of avoiding double taxation on foreign dividends and capital gains. Table 2 provides information on these data for 2014. In addition, bilateral (i.e., tax treaty) or multilateral (i.e., EU-wide) information is collected regarding a more beneficial dividend withholding tax rate or double taxation avoidance method. If the outcome on these levels is more beneficial for tax payers, the lower withholding tax rate or the more beneficial double taxation avoidance method is used in my analyses. For an extensive descriptive survey of this corporate taxation system data set for 2002–2015, see Section 4.3.

[7] The sources are, in general, national tax law, IBFD European Tax Handbook (2002-2016) and Ernst & Young (2004-2016). For CFC rules, additional sources are Deloitte (2015) and KPMG (2008). For thin capitalization or interest stripping rules, additional sources are Lund et al. (2008), Buettner et al. (2012), Blouin et al. (2014), and Buettner et al. (2017). For transfer pricing documentation rules, additional sources are Riedel et al. (2015), Zinn et al. (2014), Beer and Loeprick (2015), Buettner et al. (2017), Deloitte (2011-2016), Ernst & Young (2009-2016), KPMG (2012-2016), and PwC (2008-2016).

Table 2. Corporate taxation system data (2014).

Country	Statutory corporate income tax rate	Corporate capital gains tax rate	Dividend withhol-ding tax rate	CFC rule	Thin capitalization or interest stripping rule	Transfer pricing document-tation rule	Double taxation avoidance method (foreign dividends)	Double taxation avoidance method (foreign capital gains)
Argentina	35%	35%	10%	1	2	5	0	0
Australia	30%	30%	30%	1	3	4	1	1
Austria	25%	25%	25%	0	n/a	2	1	1
Belgium	34%	34%	25%	0	5[a]	2	1	1
Brazil	34%	34%	0%	1	2	5	0	0
Bulgaria	10%	10%	5%	0	3	2	–2	0
Canada	26%	13%	25%	1	1.5	4	0	0
Chile	21%	21%	18%	0	3	3	0	0
China	25%	25%	10%	1	2	5	0	0
Croatia	20%	20%	12%	0	4	4	1	0
Cyprus	12.5%	20%	0%	0	n/a	1	1	1
Czech Republic	19%	19%	15%	0	4	2	–1	–1
Denmark	24.5%	24.5%	27%	1	4	4	1	1
Estonia	21%	21%	0%	0[b]	n/a	3	1	0
Finland	20%	20%	20%	1	25%[c]	4	–2	0
France	38%	38%	30%	1	1.5	3	1	1
Germany	30%	30%	25%	1	30%[c]	3	1	1
Greece	26%	26%	10%	1	60%[c]	3	–2	0
Hungary	19%	19%	0%	1	3	3	1	0
Iceland	20%	20%	18%	1	n/a	3	1	1
India	34%	23%	0%	0	4	5	0	0
Indonesia	25%	25%	20%	1	3	5	0	0
Ireland	12.5%	33%	20%	0	Dividend[d]	3	0	–1
Israel	26.5%	26.5%	30%	1	n/a	4	0	0
Italy	31%	31%	20%	1	30%[c]	4	1	1
Japan	37%	37%	20%	1	3	4	1	0
Latvia	15%	15%	0%	0	4	3	1	0
Lithuania	15%	15%	0%	1	4	3	1	0
Luxembourg	29.2%	29.2%	15%	0	5.7	2	1	1
Malta	35%	35%	0%	0	n/a	1	1	1
Mexico	30%	30%	10%	1	3	3	0	0
Netherlands	25%	25%	15%	0	n/a	4	1	1
New Zealand	28%	0%	30%	1	1.5	2	1	1
Norway	27%	27%	25%	1	30%[c]	4	1	1
Poland	19%	19%	19%	0	3	4	0	0
Portugal	31.5%	31.5%	25%	1	60%[c]	4	1	1
Romania	16%	16%	16%	0	3	3	0	0
Republic of Korea	24.2%	24.2%	20%	1	3	4	0	0
Russian Federation	20%	20%	15%	0	3	3	1	0
Saudi Arabia	20%	20%	5%	0	n/a	2	–3	–3
Slovak Republic	22%	22%	0%	0	n/a	3	1	–3
Slovenia	17%	17%	15%	0	4	4	1	0
South Africa	28%	18.6%	15%	1	3	2	1	0
Spain	30%	30%	21%	1	30%[c]	3	1	1
Sweden	22%	22%	0%	1	Min. taxation[e]	3	1	1
Switzerland	21%	21%	35%	0	Asset class[f]	2	1	1
Turkey	20%	20%	15%	1	3	3	1	1
United Kingdom	21%	21%	0%	1	1	3	1	1
United States	39%	39%	30%	0	1.5	4	0	0

This table shows corporate taxation system data for the 49 OECD, EU and G20 member states for 2014. In the **CFC rule** column, 0 (1) stands for non-presence (presence) of CFC rules. In the **thin capitalization or interest stripping rule** column, the strictness of the rule is shown. The number represents the amount of debt units in relation to equity, which is accepted for unrestricted interest expense deduction from tax base. Special rules for financial institutions and holdings are not reported. n/a indicates no formal restriction. In the **transfer pricing documentation rule** column, the classification of documentation requirements follows Zinn et al. (2014). 0 represents no transfer pricing and documentation requirements; 1 represents presence of arm's length principle but no documentation requirements; 2 represents presence of arm's length principle and existence of documentation requirements in practice (e.g., in tax audits); 3 represents presence of arm's length principle and documentation requirements upon request (codified in national tax law); 4 (5) represents presence of the arm's length principle and short (long) documentation requirements upon disclosure (codified in national tax law). In the two **double taxation avoidance method** columns, 1 represents exemption method, 0 represents indirect credit method, –1 represents deduction method, –2 represents direct credit method and –3 represents no relief from double taxation.

[a] Debt-to-equity ratio is only applicable if interest recipient is not subject to taxation.

[b] CFC rules are only applicable at individual level.

[c] Net interest expenses are deductible up to the percentage number applied on EBIDTA.

[d] Interest paid to non-resident parent is re-qualified as a dividend; rule does not apply if parent resides in an EU member state or tax treaty country.

[e] Interest expenses are deductible if tax rate on interest income at affiliate is at least 10%.

[f] Debt-to-equity ratio depends on asset class.

1.3.3 Belgian subsidiary data

In Section 6, I investigate whether large German MNEs set up Belgian finance companies to use the NID regime in Belgium. This analysis requires detailed financial data on these companies. Most importantly, information on the amount of loans granted to affiliated companies and interest income is needed. While classic financial databases such as Amadeus do not provide such detailed data, the Central Balance Sheet Office of the National Bank of Belgium publishes on its website detailed, unconsolidated annual reports of practically all incorporated firms in Belgium.

To keep data collection feasible, I focus on German MNEs listed in the DAX and MDAX. These two stock indices are a good representation of the industrial structure of the German economy (boerse.de (2016a), boerse.de (2016b)) and are considered a representative subset of large German MNEs. I analyze data covering four financial years (2011–2014) from all 153 majority-owned Belgian subsidiaries of 45 DAX and MDAX MNEs. I dropped MNEs from the financial and insurance sector, MNEs without subsidiaries in Belgium, and subsidiaries with a loss in all four years. From these 45 MNEs, the majority comes from the manufacturing sector (35 MNEs); 4 MNEs come from the service sector, 3 MNEs from the trade sector and 3 MNEs from the transportation and communication sector. For information on the number of Belgian subsidiaries per group and information on the relative importance of these subsidiaries within the group, see Table 41 in Section 6.

Table 3 provides information on relevant financial data from the balance sheets and profit and loss statements of the Belgian subsidiaries. The table illustrates that the Belgian subsidiaries are very heterogeneous in size, as total assets, employee number, and turnover show. In addition, some subsidiaries do not report any loans to affiliated companies, cash, financial income, and financial expenses whereas some subsidiaries report relatively high values for these positions. Further, a small number of subsidiaries report, on average, a loss and negative equity.

Table 3. Summary statistics on Belgian subsidiary data (2011–2014).

Variable	No. of obs.	Mean	Median	Std. dev.	Min.	Max.
Total assets	153	551,000	20,800	2,550,000	80	19,300,000
No. of employees	153	202	62	429	1	3,012
Turnover	153	199,000	37,300	651,000	0	7,040,000
Loans to affiliated companies	153	325,000	239	2,030,000	0	17,500,000
Cash	153	26,900	643	140,000	0	1,570,000
Financial income	153	16,100	61	97,700	0	917,000
Financial expense	153	13,600	119	83,300	0	843,000
Earnings before taxes	153	14,400	1,368	67,000	–45,100	747,000
Equity	153	333,000	8,014	1,630,000	–15,000	14,500,000

The values are the four-year average (2011–2014) of the respective balance sheet or profit and loss statement position. Numbers are in thousand Euro (except for employee number).

Finally, besides the data set's high level of detail, another advantage of this data set compared to using the Amadeus database is that it verifiably contains all majority-owned Belgian subsidiaries of the considered DAX and MDAX MNEs because I took the participation data directly from the published and audited consolidated group reports. Since Amadeus also provides ownership data, it would have been less work-intensive to download the participation data from Amadeus; however, such a download does not provide all majority-owned Belgian subsidiaries I identified using the consolidated group reports. If I had used Amadeus data, I would have only detected two Belgian finance companies instead of seven (see Table 48 in Section 6).

In the following five sections, I present five papers that analyze in detail the data sets described above. Thereby, I contribute to empirical tax literature as highlighted in Section 1.2.

2 R&D Intensity and the Effective Tax Rate: A Meta-Regression Analysis[8]

Abstract: We apply meta-regression techniques to provide a quantitative review of the empirical literature on how R&D expenses affect the ETR. R&D expenses relate to a well-accepted profit shifting channel, strategic placement of IP within an MNE. Using a unique hand-collected data set, we add a new perspective to the current base erosion and profit shifting (BEPS) state of research and debate, in three ways: First, observing that primary studies report mixed evidence on how R&D expenses affect ETR, we provide a consensus estimate for this effect. Second, we consider this effect in more detail by separating a tax accounting effect and a profit shifting effect, which to our knowledge has not yet been investigated. We detect that one-third of the R&D effect on the ETR is due to the tax accounting effect and could be mitigated via book-tax conformity. We further find that 10% of the profit shifting effect can be traced back to R&D tax credits. Third, our meta-regression reveals factors that are possible sources of variation and bias in previous empirical studies.

Keywords: Effective tax rate • R&D intensity • Intangible assets • Profit shifting • Tax accounting • Meta-regression analysis

JEL Classification: F23 • H25 • H26 • M41

Publication: This paper is published in the *Journal of Economic Surveys* 31 (4): 988–1010. The author thanks the publisher *John Wiley and Sons* for granting a license to reuse the paper in this dissertation.

Presentations: This paper has been presented at the Accounting & Taxation Brown Bag Seminar (Mannheim University, 12th November 2014), the MaTax CampusMeeting 2014 (ZEW Mannheim, 10th December 2014), and the ZEW Public Finance Conference 2015 (ZEW Mannheim, 27th April 2015).

[8] This paper is joint work with Dr. Thomas Belz and Dr. Christian Steffens.

2.1 Introduction

Numerous empirical studies investigate tax-driven profit shifting of MNEs. In the empirical literature, there is general evidence of profit shifting to low-tax countries between the parent and its subsidiaries or among subsidiaries (e.g., Huizinga and Laeven (2008), Weichenrieder (2009), Dharmapala and Riedel (2013)). Some studies consider transfer pricing an explicit shifting channel and find that transfer prices are used to shift income to low-tax jurisdictions (e.g., Jacob (1996), Clausing (2003)). Other studies analyze the location of IP within an R&D-intensive MNE and come to the conclusion that these MNEs have an incentive to locate IP at low-tax subsidiaries or in countries with favorable IP tax treatment (e.g., Dischinger and Riedel (2011), Griffith et al. (2014)). Further, profit shifting is a highly relevant topic in the public debate, culminating in the Action Plan of the BEPS Project of the OECD, in which leading industrial countries aim to restrain profit shifting behavior of MNEs (OECD/G20 (2015a)).

At the heart of the current BEPS debate are R&D-intensive and innovative firms such as Apple Inc., Google Inc., or Amgen Inc. publicly accused of having low ETRs (e.g., Sullivan (2012)). To avoid taxes in high-tax countries, many of these R&D-intensive firms are known to have subsidiaries in tax havens. These subsidiaries are allocated IP that facilitates intragroup profit pooling at tax haven subsidiaries via tax-optimized royalty payments from subsidiaries in high-tax countries for using this IP. The reason for this is that objective market prices usually do not exist for such royalty payments. Hence, these intragroup transfer prices can be clearly manipulated in a tax-optimal way and are actually the main profit shifting channel for MNEs, as the meta-regression analysis of Heckemeyer and Overesch (2017) detects.

Our paper joins this profit shifting debate by quantitatively analyzing the empirical literature on how R&D intensity affects a firm's ETR. Both variables are at the heart of the empirical literature on BEPS: R&D activity is often used as a proxy for IP that facilitates profit shifting (e.g., Overesch and Schreiber (2010)); ETR is often used as a measure to evaluate the effectiveness of tax planning in general (e.g., Mills et al. (1998), Phillips (2003)) and to detect profit shifting behavior in particular (e.g., Rego (2003), Markle and Shackelford (2012)).

We find several empirical studies that directly analyze the relationship between R&D activity and ETR. Applying meta-regression techniques, we summarize the status quo of research and enrich the profit shifting and tax accounting literature in three ways:

First, we quantitatively investigate the R&D intensity effect on ETR and provide an overall consensus estimate across our primary studies. This contribution is of interest because primary studies report mixed evidence on how R&D intensity affects ETR (see Section

2.4). Further, and quite surprisingly, R&D intensity is not the primary variable of interest in some studies. Moreover, some studies simply use R&D intensity as a proxy for profit shifting opportunities in innovative firms, and they insufficiently review the empirical relation between R&D intensity and ETR. However, in light of the BEPS debate, this relation is in itself of interest and importance. Hence, we aim to contribute in detail to the understanding of how R&D intensity affects ETR; we estimate the consensus estimate to range between –0.17 and –0.25 depending on ETR definition, i.e., a ten percentage points increase in R&D intensity leads to a 1.7 to 2.5 percentage points decrease in ETR. This estimate is robust to controlling for intangible assets, which are usually only a share of a firm's IP. Therefore, R&D intensity seems to be a robust proxy for profit shifting opportunities in general, even beyond activated IP in the balance sheet.

Second, we go beyond our consensus estimate. In particular, we separate out two distinct R&D effects on ETR by taking advantage of a large degree of variation across different databases and time periods in our meta-data set. On the one hand, there is a profit shifting effect because R&D activity gives rise to IP. On the other hand, there is a tax accounting effect: While R&D expenses may be immediately incurred in the tax accounts, they may be capitalized and deferred in the financial accounts. Both effects generally decrease a firm's ETR; however, the relative importance of each effect is not clear. Nevertheless, both the profit shifting literature (e.g., Harris (1993), Overesch and Schreiber (2010)) and the tax accounting literature (e.g., Gupta and Newberry (1997), Armstrong et al. (2012)) refer to R&D intensity in the context of tax planning and tax avoidance. By quantifying the profit shifting and tax accounting effect separately, we are able to draw inference on the relative importance of each effect in existing empirical studies. Our meta-regression analysis thereby contributes to the status quo of profit shifting and tax accounting research.

In our analysis, we show that the R&D effect of profit shifting and tax accounting on ETR is 2:1. This result has two implications: On the one hand, we find profit shifting evidence for transfer pricing with IP (proxied by R&D) that is located in low-tax countries, driving down ETR. On the other hand, one-third of the effect of R&D intensity could be mitigated by tax legislation via book-tax conformity. In a robustness test, we further identify that about 10% of the profit shifting effect can be traced back to R&D tax credits granted by some countries, i.e., a tax incentive that allows deduction of an additional fraction of R&D expenses from the firm's tax base. Overall, these considerations give important insights for tax researchers and tax policy makers.

Third, by applying meta-regression techniques, we are able to detect significant sources of bias and variation in existing empirical studies. These findings can be used to design future empirical models in a more coherent and consistent manner, improving the quality of the estimation results.

The remainder of this paper proceeds as follows. Section 2.2 describes the profit shifting and the tax accounting effect in detail. Section 2.3 briefly presents the meta-regression methodology followed by information on our meta-data set in Section 2.4. The meta-regression results and robustness analysis are discussed in Section 2.5. Finally, Section 2.6 sets forth our conclusions.

2.2 Effect of R&D intensity on ETR

In this meta-regression analysis, the empirical relationship between firms' R&D intensity and their average ETR is our focus. Both variables are intensely debated in tax policy discussions. On the one hand, ETR is a widely used measure in evaluating effective tax planning in a profit shifting context (e.g., Rego (2003), United States Government Accountability Office (2008), Markle and Shackelford (2012), Sullivan (2012), Herbert and Overesch (2014)). On the other hand, the empirical literature often refers to R&D activity as a proxy for IP-based profit shifting (e.g., Overesch and Schreiber (2010)) and especially R&D-intensive and innovative firms such as Apple Inc. and Google Inc. are at the heart of the current profit shifting debate, as these firms report very low ETRs. However, besides this profit shifting effect of R&D intensity on ETR, a tax accounting effect could also be present due to different timing of R&D expenses in financial and tax accounts.

Both the profit shifting literature and the tax accounting literature refer to R&D intensity in the context of tax planning and tax avoidance. However, in their model design and argumentation, researchers in the profit shifting literature do not consider the R&D tax accounting effect, while researchers in the tax accounting literature do not consider the R&D profit shifting effect. As a result, the relative importance of the two effects is unknown.

Consequently, the question arises whether an effect of a firm's R&D intensity on its tax burden can empirically be verified and whether the profit shifting or the tax accounting effect dominates in empirical studies on how R&D intensity affects ETR. In the following, we explore the profit shifting and tax accounting effect of R&D intensity on ETR.

2.2.1 R&D profit shifting effect on ETR

R&D activity may lead to IP generation within a firm. To avoid taxation in high-tax countries, many R&D-intensive firms place their IP in tax haven subsidiaries, such as in Bermuda. The idea behind this is that profits are shifted to these tax havens via royalty payments from high-tax countries where the IP is actually used (e.g., Fuest et al. (2013)). Consequently, taxable income is substantially reduced in the high-tax countries and the tax burden of the group is significantly lowered. Therefore, a negative effect of R&D intensity

on the group's ETR can hint at profit shifting via IP. While there is a large body of empirical research on IP-based profit shifting, let us review the empirical studies that explicitly consider R&D intensity as a proxy for IP in their research designs.

Desai et al. (2006) examine the types of firms most likely to establish tax haven operations that facilitate tax avoidance. One indicator for firms' presence in tax havens is a high level of R&D intensity. These authors argue that this may be due to the quite easy ability to shift profits produced by IP or the relative ease of relocating IP itself. In particular, they show that a 10% greater R&D/sales ratio increases the share of affiliates in tax havens by 4%. This finding is in line with a robustness test in Graham and Tucker (2006), who find that large and profitable firms with high R&D intensity are likely to engage in tax avoidance through corporate tax shelters. Considering German outbound FDI, Overesch and Wamser (2009) observe a high tax sensitivity of R&D-intensive firms when deciding whether to set up an affiliate abroad. This result shows that affiliates play a role in tax planning with IP within MNEs. Overesch and Schreiber (2010) use R&D intensity as a proxy for IP and intragroup services provided within the context of R&D activities. These authors find evidence that for R&D-intensive MNEs, the tax sensitivity of intragroup transactions increases while the tax sensitivity of investments decreases. The studies by Grubert (2003) and Grubert (2012) show that R&D-intensive firms engage in a greater volume of intragroup transactions and have more profit shifting opportunities. The author argues that this is due to the difficult task of valuing high-tech patents and products, i.e., IP derived from R&D activity.

Overall, these empirical studies support the assumption that there is a negative impact of R&D intensity on ETR, since R&D intensity may serve as a proxy for ETR decreasing profit shifting via IP created by R&D activity (profit shifting effect).

2.2.2 R&D tax accounting effect on ETR

R&D expenses are usually treated differently between financial and tax accounting. For tax purposes, the costs of R&D are an immediate expense (e.g., Section 174 US Internal Revenue Code, Section 5 German Income Tax Code); however, financial accounting standards prescribe a capitalization of R&D expenses as intangible assets under certain conditions (e.g., ASC 350, IAS 38).

At first glance, this different treatment may have a negative effect on ETR of firms (tax accounting effect) and several empirical ETR studies make this argument (e.g., Gupta and Newberry (1997), Richardson and Lanis (2007), Armstrong et al. (2012)). Consider the following example: Earnings before taxes are 100 and R&D expenses amount to 10. For tax purposes, these expenses are immediately deductible, i.e., the tax base is 90 and the current tax expense is 27, assuming a 30% corporate income tax rate. In the financial

accounts, the R&D expenses can be capitalized, i.e., they are not deducted, and ETR is 27% (27/100). However, in this context, it is important to consider deferred tax legislation, which is common to accounting principles worldwide since the 1970s.[9] These principles require recognition of deferred taxes for temporary book-tax differences (BTD).[10] In future periods, ceteris paribus, there will be higher earnings in the tax accounts than in the financial accounts; therefore, deferred taxes—in this case deferred tax expenses—of 3 (30% from the BTD of 10) must be recognized immediately. Consequently, the total tax expense (current and deferred taxes) is 30 and ETR is 30% (30/100).

Overall, this reasoning suggests that ETR calculation plays a decisive role in whether the tax accounting effect drives down ETR: A negative effect of R&D intensity on ETR due to the tax accounting effect is suspected if, and only if, current taxes are taken into account in ETR calculation. In this case, there is no control for the different treatment of R&D expenses in financial and tax accounting. However, if current and deferred taxes are taken into account, then no tax accounting effect of R&D intensity on ETR is present. In this case, a negative effect of R&D intensity on ETR can be attributed solely to the profit shifting effect.[11]

In summary, both the profit shifting effect and the tax accounting effect suggest a negative effect of how R&D intensity affects ETR. Hence, we generally expect a negative consensus estimate. However, the inclusion or exclusion of deferred taxes in ETR calculation determines whether a tax accounting effect can be observed. Since we have variation in our meta-data set in ETR definition between studies and also within studies in this regard, we are able to control for the (temporary) tax accounting effect and isolate it from the (permanent) profit shifting effect in our meta-regression.[12] In this case, only the profit shifting effect remains, and the consensus estimate is presumed to be less negative than without such control. However, the consensus estimate is still expected to be negative because of the presence of the profit shifting effect.

[9] US-GAAP has prescribed deferred tax accounting since 1967, when APB Opinion No. 11 was issued. This opinion was replaced by FASB 96 in 1987. Since 1992, SFAS 109 (ASC 740) addresses deferred tax accounting. IFRS has prescribed deferred tax accounting since 1979, when IAS 12 was issued.

[10] See, for example, for US-GAAP ASC 740–10–25–2(b), for IFRS IAS 12.15 and IAS 12.24. In the context of this paper, the term "deferred taxes" refers to the net amount of deferred tax expense and deferred tax income.

[11] In the USA, for example, a so-called R&D tax credit is granted to firms for tax purposes (Section 41 US Internal Revenue Code). Under certain conditions, an additional fraction of R&D expenses qualifies for a deduction from the tax base. This deduction leads to a permanently negative effect on ETR and may bias our profit shifting effect. However, a robustness test shows that our results are relatively robust concerning this issue.

[12] There is no recognition of deferred taxes in case of profit shifting, because generally profit shifting does not lead to BTD. Therefore, the profit shifting effect can be seen as having a "permanently" negative effect on ETR, in contrast to the tax accounting effect, which can be seen as having only a "temporarily" negative effect on ETR.

2.3 Methodology

2.3.1 Meta-regression approach

The primary studies underlying this meta-regression analysis identify their data analysis clearly and have the following classic linear regression model:

$$ETR = \beta_0 + \beta_1 * R\&D\ Intensity + X\beta + \varepsilon. \quad (2.1)$$

The dependent variable is a firm's global average ETR, i.e., a measure of worldwide income tax expense divided by a measure of worldwide pre-tax financial income, both of which observed in firm annual financial reports.[13] In our meta-regression, the explanatory variable of interest is $R\&D\ Intensity$ measured as the ratio of R&D expenses to total assets or total sales. In addition to this variable, primary studies use a wide range of additional variables captured in vector X. β_0 is the intercept.

In our research context, the coefficient of interest is the reported β_1 of the R&D intensity variable in equation (2.1). Generally, a negative β_1 could be expected, for two reasons (see Section 2.2): First, R&D expenses may serve as a proxy for ETR decreasing profit shifting with IP. Second, R&D expenses are usually immediately tax deductible as opposed to a possible capitalization in the financial accounts under certain conditions. Although we expect this negative relationship, we detect some mixed evidence in our meta-data set, with only 54% of the 153 estimates being significantly negative in the underlying primary studies.[14]

Such variation can be quantitatively investigated by pursuing meta-regression analysis. This statistical approach formally evaluates and combines empirical results from different studies, and explores the reasons for heterogeneity across empirical studies (e.g., Smith and Glass (1977), Stanley (2001), Weichselbaumer and Winter-Ebmer (2005), Égert and Halpern (2006)). The research contribution of this meta-regression analysis is to generalize the central tendency of the empirical literature on how R&D intensity affects ETR by providing a consensus estimate. Further, we consider this effect in more detail by separating the profit shifting and tax accounting effects on ETR, which, to our knowledge, has not yet

[13] All underlying primary studies use annual ETRs. Dyreng et al. (2008) propose using long-run (10-year) cash ETRs to measure tax avoidance practices of firms because annual ETRs may be subject to year-to-year variation. However, in our meta-regression, we are bound to the approach of the primary studies and consider the effect of firm size on annual ETRs. In addition, marginal ETRs—defined as the marginal tax burden if one additional monetary unit of income is earned—are not within the scope of this paper. See Callihan (1994) for a broad review of the accounting and public finance literature on average and marginal ETRs as well as for terminology and methodology in the ETR literature.

[14] 43% are insignificant and 3% are significantly positive; the level of statistical significance is at 10%, two-sided. Additionally, every second study reports at least one non-negative estimate. For further indicators of mixed evidence, see Section 2.4.

been investigated. Finally, potential sources of bias and variation in the estimated coefficients are explained, which helps to improve future empirical and analytical models.

We analyze the coefficient of β_1 in the following linear meta-regression model:

$$y_{ji} = \delta_0 + \sum_{k=1}^{K} \delta_k X_{jik} + \varepsilon_{ji}, \text{ with } E\left[\varepsilon_{ji}^2\right] = \sigma^2 \omega_{ji} \quad (2.2)$$
$$(j = 1,2,\dots,J) \quad (i = 1,2,\dots,I) \quad (k = 1,2,\dots,K).$$

In equation (2.2), y_{ji} is the reported β_1 of regression i from a total of I regressions of primary study j in a literature of J studies. X_{jik} is a vector of explanatory variables that measures differences in specific study and model characteristics K of the primary studies and controls for heterogeneity between primary studies (see Section 3.2 for meta-regressor variable definitions). The meta-regression coefficient δ_k indicates the estimated impact on primary firm size effects if an empirical study design features characteristic k, ceteris paribus. δ_0 is the intercept.

It is crucial to consider the meta-regression error term ε_{ji}. It captures all unobserved differences across primary regressions and is expected to be normally distributed since y_{ji} are taken from classic linear regression models. However, ε_{ji} is assumed to be heteroscedastic because respective study and model characteristics (X_{jik}) influence the precision of y_{ji}, i.e., $\mathrm{Var}\left(y_{ji} \middle| \sum_{k=1}^{K} X_{jik}\right) = \sigma_{ji}^2$ (Stanley and Jarrell (1989), Feld et al. (2013)).

With heteroscedastic standard errors, estimates of OLS regression remain unbiased and consistent; yet, they lose efficiency. We bypass this problem by applying generalized least squares (GLS) regression, which allows for heteroscedastic errors.

Assume that σ_{ji}^2 depends only on a single known variable ω so that

$$\sigma_{ji}^2 = \sigma^2 \omega_{ji}. \quad (2.3)$$

Applying GLS regression, we transform equation (2.2) by dividing the *ji*th equation by $\sqrt{\omega_{ji}}$. Let $y_{ji}^* = y_{ji}/\sqrt{\omega_{ji}}$, $X_{jik}^* = X_{jik}/\sqrt{\omega_{ji}}$ and $\varepsilon_{ji}^* = \varepsilon_{ji}/\sqrt{\omega_{ji}}$, then we get the transformed model

$$y_{ji}^* = \delta_0 + \sum_{k=1}^{K} \delta_k X_{jik}^* + \varepsilon_{ji}^*, \text{ with } E\left[\varepsilon_{ji}^{*2}\right] = \sigma^2 \quad (2.4)$$
$$(j = 1,2,\dots,J) \quad (i = 1,2,\dots,I) \quad (k = 1,2,\dots,K).$$

The transformed model shown in (2.4) corrects for the heteroscedasticity problem outlined above. Now error term ε_{ji}^* is homoscedastic. Hence, the best linear unbiased estimator of

δ_k is obtained by applying GLS regression, i.e., WLS regression in (2.4).[15] Accordingly, we apply WLS in our meta-regression. This approach is also in line with the theoretical literature on meta-regression (Stanley (2008)) and existing meta-regression analyses.[16] The employed weights ($1/\omega_{ji}$) are known and correspond to the inverse of the squared standard error of each primary studies' coefficient. Thus, primary study coefficients with relatively precise (i.e., low) standard errors are given greater weight in our meta-regression.

Finally, multiple estimates per primary study may be jointly influenced by unobserved factors inherent to the respective study such as study quality or the researcher's ideology (Stanley and Doucouliagos (2012), pp. 112–113). Since we include all estimates of a primary study, we cannot assume that (homoscedastic) ε_{ji}^* calculated for each observation within a primary study are independent of each other. Moreover, they are presumably autocorrelated because

$$corr(y_{ji}, y_{ji+l}) \neq 0 \text{ for observations } l \neq 0. \tag{2.5}$$

Such autocorrelation (within-study dependence) violates the assumptions of the classic linear regression model (Fahrmeir et al. (2013), p. 191). Therefore, we relax the assumption of independence between observations within each primary study by clustering standard error ε_{ji}^* on study level.[17] This technique changes the standard errors of the estimates compared to heteroscedasticity-robust standard errors because any possible dependence among the estimates within a study is accounted for (e.g., Stanley and Doucouliagos (2012), p. 100).

2.3.2 Meta-regressor variables

$\sum_{k=1}^{K} X_{jik}$ of equation (2.4) captures differences within and between the specifications of the primary studies, which may lead to systematic variation of the R&D intensity effect on ETR within and between studies. We classify such specification differences under the following categories: definition of R&D intensity, definition of ETR, control variables, data sample characteristics, econometric specification, and publication bias.

2.3.2.1 Definition of R&D intensity in primary studies

In any meta-regression, it is decisive that the effect size of interest is comparable across the underlying primary studies (Stanley (2001)). This prerequisite is met in our meta-data set:

[15] The derivation of the WLS model is based on Heij et al. (2004), pp. 327–328 and Greene (2012), pp. 317–319.
[16] Examples of economic meta-regression analyses that apply WLS: Longhi et al. (2005), Rose and Stanley (2005), de Dominicis et al. (2008), Cipollina and Salvatici (2010), Efendic et al. (2011), Feld and Heckemeyer (2011), Havranek and Irsova (2011), Doucouliagos et al. (2012), Gechert and Will (2012), Feld et al. (2013), Lichter et al. (2015), Rusnak et al. (2013).
[17] This technique is also applied in other economic meta-regression analyses (e.g., Görg and Strobl (2001), Card et al. (2010), Cipollina and Salvatici (2010), Efendic et al. (2011), Adam et al. (2013)).

The primary studies calculate R&D intensity by scaling total R&D expenses either by total assets or by total sales.[18] Thus, primary effect sizes are comparable and do not have to be standardized or converted to a common metric. R&D intensity measures the percentage point change of ETR in response to a one percentage point change of R&D intensity. We address the variation in the R&D intensity definition by coding the dummy variable *R&D by Assets* one (zero) if the underlying primary study's regression measures R&D intensity as total R&D expenses divided by total assets (total sales).

2.3.2.2 Definition of ETR in primary studies

There is variation in the ETR definition across primary regressions. In the context of our research question, it is straightforward to group these definitions into an ETR including or excluding deferred taxes (see Section 2.2). Therefore, our variable of interest is the dummy variable *ETR Including Deferred Taxes*, which is coded one if the underlying primary study's regression considers deferred taxes in the ETR calculation, and zero if deferred taxes are not considered. This variable is defined on the primary regression-level and not the study-level and can therefore take different values within a primary study (see Section 2.4). Further, throughout our analysis, a firm's global consolidated ETR is considered, i.e., a firm's worldwide income tax expense divided by worldwide pre-tax income. We expect a positive coefficient of this dummy variable in the meta-regression. The reason for this is as follows: Primary studies that include deferred taxes in ETR calculation control for BTD that result from a possible immediate deduction of R&D expenses in the tax accounts and a deferred deduction of R&D expenses in the financial accounts (see Section 2.2.2). Consequently, a positive coefficient of this variable stands for a less negative effect size of R&D intensity on an ETR using current and deferred taxes in the calculation.

2.3.2.3 Control variables in primary studies

We include an *Intangibles* dummy variable in the meta-regression, which is coded one if the underlying primary study's regression controls for intangible asset intensity (intangible assets divided by total assets), and zero otherwise. The exclusion of a control variable for intangible asset intensity in the primary studies could overestimate the R&D intensity coefficient, since both variables may capture ETR decreasing profit shifting with IP. Thus, controlling for this possible overestimation, we expect a positive coefficient for the *Intangibles* dummy variable in the meta-regression.

Additionally, we include a *Capital Intensity* dummy variable that is coded one if the underlying primary study's regression controls for fixed asset intensity (property, plant and

[18] Harris and Feeny (2003) define R&D intensity as R&D expenses divided by total income. Although we expect total income to be highly correlated with total sales, we exclude this study in a robustness test. Indeed, we get very similar results.

equipment divided by total assets), and zero otherwise. It could be that a firm with high R&D intensity also engages in large capital expenditures on fixed assets that lead to greater depreciation deductions. Indeed, fixed asset intensity is included in some primary studies to capture different treatments of depreciation for tax and financial reporting purposes (e.g., Gupta and Newberry (1997), Hope et al. (2013)) and to capture tax planning opportunities by strategically locating fixed assets (Robinson et al. (2010)).

Inventory-intensive firms are considered to have less tax planning opportunities than capital-intensive firms.[19] Hence, no or even a positive influence on ETR can be expected (e.g., Stickney and McGee (1982), Gupta and Newberry (1997)). Lee and Swenson (2012), however, refer to inventory tax benefits, such as the "last in first out" method or profit shifting opportunities with inventory (transfer pricing), which may have a negative effect on ETR. To capture these effects, we include an *Inventory Intensity* dummy variable that is coded one if the underlying primary study's regression controls for inventory intensity (inventory divided by total assets), and zero otherwise.

One common control variable in regressions on firms' ETR is firm size, for example, the natural logarithm of total assets. However, because firm size is used as a control variable in all primary regressions, we do not include a control for firm size in our meta-regression. See the meta-regression analysis of Belz et al. (2017b) for an investigation of the relationship between firm size and ETR in light of two competing accounting theories, the political cost theory and the political power theory.

2.3.2.4 Data sample characteristics of primary studies

Some primary studies explicitly exclude loss-making firms. This exclusion is decisive in the context of this paper, since loss-making firms are generally less tax responsive, i.e., a study that excludes these firms may include relatively more firms with the possibility of profit shifting than a study that includes these firms. One may even consider an additional measurement error of the tax incentive if loss-making firms are included in an empirical profit shifting analysis (Heckemeyer and Overesch (2017)). Therefore, we include the dummy variable *Loss-Making Firms Excluded*, which marks primary studies that exclude loss-making firms in their sample. We expect a negative coefficient for this dummy variable.

Further, some primary studies truncate or winsorize ETR outliers. To control for this heterogeneity, we code the dummy variable *ETR Outliers Truncated or Winsorized* one if a primary study truncates or winsorizes ETR outliers (negative ETRs or ETRs larger than 100%), and zero otherwise.

[19] Tax benefits associated with capital investments are, for example, investment tax credits or accelerated depreciation schedules. Regularly, inventory does not fall under the scope of such beneficial tax treatment.

The time span of the primary studies' data covers more than 40 years. Two points must be considered regarding this issue: First, R&D became increasingly important during the past several decades, providing more opportunities for firms to engage in tax planning with R&D expenses and IP derived from R&D. Second, tax advisors may have searched for new (IP) tax planning opportunities over the past several years. To capture these effects, we include *Average Sample Year* of the underlying primary study's regression.

Further, the number of observations per study varies substantially; by including the *Observation Number* of the underlying primary study's regression, we control for this variation.

Finally, the primary studies cover eight databases that are quite heterogeneous.[20] They mainly differ regarding geographic coverage, collection of data (hand-collected vs. database download), types of firm represented (listed vs. non-listed firms) and time span covered. Additional variation may also derive from different financial reporting standards across countries. We include dummy variables for each database to control for such unobserved database fixed effects.

2.3.2.5 Econometric specification of primary studies

Some primary studies include time fixed effects to control for unobserved time trends, like business cycles or changing tax legislation. Such non-modeled trends may affect the level of R&D intensity in a firm. Additionally, some primary studies control for unobserved industry-specific heterogeneity by including industry fixed effects. From a profit shifting perspective, it is decisive to consider industry fixed effects, since it is empirically shown that there is variation in profit shifting among industries (e.g., Bartelsman and Beetsma (2003), Beer and Loeprick (2015)). Controlling for time and industry fixed effects may reduce the effect of R&D intensity on ETR, because cross-time and cross-sectional variation is absorbed. However, possible omitted variable biases may be reduced. Since unconsidered time and industry fixed effects could influence the effect of R&D intensity on ETR, we include two dummy variables, *Time Fixed Effects Included* and *Industry Fixed Effects Included*, which are coded one if the underlying primary study's regression controls for these unobserved fixed effects, and zero otherwise.

2.3.2.6 Publication bias of primary studies

Researchers may have a preference for publishing results that are statistically significant and in line with theoretical predictions and models. Thus, researchers could be reluctant to report insignificant results and may even search for specifications that produce expected

[20] The eight databases are Amadeus, Aspect-Huntley Financial Database, Australian Tax Office Tax Return Database, Compustat North America, Compustat Global, IBIS Enterprise Database, Worldscope, and a hand-collected data set on firms listed on the ASX.

and significant results. This circumstance is commonly referred to as publication bias (Card and Krueger (1995), Doucouliagos (2005), Stanley (2005)). To address this issue, we include the *Primary Standard Error* of primary estimates, which is the standard procedure in meta-regression analysis (e.g., Feld and Heckemeyer (2011), Doucouliagos et al. (2012), Stanley and Doucouliagos (2012), pp. 60–61, Feld et al. (2013)).

Table 4 contains detailed variable descriptions and summarizes the meta-regressor variables.

Table 4. Definitions and summary statistics of meta-regressor variables.

Variable	Description	Mean	Std. dev.
ETR Including Deferred Taxes	Binary dummy variable coded 1 if the primary regression uses the ratio of "total income tax expense to pre-tax income" as dependent variable, and 0 if the primary regression uses either the ratio of "current income tax expense to pre-tax income" or "cash income taxes paid to pre-tax income" as dependent variable[a]	0.497	0.502
R&D by Assets	Binary dummy variable coded 1 if the primary regression uses the ratio of R&D expenses to total assets, and 0 if the primary regression uses the ratio of R&D expenses to total sales	0.314	0.466
Intangibles	Binary dummy variable coded 1 if the primary regression controls for intangible assets intensity (ratio of intangible assets to total assets), and 0 otherwise	0.163	0.371
Capital Intensity	Binary dummy variable coded 1 if the primary regression controls for capital assets intensity (ratio of property, plant and equipment to total assets), and 0 otherwise	0.582	0.495
Inventory Intensity	Binary dummy variable coded 1 if the primary regression controls for inventory intensity (ratio of inventory to total assets), and 0 otherwise	0.386	0.488
Loss-Making Firms Excluded	Binary dummy variable coded 1 if loss-making firms are excluded from the sample underlying the primary regression, and 0 otherwise	0.549	0.499
ETR Outliers Truncated or Winsorized	Binary dummy variable coded 1 if ETR outliers (negative ETRs or ETRs larger than 100%) are truncated or winsorized in the sample underlying the primary regression, and 0 otherwise	0.739	0.441
Average Sample Year	Continuous variable capturing the average sample year of the primary regression	1998.8	5.823
Observation Number	Continuous variable capturing the observation number of the primary regression	12,876.7	20,700.1
Industry Fixed Effects Included	Binary dummy variable coded 1 if the primary regression controls for unobserved industry fixed effects, and 0 otherwise	0.876	0.331
Time Fixed Effects Included	Binary dummy variable coded 1 if the primary regression controls for unobserved time fixed effects, and 0 otherwise	0.510	0.502
Primary Standard Error	Continuous variable capturing the standard error of the primary R&D intensity effect estimate	0.111	0.122

Data on database dummy variables are not reported but are available upon request.

[a] Although cash and current income tax expense differ from each other (e.g., under US-GAAP), these tax positions do not consider BTD and, hence, do not include deferred taxes, which are the focus of our analysis. In a robustness test, we drop primary regressions with ETR definition "current income tax expense divided by pre-tax income" and run regressions with only "cash income taxes paid divided by pre-tax income" vs. "total income tax expense divided by pre-tax income". The results remain quantitatively and qualitatively unchanged and are available upon request.

2.4 Data

Our meta-data set consists of 153 observations from 21 primary studies (published and unpublished) by 43 different researchers. To identify relevant primary studies, we searched through online databases such as ProQuest or ScienceDirect for published studies, and SSRN for working papers. Additionally, we performed Internet research via Google Scholar. Using keywords like (e.g., "effective tax rate", "research and development", "tax planning", "tax avoidance"), we searched for empirical studies that examine determinants of ETR or that examine factors explaining variation of ETR across firms. By March 2016, we formed a sample of 49 studies; however, only 21 studies include R&D intensity as an explanatory variable in their empirical models.

We sampled all R&D intensity coefficients from each primary study.[21] There are two main reasons for this approach (Disdier and Head (2008)): First, an inherent characteristic of meta-regression is to exploit data heterogeneity. From this perspective, it would be inefficient to discard information by arbitrarily selecting only one estimate per study, because variation of model specifications within a study would get lost. Second, it would be quite subjective to decide which estimate should be used.

Table 5 provides summary statistics on the meta-data set and Figure 7 provides the kernel density function of the R&D intensity coefficient.

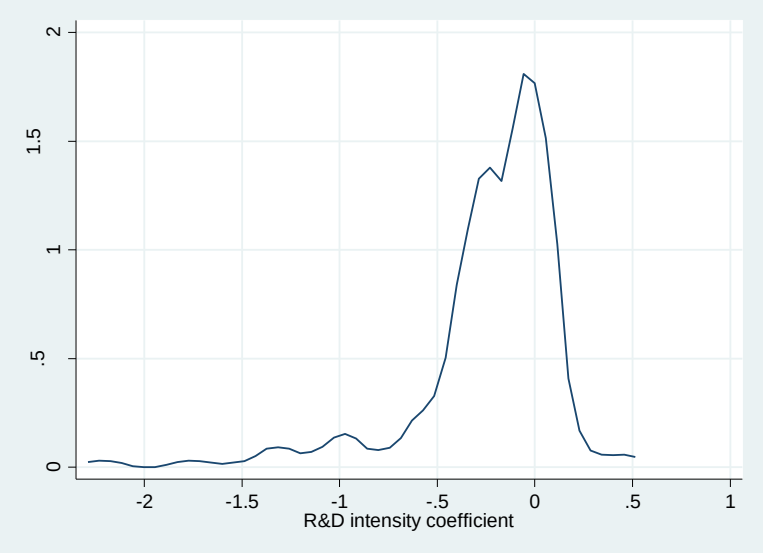
[21] This approach is not possible for four estimates of one study (Buijink et al. (1999)) that reports *p*-values for the coefficients. In this case, the standard error can generally be inferred by concluding the *t*-statistic from the *p*-value; however, four estimates are zero, i.e., the standard error remains unknown. If the *p*-value reported to three decimal places is zero, a "cautious" *p*-value of 0.00044 is assumed. In addition, eight regressions in Buijink et al. (1999) refer to subsamples with less than 35 observations. We do not include these estimates in our meta-data set, since statistical inference on samples with less than 35 observations can lead to spurious results. However, including these estimates does not change our results, both qualitatively and quantitatively.

Table 5. Summary statistics of primary studies in ETR meta-data set.

Study	Country or Region	Published (P) or Unpub-lished (U)	No. of effects	Regres-sions with ETR incl. def. taxes	Effect of R&D intensity on ETR				
					Mean	Median	Min.	Max.	Std. dev.
Armstrong et al. (2012)	USA	P	8	50%	–0.141	–0.140	–0.362	0.082	0.234
Buijink et al. (1999)	Belgium	U	37	100%	–0.040	–0.020	–0.250	0.210	0.102
Crabbé (2010)	Europe	U	7	100%	–0.000	–0.000	–0.000	–0.000	0.000
Donohoe (2015)	USA	P	6	33%	–0.192	–0.190	–0.606	0.058	0.234
Dyreng et al. (2016)	UK	P	2	100%	–0.065	–0.065	–0.161	0.032	0.136
Gupta and Newberry (1997)	USA	P	6	0%	–0.162	–0.020	–0.683	0.192	0.363
Harris and Feeny (1999)	Australia	U	5	100%	–0.713	–0.562	–1.003	–0.521	0.229
Harris and Feeny (2003)	Australia	P	10	0%	–1.321	–1.279	–2.213	–0.872	0.406
Hoi et al. (2013)	USA	P	2	0%	–0.148	–0.148	–0.152	–0.144	0.005
Hoopes et al. (2012)	USA	P	24	4%	–0.272	–0.299	–0.370	0.116	0.094
Hope et al. (2013)	USA	P	11	27%	–0.229	–0.292	–0.479	0.139	0.197
Jennings et al. (2012)	USA	P	2	100%	–0.282	–0.282	–0.616	0.053	0.473
Klassen et al. (2014)	USA	P	6	0%	–0.022	–0.218	–0.303	0.439	0.357
Lanis and Richardson (2012)	Australia	P	4	0%	–0.011	–0.013	–0.014	–0.002	0.006
Lee and Swenson (2012)	Europe	P	2	0%	–0.193	–0.193	–0.193	–0.193	0.000
McGuire et al. (2012)	USA	P	4	50%	–0.436	–0.437	–0.497	–0.374	0.070
McGuire et al. (2014)	USA	P	4	50%	–0.124	–0.107	–0.277	–0.004	0.123
Richardson and Lanis (2007)	Australia	P	2	100%	–0.538	–0.538	–0.731	–0.345	0.273
Richter et al. (2009)	USA	P	3	100%	–0.003	–0.004	–0.004	+0.000	0.002
Robinson et al. (2010)	USA	P	4	50%	+0.000	–0.002	–0.002	0.002	0.002
Taylor and Richardson (2012)	Australia	P	4	50%	–0.084	–0.085	–0.103	–0.064	0.022
Overall meta-data set			**153**	**50%**	**–0.234**	**–0.152**	**–2.213**	**0.439**	**0.374**

Last update of meta-data set: March 2016.

Figure 7. Distribution of R&D intensity coefficient.



This figure provides a graph of the Epanechnikov kernel density function of the R&D intensity coefficient. Density is on the *y*-axis and the R&D intensity coefficient is on the *x*-axis. Source: ETR meta-data set with N = 153 (full sample).

As shown in Table 5 and Figure 7, there is some variation across the primary studies, which suggests pursuing a meta-regression analysis, as follows:

First, the absolute value of the coefficient of variation, a measure of relative dispersion, is 1.60, suggesting that there is a high degree of variation of reported primary estimates relative to the mean. Additionally, an arithmetic mean of the R&D intensity coefficient of –0.23

and a median of –0.15 over all primary estimates suggests a negatively skewed distribution of the estimates.

Second, 50% of ETR calculations in the meta-data set include current and deferred taxes, while the other half includes current taxes only; 62% of the studies use an ETR either including or excluding deferred taxes, while 38% of the studies use both definitions in their regressions. Hence, there is variation of ETR calculation between and within studies.[22]

Third, the data of the primary studies cover a broad time period (1976–2012) from eight different databases, with geographic variation: 52% of the data are from studies on US firms, 32% from European firms, and 16% from Australian firms.

These summary statistics suggest that there is some variation across primary studies. However, it is an empirical question whether there is systematic variation in how R&D intensity affects ETR across primary studies. We quantitatively investigate this variation in our meta-regression analysis and explore the heterogeneity of the meta-data set in detail.

2.5 Meta-regression analysis

2.5.1 Results

Table 6 presents the results from our meta-regression. The dependent variable is the coefficient of R&D intensity found in primary studies, and the explanatory variables are specific study and model characteristics of the primary studies. For variable descriptions, see Section 2.3.2.

Specification (1) contains the baseline specification, including the definition of R&D intensity and ETR as well as the econometric specification and publication bias. The coefficient of *ETR Including Deferred Taxes* is positive and statistically significant at the 5% level. Ceteris paribus, the coefficient of 0.11 indicates that the R&D intensity effect becomes less negative by 0.11 percentage points if a primary study controls for the tax accounting effect (by considering deferred taxes in ETR calculation) in comparison to a study that does not control for the tax accounting effect (by considering only current taxes in ETR calculation). In other words, depending on ETR calculation in an empirical study, the tax accounting effect can have a significantly negative effect on ETR. This is an important insight, because the profit shifting literature argues that a negative effect of R&D intensity on ETR is due to profit shifting with IP not taking into account the tax accounting R&D effect. This result remains stable in the following specifications.

[22] Further, *ETR Including Deferred Taxes* also varies across time periods: After 2000 (median average sample year), 41% of ETR calculations include deferred taxes; in 2000 and before, 54% include deferred taxes. Studies on US firms include deferred taxes in 26% of cases, for Australia, 36% and Europe, 96%.

In Specification (2), we include *Intangibles*, which controls for considering firms' intangible assets in the primary regressions. The coefficient is significantly positive (1% level), which confirms the expected overestimation of the R&D estimate in primary regressions that do not control for intangible assets. This overestimation results from the fact that both intangible assets and R&D intensity capture ETR decreasing profit shifting with IP. Intangible assets, however, are generally only a share of a firm's IP, because not all IP fulfills the recognition criteria of intangible assets in the balance sheet. Therefore, approximating IP with intangible assets may lead to some measurement error of the real IP present in a firm. Observing that the consensus estimate decreases but remains negative suggests that R&D intensity (partly) accounts for this measurement error and could serve as a better proxy for IP.

In Specification (3), we add another important explanatory variable, *Loss-Making Firms Excluded*. This dummy variable is significantly negative (5% level), indicating that primary studies that consider only profitable firms report more negative R&D intensity estimates. This finding could plausibly be explained by loss-making firms engaging to a lesser degree in profit shifting than profitable firms.

Specification (4) includes several other control variables: in particular, *Capital Intensity*, *Inventory Intensity*, *ETR Outliers Truncated or Winsorized*, *Average Sample Year*, and *Observation Number*. These variables are not significant, and the results described above remain qualitatively unchanged.

We observe that the econometric specification is a source of substantial variation across primary studies. The dummy variables *Industry Fixed Effects Included* and *Time Fixed Effects Included* are both significantly negative throughout all specifications, except for *Industry Fixed Effects Included* being insignificant in Specification (1). The coefficient of *R&D by Assets* is insignificant for all specifications. Therefore, the definition of R&D intensity does not seem to play a major role in explaining variation across primary studies. *Primary Standard Error* as a control for publication bias is negative throughout all specifications, but significant only at the 10% level in Specifications (1) and (2). These specifications, however, lack further explanatory variables. In the more sophisticated models (3) and (4), publication bias becomes insignificant and less negative. Thus, we conclude that there is no evidence for substantial publication bias in our meta-data set.

Overall, substantial variation across primary studies stems from ETR definition, inclusion of a control variable for intangible assets, excluding loss-making firms from the data set and econometric specification of the primary studies, i.e., whether time and industry fixed effects are included in the primary regressions.

Table 6. WLS meta-regression results.

Explanatory variables	Predicted sign	(1)	(2)	(3)	(4)
Definition of ETR					
ETR Including Deferred Taxes	+	0.1101**	0.0595***	0.0805***	0.0855***
		(0.0415)	(0.0193)	(0.0235)	(0.0295)
Definition of R&D					
R&D by Assets	?	0.0478	0.0120	0.0023	0.0371
		(0.1267)	(0.0573)	(0.0458)	(0.1001)
Control Variables					
Intangibles	+		0.2013***	0.1479***	0.1631***
			(0.0209)	(0.0359)	(0.0292)
Capital Intensity	?				–0.0509
					(0.0404)
Inventory Intensity	?				0.0062
					(0.0997)
Data Sample Characteristics					
Loss-Making Firms Excluded	–			–0.0543**	–0.0857**
				(0.0259)	(0.0404)
ETR Outliers Truncated or Winsorized	?				0.0287
					(0.0489)
Average Sample Year	?				+0.0000
					(0.0000)
Observation Number	?				+0.0000
					(0.0000)
Econometric Specification					
Industry Fixed Effects Included	?	0.0021	–0.1989***	–0.1517***	–0.1941***
		(0.0122)	(0.0221)	(0.0362)	(0.0273)
Time Fixed Effects Included	?	–0.1102**	–0.0618***	–0.0838***	–0.0887***
		(0.0411)	(0.0189)	(0.0236)	(0.0297)
Publication Bias					
Primary Standard Error	–	–2.8541*	–1.1719*	–0.7195	–0.7112
		(1.4056)	(0.5859)	(0.5508)	(0.5624)
Constant	?	0.2267**	0.2533***	0.0796	0.0358
		(0.0900)	(0.0569)	(0.0730)	(0.0736)
Database dummy variables included in meta-regression		YES	YES	YES	YES
No. of primary estimations		153	153	153	153
No. of primary studies		21	21	21	21
Adjusted R-squared		0.6602	0.8088	0.8200	0.8191
Predicted effect size of R&D intensity (ETR calculation excludes deferred taxes)		–0.4360	–0.1728	–0.2409	–0.2520
Predicted effect size of R&D intensity (ETR calculation includes deferred taxes)		–0.3258	–0.1133	–0.1604	–0.1666

Regressions of the coefficients of R&D intensity found in primary studies on study and model characteristics; see equation (2.4). All study and model characteristics are coded as dummy variables (except for *Average Sample Year*, *Observation Number* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 2.3.2 and 2.4 as well as Table 4. The coefficients indicate the estimated effect of respective study or model characteristics on primary R&D intensity effects, ceteris paribus. The results for the database dummy variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on the study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of R&D intensity are calculated assuming a hypothetical empirical study including all study and model characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for database fixed effects because we attempt to generalize empirical findings, rather than refer to specific databases.

We now calculate the predicted effect size (consensus estimate) of R&D intensity in two steps. The calculation procedure is based on Feld et al. (2013) and Heckemeyer and Overesch (2017).

First, we include all explanatory variables except for *ETR Including Deferred Taxes*. Specifically, each coefficient of the insignificant dummy and continuous variables is multiplied by its sample mean. Also, the database dummy variables are evaluated at their sample mean, irrespective of their significance, because we aim to generalize empirical findings, rather than refer to specific databases (Feld et al. (2013)). The significant dummy variables are found to be important sources of variation and, hence, are not evaluated at their sample mean: These dummy variables are set to one because these variables or specification properties should be considered in an empirical study examining how R&D intensity affects ETR. This calculation leads to a predicted R&D intensity effect of –0.2520, i.e., a ten percentage point increase in R&D intensity leads to a 2.52 percentage points decrease of ETR.[23] Since the dummy variable *ETR Including Deferred Taxes* does not enter this calculation, this prediction measures the effect of R&D intensity on an ETR that takes into account current taxes only. Hence, this effect could be due to the profit shifting or tax accounting effects.

Second, to separate these two effects, we add the significantly positive coefficient of *ETR Including Deferred Taxes* to the predicted R&D intensity effect of –0.2520. This calculation leads to a prediction of –0.1666 (= –0.2520 + 0.0855*1), which takes account of deferred taxes and therefore "cancels out" the tax accounting effect on ETR. In other words, the effect of –0.1666 is due to profit shifting with IP created by R&D activity.

Accordingly, we find evidence for the profit shifting and the tax accounting effects in our meta-data set. Moreover, after controlling for deferred taxes, we observe a decline in the consensus estimate by 34%, from –0.2520 to –0.1666. In other words, around two-thirds of the negative effect of R&D intensity on ETR can be attributed to the profit shifting effect. This finding is suggestive evidence that R&D may serve as a proxy for IP that is used for profit shifting within an MNE. However, the remaining one-third of the negative effect of R&D intensity on ETR can be attributed to the tax accounting effect. Hence, R&D expenses also influence the tax burden of a firm from a pure tax accounting view, i.e., an immediate deduction of R&D expenses in the tax accounts as opposed to a possible capitalization in the financial accounts. Therefore, the profit shifting and tax accounting literature correctly refer to a negative effect of R&D intensity on a firm's tax burden from a profit shifting or tax accounting point of view. However, researchers in both strands of literature should be aware of and refer to the respective other effect in their model designs and argumentation.

[23] –0.2520 = 0.0371*0.3137 *(R&D by Assets)* + 0.1631*1 *(Intangibles)* – 0.0509*0.5817 *(Capital Intensity)* + 0.0062*0.3856 *(Inventory Intensity)* – 0.0857*1 *(Loss-Making Firms Excluded)* + 0.0287*0.7386 *(ETR Outliers Truncated or Winsorized)* + 0.00005*1998.8 *(Average Sample Year)* + 0.0001 *(Observation Number)* – 0.1941*1 *(Industry Fixed Effects Included)* – 0.0887*1 *(Time Fixed Effects Included)* – 0.7112*0.1110 *(Primary Standard Error)* – 0.1031 *(Database Fixed Effects)* + 0.0358 *(Constant)*. Differences are due to rounding error.

2.5.2 Robustness analysis

In Table 7, we check whether our main regression results are robust to model variations, taking Specification (4) in Table 6 as a starting point.

One of our main assumptions is that the error terms calculated for observations within a primary study are not independent of each other and are autocorrelated (within-study dependence, see Section 2.3.1). In Specification (1), we consider observations within a study as independent and provide heteroscedasticity-robust (instead of cluster-robust) standard errors. The level of statistical significance is robust: The insignificant estimates of Specification (4) of Table 6 remain insignificant, while the significant estimates remain significant. Hence, calculation of the predicted effect size of R&D intensity does not change.

In Specification (2), we use squared primary standard error as a control variable for publication bias, which some simulations propagate as a better control (Stanley and Doucouliagos (2012), p. 61). Nevertheless, our results remain qualitatively and quantitatively unchanged.

In our meta-regression analysis, we find no evidence for publication bias. Longhi et al. (2005) argue that in the absence of publication bias, the primary standard error can be omitted from the meta-regression. Therefore, in Specification (3), we leave the primary standard error out and observe no qualitative change in our results. Quantitatively, we obtain a slight decrease of 0.02 in the predicted R&D intensity effect.

In Specification (4), we control for the country considered in the respective primary regression, i.e., using country fixed effects instead of database fixed effects. This approach leads to qualitatively robust results; the *p*-value of *ETR Including Deferred Taxes* is 0.108. Quantitatively, we actually observe an increase in the predicted R&D intensity effect of 0.03 and 0.06, respectively. *Primary Standard Error* as a control for publication bias is significantly negative (5% level); however, the coefficient is below 2, which suggests that publication bias is not substantial. The reason for this is that, in case of substantial publication bias, estimates less than twice their standard errors (*t*-statistic of 2) remain unreported. Thus, there would be correlation between R&D intensity coefficients and their associated primary standard errors with a regression slope of at least 2 (Card and Krueger (1995), Feld et al. (2013)).

Table 7. Robustness analysis of WLS meta-regression results.

Explanatory variables	Predicted sign	(1) Heteroscedas-ticity-robust standard errors	(2) Squared standard errors	(3) Without standard errors	(4) Country fixed effects	(5) Large study dummy variable	(6) Excl. Harris and Feeny (2003)	(7) R&D tax credit dummy variable
Definition of ETR								
ETR Including Deferred Taxes	+	0.0855***	0.0920***	0.0922***	0.0601	0.0740*	0.0877***	0.0810**
		(0.0210)	(0.0301)	(0.0300)	(0.0357)	(0.0394)	(0.0306)	(0.0306)
Definition of R&D								
R&D by Assets	?	0.0371	–0.0266	–0.0719	0.2985	0.0823	0.0259	0.1151
		(0.1065)	(0.0545)	(0.0536)	(0.1883)	(0.1320)	(0.1021)	(0.1509)
Control Variables								
Intangibles	+	0.1631***	0.1624***	0.1605***	0.0884*	0.1360***	0.1600***	0.1552***
		(0.0442)	(0.0334)	(0.0341)	(0.0494)	(0.0446)	(0.0283)	(0.0271)
Capital Intensity	?	–0.0509	–0.0489	–0.0480	0.0260	–0.0697	–0.0491	–0.0430
		(0.0370)	(0.0411)	(0.0406)	(0.0589)	(0.0509)	(0.0399)	(0.0437)
Inventory Intensity	?	0.0062	–0.0290	–0.0657	0.2648	0.0766	0.0007	0.0788
		(0.0904)	(0.0802)	(0.0761)	(0.1875)	(0.1450)	(0.1006)	(0.1482)
Data Sample Characteristics								
Loss-Making Firms Excluded	–	–0.0857***	–0.0992**	–0.1018**	–0.0624**	–0.0791	–0.0873**	–0.0850*
		(0.0270)	(0.0421)	(0.0422)	(0.0285)	(0.0474)	(0.0406)	(0.0410)
ETR Outliers Truncated or Winsorized	?	0.0287	0.0328	0.0347	0.0477	0.0340	0.0274	0.0334
		(0.0307)	(0.0543)	(0.0549)	(0.0462)	(0.0544)	(0.0496)	(0.0473)
Average Sample Year	?	+0.0000	+0.0000	0.0001	0.0001	+0.0000	+0.0000	+0.0000
		(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observation Number	?	+0.0000	+0.0000	+0.0000	+0.0000	+0.0000	+0.0000	+0.0000
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Econometric Specification								
Industry Fixed Effects Included	?	–0.1941***	–0.1952***	–0.1951***	–0.1399***	–0.1728***	–0.1894***	–0.1914***
		(0.0403)	(0.0278)	(0.0277)	(0.0430)	(0.0316)	(0.0282)	(0.0284)
Time Fixed Effects Included	?	–0.0887***	–0.0950***	–0.0952***	–0.0637*	–0.0773*	–0.0909***	–0.0843**
		(0.0210)	(0.0303)	(0.0302)	(0.0358)	(0.0395)	(0.0308)	(0.0307)
Publication Bias								
Primary Standard Error	–	–0.7112			–1.8802**	–0.7396	–0.6262	–0.8538
		(0.4852)			(0.7751)	(0.5749)	(0.5789)	(0.6500)
Primary Standard Error Squared	–		–1.5541					
			(0.9438)					
Regression Number								
Large Study	?					–0.0623		
						(0.0967)		
R&D tax credit								
R&D Tax Credit	–							–0.0443
								(0.0338)
Constant	?	0.0999	–0.0081	–0.0192	0.1417	0.0932	0.0235	0.0634
		(0.2520)	(0.1020)	(0.1043)	(0.0925)	(0.1426)	(0.0730)	(0.0680)
Database dummy variables included in meta-regression		YES	YES	YES	NO	YES	YES	YES
Country dummy variables included in meta-regression		NO	NO	NO	YES	NO	NO	NO
No. of primary estimations		153	153	153	153	153	143	153
No. of primary studies		21	21	21	21	21	20	21
Adjusted R-squared		0.8191	0.8165	0.8160	0.7624	0.8190	0.6428	0.8188
Predicted effect size of R&D intensity (ETR calculation excludes deferred taxes; column (7): country does not grant R&D tax credit)		–0.2520	–0.2591	–0.2348	–0.2818	–0.2223	–0.1839	–0.2257
Predicted effect size of R&D intensity (ETR calculation includes deferred taxes; column (7): country grants R&D tax credit)		–0.1666	–0.1672	–0.1426	–0.2217	–0.1483	–0.0962	–0.1748
Predicted effect size of R&D intensity (ETR calculation includes deferred taxes; column (7): country does not grant R&D tax credit)		–0.1666	–0.1672	–0.1426	–0.2217	–0.1483	–0.0962	–0.1447

Regressions of the coefficients of R&D intensity found in primary studies on study and model characteristics; see equation (2.4). All study and model characteristics are coded as dummy variables (except for *Average Sample Year*, *Observation Number* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 2.3.2 and 2.4 as well as Table 4. The coefficients indicate the estimated effect of respective study or model characteristics on primary R&D intensity effects, ceteris paribus. The results for the database and country dummy variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on the study level (except for Specification (1) with heteroscedasticity-robust standard errors instead of clustered standard errors), to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of R&D intensity are calculated assuming a hypothetical empirical study including all study and model characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for database and country fixed effects, because we attempt to generalize empirical findings, rather than refer to specific databases or countries.

Specification (5) controls for undue weight of certain studies, because we observe a relatively large degree of variation in the number of regressions per study (see Table 5). We include a dummy variable coded one for studies that have more regressions than the average study (12 regressions or more).[24] Still, these robustness tests resemble our main meta-regression findings and we observe no qualitative change in our results. Quantitatively, we find a slight decrease of 0.02 in the predicted R&D intensity effect.

In Specification (6), we leave out Harris and Feeny (2003), who define R&D intensity as R&D expenses divided by total income instead of total sales. Since total income is probably highly correlated with total sales, we expect no significant change in our results. Indeed, although sample size decreases by 10 observations, the results are qualitatively robust.

Finally, in Specification (7), we control for countries that grant firms an R&D tax credit, i.e., allowing firms to deduct an additional fraction of R&D expenses from their tax base under certain conditions. This circumstance may bias our profit shifting effect, since the R&D tax credit also leads to a permanently negative effect on ETR (see footnote 11). We include an *R&D Tax Credit* dummy variable coded one if a primary regression refers to a country that granted an R&D tax credit during the time period the primary regression refers to, and zero otherwise (mean of *R&D Tax Credit*: 0.7273). The coefficient (–0.0443) is negative though insignificant. Hence, in case a primary regression is based on a data set with firms that are resident in countries with an R&D tax credit, the R&D intensity effect is slightly more negative, by 0.04 percentage points.[25] Our main meta-regression findings remain qualitatively robust; however, the profit shifting effect now varies between –0.1447 and –0.1748, depending on whether a country grants an R&D tax credit to its firms.

This robustness test can further be used to disentangle the R&D tax credit effect from the R&D profit shifting effect that, to our knowledge, is yet to be investigated. Consider the predicted R&D intensity effect of –0.1447, which controls for the tax accounting effect for a firm residing in a country that does not grant an R&D tax credit (i.e., *ETR Including Deferred Taxes* is set to one and *R&D Tax Credit* is set to zero in the R&D effect size calculation). In other words, this R&D intensity estimate reveals the profit shifting effect for a primary regression on firms that reside in countries not granting R&D tax credits. Comparing this estimate with the profit shifting effect of –0.1666 from Specification (4) in Table 6, which

[24] Excluding these studies would significantly lower number of observations and between-study variation. By clustering the standard error on the study level, we already control for the high degree of dependency of estimates within each study.

[25] Interestingly, the estimate of –0.04 resembles an estimate we calculate for the US R&D tax credit, independently of our meta-data set: For 2001–2011, the share of R&D tax credit granted to US firms was about 6% of total qualified R&D expenses (http://www.irs.gov/uac/SOI-Tax-Stats-Corporation-Research-Credit, last accessed: 11 September 2016). For an average US firm, we calculate an ETR decrease of 0.04 percentage points when R&D expenses increase by one percentage point. For the top 10% of R&D firms in the USA, we calculate a respective ETR decrease of 0.05 percentage points. This calculation is based on Compustat North America; data are available upon request.

does not control for an R&D tax credit, shows that we overestimated the profit shifting effect by 0.02 percentage points. Hence, our profit shifting effect from our main regression is overestimated by about 10% (= 0.02/0.1666). In other words, approximately 10% of the profit shifting effect can be traced back to R&D tax credits in our meta-data set.

Overall, the results from the robustness analysis are consistent with our main regression results: The consensus estimate for the R&D intensity effect on ETR is negative and declines by about one-third if a primary study controls for the tax accounting effect.[26]

2.6 Conclusion

Profit shifting by MNEs is of high interest in academic research and public debate and especially IP is considered a main shifting channel. While R&D activity often serves as a proxy for IP-based profit shifting, ETR is a widely used measure in evaluating effective tax planning in a profit shifting context. However, the relationship between R&D intensity and ETR is insufficiently addressed in the empirical literature.

Consequently, our research question focuses on how R&D intensity—a proxy for IP—affects firm ETR. The empirical literature shows that there is some variation in the effect of R&D intensity on ETR. To understand this variation and quantify a consensus estimate for this effect, we apply meta-regression techniques. Concerning the consensus estimate of the R&D effect, we obtain the following results that are robust to variation in model specifications.

For primary studies considering only current taxes in ETR calculation, a ten percentage point increase in R&D intensity leads to a 2.5 percentage points decrease in ETR. This finding may be due to two distinct effects: a profit shifting effect, i.e., R&D may serve as a proxy for IP used for profit shifting within an MNE, and a tax accounting effect, i.e., an immediate deduction of R&D expenses in the tax accounts, as opposed to a possible capitalization in the financial accounts.

For primary studies considering both current and deferred taxes in ETR calculation, a ten percentage point increase in R&D intensity leads to a 1.7 percentage points decrease in ETR. This effect is attributable solely to the profit shifting effect, because the tax accounting effect is controlled for by including deferred taxes. In other words, we find profit shifting evidence for transfer pricing with IP located in low-tax countries, which drives down firms' tax burden.

[26] In a further robustness test, we exclude the variable *Industry Fixed Effects Included*, which 88% of primary regressions control for. Qualitatively, our results remain unchanged, except for *Intangibles* being still positive though insignificant. Quantitatively, we observe consensus estimates of –0.3898 and –0.2767, i.e., we underestimate our consensus estimates in our main regression results. In the interest of brevity, this robustness test is not tabulated but is available upon request.

In general, this finding supports empirical studies using R&D intensity as a proxy for IP in a profit shifting context. However, in their model designs and argumentation, researchers in the profit shifting literature do not consider the R&D tax accounting effect, while researchers in the tax accounting literature do not consider the R&D profit shifting effect. Therefore, the two distinct R&D effects on firms' tax burden are not comprehensively addressed in the profit shifting and tax accounting literature and the relative importance of the two effects is unknown.

In the meta-regression analysis, we observe that, after controlling for a firm's intangible assets, the predicted R&D intensity effect declines but remains negative. Hence, the negative effect of R&D expenses on ETR cannot be fully explained by firms' intangible assets. This result is a hint that approximating IP with intangible assets may lead to measurement error, because intangible assets are only a share of a firm's IP, since not all IP fulfills the recognition criteria of intangible assets on the balance sheet. By additionally considering R&D intensity in empirical specifications, this measurement error may be (partly) accounted for.

Our general finding that inclusion or exclusion of deferred taxes in ETR calculation has a decisive impact on the size of the effect of a primary regression's explanatory variable (R&D intensity in our paper) illustrates that considering ETR definition in a research setting is crucial: An ETR calculation that considers current and deferred taxes is not affected by tax deferral strategies, while current ETR is affected by such strategies. Consequently, depending on the research question, scholars should carefully point out which effect ETR shall measure in their research setting, then decide whether to include or exclude deferred taxes in ETR calculation.

Finally, our robustness analysis allow us to further disentangle the profit shifting effect from the R&D tax credit effect: We detect that about 10% of the profit shifting effect can be traced back to R&D tax credits.

The policy implications of this meta-regression analysis are twofold. First, we provide additional evidence that IP is used for profit shifting by strategically setting transfer prices to shift income to low-tax jurisdictions, thereby lowering firms' tax burden. This finding supports OECD BEPS Action Plans Numbers 8, 9, and 10, which aim to set transfer prices in line with value creation. Second, with respect to R&D activity, the R&D effect of profit shifting and tax accounting on ETR is 2:1, i.e., one-third of the effect of R&D intensity on a firm's tax burden could be mitigated by tax legislation via book-tax conformity.

3 Taxes and Firm Size: Political Cost or Political Power?[27]

Abstract: Using a meta-regression analysis, we quantitatively review the empirical literature on the relation between ETR and firm size. Accounting literature offers two competing theories on this relation: The political cost theory, suggesting a positive size-ETR relation, and the political power theory, suggesting a negative size-ETR relation. Using a unique data set of 49 studies that do not show a clear tendency towards either of the two theories, we contribute to the discussion on the size-ETR relation in three ways: First, applying meta-regression analysis on a US meta-data set, we provide evidence supporting the political cost theory. Second, our analysis reveals factors that are possible sources of variation and bias in previous empirical studies; these findings can improve future empirical and analytical models. Third, in further analyses on a cross-country meta-data set, we find additional explanations for the two competing theories. To our knowledge, these explanations have not yet been investigated in our research context. We find that tax planning aspects, such as the introduction of the check-the-box rule in the USA, potentially affect the size-ETR relation. In addition, we find supporting evidence that Hofstede's cultural dimensions theory and a transparency index explain variation in the size-ETR relation.

Keywords: Effective tax rate • Firm size • Political cost theory • Political power theory • Meta-regression analysis

JEL Classification: H25 • H26 • M41

Publication: This paper is available as an *SSRN Working Paper* (https://dx.doi.org/10.2139/ssrn.2697468).

Presentations: This paper has been presented at the Taxation Doctoral Colloquium (Mannheim University, 29th June 2015), the MaTax CampusMeeting 2016 (ZEW Mannheim, 12th April 2016), and the EAA Annual Meeting 2016 (Maastricht, Netherlands, 11th May 2016).

Funding: This paper was supported by the Leibniz ScienceCampus "MannheimTaxation" (MaTax), a joint initiative of the ZEW and the University of Mannheim.

[27] This paper is joint work with Dr. Thomas Belz and Dr. Christian Steffens.

3.1 Introduction

For more than 40 years, accounting literature has been discussing two competing theories about the relationship between ETR and firm size. The political power theory assumes a negative relationship, i.e., the greater the firm size the lower the ETR, as larger firms have more possibilities to influence the political process in their favor, to engage in international tax planning, and to organize their activities to achieve optimal tax savings (Siegfried (1972)). In contrast, the political cost theory—which considers taxes as a part of firms' political costs—assumes a positive relationship, as larger firms are subject to larger public visibility, which causes them to be exposed to greater regulatory actions by the government or to be expected to take more social responsibility (Jensen and Meckling (1976), Zimmerman (1983), Watts and Zimmerman (1986)).

These two viewpoints have led to further empirical research, without conclusive results. In fact, as Table A 1 in the Appendix to Section 3 shows, empirical studies over the past decades provide evidence in favor of both theories: From 49 primary studies in our meta-data set, we find 20 (9) studies that provide evidence for the political cost (political power) theory, nine studies show no clear tendency towards either theory, and 11 studies provide evidence for both theories.

We investigate this inconsistency by applying a WLS meta-regression analysis to our large meta-data set of primary studies that all use ETR as the dependent variable and firm size as an explanatory variable. Besides the vast amount of empirical studies on the size-ETR relation in light of the two competing theories, which itself prompts performing meta-regression analysis, we consider this approach the most appropriate as it provides a large meta-data set with data from numerous countries and various explanatory variables and time spans. No other available database was found with a variety of variables large enough to make a firm-level analysis with a scope comparable to that from our meta-data set. In addition, meta-regression analysis enables us to consider individual research designs and varying variable definitions, which might bias the results in the primary studies. Further, we are able to control for publication bias, i.e., reporting expected and significant results in primary studies to increase the chance of being published.

Our meta-regression analysis contributes threefold to research:

First, we quantitatively summarize 25 primary studies with 161 observations that consider only US firms and provide a consensus estimate for the size-ETR relation in these studies. Our estimate is positive and implies that a ten percent increase in firm size roughly leads to a one percentage point increase in ETR. This finding supports the political cost theory. In an additional analysis of the US meta-data set, we investigate tax planning elements. As already discussed, large, multinational firms can take advantage of multiple tax planning

opportunities by optimizing their global activities to achieve highest possible tax savings. One such tax planning opportunity can be pursued by using intangible assets and intragroup transfer pricing, which facilitates separating where firms generate their profits and where they report their taxable income. This cross-border profit shifting strategy enables large firms to shelter their worldwide income from high tax rates and to reduce their ETRs (e.g., Rego (2003)). Current examples are Apple Inc. and Google Inc., which reported an ETR on their foreign earnings of 1.2 and 2.4 percent, respectively, in 2010 (Drucker (2010); Godfrey (2012)). For the US meta-data set, we find that the size-ETR relation significantly decreases after the introduction of the check-the-box rule in the USA in 1997. This rule simplified profit shifting to low-tax hybrid subsidiaries within US MNEs. This finding suggests that, after 1997, large firms effectively decreased their ETR to a significantly higher degree than small firms due to enhanced profit shifting opportunities. However, the size-ETR relation still remains positive in line with the political cost theory.

Second, we are able to identify various study characteristics that significantly influence the effect of firm size on ETR. We show that estimation results are significantly affected by definition of firm size, definition of ETR, sample period, and inclusion of control variables for a firm's capital intensity and a firm's R&D intensity. Our meta-regression analysis therefore explains why there is variation in effect sizes in the underlying primary studies and reveals possible sources of variation and bias that future research should take into account. Hence, our findings can be used to design future empirical models in a more coherent and consistent manner, improving the quality of estimation results.

Third, we extend our US-based analysis by quantitatively analyzing 49 primary studies with 393 observations on various countries (including the USA). This cross-country meta-data set allows us to examine additional explanations of the two competing theories. Thereby, we shed light on individual elements of both theories that have not yet been investigated in our research context.

Within this cross-country analysis, we find evidence that studies relying on relatively large, presumably multinationally operating firms show a significantly lower size-ETR relation, which translates into a decrease of ETR with increasing firm size. This finding may hint at international tax planning activities of large firms, as was found in the US-based analysis. However, as in the US sample, the size-ETR relation remains positive in line with the political cost theory.

In addition, we find evidence that society-related elements affect the size-ETR relation. As already discussed, according to the political cost theory, larger firms are subject to greater public scrutiny and visibility, which forces them to adapt their activities to what is viewed as socially or morally responsible. Hence, we argue that the effect of public scrutiny is stronger in societies where people strive to equalize the distribution of power and where

people demand justification of inequalities of power among people (Hofstede (1980), Hofstede (2001), Hofstede et al. (2010)). Using Hofstede's Power Distance Index as a measure of how much people in a country expect and accept the equal distribution of power, we confirm that a stronger tendency towards equalization is associated with a more positive size-ETR relation. In other words, support for the political cost theory is especially pronounced in studies based on countries where people expect more equal treatment and demand justification for inequalities of power among people.

Finally, we find evidence that the transparency index developed by Williams (2014) explains variation in the size-ETR relation. In particular, the size-ETR relation is more positive in countries with a high degree of transparency.

We apply a wide variety of robustness tests to confirm our findings for the US and cross-country meta-data set. First, we vary the definition of primary standard errors to validate the significance of our initial estimates in light of possible publication bias. Second, we exclude especially large and small firm size coefficients to overcome the threat of spurious results due to extreme values. Third, we control for the number of observations per study to consider possible over-representation of certain empirical studies. Fourth, we distinguish between other ETR definitions to deal with possible misspecifications. Fifth, for the cross-country meta-data set, we include country fixed effects instead of database fixed effects. In sum, all results prove to be robust in light of different specifications.

The remainder of this paper proceeds as follows. Section 3.2 presents the political cost and political power theories in more detail. Section 3.3 describes the meta-regression approach, defines variables, and gives an overview of our control variables. Section 3.4 provides the data and summary statistics. Section 3.5 discusses the results from the meta-regression on the US and cross-country meta-data set and provides the robustness analysis. Finally, Section 3.6 sets forth our conclusions.

3.2 Effect of firm size on ETR: Political cost theory versus political power theory

3.2.1 Political cost theory

The relationship between firm size and firm's political costs has been intensively debated in accounting research for several decades. Aichian and Kessel (1962) state that, for larger and more profitable firms, the possibility of public policy and government action directed against these firms increases. Jensen and Meckling (1976) point out that larger firms have a higher degree of public visibility and thus are more exposed to public and social pressure than smaller firms. Boynton et al. (1992) detect that "larger firms are generally subject to

closer surveillance from both the financial markets and from the IRS" (Boynton et al. (1992), 147) and Jensen and Meckling (1978) even assert that "larger corporations as we know them are destined to be destroyed" due to government actions "destroying the system of contract rights" (Jensen and Meckling (1978), 32). Watts and Zimmerman (1978) note that the political sector has the power to redistribute wealth between various groups and that the relative magnitude of such wealth transfer increases with firm size.

Watts and Zimmerman (1986) base the political cost theory on these findings. The reasoning behind the political cost theory can be subdivided into two main arguments: First, larger firms are subject to more governmental regulations. Second, they are politically more prone to public pressure and scrutiny, which forces them to act socially responsible and to adjust their actions and corporate behavior to what their social environment expects. Several studies have been conducted in support of this argument (e.g., Ernst & Young (2014), Graham et al. (2014), Dyreng et al. (2016)). The political cost theory can be empirically examined by considering the relationship between taxes—as one component of political costs—and firm size: If larger firms indeed face systematically higher ETRs compared to smaller firms, this result is consistent with the political cost theory. Zimmerman (1983) empirically examines the size-ETR relation and finds a positive relationship. The author concludes that this finding is evidence for using firm size as a proxy for a firm's political costs. His results are robust for alternative databases as well as for different definitions of ETR and firm size; however, the relationship varies across time and industries. Omer et al. (1993) confirm Zimmerman's (1983) results in a study applying five different ETR definitions; in addition, their results are robust to controlling for time and industry effects. For further studies on a positive size-ETR relation, see Table A 1 (column (2)) in the Appendix to Section 3.

3.2.2 Political power theory

First described by Siegfried (1972), the political power theory hypothesizes that large firms have greater economic resources and political power than small firms. Three arguments support this negative size-ETR relation. First, large firms can use their resources and power to negotiate their tax burden or influence legislation in their favor (e.g., lobbying activities), resulting in lower ETRs for large firms compared to small firms (e.g., Siegfried (1972), pp. 32–36, Stickney and McGee (1982), Gupta and Newberry (1997), Nicodème (2007)). Second, larger firms are able to invest more in tax experts that help maximize tax savings, and Scholes et al. (1992) find evidence that tax-motivated income shifting increases with firm size. Those authors trace this relationship back to smaller firms engaging in less opportunistic tax planning because they may have less sophisticated tax departments. Further, Mills et al. (2013) note that large firms may structure complex tax-reducing

transactions by hiring the best tax advisors. Third, larger, presumably multinational, firms benefit from economies of scale in international tax planning, which results in lower ETRs, by taking advantage of their size as they optimally arrange their global activities to minimize their overall tax burden. Results from Rego (2003) confirm this argument and large multinational firms appear to lower their tax burden by using profit shifting opportunities such as locating production or IP in low-tax countries or by taking advantage of tax subsidies in various host countries.

Porcano (1986) provides early evidence for the political power theory. He finds that larger firms have smaller ETRs although his results are sensitive to the database used (Kern and Morris (1992)). His findings are supported by work from McIntyre and Spinner (1986) and Dyreng et al. (2008). In related work, Mills et al. (2013) use ETR as a measure of a firm's political costs and investigate the interactive effects of a firm's political sensitivity and bargaining (i.e., political) power on its political costs. Interestingly, they find that firms that rely on government contracts report higher ETRs because their political sensitivity increases. However, the relation between political sensitivity and ETR decreases with a firm's political power. They conclude that some firms have sufficient political power to eliminate their tax-related political costs. For further studies on a negative size-ETR relation, see Table A 1 (column (3)) in the Appendix to Section 3.

3.2.3 Inconclusive empirical research on the effect of firm size on ETR

The empirical studies cited in Sections 3.2.1 and 3.2.2 provide evidence for either the political cost theory or the political power theory. However, several empirical studies investigating the relation between taxes and firm size do not find any relation or come to inconclusive results. For example, Bao and Romeo (2013) generally confirm the political cost theory except for the largest 5 percent of firms in their data set, where the political power theory holds. Wu et al. (2012a) find that the size-ETR relation depends on firm ownership: The political cost theory holds for privately-owned firms, while the political power theory holds for state-controlled firms. Nicodème (2007) comes to inconclusive results by first finding a negative correlation between ETR and firm size proxied by number of employees but then finding a positive correlation when firm size is proxied by total assets. Holland (1998) examines the effect of firm size on ETR over a 26-year period (1968–1993); only in four years (1978–1981) does the author find a significantly negative size-ETR relation. Kern and Morris (1992) consider the Tax Reform Act of 1986, which introduced significant changes to US tax law. The authors are able to replicate the results from both Zimmerman (1983) and Porcano (1986) for the period before the Tax Reform Act; however, post-1986, they find no systematic difference in the ETRs of large and small firms. Wilkie and Limberg (1990) reconcile the conflicting results from Zimmerman (1983)

(political cost theory) and Porcano (1986) (political power theory). The authors find that diverging empirical settings such as different data sets and different ETR and firm size definitions affect the direction and degree of the size-ETR relation. Stickney and McGee (1982) and Shevlin and Porter (1992) do not find evidence that ETRs significantly differ between large and small firms. For further studies that do not find any size-ETR relation or come to inconclusive results, see Table A 1 (columns (1) and (4)) in the Appendix to Section 3.

Overall, the empirical studies discussed in this section provide heterogeneous and conflicting results on the size-ETR relation. In our meta-data set, we consider a large set of primary studies and explore considerable heterogeneity concerning the magnitude and direction of the firm size coefficient (see Section 3.4). To quantitatively summarize and systematically examine these contradicting empirical findings, we perform meta-regression analysis on this large meta-data set with data from numerous countries and various explanatory variables and time spans. The following section explains our meta-regression approach in detail.

3.3 Methodology

3.3.1 Meta-regression approach

The primary studies underlying this meta-regression analysis identify their data analysis clearly and have the following classic linear regression model:

$$ETR = \beta_0 + \beta_1 * FIRMSIZE + X\beta + \varepsilon. \quad (3.1)$$

The dependent variable is a firm's global average ETR, i.e., a measure of worldwide income tax expense divided by a measure of worldwide pre-tax financial income, both of which observed in firm annual financial reports.[28] In our meta-regression, the explanatory variable of interest is $FIRMSIZE$ measured as total assets, market value, or sales. In addition to this variable, primary studies use a wide range of additional variables captured in vector X. β_0 is the intercept.

In our research context, the coefficient of interest is the reported β_1 of the firm size variable in equation (3.1). As outlined in Section 3.2, the sign of β_1 can be predicted via two

[28] All underlying primary studies use annual ETRs. Dyreng et al. (2008) propose using long-run (10-year) cash ETRs to measure tax avoidance practices of firms because annual ETRs may be subject to year-to-year variation. However, in our meta-regression, we are bound to the approach of the primary studies and consider the effect of firm size on annual ETRs. In addition, marginal ETRs—defined as the marginal tax burden if one additional monetary unit of income is earned—are not within the scope of this paper. See Callihan (1994) for a broad review of the accounting and public finance literature on average and marginal ETRs as well as for terminology and methodology in the ETR literature.

competing theories, the political cost theory (positive β_1) or the political power theory (negative β_1).

Indeed, there is substantial variation in the underlying empirical studies on the effect of firm size on ETR: In the full meta-sample, 50 percent of coefficients are statistically significant at 10% level (two-sided) and 63 percent (37 percent) of these significant estimates are positive (negative). Hence, which theory dominates in empirical literature is not clear.

We investigate this ambiguity in our US meta-data set using meta-regression analysis. We did not find any other database with a variety of variables large enough to make a firm-level analysis with a scope comparable to our meta-data analysis over the period 1975–2012. Thereby, we contribute to research in three ways. First, we generalize the central tendency of the empirical literature on the effect of firm size on ETR by providing a consensus estimate of this effect across primary studies. By considering the sign of the consensus estimate, we can conclude which theory holds for our meta-data set. Second, we explore reasons for heterogeneity across empirical studies and identify possible sources of bias and variation in the estimated coefficients, which helps to improve future empirical and analytical models. Third, we go beyond this basic analysis in further analyses on the size-ETR relation. In particular, we consider how firms' degree of internationality (as related to firm size), time trends, Hofstede's cultural dimensions theory, and a transparency index affect the size-ETR relative. To our knowledge, these aspects have not yet been investigated in our research context.

We analyze the coefficient of β_1 in the following linear meta-regression model:

$$y_{ji} = \delta_0 + \sum_{k=1}^{K} \delta_k X_{jik} + \varepsilon_{ji}, \text{ with } E\left[\varepsilon_{ji}^2\right] = \sigma^2 \omega_{ji} \qquad (3.2)$$
$$(j = 1,2,\dots,J) \quad (i = 1,2,\dots,I) \quad (k = 1,2,\dots,K).$$

In equation (3.2), y_{ji} is the reported β_1 of regression i from a total of I regressions of primary study j in a literature of J studies. X_{jik} is a vector of explanatory variables that measures differences in specific study and model characteristics K of the primary studies and controls for heterogeneity between primary studies (see Section 3.3.2 for meta-regressor variable definitions). The meta-regression coefficient δ_k indicates the estimated impact on primary firm size effects if an empirical study design features characteristic k, ceteris paribus. δ_0 is the intercept.

It is crucial to consider the meta-regression error term ε_{ji}. It captures all unobserved differences across primary regressions and is expected to be normally distributed as y_{ji} are taken from classic linear regression models. However, ε_{ji} is assumed to be heteroscedastic

because respective study and model characteristics (X_{jik}) influence the precision of y_{ji}, i.e., $\mathrm{Var}\left(y_{ji}\middle|\sum_{k=1}^{K} X_{jik}\right) = \sigma_{ji}^2$ (Stanley and Jarrell (1989), Feld et al. (2013)).

With heteroscedastic standard errors, estimates of OLS regression remain unbiased and consistent; yet, they lose efficiency. We bypass this problem by applying GLS regression, which allows for heteroscedastic errors.

Assume that σ_{ji}^2 depends only on a single known variable ω so that

$$\sigma_{ji}^2 = \sigma^2 \omega_{ji}. \tag{3.3}$$

Applying GLS regression, we transform equation (3.2) by dividing the *ji*th equation by $\sqrt{\omega_{ji}}$. Let $y_{ji}^* = y_{ji}/\sqrt{\omega_{ji}}$, $X_{jik}^* = X_{jik}/\sqrt{\omega_{ji}}$ and $\varepsilon_{ji}^* = \varepsilon_{ji}/\sqrt{\omega_{ji}}$, then we get the transformed model

$$y_{ji}^* = \delta_0 + \sum_{k=1}^{K} \delta_k X_{jik}^* + \varepsilon_{ji}^*, \text{ with } E\left[\varepsilon_{ji}^{*2}\right] = \sigma^2 \tag{3.4}$$
$$(j = 1,2,\dots,J) \quad (i = 1,2,\dots,I) \quad (k = 1,2,\dots,K).$$

The transformed model shown in (3.4) corrects for the heteroscedasticity problem outlined above. Now error term ε_{ji}^* is homoscedastic. Hence, the best linear unbiased estimator of δ_k is obtained by applying GLS regression, i.e., WLS regression in (3.4).[29] Accordingly, we apply WLS in our meta-regression. This approach is also in line with theoretical literature on meta-regression (Stanley (2008)) and existing meta-regression analyses.[30] The employed weights ($1/\omega_{ji}$) are known and correspond to the inverse of the squared standard error of each primary studies' coefficient. Thus, primary study coefficients with relatively precise (i.e., low) standard errors are given greater weight in our meta-regression.

Finally, multiple estimates per primary study may be jointly influenced by unobserved factors inherent to the respective study such as study quality or the researcher's ideology (Stanley and Doucouliagos (2012), 112–113). Since we include all estimates of a primary study, we cannot assume that (homoscedastic) ε_{ji}^* calculated for each observation within a primary study are independent of each other. Moreover, they are presumably autocorrelated because

$$corr\left(y_{ji}, y_{ji+l}\right) \neq 0 \text{ for observations } l \neq 0. \tag{3.5}$$

Such autocorrelation (within-study dependence) violates the assumptions of the classic linear regression model (Fahrmeir et al. (2013), 191). Therefore, we relax the assumption of

[29] The derivation of the WLS model is based on Greene (2012), 317–319 and Heij et al. (2004), 327–328.

[30] Examples of economic meta-regression analyses that apply WLS: Longhi et al. (2005), Rose and Stanley (2005), de Dominicis et al. (2008), Cipollina and Salvatici (2010), Efendic et al. (2011), Feld and Heckemeyer (2011), Havranek and Irsova (2011), Doucouliagos et al. (2012), Gechert and Will (2012), Feld et al. (2013), Lichter et al. (2015), Rusnak et al. (2013).

independence between observations within each primary study by clustering standard error ε_{ji}^{*} on study level.[31] This technique changes the standard errors of the estimates compared to heteroscedasticity-robust standard errors because any possible dependence among the estimates within a study is accounted for (e.g., Stanley and Doucouliagos (2012), 100).

3.3.2 Meta-regressor variables

$\sum_{k=1}^{K} X_{jik}^{*}$ of equation (3.4) captures differences within and between specifications of primary studies that may lead to systematic variation in the size-ETR relation within and across studies. We classify such specification differences under the following categories: definition of firm size, definition of ETR, control variables, data sample characteristics, econometric specification, and publication bias.

3.3.2.1 Definition of firm size in primary studies

In any meta-regression, the effect size of interest must be comparable across the underlying primary studies (Stanley (2001)). This prerequisite is met in our meta-data set: Primary studies calculate firm size by taking the natural logarithm of a firm's total assets, market value, or total sales. Thus, firm size measures the percentage point change in ETR in response to a percent change in firm size.

As outlined in Section 3.2, definition of firm size itself may affect the magnitude and direction of the size-ETR relation (e.g., Wilkie and Limberg (1990), Nicodème (2007)). The underlying primary studies use ln(Total Assets), ln(Market Value), and ln(Total Sales) as firm size definitions. In the meta-regression, we account for different firm size definitions by including the dummy variables *Assets* and *Market Value*. The coefficients of *Assets* and *Market Value* measure the incremental firm size effect in a primary regression applying this definition, relative to the omitted definition (*Sales*), holding constant the other regressors.

3.3.2.2 Definition of ETR in primary studies

There is variation in the ETR definition across primary studies: 65 percent of primary regressions calculate the ETR including only current taxes, while the other 35 percent consider both current and deferred taxes. Deferred tax legislation has been common in accounting principles worldwide since the 1970s[32] and requires the recognition of deferred

[31] This technique is also applied in other economic meta-regression analyses (e.g., Görg and Strobl (2001), Card et al. (2010), Cipollina and Salvatici (2010), Efendic et al. (2011), Adam et al. (2013)).

[32] US-GAAP has prescribed deferred tax accounting since 1967, when APB Opinion No. 11 was issued. This opinion was replaced by FASB 96 in 1987. Since 1992, SFAS 109 (ASC 740) addresses deferred tax accounting. IFRS has prescribed deferred tax accounting since 1979, when IAS 12 was issued.

taxes for temporary BTD, i.e., differences in income between the financial accounts and tax accounts that reverse in future periods.[33]

In the context of investigating the size-ETR relation, whether or not deferred taxes are considered in ETR calculations is important since temporary BTD can be caused by two different kinds of firm's "deferral strategies" or a mix of both. First, there may be a tax management driven earlier recognition of expenses in the tax accounts than in the financial accounts. Second, there may be an earnings management driven deferral of expenses in the financial accounts. These two strategies may systematically vary between large and small firms. Smaller, private firms may face less strong financial accounting constraints and report tax management driven lower income in the tax accounts as well as in the financial accounts (conforming tax avoidance). Larger firms, however, face greater financial accounting constraints and report lower income in the tax accounts (tax management) but higher income in the financial accounts (earnings management) leading to non-conforming tax avoidance (for this argumentation see Hanlon and Heitzman (2010)). Hence, if only current taxes are considered in ETR calculation, there may be a negative correlation between firm size and ETR. This is the case because, for larger firms, the ETR denominator increases (income in the financial accounts) while the ETR numerator decreases (current taxes) compared to smaller firms with a constant ETR due to conforming tax avoidance.

To account for this variation, we follow the ETR classification of Hanlon and Heitzman (2010), p. 140, regarding deferral strategies. In particular, we code the dummy variable *ETR Including Deferred Taxes* one if the underlying primary study's regression defines ETR as "total income tax expense divided by pre-tax income". In this case, no deferral strategies may bias the size-ETR relation. We code *ETR Including Deferred Taxes* zero if primary study's regression defines ETR as "current income tax expense divided by pre-tax income" or "cash income taxes paid divided by pre-tax income". In this case, deferral strategies may bias the size-ETR relation. We expect a positive coefficient for this variable in the meta-regression because primary studies that include deferred taxes control for ETR decreasing non-conforming tax avoidance of large firms.

3.3.2.3 Control variables in primary studies

ETR Including Deferred Taxes controls for the simultaneous occurrence of tax management and earnings management that leads to temporary BTD. Tax-driven profit shifting, however, is not captured by this control variable as it does not result in temporary BTD

[33] See, for example, for IFRS IAS 12.15 and IAS 12.24, for US-GAAP ASC 740–10–25–2(b) or for German GAAP Section 274 paragraph 1 (1) HGB and Section 306 (1) HGB. In this paper, the term "deferred taxes" refers to the net amount of deferred tax expense and deferred tax income.

and does not cause realization of deferred taxes. Moreover, profit shifting has a permanently negative effect on ETR.[34]

According to the meta-regression analysis by Heckemeyer and Overesch (2017), the dominating profit shifting channel for multinational firms is transfer pricing and licensing. Especially IP, gained from R&D activity, gives firms opportunities for tax-optimized intragroup transfer pricing. To control for profit shifting opportunities related to IP, we include two dummy variables in the meta-regression. First, an *R&D Intensity* dummy variable is coded one if the underlying primary study's regression controls for R&D intensity (R&D expenses divided by total assets or total sales), and zero otherwise. Second, an *Intangibles* dummy variable is coded one if the underlying primary study's regression controls for intangible assets intensity (intangible assets divided by total assets), and zero otherwise. The exclusion of a control variable for R&D or intangible assets intensity in the primary studies could overestimate a negative size-ETR relation because both variables may capture ETR decreasing profit shifting opportunities, which may be more prevailing in large, multinational firms.[35] Thus, controlling for this possible overestimation, we expect a positive coefficient *R&D Intensity* and *Intangibles* in the meta-regression.

Further, we include a *Capital Intensity* dummy variable that is coded one if the underlying primary study's regression controls for fixed asset intensity (property, plant and equipment divided by total assets), and zero otherwise. This variable is included in some primary studies to capture different treatments of depreciation for tax and financial reporting purposes (e.g., Gupta and Newberry (1997), Hope et al. (2013)) and to capture tax planning opportunities by strategically locating fixed assets (e.g., Robinson et al. (2010)).

Inventory-intensive firms are considered to have fewer tax planning opportunities than capital-intensive firms.[36] Hence, no or a positive influence on ETR can be expected (e.g., Stickney and McGee (1982), Gupta and Newberry (1997)). Lee and Swenson (2012), however, refer to inventory tax benefits such as the "last in first out" method or profit shifting opportunities with inventory (transfer pricing), which may have a negative effect on ETR. To capture these effects, we include an *Inventory Intensity* dummy variable that is coded one if the underlying primary study's regression controls for inventory intensity (inventory divided by total assets), and zero otherwise.

[34] Under the credit method as the method to avoid double taxation, which is applicable in the USA, this permanently negative effect is only present if foreign profits are declared "permanently reinvested earnings" (PRE), i.e., these profits are not repatriated. See the studies by Blouin et al. (2012) and Krull (2004) that provide evidence that US firms have a substantial amount of PRE abroad and that US firms use PRE for earnings management.

[35] See the meta-regression analysis by Belz et al. (2017a), where the authors detect a significantly negative effect of R&D intensity on ETR.

[36] Tax benefits associated with capital investments are, for example, investment tax credits or accelerated depreciation schedules. Generally, inventory does not fall under the scope of such beneficial tax treatment.

3.3.2.4 Data sample characteristics of primary studies

Some primary studies exclude loss-making firms from their data set. This exclusion is decisive in the context of tax planning since loss-making firms are generally less tax responsive, i.e., a study excluding loss-making firms may include relatively more firms with tax planning possibilities than a study including these firms. The inclusion of loss-making firms in empirical profit shifting analyses may even lead to additional measurement errors of tax incentives (Heckemeyer and Overesch (2017)). Therefore, we include a dummy variable *Loss-Making Firms Excluded*, which marks primary studies that exclude loss-making firms in their sample.

The time span of the primary studies' data covers more than 40 years. To capture time trends, we include the *Average Sample Year* of the underlying primary study's regression. A tax-related time trend could be that, over the past years, the increasing relevance of highly mobile intangible assets has created more tax planning opportunities for large, multinational firms. Combined with the finding in Section 3.2.2 that larger firms may invest more in tax planning to maximize tax savings, this time trend could lead to variation in the firm size coefficient over time.

Further, some primary studies exclude firms from regulated sectors such as the banking sector. To control for this heterogeneity, we code the dummy variable *Regulated Sectors Excluded* one if a primary study excludes firms from regulated sectors and code it zero otherwise.

While the primary studies in the US meta-data set are based on Compustat North America only, the studies in the cross-country meta-data set cover 16 databases that are heterogeneous.[37] They mainly differ regarding geographic coverage (single countries vs. multiple countries), collection of data (hand-collected vs. database download), types of firms represented (listed vs. non-listed firms), and time span covered. We include dummy variables for each database to control for such unobserved database fixed effects in our cross-country analysis.

3.3.2.5 Econometric specification of primary studies

Some primary studies include time fixed effects to control for unobserved time trends such as business cycles or changing tax legislation. Such non-modeled trends may affect firm size, for example, in an economic crisis, firm's market value or sales may decrease for exogenous reasons. Additionally, some primary studies control for unobserved industry

[37] The 16 databases are Aspect-Huntley Financial Database, Australian Tax Office Tax Return Database, Amadeus, China Stock Market & Accounting Research (CSMAR) Database, Compustat North America, Compustat Global, Datex New Zealand Business Information Database, IBIS Enterprise Database, JuYuan Database, PACAP Database, Prowess Corporate Database, REACH Database, Worldscope as well as hand-collected data sets on firms listed on the ASX, on the BVB and on the German Stock Exchanges (DAX, MDAX, SDAX, TecDAX).

specific heterogeneity by including industry fixed effects. Firm size may systematically vary depending on industry and, in sectors where intangible assets such as patents play an important role, for example, the pharmaceutical sector, market value or sales may be higher than in other industries.

Controlling for time and industry fixed effects may reduce the effect of firm size on ETR because cross-time and cross-sectional variation are absorbed. However, possible omitted variable biases may be reduced. Since unconsidered time and industry fixed effects could influence the effect of firm size on ETR, we include two dummy variables, *Time Fixed Effects Included* and *Industry Fixed Effects Included*, which are coded one if the underlying primary study's regression controls for these unobserved fixed effects, and zero otherwise.

3.3.2.6 Publication bias of primary studies

Researchers may have a preference for publishing results that are statistically significant and in line with theoretical predictions and models. Thus, researchers could be reluctant to report insignificant results and may even search for specifications that produce expected and significant results. This circumstance is commonly referred to as publication bias (e.g., Card and Krueger (1995), Doucouliagos (2005), Stanley (2005), Feld and Heckemeyer (2011)).

To address this issue, we include the *Primary Standard Error* of primary estimates, which is the standard procedure in meta-regression analysis (e.g., Feld and Heckemeyer (2011), Doucouliagos et al. (2012), Stanley and Doucouliagos (2012), 60–61, Feld et al. (2013)). The idea for including the primary standard error is as follows: If there is substantial publication bias, then estimates less than twice their standard errors (*t*-statistic of 2) remain unreported in empirical literature. Thus, there would be correlation between the magnitude of firm size coefficients and their associated primary standard errors with a regression slope of around 2 (Card and Krueger (1995)).

Table 8 contains variable definitions and summarizes the meta-regressor variables.

Table 8. Definitions and summary statistics of meta-regressor variables.

Variable	Description	US meta-data set (N=161)		Cross-country meta-data set (N=393)	
		Mean	Std. dev.	Mean	Std. dev.
Assets	Binary dummy variable coded 1 if the primary regression uses ln(Total Assets) as firm size definition, and 0 otherwise	0.553	0.499	0.646	0.479
Market Value	Binary dummy variable coded 1 if the primary regression uses ln(Market Value) as firm size definition, and 0 otherwise	0.342	0.476	0.140	0.347
ETR Including Deferred Taxes	Binary dummy variable coded 1 if the primary regression uses the ratio of "total income tax expense to pre-tax income" as dependent variable, and 0 if the primary regression uses either the ratio of "current income tax expense to pre-tax income" or "cash income taxes paid to pre-tax income" as dependent variable	0.354	0.480	0.450	0.498
R&D Intensity	Binary dummy variable coded 1 if the primary regression controls for R&D intensity (ratio of R&D expenses to total assets or total sales), and 0 otherwise	0.615	0.488	0.435	0.496
Intangibles	Binary dummy variable coded 1 if the primary regression controls for intangible assets intensity (ratio of intangible assets to total assets), and 0 otherwise	0.373	0.485	0.158	0.365
Capital Intensity	Binary dummy variable coded 1 if the primary regression controls for capital assets intensity (ratio of property, plant and equipment to total assets), and 0 otherwise	0.665	0.474	0.634	0.482
Inventory Intensity	Binary dummy variable coded 1 if the primary regression controls for inventory intensity (ratio of inventory to total assets), and 0 otherwise	0.404	0.492	0.351	0.478
Loss-Making Firms Excluded	Binary dummy variable coded 1 if loss-making firms are excluded from the sample underlying the primary regression, and 0 otherwise	0.596	0.492	0.598	0.491
Average Sample Year	Continuous variable capturing the average sample year of the primary regression	1999.4	5.205	1998.3	7.037
Regulated Sectors Excluded	Binary dummy variable coded 1 if firms from regulated sectors are excluded from the sample underlying the primary regression, and 0 otherwise	0.373	0.485	0.664	0.473
Industry Fixed Effects Included	Binary dummy variable coded 1 if the primary regression controls for unobserved industry fixed effects, and 0 otherwise	0.776	0.418	0.654	0.476
Time Fixed Effects Included	Binary dummy variable coded 1 if the primary regression controls for unobserved time fixed effects, and 0 otherwise	0.683	0.467	0.524	0.500
Primary Standard Error	Continuous variable capturing the standard error of the primary firm size effect estimate	0.194	0.560	0.117	0.376
Post 1997	Binary dummy variable coded 1 if *Average Sample Year* of a single primary regression is after 1997 (year of introduction of check-the-box rule), and 0 otherwise	0.783	0.414	n/a	n/a
Large Firm Regression	Binary dummy variable coded 1 if the mean of firm size in a single primary regression lies above the mean of all primary regressions, and 0 otherwise	n/a	n/a	0.522	0.500

Data on database and country fixed effects are not reported but are available upon request.

3.4 Data

Our meta-data set for primary studies on US firms consists of 161 observations from 25 published primary studies. To identify relevant primary studies, we searched through online databases such as ProQuest or ScienceDirect for published studies and SSRN for working papers. Additionally, we performed Internet research via Google Scholar. Using central keywords (e.g., "effective tax rate", "firm size", "political cost theory", "political

power theory", "tax planning"), we searched for empirical studies that examined determinants of ETR or factors explaining variation in ETR across firms.

Numerous studies investigate the size-ETR relation. However, some of these (e.g., Stickney and McGee (1982), Zimmerman (1983), Porcano (1986), Wilkie and Limberg (1990), Kern and Morris (1992)) cannot be considered in our meta-regression analysis since these studies do not run a regression of firm size on ETR (see Section 3.3.1).

We sampled all firm size coefficients from each primary study, which is the standard procedure in meta-regression analyses (e.g., Égert and Halpern (2006), Feld and Heckemeyer (2011), Rusnak et al. (2013)). There are two main reasons for sampling all firm size coefficients (Disdier and Head (2008)). First, an inherent characteristic of meta-regression is to exploit data heterogeneity. From this perspective, it would be inefficient to discard information by arbitrarily selecting only one estimate per study because variation in specifications within a study would be lost. Second, the decision on which estimate should be used would be subjective. In our robustness analysis, we address the issue of undue weight of primary studies because we observe some variation in the number of regressions per study; we find that this issue does not bias our regression results.

Table 9 provides summary statistics on the meta-data set and shows substantial variation in the meta-data set, which suggests pursuing a meta-regression analysis, as follows.

First, firm size coefficients vary considerably across primary studies between a minimum value of –3.130 and a maximum value of 3.450. In addition, the arithmetic mean of firm size coefficients per study varies from –2.097 to 2.011.

Second, the absolute value of the coefficient of variation, a measure of relative dispersion, is 6.474, suggesting that there is a high degree of variation in reported primary estimates relative to the mean. Additionally, an arithmetic mean of firm size coefficient of 0.133 and a median of 0.003 suggest a positively skewed distribution of the estimates.

Third, definition of firm size varies: 55 percent of firm size definitions refer to ln(Total Assets) while 34 percent refer to ln(Market Value) and 11 percent to ln(Total Sales).

Fourth, data of the primary studies cover a broad time period (1975–2012). In addition, the cross-country meta-data set covers 16 different databases with geographic variation: 41 percent of the data are from studies on US firms, 25 percent are on European firms, 26 percent are on Asian firms, and 7 percent are on firms from Australia or New Zealand.[38] To our knowledge, there is no firm-level database with a comparable geographic variation over the period 1975–2012.

[38] One percent are other countries and regions (Brazil and China/USA).

Table 9. Summary statistics of primary studies in ETR meta-data set.

Study	Published (P) or unpublished (U)	No. of effects	Effect of firm size on ETR				
			Mean	Median	Min.	Max.	Std. dev.
United States							
Armstrong et al. (2012)	P	8	0.004	0.005	–0.001	0.009	0.004
Boone et al. (2013)	P	3	–0.019	–0.022	–0.022	–0.014	0.005
Chen et al. (2010)	P	5	–0.002	–0.002	–0.003	–0.001	0.001
Chyz et al. (2013)	P	8	0.001	–0.001	–0.010	0.013	0.010
Donohoe (2015)	P	6	0.005	0.006	–0.005	0.013	0.006
Gallemore and Labro (2015)	P	8	–0.003	–0.002	–0.014	0.003	0.006
Gupta and Mills (2002)	P	5	0.072	0.081	–0.004	0.150	0.073
Gupta and Newberry (1997)	P	6	–0.010	–0.002	–0.092	0.041	0.049
Higgins et al. (2015)	P	4	0.007	0.007	0.003	0.010	0.003
Hoi et al. (2013)	P	2	–0.000	–0.000	–0.001	0.001	0.001
Hoopes et al. (2012)	P	23	+0.000	0.003	–0.076	0.019	0.018
Hope et al. (2013)	P	11	0.011	0.010	–0.002	0.019	0.007
Huseynov and Klamm (2012)	P	6	–1.212	–1.310	–1.940	–0.520	0.511
Jacob (1996)	P	4	+0.000	+0.000	–0.000	0.001	0.001
Jennings et al. (2012)	P	2	–0.120	–0.120	–0.240	0.001	0.170
Klassen et al. (2014)	P	6	0.012	0.005	0.001	0.029	0.013
Kubick et al. (2015)	P	9	0.003	0.004	–0.003	0.006	0.003
McGuire et al. (2012)	P	4	0.008	0.008	0.003	0.012	0.005
McGuire et al. (2014)	P	4	0.003	0.005	–0.001	0.005	0.003
Mills et al. (1998)	P	3	–2.097	–1.780	–3.130	–1.380	0.917
Mills et al. (2013)	P	3	0.004	0.006	–0.001	0.008	0.004
Phillips (2003)	P	2	–0.003	–0.003	–0.003	–0.002	0.001
Rego (2003)	P	8	0.051	0.050	0.001	0.087	0.024
Richter et al. (2009)	P	17	2.011	2.356	–0.200	3.450	1.314
Robinson et al. (2010)	P	4	0.005	0.006	–0.004	0.010	0.006
Europe							
Buijink et al. (1999)	U	43	0.084	0.050	–0.400	0.540	0.190
Dyreng et al. (2016)	P	2	0.026	0.026	0.021	0.031	0.007
Herbert and Overesch (2014)	U	13	–0.001	–0.001	–0.010	0.015	0.006
Jaafar and Thornton (2015)	P	4	0.006	0.006	0.005	0.008	0.001
Janssen (2003)	U	22	–0.006	–0.002	–0.060	0.037	0.022
Kraft (2014)	P	7	0.016	0.020	–0.021	0.031	0.017
Lazăr (2014)	P	6	0.010	0.009	0.004	0.018	0.005
Lee and Swenson (2012)	P	2	–0.005	–0.005	–0.005	–0.005	0.000
Asia							
Guha (2007)	P	2	–0.012	–0.012	–0.016	–0.008	0.006
Kim and Limpaphayom (1998)	P	40	0.005	–0.004	–0.033	0.022	0.011
Liu and Cao (2007)	P	5	–0.003	–0.003	–0.008	0.004	0.005
Noor et al. (2010)	P	3	0.024	0.023	0.021	0.027	0.003
Wu et al. (2013)	P	14	1.089	1.667	0.017	1.712	0.829
Wu et al. (2012a)	P	28	0.002	–0.001	–0.153	0.239	0.055
Wu et al. (2012b)	P	4	1.528	1.286	1.162	2.378	0.571
Zeng (2010)	P	4	0.010	0.010	0.008	0.013	0.002
Australia and New Zealand							
Harris and Feeny (1999)	U	5	0.011	0.004	0.003	0.022	0.010
Harris and Feeny (2003)	P	10	–0.011	–0.013	–0.017	0.001	0.005
Lanis and Richardson (2012)	P	4	–0.018	–0.018	–0.022	–0.014	0.004
Richardson and Lanis (2007)	P	2	–0.016	–0.016	–0.024	–0.007	0.012
Taylor and Richardson (2012)	P	4	0.022	0.021	0.016	0.028	0.006
Wilkinson et al. (2001)	P	2	1.458	1.458	0.845	2.072	0.868
Other							
Fernández-Rodríguez and Martínez-Arias (2012)	P	2	0.050	0.050	0.047	0.053	0.005
Fernández-Rodríguez and Martínez-Arias (2014)	P	4	0.011	0.008	–0.047	0.075	0.052
US meta-data set		**161**	**0.133**	**0.003**	**–3.130**	**3.450**	**0.861**
Cross-country meta-data set		**393**	**0.126**	**0.003**	**–3.130**	**3.450**	**0.635**

Last update of meta-data set: January 2017.

However, these summary statistics may be biased since several important influencing factors are not taken into account at this point. Hence, it is an empirical question whether

there is systematic variation in firm size coefficients across primary studies. In the following section, we quantitatively investigate this variation in our meta-regression analysis and explore heterogeneity of the US and cross-country meta-data set in detail.

3.5 Meta-regression analysis

3.5.1 US analysis

In this section, we analyze our US meta-data set, i.e., we consider only primary studies that are based on Compustat North America and focus on US firms. This approach has two main advantages. First, firms in the underlying primary studies have to comply with the same set of tax and accounting rules, i.e., firms are exposed, for example, to the same STR, deferred tax legislation or treatment of R&D expenses. Second, these primary studies refer to only one database, i.e., variable definitions are more precise compared to the cross-country meta-data analyzed in Section 3.5.3. Consequently, considering primary studies based on only one database and country enables us to perform a meta-regression analysis on a "clean" meta-data set. However, there is still variation between these US studies regarding, for example, included control variables (see Table 8) or reported size-ETR relation: 16 (9) of these studies report a positive (negative) size-ETR relation on average and 4 (5) of these studies report exclusively positive (negative) size coefficients (see Table 9).

Table 10 presents the results from our basic meta-regression on the US meta-data set. The dependent variable is the coefficient of firm size found in primary studies, and explanatory variables are specific study and model characteristics of the primary studies. For variable descriptions, see Section 3.3.2.

Table 10. WLS meta-regression results for US meta-data set.

Explanatory variables	Predicted sign	(1)	(2)	(3)	(4)
Definition of Firm Size					
Assets	?	–0.0284**	–0.0295**	–0.0268**	–0.0253**
		(0.0133)	(0.0127)	(0.0117)	(0.0114)
Market Value	?	–0.0301**	–0.0276**	–0.0249*	–0.0233*
		(0.0130)	(0.0125)	(0.0122)	(0.0119)
Definition of ETR					
ETR Including Deferred Taxes	+	0.0026	0.0036*	0.0042***	0.0049***
		(0.0019)	(0.0018)	(0.0015)	(0.0015)
Control Variables					
R&D Intensity	+		0.0067**	0.0071	0.0110**
			(0.0028)	(0.0042)	(0.0045)
Intangibles	+		0.0017	0.0020	0.0070*
			(0.0037)	(0.0054)	(0.0036)
Capital Intensity	?		–0.0094	–0.0104	–0.0117*
			(0.0056)	(0.0066)	(0.0067)
Inventory Intensity	?		–0.0046	–0.0064	–0.0048
			(0.0038)	(0.0053)	(0.0045)
Data Sample Characteristics					
Loss-Making Firm Excluded	?			0.0032	0.0042
				(0.0056)	(0.0043)
Average Sample Year	?			–0.0002	
				(0.0003)	
Regulated Sectors Excluded	?			0.0022	0.0010
				(0.0047)	(0.0042)
Econometric Specification					
Industry Fixed Effects Included	?	–0.0068**	–0.0083***	–0.0085**	–0.0059**
		(0.0028)	(0.0029)	(0.0034)	(0.0025)
Time Fixed Effects Included	?	0.0058	0.0041	0.0046	0.0031
		(0.0047)	(0.0045)	(0.0045)	(0.0035)
Publication Bias					
Primary Standard Error	?	0.4507	0.5756	0.4918	0.4659
		(0.8205)	(0.8209)	(0.8856)	(0.8609)
Check-the-Box Rule					
Post 1997	–				–0.0104**
					(0.0044)
Constant	?	0.0311**	0.0345**	0.3326	0.0303***
		(0.0126)	(0.0130)	(0.6017)	(0.0101)
Database fixed effects included in meta-regression		NO	NO	NO	NO
No. of primary estimations		161	161	161	161
No. of primary studies		25	25	25	25
Adjusted R-squared		0.3605	0.3958	0.3941	0.4811
Predicted effect of firm size—ln(Total Assets)		0.0883	0.1141	0.0956	0.0934
Predicted effect of firm size—ln(Market Value)		0.0866	0.1160	0.0976	0.0954
Predicted effect of firm size—ln(Total Sales)		0.1167	0.1436	0.1225	0.1187

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. No database fixed effects are included as the primary studies in the US meta-data set are based on only one database (Compustat North America). All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction.

In a first step, we consider the predicted effect size (consensus estimate), which can be calculated using the meta-regression results in Table 10.[39] We multiply each coefficient of the insignificant dummy variables and continuous variables by its sample mean. We use

[39] The calculation procedure is based on Feld et al. (2013) and Heckemeyer and Overesch (2017).

sample mean because these study and model characteristics did not prove to have a significant effect on the firm size estimate. All significant explanatory dummy variables are not evaluated at their sample mean because these variables are found to be significant sources of variation. These variables are set to one because they reflect study and model characteristics that should be considered in an empirical study examining the effect of firm size on ETR.

For Specification (3), we derive the following three consensus estimates:

- 0.0956 for firm size defined as ln(Total Assets),[40]
- 0.0976 for firm size defined as ln(Market Value),
- 0.1225 for firm size defined as ln(Total Sales).

The interpretation is as follows. A ten percent increase in firm size leads to a roughly one percentage point increase in ETR when a primary study defines firm size as ln(Total Assets). For the other two firm size definitions, the effect is slightly higher. Hence, in our US meta-data set, the political cost theory dominates.

In a second step, we explore reasons for variation in the predicted effect sizes, which is helpful for future empirical studies on the size-ETR relation.

We find that the definition of firm size in primary studies has a significant effect. The coefficients of *Assets* and *Market Value* are significantly negative, i.e., compared to the omitted firm size definition ln(Total Sales), these definitions have a negative effect on the size-ETR relation. This result is in line with some empirical studies' findings that the size-ETR relation is dependent on the definition of firm size (e.g., Wilkie and Limberg (1990), Nicodème (2007)).

Further, the coefficient of *ETR Including Deferred Taxes* is significantly positive, as expected. The coefficient indicates that a study considering current and deferred taxes in ETR calculation reports a more positive size-ETR relation than a study considering only current taxes. One explanation is that deferred taxes cancel out BTD resulting from ETR decreasing non-conforming tax avoidance, which may be more pronounced in larger firms (see Section 3.3.2.2).

With respect to the dummy variables *R&D Intensity* and *Intangibles*, which control for a firm's profit shifting possibilities, we find positive coefficients, as expected. The coefficient for *R&D Intensity* is significant in Specifications (2) and (4); in Specification (3), the *p*-value

[40] 0.0956 = –0.0268*1 (*Assets*) – 0.0249*0 (*Market Value*) + 0.0042*1 (*Including Deferred Taxes*) + 0.0071*0.6149 (*R&D Intensity*) + 0.0020*0.3727 (*Intangibles*) – 0.0104*0.6646 (*Capital Intensity*) – 0.0064*0.4037 (*Inventory Intensity*) + 0.0032*0.5963 (*Loss-Making Firms Excluded*) – 0.0002*1999.4 (*Average Sample Year*) + 0.0022*0.3727 (*Regulated Sectors Excluded*) – 0.0085*1 (*Industry Fixed Effects Included*) + 0.0046*0.6832 (*Time Fixed Effects Included*) + 0.4918*0.1943 (*Primary Standard Error*) + 0.3326*1 (*Constant*). Differences are due to rounding error. Calculation for ln(Market Value) and ln(Total Sales) is done accordingly.

is 0.104. The coefficient of 0.0110 implies that a primary study not controlling for *R&D Intensity* reports a size-ETR relation that is lower by 0.0110 than that of a study controlling for this variable. Hence, not controlling for R&D intensity in primary studies leads to a downward bias of the size-ETR relation, possibly because larger firms may engage to a higher degree in profit shifting with IP (proxied by R&D intensity). *Intangibles* is also positive but only significant in Specification (4). A weaker effect of activated intangible assets may arise because these assets are generally only a share of a firm's IP since not all IP fulfills the recognition criteria of intangible assets in the balance sheet. Hence, approximating IP with intangible assets may lead to some measurement error of real IP, and R&D intensity may be the better proxy for IP.

Regarding the variables that control whether primary studies consider firm's capital and inventory intensity, we obtain the following. While *Inventory Intensity* is insignificantly negative, the coefficient of *Capital Intensity* is significantly negative in Specification (4); in Specifications (2) and (3), the *p*-values are 0.108 and 0.125. The coefficient of –0.0117 implies that a primary study not controlling for capital intensity reports a size-ETR relation that is higher by 0.0117 than a study controlling for this variable. Hence, not controlling for capital intensity in primary studies leads to an upward bias of the size-ETR relation. This finding is particularly interesting in combination with the significantly negative coefficient of *R&D Intensity*: While large capital-intensive firms report higher ETRs, large R&D-intensive firms seem to report lower ETRs. This may suggest that heterogeneity in the asset-structure among firms, in this case capital-intensive firms vs. R&D-intensive firms, affects ETR-decreasing tax avoidance behavior.

With respect to varying data sample characteristics, we find that the control variables *Loss-Making Firms Excluded* and *Regulated Sectors Excluded* are insignificantly positive and *Average Sample Year* is insignificantly negative.

With respect to the econometric specification, we obtain the following results. The dummy variable *Industry Fixed Effects Included* is significantly negative, while *Time Fixed Effects Included* is insignificantly positive throughout all specifications. Consequently, controlling for industry fixed effects is a source of substantial variation across primary studies.

Primary Standard Error as a control for publication bias is positive throughout all specifications but insignificant and well below two. Thus, we find no evidence for substantial publication bias in our meta-data set (see Section 3.3.2.6). The explanation could be that most researchers refer to the two conflicting theories on the size-ETR relation in their studies and, therefore, have no expectation of the sign of the firm size coefficient. Consequently, publication bias may be less pronounced in studies on the size-ETR relation.

In a third step, we investigate the introduction of the check-the-box rule in the USA in 1997. This rule is considered an important tax planning instrument since it is presumed to simplify the use of hybrid entities for tax avoidance activities within US MNEs. In particular, the rule allows avoidance of CFC rules of subpart F of the US Internal Revenue Code, which aim to restrain international profit shifting activities by immediate taxation of intragroup payments, such as interest and royalties, to tax haven subsidiaries (e.g., Altshuler and Grubert (2006), Mutti and Grubert (2009)). In other words, the introduction of the check-the-box rule makes it possible for US firms to reduce their tax payments and ETR by profit shifting to low-tax hybrid subsidiaries under certain circumstances. Based on the argumentation in Section 3.2.2, we argue that large, presumably multinationally operating firms have more profit shifting opportunities than small firms and benefit from economies of scale in international tax planning (Rego (2003)). Consequently, we hypothesize that, after 1997, especially large firms are able to reduce their tax payments by profit shifting activities, leading to a negative effect on these firms' ETR. In Specification (4), we consider a dummy variable that is coded one if *Average Sample Year* of a single primary regression is after 1997, and zero otherwise. We observe that this variable is significantly negative. In particular, we find that after the introduction of the check-the-box rule, the size-ETR relation decreases by about 0.01 but remains positive in line with the political cost theory. This may be evidence that, after 1997, large firms effectively decrease their ETR to a significantly higher degree than small firms due to enhanced profit shifting opportunities using hybrid entities. This finding is in line with Dyreng et al. (2017), who also find a decrease in ETRs of large US firms after the introduction of the check-the-box rule.

Taken together, based on this purely US meta-data set, we find that a ten percent increase in firm size leads to a roughly one percentage point increase in ETR. In addition, we detect that definitions of firm size and ETR as well as the time period of the sample being examined significantly impact the size-ETR relation. Further, a control for R&D intensity and capital intensity significantly explains variation across primary studies. Future research on the size-ETR relation should consider these findings to avoid possibly spurious regression results.

3.5.2 Robustness analysis of US analysis

Table 11 and Table 12 provide the results from our check on whether our basic regression results on the US meta-data set are robust to specification variations, taking Specification (3) in Table 10 as a starting point.

In Specification (1) of Table 11, we use the squared primary standard error as a control variable for publication bias, which some simulations propagate as a better control variable (Stanley and Doucouliagos (2012), p. 61). *Primary Standard Error Squared* is insignificantly positive. Specification (2) excludes 18 firm size coefficients from three primary studies that are the ten percent most extreme primary coefficients, i.e., we drop the top 5 percent lower and upper firm size coefficients (coefficients smaller than –0.520 and larger than 2.356) to overcome the thread of spurious results due to extreme values. The results remain quantitatively and qualitatively stable regarding these two robustness tests.

In Specification (1) of Table 12, we control for undue weight of certain studies as we observe some variation in number of regressions per study (see Table 9). We include a dummy variable (*Large Study*) that is coded one for studies that have more regressions than the average study (more than six regressions). *Large Study* is insignificant and this robustness test resembles our regression findings, both quantitatively and qualitatively. The consensus estimates decrease by about 0.05 but remain positive. In Specifications (2) and (3), we consider ETR definitions in more detail. In Specification (2), we insert an additional dummy variable that is coded one if the ETR definition in the underlying primary study's regression uses firms' cash flow as an income figure, and zero otherwise. In Specification (3), we exclude 11 firm size coefficients that are taken from primary regressions with ETR definitions that slightly differ from the other definitions.[41] The results concerning these two robustness tests resemble our regression findings, both quantitatively and qualitatively.

[41] Instead of dividing income tax expense by pre-tax financial income, these ETRs are calculated by dividing income tax expense by, for example, taxable income.

Table 11. Robustness analysis I for US meta-data set.

Explanatory variables	Predicted sign	(1) Primary standard error squared	(2) Excl. regressions with size coefficient in 5 percent upper and lower range
Definition of Firm Size			
Assets	?	–0.0270**	–0.0265**
		(0.0119)	(0.0116)
Market Value	?	–0.0253*	–0.0244*
		(0.0124)	(0.0120)
Definition of ETR			
ETR Including Deferred Taxes	+	0.0042***	0.0042***
		(0.0015)	(0.0015)
Control Variables			
R&D Intensity	+	0.0070	0.0072*
		(0.0042)	(0.0041)
Intangibles	+	0.0020	0.0021
		(0.0055)	(0.0052)
Capital Intensity	?	–0.0100	–0.0110
		(0.0066)	(0.0065)
Inventory Intensity	?	–0.0067	–0.0060
		(0.0053)	(0.0053)
Data Sample Characteristics			
Loss-Making Firm Excluded	?	0.0036	0.0025
		(0.0056)	(0.0055)
Average Sample Year	?	–0.0001	–0.0002
		(0.0003)	(0.0003)
Regulated Sectors Excluded	?	0.0021	0.0024
		(0.0047)	(0.0046)
Econometric Specification			
Industry Fixed Effects Included	?	–0.0089**	–0.0078**
		(0.0036)	(0.0030)
Time Fixed Effects Included	?	0.0048	0.0045
		(0.0046)	(0.0045)
Publication Bias			
Primary Standard Error	?		1.1684
			(0.8011)
Primary Standard Error Squared	?	0.3702	
		(0.3409)	
Constant	?	0.3111***	0.3497***
		(0.6156)	(0.5850)
Database fixed effects included in meta-regression		NO	NO
No. of primary estimations		161	143
No. of primary studies		25	23
Adjusted R-squared		0.3930	0.4174
Predicted effect of firm size—ln(Total Assets)		0.1301	0.0938
Predicted effect of firm size—ln(Market Value)		0.1319	0.0959
Predicted effect of firm size—ln(Total Sales)		0.1572	0.1203

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. No database fixed effects are included as the primary studies in the US meta-data set are based on only one database (Compustat North America). All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction.

Table 12. Robustness analysis II for US meta-data set.

Explanatory variables	Predicted sign	(1) Large study (dummy variable: studies > avg. reg. no.)	(2) ETR with cash flow denominator (dummy variable)	(3) Excl. other ETR definitions
Definition of Firm Size				
Assets	?	–0.0260**	–0.0271**	–0.0306*
		(0.0122)	(0.0118)	(0.0165)
Market Value	?	–0.0239*	–0.0251*	–0.0299
		(0.0131)	(0.0122)	(0.0180)
Definition of ETR				
ETR Including Deferred Taxes	+	0.0041**	0.0044***	0.0037***
		(0.0016)	(0.0015)	(0.0013)
ETR with Cash Flow Denominator	?		0.0140*	
			(0.0075)	
Control Variables				
R&D Intensity	+	0.0057	0.0078*	0.0052
		(0.0073)	(0.0042)	(0.0045)
Intangibles	+	0.0009	0.0034	0.0003
		(0.0062)	(0.0052)	(0.0060)
Capital Intensity	?	–0.0090	–0.0117*	–0.0067
		(0.0055)	(0.0067)	(0.0076)
Inventory Intensity	?	–0.0057	–0.0074	–0.0061
		(0.0041)	(0.0054)	(0.0066)
Data Sample Characteristics				
Loss-Making Firm Excluded	?	0.0032	0.0038	0.0034
		(0.0057)	(0.0054)	(0.0062)
Average Sample Year	?	–0.0002	–0.0002	–0.0003
		(0.0003)	(0.0003)	(0.0005)
Regulated Sectors Excluded	?	0.0025	0.0017	0.0011
		(0.0053)	(0.0046)	(0.0056)
Econometric Specification				
Industry Fixed Effects Included	?	–0.0078*	–0.0088**	–0.0064**
		(0.0043)	(0.0035)	(0.0028)
Time Fixed Effects Included	?	0.0049	0.0047	0.0052
		(0.0041)	(0.0046)	(0.0040)
Publication Bias				
Primary Standard Error	?	0.4993	0.3470	0.4111
		(0.8860)	(0.9117)	(0.9003)
Regression Number				
Large Study	?	0.0011		
		(0.0047)		
Constant	?	0.3473***	0.3888***	0.7252***
		(0.6195)	(0.5693)	(0.9397)
Database fixed effects included in meta-regression		NO	NO	NO
No. of primary estimations		161	161	150
No. of primary studies		25	25	24
Adjusted R-squared		0.3905	0.3959	0.3905
Predicted effect of firm size—ln(Total Assets)		0.0481	0.0974	0.0805
Predicted effect of firm size—ln(Market Value)		0.0495	0.0995	0.0825
Predicted effect of firm size—ln(Total Sales)		0.0746	0.1234	0.1076

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. No database fixed effects are included as the primary studies in the US meta-data set are based on only one database (Compustat North America). All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction.

3.5.3 Cross-country analysis

In this section, we analyze our cross-country meta-data set, i.e., we extend our analysis to include US primary studies as well as studies that focus on other countries. This cross-country approach has the advantage of exploiting between-country variation and analyzing whether there are systematic differences in the size-ETR relation between countries. The cross-country meta-data set, however, is not as precise as the US-only meta-data set and, therefore, is not used for the basic meta-regression analysis in Section 3.5.1. Table 13 presents the results from an extended meta-regression on the cross-country meta-data set.

The results regarding significant control variables in Specifications (1) to (3) are very similar to the results in Table 10 for the US meta-data set. However, the consensus estimates decrease by around 0.04 but remain positive. Hence, based on the cross-country meta-data set, we generally verify our results from the US meta-data set and find that the political cost theory also dominates in the cross-country analysis. In the following, we exploit variation in the cross-country meta-data set concerning specific countries considered in the primary regressions to investigate whether tax planning, culture, and transparency-related elements, which vary across countries, affect the size-ETR relation.

As outlined in Section 3.2.2, a negative size-ETR relation could be present because large, multinational firms have enhanced profit shifting opportunities and benefit from economies of scale in international tax planning (Rego (2003)). To capture these opportunities, we investigate whether there is a significant difference between primary studies that consider relatively larger firms on average than other primary studies. More specifically, we make use of summary statistics provided in primary studies: In Specification (4), we refer to the mean of the firm size variable in each primary regression. If the mean of firm size in a single primary regression lies above the mean over all primary regressions, we code a dummy variable (*Large Firm Regression*) one, and zero otherwise.[42] This variable may be considered a proxy for the presence of large, presumably multinational firms with profit shifting opportunities such as tax-optimized intragroup transfer pricing (e.g., Rego (2003)). Indeed, the coefficient of *Large Firm Regression* is significantly negative, suggesting that primary studies with larger, presumably multinationally operating firms on average report a significantly lower—though still positive—effect size.[43]

[42] Due to the different firm size definitions, it is not possible to include firm size as a continuous variable in the meta-regression.

[43] For small firm regressions, the predicted effect for firm size defined as ln(Total Assets) is 0.0678 (vs. 0.0630 for large firm regressions), for firm size defined as ln(Market Value), is 0.0698 (vs. 0.0650), and for firm size defined as ln(Total Sales), is 0.0920 (vs. 0.0872).

Table 13. WLS meta-regression results for cross-country meta-data set.

Explanatory variables	Predicted sign	(1)	(2)	(3)	(4)
Definition of Firm Size					
Assets	?	–0.0273**	–0.0283**	–0.0258**	–0.0242**
		(0.0134)	(0.0129)	(0.0117)	(0.0112)
Market Value	?	–0.0300**	–0.0274**	–0.0244**	–0.0222*
		(0.0134)	(0.0129)	(0.0120)	(0.0115)
Definition of ETR					
ETR Including Deferred Taxes	+	0.0056*	0.0067**	0.0071***	0.0065***
		(0.0029)	(0.0028)	(0.0025)	(0.0023)
Control Variables					
R&D Intensity	+		0.0049*	0.0063*	0.0040
			(0.0028)	(0.0037)	(0.0041)
Intangibles	+		0.0016	0.0025	0.0009
			(0.0029)	(0.0048)	(0.0048)
Capital Intensity	?		–0.0081	–0.0095*	–0.0086
			(0.0049)	(0.0055)	(0.0057)
Inventory Intensity	?		–0.0022	–0.0037	–0.0033
			(0.0035)	(0.0052)	(0.0053)
Data Sample Characteristics					
Loss-Making Firm Excluded	?			0.0033	0.0015
				(0.0055)	(0.0055)
Average Sample Year	?			–0.0003*	–0.0003*
				(0.0002)	(0.0002)
Regulated Sectors Excluded	?			0.0027	0.0020
				(0.0045)	(0.0045)
Econometric Specification					
Industry Fixed Effects Included	?	–0.0024	–0.0031*	–0.0027	–0.0019
		(0.0015)	(0.0016)	(0.0020)	(0.0017)
Time Fixed Effects Included	?	0.0040	0.0029	0.0031	0.0040
		(0.0030)	(0.0027)	(0.0027)	(0.0029)
Publication Bias					
Primary Standard Error	?	0.3127	0.3557	0.3236	0.4757
		(0.4192)	(0.4218)	(0.4432)	(0.4425)
Profit Shifting					
Large Firm Regression	–				–0.0048***
					(0.0010)
Constant	?	0.0102	0.0160	0.6030*	0.6987**
		(0.0137)	(0.0154)	(0.3456)	(0.3420)
Database fixed effects included in meta-regression		YES	YES	YES	YES
Country fixed effects included in meta-regression		NO	NO	NO	NO
No. of primary estimations		393	393	393	393
No. of primary studies		49	49	49	49
Adjusted R-squared		0.5474	0.5645	0.5713	0.5832
Predicted effect of firm size—ln(Total Assets)		0.0502	0.0546	0.0527	0.0630
Predicted effect of firm size—ln(Market Value)		0.0474	0.0555	0.0541	0.0650
Predicted effect of firm size—ln(Total Sales)		0.0775	0.0829	0.0785	0.0872

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year*, *Primary Standard Error*, and *Power Distance Index*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. The results for the database and country variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for database and country fixed effects because we attempt to generalize empirical findings rather than refer to specific databases or countries.

Table 14 shows the results from our check on whether the Hofstede Power Distance Index and a Transparency Index explain variation of the size-ETR relation, taking Specification (3) in Table 13 as a starting point. Instead of database fixed effects, we include country fixed effects, which absorb any country-specific characteristics (e.g., differences in

tax regulation and/or financial accounting requirements), which may affect the size-ETR relation and which may be correlated with the country-specific indices. Table A 2 in the Appendix to Section 3 contains the variable descriptions and summary statistics of both indices.

In Specification (1), we consider the Power Distance Index of Hofstede's Cultural Dimensions Theory Data Set.[44] Developed by Hofstede (1980), Hofstede (2001) and Hofstede et al. (2010), this data set has been used in many studies from various disciplines.[45] We find that *Power Distance Index* is significantly negative. Hence, we confirm that a stronger tendency towards equalization, i.e., a decreasing *Power Distance Index*,[46] is associated with a larger consensus estimate of firm size. This finding supports the political cost theory, in line with assuming that large firms have to deal with a higher degree of public scrutiny in countries with a low *Power Distance Index*.[47]

In Specification (2), we consider the Information and Accountability Transparency Data Set developed by Williams (2014).[48] Basically, transparency means in this context that economic, social, and political information is available to all relevant stakeholders in a timely and reliable way. Overall, we expect that countries with a greater degree of transparency show a more positive size-ETR relation because corruption activity between the government and large firms may be detected more easily where the level of transparency is high. In line with this argumentation, we find that an increase in transparency positively affects the firm size coefficient in a significant way, supporting the political cost theory.

Taken together, based on this cross-country meta-data set, we find that a society's tendency not to accept inequalities has a positive effect on the size-ETR relation, which implies greater public pressure on larger firms in those countries. In addition, we find that countries with a high degree of transparency have a more positive size-ETR relation. Both results are in line with the political cost theory.

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[44] Eight primary regressions (three studies) do not explicitly refer to a certain country; hence, we cannot attribute a Power Distance Index to these primary estimates and our sample decreases to 385 observations (46 studies). Further, Hofstede's cultural dimensions theory is based on a survey conducted between 1967 and 1973. However, although Power Distance Index have changed in absolute terms over the past decades, countries' scores relative to others have changed only slightly (Beugelsdijk et al. (2015)).

[45] For accounting literature, see, for example, Schultz et al. (1993), Kachelmeier and Shehata (1997) and Matoussi and Jardak (2012); for taxation literature, see, for example, Tsakumis et al. (2007) and Richardson (2008); for finance literature, see, for example, Chui et al. (2010).

[46] A lower *Power Distance Index* value means that people in that country tend to accept hierarchies less, demand justification for inequalities of power among people and strive to equalize distribution of power. In contrast, a higher *Power Distance Index* value stands for people that accept hierarchies and possibly accept large, powerful firms and do not question their political power and influence.

[47] Evaluated at the mean of Power Distance Index (49.9), the consensus estimate for firm size defined as ln(Total Assets) is 0.1177. A country with a one standard deviation higher (lower) Power Distance Index results in consensus estimates of 0.0565 (0.1788).

[48] Eight primary regressions (three studies) do not explicitly refer to a certain country and Williams considers a time span between 1980 and 2010 so that our sample decreases to 367 observations (46 studies).

Table 14. Analysis of Hofstede Power Distance Index and Transparency Index in cross-country meta-data set.

Explanatory variables	Predicted sign	(1) Hofstede Power Distance Index	(2) Transparency Index
Definition of Firm Size			
Assets	?	–0.0274**	–0.0280**
		(0.0128)	(0.0129)
Market Value	?	–0.0257*	–0.0266**
		(0.0130)	(0.0132)
Definition of ETR			
ETR Including Deferred Taxes	+	0.0049***	0.0055***
		(0.0015)	(0.0017)
Control Variables			
R&D Intensity	+	0.0058	0.0082*
		(0.0039)	(0.0045)
Intangibles	+	0.0013	0.0041
		(0.0045)	(0.0044)
Capital Intensity	?	–0.0083	–0.0094*
		(0.0051)	(0.0051)
Inventory Intensity	?	–0.0027	–0.0024
		(0.0046)	(0.0043)
Data Sample Characteristics			
Loss-Making Firm Excluded	?	0.0010	0.0021
		(0.0054)	(0.0048)
Average Sample Year	?	–0.0002	–0.0003
		(0.0002)	(0.0003)
Regulated Sectors Excluded	?	0.0018	0.0009
		(0.0044)	(0.0044)
Econometric Specification			
Industry Fixed Effects Included	?	–0.0030*	–0.0028
		(0.0017)	(0.0018)
Time Fixed Effects Included	?	0.0033	0.0028
		(0.0025)	(0.0023)
Publication Bias			
Primary Standard Error	?	1.0166**	0.9442*
		(0.4916)	(0.5075)
Hofestede Index & Transparency Index			
Power Distance Index	–	–0.0031***	
		(0.0011)	
Transparency Index	+		0.0005*
			(0.0003)
Constant	?	0.7262*	0.8716
		(0.3461)	(0.5397)
Country fixed effects included in meta-regression		YES	YES
No. of primary estimations		385	367
No. of primary studies		46	46
Adjusted R-squared		0.5311	0.5399
Predicted effect of firm size—ln(Total Assets)		0.1437	0.1464
Predicted effect of firm size—ln(Market Value)		0.1163	0.1183
Predicted effect of firm size—ln(Total Sales)		0.1180	0.1197

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year*, *Primary Standard Error, Power Distance Index*, and *Transparency Index*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. The results for the country variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for country fixed effects because we attempt to generalize empirical findings rather than refer to countries.

3.5.4 Robustness analysis of cross-country analysis

Table 15 and Table 16 provide the results from our check on whether our regression results are robust to specification variations, taking Specification (3) in Table 13 as a starting point.

In our regressions so far, we find no evidence for substantial publication bias. Still, in Specifications (1) to (3) of Table 15, we consider this issue in more detail. As in the robustness analysis of the US meta-data set, we alternatively use the squared primary standard error as a control variable for publication bias. In Specification (1), we observe that *Primary Standard Error Squared* is significantly positive but well below four so the publication bias is plausibly not substantial (see Section 3.3.2.6). The coefficients remain qualitatively and quantitatively stable; however, the consensus estimates increase by about 0.07. In Specification (2), instead of *Primary Standard Error*, we include a dummy variable *Published Study* that is coded one if the underlying primary study is published, and zero otherwise. *Published Study* is significantly positive. This finding is considered in more detail in Specification (3), where we run the meta-regression on published studies only. *Primary Standard Error* remains insignificant, and also the other coefficients and their significance levels remain stable; however, the consensus estimates increase by about 0.04, which indicates that published studies report a significantly higher size-ETR relation.[49] Similar to the robustness analysis of the US meta-data set, Specification (4) drops the top 5 percent lower and upper firm size coefficients (coefficients smaller than –0.060 and larger than 1.676) from 11 primary studies to overcome the threat of spurious results due to extreme values. The results remain quantitatively and qualitatively stable.

In Specification (1) of Table 16, we control for the country considered in the respective primary regression, i.e., we use country fixed effects instead of database fixed effects.[50] Thereby, we capture country-specific characteristics such as special tax benefits that are only applicable to firms below a certain firm size threshold, which could lead to bunching of firms below these thresholds. The coefficients remain qualitatively stable and the consensus estimates increase by about 0.07. As in the robustness analysis of the US meta-data set, we control for undue weight of certain studies as we observe some variation in the number of regressions per study (see Table 9) in Specification (2). We include a dummy variable (*Large Study*) that is coded one for studies that have more regressions than the average study (more than eight regressions). *Large Study* is insignificant and this robustness test resembles our regression findings, both quantitatively and qualitatively. In Specifications (3) and (4), we consider ETR definitions in more detail, as we did in the

[49] As all primary studies in the US meta-data set are published, those two robustness tests are not done for the US meta-data set.

[50] Eight primary regressions (three studies) do not explicitly refer to a certain country; hence, we exclude them from this robustness test.

robustness analysis of the US meta-data set. The results concerning these two robustness tests resemble our regression findings, both quantitatively and qualitatively.

In further robustness tests, we exclude primary regressions that include loss-making firms. Although sample size decreases significantly, we obtain qualitatively robust results for the US and cross-country analysis. In the interest of brevity, these robustness tests are not tabulated but are available upon request.

Table 15. Robustness analysis I for cross-country meta-data set.

Explanatory variables	Predicted sign	(1) Primary standard error squared	(2) Published study (dummy variable)	(3) Excl. unpublished studies	(4) Excl. regressions with size coefficient in 5 percent upper and lower range
Definition of Firm Size					
Assets	?	–0.0261**	–0.0262**	–0.0262**	–0.0255**
		(0.0119)	(0.0119)	(0.0118)	(0.0117)
Market Value	?	–0.0247**	–0.0248**	–0.0246**	–0.0242*
		(0.0122)	(0.0122)	(0.0121)	(0.0120)
Definition of ETR					
ETR Including Deferred Taxes	+	0.0070***	0.0070***	0.0072***	0.0072***
		(0.0024)	(0.0024)	(0.0026)	(0.0026)
Control Variables					
R&D Intensity	+	0.0064	0.0065*	0.0066*	0.0062*
		(0.0038)	(0.0038)	(0.0037)	(0.0037)
Intangibles	+	0.0027	0.0028	0.0027	0.0022
		(0.0048)	(0.0048)	(0.0047)	(0.0047)
Capital Intensity	?	–0.0094*	–0.0096*	–0.0100*	–0.0094*
		(0.0056)	(0.0056)	(0.0056)	(0.0055)
Inventory Intensity	?	–0.0038	–0.0039	–0.0036	–0.0034
		(0.0052)	(0.0052)	(0.0052)	(0.0051)
Data Sample Characteristics					
Loss-Making Firm Excluded	?	0.0036	0.0035	0.0029	0.0031
		(0.0055)	(0.0055)	(0.0056)	(0.0055)
Average Sample Year	?	–0.0003*	–0.0003*	–0.0003*	–0.0003
		(0.0002)	(0.0002)	(0.0002)	(0.0002)
Regulated Sectors Excluded	?	0.0026	0.0026	0.0028	0.0029
		(0.0045)	(0.0045)	(0.0045)	(0.0045)
Econometric Specification					
Industry Fixed Effects Included	?	–0.0028	–0.0028	–0.0027	–0.0028
		(0.0020)	(0.0020)	(0.0019)	(0.0019)
Time Fixed Effects Included	?	0.0030	0.0029	0.0030	0.0031
		(0.0027)	(0.0026)	(0.0027)	(0.0027)
Publication Bias					
Primary Standard Error	?			0.6536	0.5807
				(0.6088)	(0.3945)
Primary Standard Error Squared	?	0.7015**			
		(0.3287)			
Published Study	?		0.0486***		
			(0.0120)		
Constant	?	0.6157*	0.5766	0.6381	0.5964***
		(0.3499)	(0.3467)	(0.3463)	(0.3537)
Database fixed effects included in meta-regression		YES	YES	YES	YES
No. of primary estimations		393	393	310	353
No. of primary studies		49	49	45	47
Adjusted R-squared		0.5723	0.5709	0.5790	0.6073
Predicted effect of firm size—ln(Total Assets)		0.1203	0.0218	0.0927	0.0367
Predicted effect of firm size—ln(Market Value)		0.1217	0.0232	0.0943	0.0380
Predicted effect of firm size—ln(Total Sales)		0.1464	0.0480	0.1188	0.0622

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. The results for the database variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for database fixed effects because we attempt to generalize empirical findings rather than refer to specific databases.

Table 16. Robustness analysis II for cross-country meta-data set.

Explanatory variables	Predicted sign	(1) Country fixed effects	(2) Large study (dummy variable: studies > avg. reg. no.)	(3) ETR with cash flow denominator (dummy variable)	(4) Excl. other ETR definitions
Definition of Firm Size					
Assets	?	–0.0273**	–0.0265**	–0.0258**	–0.0306*
		(0.0128)	(0.0117)	(0.0117)	(0.0159)
Market Value	?	–0.0257*	–0.0251**	–0.0244**	–0.0306*
		(0.0130)	(0.0119)	(0.0121)	(0.0172)
Definition of ETR					
ETR Including Deferred Taxes	+	0.0048***	0.0077***	0.0068***	0.0070**
		(0.0014)	(0.0026)	(0.0022)	(0.0029)
ETR with Cash Flow Denominator	?			0.0018	
				(0.0030)	
Control Variables					
R&D Intensity	+	0.0061	0.0102*	0.0063*	0.0049
		(0.0039)	(0.0054)	(0.0037)	(0.0047)
Intangibles	+	0.0016	0.0051	0.0027	0.0014
		(0.0044)	(0.0047)	(0.0047)	(0.0065)
Capital Intensity	?	–0.0083	–0.0130*	–0.0096*	–0.0064
		(0.0051)	(0.0062)	(0.0055)	(0.0058)
Inventory Intensity	?	–0.0027	–0.0046	–0.0038	–0.0037
		(0.0046)	(0.0049)	(0.0052)	(0.0061)
Data Sample Characteristics					
Loss-Making Firm Excluded	?	0.0012	0.0036	0.0033	0.0039
		(0.0053)	(0.0053)	(0.0055)	(0.0064)
Average Sample Year	?	–0.0002	–0.0003*	–0.0003*	–0.0004*
		(0.0002)	(0.0002)	(0.0002)	(0.0002)
Regulated Sectors Excluded	?	0.0017	0.0019	0.0026	0.0015
		(0.0044)	(0.0043)	(0.0045)	(0.0053)
Econometric Specification					
Industry Fixed Effects Included	?	–0.0029	–0.0028	–0.0028	–0.0021
		(0.0017)	(0.0020)	(0.0020)	(0.0017)
Time Fixed Effects Included	?	0.0033	0.0028	0.0031	0.0034
		(0.0025)	(0.0025)	(0.0027)	(0.0025)
Publication Bias					
Primary Standard Error	?	1.0196**	0.2724	0.3405	0.3038
		(0.4910)	(0.4446)	(0.4433)	(0.4958)
Regression Number					
Large Study	?		–0.0038		
			(0.0026)		
Constant	?	1.5856***	0.6295*	0.5917*	0.7424*
		(0.3982)	(0.3555)	(0.3401)	(0.4262)
Database fixed effects included in meta-regression		NO	YES	YES	YES
Country fixed effects included in meta-regression		YES	NO	NO	NO
No. of primary estimations		385	393	393	351
No. of primary studies		46	49	49	46
Adjusted R-squared		0.5322	0.5753	0.5721	0.5753
Predicted effect of firm size—ln(Total Assets)		0.1177	0.1177	0.0543	0.0506
Predicted effect of firm size—ln(Market Value)		0.1193	0.1193	0.0558	0.0506
Predicted effect of firm size—ln(Total Sales)		0.1450	0.1450	0.0802	0.0812

Regressions of the coefficients of firm size found in primary studies on study characteristics; see equation (3.4). All study characteristics are coded as dummy variables (except for *Average Sample Year* and *Primary Standard Error*). For detailed variable descriptions and data sources, see Sections 3.3.2 and 3.4. The coefficients indicate the estimated effect of the respective study or model characteristics on primary firm size effects, ceteris paribus. The results for the database and country variables are not displayed but are available upon request. All regressions are estimated using WLS. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on study level to control for heteroscedasticity and autocorrelation (within-study dependence). Predicted effect sizes of firm size are calculated assuming a hypothetical empirical study including all study characteristics that prove to be significant in the meta-regressions, i.e., respective dummy variables are set to one. With respect to continuous or insignificant characteristics, sample means are used for the prediction. The same is done for database and country fixed effects because we attempt to generalize empirical findings rather than refer to specific databases or countries.

3.6 Conclusion

This paper investigates the effect of firm size on ETR. Interest in academic literature on this relation generally arises from two competing theories: the political cost theory and the political power theory. Based on a unique hand-collected meta-data set of 49 primary studies (393 observations) over the period 1975–2012 and various countries, we apply meta-regression analysis to quantitatively summarize and analyze empirical studies on the size-ETR relation. Our findings contain three important messages.

First, taking advantage of a large degree of within-study and between-study variation among 25 empirical studies (161 observations) on US firms, we find a positive consensus estimate for the size-ETR relation that varies between 0.0956 and 0.1225. This translates into an increase in ETR of about one percentage point with a ten percent increase in firm size. This finding supports the political cost theory, which predicts a positive size-ETR relation due to greater regulatory actions as well as public pressure and scrutiny on larger firms. For this US meta-data set, we further find suggestive evidence that particularly large, presumably multinationally operating firms decrease their ETR by profit shifting to low-tax hybrid subsidiaries. The use of these hybrid structures for tax avoidance was presumably simplified by the introduction of the check-the-box rule in the USA in 1997. However, the size-ETR relation remains positive so that the political cost theory still holds in our meta-data set.

Second, we identify sample characteristics that significantly affect the size-ETR relation and explain variation in the underlying primary studies. Our results show that future research could avoid possibly spurious results by paying particular attention to definitions of firm size and ETR. In addition, the sample period and a control variable for R&D intensity and capital intensity explain variation across primary studies. Hence, heterogeneity in the asset-structure among firms, in this case capital-intensive firms vs. R&D-intensive firms, significantly affects the size-ETR relation.

Third, beyond this basic analysis, we isolate society-related and tax planning effects and thus investigate whether these aspects affect the size-ETR relation, which, to our knowledge, has not yet been investigated in our research context. For this purpose, we analyze our cross-country meta-data set. First, we find that the consensus estimate remains positive and our basic analysis is still valid. Second, we identify social acceptance of hierarchies as an element affecting the size-ETR relation. In particular, a society's tendency not to accept inequalities has a positive effect on the size-ETR relation, which implies greater public pressure on larger firms in those countries, supporting the political cost theory. Third, we find that countries with a high degree of transparency show more positive firm size estimates. Fourth, we find suggestive evidence that tax planning of relatively large, presumably multinational firms has a negative effect on the size-ETR relation, while the overall size-ETR relation remains positive supporting the political cost theory.

4 International Taxation and M&A Prices[51]

Abstract: We show that corporate taxation systems regarding foreign dividends and capital gains across 49 countries differ in many aspects, contradicting the requirements for capital ownership neutrality (CON) and indicating that ownership patterns are distorted. Consequently, a national tax policy maker may ask which taxation system improves the position of its MNEs in bidding for foreign targets. To address this question, we develop a theoretical model on the impact of foreign dividends and capital gains taxation on cross-border M&A prices from the acquirer's perspective and theoretically compare different taxation systems. In a next step, we empirically validate our model in a regression analysis on a large cross-border M&A data set. Based on this analysis, we find that foreign dividends taxation rather than capital gains taxation impacts M&A prices. Finally, we provide tax policy suggestions.

Keywords: International taxation • Repatriation taxes • Capital gains taxes • Lock-in effect • Multinational entities • Cross-border M&As

JEL Classification: F23 • G34 • H25 • H26 • H32 • H73

Publication: This paper is available as a *ZEW Discussion Paper 17/040* (http://ftp.zew.de/pub/zew-docs/dp/dp17040.pdf).

Presentations: This paper has been presented at the Accounting & Taxation Brown Bag Seminar (Mannheim University, 18th October 2016), the EAA Annual Meeting 2017 (Valencia, Spain, 12th May 2017), the MaTax CampusMeeting 2017 (ZEW Mannheim, 4th July 2017), the AAA Annual Meeting 2017 (San Diego, USA, 9th August 2017), and the MaTax Conference 2017 (ZEW Mannheim, 21st September 2017).

Funding: This paper was financially supported by the Julius Paul Stiegler Memorial Foundation.

[51] This paper is joint work with Fabian Nicolas Pönnighaus, M.Sc.

4.1 Introduction

Cross-border M&As are a prominent form of FDI[52] and an important tool for MNEs in their portfolio management, i.e., investing in and restructuring their group. When MNEs from various countries bid for a certain foreign target, each country's corporate taxation system for foreign dividends and capital gains impacts reservation prices and thus may have a decisive impact on ownership allocation.

The question of how to neutrally tax M&A transactions has been widely discussed in CON literature (e.g., Desai and Hines (2003), Becker and Fuest (2010), Becker and Fuest (2011), Ruf (2012), Devereux et al. (2015)). To achieve CON, one crucial requirement is that all countries apply the same taxation system, i.e., variation among taxation systems leads to inefficient ownership structures and a violation of CON. However, we find substantial variation among taxation systems across 49 countries over the 2002–2015 period, which suggests that the requirements for CON are not fulfilled in reality.

Given that CON is not reached in the taxation environment faced by MNEs, the question arises as to how a national tax policy maker can strengthen the position of its MNEs in acquiring foreign targets. Such a strong position is in the interest of a national tax policy maker due to positive spillovers of cross-border M&A activity to the MNE's residence country (e.g., Manne (1965), Scharfstein (1988), Bresman et al. (1999), Devos et al. (2009), Wang and Xie (2009), Bena and Li (2014), Sapra et al. (2014), Stiebale (2016)). In addition, it is in a country's interest to strengthen the position of its MNEs as buyers in cross-border M&A because the range of suitable targets is limited for operational reasons (e.g., specific IP that can be acquired).

To give detailed guidance to national tax policy makers on how to strengthen the position of their respective MNEs in bidding for foreign targets, i.e., increase the MNEs' reservation price, we model the joint impact of foreign dividends and capital gains taxation at the corporate level on the acquiring MNE's reservation price for a specific target in a multi-period design. For dividends taxation, we analyze whether (non-)taxation of repatriated profits affects the reservation price. In determining profit taxation, we take into account STRs, withholding tax rates and profit shifting opportunities. For capital gains taxation, we analyze whether the reservation price is affected by a potential tax treatment of participation losses arising from liquidating the target in the future.

In an empirical application on a large cross-border M&A data set, we show that our model holds in reality. In particular, we conclude that foreign dividends taxation plays a decisive role in determining the reservation price, whereas the capital gains taxation effect is

[52] In 2016, cross-border M&As accounted for 869 billion USD. The other prominent form of FDI is foreign greenfield investment, which accounted for 828 billion USD in 2016 (UNCTAD (2017a)).

irrelevant. These results have important implications for tax policy. We propose that it is in a country's interest to exempt foreign dividends to improve the position of its MNEs when bidding for foreign targets. Additionally, countries should refrain from imposing CFC rules at acquirer level that hinder profit shifting and, consequently, increase the tax burden.

Our paper contributes to theoretical M&A tax research by deriving a model that implements the joint effect of foreign dividends and capital gains taxation on M&A prices from the acquirer perspective. While these effects have already been discussed in literature, our model differs in that it discusses these effects without taking into account taxation at the personal level. Additionally, different from Devereux et al. (2015), we allow for profit shifting between subsidiaries rather than only between parent and subsidiary. Finally, we additionally model the impact of selling the target in future periods instead of liquidating it and of indefinite profit retention with debt-financed payouts to shareholders. These two aspects have not been discussed in CON literature so far.

Our paper contributes to empirical M&A tax research by jointly considering the effect of foreign dividends and capital gains taxation on cross-border M&A activity. While a few studies investigate the effect of acquirers' taxation systems on M&A activity, they focus only on foreign dividends taxation. Further, the M&A studies by Hebous et al. (2011), Herger et al. (2016) and Arulampalam et al. (2017) find that the corporate income tax rate of a potential target has a negative effect on its actual acquisition; however, these studies focus only on the target corporate income tax rate and, consequently, do not allow policy implications to be drawn on how to design the taxation system of the acquirer's residence country. Additionally, to our knowledge, our study is the first to analyze the impact of capital gains taxation at the acquirer level on M&A prices. Finally, we show that tax planning plays a role in cross-border M&A activity; thereby, we contribute to a growing body of empirical literature on tax planning and M&As (e.g., Belz et al. (2016)).

The remainder of this paper is structured as follows. In Section 4.2, we provide a short review of relevant theoretical literature on optimal M&A taxation systems, and in Section 4.3, we survey the taxation systems of the OECD, G20 and EU member states over the 2002–2015 period. We develop our theoretical model in Section 4.4, and in Section 4.5 , we provide an empirical application of our model and tax policy suggestions. Finally, Section 4.6 concludes our paper.

4.2 Optimal M&A taxation systems: Review of theoretical literature

The question how M&As should be taxed best from an economic point of view has been extensively discussed in literature. In the following, we give a brief overview of the most relevant CON literature[53].

Desai and Hines (2003) were the first to define CON. They claim that "[t]ax systems satisfy [CON] if they do not distort ownership patterns." Based on the transaction cost theory, the authors expect that there are productivity differences among several potential owners of an asset. Consequently, CON requires "the most productive ownership of assets within the set of feasible investors." The paper does not give a formal approach to CON, but from their work, Desai and Hines (2003) postulate that CON is achievable under the exemption or the credit method. However, to achieve CON, it is crucial that all countries apply an identical taxation system, i.e., all countries either exempt or tax foreign income.

A first formal approach to CON is taken by Becker and Fuest (2010). They analyze M&A and greenfield investment under two different assumptions. Their first assumption is that ownership advantage is a private (i.e., scarce) good within the firm. In this case, domestic and foreign investment are substitutes and the authors argue that CON cannot be achieved. Their second assumption is that ownership advantage is a public good within the firm. In this case, domestic and foreign investment are complements and the authors argue that CON can be achieved by either the exemption method or the cross-border cash flow taxation system. Becker and Fuest (2010) derive these results in a setting without taxation of capital gains and interest.

Becker and Fuest (2011) advance the model by Becker and Fuest (2010) by adding interest taxation in the residence country of the owner.[54] However, capital gains taxation is still not implemented, and their paper does not look at CON referring to MNEs but at CON referring to the direct (and ultimate) shareholder being an individual. Therefore, corporate taxation only matters at target level. If dividends are taxed at the individual shareholder's level, CON is only achievable if interest and dividends tax rates of the domestic and the foreign country have equal ratios to each other. Again, the models by Becker and Fuest (2010) and Becker and Fuest (2011) show that CON is only achievable if all countries apply an identical taxation system.

A different approach to CON is taken by Ruf (2012). He implements CON in a setting with a classic taxation system, where interest income is subject to taxation $(1 + r(1 - \tau))$. However, his model deviates from taxation systems applied in reality in

[53] CON has been first mentioned in Devereux (1990).
[54] Interest taxation is modelled differently to that in a classic taxation system. While, usually, the interest rate alone is taxed $(1 + r \cdot (1 - \tau))$, Becker and Fuest (2011) model a cash flow tax $(1 + r) \cdot (1 - \tau)$.

assuming economic depreciation instead of historical cost depreciation because interest taxation otherwise distorts the intertemporal allocation of resources. In such a taxation system, CON can be achieved by using the credit method. The assumption of historical cost accounting introduces distortions and CON can no longer be achieved using the credit method. Under the exemption method, the MNE refrains from selling foreign subsidiaries even though an acquirer has higher ownership advantage. Consequently, CON cannot be achieved by the exemption method either.

Devereux et al. (2015) set up a model allowing for either greenfield or M&A investment. Additionally, they implement management capacity as a restriction for greenfield or M&As investment. Contrary to Ruf (2012), the MNE maximizes its value by discounting the after-tax cash flows with the gross interest rate. This approach implies that the MNE does not take into account taxation at the individual shareholder level. Capital gains taxation is not modelled explicitly, but the final tax payment of the MNE depends on the taxation method of domestic and foreign profits as well as on an allowance granted to the MNE in the first period. This allowance can be interpreted as a discounted value of depreciation of the participation in future periods and, therefore, could principally be the same as modelling capital gains taxation. For M&A investment, CON can be achieved by applying a cross-border cash flow taxation system on foreign investment. If unlimited management capacity is given, the exemption method also ensures CON. Further, the authors show that their results hold in the presence of profit shifting. In addition, as no country has so far implemented a cross-border cash flow taxation system on foreign investment, the authors discuss how the results change with historical cost accounting. Depending on the height of costs and the relation of the tax rates in both countries to each other, the exemption method can dominate the credit method (or vice versa) in welfare terms, but neither of these taxation systems leads to CON.

As this review shows, CON can only be achieved under specific circumstances. The most important requirement is that all countries apply an identical taxation system and most papers argue that CON is achievable in a cross-border cash flow taxation system if investment at home and abroad are not perfect complements. Further, capital gains taxation plays an important part but usually results in CON being distorted if the tax base for capital gains is historical cost accounting. In the following section, these requirements undergo a reality check.

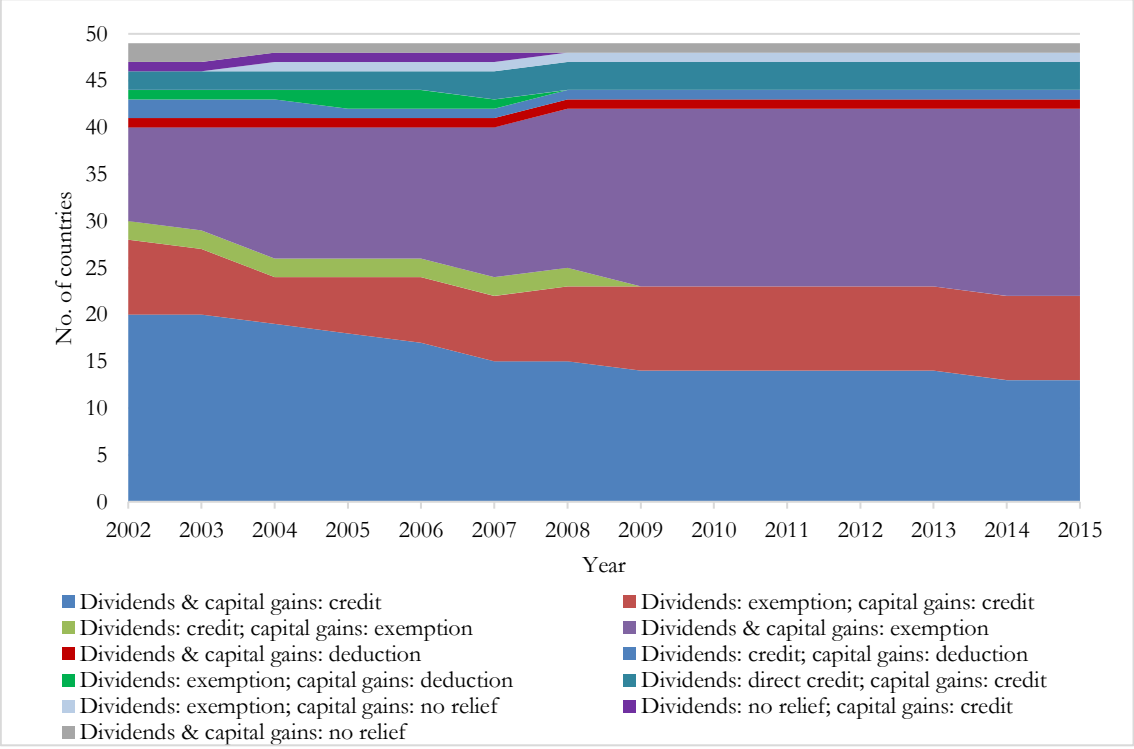
4.3 Extensive survey on corporate taxation systems and anti profit shifting measures

4.3.1 Variation in corporate taxation systems

To check whether the requirements of the theoretical CON literature outlined in Section 4.2 hold in reality, we undertake an extensive survey on the actual corporate taxation systems in place across the OECD, G20 and EU member states (49 countries) over the 2002–2015 period. For this purpose, we collect data on the unilateral method, whereby the national tax law of the respective country stipulates how double taxation of foreign dividends and capital gains can be avoided.

As Figure 8 shows, the applied taxation systems are diverse, with 11 different taxation systems. The most common are the exemption method (in place in 20 countries in 2015) and the credit method (13 countries) for both foreign dividends and capital gains. While the exemption method has gained in popularity over the last years, the credit method has lost. The split taxation system of exempting foreign dividends and crediting foreign capital gains is also common (9 countries) and remains stable over time. We observe 18 countries that change their taxation system over time.

Figure 8. Changes in corporate taxation systems for 49 countries (OECD, G20 and EU member states) for 2002–2015.

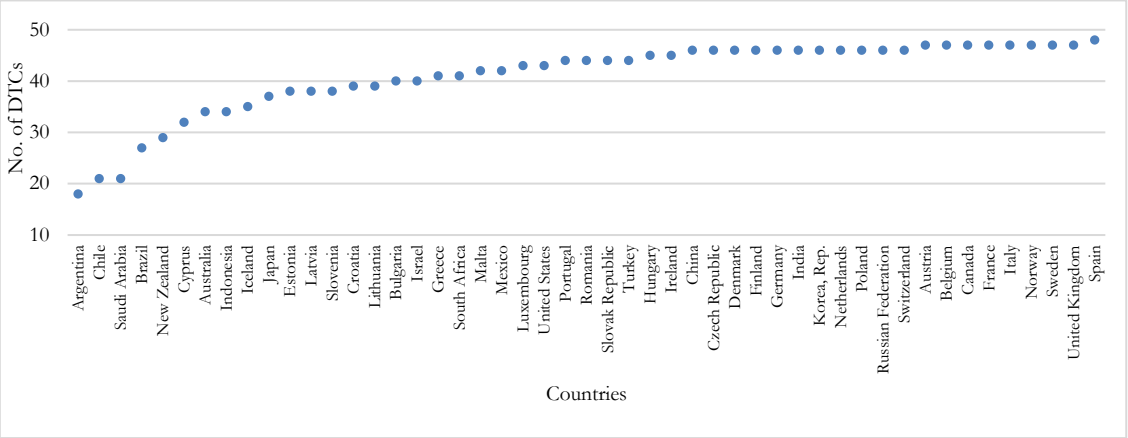


Source: Corporate taxation system data set.

21 countries apply a different taxation method on foreign dividends to that on foreign capital gains. More specifically, in 205 from a total of 686 country-year observations, foreign dividends and capital gains are taxed differently. Further, four countries that apply the credit method on foreign dividends and capital gains apply different tax rates on the respective income (see Figure A 4, Figure A 5, Figure A 6 and Figure A 7 in Appendix to Section 4). In addition, some EU member states differentiate in their taxation system depending on foreign subsidiary location. For example, since 2008, the Czech Republic has applied the exemption method on EU subsidiaries and the deduction method on non-EU subsidiaries.

Finally, as Figure 9 shows, the countries under consideration concluded a substantial number of double taxation conventions (DTCs) with each other. The median number of DTCs is 44, and only very few countries have a relatively low number of DTCs. Favorable taxation methods on foreign dividends and capital gains in a DTC overrule the unilateral taxation method. Hence, an additional dimension of variation in taxation systems is present.

Figure 9. Number of DTCs between OECD, G20 and EU member states (2015).



Source: Corporate taxation system data set.

Taken together, we observe substantial variation of taxation systems in reality. This observation is in sharp contrast to the identical taxation system across countries required to achieve CON, as outlined in Section 4.2. Thus, CON cannot be achieved in reality and the question arises how the different taxation systems distort cross-border M&A activity in general and M&A prices in particular. However, empirical research on the effect of taxation systems on cross-border M&A activity is scarce as the following short review shows, and we aim to extend this strand of literature.

To our knowledge, there are three empirical studies on the effect of foreign dividends taxation on M&A activity. Feld et al. (2016a) start from an ownership neutrality point of view. They argue that CON is violated if the system to avoid double taxation of dividends of potential foreign targets varies across countries. This effect is due to second-best ownership structures that may evolve because after-tax dividends of foreign targets differ

across countries, depending on their taxation system. Indeed, the authors find evidence that the credit method impedes cross-border M&A activity. Huizinga and Voget (2009) investigate the direction and volume of cross-border M&A activity by analyzing whether the prospect of international double taxation of foreign dividends in the acquiring country affects the parent-subsidiary-structure following cross-border M&As. They show that countries with a higher rate of international double taxation are less likely to attract parent firms in a newly created MNE after cross-border M&As. Finally, Voget (2011) finds that, upon repatriation of foreign dividends, additional taxation in the residence country increases the probability of headquarters relocations away from that country.

To our knowledge, there are two empirical studies on the effect of corporate capital gains taxation on M&A activity. These studies base their argumentation on the fact that selling a subsidiary may trigger capital gains taxation. This tax burden could be seen as additional transaction costs that increase the reservation price of sellers. Ayers et al. (2007) consider this so-called lock-in effect and argue that capital gains taxation reduces the number and trading volume of M&As. Indeed, in a US M&A data set, they find a negative association between acquisitions and capital gains tax rate. Feld et al. (2016b) investigate this lock-in effect in a global M&A data set, where a vendor sells one of its domestic subsidiaries. They find that a decrease in capital gains tax rate increases M&A activity. Additionally, to our knowledge, two studies focus on the impact of individual shareholder capital gains taxation on M&A premiums. Ayers et al. (2003) show a positive relation between the M&A premium and capital gains taxation at the level of the selling individual shareholder. Huizinga et al. (2017) show that future capital gains taxation at the acquirer individual shareholder level negatively affects the M&A premium with an increasing tax rate differential between acquirer and seller capital gains taxation.

4.3.2 Variation in anti profit shifting measures

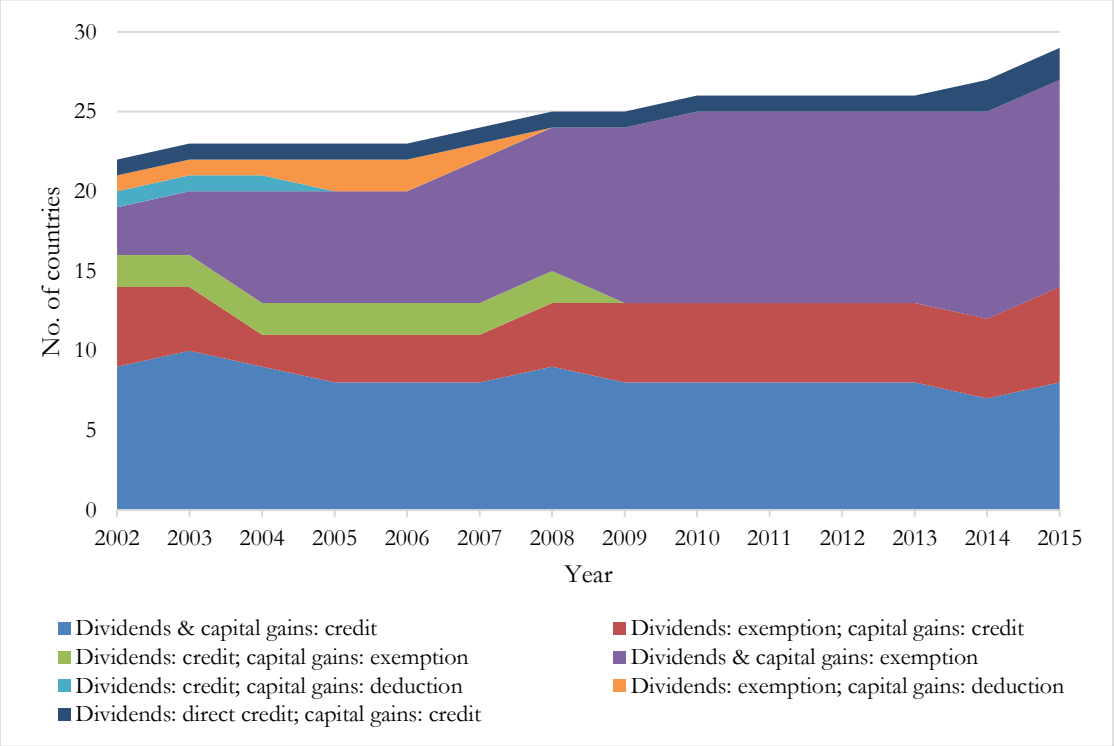
In addition to observed variation in taxation systems, profit shifting opportunities might impact reservation prices. MNE-wide profit shifting has been in the focus of the public, politicians, practitioners and researchers over the last years.[55] However, the impact of profit shifting on M&A prices has rarely been discussed. Devereux et al. (2015) argue that profit shifting does not distort CON assuming of a worldwide cross-border cash flow taxation system incorporating the credit method. However, as our model developed in Section 4.4.2 shows, profit shifting has an impact on M&A prices and, thereby, distorts CON in a non-

[55] For empirical evidence on tax-motivated profit shifting see, for example, Huizinga and Laeven (2008), Weichenrieder (2009), Dischinger and Riedel (2011), Grubert (2012), Buettner and Wamser (2013) and Dharmapala and Riedel (2013). For anecdotal evidence see, for example, Sullivan (2012). In addition, profit shifting has a high priority on the agenda of current tax policy debates, as the OECD BEPS Project (OECD/G20 (2015a)) or the anti tax avoidance directive of the EU (European Council (2016)) show.

cash flow taxation world with various taxation systems. In the following survey, we show that MNEs' profit shifting opportunities vary substantially among countries.

One important anti profit shifting measure are CFC rules. These rules aim at MNE-wide book profit shifting strategies, i.e., shifting profits generated in high-tax subsidiaries to low-tax subsidiaries via internal debt-financing or IP-licensing. If CFC rules are applicable, they lead to immediate taxation of low-tax subsidiaries' profits in the MNE's ultimate parent's country. Consequently, these profit shifting strategies are ineffective. Indeed, empirical research has shown that the presence of CFC rules in the ultimate parent's country severely mitigates profit shifting opportunities within the MNE (e.g., Altshuler and Hubbard (2003), Ruf and Weichenrieder (2012)). As shown in Figure 10, CFC rules are present in 29 of the 49 countries in 2015, compared to 22 countries in 2002. Among the two major taxation systems, 52% (65%) of countries that apply the credit (exemption) method on foreign dividends and capital gains have CFC rules. Consequently, there is substantial variation in the presence and non-presence of CFC rules and also countries with the same taxation system may or may not apply CFC rules.

Figure 10. Changes in CFC rules and corporate taxation systems for 49 countries (OECD, G20 and EU member states) for 2002–2015.



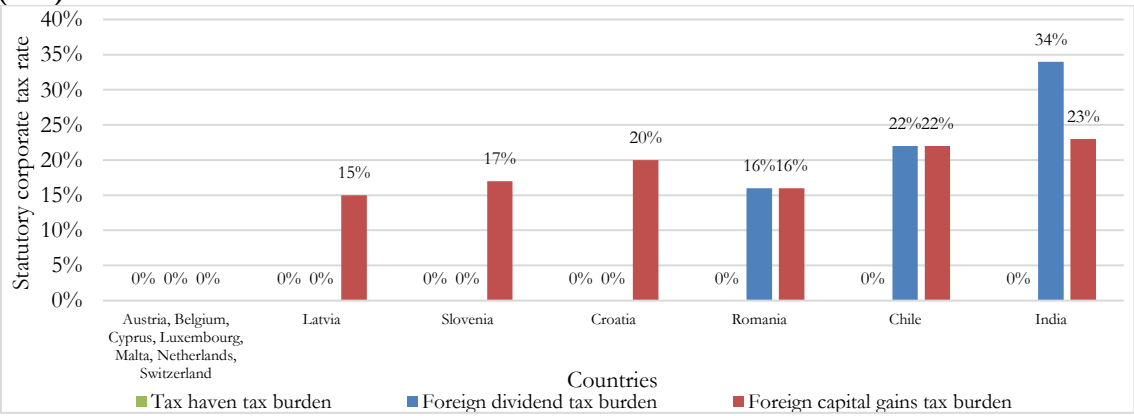
Source: Corporate taxation system data set.

Figure 11 and Figure 12 summarize the findings on taxation systems and MNE-wide profit shifting opportunities by calculating the tax burden of immediate foreign dividends repatriation and capital gains realization as well as profit retention in a tax haven. We

consider the year 2015 and those countries that apply the exemption or credit method on foreign dividends and capital gains. The tax burden of foreign dividends and capital gains taxation reflects the STR on the respective income. The tax burden of profit retention in a tax haven is calculated in the following way: Generally, we assume full profit shifting within the MNE and set the profit retention tax burden equal 0% as this is the logical lower bound for profit taxation. If the residence country of the MNE applies CFC rules, the tax burden is set to the tax rate threshold that triggers the application of CFC rules in the residence country.[56] Consequently, the tax burden on profit retention is the minimum tax burden an MNE can achieve using MNE-wide profit shifting.

Both figures start with countries that apply the exemption method for both foreign dividends and capital gains, followed by countries that apply the exemption method for foreign dividends and apply the credit method for capital gains, followed by countries that apply the credit method for both foreign dividends and capital gains. Figure 11 shows countries without CFC rules and Figure 12 shows countries with CFC rules. Both figures show a diverse picture. Countries such as the Netherlands or Switzerland have no CFC rules and exempt foreign dividends and capital gains, whereas countries such as Mexico and Brazil have relatively high tax rate thresholds for the application of CFC rules and a relatively high tax rate on foreign dividends and capital gains. Several countries exempt foreign dividends and apply the credit method on capital gains in both CFC rule countries (e.g., Japan) and non-CFC rule countries (e.g., Russian Federation).

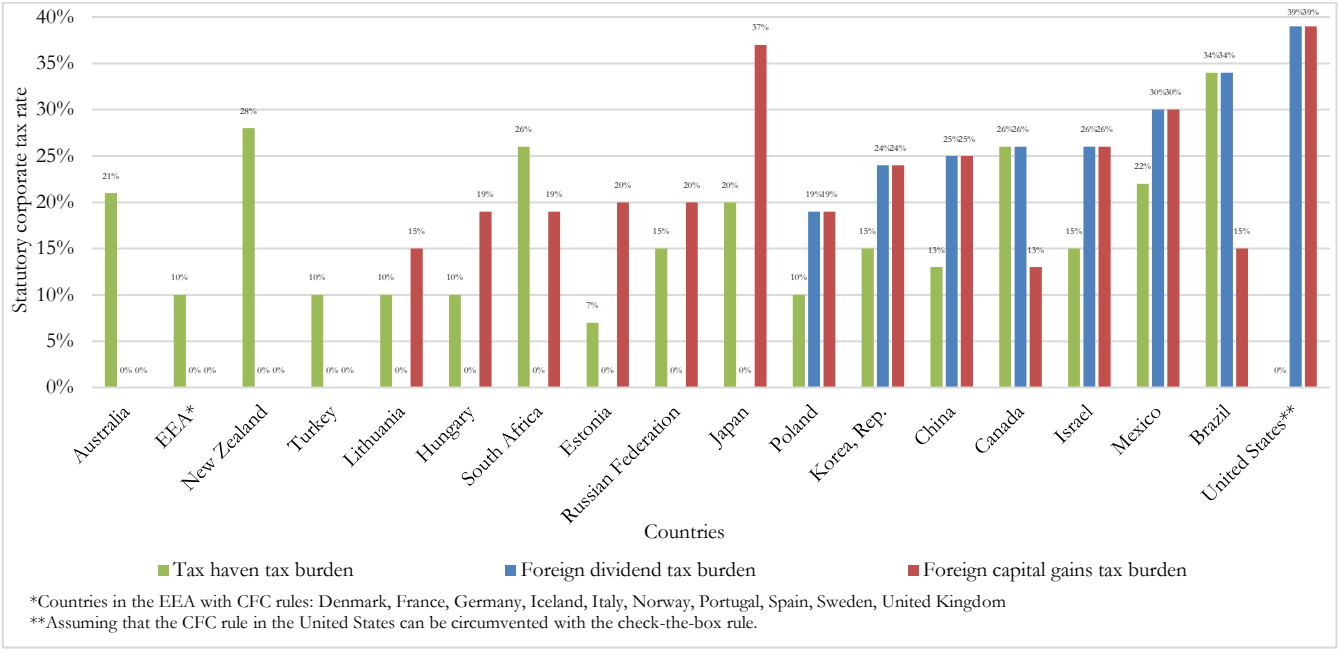
Figure 11. Non-CFC rule countries: Tax burden of foreign dividends, capital gains and profit retention (2015).



Source: Corporate taxation system data set.

[56] Some countries use a blacklist (whitelist) that triggers (does not trigger) the application of CFC rules. In this case, the tax burden is derived based on the countries mentioned in these lists. For EEA member states in the years after the Cadbury-Schweppes ruling of the European Court of Justice (ECJ) in 2006 (European Court of Justice (2006)), we assume that CFC rule countries apply a clause allowing firms to escape CFC rule application if they prove sufficient economic activity in the respective low-tax EEA member state. Therefore, we set the tax burden equal to the lowest STR within the EEA. This is consistent with empirical evidence provided by Ruf and Weichenrieder (2013), who show that European MNEs preferably shift profits to EEA subsidiaries after the ECJ decision. For the USA, we set the tax burden equal to 0% as the check-the-box rule may allow US MNEs to escape from CFC rules under special circumstances (e.g., Altshuler and Grubert (2006), Mutti and Grubert (2009)).

Figure 12. CFC rule countries: Tax burden of foreign dividends, capital gains and profit retention (2015).

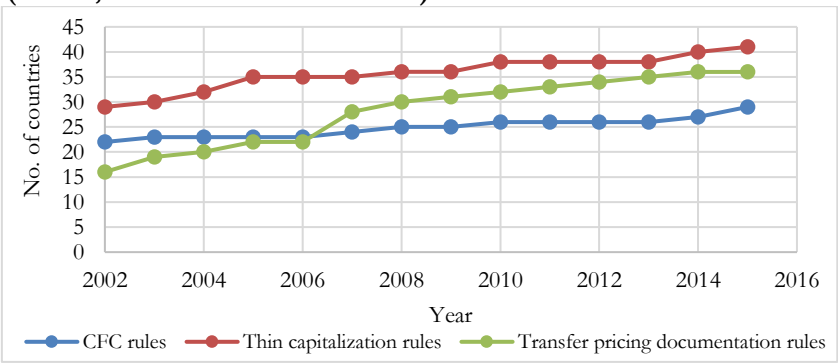


*Countries in the EEA with CFC rules: Denmark, France, Germany, Iceland, Italy, Norway, Portugal, Spain, Sweden, United Kingdom
**Assuming that the CFC rule in the United States can be circumvented with the check-the-box rule.

Source: Corporate taxation system data set.

Two further anti profit shifting measures may partly impede profit shifting strategies; however, they are applicable at the subsidiary level and, consequently, have no link to the taxation systems analyzed above. Thin capitalization or interest stripping rules may restrict the deduction of excessive interest expenses; transfer pricing rules require the application of the arm's length principle on intra-group transfer prices and may restrict the deduction of unjustifiably high interest or royalty expenses. Figure 13 shows that mandatory transfer pricing documentation rules[57] more than doubled over the 2002–2015 period and thin capitalization or interest stripping rules increased by around 50%. However, not all countries apply those anti profit shifting measures and profit shifting strategies are still (partly) implementable within an MNE depending on the location of subsidiaries.

Figure 13. Changes in anti profit shifting measures for 49 countries (OECD, G20 and EU member states) for 2002–2015.



Source: Corporate taxation system data set.

[57] We define mandatory transfer pricing documentation rules to be present in a country if the country's tax law requires the application of the arm's length principle on intra-group transfer prices and requires documentation or disclosure of those transfer prices.

4.4 Theoretical model on the impact of corporate taxation systems on acquirer reservation prices

4.4.1 Motivation of model

Section 4.3 illustrates that countries apply various corporate taxation systems regarding foreign dividends and capital gains taxation; in addition, there is a wide spectrum of profit shifting opportunities and tax rates. These findings are in sharp contrast to the theoretical results from CON literature presented in Section 4.2 that claim that CON can only be achieved if all countries apply an identical taxation system, in particular, a cross-border cash flow taxation system using the credit method (Devereux et al. (2015)). Combining the findings of Section 4.2 and 4.3 and taking into account the empirical evidence showing that taxing foreign dividends or capital gains impedes the M&A activity of that country's MNEs, it is clear that CON cannot be reached in the current taxation environment. Moreover, a country that implements a taxation system satisfying CON may put its own MNEs at a disadvantage relative to other MNEs in bidding for foreign targets if the taxation system those MNEs are subject to enhances M&A activity.

It is not easy to answer the question as to which taxation system enhances or hinders cross-border M&A activity. As outlined in Section 4.3.1, empirical results suggest that taxing foreign dividends leads to fewer acquisitions, while taxing capital gains leads to fewer sellings. Further, the focus of those studies lies on the effects of either dividends or capital gains taxation, i.e., those effects are not considered jointly. While this isolated consideration does not imply that the results from those studies are biased in answering their research questions, a joint consideration may help to comprehensively understand the effect of the taxation system on the acquirer's reservation price. Especially, differences in tax rates for foreign dividends or capital gains cannot be covered by looking at only one of the two aspects. Further, taking profit shifting opportunities into account seems to be relevant in determining the tax impact on reservation prices. Besides a huge body of empirical literature showing that profit shifting takes place in general (see Section 4.3.2), a growing body of empirical literature specifically investigates M&As in light of profit shifting. For example, Belz et al. (2016) find that domestic targets experience a decrease in their ETRs by up to 8% following acquisition by a tax aggressive MNE. Additionally, the well-known phenomenon of tax induced inversions, i.e., a tax motivated relocation of headquarters by a merger with a foreign firm located in a tax haven country, has been researched in several studies (e.g., Desai and Hines (2002), Cloyd et al. (2003), Babkin et al. (2017)).

Based on theoretical CON literature as outlined in Section 4.2, we argue that when an acquirer determines the reservation price for a foreign target, he considers tax consequences

of future dividends repatriation as well as tax consequences of future capital gains or losses[58] once the target is eventually sold or liquidated. Further, based on empirical tax literature mentioned above, we argue that he may consider profit shifting opportunities available to him, tax strategies such as delaying repatriation and additional taxes such as withholding taxes. Therefore, a joint consideration of all these effects is necessary to provide detailed guidance for the national tax policy maker on a corporate taxation system that enhances cross-border M&A activity.

Based on this argumentation, we derive a simple model of how a potential acquirer determines the taxation impact on his reservation price. This model encompasses all of the aforementioned aspects of taxation systems and is based on the models developed by Ruf (2012) and Devereux et al. (2015). However, we do not allow for economic depreciation (Ruf (2012)) or an immediate deduction of the acquisition price from the tax base (Devereux et al. (2015)) but rather restrict our model to the more realistic case of depreciation of the book value of a participation in the target to account for capital gains taxation at the acquirer level. In addition, we explicitly allow for profit shifting. Finally, by considering capital gains taxation at the acquirer side, we add another dimension to empirical tax literature that so far focuses on the seller side in investigating the effect of capital gains taxation.

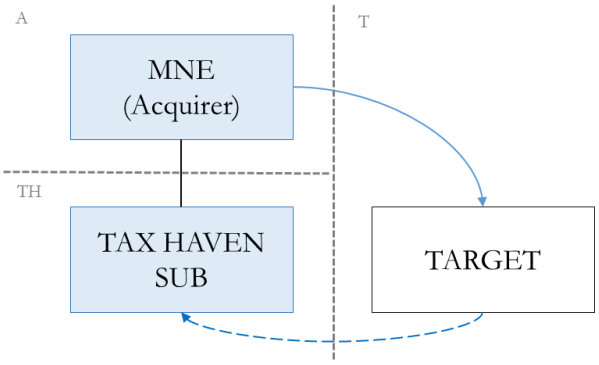
4.4.2 Development of model

Figure 14 shows the basic setup of our model: An MNE located in Country A wants to acquire a certain target firm (TARGET) located in Country T.[59] MNE is the global ultimate owner of the group and acquires TARGET directly. Subsequent to the acquisition, profits generated by TARGET may be shifted to a tax haven subsidiary (TAX HAVEN SUB) located in Country TH.

[58] In this paper, the term "capital gains" refers to capital gains and losses.

[59] To finance the acquisition, MNE raises equity from multiple individual shareholders located in different countries. As these shareholders are assumed to be relatively small, their individual tax rules do not impact the gross market interest rate they demand from MNE. Consequently, MNE does not take into account the specific tax rules of its shareholders and discounts with the gross market interest rate. Further, we assume MNE to have access to shareholders globally. Therefore, the gross market interest rate is not country-specific, but a worldwide uniform rate. This would also be the result if arbitrage on investment opportunities amongst savers "leads to an outcome in which all projects offer the same rate of return to savers before personal tax" (King and Fullerton (1984), p. 12). This assumption is reasonable, as the presence of untaxed investors (e.g., pension funds) should otherwise result in an equilibrium with zero personal taxes for all investors. The same result will also follow if MNE finances the acquisition by using (untaxed) profit reserves from a tax haven subsidiary. Given that many US MNEs have retained large amounts of (almost untaxed) profits in tax havens (e.g., Cox (2016)), this scenario is also a plausible explanation for assuming that personal taxes do not matter.

Figure 14. Theoretical model overview.



Source: Own illustration.

The acquirer's reservation price (P_{Acq}) is then determined as follows:

$$P_{Acq} = DIV_{Acq} \cdot PVF_t \cdot \left(1 - \tau_{Acq}\right) + \frac{\tau^{A,CG} \cdot P_{Acq}}{(1+r)^t}. \quad (4.1)$$

DIV_{Acq} stands for dividend payments that MNE receives from TARGET. τ_{Acq} represents the potential tax burden that dividend payments face upon repatriation to MNE and PVF_t is the present value factor for dividend payments. $\tau^{A,CG}$ is the tax rate applied on capital gains in MNE's country. The reservation price is driven by two tax effects outlined in the following.

The first term represents the effect of the present value of the after-tax cash flow (i.e., dividend payments) that MNE receives from TARGET. The acquirer's reservation price decreases if τ_{Acq} increases, and this effect is strictly time invariant (although the absolute value changes with the number of periods taken into account).

The second term represents the effect of the present value of the potential tax refund that the acquirer receives upon liquidation or sale of TARGET in period t. The tax refund emerges as the acquirer can potentially either depreciate the book value of the participation in TARGET upon liquidation or reduce the gains from selling TARGET by the book value.[60] The higher the capital gains tax rate $\tau^{A,CG}$, the higher the tax refund. However, unlike dividends taxation, the capital gains taxation effect is strictly time dependent—it occurs only once—and decreases with an increasing number of periods taken into account.

[60] It is assumed that MNE generates sufficient profits from other sources to make use of the capital loss. Further, it is important to note that our model design assumes that the capital loss is used at the acquirer level only. However, the capital losses may also be considered in Country T if MNE is subject to limited tax liability in T. Therefore, the method to avoid double taxation for capital gains in Country A might also impact the reservation price if a tax refund in Country T occurs. However, Article 13 (5) of the OECD Model Tax Convention (OECD (2014)) prohibits the country in which the shares are alienated (T in this case) to tax such proceeds. See footnote 73 for how we deal with the rare case in our empirical application, where limited tax liability in T may be problematic if no DTC between A and T exists.

As a result, the acquirer's reservation price decreases if τ_{Acq} decreases or the number of periods increases; the acquirer's reservation price increases if $\tau^{A,CG}$ increases.

TARGET's dividends are assumed to be the full profits of TARGET and equal TARGET's cash flows.[61] They consist of two components: The profit generated by TARGET's business activities (denoted by ε) and an additional profit created solely because MNE becomes the parent of TARGET, i.e., a synergy (denoted by Δ_{Acq}). Consequently, DIV_{Acq} could be written as $DIV_{Acq} = \varepsilon + \Delta_{Acq}$.

It is assumed that TARGET has neither paid-in capital nor profit reserves at the beginning of the first period. As a result, there are no assets left in TARGET after the repatriation of profits at the end of the last period. Consequently, TARGET is liquidated.[62] A modification of this assumption is discussed in the Appendix to Section 4. There we allow for subsequent acquisitions instead of liquidation. As the liquidation occurs in the books of the acquirer, the depreciation yields tax refunds in the acquirer residence country.[63]

From a tax perspective, τ_{Acq} depends on multiple characteristics. If no profits are shifted, no withholding taxes exist and foreign dividends are exempted from taxation in the acquirer's residence country, then τ_{Acq} simply equals the tax rate in the target residence country, i.e., $\tau_{Acq}^{Exemption} = \tau^T$. If, however, withholding taxes are levied, $\tau_{Acq}^{Exemption,WHT} = \tau^T + \tau_{WHT}^T \cdot (1 - \tau^T)$. If, on the contrary, no profits are shifted and foreign dividends are taxed in the acquirer's residence country with a credit granted for underlying foreign taxes paid, then τ_{Acq} equals the tax rate in the acquirer residence country, i.e., $\tau_{Acq}^{Credit} = \tau^A$. Further, we analyze the setting in which all profits are shifted to a tax haven without costs, resulting in $\tau_{Acq}^{Exemption,fullPS} = \tau^{TH}$ with τ^{TH} being the tax rate in the tax haven. For MNEs from residence countries applying the credit method, profit shifting does not impact the dividends tax burden if $\tau^T \leq \tau^A$ and works as a means to avoid excess foreign tax credits if $\tau^T > \tau^A$.[64]

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[61] Accordingly, we use the terms "profit" and "cash flow" synonymously throughout the remainder of this paper.

[62] If TARGET has paid-in capital at the beginning of the first period, this paid-in capital is accounted for in the reservation price and can be repatriated tax free to MNE, resulting in a tax neutral reduction of the book value of TARGET. Consequently, each unit of paid-in capital will increase the reservation price by one unit. If TARGET has profit reserves at the beginning of the first period, these profit reserves are also paid for in the reservation price; however, their repatriation to MNE may lead to dividends taxation in A. The calculation looks similar to the one below except that the profit reserves are already taxed at rate τ^T and, therefore, cannot be shifted to TH.

[63] In principle, target residence country could also tax capital losses upon TARGET liquidation and thus also grant a tax refund. This case, however, is highly unlikely. First, Article 13 (5) of the OECD Model Tax Convention (OECD (2014)) prohibits TARGET residence country from taxing such proceeds and, second, the tax refund would only materialize if the acquirer has other income in TARGET residence country. Therefore, we abstain from this case.

[64] As shown in Appendix to Section 4, the complexity of the model increases once costs of profit shifting are taken into account. However, costs of profit shifting are covered by several variables in the empirical application (e.g., CFC rules, transfer pricing regulations or thin capitalization rules). Therefore, we limit our model to the case without costs of profit shifting to increase model readability.

$\tau^{A,CG}$ is also dependent on the taxation system that the acquirer residence country applies. If foreign capital gains are exempted from taxation, the capital gains tax rate is zero, i.e., $\tau^{A,CG} = 0$. If foreign capital gains are taxed, the capital gains tax rate is positive and—in most cases—equals the STR, i.e., $\tau^{A,CG} = \tau^{A}$.

PVF_t is the present value of the terminal value factor TVF_t, i.e., $PVF_t = \frac{TVF_t}{(1+r)^t}$. TVF_t takes the value $\frac{\left\{1+\frac{r}{1-\tau^A}\cdot(1-\tau^T)\right\}^t-1}{\frac{r}{1-\tau^A}\cdot(1-\tau^T)}$ if no profits are shifted and $\frac{\left\{1+\frac{r}{1-\tau^A}\cdot(1-\tau^{TH})\right\}^t-1}{\frac{r}{1-\tau^A}\cdot(1-\tau^{TH})}$ if profits are shifted. The underlying assumption is that profits are reinvested at the cost of capital of the firm. As the acquirer is assumed to be financed with equity only, the cost of capital depend on the rate of return that the investors demand (r) and the tax rate the MNE faces. As the ETR of the MNE depends on all its investments and not only on the acquisition whose price is determined, we approximate this ETR by τ^A. Consequently, the cost of capital is calculated as $\frac{r}{1-\tau^A}$. TVF_t is thus country specific.[65]

Section 3.1 has shown that the most relevant methods to avoid double taxation are the credit method and the exemption method. Consequently, we focus on these two methods when analyzing the impact of dividends taxation on M&A deal values. Additionally, countries may choose between taxing or not taxing foreign capital gains.[66]

Thus, the following four different taxation systems are analyzed:

- DIV0CG0:
  Foreign dividends are taxed and underlying foreign taxes as well as withholding taxes are credited (DIV0); foreign capital gains are taxed (CG0).
- DIV0CG1:
  Foreign dividends are taxed and underlying foreign taxes as well as withholding taxes are credited (DIV0); foreign capital gains are exempted (CG1).
- DIV1CG0:
  Foreign dividends are exempted (DIV1); foreign capital gains are taxed (CG0).
- DIV1CG1:
  Foreign dividends and foreign capital gains are exempted (DIV1 & CG1).

[65] If the MNE's ETR regarding this investment $\left(\frac{\Pi_{Acq}}{\varepsilon+\Delta_{Acq}}\cdot\tau^{TH}+\left(1-\frac{\Pi_{Acq}}{\varepsilon+\Delta_{Acq}}\right)\cdot\tau^{T}\right)$ is higher than τ^A, the rate of return upon reinvestment falls below the required rate of return of the investors (r). Consequently, it is assumed that the MNE does not reinvest but repatriates the earnings and TVF_t takes the value $\frac{(1+r)^t-1}{r}$.

[66] Double taxation of capital gains does not play a role in our analysis, as our sample consists of almost only M&A deals between countries that have concluded DTCs with each other. For additional information, see footnote 60.

Table 17 shows the calculation of *TAX* in detail. Based on the values of *TAX*, we can draw conclusions with respect to differences in *TAX* between countries and analyze which taxation system yields the highest reservation prices for M&A bidders.

Table 17. Calculation of *TAX* among the four corporate taxation systems.

DIV0CG0	DIV0CG1	DIV1CG0	DIV1CG1
Full profit shifting (TAX^{fullPS})			
$TVF_t \cdot \frac{(1-\tau^A)}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^A)}{(1+r)^t}$	$TVF_t \cdot \frac{(1-\tau^{TH})}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^{TH})}{(1+r)^t}$
No profit shifting (TAX^{noPS})			
$1-(1-\tau^T)\cdot(1-\tau^T_{WHT}) < \tau^A$			
$TVF_t \cdot \frac{(1-\tau^A)}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^A)}{(1+r)^t}$	$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t}$
$1-(1-\tau^T)\cdot(1-\tau^T_{WHT}) > \tau^A$			
$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t}$	$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t - \tau^{A,CG}}$	$TVF_t \cdot \frac{(1-\tau^T)\cdot(1-\tau^T_{WHT})}{(1+r)^t}$

Table illustrates calculation of tax component (*TAX*) based on our model among the four taxation systems. TAX^{fullPS} considers the assumption that all profits are shifted from TARGET to TAX HAVEN SUB. TAX^{noPS} considers the assumption of no profit shifting.

Based on the calculation of *TAX*, the following analysis can be undertaken for a country applying the DIV1CG1 system. This country's MNEs have a higher reservation price for a certain target than MNEs from a country applying the DIV0CG1 system (i.e., $TAX^{fullPS}_{DIV1CG1} > TAX^{fullPS}_{DIV0CG1}$) as dividends are taxed only at the target or the tax haven tax rate.[67] On the contrary, a higher capital gains tax rate increases the reservation price of MNEs for a certain target as the tax refund they get in the last period becomes more valuable to them (i.e., $TAX^{fullPS}_{DIV1CG1} < TAX^{fullPS}_{DIV1CG0}$).[68]

The same analysis can be undertaken for a country applying the DIV0CG0 system. That country's MNEs have a lower (higher) reservation price for a certain target than MNEs from a country applying the DIV1CG0 (DIV0CG1) system. Consequently, we expect $TAX^{fullPS}_{DIV0CG0} < TAX^{fullPS}_{DIV1CG0}$ and $TAX^{fullPS}_{DIV0CG0} > TAX^{fullPS}_{DIV0CG1}$.

Finally, it is unclear whether MNEs from a country applying the DIV0CG0 system derive lower or higher reservation prices than MNEs from countries applying the DIV1CG1 system. The reason is that it is unclear which of the two effects—the value increasing effect of lower dividends taxation or the value decreasing effect of no capital gains taxation—dominates.

[67] Given that the target or tax haven has a lower tax rate than the MNE residence country, i.e., $\tau^{TH} < \tau^T < \tau^A$.

[68] Given that the potential difference in tax haven tax rates (τ^{TH}) between two acquirer countries does not overcompensate the capital gains effect.

4.4.3 Extension of model

So far, we have assumed that an acquirer calculates the reservation price for a certain target over a predefined period. However, tax literature (e.g., Foley et al. (2007)) argues that several US firms claim a large portion of their foreign earnings as permanently reinvested abroad, i.e., these firms do not plan on repatriating these foreign earnings. The cumulative amount of these permanently reinvested earnings is currently estimated at more than 2.4 trillion USD (McKeon (2016)). Applying this idea to our model results in the following problem: If a firm never repatriates foreign earnings, no payout to its shareholders can be made. Consequently, the value of the foreign profits for the MNE and its shareholders drops to zero. To circumvent this problem, MNEs may choose to pay their shareholders dividends financed by taking up loans, a structure known from Apple Inc. (e.g., Apple Inc (2015), Thielman (2016)).

The economic effects of Apple Inc.'s structure are as follows: As foreign earnings are reinvested abroad, repatriation taxes are saved. The interest expenses generated by this structure are tax deductible in the USA, i.e., 1 USD paid in interest saves US taxes of about 0.39 USD. Consequently, there is a liquidity disadvantage of about 61% of the interest payments made. As it is not reasonable to assume that Apple Inc. can cover these (increasing) interest expenses with US earnings forever, the liquidity disadvantage should be covered by the foreign operations. Consequently, Apple Inc. should repatriate just enough money from foreign operations to cover for this liquidity disadvantage.[69]

To implement this strategy in our model, we adjust the model under the full profit shifting assumption as follows: The individual shareholders do not value foreign cash flow directly (as this is almost completely retained abroad), but rather the cash flow that the acquirer pays out to its shareholders (i.e., the debt the acquirer takes up). In the first period, the MNE takes up a loan of D_{Acq}. This loan bears interest at the gross market interest rate r. It is assumed that all loans have a maturity of one year. Consequently, the loan taken up in the first period has to be paid back at the end of the second period. To fund this payback, another loan is taken up in period two amounting to the amount of debt paid back plus the constant payout to the shareholders, i.e., $n \cdot D_{Acq}$ in period n. The foreign earnings are assumed to be reinvested at the capital market rate r[70] and are then repatriated to fund interest payments on the loan. Dividend payments from the tax haven subsidiary to the MNE consequently amount to $(n-1) \cdot \left(\varepsilon + \Delta_{Acq}\right) \cdot (1-\tau^{TH})^2 \cdot r$ in period n. Given

[69] In the year 2016, about 50% of all foreign cash of subsidiaries of Apple Inc. were accounted for as permanently reinvested earnings. Consequently, Apple Inc. plans on repatriating the other half of foreign cash in the forseeable future (Apple Inc (2016), p. 55), indicating that this money could be used to fund interest payments on debt taken up in the USA.

[70] In the long run, it is not reasonable to assume that the firm will always be able to find investment projects that yield a higher return than the capital market rate.

that the residence country applies the credit method and no additional profits exist at MNE level to make use of potential excess foreign tax credits, the profit maximizing constant payout to the individual shareholders of the MNE amounts to $D^*_{Acq} = (\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})^2$.[71] For this amount of annual (additional) debt, the liquidity effect (dividends received ./. interest paid ./. taxes) at the level of the MNE equals zero, as interest payments equal dividends payments. As a result, the tax basis is zero and no tax payments are due at MNE level.

The acquirer's reservation price can then be expressed as follows:

$$P_{Acq}^{Credit,IndefiniteRetention}(\Delta_{Acq}) = (\varepsilon + \Delta_{Acq}) \cdot \frac{(1-\tau^{TH})^2}{r}. \quad (4.2)$$

If the acquirer had not used this structure, his reservation price would be derived as follows:

$$P_{Acq}^{Credit,Repatriation}(\Delta_{Acq}) = (\varepsilon + \Delta_{Acq}) \cdot \frac{1-\tau^{A}}{r}. \quad (4.3)$$

Therefore, for acquirers from credit countries, using the structure is beneficial as long as $\tau^A > \tau^{TH} \cdot (2 - \tau^{TH})$.

Acquirers from exemption countries do not use this structure. As they do not have any taxable income (due to dividends exemption), no tax effect of taking up loans emerges because potential loss carry forwards can never be used. As a result, the highest possible debt-financed payout equals the amount derived above for credit countries. However, this will always be lower than the reservation price when the structure is not used:

$$P_{Acq}^{Exemption,Repatriation}(\Delta_{Acq}) = (\varepsilon + \Delta_{Acq}) \cdot \frac{(1-\tau^{TH})}{r}. \quad (4.4)$$

We account for this model adjustment in a further analysis in the empirical application. In calculating $TAX_{div}^{fullPS,indefinite}$, we assume that acquirers from exemption countries will always repatriate foreign earnings. Acquirers from credit countries will use the proposed structure as long as $\tau^A > \tau^{TH} \cdot (2 - \tau^{TH})$ and repatriate foreign earnings otherwise.

4.5 Empirical application

4.5.1 M&A data and calculation of *TAX*

4.5.1.1 M&A data

In this section, we apply our theoretical model derived in the previous section to real world M&A data. These data are taken from SDC Platinum, which contains worldwide M&A

[71] See Table A 4 in Appendix to Section 4 for an overview of all liquidity and tax effects.

transactions and provides information on the countries of the acquirer ultimate parent, direct acquirer and target. We investigate the period 2002–2014. In line with our theoretical model assumptions outlined in Section 4.4.2, we have selected all completed M&As through which 100% of target shares are acquired and restrict our sample to cross-border M&As defined as an acquirer buying the shares of a foreign target. To eliminate the possibility that a subsidiary in a third country is involved in the M&A, we require that the acquirer ultimate parent directly acquires the target. Further, we exclude acquirer ultimate parents from the financial sector. Finally, as our model and empirical application focus on the credit method and the exemption method as the most common methods to avoid double taxation, we do not consider country-years in which no relief or the deduction method is implemented.

Table 18 shows that 9,108 cross-border M&As and 40 countries remain. In line with di Giovanni (2005), we observe that countries with the largest financial markets have most observations in our sample. Our sample decreases by 92% to 709 observations from 29 countries once we take into account firm level control variables, which are needed for our regression analysis in Section 4.5.2. As Table 18 shows, the decrease is very close to 92% in most countries and, hence, is not driven by specific countries. Further, it is not a single variable that causes the reduction in observations but the combination of financial data needed for the empirical application. Hence, we assume that the smaller sub-sample is a representative subset of the larger one and that focusing on this subset does not bias our subsequent empirical work.[72] Table 18 also gives an overview of the M&A deal numbers and M&A deal values per acquirer ultimate parent country. Further, the table shows that almost half of the considered countries changed their taxation system between 2002 and 2014. More details on the respective taxation systems of the considered countries are shown in Table A 3 in the Appendix to Section 4.

[72] This argumentation follows Huizinga and Voget (2009), p. 1228, who face the same problem using firm level data from SDC Platinum and who observe a similar decrease in sample size. To expand our sub-sample, we follow Huizinga and Voget (2009) and use Compustat North America and Compustat Global that are together global in coverage to fill-up firm level control variables. We use CUSIP and SEDOL firm identification codes to link the Compustat databases with SDC Platinum.

Table 18. Cross-border M&As with acquirer ultimate parents resident in the 40 countries under consideration (2002–2014).

Country	No. of deals	No. of deals with given control variables	Sample decrease (column (2) to column (3))	Total deal value in small sample (in million USD)	Mean of *TAX* in small sample	Std. dev. of *TAX* in small sample	Min. of *TAX* in small sample	Max. of *TAX* in small sample	Change in taxation system?
Australia	513	22	96%	9,342	11.7	0.87	10.0	12.7	YES
Austria	53	2	96%	210	12.1	0.10	12.0	12.2	NO
Belgium	97	12	88%	3,668	11.5	0.73	10.0	12.8	NO
Brazil	23		100%						NO
Canada	1,418	60	96%	53,470	12.1	2.35	10.0	20.0	NO
Chile	12	1	92%	3,425	15.5		15.5	15.5	NO
China	90	2	98%	44	10.7	0.54	10.4	11.1	NO
Croatia	3		100%						NO
Cyprus	9		100%						NO
Denmark	76	8	89%	4,360	11.5	1.06	9.4	12.5	NO
Estonia	1		100%						YES
Finland	139	10	93%	10,172	12.4	2.10	10.0	17.6	NO
France	217	23	89%	63,580	12.3	1.71	10.3	16.3	YES
Germany	248	20	92%	56,932	12.5	1.42	10.3	15.0	NO
Hungary	5		100%						NO
Iceland	25	6	76%	1,336	11.5	0.65	11.0	12.8	YES
India	192	16	92%	1,396	11.6	1.43	9.3	14.2	NO
Israel	125	12	90%	26,917	11.4	2.37	9.4	16.9	NO
Italy	117	9	92%	7,096	12.2	1.40	9.7	14.3	YES
Japan	257	21	92%	15,555	13.5	2.50	11.2	20.9	YES
Latvia	1		100%						NO
Lithuania	1		100%						NO
Luxembourg	29	2	93%	563	9.9	0.26	9.7	10.1	NO
Malta	3		100%						YES
Mexico	37	2	95%	15,912	14.8	2.11	13.3	16.3	NO
Netherlands	217	33	85%	43,007	11.7	1.43	10.2	16.8	NO
New Zealand	65	2	97%	92	10.9	0.97	10.2	11.6	YES
Norway	159	8	95%	3,206	12.2	1.26	9.2	12.9	YES
Portugal	18	2	89%	12	12.2	0.14	12.1	12.3	YES
Republic of Korea	88	2	98%	177	12.0	2.33	10.4	13.7	NO
Romania	3		100%						NO
Russian Federation	18	2	89%	1,130	10.4	0.00	10.4	10.4	YES
Slovenia	4		100%						YES
South Africa	39	5	87%	2,118	12.9	0.81	12.2	14.3	YES
Spain	154	12	92%	64,875	11.2	1.58	9.0	13.6	NO
Sweden	384	34	91%	27,353	12.1	1.40	10.0	16.0	YES
Switzerland	200	21	89%	39,165	11.2	1.16	9.7	13.9	NO
Turkey	11		100%						YES
United Kingdom	1,633	80	95%	78,087	11.4	1.19	9.7	17.4	YES
United States	2,424	280	88%	174,536	13.2	1.19	10.3	16.6	NO
Total	**9,108**	**709**	**92%**	**707,738**	**12.4**	**1.64**	**9.02**	**20.9**	

This table shows number of acquirer ultimate parents per country in the cross-border M&A sample where the acquirer ultimate parent is resident in one of the 40 considered countries (OECD, G20 and EU member states) that apply the exemption or credit method on foreign dividends and capital gains. Argentina and Indonesia, which apply the credit method, do not have observations. The target is resident in a member state of the OECD, G20 or EU. The sample decrease shows the relative decrease in observed M&As from the base sample (9,108 observations) to the sample including firm level control variables (*lnTarEBITDA*, *lnTarEquity*, *lnTarTotAss*, *TarLeverage*, *lnAcqUltParTotAss*, *AcqUltParROA*). Cross-border M&As are defined as acquirer ultimate parent and target being in different countries. *TAX* refers to TAX^{noPS} for a period of 30 years.

4.5.1.2 Calculation of *TAX*

To avoid double taxation on foreign dividends and capital gains as described in Section 4.3, the calculation of *TAX* according to Table 17 is based on the unilateral method. However, relying only on this unilateral method in analyzing observed cross-border M&A transactions would lead to spurious results as most countries in our sample have a large DTC network, as Figure 9 shows. These bilateral tax treaties overrule national tax law when

there is a beneficial outcome for the tax payer. Therefore, we consider all DTC country-year pairs and replace the unilateral method by the DTC method for the case of a beneficial outcome. Further, based on our findings in Section 4.3.1, we check for each EU member state whether it has any beneficial method to avoid double taxation for subsidiaries residing in another EU member state. If that is the case, we replace the unilateral or bilateral method to avoid double taxation with this EU method.

The necessary tax rates to calculate *TAX* are STRs of the acquirer ultimate parent and target country (τ^A, τ^T) and capital gains tax rates of the acquirer ultimate parent country ($\tau^{A,CG}$).[73] For calculating TAX^{fullPS}, we include the lowest possible tax haven tax rate (τ^{TH}) for each acquirer ultimate parent country, as derived in Section 4.3.2. If τ^{TH} is higher than τ^T, we set τ^{TH} equal to τ^T as it would not make sense to shift profits to the higher taxed tax haven subsidiary.[74] Under the assumption of no profit shifting (TAX^{noPS}), we include the withholding tax rate on dividends of the target country (τ^T_{WHT}). τ^T_{WHT} equals the unilateral withholding tax rate and is replaced by the potentially lower withholding tax rate of the DTC, if a DTC is present between the acquirer ultimate parent and target country. Under the assumption of full profit shifting from the target to a tax haven subsidiary (TAX^{fullPS}), we set the withholding tax rate to zero since we assume that tax haven countries do not apply withholding taxes on dividends. Finally, as the measure of r in *TAX*, we use average long-term interest rate for government bonds of selected countries where the capital repayment is guaranteed by governments. These government bonds represent the alternative financial investment that is used as the benchmark investment in our theoretical model.

Based on Table 17 and our detailed tax data set, we can now calculate the values of *TAX* for each deal in our cross-border M&A sample. Table 18 shows the summary statistics of TAX^{noPS} for each country for a period of 30 years and Table 19 shows summary statistics of TAX^{noPS} among each of the four taxation systems. Overall, we observe substantial variation in TAX^{noPS} between and within the different taxation systems. However, it is still an empirical question whether this variation explains the differences in observed M&A

[73] We assume that no capital gains taxation in the target country occurs. However, as outlined in footnote 60, this assumption is critical if no DTC between the acquirer ultimate parent and target exists. Therefore, we drop very few observations if no DTC between those countries exists and (1) where the acquirer ultimate parent country exempts capital gains and the target country may tax those capital gains due to limited tax liability, or (2) where the acquirer ultimate parent country taxes capital gains applying the credit method and the target country may tax those capital gains due limited tax liability at a higher capital gains tax rate than the acquirer ultimate parent country, i.e., no excess foreign tax credits should occur. Additionally, we ensure that each of the countries that is identified as taxing capital gains also permits the deduction of capital losses.

[74] CFC rules are not applicable to the income of this low-tax target since we assume that the target generates active income, which does not fall under the scope of CFC rules applicable in our data set.

prices in our M&A data set. Therefore, we apply a multivariate regression analysis to our data set in the following.

Table 19. Summary of *TAX* among the four corporate taxation systems.

	DIV0CG0	DIV0CG1	DIV1CG0	DIV1CG1
No. of obs.	325	56	90	238
Share	45.8%	7.9%	12.7%	33.6%
Mean	13.02	11.09	12.41	11.89
Median	12.98	11.20	12.13	11.83
Std. dev.	1.37	0.83	2.38	1.42
Min.	9.27	9.74	9.98	9.02
Max.	16.95	12.58	20.91	17.64

This table shows summary statistics on TAX^{noPS} for a period of 30 years.

4.5.2 Regression analysis

4.5.2.1 OLS regression analysis

In this section, we investigate whether the tax component *TAX* as summarized in Table 19 explains variation in M&A deal values[75] in our sample of cross-border M&A transactions. Equation (4.1) of our theoretical model gives rise to the following regression equation to investigate the effect of taxation systems on cross-border M&A prices:

$$M\&A\_DealValue_{ijt} = \alpha + \beta TAX_{ijt} + \gamma_1 EBITDA_{jt} + \gamma_2 Assets_{it} + \gamma_3 ROA_{it} + \Phi FIRMCONTROLS + \phi_{AcqUltParCtry} + \phi_{TarCtry} + \phi_{Year} + \phi_{TarInd} + \varepsilon_{ijt}, \quad (4.5)$$

where α is the intercept, β is the coefficient of interest, γ_1, γ_2, γ_3 are coefficients corresponding to model-specific firm variables, Φ is a vector of coefficients corresponding to further firm level control variables, and ε_{ijt} is the residual. To account for any unobserved effects, we include fixed effects for acquirer ultimate parent country, target country, year and target industry. All variables are defined and summarized in Table 20.

[75] We do not observe the reservation price of the acquirer ultimate parent. However, the acquirer's reservation price should impact the acquisition price as long as bargaining power is not fully on the side of the acquirer. Consequently, we assume that deal value is a reasonable proxy for the reservation price.

Table 20. Definitions, data sources and summary statistics of variables for OLS regression.

Variable	Description	Source	No. of obs.	Mean	Std. dev.	Min.	Max.
lnValueUSD	M&A deal value (natural logarithm)	SDC Platinum	709	18.87	2.07	12.10	24.18
$TAX^{noPS,1\ period}$	Tax component for no profit shifting for 1 periods	Tax Guides & OECD	709	0.78	0.14	0.50	1.14
$TAX^{noPS,10\ periods}$	Tax component for no profit shifting for 10 periods	Tax Guides & OECD	709	6.26	0.86	4.34	9.46
$TAX^{noPS,30\ periods}$	Tax component for no profit shifting for 30 periods	Tax Guides & OECD	709	12.41	1.64	9.02	20.91
$TAX_{div}^{noPS,1\ period}$	Tax component for profits only for no profit shifting for 1 periods	Tax Guides & OECD	709	0.61	0.05	0.48	0.86
$TAX_{div}^{noPS,10\ periods}$	Tax component for profits only for no profit shifting for 10 periods	Tax Guides & OECD	709	5.32	0.48	4.19	7.65
$TAX_{div}^{noPS,30\ periods}$	Tax component for profits only for no profit shifting for 30 periods	Tax Guides & OECD	709	11.61	1.35	8.52	18.87
$TAX_{cg}^{1\ period}$	Tax component for capital gains only for 1 periods	Tax Guides & OECD	709	1.29	0.27	1.00	1.64
$TAX_{cg}^{10\ periods}$	Tax component for capital gains only for 10 periods	Tax Guides & OECD	709	1.18	0.17	1.00	1.40
$TAX_{cg}^{30\ periods}$	Tax component for capital gains only for 30 periods	Tax Guides & OECD	709	1.07	0.06	1.00	1.20
$TAX_{div}^{fullPS,30\ periods}$	Tax component for profits only for full profit shifting for 30 periods	Tax Guides & OECD	709	16.53	2.93	10.65	25.48
$TAX_{div}^{fullPS,indefinite}$	Tax component for indefinite profit retention and full profit shifting	Tax Guides & OECD	709	22.54	3.92	13.55	34.18
$TAX_{div,effectivetaxrate}^{noPS,30\ periods}$	Tax component for profits only for no profit shifting for 30 periods using corporate average effective tax rate	Tax Guides, OECD & ZEW	613	11.08	1.09	7.04	16.92
lnTarEBITDA	EBITDA of target (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	709	16.34	2.11	9.85	24.27
lnTarTotAss	Total assets of target (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	709	18.41	2.11	12.90	26.20
lnTarEquity	Equity of target (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	709	17.47	2.25	11.75	25.35
TarLeverage	Leverage of target (in %)	SDC Platinum; Compustat North America; Compustat Global	709	52.90	23.50	0.58	99.58
lnAcqUltParTotAss	Total assets of acquirer ultimate parent (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	709	21.32	2.10	14.22	27.25
AcqUltParROA	Return on assets (ROA) of acquirer ultimate parent (in %)	SDC Platinum; Compustat North America; Compustat Global	709	6.21	10.32	–72.74	78.31
AcqUltParCSTR	STR, including typical local taxes, in acquirer ultimate parent country (in %)	Tax Guides	709	33.55	5.87	17.00	40.00
AcqUltParCGTR	Capital gains tax rate in acquirer ultimate parent country (in %)	Tax Guides	709	31.80	7.97	13.00	40.00
AcqUltParTHCSTR	Lowest possible tax haven tax rate for acquirer ultimate parent (in %)	Tax Guides	709	8.90	11.01	0.00	36.00
TarCSTR	STR, including typical local taxes, in target country (in %)	Tax Guides	709	31.53	5.52	10.00	41.00
TarCATR	EATR in target country (in %)	ZEW	613	0.37	0.04	0.14	0.56
TarWHTR	Withholding tax rate in target country on dividend payments to acquirer ultimate parent country	Tax Guides	709	1.92	3.49	0.00	22.00
TarTC_presence	Binary dummy variable coded 1 if thin capitalization or interest stripping rules exist in target country, and 0 otherwise	Tax Guides	709	0.95	0.23	0.00	1.00
TarTP_docu	Binary dummy variable coded 1 if mandatory transfer pricing documentation rules exist in target country, and 0 otherwise	Tax Guides	709	0.88	0.32	0.00	1.00
Interest_rate_1	Mean interest rate for government bonds of DE, ES, FR, IT, JP, UK and US maturing in 1 year (in %)	Investing.com	709	5.11	1.84	2.57	8.18
Interest_rate_10	Mean interest rate for government bonds of DE, ES, FR, IT, JP, UK and US maturing in 10 years (in %)	Investing.com	709	3.75	0.33	3.24	4.61
Interest_rate_30	Mean interest rate for government bonds of DE, ES, FR, IT, JP, UK and US maturing in 30 years (in %)	Investing.com	709	4.03	0.37	2.93	4.67
sameIndustry	Binary dummy variable coded 1 if acquirer ultimate parent and target have the same SIC code, and 0 otherwise, and 0 otherwise	SDC Platinum; Compustat North America; Compustat Global	709	0.72	0.45	0.00	1.00
lnTarGDP	GDP in target country (natural logarithm)	World Bank	709	28.41	1.21	24.72	30.48
lnAcqUltParGDP	GDP in acquirer ultimate parent country (natural logarithm)	World Bank	709	28.71	1.51	23.34	30.48

Data on acquirer ultimate parent country, target country, year and target industry fixed effects are not reported but are available upon request. Data sources for the tax variables are IBFD European Tax Handbook (2002-2016), various corporate tax guides (Ernst & Young (2004-2016), Ernst & Young (2009-2016), Deloitte (2011-2016), KPMG (2012-2016), KPMG (2003-2015), PwC (2008-2016)) and Zinn et al. (2014).

We estimate the regression using OLS regression. The dependent variable ($M\&A\_DealValue_{ijt}$) is the natural logarithm of the M&A deal value where acquirer ultimate parent *i* acquirers target *j* in year *t*. Our variable of interest (TAX_{ijt}) represents our measure of the taxation system that jointly considers foreign dividends and capital gains taxation if acquirer ultimate parent *i* acquires target *j* in year *t*, see Table 17.

As prior literature has shown, the target country tax rate has a significant impact on target acquisition (e.g., Hebous et al. (2011), Herger et al. (2016), Arulampalam et al. (2017)). Therefore, we start our analysis with TAX^{noPS}, i.e., with the assumption of no profit shifting, where profits are taxed in the target country and not shifted to a tax haven subsidiary.

If an acquirer considers foreign dividends and capital gains taxation in determining the reservation price in the way our theoretical model predicts, we expect the coefficient of TAX^{noPS} to take a value slightly above 1 in the one period model. That is because the value of TAX^{noPS} varies around 0.8 in the one period model.[76] As TAX^{noPS} increases over time due to an increasing TVF_t, the coefficient should decrease over time following a convex function. Based on our theoretical model, we hypothesize the following, stated in alternative form:

Hypothesis 1: TAX^{noPS} has a positive effect on M&A deal value.

To investigate the individual importance of foreign dividends and capital gains taxation, we disentangle TAX^{noPS} into TAX_{div}^{noPS} and TAX_{CG}, i.e., we consider the two effects of foreign dividends and capital gains taxation separately. TAX_{div}^{noPS} incorporates dividends taxation upon repatriation, i.e., $DIV_{Acq} \cdot (1 - \tau^A)$, and the PVF_t. As PVF_t reflects profit taxation of retained or redistributed earnings, TAX_{div}^{noPS} covers all aspects of profit taxation and increases with an increasing time period. Based on our theoretical model, we hypothesize the following, stated in alternative form:

Hypothesis 2: TAX_{div}^{noPS} has a positive effect on M&A deal value and the coefficient decreases following a convex function with an increasing time period.

TAX_{CG} takes the value of one if capital gains are exempt and a value larger than one if capital gains are taxed. It decreases with an increasing time period. Based on our theoretical model, we hypothesize the following, stated in alternative form:

Hypothesis 3: TAX_{CG} has a positive effect on M&A deal value and the coefficient increases following a concave function with an increasing time period.

[76] TAX^{noPS} has a mean of 0.78 with minimum (maximum) values of 0.50 (1.14).

As empirical literature provides evidence of profit shifting within MNEs (see Section 4.3.2), we also analyze the dividend component of *TAX* under the assumption of full profit shifting, i.e., TAX_{div}^{fullPS}. However, profit shifting opportunities crucially depend on anti profit shifting measures in the target country. In particular, thin capitalization or interest stripping rules and mandatory transfer pricing documentation may hinder profit shifting from the target to a tax haven subsidiary.[77] We, therefore, hypothesize the following, stated in alternative form:

Hypothesis 4: TAX_{div}^{fullPS} has a positive effect (no effect) on M&A deal value when targets with (without) profit shifting opportunities are acquired.

On the firm level, we use three variables from firms' consolidated financial statements to control for firm-specific characteristics that are also considered in our theoretical model. $EBITDA_{jt}$ is used to control for target cash flow and refers to ε in our theoretical model.[78] As highlighted in Section 4.4.2, cash flow and profit are assumed to be equal in our theoretical model. Consequently, one could take pre-tax income for the reservation price calculation. However, in the real world, an important difference between cash flow and profit is depreciation and amortization. Therefore, we take earnings before interest, taxes, depreciation, and amortization (EBITDA) as our proxy for cash flow as it corrects for depreciation and amortization. The acquirer's size ($Assets_{it}$) and profitability measured as the acquirer's ROA (ROA_{it}) are used to control for synergies generated at the target level due to joining the MNE and refer to Δ_{Acq} in our theoretical model. We do not observe the real synergies; however, empirical studies argue that synergies generated through M&As are positively related to the acquirer's size and profitability. For example, Huyghebaert and Luypaert (2013) point out that economies of scale and economies of scope can lead to cost-based synergies after M&As. The larger the acquirer, the higher the degree of labor specialization and the higher the potential to allocate fixed costs of target operations over a large number of units within the acquirer.

The vector $FIRMCONTROLS$ captures further target control variables. Equity controls for the presence of paid-in capital and/or profit reserves of the target, which are presumed to have a positive effect on M&A deal values. Leverage considers the debt level of the target and controls for two target characteristics. First, high leverage can be considered as a measure of a high borrowing capacity, for example, due to the presence of valuable fixed

[77] Several empirical studies provide evidence that these provisions are effective in reducing profit shifting opportunities; see, for example, Buettner et al. (2012) or Riedel et al. (2015).

[78] We exclude targets with a negative EBITDA as estimating prices based on a negative EBITDA may result in negative prices. Thereby, we additionally ensure that there is no selection bias amongst acquirers as acquirers from countries that tax capital gains could tend to invest more in riskier targets because these acquirers can make use of capital losses as opposed to acquirers from countries who exempt capital gains.

assets at target level (Huizinga and Voget (2009)). Second, high leverage may prevent the target from additional borrowing to finance worthwhile investments (Huizinga et al. (2012)). Both arguments suggest a positive effect of leverage on M&A deal values.

We expect that country- or industry-specific shocks (such as the financial crisis in 2008) are controlled for by including country, year and industry fixed effects. Further, following the argumentation by Feld et al. (2016a), we expect that these shocks do not distort our empirical results since our variable of interest (*TAX*) also varies due to changes at a bilateral level (e.g., DTC between acquirer ultimate parent and target country). It is reasonable to assume that these shocks are not correlated with our bilateral-specific variable of interest and, consequently, these shocks should not bias our empirical results.

Table 21 presents our main OLS regression results with $M\&A\_DealValue$ as the dependent variable under the assumption of no profit shifting.

In columns (1) to (3), we investigate Hypothesis 1 and consider the joint effect of the taxation system of foreign dividends and capital gains. We observe a non-significant positive estimate for the one and thirty period consideration; for the ten period consideration, we observe significance at the 10% level. Hence, we find only weak evidence in support of Hypothesis 1. To investigate the individual importance of foreign dividends and capital gains taxation as hypothesized under Hypothesis 2 and Hypothesis 3, we disentangle *TAX* in columns (4) to (6) into a dividends taxation component (TAX_{div}^{noPS}) and a capital gains taxation component (TAX_{CG}). We observe that TAX_{div}^{noPS} is significantly positive at the 1% or 5% level, which supports Hypothesis 2. However, we do not find evidence in support of Hypothesis 3, as TAX_{CG} is insignificant throughout all specifications. Rejecting Hypothesis 3 implies that acquirers do not consider capital gains taxation in determining their reservation price. This irrelevance of capital gains taxation could be explained in three ways. First, valuation literature typically does not include the capital gains effect on the acquirer side as the firm is typically valued under the going concern assumption (e.g., Penman (2013)). Second, even if valuation is undertaken with regard to a limited time horizon, the capital gains effect could be neglectable as it becomes rather small with long time horizons. Third, time horizons taken into account in firm valuation could differ among acquirers and, therefore, the height of the capital gains effect could differ drastically between observations in our data set.

Table 21. OLS regression results under no profit shifting assumption.

Explanatory variables	Joint TAX^{noPS}			Disentangled TAX^{noPS}		
	(1)	(2)	(3)	(4)	(5)	(6)
$TAX^{noPS,1\ period}$	1.221					
	(0.938)					
$TAX^{noPS,10\ periods}$		0.294*				
		(0.147)				
$TAX^{noPS,30\ periods}$			0.123			
			(0.073)			
$TAX_{div}^{noPS,1\ period}$				3.428***		
				(1.192)		
$TAX_{CG}^{1period}$				–0.840		
				(0.921)		
$TAX_{div}^{noPS,10\ periods}$					0.377**	
					(0.147)	
$TAX_{CG}^{10periods}$					0.248	
					(1.677)	
$TAX_{div}^{noPS,30\ periods}$						0.159**
						(0.074)
$TAX_{CG}^{30periods}$						–1.701
						(2.678)
lnTarEBITDA	0.347***	0.346***	0.343***	0.345***	0.346***	0.342***
	(0.041)	(0.040)	(0.038)	(0.040)	(0.040)	(0.039)
lnTarEquity	0.331***	0.333***	0.335***	0.331***	0.332***	0.336***
	(0.050)	(0.049)	(0.047)	(0.049)	(0.049)	(0.048)
TarLeverage	0.003	0.003	0.003*	0.003	0.003	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
lnAcqUltParTotAss	0.237***	0.239***	0.237***	0.237***	0.238***	0.236***
	(0.033)	(0.033)	(0.033)	(0.032)	(0.032)	(0.032)
AcqUltParROA	0.016**	0.016**	0.016**	0.017**	0.017**	0.016**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	1.536**	0.808	1.169	1.046	0.127	2.487
	(0.682)	(0.706)	(0.740)	(1.148)	(1.752)	(2.862)
No. of observations	709	709	709	709	709	709
Acquirer Ultimate Parent Country Fixed Effects	YES	YES	YES	YES	YES	YES
Target Country Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Target Industry Fixed Effects	YES	YES	YES	YES	YES	YES
No. of clusters	29	29	29	29	29	29

Regression of natural logarithm of M&A deal value on *TAX*; see equation (4.5). For variable definitions and data sources, see Table 20. Results for country, year and industry fixed effects are not displayed but are available upon request. All regressions are estimated using OLS regression. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on acquirer ultimate parent country level to control for heteroscedasticity and autocorrelation.

Further, we find that the coefficient of TAX_{div}^{noPS} decreases following a convex function the more years are taken into account. This also supports Hypothesis 2 and is consistent with our model expectation because TAX_{div}^{noPS} increases the more periods are considered. The interpretation of the TAX_{div}^{noPS} coefficient in column (6) is as follows: If TAX_{div}^{noPS} changes by one unit in a certain country and year, the price an MNE in this country and year is willing to pay for a target increases by 15.9%. For example, if the USA changes from the

credit method to the exemption method for foreign dividends as proposed by the United States Department of the Treasury (2017), the value of TAX_{div}^{noPS} will increase from 14.04 to 16.46, which translates into an M&A price increase of around 38.5%.[79]

The coefficients for target cash flow (*lnTarEBITDA*) and equity (*lnTarEquity*) are significantly positive as expected and suggest that a 1%-increase in cash flow (equity) leads to a 0.35% (0.33%) increase in M&A deal value. Target leverage (*TarLeverage*) has a positive though mostly insignificant coefficient. The synergy control variables at acquirer ultimate parent level are significantly positive as expected: If the acquirer's size (profitability) increases by 1% (1 percentage point), M&A prices are higher by 0.24% (1.6%).

In Table 22, we check the explanatory power of our model under the assumption of full profit shifting. Under this assumption, we still observe substantial variation in TAX^{fullPS} as the presence of CFC rules with different tax haven tax rate thresholds creates variation for MNEs from exemption countries and MNEs from credit countries vary along their STR. We observe in column (1) that the coefficient of TAX^{fullPS} is significantly positive at the 10% level, suggesting that our model weakly explains variation in observed M&A deal values under this assumption. However, TAX^{fullPS} only incorporates possible application of CFC rules in the acquirer ultimate parent country and, thereby, only reflects anti profit shifting provisions at acquirer level. Yet, also at target level, profit shifting opportunities may be severely reduced by thin capitalization or interest stripping rules and mandatory transfer pricing documentation. Therefore, we split our sample into targets that reside in countries with maximally one of those two anti profit shifting measures, i.e., countries where profit shifting is still possible (column (2)) and into targets that reside in countries with both of those anti profit shifting measures, i.e., countries where profit shifting is very limited or even impossible (column (3)). We observe that the coefficient of TAX^{fullPS} is significantly positive at the 1% level in the sample of targets with profit shifting opportunities, while it is insignificant in the sample of targets with very limited profit shifting opportunities. This finding supports Hypothesis 4 and suggests that acquirers take into account anti profit shifting provisions in the target country in determining their reservation price. A deeper investigation of the target country taxation system on M&A prices would go beyond the scope of this paper and would be an interesting area for future research. Column (4) addresses the same sample as column (2) based on the definition of TAX^{fullPS} for the case of indefinite profit retention as modelled in Section 4.4.3. The coefficient remains significantly positive.

[79] $\left(TAX_{div,2017,25.5\%}^{noPS,US} - TAX_{div,2017,39\%}^{noPS,US}\right) \cdot coefficient = (16.46 - 14.04) \cdot 0.159 = 0.385$. Under the exemption method and the assumption of no profit shifting, only the target STR is relevant; we use a target tax rate of 25.5%, which is the mean target tax rate across our M&A observations.

Table 22. OLS regression results under full profit shifting assumption.

Explanatory variables	(1) Full sample	(2) Sample of targets with profit shifting opportunities	(3) Sample of targets with very limited profit shifting opportunities	(4) Indefinite profit retention in the sample of targets with profit shifting opportunities
$TAX_{div}^{fullPS,30\ periods}$	0.050*	0.532***	0.007	
	(0.026)	(0.150)	(0.040)	
$TAX_{CG}^{30periods}$	–0.505	26.975	–0.562	
	(2.549)	(15.983)	(2.661)	
$TAX_{div}^{fullPS,indefinite}$				0.855***
				(0.160)
lnTarEBITDA	0.350***	0.480**	0.360***	0.421**
	(0.039)	(0.224)	(0.040)	(0.196)
lnTarEquity	0.331***	–0.070	0.355***	–0.040
	(0.048)	(0.229)	(0.041)	(0.196)
TarLeverage	0.003	0.004	0.004**	0.009
	(0.002)	(0.010)	(0.002)	(0.008)
lnAcqUltParTotAss	0.240***	0.414***	0.211***	0.401***
	(0.032)	(0.069)	(0.031)	(0.052)
AcqUltParROA	0.016**	–0.000	0.014**	0.004
	(0.006)	(0.029)	(0.006)	(0.028)
TarTC_presence	–0.605			
	(0.459)			
TarTP_docu	–0.006			
	(0.249)			
Constant	2.842	–28.257*	2.568	–7.256*
	(2.740)	(15.118)	(2.989)	(3.564)
No. of observations	709	106	603	106
Acquirer Ultimate Parent Country Fixed Effects	YES	YES	YES	YES
Target Country Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Target Industry Fixed Effects	YES	YES	YES	YES
No. of clusters	29	18	29	18

Regression of natural logarithm of M&A deal value on *TAX*; see equation (4.5). For variable definitions and data sources, see Table 20. Results for country, year and industry fixed effects are not displayed but are available upon request. All regressions are estimated using OLS regression. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on acquirer ultimate parent country level to control for heteroscedasticity and autocorrelation.

In Table 23, we apply a variety of robustness tests to confirm our findings, taking column (6) of Table 21 as a starting point. In column (1), we use the corporate effective average tax rate (EATR) of the target country provided by ZEW, instead of the STR. We observe that the coefficient's level of significance decreases, which may indicate that acquirers use statutory instead of effective tax rates in target valuation. In columns (2) and (3), we consider cross-border M&As, where the acquirer ultimate parent and target are in the same industry. It may be argued that taxes play a more important role in such horizontal M&As rather than in vertical M&As. The results remain robust using a dummy variable (column (2)) or a sample reduced to horizontal M&As (column (3)). In column (4), we include the gross domestic product (GDP) of the target and acquirer ultimate parent

country and observe no change in our main regression results. Target equity is substituted by target total assets in column (5) and our results prove to be robust. In column (6), we exclude year fixed effects and observe a decrease of the coefficient; yet, it remains significantly positive. An exclusion of target industry fixed effects (column (7)) does not change our main regression results. To check whether outliers may bias our results, we exclude M&As where the deal value is in the 1st and 99th percentile and observe quantitatively and qualitatively robust results (column (8)). Finally, in columns (9) and (10), we vary the calculation of standard errors. The levels of significance remain stable regarding no clustering (heteroscedastic standard errors, column (9)) and clustering at target country level (column (10)). Overall, our results prove to be quantitatively and qualitatively robust to a variety of robustness tests.

Table 23. Robustness analysis of OLS regression results.

Explanatory variables	(1) Target EATR	(2) Same industry (dummy)	(3) Same industry (sample reduction)	(4) With country control variables	(5) With target total assets	(6) Excl. year fixed effects	(7) Excl. target industry fixed effects	(8) Trimmed deal value	(9) Robust standard errors	(10) Standard errors clustered on target country
$TAX_{div,effectivetaxrate}^{noPS,30\ periods}$	0.073*									
	(0.043)									
$TAX_{div}^{noPS,30\ periods}$		0.159**	0.216**	0.163**	0.135*	0.093**	0.151*	0.168*	0.159**	0.159**
		(0.075)	(0.085)	(0.074)	(0.072)	(0.043)	(0.076)	(0.086)	(0.075)	(0.063)
$TAX_{CG}^{30periods}$	–0.167	–1.804	–2.549	–1.474	–1.665	–2.086	–0.925	–3.211	–1.701	–1.701
	(2.071)	(2.689)	(3.164)	(2.630)	(2.433)	(1.953)	(2.498)	(2.779)	(2.936)	(3.090)
lnTarEBITDA	0.347***	0.341***	0.309***	0.343***	0.278***	0.344***	0.347***	0.335***	0.342***	0.342***
	(0.047)	(0.038)	(0.041)	(0.038)	(0.041)	(0.040)	(0.040)	(0.041)	(0.048)	(0.021)
lnTarEquity	0.321***	0.335***	0.330***	0.335***		0.331***	0.338***	0.315***	0.336***	0.336***
	(0.054)	(0.047)	(0.066)	(0.048)		(0.049)	(0.049)	(0.041)	(0.058)	(0.053)
lnTarTotAss					0.418***					
					(0.051)					
TarLeverage	0.004*	0.003	0.003	0.003*	–0.007***	0.003	0.003*	0.003*	0.003	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
lnAcqUltParTotAss	0.250***	0.238***	0.264***	0.236***	0.228***	0.238***	0.235***	0.230***	0.236***	0.236***
	(0.032)	(0.032)	(0.040)	(0.032)	(0.031)	(0.033)	(0.033)	(0.033)	(0.035)	(0.040)
AcqUltParROA	0.016***	0.016**	0.022**	0.017**	0.016**	0.017**	0.016**	0.015**	0.016***	0.016***
	(0.006)	(0.006)	(0.009)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.004)	(0.005)
lnTarGDP				0.055						
				(0.300)						
lnAcqUltParGDP				0.189						
				(0.494)						
sameIndustry		0.055								
		(0.068)								
Constant	1.750	2.545	3.042	–4.317	2.474	3.759*	2.038	4.480	2.487	2.487
	(2.212)	(2.875)	(3.231)	(17.536)	(2.603)	(1.944)	(2.603)	(3.242)	(3.062)	(2.989)
No. of observations	613	709	514	709	709	709	709	663	709	709
Acquirer Ultimate Parent Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Target Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES
Target Industry Fixed Effects	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES
No. of clusters	28	29	27	29	29	29	29	29	n/a	29

Regression of natural logarithm of M&A deal value on *TAX*; see equation (4.5). For variable definitions and data sources, see Table 20. Results for country, year and industry fixed effects are not displayed but are available upon request. All regressions are estimated using OLS regression. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Standard errors are provided in parentheses and are clustered on acquirer ultimate parent country level to control for heteroscedasticity and autocorrelation (except for columns (9) and (10) with heteroscedastic standard errors and standard errors clustered on target country level).

4.5.2.2 Logit regression analysis

In our OLS regression analysis, we analyze the influence of the acquirer country's taxation system on cross-border M&A prices using firm level data. In the following, we take a macroeconomic perspective on our theoretical model. In particular, we investigate whether taxation systems affect the probability of being the acquiring country of a given foreign target. This analysis and empirical approach follow Feld et al. (2016a), who find that foreign dividends taxation applying the credit method impedes cross-border M&A activity compared to exempting foreign dividends from taxation. We extend Feld et al. (2016a) in two ways: First, we additionally implement capital gains taxation. Second, we use a different measure—*TAX* based on our theoretical model—to investigate the effect of taxation systems on cross-border M&A activity.

Equation (4.1) of our theoretical model gives rise to the following regression equation to investigate the effect of a country's taxation system on the probability (P) of being the actual acquiring country of a foreign target:

$$P\left(V_{ijk} \geq V_{hjk}|X\right) = \frac{exp(\alpha TAX_i + \beta X_{ijk})}{\sum_{l=1}^{I} exp(\alpha TAX_i + \beta X_{ijk})} \quad \forall\, h \in (1, \dots, I), \tag{4.6}$$

where *i* is the actual acquirer ultimate parent country from a total of *I* candidate acquirer ultimate parent countries and *j* is the country of target *k*.[80] Given that the observed M&As reflect synergies from combining two firms and that acquirers value the individual firms and M&A correctly at their fair value, equation (4.6) can be considered a choice model. Using conditional logit and mixed logit regression models, we analyze whether a country's taxation system, i.e., *TAX* from our theoretical model, affects $P\left(V_{ijk} \geq V_{hjk}|X\right)$.

We consider various control variables in vector X_{ijk} to capture owner-country-specific synergies realized through a potential M&A. In particular, we control for GDP, GDP per capita and GDP growth of the candidate acquirer ultimate parent country. These controls capture productivity levels in the acquirer country, and we expect positive coefficients of these variables. We further control for bilateral factors such as distance, common language, colonial relationships and common origins of the legal systems between the candidate acquirer ultimate parent and target country. These controls capture bilateral transaction costs, and we expect a significant influence of these variables. Further, we include acquirer ultimate parent fixed affects. The target is the same for every (potential) deal; therefore, we automatically account for target, target country, year and target industry fixed effects. All variables are defined and summarized in Table 24. Section 4.5.1.1 provides information on the considered data set with 9,103 cross-border M&As.

[80] We suppress a time subscript *t* in the interest of readability of the model.

Table 24. Definitions, data sources and summary statistics of variables for logit regression.

Variable	Description	Source	No. of obs.	Mean	Std. dev.	Min.	Max.
$TAX^{noPS,30\ periods}$	Tax component for no profit shifting for 30 periods (retention)	Tax Guides & OECD	314,626	11.67	2.04	7.05	25.35
$TAX_{div}^{noPS,30\ periods}$	Tax component for profits only for no profit shifting for 30 periods (retention)	Tax Guides & OECD	314,626	11.20	1.93	6.78	22.15
$TAX_{cg}^{30\ periods}$	Tax component for capital gains only for 30 periods	Tax Guides & OECD	314,626	1.04	0.04	1.00	1.20
lnAcqUltParGDP	GDP in candidate acquirer ultimate parent country (natural logarithm)	World Bank	314,626	26.58	1.82	22.18	30.48
lnAcqUltParGDP_percapita	GDP per capita in candidate acquirer ultimate parent country (natural logarithm)	World Bank	314,626	9.87	0.99	6.13	11.54
AcqUltParGDP_growth	Growth of GDP in candidate acquirer ultimate parent country (in %)	World Bank	314,626	2.77	3.53	–14.81	14.23
lnDistance	Simple distance in km between most populated cities of candidate acquirer ultimate parent and target country (natural logarithm)	Mayer and Zignago (2011)	314,626	8.44	1.04	4.09	9.88
CommonLanguage	Common language index (0 (low similarity) to 1 (high similarity))	Melitz and Toubal (2014)	314,626	0.23	0.19	0.00	0.99
ColonialRelationship	Binary dummy variable coded 1 if candidate acquirer ultimate parent and target country were ever in a colonial relationship, and 0 otherwise	Mayer and Zignago (2011)	314,626	0.07	0.26	0.00	1.00
CommonLegalSystem	Binary dummy variable coded 1 if legal system of candidate acquirer ultimate parent and target country have common legal origins, and 0 otherwise	Head et al. (2010)	314,626	0.24	0.43	0.00	1.00

Data on acquirer ultimate parent country fixed effects are not reported but are available upon request. Data sources for the tax variables are IBFD European Tax Handbook (2002-2016) and various corporate tax guides (Ernst & Young (2004-2016), KPMG (2003-2015)).

Table 25 presents the results from our logit regressions. The results regarding TAX^{noPS} are similar to the results presented in the previous section: A higher value of TAX^{noPS} significantly increases the probability of acquisitions from the respective country. Disentangling TAX^{noPS} into a dividends and capital gains component confirms the finding that dividends taxation drives this significant influence. This finding is in line with Feld et al. (2016a). Regarding significant control variables, GDP growth in the acquirer ultimate parent country strongly affects M&A activity; GDP and GDP per capita show positive coefficients. Further, M&A activity is strongly affected by a shorter distance between the acquirer ultimate parent country and target country, a common language, former colonial relationships and a similar legal system.

Taken together, the logit regression analysis shows that our theoretical model, which is primarily set up to explain cross-border reservation prices on a firm level, also explains M&A activity on a macroeconomic level.

Table 25. Logit regression results.

Explanatory variables	(1) Conditional logit (I)	(2) Conditional logit (II)	(3) Mixed logit (I)	(4) Mixed logit (II)
$TAX^{noPS,30\ periods}$	0.118***		0.079***	
	(0.019)		(0.021)	
$TAX_{div}^{noPS,30\ periods}$		0.127***		0.088***
		(0.020)		(0.022)
$TAX_{CG}^{30periods}$		–0.858		–1.333
		(0.870)		(0.961)
lnAcqUltParGDP	0.292	0.363	0.239	0.308
	(0.234)	(0.236)	(0.251)	(0.254)
lnAcqUltParGDP_percapita	0.450*	0.291	0.489*	0.327
	(0.238)	(0.243)	(0.257)	(0.263)
AcqUltParGDP_growth	0.045***	0.044***	0.045***	0.043***
	(0.012)	(0.012)	(0.013)	(0.013)
lnDistance	–0.464***	–0.462***	–0.505***	–0.503***
	(0.015)	(0.015)	(0.021)	(0.021)
CommonLanguage	0.658***	0.666***	0.370***	0.376***
	(0.125)	(0.125)	(0.141)	(0.141)
ColonialRelationship	0.323***	0.320***	0.332***	0.330***
	(0.048)	(0.048)	(0.052)	(0.052)
CommonLegalSystem	0.434***	0.433***	0.491***	0.490***
	(0.040)	(0.040)	(0.045)	(0.045)
No. of observations	314,626	314,626	165,218	165,218
Acquirer Ultimate Parent Country Fixed Effects	YES	YES	YES	YES
Log-likelihood	–19,259	–19,257	–17,597	–17,595

Regressions of probability of being the acquirer ultimate parent country on *TAX*; see equation (4.6). For each deal, the dependent variable equals one if the respective country is the actual acquirer's country of origin, and zero if the respective country is a counterfactual acquirer country. All regressions control for acquirer ultimate parent country fixed effects, which follow a random distribution in the mixed logit regressions; results for acquirer ultimate parent country fixed effects are not displayed but are available upon request. To keep the mixed logit regressions computationally feasible, the set of 40 acquiring countries considered in the conditional logit regression is restricted to the 20 most frequent acquirer countries. For variable definitions and data sources, see Table 24. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

4.5.3 Tax policy implications

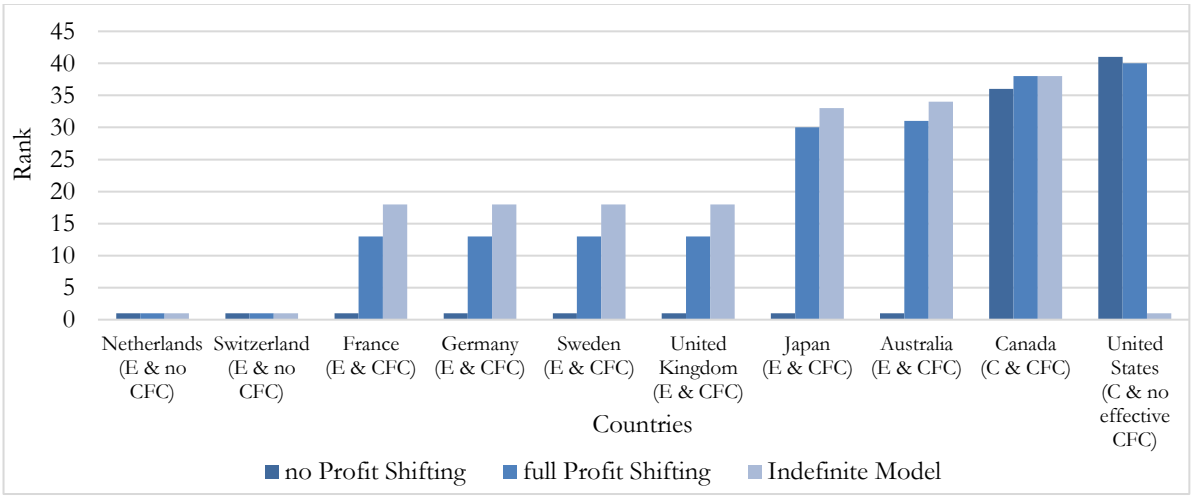
Our regression analysis shows that our theoretical model holds in reality and in a final step, we aim to derive implications for national tax policy makers. Generally, our model suggests a two-fold impact of an acquirer's taxation systems on his reservation price for a foreign target. On the one hand, the price should decrease with increasing dividends taxation; on the other hand, the price should increase with increasing capital gains taxation.

As our empirical analysis has shown, higher dividends taxation at the acquirer level negatively affects M&A prices, while capital gains taxation at the acquirer level does not have an effect. This finding indicates that acquirers do not take capital gains taxation into account when determining their reservation price. If national tax policy makers aim at improving the position of their MNEs in bidding for foreign targets, they should therefore focus on reducing dividends taxation rather than trying to impact reservation prices by applying capital gains taxation. Reducing dividends taxation can be undertaken in two ways. First, the tax burden can be directly reduced by switching from the credit method to the exemption method, by lowering the STR, or by allowing for unlimited tax credits (i.e.,

refunding foreign taxes paid). Second, the tax burden can be indirectly reduced by allowing for profit shifting. As column (2) of Table 22 shows, TAX_{div}^{fullPS} proves to be significant if outbound profit shifting is possible from the target country. As the tax haven tax rate is determined based on CFC rules of the acquirer residence country, MNEs from countries without CFC rules (or low CFC tax rate thresholds) are able to engage in more profit shifting. Consequently, acquirer residence countries should refrain from applying CFC rules.

Figure 15 provides an overview of the ranks in 2015 of those 10 countries with most observations in our M&A data set with regard to the impact of acquirer countries' taxation systems on reservation prices. A higher rank indicates a lower value of *TAX* and, consequently, MNEs residing in that country can only pay a lower price.

Figure 15. Selected countries ranked by their value of *TAX* (2015).



The bars show the rank for the respective country in 2015 under the assumption of no profit shifting (dark blue), full profit shifting (mid-blue) and the indefinite profit retention model (light blue). All ranks are derived based on *TAX* calculated by the model shown in Section 4.4 for a period of 30 years. The target tax rate is set to 25.5%, which is the mean target tax rate across our M&A observations. Ranks for full and no profit shifting are calculated under the assumption of identical costs of capital to simplify depiction. Lower ranks indicate higher values of *TAX*. The shown countries are the 10 countries with most observations in our M&A data set. Sources: Corporate taxation system data set and cross-border M&A data set.

We observe that countries that exempt foreign dividends offer their firms the best environment under the no profit shifting assumption. Under the full profit shifting assumption and no CFC rules (e.g., Netherlands), this position can be retained. Countries that exempt foreign dividends but have CFC rules (e.g., France) weaken their position by applying CFC rules. This is true for both, the full profit shifting and the indefinite profit retention assumptions. France, Germany, Sweden and the United Kingdom have identical ranks as their respective tax haven tax rate is assumed to be identical (see Section 4.3.2). Japan and Australia have higher tax haven tax rates and, thus, worse ranks.

Contrary to our proposal to refrain from applying CFC rules, the OECD BEPS project calls on countries to implement effective CFC rules (OECD/G20 (2015b)). The EU requires all member states to implement CFC rules by 2019 (European Council (2016)). The argument above that CFC rules reduce acquisition prices and thus worsen the position of domestic MNEs in bidding for foreign targets refers to a case where some countries apply CFC rules while others do not. Consequently, a uniform application of CFC rules by all (or in the case of the BEPS project at least by the OECD and G20 countries) could therefore be one way to secure tax basis, while not putting domestic MNEs at a disadvantage. However, the OECD and EU proposal lacks a uniform definition of the CFC tax rate threshold and, consequently, countries can still compete via the CFC tax rate threshold.

Countries applying the credit method have generally higher ranks than exemption countries. However, this is mainly due to high tax rates in these credit countries. Under the no profit shifting assumption, credit countries with low tax rates would have no disadvantage to exemption countries, even if excess foreign tax credits result. Under the full profit shifting assumption, credit countries generally have higher ranks as the tax haven tax rate is typically lower than the acquirer country tax rate. CFC rules worsen the ranks for credit countries (e.g., Canada), while no CFC rules (or ineffective CFC rules) improve the rank (e.g., United States). However, this effect is relatively low due to the low interest rate in 2015. In the indefinite profit retention model with the full profit shifting assumption and debt financing of distributions, residence country tax rates are irrelevant for determining the final price for credit countries.[81] The price is then only determined by the tax haven tax rate. Consequently, a credit country without or with ineffective CFC rules (e.g., United States) has an identical rank as an exemption country without CFC rules (e.g., Netherlands) and a better rank than an exemption country with CFC rules (e.g., Germany). Taken together, in the indefinite profit retention model, in which capital gains no longer occur, an improvement in the relative position of a country can mainly be achieved by not applying CFC rules or lowering CFC tax rate thresholds.

Independent of the question how a country reduces profit taxation, it will most likely suffer a tax revenue loss. Therefore, the size of positive spillovers from cross-border M&A activity is highly relevant to national tax policy makers. Even though the absolute height remains unclear, positive spillovers have been shown empirically. For example, Bresman et al. (1999) and Bena and Li (2014) show that home investment benefits from knowledge spillovers from cross-border M&A activity. Further, M&As are found to increase productivity (e.g., Devos et al. (2009)), management efficiency (e.g., Manne (1965), Wang and Xie (2009)),

[81] This is only true if retaining profits abroad makes sense, as described in Section 4.3. Credit countries with very high CFC tax rate thresholds (e.g., Canada) and all exemption countries would choose immediate repatriation.

discipline (e.g., Scharfstein (1988), Sapra et al. (2014)) and innovation (e.g., Stiebale (2016)). Thus, in a mid- or long-term calculation, tax revenue losses should (at least partially) be compensated by additional tax revenue gains through increasing inbound investment and increasing earnings in the residence country. Nevertheless, national tax policy makers might want to compensate tax revenue losses in the short-term. This could be undertaken by broadening the tax base through hindering outbound profit shifting of resident target firms via interest stripping rules or tightening transfer pricing regulations.[82] Such a reduction in outbound profit shifting is also on the political agenda in many countries. While the OECD only recommends that countries introduce an interest stripping rule (OECD/G20 (2015a)), the EU came forward with a mandatory interest stripping rule for all EU member states as of 2019 (European Council (2016)). As a result, profit shifting opportunities via internal debt financing will be limited for EU targets. Additionally, the OECD has implemented new OECD Transfer Pricing Guidelines (OECD (2017)) that redefine the arm's length price especially for license payments to locate profits to where value creation measured by functions and risks takes place. Consequently, profit shifting via internal licensing should get harder.

Finally, the irrelevance of capital gains taxation for acquirer reservation price determination has a significant impact on results in the CON literature and the question of whether to tax capital gains or not. We find that capital gains taxation is irrelevant in acquirer reservation price determination; consequently, the question whether to tax capital gains or not should be answered by looking solely at the seller. On the seller-side, the lock-in effect of capital gains taxation is an empirically validated obstacle to selling firms. Consequently, capital gains should not be taxed at all. As a result, optimal M&A taxation would only be determined by profit taxation.

4.6 Conclusion

CON is the concept of neutral taxation of M&As. One crucial assumption is that all countries apply the same taxation system on foreign dividends and capital gains. However, in analyzing the actual taxation systems of the 49 EU, OECD and G20 member states over the 2002–2015 period, we show that countries apply different taxation systems and that these taxation systems differ in many aspects. Hence, CON is globally not achievable. Given this tax distortion and positive spillovers of cross-border M&A activity that have been extensively documented in empirical literature, we argue that a national tax policy maker should focus on how to improve the position of its MNEs in bidding for foreign

[82] Of course, there are also other ways to compensate tax revenue loss, for example, increasing non-profit taxes such as value added tax.

targets instead of setting up a taxation system that is neutral regarding M&As but might put its MNEs at a disadvantage in bidding for foreign targets.

To address this tax policy issue, we develop a multi-period theoretical model that considers the joint effect of foreign dividends and capital gains taxation on the acquiring MNE's reservation price for a specific target. Our model also implements profit shifting opportunities and tax deferral of dividends taxation. We derive a tax factor (*TAX*) for different taxation systems that allows us to theoretically compare these taxation systems. Thereby, guidance can be given to national tax policy makers on how to improve the position of their MNEs in bidding for foreign targets regarding tax base, tax rates and profit shifting restrictions.

In the empirical application of our theoretical model, we apply *TAX* to a large sample of cross-border M&A transactions. In our regression analysis, we find that dividends taxation has a significant effect on M&A prices, whereas capital gains taxation seems to be irrelevant. Further, we provide evidence that profit shifting positively affects M&A prices if the target country allows for a certain degree of profit shifting. Moreover, we provide evidence that acquirer country's CFC rules negatively impact prices paid for targets. In addition, it follows from the irrelevance of capital gains taxation for acquirers that capital gains taxation should be avoided as empirical literature documents that taxing capital gains impedes M&A activity with regard to selling firms.

Our policy suggestion is that countries that want to enhance the position of their MNEs in acquiring foreign targets should best apply the exemption method and not hinder profit shifting by imposing CFC rules. Not imposing CFC rules and taxing foreign dividends is also a suitable strategy, as long as the acquirer country's tax rate is low and an unlimited tax credit is granted. Hence, countries with high tax rates should primarily reduce their tax rate, if they do not want to change to the exemption method.

The irrelevance of capital gains taxation on the acquirer side should also impact the way CON is currently discussed in literature. If capital gains are irrelevant in determining the acquirer's price for a certain target, then the acquirer can never be taxed neutrally unless the tax rate is zero. In the presence of positive tax rates, the only way of determining identical prices for the acquirer and the seller, and thus neutrally taxing the acquisition, is to exempt foreign dividends and capital gains while preventing profit shifting at the source.

5 Controlled Foreign Corporation Rules and Cross-Border M&A Activity[83]

Abstract: We investigate the influence of one main anti tax avoidance measure, CFC rules, on cross-border M&A activity on a global scale. Using three different econometric approaches and a large M&A data set, we find that CFC rules distort ownership patterns due to a competitive advantage of MNEs whose parents reside in non-CFC rule countries. First, we show that the probability of being the acquirer of a low-tax target decreases if CFC rules may be applicable to this target's income. Second, we show that CFC rules distort the acquirer's location choice of targets. Third, we show that CFC rules negatively affect the probability of being the acquirer in a cross-border M&A. Altogether, this study shows that for affected acquirer countries, CFC rules lead to less M&A activity in low-tax countries because profit shifting seems to be less feasible. This behavior change could result in an increase in global corporate tax revenue.

Keywords: International taxation • CFC rules • Profit shifting • Mergers and acquisitions • Multinational entities

JEL Classification: F23 • G34 • H25 • H26 • H32 • H73

Publication: This paper is available as an *Oxford University Centre for Business Taxation Working Paper 17/17* (https://www.sbs.ox.ac.uk/sites/default/files/Business_Taxation/Docs/Publications/Working_Papers/Series_17/WP1717.pdf)

Presentations: This paper has been presented at the Accounting & Taxation Brown Bag Seminar (Mannheim University, 31st May 2016), and the EAA Annual Meeting 2017 (Valencia, Spain, 12th May 2017).

[83] This paper is joint work with Axel Prettl, M.Sc.

5.1 Introduction

Globalization and its accompanying effects in various business fields such as reallocation of production or new customers all around the world are current challenges that MNEs are facing. Further, in all these various dimensions, MNEs and countries, which are concerned about their tax revenue, compete against each other. In addition, international tax law, once a rather minor concern in corporate tax planning, has become increasingly important and MNEs try to use tax loopholes within international tax law to minimize their overall tax payments. One way to minimize tax payments can be realized by MNE-wide profit shifting, which is intensely discussed in current tax policy debates as the OECD BEPS project (OECD/G20 (2015a)) or the anti tax avoidance directive of the EU (European Council (2016)) show. Further, empirical literature provides extensive evidence of MNE-wide profit shifting strategies (e.g., Huizinga and Laeven (2008), Weichenrieder (2009), Grubert (2012), Dharmapala and Riedel (2013)). The basic idea of such profit shifting strategies is to reduce taxable income in high-tax countries by, for example, royalty or interest payments from high-tax to low-tax subsidiaries.[84]

Several countries, however, have implemented anti tax avoidance measures to counteract this profit shifting behavior. The three major measures are transfer pricing rules, thin capitalization or interest stripping rules and CFC rules. This study tries to shine some light on CFC rules, which aim at MNE-wide profit shifting strategies by immediately taxing profits of low-tax subsidiaries, redistributed or not, in the MNE's parent country if certain conditions are fulfilled. Hence, CFC rules make typical profit shifting strategies unattractive for an MNE (e.g., Altshuler and Hubbard (2003), Ruf and Weichenrieder (2012)), since these strategies do no longer reduce the MNE's tax burden.

If a company decides to engage in tax avoidance or to extend its existing tax avoidance strategies, it could try to establish a foreign subsidiary in a low-tax country as a profit shifting vehicle, where profits are taxed at a low rate. There are two common ways to establish a foreign subsidiary: greenfield investment in a new firm or buying an existing firm. Our study focuses on the latter one, cross-border M&As, which is considered an important form of FDI (UNCTAD (2017a)). Additionally, even more profit shifting opportunities may be given by acquiring a foreign firm, such as using existing loss carry forwards. Based on the argumentation above, one can easily imagine that the existence and strength of CFC rules that try to counteract such behavior could have an impact on cross-border M&As and, thereby, on ownership structures of MNEs.

[84] A typical profit shifting strategy looks as follows: An MNE equips a subsidiary in a low-tax country with IP and equity. This subsidiary then may license IP to the parent or subsidiaries in high-tax countries that pay transfer prices (royalties) in exchange for using IP. Further, the low-tax subsidiary may provide debt to the parent or subsidiaries in high-tax countries that pay interest in exchange for the internal loan. Taken together, the royalty and interest expenses reduce taxable income in high-tax countries and increase income in low-tax countries.

We investigate whether CFC rules influence ownership patterns on a global scale by analyzing the effect of CFC rules on cross-border M&As. In our different econometric analyses, we investigate a large data set of worldwide M&A deals with around 14,000 observations and a hand-collected detailed CFC rule data set of 29 countries, extended by countries that do not have CFC rules, for 2002–2014. We find that CFC rules impact cross-border M&A activity in two ways.

First, we detect that CFC rules distort the acquisition of low-tax targets. In particular, we observe that the probability of acquiring a low-tax target is negatively influenced by potential CFC rule application on the low-tax target's income. Our explanation for this finding is that MNEs with parents in non-CFC rule countries (non-CFC rule MNEs) calculate higher reservation prices for low-tax targets than MNEs with parents in CFC rule countries (CFC rule MNEs), because these targets may be used as valuable profit shifting vehicles within non-CFC rule MNEs. CFC rule MNEs, on the other side, fear the application of CFC rules on low-tax targets' income, which decreases after-tax cash flows. Hence, they calculate lower reservation prices for low-tax targets than non-CFC rule MNEs.

Second, we detect that CFC rules distort the direction of cross-border M&As between firms. In particular, we observe that if a firm acquires another non-domestic firm, CFC rules negatively affect the M&A direction, i.e., which firm becomes the acquirer and, thereby, the parent of the newly formed MNE. This finding is in line with previous research by Voget (2011), who detects that the presence of CFC rules increases the number of headquarters relocation. However, our approach differs from Voget (2011) by using a different identification strategy and analyzing M&A observations from a different database.

Our paper contributes to tax research and policy considerations in three ways. First, we contribute to empirical tax research on the effects of CFC rules on firm behavior, where little research has been undertaken so far (see Section 5.2). As Egger and Wamser (2015) point out, this may be due to the difficulty of isolating the effect of anti tax avoidance measures on MNEs who operate in multiple jurisdictions and avail complex group interrelations with respect to, for example, financing decisions. In addition, the effect of CFC rules is difficult to identify as the applicability of CFC rules depends on the foreign subsidiary's characteristics as well as its host-country's characteristics. To overcome these identification difficulties, we do not only follow a mere dummy variable approach on the presence or non-presence of CFC rules; moreover, we go into the details of each country's CFC rules by considering individual components of CFC rules.

Second, we contribute to empirical tax research in the field of M&As and their tax-related determinants. Indeed, there are many empirical studies on the effect of taxes on M&As from various perspectives, for example, repatriation taxes (Voget (2011), Hanlon et al.

(2015), Edwards et al. (2016), Feld et al. (2016a)), international double taxation (Huizinga and Voget (2009), Huizinga et al. (2012)) or capital gains taxes (Ayers et al. (2003), Ayers et al. (2007), Feld et al. (2016b), Huizinga et al. (2017)). However, besides Voget (2011), there are to our knowledge no published empirical studies that compare the effect of anti tax avoidance measures on M&A activity over various countries. In particular, there is no such study about the increasingly important CFC rules. However, since anti tax avoidance measures are expanding as shown in Figure 13 in Section 4.3.2, the strand of empirical literature dealing with location choices of MNEs and their tax-related elements becomes more important.

Third, understanding how CFC rules influence M&A activity on a global scale is also of economic interest, as cross-border M&As are an important form of FDI: In 2016, the value of cross-border M&As accounted globally for 869 billion USD, which slightly exceeded the value of announced greenfield projects (828 billion USD, UNCTAD (2017a)). Hence, our analysis on distortionary tax effects on cross-border M&As is also of interest from a global economic perspective and not only from countries' tax policy perspective.

The remainder of this paper proceeds as follows. Section 5.2 gives a brief review of empirical literature on CFC rules. Section 5.3 provides our analysis of the effect of CFC rules on the acquisition of low-tax targets. Section 5.4 analyzes the effect of CFC rules on the direction of cross-border M&As. Finally, Section 5.5 sets forth our conclusions.

5.2 Empirical literature on CFC rules

CFC rules are applicable at an MNE's parent level and usually work as follows: If an MNE's foreign subsidiary fulfills certain requirements, at least a part of its income is taxed in the MNE's parent country where the CFC rule is enacted, even if no repatriation takes place. Thereby, MNE-wide profit shifting strategies become mostly ineffective. Typically, three requirements are crucial for CFC rule application: Low taxation of the foreign subsidiary, passive income of the subsidiary, and minimum ownership in the subsidiary. There is a high degree of variation in how CFC rules are specified, for example, regarding what is considered low taxation or regarding a passive-to-active-income ratio that may trigger CFC rule application.

Despite the far-reaching consequences of CFC rules on MNEs' tax burdens, empirical studies on the effects of CFC rules on firm behavior are scarce. Altshuler and Hubbard (2003) find that tightening US CFC rules in 1986 has substantially reduced tax planning opportunities with financial services firms in low-tax countries; three years later, Altshuler and Grubert (2006) show that the so-called check-the-box rule, which may allow for an escape from CFC rules for US MNEs, abolished these effects. For a panel of German

MNEs, Ruf and Weichenrieder (2012) detect that German CFC rules are effective in reducing passive investments in low-tax countries. These studies show that CFC rules reach the intended goal of reducing profit shifting opportunities with low-tax subsidiaries. However, Egger and Wamser (2015) find that German MNEs, whose subsidiaries are subject to CFC rules, also show significantly lower fixed assets in these subsidiaries. They conclude that CFC rules lead to an increase in cost of capital if subsidiaries are treated by CFC rules. Hence, by influencing real activity abroad, the application of CFC rules can also have non-intended "real" effects. These findings contradict the theoretical thoughts from Weichenrieder (1996) who shows that certain characteristics of CFC rules, such as an accepted passive-to active-income ratio, can lower the cost of capital in foreign subsidiaries under certain circumstances.

We aim to contribute to the scarce literature on CFC rules by investigating the effects of CFC rules on an important form of FDI—cross-border M&A activity—that accounts for almost 1 trillion USD in 2016 (UNCTAD (2017a)). In particular, in Section 5.3, we investigate whether CFC rules influence the acquisition of low-tax targets that potentially fall under the scope of CFC rules. In Section 5.4, we investigate whether CFC rules influence the direction of cross-border M&As between firms, i.e., which firm becomes the acquirer and, thereby, the parent of the newly formed MNE.

5.3 CFC rules and the acquisition of low-tax targets

5.3.1 Hypothesis development

Non-CFC rule MNEs face fewer constraints in implementing profit shifting strategies within their group than CFC rule MNEs.[85] That is because CFC rules aim at profits shifted to low-tax subsidiaries within the MNE and, thereby, make typical profit shifting strategies less attractive for an MNE. Following the argumentation and findings of Egger and Wamser (2015), CFC rules even increase the cost of capital of subsidiaries that fall under the scope of CFC rules. Consequently, it is less attractive for a CFC rule MNE to acquire a low-tax target that may fall under the scope of CFC rules compared to a non-CFC rule MNE. Put differently, for a non-CFC rule MNE, a low-tax target could function—in addition to other synergies—as a profit shifting vehicle within the MNE. This additional function could make a candidate target more valuable for this MNE compared to a CFC

[85] In our analysis on the effects of CFC rules on cross-border M&A activity, we consider CFC rules in the country of the MNE's parent to be relevant. The reason is straightforward: On the one side, a non-CFC rule MNE gets into a worse tax position if the acquisition is done via a CFC rule subsidiary; hence, the MNE would not acquire through this subsidiary. In support of this reasoning, Lewellen and Robinson (2014) find that the likelihood of choosing a subsidiary as a holding firm within an MNE is significantly lower if that subsidiary resides in a CFC rule country. On the other side, a CFC rule MNE does not get into a better tax position if the acquisition is done via a non-CFC rule subsidiary, because the parent's CFC rule would overall still be applicable in the MNE.

rule MNE without such profit shifting opportunities. Due to this competitive advantage, non-CFC rule MNEs may calculate higher reservation prices for foreign low-tax targets compared to CFC rule MNEs. We, therefore, hypothesize the following, stated in alternative form:

Hypothesis 1a: The probability of being the acquirer of a given low-tax target in a cross-border M&A is higher for non-CFC rule MNEs compared to MNEs that potentially have to apply CFC rules on this target's income.

Hypothesis 1a investigates the influence of CFC rules on the likelihood of acquiring a given target that acquirers from various countries bid for. We also take the "opposite" perspective that a given acquirer has the choice to buy a target out of a pool of targets from various countries. Based on the reasoning above—it is less attractive for a CFC rule MNE to acquire a low-tax target that may fall under the scope of CFC rules compared to a target that does not fall under the scope of CFC rule—we hypothesize the following, stated in alternative form:

Hypothesis 1b: The probability of being the target of a given acquirer in a cross-border M&A is lower for targets that potentially fall under the scope of CFC rules of this acquirer compared to targets that do not fall under the scope of CFC rules of this acquirer.

Almost all observed CFC rules include a so-called "minimum low tax rate threshold" requirement, which determines whether the foreign subsidiary's country is considered a low-tax country. This requirement varies over countries and time. We use these low tax rate thresholds to determine whether the target is located in a low-tax country so that CFC rules are potentially applicable. Acquirers from countries with CFC rules and a low tax rate threshold could especially aim for targets that are located in countries with an STR below their own one but above the low tax rate threshold to achieve tax rate advantages. If, however, the target is located in a country with a higher STR than the acquirer's country STR, we argue that non-CFC rule acquirers may be more prone to buy these targets. This argument is motivated by the following consideration: These acquirers—other than CFC rule acquirers—could shift profits out of the high-tax target country to low-tax countries. We, therefore, hypothesize the following, stated in alternative form:

Hypothesis 1c: The probability of being the acquirer (medium-tax target[86]) of a given medium-tax target (given acquirer) in a cross-border M&A is higher for CFC rule MNEs compared to non-CFC rule MNEs. Additionally, the probability of being the acquirer of a target in a country with a higher STR than in the acquirer's country is lower for CFC rule acquirers than for non-CFC rule acquirers.

[86] A "medium-tax target" is a target, which is located in a country with an STR above the minimum low tax rate threshold but below the STR of the specific acquirer country.

5.3.2 Empirical approach

Our empirical approach to analyze the probability of being the actual acquirer country among several candidate acquirer countries follows the common assumption in M&A literature that M&As reflect synergies from combining two firms with all assets being priced at their fair value (e.g., Mitchell and Mulherin (1996), Becker and Fuest (2010), Feld et al. (2016a)) where

$$V_{ijk} = \alpha CFC_{ij} + \beta bx_{ijk} + \varepsilon_{ijk} \tag{5.1}$$

is the value of target *k* in country *j* if it was owned by an acquirer from country *i*.[87] The term CFC_{ij} reflects the higher burden of potential taxation of target income due to CFC rules in the acquirer country *i* if the target is located in country *j*. The variable vector x_{ijk} contains various country control variables to capture owner-country-specific synergies realized through a potential M&A. ε_{ijk} is the residual. Coefficients α and β are the estimated parameters. In this approach, the target is the same for every concerned M&A; therefore, we automatically account for target firm, target country and time fixed effects. Hence, these fixed effects do not need to be included. We control for acquirer country fixed effects. In robustness checks, we also include specific target and acquirer firm controls.

We use the fact that a foreign firm from country *i* will acquire a target if the value for this target is higher than for any other candidate acquirer from country *h*, i.e.,

$$V_{ijk} \geq V_{hjk}, \ \forall \ h \ \in (1, \dots, I), \tag{5.2}$$

where *I* indicates the number of candidate acquirer countries. We analyze the probability that a particular acquirer buys a target, depending on potential application of CFC rules in the country of that particular acquirer and given that we know that the transaction takes place, which is given by:

$$P(V_{ijk} > V_{hjk}|X) = \frac{exp(\alpha CFC_{ij} + \beta X_{ijk})}{\sum_{l=1}^{I} exp(\alpha CFC_{lj} + \beta X_{ljk})} \quad \forall \ h \ \in (1, \dots, I). \tag{5.3}$$

Equation (5.3) considers a choice model assuming that M&As reflect synergies from combining two firms and that acquirers value the individual firms and the M&A correctly at their fair value. Using conditional logit and mixed logit regression models, we aim to calculate $P(V_{ijk} > V_{hjk}|X)$.[88]

In our first approach, the difference between CFC rules is shown by a treatment effect using a simple dummy variable if a CFC rule is enacted in the acquirer country *i* and is

[87] We suppress a time subscript *t* in the interest of readability of the model.
[88] The presented multinomial choice model is based on Feld et al. (2016a), p. 15.

potentially applicable on target income, i.e., the STR in target country *j* is below the minimum low tax rate threshold of the CFC rule of the candidate acquirer country *i*. Hence, the first variable of interest is constructed as

$$CFC^{dummy} = \begin{cases} 1, & if\ t_{i_{threshold}} > t_j\ or\ country\ i\ applies\ CFC \\ & rules\ without\ a\ tax\ rate\ threshold \\ 0, & otherwise, \end{cases} \quad (5.4)$$

where $t_{i_{threshold}}$ is the tax rate threshold of the CFC rule of the candidate acquirer country *i* and t_j is the STR in the target country *j*.

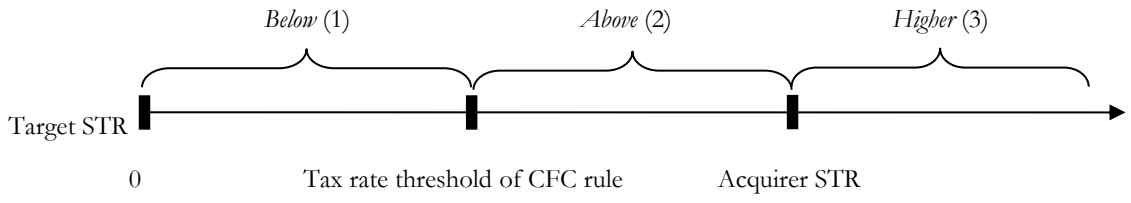
In our first approach, the treatment effect is assumed to be homogenous. In our second approach, we consider heterogeneity by using the tax rate differential between the home and host countries as a finer metering of the treatment. In particular, we consider the additional taxes payable due to CFC rule application if the target is used as a profit shifting vehicle[89]:

$$CFC^{diff} = \begin{cases} \tau_i - \tau_j, & if\ t_{i_{threshold}} > t_j\ or\ country\ i\ applies\ CFC \\ & rules\ without\ a\ tax\ rate\ threshold \\ 0, & otherwise. \end{cases} \quad (5.5)$$

For both approaches, we expect a negative sign of the regression coefficients α according to Hypothesis 1a and 1b derived in Section 5.3.1.

In a third step, to address Hypothesis 1c, we take a different approach and split up the targets into three groups: Group (1) contains targets with STRs below the low tax rate threshold of the CFC rule; group (2) contains targets with STRs below the acquirer STRs but above the tax rate threshold of the CFC rule; group (3) contains targets with STRs higher than the acquirer STRs if the acquirer country applies CFC rules. Figure 16 illustrates this target grouping.

Figure 16. Target grouping among the three groups.



Source: Own illustration.

[89] $\tau_i - \tau_j$ (and not τ_i) are the additional taxes because the observed CFC rules grant a credit for the taxes paid by the foreign subsidiary in its host country.

$$Below = \begin{cases} \tau_i - \tau_j, & if\ t_{i_{threshold}} > t_j\ or\ country\ i\ applies\ CFC \\ & rules\ without\ a\ tax\ rate\ threshold\ AND\ t_i > t_j \\ 0, & otherwise, \end{cases} \quad (5.6)$$

$$Above = \begin{cases} \tau_i - \tau_j, & if\ t_{i_{threshold}} < t_j\ AND\ t_i > t_j \\ 0, & otherwise, \end{cases} \quad (5.7)$$

$$Higher = \begin{cases} \tau_j - \tau_i, & if\ t_i < t_j\ and\ country\ i\ applies\ CFC\ rules \\ 0, & otherwise, \end{cases} \quad (5.8)$$

If the target STR (τ_j) is below the tax rate threshold of the CFC rule, there is additional taxation in the acquirer country at the acquirer STR (τ_i) as already shown in (5.5). We expect a negative coefficient of *Below* since these targets are unattractive to acquire from a CFC rule perspective.

If τ_j is above the tax rate threshold of the CFC rule but below τ_i, the acquirer could shift profits to the target and reduce his effective tax burden by $\tau_i - \tau_j$. We expect a positive coefficient of *Above* as profits could be shifted—without CFC rule application—to the target, which may be particularly attractive for CFC rule acquirers.

If τ_j is higher than τ_i, profit shifting in the here observed way to the target does not make sense as the target resides in a higher taxed country. We expect a negative coefficient of *Higher* since the high-tax target is unattractive for CFC rule acquirers from a tax perspective. Moreover, non-CFC rule acquirers could be more prone to acquire such targets as these acquirers may shift profits out of the high-tax target to low-tax subsidiaries.

In our robustness test, we check whether our results are robust to considering EATRs as CFC rules usually take into account the effective tax burden of the foreign low-tax subsidiary. Since we do not observe the effective tax burden of the targets, we use country-level EATRs from the Oxford University Centre for Business Taxation to determine whether a target may fall under the scope of CFC rules:

$$CFC^{diffEATR} = \begin{cases} \tau_i - \tau_j, & if\ t_{i_{threshold}} > t_{j_{EATR}}\ or\ country\ i\ applies\ CFC \\ & rules\ without\ a\ tax\ rate\ threshold \\ 0, & otherwise. \end{cases} \quad (5.9)$$

In a further robustness test, we consider the scope of income included by the CFC rule. While some CFC rules only include passive income of the subsidiary, some CFC rules

include passive and active income. Therefore, we let the treatment effect differ in this regard:

$$CFC^{taxbase} = \begin{cases} \tau_i, & if\ t_{i_{thresh}} > t_j\ or\ country\ i\ applies\ CFC\ rules\ without\ a\ tax\ rate\ threshold\ and\ has\ a\ full\ income\ tax\ base \\ \frac{(\tau_i + \tau_j)}{2}, & if\ t_{i_{thresh}} > t_j\ or\ country\ i\ applies\ CFC\ rules\ without\ a\ tax\ rate\ threshold\ and\ has\ a\ passive\ income\ tax\ base \\ \tau_j, & otherwise. \end{cases} \quad (5.10)$$

According to this differentiation, all targets are taxed at their STR. Further, this differentiation takes into account the additional CFC rule tax burden—assuming that active and passive income in the target are at the same height—in the following way: If CFC rules include the full target income once triggered, the total tax burden is set to the acquirer STR. If CFC rules include only target's passive income once triggered, the total tax burden is set to the average between target and acquirer STR.

The approach presented above takes an acquirer perspective by analyzing why a given target is bought by an acquirer from a specific country (Hypothesis 1a). In a second analysis, we follow the same logic but take a target perspective by analyzing why a given acquirer chooses to buy a target from a specific country (Hypothesis 1b).[90]

Following Feld et al. (2016a) and Arulampalam et al. (2017), we include several control variables in both perspectives. We control for STR and economic indicators, such as GDP per capita, GDP growth, stock market capitalization per GDP and credits granted to private sector per GDP in the country of the candidate acquirer (or target), depending on whether the acquirer (or target) perspective is taken. Further, we control for several distance variables, such as the distance between the acquirer and target country, whether the acquirer and target have a common language, whether the acquirer and target were ever in a colonial relationship and whether the legal system of the acquirer and target country have common legal origins. In the target perspective, we additionally include variables to control for the institutional framework of the candidate target country, such as corruption control, business start-up costs, unemployment rate and number of listed domestic firms.

5.3.3 Data

Data for the empirical analysis is taken from SDC Platinum, which contains worldwide M&A transactions. We have selected all completed M&As for 2002–2014 through which

[90] Such a target perspective is also taken by Arulampalam et al. (2017).

majority control (>50%) of the targets has been attained.[91] Further, for each M&A, country of the acquirer ultimate parent, direct acquirer, target ultimate parent and direct target must be given.[92] In addition, we require that the acquirer ultimate parent and the target reside in different countries and that the acquirer ultimate parent and direct acquirer reside in the same country to reduce the possibility of a subsidiary in a third country involved in the M&A. To keep the mixed logit regressions computationally feasible, the set of considered candidate acquirer countries (Hypothesis 1a) or candidate target countries (Hypothesis 1b) is restricted to the 30 most frequent acquirer or target locations.[93] These restrictions leave a sample of 14,421 cross-border M&As involving 55 countries to investigate Hypothesis 1a and a sample of 13,447 cross-border M&As involving 54 countries to investigate Hypothesis 1b. Table 26 and Table 27 give an overview over the number of acquirer ultimate parents and targets in the respective cross-border M&A sample per country. In line with di Giovanni (2005), we observe that countries with the largest financial markets have most observations in both samples. Further, these tables provide information on whether CFC rules are implemented in those countries.

Data on CFC rules are based on IBFD European Tax Handbook (2002-2016), various corporate tax guides (Ernst & Young (2004-2016), Deloitte (2015), KPMG (2003-2015)) and the specific tax law of each country. We have sampled various dimensions of CFC rules for 2002–2014, such as:

- tax rate threshold that triggers CFC rule,
- country lists that trigger (blacklists) or do not trigger (whitelists) CFC rule,
- threshold for passive-to-active-income ratio that triggers CFC rule,
- whether active or only passive income of CFC is included at the parent level, or
- significant exemptions to CFC rule.

[91] All observed CFC rules have a participation threshold below or equal to 50% so that the majority control requirement of CFC rules is always fulfilled.

[92] Throughout our paper, we use the terms "ultimate parent" and "parent" synonymously.

[93] To investigate Hypothesis 1a, important control variables are missing for Guernsey, Luxembourg and Taiwan so that we effectively consider 27 candidate acquirer countries. To investigate Hypothesis 1b, important control variables are missing for Indonesia and Sweden so that we effectively consider 28 candidate target countries.

Table 26. Cross-border M&A sample (2002–2014) for analyzing the effect of acquirer CFC rules on probability of being acquirer country (Section 5.3.4.1).

Country	CFC rule	No. of acquirers	No. of targets	Country	CFC rule	No. of acquirers	No. of targets
Australia	1	923	663	Japan	1	529	166
Austria	0	125	73	Latvia	n/a	n/a	2
Belarus	n/a	n/a	6	Lithuania	n/a	n/a	14
Belgium	0	154	186	Malaysia	0	212	157
Bermuda	n/a	n/a	29	Malta	n/a	n/a	4
Brazil	n/a	n/a	251	Mexico	n/a	n/a	197
British Virgin Islands	n/a	n/a	70	Netherlands	0	421	355
Bulgaria	n/a	n/a	30	New Zealand	1	68	196
Canada	1	1,124	1,074	Norway	1	296	144
Cayman Islands	n/a	n/a	17	Panama	n/a	n/a	10
Chile	n/a	n/a	95	Poland	n/a	n/a	140
China	1	338	846	Portugal	n/a	n/a	69
Croatia	n/a	n/a	20	Republic of Korea	1	187	147
Cyprus	n/a	n/a	16	Russian Federation	0	39	112
Czech Republic	n/a	n/a	81	Seychelles	n/a	n/a	2
Denmark	1	42	158	Singapore	0	490	271
Estonia	n/a	n/a	12	Slovak Republic	n/a	n/a	16
Finland	1	62	142	Slovenia	n/a	n/a	15
France	1	644	667	South Africa	n/a	n/a	119
Germany	1	622	842	Spain	1	324	360
Greece	n/a	n/a	25	Sweden	1	71	369
Hong Kong	0	560	343	Switzerland	0	344	209
Hungary	n/a	n/a	45	Taiwan	n/a	n/a	105
Iceland	n/a	n/a	3	Turkey	n/a	n/a	79
India	0	337	214	Ukraine	n/a	n/a	31
Ireland	0	342	152	United Kingdom	1	1,670	1,772
Israel	1	206	129	United States	1	4,020	2,857
Italy	1	271	314	**Total**		**14,421**	**14,421**

This table shows number of acquirer ultimate parents and targets per country in our cross-border M&A sample to investigate Hypothesis 1a. In this context, cross-border M&As are defined as acquirer ultimate parent and target residing in different countries; the direct acquirer and acquirer ultimate parent reside in the same country. CFC rule takes the value one, if the country has implemented CFC rules in 2014.

Table 27. Cross-border M&A sample (2002–2014) for analyzing the effect of acquirer CFC rules on probability of being target country (Section 5.3.4.2).

Country	CFC rule	No. of acquirers	No. of targets	Country	CFC rule	No. of acquirers	No. of targets
Australia	1	712	801	Italy	1	198	334
Austria	0	77	n/a	Japan	1	431	170
Belarus	0	1	n/a	Lithuania	1	5	n/a
Belgium	0	123	197	Malaysia	0	178	174
Bermuda	0	56	n/a	Malta	0	5	n/a
Brazil	1	40	320	Mexico	1	54	270
British Virgin Islands	0	28	n/a	Netherlands	0	296	404
Bulgaria	0	1	n/a	New Zealand	1	92	141
Canada	1	1,824	594	Norway	1	130	260
Cayman Islands	0	17	n/a	Panama	0	5	n/a
Chile	0	19	n/a	Poland	0	25	170
China	1	271	897	Portugal	1	35	n/a
Croatia	0	1	n/a	Republic of Korea	1	162	153
Cyprus	0	35	n/a	Russian Federation	0	51	82
Czech Republic	0	7	n/a	Seychelles	0	7	n/a
Denmark	1	118	35	Singapore	0	416	290
Estonia	0	1	n/a	Slovak Republic	0	2	n/a
Finland	1	112	44	Slovenia	0	5	n/a
France	1	490	708	South Africa	1	58	156
Germany	1	433	951	Spain	1	239	369
Greece	1	17	n/a	Sweden	1	365	n/a
Hong Kong	0	487	377	Switzerland	0	268	240
Hungary	1	7	n/a	Taiwan	0	90	n/a
Iceland	1	38	n/a	Turkey	1	17	n/a
India	0	295	227	Ukraine	0	8	n/a
Ireland	0	253	181	United Kingdom	1	2,023	1,084
Israel	1	172	n/a	United States	1	2,647	3,818
				Total		**13,447**	**13,447**

This table shows number of acquirer ultimate parents and targets per country in our cross-border M&A sample to investigate Hypothesis 1b. In this context, cross-border M&As are defined as acquirer ultimate parent and target residing in different countries; the direct acquirer and acquirer ultimate parent reside in the same country. CFC rule takes the value one, if the country has implemented CFC rules in 2014.

5.3.4 Regression analysis

5.3.4.1 Acquirer perspective

Table 28 provides definitions, data sources and summary statistics of all variables analyzed in the acquirer perspective. Table 29 presents the baseline results from different multinomial choice models to test Hypothesis 1a on the influence of CFC rules on the likelihood of being the acquirer country of a given target (acquirer perspective). For each deal, the dependent variable equals one for the actual acquirer country of origin and zero for all other counterfactual acquirer countries.

In the conditional logit regression (1), CFC^{dummy} from equation (5.4) is the variable of interest, which indicates potential taxation of target income via CFC rules in the acquirer country. We observe a negative coefficient, which suggests that potential taxation in the acquirer country due to CFC rule application has a negative influence on the probability of being the acquirer country for a given target. To be more specific, we consider CFC^{diff} from equation (5.5) in regression (2). CFC^{diff} measures the magnitude of a potential additional tax burden on target income due to CFC rule application and the coefficient is significantly negative. The substantially lower *p*-value of CFC^{diff} (p<0.000) compared to CFC^{dummy} (p=0.199) is probably due to introducing heterogeneity to the treatment effect by considering the specific tax rate differential between the acquirer and target country in case CFC rules apply. The coefficient of –1.4569 implies that if the target is potentially treated by CFC rules and CFC^{diff} increases by 1%, the likelihood of acquiring this targets decreases by 0.05%. Taken together, we provide evidence that potential CFC rule application on a target's income reduces the probability of acquiring this target; this finding supports Hypothesis 1a. However, the calculated economic effect seems to be very low for small STR differences.

As argued in Feld et al. (2016a), a violation of the assumption of the independence of irrelevant alternatives (IIA) in the conditional logit model could be problematic because estimates may be biased. Consequently, we randomize our variables of interest by using a mixed logit estimator. This randomization follows a normal distribution with mean *g* and covariance *W*; the parameters are estimated by simulated maximum likelihood with 50 Halton draws.[94] In our mixed logit regressions, we observe that the estimated standard deviations of the normal distribution are highly significant; therefore, we prefer this approach and apply mixed logit regressions in the remaining regressions.

[94] In untabulated regression results, we find that using 100 Halton draws produces very similar results in both the acquirer and target perspective; these results are available upon request.

Table 28. Definitions, data sources and summary statistics of variables for analyzing the effect of acquirer CFC rules on probability of being acquirer country.

Variable	Definition	Data source	No. of obs.	Mean	Std. dev.	Min.	Max.
CFC^{dummy}	Binary dummy variable coded 1 if target country STR is smaller than acquirer country's tax rate threshold of CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides	317,835	0.111	0.315	0	1
CFC^{diff}	Difference between acquirer country STR and target country STR if target country STR is smaller than acquirer country's tax rate threshold of CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides	317,835	0.012	0.043	0.000	0.409
$CFC^{diffEATR}$	Difference between acquirer country STR and target country STR if target country EATR is smaller than acquirer country's tax rate threshold of the CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides; Oxford University Centre for Business Taxation	317,835	0.011	0.039	–0.011	0.409
$CFC^{diffEEA}$	Same as CFC^{diff}; however, set to zero if acquirer and target country are both EEA member states and M&A year is after 2006	Tax Guides	317,835	0.012	0.042	0.000	0.409
Below	See equation (5.6)	Tax Guides	317,835	0.012	0.043	0.000	0.409
Above	See equation (5.7)	Tax Guides	317,835	0.010	0.029	0.000	0.273
Higher	See equation (5.8)	Tax Guides	317,835	0.015	0.031	0.000	0.155
$CFC^{taxbase}$	See equation (5.10)	Tax Guides	317,835	0.318	0.066	0.000	0.409
$CFC^{profitable}$	Same as CFC^{diff}; however, for non-profitable targets set to zero	Tax Guides; SDC Platinum; Compustat North America; Compustat Global	55,715	0.007	0.034	0.000	0.395
$CFC^{non\_profitable}$	Same as CFC^{diff}; however, for profitable targets set to zero	Tax Guides; SDC Platinum; Compustat North America; Compustat Global	55,715	0.003	0.021	0.000	0.409
STR	STR in candidate acquirer country, including typical local taxes	Tax Guides	317,835	0.291	0.071	0.125	0.409
ExemptionMethod	Binary dummy variable coded 1 if candidate acquirer country unilaterally applies the exemption method to avoid double taxation of foreign dividends, and 0 if it unilaterally applies the credit method	Tax Guides	294,697	0.606	0.489	0	1
lnGDPpercapita	GDP per capita in candidate acquirer country (natural logarithm)	World Bank	317,835	10.416	0.620	7.942	11.284
GDPgrowth	Growth of GDP in candidate acquirer country (in %)	World Bank	317,835	3.095	3.168	–7.821	15.240
StockmarketSize	Stock market capitalization of listed domestic companies in candidate acquirer country (in % of GDP)	World Bank	317,835	121.5	175.6	15.767	1,254.5
PrivateCredit	Domestic credit to private sector in candidate acquirer country (in % of GDP)	World Bank	317,835	115.3	39.525	31.081	233.4
lnDistance	Simple distance (in km) between most populated cities of candidate acquirer and target country (natural logarithm)	Mayer and Zignago (2011)	317,835	8.498	1.100	4.088	9.883
CommonLanguage	Common language index between candidate acquirer and target country (0 (low similarity) to 1 (high similarity))	Melitz and Toubal (2014)	317,835	0.242	0.217	0.000	0.983
ColonialRelationship	Binary dummy variable coded 1 if candidate acquirer and target country were ever in a colonial relationship, and 0 otherwise	Mayer and Zignago (2011)	317,835	0.095	0.294	0	1
CommonLegalSystem	Binary dummy variable coded 1 if legal system of candidate acquirer and target country have common legal origins, and 0 otherwise	Head et al. (2010)	317,835	0.319	0.466	0	1
TargetAssets	Pre-deal consolidated target total assets in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	52,809	18.118	2.297	11.513	28.060
TargetROA	Pre-deal consolidated target pre-tax income in the last year before the effective M&A date divided by pre-deal consolidated target total assets in the last year before the effective M&A date	SDC Platinum; Compustat North America; Compustat Global	52,809	–0.036	0.844	–11.800	18.000
TargetSales	Pre-deal consolidated target net sales in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	78,495	17.667	2.320	6.908	26.216
TargetEBITDA	Pre-deal consolidated target EBITDA in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	34,405	16.369	2.093	7.601	24.300

Data on country fixed effects are not reported but are available upon request.

Table 29. Effect of acquirer CFC rules on probability of being acquirer country.

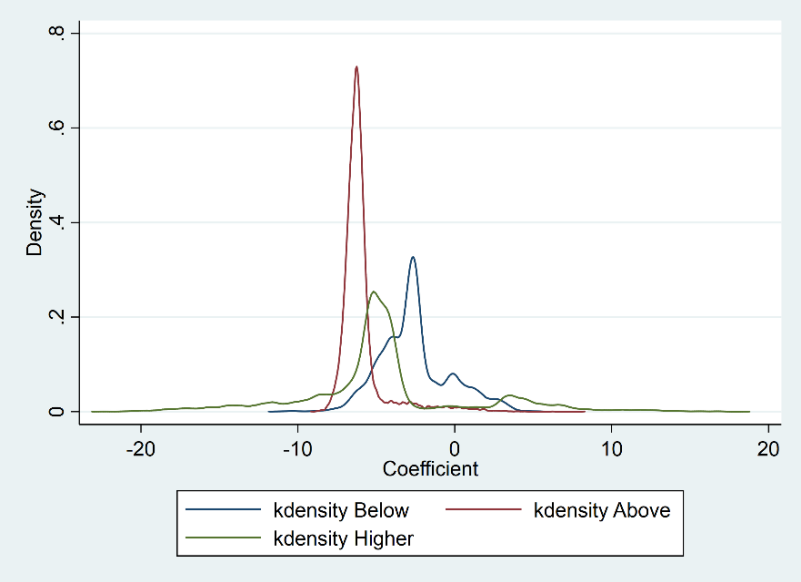
Explanatory variables	(1) Conditional logit (I)	(2) Conditional logit (II)	(3) Mixed logit (III)	(4) Mixed logit (IV)	(5) Mixed logit (V)
CFC^{dummy}	–0.0523[a]				
	(0.0407)				
CFC^{diff}		–1.4569***	–1.2387***	–1.2387**	
		(0.3277)	(0.3482)	(0.5606)	
Below					–2.5882***
					(0.4015)
Above					–5.8277***
					(1.1959)
Higher					–4.5472***
					(0.6634)
STR	–2.0538***	–1.7568***	–2.0903***	–2.0903**	–1.9648***
	(0.6319)	(0.6330)	(0.6442)	(0.8423)	(0.7104)
lnGDPpercapita	1.0541***	1.0452***	1.1104***	1.1104***	1.1838***
	(0.1619)	(0.1625)	(0.1652)	(0.2118)	(0.1710)
GDPgrowth	–0.0034	–0.0032	–0.0041	–0.0041	–0.0041
	(0.0076)	(0.0075)	(0.0076)	(0.0099)	(0.0078)
StockmarketSize	0.0005***	0.0005***	0.0005***	0.0005	0.0005***
	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)
PrivateCredit	0.0007	0.0006	0.0007	0.0007	0.0005
	(0.0006)	(0.0006)	(0.0006)	(0.0011)	(0.0007)
lnDistance	–0.5852***	–0.5789***	–0.5906***	–0.5906***	–0.6185***
	(0.0114)	(0.0115)	(0.0119)	(0.0217)	(0.0128)
CommonLanguage	1.8148***	1.8112***	1.8494***	1.8494***	1.9616***
	(0.0620)	(0.0620)	(0.0629)	(0.1289)	(0.0653)
ColonialRelationship	0.3020***	0.2868***	0.2994***	0.2994***	0.3168***
	(0.0360)	(0.0359)	(0.0364)	(0.0569)	(0.0378)
CommonLegalSystem	0.1029***	0.1145***	0.1117***	0.1117**	0.1107***
	(0.0251)	(0.0252)	(0.0254)	(0.0470)	(0.0259)
Acquirer country fixed effects	YES	YES	YES	YES	YES
No. of observations	317,835	317,835	317,835	317,835	317,835
Log-likelihood	–32,188	–32,178	–32,165	–32,165	–32,091

Regressions of probability of being the acquirer country on (potential) CFC rule application; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual acquirer's country of origin, and zero if country *i* is a counterfactual acquirer country. For variable definitions and data sources, see Table 28. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for acquirer country fixed effects, which are available upon request. The variables of interest follow a random distribution in the mixed logit regressions. Regressions (1) and (2) are estimated by a conditional logit model and regressions (3), (4) and (5) are estimated by a mixed logit model. Regression (4) is identical to regression (3) except for standard errors, which are robust to clustering on the target-country/year level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.
[a] The level of statistical significance is 19.9%.

In regression (3), we observe that applying the mixed logit model does not change the basic results as CFC^{diff} remains significantly negative at the 1% level and quantitatively stable. In regression (4), we cluster the standard errors at the target-country/year level and observe that CFC^{diff} is significant at the 5% level. In regression (5), we split the targets as described in equations (5.6), (5.7) and (5.8). Figure 17 shows a kernel density estimate of the simulated

coefficients of the variables of interest. The significantly negative coefficient of *Below* confirms the results from previous regressions and also the significantly negative coefficient of *Higher* is as expected. This finding shows that it is less likely that a CFC rule acquirer buys a target, which is located in a country with a higher STR than the CFC rule acquirer. This finding supports Hypothesis 1c. However, the significantly negative coefficient of *Above* is counterintuitive as we hypothesized that firms from CFC rule countries are more likely to be the acquirer if the target is located in a country with an STR below the acquirer STR but above the tax rate threshold of the CFC rule. Hence, we reject Hypothesis 1c in the acquirer perspective.

Figure 17. Distribution of coefficients of *Below*, *Above* and *Higher* in the acquirer perspective.



This figure provides a graph of the Epanechnikov kernel density function of the simulated coefficients of *Below*, *Above* and *Higher* in regression (5) of Table 29 using simulated maximum likelihood with 50 Halton draws. The mean (standard deviation) of the simulated coefficients is –2.59 (0.40) for *Below*, –5.83 (1.20) for *Above* and –4.55 (0.66) for *Higher*. Density is on the *y*-axis and the coefficient is on the *x*-axis. Sources: Corporate taxation system data set and cross-border M&A data set.

Most control variables are highly significant and show the expected signs. Regarding *STR*, we find a negative effect on the likelihood to be the successful bidder if the bidder is located in a high-tax country. This finding is in line with Becker and Riedel (2012), who find a negative effect of parent STR on investment in foreign subsidiaries. Helpman et al. (2004) show that the productivity level of firms influences their investments abroad and firms with the highest productivity engage in FDI. Similar to other studies, we use *lnGDPpercapita* and *GDPgrowth* as proxies for productivity levels in an acquirer country and find that *lnGDPpercapita* has a significantly positive coefficient, while *GDPgrowth* is insignificant. Hence, a high level of GDP per capita has a positive impact on cross-border M&A activity.

StockmarketSize has the expected positive coefficient, which indicates that well-developed stock markets in the acquirer country offer good financing conditions to raise capital to fund cross-border M&As. The size of the private credit market captured by *PrivateCredit* has an insignificant effect. Cross-border M&A literature finds that lower bilateral transaction costs between the acquirer and target due to less cultural and geographic distance positively affect M&A activity (e.g., di Giovanni (2005)). In line with these findings, we observe that *lnDistance*, *CommonLanguage*, *ColonialRelationship* and *CommonLegalSystem* show the expected signs and are highly significant.

Table 30 provides the results from our check on whether our baseline results are robust to specification variations. In regression (1), we include a dummy variable capturing the unilateral double taxation avoidance method for foreign dividends (i.e., the credit method or the exemption method). The significantly positive coefficient of *ExemptionMethod* indicates that the likelihood of being the acquirer increases if the acquirer resides in a country that exempts foreign dividends of the target from taxation, which is in line with the result of Feld et al. (2016a). In regressions (2), (3) and (4), we vary the calculation of our variable of interest by considering target EATRs ($CFC^{diffEATR}$), potential non-application of CFC rules within the EEA ($CFC^{diffEEA}$)[95] and the included income by CFC rules ($CFC^{taxbase}$). In regression (5), we additionally randomize *STR* and in regression (6), we exclude acquirers from Australia, Canada and New Zealand because their CFC rules do not explicitly mention a tax rate threshold, where our identification is coming from. Regression (7) excludes the largest acquirer countries (Canada, UK and USA), which account for around half of our observations. The exclusion of the USA further checks for a potential bias due to the so-called check-the-box rule, which was introduced in the USA in 1997 and may allow for an escape from CFC rules for US MNEs under specific circumstances by using hybrid entities (e.g., Altshuler and Grubert (2006), Mutti and Grubert (2009)). We observe that all robustness tests validate our baseline results, both quantitatively and qualitatively.

[95] Ruf and Weichenrieder (2013) investigate the Cadbury-Schweppes ruling of the ECJ in 2006 (European Court of Justice (2006)), which triggered a substantial mitigation of the application of CFC rules within the EEA. In line with this argumentation, the authors find evidence for a relative increase in passive investments in low-tax EEA subsidiaries and a parallel decrease in passive investments in non-EEA subsidiaries.

Table 30. Robustness analysis I of the effect of acquirer CFC rules on probability of being acquirer country.

Explanatory variables	(1) Controlling for double taxation avoidance method	(2) Using target EATR	(3) Considering EEA exemption (post 2006)	(4) Considering included income of CFC rule	(5) Randomizing STR	(6) Excl. acquirers from AU&CA&NZ	(7) Excl. acquirers from CA&UK&US
CFC^{diff}	–0.6035*				–1.2130***	–1.6977***	–1.0453*
	(0.3472)				(0.3507)	(0.3588)	(0.5643)
$CFC^{diffEATR}$		–1.2961***					
		(0.3162)					
$CFC^{diffEEA}$			–1.5406***				
			(0.3491)				
$CFC^{taxbase}$				–1.7810***			
				(0.3993)			
STR	–2.3967***	–1.9075***	–1.9575***	–2.0217***	–2.1346***	–1.6298**	–1.9436***
	(0.6431)	(0.6363)	(0.6440)	(0.6433)	(0.6472)	(0.6774)	(0.7260)
ExemptionMethod	0.8440***						
	(0.0859)						
lnGDPpercapita	1.2497***	1.0501***	1.1225***	1.1152***	1.0906***	1.1571***	1.0672***
	(0.1661)	(0.1621)	(0.1655)	(0.1653)	(0.1666)	(0.1680)	(0.1805)
GDPgrowth	–0.0071	–0.0034	–0.0040	–0.0044	–0.0046	0.0051	–0.0106
	(0.0077)	(0.0076)	(0.0076)	(0.0076)	(0.0077)	(0.0085)	(0.0086)
StockmarketSize	0.0006***	0.0005***	0.0005***	0.0005***	0.0005***	0.0004***	0.0003**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
PrivateCredit	0.0012*	0.0006	0.0007	0.0007	0.0007	0.0006	0.0010
	(0.0007)	(0.0006)	(0.0006)	(0.0006)	(0.0007)	(0.0008)	(0.0010)
lnDistance	–0.5657***	–0.5890***	–0.5884***	–0.5948***	–0.5919***	–0.5696***	–0.6515***
	(0.0121)	(0.0115)	(0.0119)	(0.0119)	(0.0119)	(0.0143)	(0.0175)
CommonLanguage	1.9151***	1.8596***	1.8491***	1.8603***	1.8598***	1.9419***	2.2097***
	(0.0641)	(0.0625)	(0.0630)	(0.0631)	(0.0627)	(0.0676)	(0.0770)
ColonialRelationship	0.2454***	0.3005***	0.2971***	0.3004***	0.2937***	0.2334***	0.4303***
	(0.0370)	(0.0360)	(0.0364)	(0.0365)	(0.0371)	(0.0388)	(0.0475)
CommonLegalSystem	0.0946***	0.1030***	0.1139***	0.1136***	0.1122***	0.1244***	0.1925***
	(0.0258)	(0.0251)	(0.0254)	(0.0254)	(0.0256)	(0.0258)	(0.0277)
Acquirer country fixed effects	YES	YES	YES	YES	YES	YES	YES
No. of observations	294,697	317,835	317,835	317,835	317,835	243,136	151,651
Log-likelihood	–30,936	–32,175	–32,164	–32,161	–32,164	–25,945	–19,203

Regressions of probability of being the acquirer country on (potential) CFC rule application; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual acquirer's country of origin, and zero if country *i* is a counterfactual acquirer country. For variable definitions and data sources, see Table 28. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for acquirer country fixed effects, which are available upon request, and are estimated by a mixed logit model. The variables of interest follows a random distribution. Regression (1) additionally controls for double taxation avoidance method, regression (2), (3) and (4) check whether our variable of interest is robust to using EATR, considering potential non-application of CFC rules within the EEA and considering the included income by CFC rules. In regression (5), also *STR* follows a random distribution. Regressions (6) and (7) exclude certain countries. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

Table 31 provides further robustness tests. In regression (1), we exclude all control variables except for the acquirer country fixed effects to check if there is a bias due to correlation between CFC^{diff} and the control variables. We find that CFC^{diff} decreases substantially and remains significant. Further, we check whether our results are robust to differentiating between profitable and loss-making targets in regression (2). Due to missing firm level variables, the sample decreases substantially. We find that the coefficients of $CFC^{profitable}$ and $CFC^{non\_profitable}$ remain significantly negative. Interestingly, the effect is more pronounced for loss-making targets; the difference between the coefficients is significant at a *p*-value of 0.019 (two-sided). One possible reason could be that non-CFC rule acquirers are more interested in acquiring low-tax loss-making targets than CFC rule acquirers, because non-CFC rule acquirers may shift profits to the loss-making targets and, thereby, net out the losses—or even use existing loss carryforwards if possible—of these targets. Finally, regressions (3), (4) and (5) control for target-specific financial data (total assets, ROA, sales and EBITDA) by interacting these consolidated profit and loss statement and balance sheet items with each candidate acquirer country. While again the sample size decreases substantially, we observe that CFC^{diff} remains significantly negative.

Table 31. Robustness analysis II of the effect of acquirer CFC rules on probability of being acquirer country.

Explanatory variables	(1) Excl. control variables	(2) Profitable vs. non-profitable targets	(3) Incl. target assets & target ROA	(4) Incl. target sales	(5) Incl. target EBITDA
CFC^{diff}	–4.1258***		–3.1934***	–2.8136***	–2.1391*
	(0.3294)		(1.1995)	(0.7548)	(1.2086)
$CFC^{profitable}$		–1.9250**			
		(0.9653)			
$CFC^{non\_profitable}$		–5.5943***			
		(1.7488)			
STR		0.8489	0.4872	–0.6872	–0.5640
		(1.5131)	(1.5582)	(1.2818)	(1.8920)
lnGDPpercapita		1.6639***	1.8388***	1.2574***	1.1308**
		(0.3762)	(0.3851)	(0.3246)	(0.5062)
GDPgrowth		0.0383**	0.0455**	0.0166	0.0272
		(0.0195)	(0.0202)	(0.0176)	(0.0258)
StockmarketSize		0.0003	–0.0002	–0.0000	–0.0007
		(0.0004)	(0.0005)	(0.0004)	(0.0006)
PrivateCredit		0.0001	0.0003	–0.0010	–0.0008
		(0.0017)	(0.0018)	(0.0014)	(0.0023)
lnDistance		–0.5018***	–0.4904***	–0.4932***	–0.5148***
		(0.0313)	(0.0338)	(0.0266)	(0.0422)
CommonLanguage		1.7924***	1.6550***	1.5999***	1.4257***
		(0.1765)	(0.1951)	(0.1562)	(0.2360)
ColonialRelationship		0.2783***	0.2070**	0.1570**	0.1919*
		(0.0862)	(0.0921)	(0.0731)	(0.1080)
CommonLegalSystem		0.2239***	0.3270***	0.3013***	0.3555***
		(0.0654)	(0.0713)	(0.0560)	(0.0860)
Acquirer country fixed effects	YES	YES	YES	YES	YES
No. of observations	317,835	55,715	52,809	78,495	34,405
Log-likelihood	–35,450	–5,495	–5,157	–7,715	–3,287

Regressions of probability of being the acquirer country on (potential) CFC rule application; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual acquirer's country of origin, and zero if country *i* is a counterfactual acquirer country. For variable definitions and data sources, see Table 28. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for acquirer country fixed effects, which are available upon request, and are estimated by a mixed logit model. The variables of interest follow a random distribution. Regression (1) drops all control variables and regression (2) distinguishes between profitable and non-profitable targets. Regression (3) includes the interaction between acquirer country fixed effects and *TargetAssets* and the interaction between acquirer country fixed effects and *TargetROA*. Regression (4) includes the interaction between acquirer country fixed effects and *TargetSales*. Regression (5) includes the interaction between acquirer country fixed effects and *TargetEBITDA*. The coefficients and standard errors of these interactions are shown in Table A 5 in Appendix to Section 5. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

5.3.4.2 Target perspective

With the same econometric idea as in Section 5.3.4.1 but with a target perspective, we analyze for each given acquirer the origin of the eventual target country among a choice set of various target countries (target perspective). Table 32 provides definitions, data sources

and summary statistics of all variables and Table 33 presents the baseline results from different multinomial choice models to test Hypothesis 1b on the influence of CFC rules on the likelihood of being chosen as the target country of a given acquirer. For each deal, the dependent variable equals one for the actual target country of origin and zero for all other counterfactual target countries. Due to a different perspective and additional control variables, the data set differs from the former data set in Section 5.3.4.1.

In the conditional logit regression (1), CFC^{dummy} has a significantly negative coefficient, which indicates that potential CFC rule application on a candidate target's income has a negative effect on actually choosing the target country as a location. CFC^{diff} measures in more detail the magnitude of a potential additional tax burden due to CFC rule application and—similar to the result in Section 5.3.4.1—the significance level increases compared to the mere dummy variable approach (CFC^{dummy}). In line with Hypothesis 1b, this finding indicates that potential CFC rule application on target's income negatively influences the target location choice of a given acquirer. From a global perspective and with an increasing number of countries introducing or strengthening CFC rules, this finding may further indicate higher overall tax revenue due to less profit shifting opportunities.

To cope with a possible violation of the IIA (see Section 5.3.4.1), we use again a mixed logit estimator and randomize our variables of interest in the remaining regressions. Again, we observe that the estimated standard deviations of the normal distribution are highly significant; therefore, we prefer this approach and apply mixed logit regressions in the remaining regressions. We observe a further decrease of CFC^{diff} and the significance level remains stable in regression (3) and regression (4), where we cluster the standard errors at the acquirer-country/year level. In regression (5), we observe a similar pattern as in Section 5.3.4.1 and Figure 18 shows a kernel density estimate of the simulated coefficients of the variables of interest. Again, the coefficients of *Below* and *Higher* are significantly negative, which is in line with Hypothesis 1c and suggests that the likelihood of target location choice decreases if the target potentially falls under the scope of CFC rule or has a higher STR than the acquirer. However, we again observe that *Above* is significantly negative, which is counterintuitive, because we would expect that targets are more likely to be acquired if they are located in a country with an STR below the acquirer STR but above the tax rate threshold of the acquirer's CFC rule. Hence, also in the target perspective, we reject Hypothesis 1c.

Table 32. Definitions, data sources and summary statistics of variables for analyzing the effect of acquirer CFC rules on probability of being target country.

Variable	Definition	Data source	No. of obs.	Mean	Std. dev.	Min.	Max.
CFC^{dummy}	Binary dummy variable coded 1 if target country STR is smaller than acquirer country's tax rate threshold of CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides	317,444	0.345	0.475	0	1
CFC^{diff}	Difference between acquirer country STR and target country STR if target country STR is smaller than acquirer country's tax rate threshold of CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides	317,444	0.037	0.063	0.000	0.284
$CFC^{diffEATR}$	Difference between acquirer country STR and target country STR if target country EATR is smaller than acquirer country's tax rate threshold of the CFC rule or acquirer country applies CFC rules without a tax rate threshold, and 0 otherwise	Tax Guides; Oxford University Centre for Business Taxation	317,444	0.031	0.057	–0.033	0.284
$CFC^{diffEEA}$	Same as CFC^{diff}; however, set to zero if acquirer and target country are both EEA member states and M&A year is after 2006	Tax Guides	317,444	0.035	0.062	0.000	0.284
Below	See equation (5.6)	Tax Guides	317,444	0.037	0.063	0.000	0.284
Above	See equation (5.7)	Tax Guides	317,444	0.008	0.026	0.000	0.258
Higher	See equation (5.8)	Tax Guides	317,444	0.014	0.030	0.000	0.259
$CFC^{taxbase}$	See equation (5.10)	Tax Guides	317,444	0.305	0.058	0.125	0.409
$CFC^{profitable}$	Same as CFC^{diff}; however, for non-profitable targets set to zero	Tax Guides; SDC Platinum; Compustat North America; Compustat Global	53,270	0.026	0.057	0.000	0.284
$CFC^{non\_profitable}$	Same as CFC^{diff}; however, for profitable targets set to zero	Tax Guides; SDC Platinum; Compustat North America; Compustat Global	53,270	0.013	0.042	0.000	0.277
STR	STR in candidate target country, including typical local taxes	Tax Guides	317,444	0.287	0.071	0.125	0.409
lnGDPpercapita	GDP per capita in candidate target country (natural logarithm)	World Bank	317,444	10.267	0.687	7.942	11.284
GDPgrowth	Growth of GDP in candidate target country (in %)	World Bank	317,444	3.221	3.206	–7.821	15.240
StockmarketSize	Stock market capitalization of listed domestic companies in candidate target country (in % of GDP)	World Bank	317,444	124.1	178.4	17.020	1,254.5
PrivateCredit	Domestic credit to private sector in candidate target country (in % of GDP)	World Bank	317,444	109.5	47.091	13.353	233.4
lnDistance	Simple distance (in km) between most populated cities of acquirer and candidate target country (natural logarithm)	Mayer and Zignago (2011)	317,444	8.609	1.046	5.153	9.883
CommonLanguage	Common language index between acquirer and candidate target country (0 (low similarity) to 1 (high similarity))	Melitz and Toubal (2014)	317,444	0.235	0.212	0.000	0.991
ColonialRelationship	Binary dummy variable coded 1 if acquirer and candidate target country were ever in a colonial relationship, and 0 otherwise	Mayer and Zignago (2011)	317,444	0.103	0.304	0	1
CommonLegalSystem	Binary dummy variable coded 1 if legal system of acquirer and candidate target country have common legal origins, and 0 otherwise	Head et al. (2010)	317,444	0.329	0.470	0	1
CorruptionControl	Corruption control index of candidate target country (–3 (low control) to 3 (high control))	World Bank	317,444	1.072	0.976	–1.088	2.527
BusinessStartupCost	Cost of business start-up procedures in candidate target country (in % of GNI per capita)	World Bank	317,444	9.601	12.746	0.000	78.400
UnemploymentRate	Unemployment rate in candidate target country (in % of total labor force)	World Bank	317,444	7.031	5.050	2.493	27.140
lnDomesticFirms	Number of listed domestic companies in candidate target country (natural logarithm)	World Bank	317,444	6.426	1.232	3.714	8.638
BusinessDisclosure	Business extent of disclosure index of in candidate target country (0 (less disclosure) to 10 (more disclosure))	World Bank	264,159	7.188	2.344	0	10
AcquirerAssets	Pre-deal consolidated acquirer total assets in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	215,197	20.280	2.808	11.513	28.710
AcquirerROA	Pre-deal consolidated acquirer pre-tax income in the last year before the effective M&A date divided by pre-deal consolidated acquirer total assets in the last year before the effective M&A date	SDC Platinum; Compustat North America; Compustat Global	215,197	0.035	5.999	–191.9	360.5
AcquirerSales	Pre-deal consolidated acquirer net sales in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	206,176	19.979	2.732	8.219	26.834
AcquirerEBITDA	Pre-deal consolidated acquirer EBITDA in the last year before the effective M&A date (natural logarithm)	SDC Platinum; Compustat North America; Compustat Global	180,202	18.594	2.365	9.210	24.723

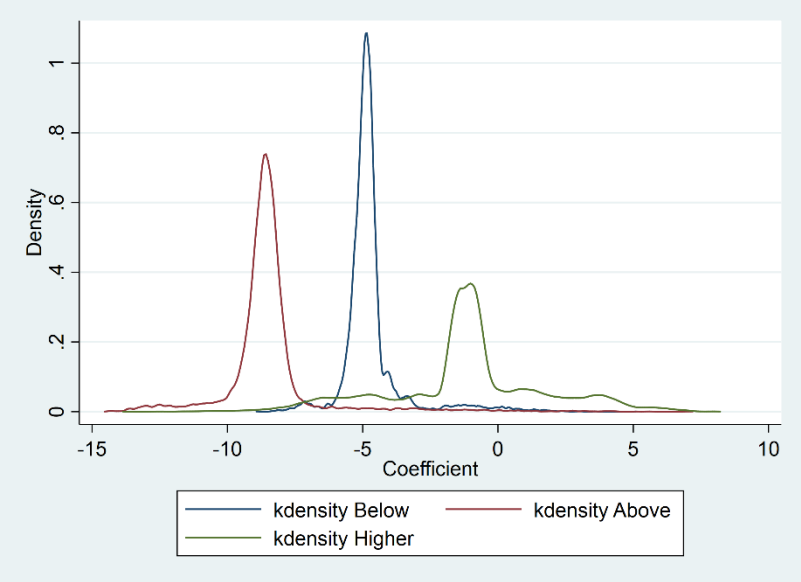
Data on country fixed effects are not reported but are available upon request.

Table 33. Effect of acquirer CFC rules on probability of being target country.

Explanatory variables	(1) Conditional logit (I)	(2) Conditional logit (II)	(3) Mixed logit (III)	(4) Mixed logit (IV)	(5) Mixed logit (V)
CFC^{dummy}	–0.1078**				
	(0.0450)				
CFC^{diff}		–1.7115***	–2.8880***	–2.8880***	
		(0.3921)	(0.5306)	(0.8075)	
Below					–4.7124***
					(0.5975)
Above					–8.6127***
					(1.0042)
Higher					–1.1460**
					(0.5413)
STR	2.6019***	2.4139***	2.0753***	2.0753**	1.6429**
	(0.6293)	(0.6309)	(0.6398)	(0.8535)	(0.6891)
lnGDPpercapita	–0.0639	–0.0388	–0.0848	–0.0848	–0.1192
	(0.1740)	(0.1739)	(0.1744)	(0.3059)	(0.1788)
GDPgrowth	0.0142*	0.0143*	0.0134*	0.0134	0.0128
	(0.0081)	(0.0081)	(0.0081)	(0.0112)	(0.0082)
StockmarketSize	–0.0003	–0.0003	–0.0003	–0.0003	–0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)
PrivateCredit	–0.0019**	–0.0019**	–0.0021***	–0.0021**	–0.0022***
	(0.0008)	(0.0008)	(0.0008)	(0.0011)	(0.0008)
lnDistance	–0.5799***	–0.5740***	–0.5736***	–0.5736***	–0.5934***
	(0.0112)	(0.0114)	(0.0114)	(0.0188)	(0.0123)
CommonLanguage	1.9043***	1.9006***	1.9162***	1.9162***	1.9734***
	(0.0639)	(0.0638)	(0.0641)	(0.1225)	(0.0671)
ColonialRelationship	0.2992***	0.2777***	0.2712***	0.2712***	0.2252***
	(0.0375)	(0.0377)	(0.0378)	(0.0489)	(0.0387)
CommonLegalSystem	0.0172	0.0311	0.0345	0.0345	0.0672**
	(0.0269)	(0.0271)	(0.0272)	(0.0483)	(0.0278)
CorruptionControl	0.1651*	0.1644*	0.1600*	0.1600	0.1542*
	(0.0859)	(0.0860)	(0.0863)	(0.1337)	(0.0884)
BusinessStartupCost	–0.0073**	–0.0072**	–0.0075**	–0.0075*	–0.0069**
	(0.0033)	(0.0033)	(0.0033)	(0.0044)	(0.0033)
UnemploymentRate	–0.0004	0.0001	0.0004	0.0004	–0.0002
	(0.0064)	(0.0064)	(0.0064)	(0.0085)	(0.0065)
lnDomesticFirms	0.1775**	0.1651*	0.1834**	0.1834	0.2095**
	(0.0848)	(0.0846)	(0.0848)	(0.1338)	(0.0853)
Target country fixed effects	YES	YES	YES	YES	YES
No. of observations	317,444	317,444	317,444	317,444	317,444
Log-likelihood	–31,158	–31,151	–31,144	–31,144	–31,064

Regressions of probability of being the target country on (potential) CFC rule application in acquirer country; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual target's country of origin, and zero if country *i* is a counterfactual target country. For variable definitions and data sources, see Table 32. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for target country fixed effects, which are available upon request. The variables of interest follow a random distribution in the mixed logit regressions. Regressions (1) and (2) are estimated by a conditional logit model and regressions (3), (4) and (5) are estimated by a mixed logit model. Regression (4) is identical to regression (3) except for standard errors, which are robust to clustering on the acquirer-country/year level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

Figure 18. Distribution of coefficients of *Below*, *Above* and *Higher* in the target perspective.



This figure provides a graph of the Epanechnikov kernel density function of the simulated coefficients of *Below*, *Above* and *Higher* in regression (5) of Table 33 using simulated maximum likelihood with 50 Halton draws. The mean (standard deviation) of the simulated coefficients is –4.71 (0.60) for *Below*, –8.61 (1.00) for *Above* and –1.15 (0.54) for *Higher*. Density is on the *y*-axis and the coefficient is on the *x*-axis. Sources: Corporate taxation system data set and cross-border M&A data set.

Regarding significant control variables, we observe that STR has a positive effect on target location choice, which is an unexpected result as FDI literature generally suggests a negative effect of host country STR on host country investment (e.g., Feld and Heckemeyer (2011)). An explanation for this result could be that cross-border M&As are less sensitive to host country STRs (e.g., Hebous et al. (2011), Herger et al. (2016)) or that profit shifting structures within the acquiring MNE mitigate this effect (e.g., Arulampalam et al. (2017)). Additionally, variation of STR is also used to compose our variable of interest, which may lead to interdependencies. Finally, the significantly positive effect of STR does not prove to be robust.

Regarding control variables, *lnGDPpercapita* and *StockmarketSize* have insignificant coefficients, whereas *GDPgrowth* has a significantly positive effect in some regressions, i.e., targets located in growing economies are more likely to be acquired. Further, *PrivateCredit* has a significantly negative effect on target location choice. The explanation for this finding may be the following: If a target is located in a country with a low ratio of private credits granted to the private sector, the supply of credits may be limited. Consequently, credit supply for internal expansion is limited, which makes targets in these countries more likely to be acquired (Arulampalam et al. (2017)). Similar to the findings in Section 5.3.4.1, we observe that lower bilateral transaction costs between the acquirer and target positively affect target location choice: *lnDistance*, *CommonLanguage* and *ColonialRelationship* have the

expected significant coefficient; *CommonLegalSystem* has an expected positive though insignificant estimate. Finally, the control variables for the institutional framework in the candidate target country have significant explanatory power. A high degree of corruption control, a large number of listed firms and low business start-up costs increase the chances to be chosen as target location; unemployment rate has an insignificant effect.

In Table 34, we provide similar robustness tests as in Table 30 and yield similar results. Regressions (1), (2), and (3) take into account target EATRs ($CFC^{diffEATR}$), potential non-application of CFC rules within the EEA ($CFC^{diffEEA}$) and the included income by CFC rules ($CFC^{taxbase}$). In regression (4), we additionally randomize *STR* and in regression (5), we exclude acquirers from Australia, Canada and New Zealand because their CFC rules do not explicitly mention a tax rate threshold. Regression (6) excludes the largest target countries (Germany, UK and USA), which account for almost half of our observations. In regression (7), we include *BusinessDisclosure* as a further variable for the institutional framework in the candidate target country. This variable is not included in our baseline results since its inclusion substantially drops the observation number. We observe that all robustness tests resemble our baseline results, both quantitatively and qualitatively.

Table 34. Robustness analysis I of the effect of acquirer CFC rules on probability of being target country.

Explanatory variables	(1) Using target EATR	(2) Considering EEA exemption (post 2006)	(3) Considering included income of CFC rule	(4) Randomizing STR	(5) Excl. acquirers from AU&CA&NZ	(6) Excl. targets from DE&UK&US	(7) Incl. business disclosure index
CFC^{diff}				–2.9635***	–3.0176***	–1.9885***	–2.1462***
				(0.5612)	(0.5315)	(0.6091)	(0.5646)
$CFC^{diffEATR}$	–1.6836***						
	(0.4775)						
$CFC^{diffEEA}$		–3.2489***					
		(0.5360)					
$CFC^{taxbase}$			–1.3819[a]				
			(0.9350)				
STR	2.3923***	1.9682***	3.8860***	1.8021***	2.2549***	–0.7337	1.8860**
	(0.6354)	(0.6407)	(1.0668)	(0.6577)	(0.6744)	(0.9266)	(0.7650)
lnGDPpercapita	–0.0710	–0.0803	–0.1884	–0.3431*	0.0169	–0.5203***	0.3354
	(0.1744)	(0.1749)	(0.1798)	(0.1848)	(0.1825)	(0.1978)	(0.2291)
GDPgrowth	0.0139*	0.0137*	0.0140*	0.0119	0.0109	0.0186**	0.0204**
	(0.0081)	(0.0081)	(0.0082)	(0.0083)	(0.0087)	(0.0093)	(0.0087)
StockmarketSize	–0.0003	–0.0003	–0.0002	–0.0001	–0.0003	–0.0002	–0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
PrivateCredit	–0.0020**	–0.0022***	–0.0018**	–0.0022***	–0.0029***	–0.0034***	–0.0025***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0011)	(0.0009)
lnDistance	–0.5834***	–0.5712***	–0.5919***	–0.5985***	–0.5562***	–0.6799***	–0.5717***
	(0.0113)	(0.0115)	(0.0122)	(0.0125)	(0.0145)	(0.0166)	(0.0123)
CommonLanguage	1.9332***	1.9217***	1.9710***	2.0260***	1.9892***	2.0413***	1.9405***
	(0.0639)	(0.0640)	(0.0670)	(0.0684)	(0.0685)	(0.0805)	(0.0687)
ColonialRelationship	0.2986***	0.2636***	0.2760***	0.2637***	0.2214***	0.3984***	0.2497***
	(0.0377)	(0.0378)	(0.0384)	(0.0387)	(0.0403)	(0.0485)	(0.0413)
CommonLegalSystem	0.0139	0.0364	0.0282	0.0315	0.0482*	0.0919***	0.0162
	(0.0269)	(0.0272)	(0.0278)	(0.0280)	(0.0278)	(0.0341)	(0.0291)
CorruptionControl	0.1784**	0.1504*	0.1641*	0.1525*	0.1277	0.0777	0.3170***
	(0.0860)	(0.0865)	(0.0875)	(0.0889)	(0.0922)	(0.1113)	(0.1135)
BusinessStartupCost	–0.0074**	–0.0074**	–0.0076**	–0.0081**	–0.0052	–0.0071*	–0.0064*
	(0.0033)	(0.0033)	(0.0033)	(0.0034)	(0.0035)	(0.0037)	(0.0036)

(*Continued*)

Table 34. *Continued.*

UnemploymentRate	0.0003	0.0002	–0.0026	–0.0032	0.0033	–0.0134*	0.0055
	(0.0064)	(0.0064)	(0.0065)	(0.0065)	(0.0067)	(0.0081)	(0.0071)
lnDomesticFirms	0.1715**	0.1794**	0.2252***	0.2844***	0.2078**	0.2547***	0.0623
	(0.0848)	(0.0849)	(0.0861)	(0.0876)	(0.0883)	(0.0907)	(0.1015)
BusinessDisclosure							0.0820
							(0.0686)
Target country fixed effects	YES	YES	YES	YES	YES	YES	YES
No. of observations	317,444	317,444	317,444	317,444	255,172	161,910	264,159
Log-likelihood	–31,155	–31,140	–31,136	–31,119	–26,594	–19,327	–26,172

Regressions of probability of being the target country on (potential) CFC rule application in acquirer country; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual target's country of origin, and zero if country *i* is a counterfactual target country. For variable definitions and data sources, see Table 32. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for target country fixed effects, which are available upon request, and are estimated by a mixed logit model. The variables of interest follow a random distribution in the mixed logit regressions. Regression (1), (2) and (3) check whether our variable of interest is robust to using EATRs, considering potential non-application of CFC rules within the EEA and considering the included income by CFC rules. In regression (4), also STR follows a random distribution. Regressions (5) and (6) exclude certain countries and regression (7) considers a further control variable (*BusinessDisclosure*). *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

[a] The level of statistical significance is 13.9%.

Table 35 provides further robustness tests yielding similar results as presented in Table 31. In regression (1), we exclude all control variables except for the target country fixed effects to check if there is a bias due to correlation between CFC^{diff} and the control variables. Again, we find that CFC^{diff} decreases substantially and remains significant. Further, we check whether our results are robust to differentiating between profitable and loss-making targets in regression (2). We find that the coefficients of $CFC^{profitable}$ and $CFC^{non\_profitable}$ remain significantly negative; however, in this robustness test, there is no significant difference between the coefficients of $CFC^{profitable}$ and $CFC^{non\_profitable}$. Finally, in regressions (3), (4) and (5), we include acquirer-specific financial data (total assets, ROA, sales and EBITDA) by interacting these consolidated profit and loss statement and balance sheet items with each candidate target country. We again observe a substantial sample decrease due missing firm level variables, but the results prove to be robust.

Table 35. Robustness analysis II of the effect of acquirer CFC rules on probability of being target country.

Explanatory variables	(1) Excl. control variables	(2) Profitable vs. non-profitable targets	(3) Incl. acquirer assets & acquirer ROA	(4) Incl. acquirer sales	(5) Incl. acquirer EBITDA
CFC^{diff}	–6.4155***		–3.5409***	–3.4268***	–3.2957***
	(0.4292)		(0.6830)	(0.6655)	(0.7050)
$CFC^{profitable}$		–6.4673***			
		(1.6700)			
$CFC^{non\_profitable}$		–7.2323***			
		(1.9287)			
STR		–1.8795	2.4216***	2.7097***	2.7031***
		(1.7514)	(0.7889)	(0.7979)	(0.8450)
lnGDPpercapita		0.2851	–0.1952	–0.0804	–0.3150
		(0.5944)	(0.2289)	(0.2319)	(0.2494)
GDPgrowth		–0.0329	0.0119	0.0107	0.0096
		(0.0227)	(0.0101)	(0.0104)	(0.0111)
StockmarketSize		–0.0003	0.0000	–0.0002	–0.0000
		(0.0007)	(0.0003)	(0.0003)	(0.0003)
PrivateCredit		–0.0050***	–0.0027***	–0.0029***	–0.0026**
		(0.0018)	(0.0010)	(0.0010)	(0.0011)
lnDistance		–0.4524***	–0.5450***	–0.5504***	–0.5388***
		(0.0303)	(0.0145)	(0.0152)	(0.0162)
CommonLanguage		2.0888***	1.6471***	1.5955***	1.4247***
		(0.1776)	(0.0896)	(0.0895)	(0.1006)
ColonialRelationship		0.2331***	0.2761***	0.2821***	0.2991***
		(0.0901)	(0.0462)	(0.0468)	(0.0489)
CommonLegalSystem		0.1076	0.1376***	0.1668***	0.2000***
		(0.0681)	(0.0363)	(0.0363)	(0.0388)
CorruptionControl		0.0070	0.1240	0.0248	0.0192
		(0.2145)	(0.1076)	(0.1088)	(0.1168)
BusinessStartupCost		–0.0087	–0.0122***	–0.0110***	–0.0091**
		(0.0089)	(0.0041)	(0.0042)	(0.0046)
UnemploymentRate		–0.0252	–0.0091	–0.0124	–0.0128
		(0.0160)	(0.0081)	(0.0082)	(0.0087)
lnDomesticFirms		0.4353*	0.1074	0.0945	0.1462
		(0.2224)	(0.1060)	(0.1069)	(0.1119)
Target country fixed effects	YES	YES	YES	YES	YES
No. of observations	317,444	53,270	215,197	206,176	180,202
Log-likelihood	–34,219	–5,028	–20,617	–19,818	–17,463

Regressions of probability of being the target country on (potential) CFC rule application in acquirer country; see equation (5.3). For each deal, the dependent variable equals one if country *i* is the actual target's country of origin, and zero if country *i* is a counterfactual target country. For variable definitions and data sources, see Table 32. Only cross-border M&As where the direct acquirer country is equal to the acquirer ultimate parent country are considered. All regressions control for target country fixed effects, which are available upon request, and are estimated by a mixed logit model. The variables of interest follow a random distribution in the mixed logit regressions. Regression (1) drops all control variables and regression (2) distinguishes between profitable and non-profitable targets. Regression (3) includes the interaction between target country fixed effects and *AcquirerAssets* and the interaction between target country fixed effects and *AcquirerROA*. Regression (4) includes the interaction between target country fixed effects and *AcquirerSales*. Regression (5) includes the interaction between target country fixed effects and *AcquirerEBITDA*. The coefficients and standard errors of these interactions are shown in Table A 6 in Appendix to Section 5. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

5.4 CFC rules and the direction of cross-border M&As

5.4.1 Hypothesis development

In this section, we consider the direction of cross-border M&As. In particular, we investigate whether CFC rules affect the decision which firm becomes the parent firm of a newly created MNE through a cross-border M&A. Following the finding of Voget (2011) that CFC rules trigger the relocation of headquarters, we argue that CFC rules negatively influence the direction of a cross-border M&A between two firms from different countries, i.e., we expect that it is more probable that the non-CFC rule firm acquires the CFC rule firm. The reasoning is as follows: If the non-CFC rule firm becomes the new MNE's parent, potential (new) profit shifting strategies may arise by setting up or using an already existing tax haven subsidiary within the MNE, which potentially decreases the overall tax burden. These (new) profit shifting strategies would not exist if the CFC rule firm became the acquirer due to potential CFC rule application on low-tax subsidiaries' income. We, therefore, hypothesize the following, stated in alternative form:

Hypothesis 2: The probability of being the acquiring firm in cross-border M&As is higher for firms in non-CFC rule countries compared to firms in CFC rule countries.

This analysis is different to the analysis presented in Section 5.3, where we investigate whether CFC rules affect the decision to acquire a target if CFC rules are potentially applied to this target's income. By analyzing the effect of CFC rules on the direction of cross-border M&As, we consider whether CFC rules negatively affect the choice of who becomes the parent of the newly created MNE.

5.4.2 Empirical approach

To analyze the direction of observed cross-border M&As, we assume that firm *a* acquires firm *b*; *a* and *b* do not reside in the same country. Under the assumption that M&As reflect synergies from combining these two firms and that investors value the individual firms and the M&A correctly, it follows that the value when *a* acquires *b* (V_{ab}) is higher than the value when *b* acquires *a* (V_{ba}), i.e., $V_{ab} - V_{ba} > 0$. Based on Hypothesis 2 derived under 5.4.1, we argue that CFC rules have an impact on this valuation. In particular, CFC rules lead to a competitive disadvantage for parent firms as those firms have less profit shifting opportunities and have to fear potential CFC rule application on low-tax subsidiaries' income. We consider the following model to analyze the direction in cross-border M&As,

depending on the CFC rules of the two involved firms and given that we know that the transaction takes place:

$$P(V_{ab} > V_{ba}|X) = E(Y|\Delta CFC + \Delta X) = \frac{exp(\beta(\Delta CFC + \Delta X))}{1 + exp\big(\beta(\Delta CFC + \Delta X)\big)} \tag{5.11}$$

$$Y \begin{cases} 1 \; if \; V_{ab} - V_{ba} > 0 \\ 0 \; if \; V_{ab} - V_{ba} \leq 0 \end{cases}$$

Using logit regression models, we aim to calculate $P(V_{ab} > V_{ba}|X)$, i.e., we always consider the setting that *a* acquires *b* ($V_{ab} - V_{ba} > 0$ in equation (5.11)). This consideration implies that y, our dependent variable, always takes the value 1.[96] The variable of interest is ΔCFC, which measures the difference in CFC rules between *a* and *b*. We consider two approaches in calculating ΔCFC.

First, we construct a CFC dummy variable (Δ*CFCdummy*) that measures whether CFC rules are present in the residence countries of *a* and *b*. If, for example, the country of *a* does not apply CFC rules (0) and the country of *b* applies CFC rules (1) in the M&A year, Δ*CFCdummy* takes the value 0-1 = -1.

Second, we consider individual characteristics of CFC rules to allow for more heterogeneity among CFC rules. We construct a CFC variable (Δ*CFCvalue*), which is coded zero for non-CFC rule countries and one for CFC rule countries. In addition to that, we consider the CFC rule countries in more detail and group them regarding their CFC rule harshness among the two main CFC rule features, which can be derived from all observed CFC rules: The lowest possible tax haven STR and the passive-to-active-income ratio accepted by CFC rules. This approach can increase Δ*CFCvalue* up to the value 3. Among the CFC rule countries, the lowest possible tax haven STR is set to the tax rate threshold of the CFC rule.[97] For CFC rule countries with a tax haven STR equal or above its median value of 15%, we add 1 to Δ*CFCvalue*. Similarly, we consider the passive-to-active-income ratio, which determines the amount of passive income that is allowed so that CFC rules are not triggered. The median value of the passive-to-active-income ratio is 10%; for CFC rule countries with a passive-to-active-income ratio below 10%, we add 1 to Δ*CFCvalue*.[98] Table **36** provides one country example for each of the four categories of Δ*CFCvalue*.

[96] The presented binary choice model is based on Huizinga and Voget (2009), pp. 1229ff.

[97] For EEA member states in the years after the decision of the ECJ in the case "Cadbury-Schweppes" (C-194/04) in 2006 (European Court of Justice (2006)), we set the tax haven tax rate equal to the lowest STR within the EU, because since this decision, CFC rules are de facto not applicable within the EU. In support of this reasoning, Ruf and Weichenrieder (2013) provide evidence for an increase of profit shifting within the EEA after this decision (see footnote 95).

[98] These thresholds are subjective; however, they split the CFC rule countries into two equal halves and allow a grouping of the CFC rule countries according to their relative CFC rule harshness.

Table 36. Country examples for the four categories of *ΔCFCvalue*.

Δ*CFCvalue* of country	Exemplary country	CFC rules?	Tax rate threshold ≥ 15%?	Passive-to-active-income ratio < 10%?
0	Netherlands	no	n/a	n/a
1	China (from 2008)	yes (since 2008)	no (12.5%)	no (50%)
2	Republic of Korea	yes	yes (15%)	no (50%)
3	Japan	yes	yes (20%)	yes (no ratio)

If, for example, a firm residing in the Netherlands acquires a firm residing in the Republic of Korea, Δ*CFCvalue* takes the value 0–2 = –2. We expect a negative coefficient for both Δ*CFCdummy* and Δ*CFCvalue*, indicating that it is more likely that the firm without CFC rules or with less harsh CFC rules becomes the acquiring firm.

Following Huizinga and Voget (2009), we control for firm characteristics and macroeconomic conditions in the two countries captured by ΔX. On the firm level, we include the firms' consolidated financial data. We control for relative size of the two firms (Δ*Size*) and expect a positive coefficient, as larger firms are considered more likely to acquire smaller firms. Δ*Leverage* considers the difference in leverage ratio between the two firms. Following Desai and Hines (2002), we argue that firms with higher leverage have lower borrowing costs. Thus, these firms have higher borrowing capacity, which makes them more likely to be the acquirer. Δ*PTI* measures the relative difference between pre-tax income of the two firms. Similar to our expectation of Δ*Size*, we expect that firms with higher profits are more likely to acquire firms with lower profits.

On the country-level, we control for the difference in STRs (Δ*STR*). We have no expectation on its coefficient as high-tax countries may have a better investment environment whereas low-tax country may attract firms due to tax savings. Based on the finding of Huizinga and Voget (2009) that taxation of dividend repatriation affects M&A direction, we include the difference in both countries' double taxation avoidance method on foreign dividends (Δ*DTM*), where 0 (1) stands for the credit (exemption) method. We expect a positive coefficient for this variable. We also include the two countries' relative stock market size (Δ*StockMrk*), which proxies for the relative ease to raise capital at stock markets and we expect a positive coefficient. In addition, we include the two countries' relative difference between domestic credits granted to the private sector (Δ*CreditMrk*). Similar to the argumentation in Section 5.3.4.2, we argue that if a company is located in a country with a low ratio of credits granted to the private market, the supply of credit may be limited and, hence, the possibility to finance an acquisition via credit is limited. Thus, we expect a positive coefficient. Finally, to control for the price level in an economy, we include the difference in the inflation rate (Δ*Inflation*) between both countries. We have a negative expectation on its coefficient.

Further, we include country fixed effects that reflect whether the country is the acquirer or the target country: For each M&A, the acquirer country gets the value of 1 and the target country gets the value of -1; all other countries get the value of 0 for the respective M&A.

Following Huizinga and Voget (2009), our logit regression is estimated using maximum likelihood estimation without a constant. The reason is straightforward: Since we always consider the setting that firm *a* acquires firm *b* ($V_{ab} - V_{ba} > 0$ in equation (5.11)), the dependent variable is always one and, consequently, there is no variation in the dependent variable and the constant would be a perfect fit.

5.4.3 Data

The M&A data analyzed in this section are the same as described in Section 5.3.3 with two exceptions. First, we relax the restriction to the 30 most frequent acquirer or target locations. Second, we require that the direct acquirer and the direct target reside in the same country as their respective ultimate parent to reduce the possibility of a subsidiary in a third country being involved in the M&A. In addition, as outlined above, we need consolidated financial data of both firms as control variables, which reduces our sample to 1,199 cross-border M&As involving 30 countries.[99] Table 37 gives an overview of the number of acquirer ultimate parents and target ultimate parents in this cross-border M&A sample per country. Further, this table provides information on whether CFC rules are implemented in those countries. For definitions, data sources and summary statistics of all variables see Table 38.

[99] We experience this sharp decrease in cross-border M&A observation due to the lack of important financial control variables. However, this decrease is not due to specific countries or a specific financial control variable. Hence, we assume that the smaller sub-sample is a representative subset of the larger one and that focusing on this subset does not bias our subsequent empirical work. This argumentation follows Huizinga and Voget (2009), p. 1228, who face the same problem using firm level data from SDC Platinum and who observe a similar decrease in sample size. To expand our sub-sample, we follow Huizinga and Voget (2009) and use Compustat North America and Compustat Global that are together global in coverage to fill-up firm level control variables. We use CUSIP and SEDOL firm identification codes to link the Compustat databases with SDC Platinum.

Table 37. Cross-border M&A sample (2002–2014) for analyzing the effect of CFC rules on direction of cross-border M&As.

Country	CFC rule	No. of acquirers	No. of targets	Country	CFC rule	No. of acquirers	No. of targets
Australia	1	43	57	Luxembourg	0	3	6
Austria	0	7	3	Mexico	1	7	5
Belgium	0	21	27	Netherlands	0	41	19
Brazil	1	3	24	New Zealand	1	4	4
Canada	1	70	101	Norway	1	9	24
Chile	0	2	6	Poland	0	1	5
China	1	14	6	Portugal	1	2	1
Denmark	1	7	9	Republic of Korea	1	9	9
France	1	64	83	Russian Federation	0	6	2
Germany	1	55	65	South Africa	1	20	10
India	0	32	12	Spain	1	29	40
Ireland	0	32	14	Sweden	1	5	5
Israel	1	21	16	Switzerland	0	40	18
Italy	1	30	21	United Kingdom	1	156	338
Japan	1	55	9	United States	1	411	260
				Total		**1,199**	**1,199**

This table shows number of acquirer ultimate parents and targets ultimate parents per country in our cross-border M&A sample to investigate Hypothesis 2. In this context, cross-border M&As are defined as acquirer ultimate parent and target ultimate parent residing in different countries; the direct acquirer and acquirer ultimate parent reside in the same country and also the direct target and target ultimate parent reside in the same country. CFC rule takes the value one, if the country has implemented CFC rules in 2014. Each country has at least one acquiring firm and one target firm to ensure that maximum likelihood estimation yields finite likelihood.

Table 38. Definitions, data sources and summary statistics of variables for analyzing the effect of CFC rules on direction of cross-border M&As.

Variable	Definition	Data source	No. of obs.	Mean	Std. dev.	Min.	Max.
Δ*CFCvalue*	Difference in CFC value of the two firms (see Section 5.4.2)	Tax Guides	1,199	0.059	1.536	–3	3
Δ*CFCdummy*	Difference in CFC rule of the two firms (see Section 5.4.2)	Tax Guides	1,580	–0.069	0.466	–1	1
Δ*STR*	Difference in STRs, including typical local taxes, of the two firms (in %)	Tax Guides	1,199	1.149	9.233	–26.706	26.823
Δ*DTM*	Difference in method to avoid double taxation on foreign dividends of two firms where 0 (1) represents the credit (exemption) method	Tax Guides	1,199	–0.008	0.690	–1	1
Δ*Size*	Difference in total assets of the two firms divided by the sum of the firms' total assets	SDC Platinum; Compustat North America; Compustat Global	1,199	0.799	0.301	–0.990	1.000
Δ*PTI*	Difference in pre-tax incomes of the two firms divided by the sum of the firms' pre-tax incomes, where non-positive values of pre-tax income are replaced by 0.001 to avoid low values in the denominator	SDC Platinum	1,199	0.645	0.550	–1.000	1.000
Δ*Leverage*	Difference in leverage ratios of the two firms (total liabilities/total assets, in %)	SDC Platinum; Compustat North America; Compustat Global	1,199	–0.082	0.942	–22.413	4.314
Δ*StockMrk*	Difference in stock market capitalizations of the two countries divided by the sum of the countries' stock market capitalization volume	World Bank	1,199	0.104	0.783	–1.000	1.000
Δ*CreditMrk*	Difference in domestic credits to private sector of the two countries divided by the sum of the countries' domestic credit volume	World Bank	1,199	0.089	0.732	–0.997	0.998
Δ*Inflation*	Difference in inflation rates of the two countries (in %)	World Bank	1,199	0.037	2.106	–13.352	11.742

Data on country fixed effects are not reported but are available upon request. These statistics show relative values of the variables when firm *a* acquires firm *b*, see equation (5.11). For example, if firm *a* has a leverage ratio of 0.45 and firm *b* has a leverage ratio of 0.50 then Δ*Leverage* takes the value –0.05 (=0.45–0.50).

5.4.4 Regression analysis

Table 39 shows the results from the binary choice model to test Hypothesis 2 on the influence of CFC rules on the direction of cross-border M&As between two firms, i.e., which firm becomes the acquirer.

Table 39. Effect of CFC rules on direction of cross-border M&As.

Explanatory variables	Level of direct acquirer & direct target		Level of acquirer ultimate parent & target ultimate parent			
	(1)	(2)	(3)	(4)	(5)	(6)
Δ*CFCvalue*	–1.127**		–1.438**		–2.025[a]	
	(0.530)		(0.701)		(1.558)	
Δ*CFCdummy*		–2.027*		–3.543**		–10.944***
		(1.132)		(1.754)		(2.620)
Δ*STR*	0.168*	0.096**	0.278***	0.062	0.693***	0.079
	(0.086)	(0.038)	(0.105)	(0.043)	(0.254)	(0.058)
Δ*DTM*	–0.242	0.201	–0.910	–0.399	–1.833**	–0.881
	(0.652)	(0.671)	(0.853)	(0.879)	(0.927)	(1.040)
Δ*Size*	5.101***	5.509***	5.480***	5.698***	7.523***	6.037***
	(0.398)	(0.409)	(0.501)	(0.477)	(1.403)	(0.886)
Δ*PTI*	1.177***	1.128***	1.399***	1.307***	1.571	0.906
	(0.407)	(0.375)	(0.466)	(0.366)	(1.040)	(0.844)
Δ*Leverage*	0.158**	0.216**	0.123*	0.206**	–0.098	–0.372
	(0.068)	(0.086)	(0.068)	(0.083)	(0.983)	(0.638)
Δ*StockMrk*	4.914***	2.802**	6.446***	3.004**	9.175***	2.896
	(1.615)	(1.292)	(2.278)	(1.459)	(3.105)	(2.410)
Δ*CreditMrk*	–6.363***	–2.533*	–8.826***	–3.069	–9.829*	0.013
	(1.848)	(1.403)	(2.851)	(1.884)	(5.900)	(4.130)
Δ*Inflation*	0.193	0.083	0.321	0.132	0.245	0.002
	(0.205)	(0.171)	(0.245)	(0.210)	(0.534)	(0.427)
Country fixed effects	YES	YES	YES	YES	YES	YES
No. of observations	1,199	1,580	989	1,305	418	492
No. of countries	30	31	30	30	29	29
Log-likelihood	–99.2	–133.6	–70.2	–100.7	–24.8	–38.1
Time period	2002–2014	1995–2014	2002–2014	1995–2014	2002–2014	1995–2014

Logit regressions of probability of being the acquirer country on (potential) CFC rules in a cross-border M&A; see equation (5.11). For variable definitions and data sources, see Table 38. All regressions control for country fixed effects, which are available upon request. Regressions (1) and (2) consider M&As where the direct acquirer and direct target reside in the same country as their respective ultimate parents. Regressions (3) and (4) are the same as (1) and (2), but require that the direct acquirer and the direct target are the respective groups' ultimate parents. Regressions (5) and (6) are the same as (3) and (4), but exclude M&As involving the USA. Regressions (2), (4) and (6) consider in addition years 1995–2001; due to a lack of more detailed historic CFC rule data Δ*CFCvalue* cannot be constructed for the time period 1995–2001. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

[a] The level of statistical significance is 19.4%.

In regressions (1) and (2), we find that CFC rules negatively affect the probability which firm becomes the acquirer. In particular, we find a significant coefficient at the 5% level for

Δ*CFCvalue*. This finding suggests that when two firms perform a cross-border M&A, it is less likely that the firm with the harsher CFC rule becomes the acquiring firm. For the dummy variable approach (Δ*CFCdummy*), we observe a significantly negative coefficient at the 10% level. Hence, also the mere presence of CFC rules seems to affect cross-border M&A direction. These results prove to be robust in regressions (3) and (4), where we analyze a slightly smaller sample by considering only cross-border M&As directly between the ultimate parents, i.e., the acquirer is the acquirer ultimate parent and the target is the target ultimate parent. In regressions (5) and (6), we consider the same setting as in regressions (3) and (4), but exclude M&As that involve the USA. We do this to check that the results are not biased by potential check-the-box rule application in the USA, which may allow for an escape from CFC rules for US MNEs under specific circumstances by using hybrid entities (e.g., Altshuler and Grubert (2006), Mutti and Grubert (2009)). Although this exclusion decreases the sample by more than half, we still observe a significantly negative estimate for Δ*CFCdummy*. The coefficient of Δ*CFCvalue* remains also negative; however, its *p*-value drops to 0.194.

Taken together, we provide evidence for Hypothesis 2 that the direction of cross-border M&As between firms is negatively affected by the presence and harshness of CFC rules. This finding contributes to previous research documenting that headquarters relocation is influenced by CFC rules (Voget (2011)). Our interpretation of this finding is that if the non-CFC rule firm acquirers the CFC rule firm, new profit shifting opportunities may potentially come up within the newly formed MNE, which may decrease the tax burden and yield higher cash flows in the future. If the CFC rule firm acquires the non-CFC rule firm, these profit shifting opportunities are rather unattractive due to CFC rules in the new parent country. In addition, the CFC rule firm has to fear potential CFC rule application on low-tax subsidiaries' income if such subsidiaries are already present in the acquired firm. The firms involved in the M&As are quite large with an average value of total assets of the acquirers (targets) of 38.3 (2.4) billion USD. Hence, it is reasonable to assume that at least some of the involved firms are already MNEs with implemented profit shifting strategies within their group if no CFC rules are present in the ultimate parent country.

Regarding control variables, we find, as expected, that firm size has a significantly positive impact on the likelihood of being the acquiring firm and, in most regressions, firm profitability, firm leverage, STR and stock market size have a significantly positive effect on M&A direction. Credit market size has an unexpected negative effect in most regressions. We observe non-significant estimates for inflation rate and the method to avoid double taxation.

5.5 Conclusion

In this study, we investigate the impact of an increasingly important anti tax avoidance measure on cross-border M&A activity of firms on a global scale. In particular, we consider important characteristics of CFC rules from a variety of countries and apply different logit regression models on a large worldwide cross-border M&A data set. Considering individual M&As, we find that the probability of being the acquirer of low-tax targets decreases if CFC rules may be applicable on this target's income. This finding implies that acquirers from non-CFC rule countries have a competitive advantage in bidding for targets in low-tax countries. This is explained by possibly higher reservation price of these non-CFC rules acquirers due to potential firm value increasing profit shifting opportunities after the M&A. Further, we show that the acquirer's location choice of a target is negatively affected if the target may fall under the scope of CFC rules of an acquirer. The reasoning behind this result is the same as before but the underlying perspective is different. Thereby, we find evidence that CFC rules affect M&A activity on the bidding side, i.e., non-CFC rule acquirers have competitive advantages in bidding for a given low-tax target, and on the target side, i.e., low-tax targets are rather acquired by non-CFC rule acquirers. These two findings provide robust evidence that CFC rules distort ownership of low-tax targets. Finally, we show that CFC rules negatively affect the direction of cross-border M&A, i.e., countries with CFC rules are less likely to attract parent firms in a newly created MNE after M&As.

However, our results should not necessarily be interpreted as suggesting that countries should refrain of CFC rules. Moreover, our findings suggest that CFC rules seem to reach the intended goal of reducing profit shifting opportunities with low-tax subsidiaries in our cross border M&A context. In other words, our results suggest that the specific way of investing in foreign low-tax countries to shift profits afterwards is limited by existing CFC rules in the acquirer country. Therefore, CFC rules can be used by countries to counteract tax avoidance behavior of their MNEs, which could result in an increase in tax revenue.

Nevertheless, the parallel presence and non-presence of CFC rules across countries is problematic from an economic perspective due to competitive disadvantages on the cross-border M&A market and potentially tax-biased ownership structures on a global scale. Thereby, we contribute to a strand of literature where little research has been undertaken so far. Further, our findings are particularly interesting in light of current tax policy developments. While the BEPS project of the OECD suggests an implementation of effective CFC rules in the OECD and G20 countries (OECD/G20 (2015a)), the European Council issued a legally binding directive requiring EU member states to implement CFC rules by 2019 (European Court of Justice (2006)). In other words, at the latest from 2019 onwards, firms residing in the EU may face competitive disadvantages in global M&A activities due to tax legislation, compared to firms residing in OECD and G20 member

states, which do not follow the BEPS project's suggestion to implement effective CFC rules. This finding indicates that more coordination regarding countries' international tax law seems to be necessary if tax avoidance behavior of MNEs is considered unfavorable and intended measures to counteract this behavior are supposed to be fruitful on a global scale.

6 Nutzen deutsche Konzerne Belgien als Finanzierungsstandort? – Eine Fallstudie[100]

Zusammenfassung: Belgien ermöglicht es Unternehmen einen Eigenkapital-Zinsaufwand steuerlich zu berücksichtigen. Dies eröffnet multinationalen Konzernen die Möglichkeit, Gewinne in belgische Finanzierungsgesellschaften zu verlagern und dort praktisch zum Nulltarif zu versteuern. Diese Fallstudie stellt zunächst dar, wie eine solche Finanzierungsgesellschaft aufgesetzt werden kann. Anschließend wird mittels eines einzigartigen Datensatzes untersucht, inwieweit DAX und MDAX Konzerne Steuerplanung mittels Finanzierungsgesellschaften in Belgien betreiben. Es werden sieben Finanzierungsgesellschaften identifiziert; sieben weitere Konzerne betreiben eine operativ tätige Finanzierungsgesellschaft. In einem weiteren Schritt wird approximiert, dass jährlich Gewinne in Höhe von 914 Mio. Euro verlagert und dadurch Steuern in Höhe von 179 bis 242 Mio. Euro gespart werden. Für diesen Datensatz wird ein Steueraufkommensverlust für Belgien aufgrund des Eigenkapital-Zinsaufwands in Höhe von 11 bis 36 Mio. Euro jährlich geschätzt.

Schlüsselwörter: DAX & MDAX • Notional Interest Deduction • Kapitalstruktur • Gewinnverlagerung • Steuerplanung in Belgien

JEL-Classification: F23 • H25 • H26 • H32 • H73 • M41

Publication: This paper is published in the *Zeitschrift für betriebswirtschaftliche Forschung* 69 (4): 441–475. The author thanks the publisher *Springer* for granting a license to reuse the paper in this dissertation.

Presentations: This paper has been presented at the Taxation Doctoral Colloquium (Mannheim University, 10th December 2014).

[100] This paper is joint work with Oliver Hahn, M.Sc., and Fabian Nicolas Pönnighaus, M.Sc.

Do German corporations use Belgium as a financing location? – A case study

Abstract: For tax purposes, Belgium allows companies to take into account an NID on their equity. This regime enables companies to tax corporate profits in Belgian finance companies virtually for free. This case study presents in a first step how such finance companies can be set up. Then, using a unique hand-collected data set, it examines the extent to which DAX und MDAX corporations avail of tax planning strategies using finance companies in Belgium. This case study identifies seven finance companies; seven other DAX and MDAX corporations have a finance company that seems to be operationally active. In a further step, this case study approximates that profits of 914 million Euro are shifted to Belgium per year, which results in tax savings of 179 to 242 million Euro. For this data set, Belgium's tax revenue loss due the NID on equity is estimated to equal 11 to 36 million Euro per year.

Keywords: DAX & MDAX • Notional interest deduction • Capital structure • Profit shifting • Tax planning in Belgium

6.1 Einleitung

Die Bekämpfung von Gewinnverkürzung und Gewinnverlagerung wird auf höchster politischer Ebene diskutiert (vgl. z.B. Bundesministerium der Finanzen (2015), OECD/G20 (2015a)). Dabei standen lange Zeit insbesondere amerikanische Konzerne wie Apple, Amazon und Starbucks im Fokus der öffentlichen Debatte, während Steuerplanung deutscher Konzerne keine wesentliche Rolle spielte.[101] In jüngster Zeit stehen jedoch auch die Steuerplanungsmodelle deutscher Konzerne in der öffentlichen Diskussion. So berichteten im Jahr 2013 Spiegel Online und Süddeutsche Zeitung über Steuerplanung deutscher Konzerne mittels belgischer Finanzierungsgesellschaften (vgl. Spiegel Online (2013), Süddeutsche Zeitung (2013)).[102] Die Berichterstattung über „Luxemburg-Leaks" hat weitere deutsche Konzerne ins Zentrum der Debatte gerückt (vgl. z.B. Süddeutsche Zeitung (2014a), Süddeutsche Zeitung (2014b)).

Neben dieser anekdotischen Evidenz gibt es auch empirische Evidenz, dass deutsche Konzerne internationale Gewinnverlagerung betreiben. Allerdings gehen die Schätzungen zum genauen Ausmaß der Gewinnverlagerung deutscher Unternehmen weit auseinander.[103] Analog zu den Studien, die ein relativ geringes Maß der Gewinnverlagerung konstatieren, gibt es Hinweise in der empirischen Literatur, dass Deutschland effektive Missbrauchsvorschriften, wie beispielsweise die Hinzurechnungsbesteuerung, etabliert hat (vgl. z.B. Ruf and Weichenrieder (2012), Schanz and Feller (2015)).

Seit 2006 findet die Hinzurechungsbesteuerung jedoch faktisch keine Anwendung innerhalb der EU, was deutschen Konzernen Steuerplanungsmöglichkeiten eröffnet.[104] Gleichzeitig hat Belgien 2006 das NID Regime eingeführt, was den steuerlichen Abzug eines Eigenkapital-Zinsaufwandes ermöglicht (vgl. z.B. Gerard (2006a)). Mit dieser Kombination aus praktisch nicht greifender Hinzurechungsbesteuerung und NID Regime

[101] Vgl. für die beherrschende Meinung der öffentlichen Debatte z.B. Meck (2013). Auch im akademischen Diskurs lag der Fokus zunächst auf den Steuerplanungsmodellen von US-amerikanischen Unternehmen (vgl. z.B. Pinkernell (2012), Sullivan (2012)).

[102] Laut Spiegel Online hat eine belgische Tochtergesellschaft von Volkswagen im Jahr 2011 141 Mio. Euro steuerfrei vereinnahmt und eine belgische Tochtergesellschaft von BASF bzw. Bayer eine effektive Steuerquote von 2,4% bzw. 4,2% aufgewiesen. Zu einem ähnlichen Ergebnis kommt eine Studie im Auftrag der Europagruppe GRÜNE im Europäischen Parlament zur Steuerplanung von BASF, welche eine Steuerersparnis durch das NID Regime zwischen 2010 und 2015 in Höhe von 202 Mio. Euro in Belgien konstatiert, was einer effektiven Steuerquote von 1,29% entspricht, vgl. Auerbach (2016).

[103] So beziffert Bach (2013) anhand der volkswirtschaftlichen Gesamtrechnung die höchstmögliche Gewinnverlagerung für Deutschland auf etwa 90 Mrd. Euro für das Jahr 2008. Heckemeyer and Spengel (2008) hingegen korrigieren dieses Maß auf maximal 61 Mrd. Euro. Finke (2013) berechnet einen Steueraufkommensverlust von etwa 10 Mrd. Euro für das Jahr 2007 und Huizinga and Laeven (2008) berechnen einen Aufkommensverlust von lediglich 1,3 Mrd. Euro für das Jahr 1999 (bei damals deutlich höheren Steuersätzen).

[104] Seit dem Urteil des Europäischen Gerichtshofes vom 12.09.2006 in der Rechtssache Cadbury-Schweppes ist die Anwendung der Hinzurechnungsbesteuerung ausgeschlossen, wenn eine Tochtergesellschaft in einem Mitgliedstaat des Europäischen Wirtschaftsraums eine tatsächliche wirtschaftliche Tätigkeit ausübt und der Steuerpflichtige dies nachweist, vgl. European Court of Justice (2006). Empirische Hinweise für vermehrte Steuerplanung in der EU nach 2006 liefern Ruf and Weichenrieder (2013).

bietet Belgien für deutsche multinationale Konzerne sehr gute Bedingungen, um Gewinne mittels konzerninterner Fremdfinanzierung aus Hochsteuerländern wie Deutschland oder Frankreich steuerfrei zu vereinnahmen und anschließend an die Konzernmuttergesellschaft auszuschütten.[105]

Die ökonomische Fundierung findet das NID Regime in den Arbeiten von Boadway and Bruce (1979), Wenger (1983) sowie Boadway and Bruce (1984). Durch den Abzug von Eigenkapital-Zinsaufwand sichert die zinsbereinigte Einkommensteuer verzerrungsfreie Finanzierungs- und Investitionsentscheidungen und wird auch als Allowance for Corporate Equity (ACE) bezeichnet (vgl. Institute of Fiscal Studies (1991)). Auch heute noch ist die Diskussion um die ACE aktuell. So empfiehlt beispielsweise der Mirrlees Review von 2011 die Einführung eines ACE Regimes für Großbritannien (vgl. Mirrlees (2011)). Zudem sieht der Richtlinien-Entwurf der Europäischen Kommission für eine Gemeinsame Körperschaftsteuer-Bemessungsgrundlage eine ACE-ähnliche Regelung vor (vgl. Artikel 11 in European Commission (2016b)).

Empirisch befassen sich Hebous and Ruf (2017) mit der Wirkung von NID Regimen auf ausländische Tochtergesellschaften deutscher Unternehmen. Sie ermitteln, dass sich die Fremdkapitalquote von Tochtergesellschaften in Staaten mit NID Regimen um drei bis fünf Prozentpunkte verringert. Zudem stellen sie fest, dass die Einführung eines NID Regimes zwar einen Anstieg des passiven Investments einer Tochtergesellschaft induziert, jedoch keine Erhöhung des Sachanlagevermögens nach sich zieht. Empirische Hinweise, dass sich die Einführung des NID Regimes in Belgien auf die Kapitalstruktur von belgischen Unternehmen ausgewirkt hat, liefern Princen (2012) und Panier et al. (2015). Sie stellen fest, dass die Fremdkapitalquote belgischer Unternehmen nach Einführung des NID Regimes signifikant sinkt. Speziell für belgische Banken berechnet Schepens (2016) eine Erhöhung der Eigenkapitalquote um etwa 19%.

Diese empirischen Studien zeigen, dass sich das NID Regime erheblich auf die Kapitalstruktur von belgischen Unternehmen auswirken kann. Darüber hinaus kommen ökonometrische Analysen zum Einfluss des Steuersatzes auf die Kapitalstruktur von Unternehmen zu dem Ergebnis, dass eine Erhöhung des Steuersatzes um 10 Prozentpunkte eine Erhöhung der Fremdkapitalquote von 1,5 bis 3 Prozentpunkten bewirkt.[106]

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[105] Belgien ist nicht der erste Staat, der ein NID Regime eingeführt hat. Bereits in den 1990er Jahren ließen Italien, Kroatien und Österreich einen Abzug von Eigenkapital-Zinsaufwand zu. Allerdings haben diese Staaten das Regime zwischen 2001 und 2004 wieder abgeschafft. 2011 hat Italien das NID Regime zwar wiedereingeführt, allerdings liegt die effektive Steuerentlastung durch das NID Regime in Belgien über der Entlastung in Italien im hier betrachteten Zeitraum, sodass Belgien europaweit der attraktivste Standort zur Nutzung des NID Regimes ist. Zudem haben Lettland (2009–2013), Liechtenstein (ab 2011) und Portugal (2008–2013) ein NID Regime eingeführt, vgl. Massimi and Petroni (2012) und Zangari (2014).

[106] Vgl. z.B. Desai et al. (2004), Mintz and Weichenrieder (2005), Buettner et al. (2009), Overesch and Wamser (2009), Buettner et al. (2012) oder Feld et al. (2013).

Dies ist ökonomisch betrachtet jedoch kein sonderlich großer Einfluss, was vielschichtige Gründe haben kann. Ein Grund könnte darin liegen, dass die Steuerplanungsmöglichkeiten der Unternehmen in den jeweiligen Datensätzen sehr heterogen sind. So werden in den Studien beispielsweise auch kleine multinationale Unternehmen betrachtet, die Steuerplanung verglichen mit großen multinationalen Unternehmen wohl eher in geringem Umfang betreiben. Diese Argumentation wird durch Rego (2003) unterstützt, die herausfindet, dass große multinationale Konzerne von Skaleneffekten bei der Steuerplanung profitieren.

Mit dem hier vorgenommenen Fallstudienansatz, das heißt dem expliziten Betrachten von Einzelbilanzen belgischer Tochtergesellschaften der DAX und MDAX Konzerne, wird der Fokus auf die größten und umsatzstärksten deutschen börsennotierten Konzerne gelegt. Dazu wird im Folgenden auf eine Regressionsanalyse verzichtet und stattdessen eine Fallstudie anhand eines einzigartigen und detaillierten Datensatzes, der die Daten aller unkonsolidierten Einzelabschlüsse belgischer Tochtergesellschaften der DAX und MDAX Konzerne enthält, entwickelt. Anhand des Detailgrades des Datensatzes können mittels dieses Fallstudienansatzes einzelne Finanzierungsgesellschaften identifiziert und in ihrer Bilanzstruktur sowie der Zusammensetzung ihres Geschäftes analysiert werden. Es ist ebenfalls möglich, Abschätzungen zum Umfang der Gewinnverlagerung und deren Effektivität auf Ebene der einzelnen Gesellschaften vorzunehmen. Dadurch wird deutlich, welche Konzerne Belgien als Standort für ihre Finanzierungsgesellschaften nutzen, inwieweit diese Gesellschaften neben dem Finanzierungsgeschäft für den Konzern auch operativ tätig sind und welche Steuerersparnis die Konzerne durch konzerninterne Darlehensvergabe einer belgischen Tochtergesellschaft generieren können.

Der Detailgrad der erhobenen Abschlüsse ist deutlich höher als der in gängigen Unternehmensdatenbanken wie Amadeus (Bureau van Dijk) oder Compustat North America (Standard & Poor‘s). Zudem kann im Rahmen der Fallstudie ein vollständiges Bild aller belgischen Tochtergesellschaften der deutschen DAX und MDAX Konzerne garantiert werden. Die Fallstudie bietet somit einen deutlich besseren Einblick in Steuerplanungsaktivitäten deutscher DAX und MDAX Konzerne in Belgien als es durch Verwendung einer gängigen Unternehmensdatenbank möglich wäre.

Die Fallstudie ist wie folgt strukturiert: Zunächst wird anhand einer Steuerwirkungsanalyse erläutert, wie Unternehmensgewinne in Belgien praktisch zum Nulltarif versteuert werden können und wie die Bilanz einer typischen belgischen Finanzierungsgesellschaft aufgebaut sein sollte. Anschließend werden die einzelnen Bilanzen der belgischen DAX und MDAX Tochtergesellschaften analysiert und Finanzierungsgesellschaften identifiziert. Sodann werden Abschätzungen zur Gewinnverlagerung und Steuerersparnis dieser Gesellschaften sowie zum Steueraufkommen Belgiens durch Einführung des NID Regimes

vorgenommen. Zum Schluss wird durch Verwendung von Daten aus Amadeus versucht, ein vergleichbares Bild für belgische Tochtergesellschaften französischer Konzerne sowie europäischer Tochtergesellschaften deutscher Konzerne zu zeichnen. Dadurch werden die Limitationen einer unternehmensdatenbankgestützten Analyse deutlich.

6.2 Notional Interest Deduction und steueroptimierte Finanzierungsgesellschaften

6.2.1 Rechtliche Grundlagen zur Notional Interest Deduction

Belgien verfügt über verschiedene steuerliche Regelungen, die es als Standort für Gewinnverlagerung attraktiv machen. So senkt das NID Regime die Steuerlast auf mit Eigenkapital finanzierte Investitionen, das Patentbox Regime erlaubt niedrige Steuersätze auf Lizenzerträge[107] und das Excess Profit Regime erlaubt es, die Steuerbemessungsgrundlage belgischer Tochtergesellschaften multinationaler Konzerne um 50% bis 90%[108] zu verringern. Die Europäische Kommission sieht in ihrer Entscheidung vom 11.01.2016 diese Regelung jedoch als einen Verstoß gegen den in den EU-Beihilfevorschriften verankerten Fremdvergleichsgrundsatz und somit eine unerlaubte Staatshilfe (vgl. European Commission (2016a)). Trotz dieser Entscheidung findet das Excess Profit Regime während des gesamten hier betrachteten Zeitraums uneingeschränkte Anwendung. Allerdings nutzt keine der in Table 42 identifizierten Finanzierungsgesellschaften dieses Regime.[109] Zudem verfügt Belgien über eine hohe Zahl von Doppelbesteuerungsabkommen (DBA)[110], sodass Quellensteuereinflüsse auf die Gewinnverlagerung gering ausfallen dürften. Innerhalb der EU fallen zudem aufgrund der Zins- und Lizenzrichtlinie sowie der Mutter-Tochter-Richtlinie keine Quellensteuern auf Zins- und Lizenzzahlungen sowie Dividenden an.

Das in dieser Fallstudie betrachtete NID Regime erlaubt es Unternehmen, einen Eigenkapital-Zinsaufwand für steuerliche Zwecke vom zu versteuernden Einkommen abzuziehen. Begünstigt werden neben belgischen Unternehmen auch Betriebstätten

[107] Artikel 205/1–205/4 des belgischen Einkommensteuergesetzes erlaubt es Kapitalgesellschaften und deren Betriebstätten 80% der Erträge aus selbsterstellten Patenten von dem zu versteuernden Einkommen abzuziehen, soweit diese Erträge dem Fremdüblichkeitsgrundsatz entsprechen. Die effektive Steuerbelastung für Einkommen aus Patenten beträgt bei dem belgischen Körperschaftsteuersatz von 33,99% folglich nur 6,8% (vgl. z.B. PwC (2016)).

[108] Der tatsächliche aus belgischer Geschäftstätigkeit stammende Gewinn wird dabei aufgeteilt in einen hypothetischen Durchschnittsgewinn eines eigenständigen Unternehmens und einen Mehrgewinn („excess profit"), der nur deshalb entsteht, weil die Gesellschaft Teil eines Konzerns ist. Die Steuerbemessungsgrundlage wird dann proportional verringert.

[109] Mit der BASF ist zwar ein DAX Konzern unter den begünstigten Gesellschaften, die betreffende Gesellschaft (BASF Antwerpen) wird in Abschnitt 6.4.1 jedoch nicht als Finanzierungsgesellschaft identifiziert.

[110] Belgien verfügt 2014 über 94 DBA, Deutschland z.B. über 98 DBA.

ausländischer Unternehmen[111], solange diese der belgischen Körperschaftsteuer unterliegen, sowie ausländische Unternehmen, die Immobilien in Belgien besitzen oder die Eigentumsrechte an solchen Immobilen halten. Ausgeschlossen sind hingegen Unternehmen, die bereits anderen Vergünstigungsregimen unterliegen, wie etwa der Tonnagebesteuerung oder dem Coordination Center Regime.[112] Der Basissatz für das NID Regime wird jährlich festgelegt und bestimmt sich aus dem monatlichen Durchschnitt risikofreier 10-jähriger belgischer Staatsanleihen während des Kalenderjahres vor dem jeweiligen Steuerjahr. Mit diesem Abzug sollen die ökonomischen Eigenkapitalkosten abgebildet werden und die steuerliche Diskriminierung von Eigenkapital gegenüber Fremdkapital reduziert werden (vgl. Gerard (2006b)).

Mit der belgischen Unternehmenssteuerreform von 2013 wird der maximale Eigenkapital-Zinssatz des NID Regimes auf 3% für große Unternehmen[113] beschränkt; Änderungen dieses Zinssatzes dürfen nicht mehr als einen Prozentpunkt betragen. Gleichzeitig wird der bis dahin mögliche siebenjährige NID Vortrag abgeschafft. Der bis zum Steuerjahr 2012 angesammelte NID Vortrag kann weiterhin vorgetragen werden. Die jeweils gültigen Zinssätze für das NID Regime für die Jahre 2011 bis 2014 sind in Table 40 dargestellt.

[111] Nach alter Rechtslage (eingeschränkte Selbständigkeitsfiktion) waren Finanzierungsbetriebstätten aus deutscher Sicht nicht möglich, da die Zinserträge dem Stammhaus zugerechnet wurden (Zentralfunktion des Stammhauses). Nach neuer Rechtslage (uneingeschränkte Selbständigkeitsfiktion, ab 2013) können gemäß § 17 BsGaV Konzerne zwar generell ausländische Betriebstätten zur Erbringung konzerninterner Finanzdienstleistungen (Finanzierungsbetriebstätte) einrichten, welche die Liquiditätssteuerung für eine oder mehrere andere Betriebstätten desselben Unternehmens ausüben. Einer Finanzierungsbetriebstätte werden jedoch nach § 17 Absatz 2 und 5 BsGaV regelmäßig weder die Zinsaufwendungen noch das benötigte Eigenkapital zugeordnet, sodass kaum nennenswerte Gewinne in der Betriebstätte anfallen dürften. Sofern die Kapitalerträge aus diesen Finanzierungsaktivitäten einer niedrigen Besteuerung unterliegen, greift in Deutschland im hier betrachteten Zeitraum zudem § 20 Absatz 2 AStG (Switch-over-Klausel), sodass die Kapitalerträge mit dem deutschen Besteuerungsniveau belastet werden und der Steuersatzvorteil verloren geht. Im Folgenden wird daher auf eine Untersuchung von Finanzierungsbetriebstätten verzichtet.

[112] Dies gilt für Unternehmen, die das Coordination Center Regime gemäß des Königlichen Erlasses Nummer 187 vom 30.12.1982 nutzen. Das Coordination Center Regime, welches die Vorgängerregelung des NID Regimes darstellt, war für Firmen, die bereits 2003 ein Coordination Center waren, mit einer 10-jährigen Verlängerung noch maximal bis 2015 anwendbar. Somit hat das Coordination Center Regime bereits seit 2003 keine steuerplanerische Relevanz mehr. Für einen Überblick der gesetzlich vorgesehenen Anwendungsausnahmen vgl. Federal Public Service Finance (2012).

[113] Ein großes Unternehmen ist ein Unternehmen, das mindestens zwei der drei Größenkriterien erfüllt: i) Nettoumsatz von mindestens 7,3 Mio. Euro, ii) eine Bilanzsumme von mindestens 3,65 Mio. Euro und iii) mindestens 50 Mitarbeiter (vgl. Artikel 15 des belgischen Körperschaftsteuergesetzes).

Table 40. Eigenkapital-Zinssätze des belgischen NID Regimes.

Steuerjahr	NID Regime Satz
2011	3,800%
2012	3,425%
2013	3,000%
2014	2,630%

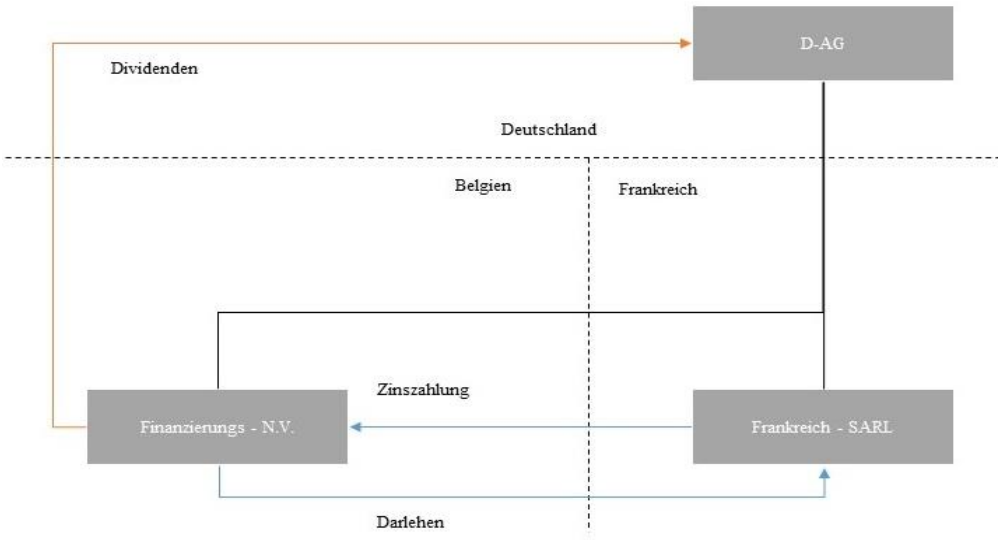
Gezeigt werden die Eigenkapital-Zinssätze des belgischen NID Regimes für die Jahre 2011–2014.

Der steuerliche Abzug bemisst sich nach dem qualifizierten Eigenkapital. Dies ist das in der Eröffnungsbilanz des jeweiligen Steuerjahres ausgewiesene Eigenkapital, welches gemäß belgischer Rechnungslegungsvorschriften ermittelt wurde. Enthalten sind darin unter anderem eingezahltes Unternehmenskapital, Aktienagios, nicht realisierte Neubewertungsgewinne, stille Reserven, Gewinn- oder Verlustvorträge, Gewinnrücklagen sowie Subventionen (Investitionszuschüsse und Investitionszulagen). Um eine künstliche Überbewertung des Eigenkapitals und eine doppelte Nutzung von Steuervorteilen zu verhindern, sind unter anderem folgende Posten vom Eigenkapital abzuziehen: i) der steuerliche Nettowert eigener Anteile, ii) der steuerliche Nettowert von Anteilen und Aktien, die dem belgischen Schachtelprivileg unterliegen, iii) das ausländische Betriebstättenvermögen, sofern Belgien mit dem Belegenheitsstaat ein DBA abgeschlossen hat, sowie iv) der steuerbefreite Anteil von Neubewertungsgewinnen, Subventionen und Steuergutschriften für Forschung und Entwicklung (vgl. IBFD (2014) Abschnitt 1.9.6.).

6.2.2 Steuerplanerische Möglichkeiten mit Finanzierungsgesellschaften

Aus dem belgischen Besteuerungssystem ergeben sich steuerplanerisch attraktive Möglichkeiten für deutsche Konzerne. So lässt sich durch die Kombination des belgischen NID Regimes mit der europäischen Mutter-Tochter-Richtlinie und der faktischen Nichtanwendung der deutschen Hinzurechungsbesteuerung innerhalb des Europäischen Wirtschaftsraumes (vgl. Fußnote 104) eine Finanzierungsgesellschaft mit einer theoretischen effektiven Steuerquote von 0% errichten. Diese Möglichkeit wird im Folgenden systematisch dargestellt und anhand einer Steuerwirkungsanalyse erläutert.

Figure 19. Konzerninterne Fremdfinanzierung mittels Finanzierungsgesellschaft in Belgien.



Quelle: Eigene Darstellung.

Wie in Figure 19 gezeigt, würde eine deutsche Konzernmuttergesellschaft zur Erreichung einer niedrigen effektiven Steuerquote das benötigte Kapital für eine Investition nicht direkt an eine operative Gesellschaft geben, sondern stattdessen eine Einlage in eine belgische Kapitalgesellschaft tätigen. Diese Einlage würde gleichzeitig das gesamte Eigenkapital (EK) der Finanzierungsgesellschaft darstellen. Die belgische Finanzierungsgesellschaft könnte die Einlage als Darlehen (D) an eine andere Konzerngesellschaft weitergeben und würde im Gegenzug Zinszahlungen in Höhe von $i * D$ für die Überlassung des Darlehens erhalten, wobei i der fremdvergleichsübliche Zinssatz ist. Der Zahlungsüberschuss nach Steuern ($Z\ddot{U}_N^{BE}$) der Finanzierungsgesellschaft ergibt sich nach folgender Gleichung, wobei n der fiktive Eigenkapital-Zinssatz ist und s_K^{BE} der belgische Körperschaftsteuersatz[114]:

$$Z\ddot{U}_N^{BE} = i * D - s_K^{BE} * [max(i * D - n * EK - \min(VN; VN^{max})); 0]. \quad (6.1)$$

VN bezeichnet den 2013 abgeschafften Vortrag für ungenutzten Eigenkapital-Zinsaufwand und $VN^{max} = \max(1\ Mio.€; i * D * 0{,}6)$ den durch die Mindestbesteuerung begrenzten maximal abzugsfähigen ungenutzten Eigenkapital-Zinsaufwand. In einer idealtypischen Finanzierungsgesellschaft, welche nur zur Steueroptimierung etabliert wurde, sollte es im Allgemeinen jedoch nicht zur Bildung eines NID Vortrags kommen, da niedrige Kosten (z.B. fixe Personalkosten) hohen verlagerten Gewinnen gegenüberstehen sollten. Daher

[114] s_K^{BE} beträgt 33,99% und ist der kombinierte Steuersatz für Kapitalgesellschaften aus Körperschaftsteuersatz (33%) und dem Sanierungsprogrammzuschlag (contribution complémentaire de crise) (3%).

wird im Folgenden vereinfachend davon ausgegangen, dass der Vortrag ungenutzten Eigenkapital-Zinsaufwands null beträgt ($VN = 0$).[115]

Wenn $i \leq n$, sind die Gewinne aus dem konzerninternen Darlehen in Belgien steuerfrei. Wenn $i > n$, wird auf die Differenz zwischen den Zinszahlungen und dem Eigenkapital-Zinsaufwand $(i * D - n * EK)$ der Körperschaftsteuersatz angewandt. In diesem Fall könnte es aus Konzernsicht steuerlich sinnvoller sein, eine Finanzierungsgesellschaft in einem anderen EU-Mitgliedstaat zu gründen. Die Nutzung des NID Regimes in Belgien ist deswegen nur solange vorteilhaft gegenüber vergleichbaren Strukturen, wie gilt, dass der Zahlungsüberschuss nach Steuern in Belgien ($Z\ddot{U}_N^{BE}$) höher ist als der Zahlungsüberschuss nach Steuern in anderen EU-Mitgliedstaaten ($Z\ddot{U}_N^{A}$). Anders ausgedrückt muss gelten, dass

$$Z\ddot{U}_N^{BE} = i * D - s_K^{BE} * [max(i * D - n * EK); 0] \geq i * D - s_K^{A} * i * D = Z\ddot{U}_N^{A}, \tag{6.2}$$

wobei s_K^A den ausländischen Körperschaftsteuersatz in Staat A darstellt. Sind die Zinserträge aus Darlehen an verbundenen Unternehmen kleiner als der Eigenkapital-Zinsaufwand $(i * D - n * EK \leq 0)$, beträgt die belgische Körperschaftsteuer null, da durch das NID Regime weder eine Steuererstattung noch ein Verlustvortrag begründet werden kann.

Sind die Zinserträge aus Darlehen an verbundenen Unternehmen größer als der Eigenkapital-Zinsaufwand $(i * D - n * EK \geq 0)$, ergibt sich ein Grenzzinssatz i^* von:[116]

$$i^* \leq \frac{n * s_K^{BE}}{s_K^{BE} - s_K^{A}} * \frac{EK}{D}. \tag{6.3}$$

Der Grenzzinssatz bezeichnet die Höhe des Zinssatzes, bis zu der es vorteilhaft ist, die Finanzierungsgesellschaft in Belgien anstatt im Staat A zu gründen. Für $(s_K^{BE} \geq s_K^{A})$ sinkt ceteris paribus der Grenzzinssatz mit steigender Differenz der Körperschaftsteuersätze $(s_K^{BE} - s_K^{A})$. Hingegen steigt der Grenzzinssatz, je höher das Verhältnis von Eigenkapital zu Darlehen an verbundenen Unternehmen ist (EK/D). Des Weiteren steigt der Grenzzinsatz, je höher der Zinssatz des NID Regimes (n) ist. Da der Wert für n über die Jahre variiert, ergeben sich in jeder Periode unterschiedliche Werte für i^*.

Belgien ist demnach der günstigste Standort für eine Finanzierungsgesellschaft innerhalb der EU, solange die Differenz aus Zinsertrag aus konzerninternen Darlehen und dem NID-

[115] Diese Annahme steht im Einklang mit Ergebnissen in Unterkapitel 6.4.1, wonach reine Finanzierungsgesellschaften niedrige Mitarbeiterzahlen, aber einen überdurchschnittlich hohen Gewinn aufweisen.

[116] Diese Betrachtung beschränkt sich auf Steuerplanung innerhalb der EU. Bezieht man Staaten mit ein, in denen die Mutter-Tochter-Richtlinie nicht zur Anwendung kommt, müssen zusätzlich etwaige Quellensteuern auf Dividendenzahlungen berücksichtigt werden.

Abzug niedriger besteuert wird als der gesamte Zinsertrag in den Staaten mit dem niedrigsten Körperschaftsteuersatz innerhalb der EU (Bulgarien, Irland und Zypern).[117] Unter der Annahme, dass das Eigenkapital der Finanzierungsgesellschaft den ausgereichten Darlehen (D) entspricht[118], ergeben sich für 2012 (n = 3,425%) Grenzwerte für den maximalen Zinssatz i^* von 4,85% (Bulgarien) sowie 5,42% (Irland und Zypern). Dies sind durchaus realistische Grenzwerte für Zinssätze deutscher Konzerne im Jahr 2012,[119] sodass das NID Regime in Belgien auch gegenüber Niedrigsteuerländern in der EU vorteilhaft ist. Da die deutsche Hinzurechnungsbesteuerung bei Finanzierungsgesellschaften außerhalb der EU greift, kann Belgien aus steuerlicher Sicht weltweit als der attraktivste Standort für Finanzierungsgesellschaften deutscher Konzerne angesehen werden. Es sollte allerdings darauf hingewiesen werden, dass Konzerne in der Wahl des verwendeten Zinssatzes durch Transferpreisregelungen eingeschränkt werden können (Fremdvergleichsgrundsatz), sodass es durchaus möglich ist, dass die tatsächlich verwendeten Zinssätze noch deutlich unter dem Grenzzinssatz liegen.

6.3 Daten

Die Studie betrachtet die am 31.12.2014 im DAX und MDAX gelisteten Konzerne. Der DAX enthält die umsatzstärksten deutschen Unternehmen und repräsentiert etwa 60% des Grundkapitals deutscher börsennotierter Unternehmen und 80% der Börsenumsätze in deutschen Aktien. Zudem bildet der Index die Branchenstruktur der deutschen Volkswirtschaft weitgehend ab. Der MDAX enthält deutsche Konzerne, welche nach Marktkapitalisierung und Börsenumsatz direkt auf die im DAX enthaltenen Werte folgen (vgl. boerse.de (2016a), boerse.de (2016b)). Somit spiegeln der DAX und MDAX die wirtschaftliche Situation von multinationalen Konzernen mit Sitz in Deutschland wider.

Der Fokus dieser Analyse liegt auf der Bilanzstruktur von belgischen Tochtergesellschaften der DAX und MDAX Konzerne. Da Unternehmen aus dem Banken- und Versicherungssektor aufgrund zusätzlicher regulatorischer und institutioneller Rahmenbedingungen eine von Industrieunternehmen sehr unterschiedliche Bilanzstruktur aufweisen, werden vier DAX und drei MDAX Konzerne aus diesem Sektor von der Analyse ausgeschlossen.[120] Zudem wird die 2014 im MDAX gelistete MAN AG

[117] Die Steuersätze für die Jahre 2011 bis 2014 betragen 10% für Bulgarien und 12,5% für Irland. Zypern hat 2011 und 2012 einen Steuersatz von 10% und 2013 und 2014 einen Steuersatz von 12,5%.

[118] Diese Annahme entspricht näherungsweise den Ergebnissen in Unterkapitel 6.4.1. Steigt das Verhältnis von Eigenkapital zu Fremdkapital – etwa durch höhere liquide Mittel – nimmt der Grenzwert für den maximalen Zinssatz i^* zu.

[119] Laut einer Studie des Centrums für Bilanzierung und Prüfung an der Universität des Saarlandes liegen die durchschnittlichen Zinssätze für festverzinsliche Anleihen untersuchter DAX Konzerne im Jahr 2012 zwischen 1,7% (SAP SE) und 4,0% (HeidelbergCement AG) (vgl. Hansen et al. (2013)).

[120] Ausgeschlossen werden Allianz SE, Commerzbank AG, Deutsche Bank AG und Münchener Rückversicherungs-Gesellschaft AG für den DAX sowie Aareal Bank AG, Hannover Rück SE und Talanx AG für den MDAX. Der

ausgeschlossen, an der die im DAX gelistete Volkswagen AG seit 2011 mehrheitlich beteiligt ist, um belgische Tochtergesellschaften der MAN AG nicht doppelt zu erfassen. Des Weiteren werden die Airbus Group SE und die RTL Group SA ausgeschlossen, da diese zwar im MDAX gelistet sind, ihren Konzernsitz aber nicht in Deutschland haben.

Für die 70 restlichen Konzerne werden im jeweiligen Konzernabschluss 2014 alle belgischen Tochtergesellschaften herausgesucht, an denen der Konzern für die Jahre 2011 bis 2014 durchgängig zu über 50% (Mehrheitsbeteiligung) beteiligt ist.[121] Drei DAX Konzerne (Deutsche Börse AG, Infineon Technologies AG und Fresenius Medical Care AG & Co. KGaA) sowie 21 MDAX Konzerne verfügen über keine Mehrheitsbeteiligung an belgischen Tochtergesellschaften im hier betrachteten Zeitraum und werden somit von der Analyse ausgeschlossen. Für die verbleibenden 46 Konzerne beträgt die Grundgesamtheit an belgischen Tochtergesellschaften 170.

Für diese 170 Gesellschaften werden die unkonsolidierten testierten Jahresabschlüsse für die Jahre 2011 bis 2014 von der Bilanzzentrale der Belgischen Nationalbank (Central Balance Sheet Office of the National Bank of Belgium) heruntergeladen. Die Bilanzzentrale sammelt und verarbeitet die Jahresabschlüsse praktisch aller in Belgien tätigen juristischen Personen und stellt diese öffentlich zur Verfügung.[122] Für zwei Gesellschaften kann jedoch nicht für jedes Jahr ein Jahresabschluss gefunden werden; diese Gesellschaften werden aus dem Datensatz entfernt, wodurch der Konzern ProSiebenSat.1 Media SE komplett ausgeschlossen wird. Zudem werden 13 Gesellschaften ausgeschlossen, die jeweils in allen vier Jahren Verluste erwirtschaftet haben. Da nur im Falle eines Gewinnes die Anwendung des NID Regimes möglich ist (vgl. Unterkapitel 6.2.1), können diese Gesellschaften in keinem Jahr einen Vorteil aus dem Eigenkapital-Zinsaufwand ziehen.[123] Schließlich werden zwei Gesellschaften ausgeschlossen, die jeweils in allen vier Jahren eine Bilanzsumme von null haben. Damit beträgt die endgültige Anzahl belgischer Tochtergesellschaften 153, die sich auf die 45 DAX und MDAX Konzerne wie in Table 41 dargestellt verteilen.

Ausschluss von Unternehmen aus dem Finanzdienstleistungssektor in der Analyse von Gewinnverlagerung multinationaler Konzerne ist ein übliches Vorgehen in der empirischen Literatur (vgl. z.B. Weichenrieder (2009), Overesch and Schreiber (2010), Buettner et al. (2012)).

[121] Der Ausschluss von Minderheitsbeteiligungen in der Analyse von Gewinnverlagerung multinationaler Konzerne ist ein übliches Vorgehen in der empirischen Literatur (vgl. z.B. Huizinga and Laeven (2008), Huizinga et al. (2008), Beer and Loeprick (2015)). Theoretisch wird Gewinnverlagerung ausschließlich in 100%igen Tochtergesellschaften erwartet, da ansonsten die Vorteile der Gewinnverlagerung unter allen Anteilseignern geteilt und Informationen über die Steuerpolitik eines Konzerns (zumindest im Kreis der Anteilseigner der niedrig besteuerten Gesellschaft) öffentlich würden. Tatsächlich werden alle identifizierten Finanzierungsgesellschaften zu 100% gehalten (vgl. Table 42).

[122] Die Rechtsgrundlage für die Aufstellung und Hinterlegung der Jahresabschlüsse bei der Bilanzzentrale erfolgt gemäß europäischer und belgischer gesetzlicher Bestimmungen. Für weitere Informationen vgl. Bilanzzentrale der Belgischen Nationalbank (Central Balance Sheet Office of the National Bank of Belgium).

[123] Der Ausschluss von Verlustunternehmen in der Analyse von Gewinnverlagerung multinationaler Konzerne ist ein übliches Vorgehen in der empirischen Literatur (vgl. z.B. Rego (2003)).

Table 41. Überblick über untersuchte DAX und MDAX Konzerne und belgische Tochtergesellschaften.

Konzern	Anzahl belg. Tochterge-sellschaften	⌀ Bilanz-summe der belg. Ges. (Mio. €)	Anteil Bilanzsumme der belg. Ges. an Bilanzsumme des Konzerns	⌀ Mitar-beiteran-zahl der belg. Ges.	Anteil Mitarbeiter der belg. Ges. an Mitarbeiter des Konzerns
Adidas AG	2	10	0,1%	33	0,1%
Aurubis AG	1	904	20,8%	488	8,4%
Axel Springer SE	1	9	0,2%	99	0,8%
BASF SE	6	19.509	30,1%	3.557	3,3%
BMW AG	5	2.510	1,8%	487	0,5%
Bayer AG	4	10.349	18,3%	1.534	1,4%
Beiersdorf AG	3	160	2,8%	106	0,6%
Bilfinger SE	4	53	0,8%	843	1,4%
Brenntag AG	2	146	2,5%	218	1,6%
Celesio AG	3	132	1,6%	359	1,0%
Continental AG	4	612	2,2%	658	0,4%
DMG Mori Seiki AG	1	7	0,4%	20	0,3%
Daimler AG	12	996	0,6%	1.051	0,4%
Deutsche Lufthansa AG	2	24	0,1%	509	0,4%
Deutsche Post AG	12	469	1,3%	3.377	0,7%
Deutsche Telekom AG	1	9	0,0%	75	0,0%
E.ON SE	1	78	0,1%	15	0,0%
Evonik Industries AG	2	789	4,8%	1.027	3,1%
Fresenius SE & Co. KGaA	2	43	0,1%	95	0,1%
Fuchs Petrolub SE	1	17	1,5%	54	1,4%
GEA Group AG	4	81	1,3%	238	1,0%
Gerresheimer AG	1	40	2,5%	524	4,9%
HeidelbergCement AG	9	2.316	8,3%	982	2,0%
Henkel AG & Co. KGaA	2	169	0,9%	379	0,8%
Hugo Boss AG	2	15	0,9%	105	0,8%
Jungheinrich AG	1	34	1,2%	174	1,6%
K+S AG	2	1.372	19,6%	15	0,1%
KION Group AG	1	18	0,3%	112	0,5%
KUKA AG	2	13	0,9%	39	0,5%
Klöckner & Co SE	2	26	0,6%	86	0,8%
Krones AG	1	18	0,8%	42	0,4%
Lanxess AG	2	1.076	15,1%	1.336	8,0%
Leoni AG	1	6	0,3%	10	0,0%
Linde AG	1	13	0,0%	33	0,1%
Merck KGaA	3	42	0,2%	139	0,4%
Metro Group AG	20	723	2,3%	5.028	1,9%
RWE AG	2	309	0,4%	137	0,2%
SAP SE	1	182	0,6%	250	0,4%
STADA Arzneimittel AG	1	106	3,4%	96	1,1%
Siemens AG	4	988	0,9%	1.667	0,4%
Symrise AG	2	92	3,5%	2	0,0%
Südzucker AG	3	1.343	15,7%	962	5,4%
ThyssenKrupp AG	4	155	0,4%	487	0,3%
Volkswagen AG	12	20.632	6,7%	3.362	0,6%
Wincor Nixdorf AG	1	26	2,6%	158	9,7%
Gesamt	**153**	**66.622**		**30.967**	

Betrachtet werden die am 31.12.2014 im DAX und MDAX gelisteten Konzerne und ihre belgischen Tochtergesellschaften (Mehrheitsbeteiligung) über den Zeitraum 2011–2014. Ausgeschlossen werden sieben Konzerne aus dem Banken- und Versicherungssektor, die MAN AG, die zur Volkswagen AG gehört, sowie die Airbus Group SE und RTL Group SA, welche ihren Konzernsitz nicht in Deutschland haben. 24 Konzerne haben keine Mehrheitsbeteiligung an belgischen Tochtergesellschaften; ein Konzern fällt heraus, da bei seiner (einzigen) belgischen Tochtergesellschaft nicht für jedes Jahr ein Jahresabschluss vorhanden ist.

Table 41 zeigt, dass die untersuchten DAX und MDAX Konzerne im Durchschnitt über die Jahre 2011 bis 2014 insgesamt etwa 67 Mrd. Euro Vermögenswerte[124] in Belgien aufweisen, wobei drei Konzerne das Bild dominieren: BASF SE, Bayer AG und Volkswagen AG machen etwa 76% dieser Vermögenswerte aus. Auch bei der durchschnittlichen Mitarbeiteranzahl über die untersuchten Jahre ergibt sich ein heterogenes Bild: Neun Konzerne beschäftigen mehr als 1.000 Mitarbeiter in Belgien, während etwa die K+S AG nur 15 Mitarbeiter beschäftigt, jedoch knapp 1,4 Mrd. Euro Vermögenswerte in Belgien aufweist.

Die Vorgehensweise des Konsultierens der Konzernabschlüsse und der Bilanzzentrale der Belgischen Nationalbank (Central Balance Sheet Office of the National Bank of Belgium) hat zwei essenzielle Vorteile im Rahmen dieser Analyse. Erstens werden die Daten direkt aus den Primärquellen erhoben, zum einen aus den Konzernabschlüssen bezüglich der Beteiligungsdaten an belgischen Tochtergesellschaften und zum anderen aus der Bilanzzentrale bezüglich der testierten Jahresabschlüsse dieser Gesellschaften. Damit kann ein korrekter sowie vollständiger Datensatz garantiert werden. Zweitens haben die Jahresabschlüsse einen hohen Detailgrad, den klassische Unternehmensdatenbanken wie etwa Amadeus oder Compustat North America nicht aufweisen, der für die weitere Analyse jedoch von grundlegender Bedeutung ist. So kann bei den Finanzanlagen und bei den Forderungen etwa ermittelt werden, in welcher Höhe Beteiligungen und Forderungen gegenüber verbundenen Unternehme bestehen. Aus der Bilanz der belgischen Tochtergesellschaften werden die folgenden Positionen erhoben:[125]

- Beteiligungen an verbundenen Unternehmen (280)
- Sonstige Forderungen gegenüber verbundenen Unternehmen (281 bzw. 9281)
- Forderungen aus Lieferung und Leistung (290 und 40)
- Liquide Mittel (50/53 und 54/58)
- Eigenkapital (10/15)
- Bilanzsumme (20/58)

Zudem enthält der Anhang zum Jahresabschluss relevante Daten zu Forderungen gegenüber verbundenen Unternehmen (9291), worin aber auch Forderungen aus Lieferung und Leistung enthalten sein können, die aus dem operativen Geschäft der belgischen Tochtergesellschaft stammen und nicht in Zusammenhang mit Darlehen an verbundene Unternehmen stehen. Um diese Position von Forderungen aus Lieferung und Leistung zu bereinigen, werden die in der Bilanz mit der Bilanzposition 290 und 40 aufgeführten

[124] Die Vermögenswerte entsprechen der Bilanzsumme abzüglich dem Buchwert der Beteiligung an belgischen Tochtergesellschaften.
[125] Zahlen in Klammern hinter den Variablen beziehen sich auf die Position im standardisierten Jahresabschluss der Bilanzzentrale der Belgischen Nationalbank (Central Balance Sheet Office of the National Bank of Belgium).

Forderungen aus Lieferung und Leistung von der Position abgezogen. Dadurch werden zwar eventuell auch Forderungen aus Lieferung und Leistung gegenüber Konzerndritten abgezogen, das ist allerdings unkritisch, da auf diese Weise die Forderungen gegenüber verbundenen Unternehmen in der weiteren Analyse höchstens unterschätzt[126] werden und eine idealtypische Finanzierungsgesellschaft kein operatives Geschäft unterhält. Im Weiteren werden zu dieser Position die unter Finanzanlagen aufgeführten sonstigen Forderungen gegenüber verbundenen Unternehmen (281 bzw. 9281) hinzuaddiert, da diese in der Position 9291 nicht enthalten sind. Diese Variable deckt nun alle Forderungen gegenüber verbundenen Unternehmen ab, die nicht aus dem operativen Geschäft stammen. Schließlich wird für die belgischen Tochtergesellschaften noch die Anhangangabe zur durchschnittlichen Mitarbeiteranzahl in Vollzeitäquivalenten (9087) erhoben.

Aus der Gewinn- und Verlustrechnung der belgischen Tochtergesellschaften werden die folgenden Positionen erhoben:

- Operativer Ertrag (70/74)
- Operativer Gewinn (9901)
- Finanzertrag (75)
- Sonstiger Finanzertrag (752/9)[127]
- Finanzaufwand (65)
- Zinsaufwand (650)
- Gewinn (Verlust) vor Steuern (9903)
- Ertragsteueraufwand (67/77)
- Gewinn (Verlust) (9904)

Für die 45 DAX und MDAX Konzerne werden für die Jahre 2011 bis 2014 aus Amadeus das Eigenkapital, die Bilanzsumme, der Gewinn (Verlust) vor Steuern, der Ertragsteueraufwand und die Mitarbeiteranzahl aus ihren konsolidierten Konzernabschlüssen heruntergeladen.

6.4 Deskriptiv-empirische Analyse der Notional Interest Deduction

6.4.1 Identifikation von Finanzierungsgesellschaften

Die idealtypische Finanzierungsgesellschaft würde ausschließlich mit Eigenkapital finanziert und das gesamte Eigenkapital in Form von Darlehen an Konzerngesellschaften weiterreichen (vgl. Unterkapitel 6.2.2). Folglich würde die Aktivseite der Bilanz nur aus

[126] Das verwendete Maß kann auch negativ werden. In diesem Fall wird der Wert auf null gesetzt.
[127] Der sonstige finanzielle Ertrag ist eine Unterposition vom Finanzertrag (75) und enthält Erträge aus Währungseffekten, Optionen und Finanzprodukten.

Forderungen gegenüber verbundenen Unternehmen bestehen. In der Praxis ist jedoch eine deutliche Abweichung von dieser idealtypischen Bilanz zu erwarten. So könnte eine solche Finanzierungsgesellschaft auch über erhebliche liquide Mittel verfügen, die aus noch nicht vergebenen oder bereits beglichenen Darlehen sowie aus Zinszahlungen stammen könnten.

Als wichtigstes Kriterium für die Identifikation einer Finanzierungsgesellschaft wird daher der Anteil der Summe der Forderungen gegenüber verbundenen Unternehmen, die nicht aus Lieferung und Leistung stammen (im Folgenden „Forderungen gegenüber verbundenen Unternehmen"), und der liquiden Mitteln an der Bilanzsumme der Gesellschaft herangezogen. Dieser Anteil muss in jedem der vier Jahre über 50% liegen. Dies bedeutet, dass sich mehr als die Hälfte der Vermögenswerte aus konzerninternen Darlehen oder liquiden Mitteln zusammensetzen. Grundsätzlich könnte dieser Schwellenwert auch höher oder niedriger liegen. Für die identifizierten Finanzierungsgesellschaften (vgl. Table 42) dürfte der Schwellenwert bis auf 71% steigen, damit alle identifizierten Finanzierungsgesellschaft auch weiterhin identifiziert werden.

Über einen hohen Forderungsbestand gegenüber verbundenen Unternehmen hinaus sollte eine Finanzierungsgesellschaft auch ein relativ hohes Finanzergebnis aufweisen. Dazu wird das Verhältnis aus Finanzergebnis und operativem Ergebnis herangezogen, welches in jedem der vier Jahre im Betrag größer als eins sein muss. Zudem muss das Finanzergebnis positiv sein. Auch hier sind höhere oder niedrigere Schwellenwerte denkbar. Für die identifizierten Finanzierungsgesellschaften liegt der minimale Schwellenwert bei 2,3, damit alle identifizierten Finanzierungsgesellschaften auch weiterhin identifiziert werden.

Zudem wird für jede Gesellschaft eine effektive Steuerquote[128] von maximal 20% in jedem der vier Jahre vorausgesetzt. Somit wird sichergestellt, dass die Gesellschaft tatsächlich zu einer Senkung der effektiven Konzernsteuerquote beiträgt. Der Schwellenwert von 20% bedeutet eine deutliche Senkung des belgischen Körperschaftsteuersatzes (33,99%) und der durchschnittlichen effektiven Konzernsteuerquote der betrachteten DAX und MDAX Konzerne (28%) um 40% und 30%.[129]

Schließlich muss die Bilanzsumme der belgischen Tochtergesellschaft mindestens 1% der jeweiligen Konzernbilanzsumme in jedem der vier Jahre betragen, um im Konzern von ausreichend ökonomischer Relevanz zu sein.[130]

Unter Anwendung dieser Kriterien lassen sich sieben Finanzierungsgesellschaften identifizieren. Diese sind mit den wichtigsten Kennzahlen in Table 42 aufgelistet.

[128] Die effektive Steuerquote wird als Verhältnis des Steueraufwands zum Gewinn vor Steuern des jeweiligen Jahres definiert.
[129] Zu beachten ist hierbei, dass eine mögliche Steuerersparnis in Belgien bereits in der effektiven Konzernsteuerquote berücksichtigt ist.
[130] Für die BASF SE liegt der Schwellenwert z.B. im Jahr 2014 bei 714 Mio. Euro. Dies würde eine steuerfreie Gewinnverlagerung nach Belgien von mindestens 19 Mio. Euro (=714 Mio. Euro * 2,63%) im Jahr 2014 implizieren.

Table 42. Bilanzpositionen und Kennzahlen der Finanzierungsgesellschaften.

Konzern[a]	Bilanzsumme (Mio. €)	Anteil Ford. ggü. verb. Unt. an Bilanzsumme	Anteil liquider Mittel an Bilanzsumme	Eigenkapitalquote	Mitarbeiteranzahl[b]	Verhältnis Gewinn pro Mitarbeiter der Tochterges. zum Konzern	Effektive Steuerquote
BASF SE	15.755	99%	0%	92%	216	5	2%
Bayer AG	9.980	94%	0%	91%	805	10	6%
Beiersdorf AG	107	59%	41%	100%	1	20	1%
Heidelberg-Cement AG	1.357	98%	0%	100%	9	290	1%
K+S AG	1.892	65%	6%	100%	3	478	17%
Symrise AG	92	99%	1%	95%	1	80	5%
Volkswagen AG	19.331	90%	9%	49%[c]	56	90	0%

Aufgeführt sind alle DAX und MDAX Konzerne mit Finanzierungsgesellschaften für 2011–2014. Die Beteiligung beträgt in allen Fällen 100%. Die angewandten Kriterien sind für alle vier Jahre (1) eine Mindestbilanzsumme der Gesellschaft von 1% der jeweiligen Konzernbilanzsumme, (2) eine maximale effektive Steuerquote von 20%, (3) ein Anteil der Forderungen gegenüber verbundenen Unternehmen, die nicht aus Lieferung und Leistung stammen (wie in Unterkapitel 6.3 dargelegt), und der liquiden Mittel von mindestens 50% der Bilanzsumme sowie (4) ein Finanzergebnis, welches das operative Ergebnis übersteigt. Die Werte entsprechen dem arithmetischen Mittel der Jahre 2011–2014.

[a] Für die angegebenen DAX und MDAX Konzerne wird jeweils eine mögliche belgische Finanzierungsgesellschaft identifiziert. Die Namen dieser Finanzierungsgesellschaften sowie weitere Bilanzdaten und Kennzahlen sind in Table A 7 im Anhang (Appendix to Section 6) aufgeführt.

[b] Die Tochtergesellschaften der BASF SE und Bayer AG verfügen über substantielles Anlagevermögen (inklusive immaterieller Vermögenswerte). Zudem werden Umsätze von etwa 120 Mio. und 1,2 Mrd. Euro erreicht und Aufwendungen für Handelswaren, Hilfs- und Grundstoffe von etwa 40 und 850 Mio. Euro verbucht (Werte jeweils für das Jahr 2014). Die Gesellschaften scheinen also neben dem Finanzierungsgeschäft auch einen operativen Geschäftsteil zu haben, der unter anderem auch in der Forschung und Entwicklung tätig sein könnte. Dies könnte die verhältnismäßig hohe Mitarbeiteranzahl erklären.

[c] Die Tochtergesellschaft der Volkswagen AG verfügt über einen hohen Anteil an Forderungen gegenüber verbundenen Unternehmen. Dieser übersteigt jedoch die Eigenkapitalquote deutlich. Folglich ist ein großer Anteil (mindestens 46%) dieser Forderungen gegenüber verbundenen Unternehmen nicht mit Eigenkapital, sondern mit Fremdkapital unterlegt. Das Fremdkapital stammt vermutlich jedoch nicht aus konzerninterner Darlehensaufnahme, sondern aus externer Darlehensaufnahme. So ist die Gesellschaft laut Homepage der Volkswagen AG Emittentin des „Euro 5,0 Mrd. Belgian Short-Term Treasury Notes Programme". Die Volkswagen AG scheint also einen Teil der Konzernfremdfinanzierung durch die belgische Tochtergesellschaft zu betreiben (vgl. Volkswagen AG (2016)).

Auffällig bei diesen sieben Gesellschaften sind insbesondere die hohen Eigenkapitalquoten, die auf eine Ausnutzung des NID Regimes hindeuten, die hohen Bestände an Forderungen gegenüber verbundenen Unternehmen und liquiden Mitteln sowie die niedrigen effektiven Steuerquoten. Zudem weisen die Gesellschaften einen sehr hohen Gewinn pro Mitarbeiter im Verhältnis zum Konzerngewinn pro Mitarbeiter auf. Die Mitarbeiter der belgischen Tochtergesellschaften sind also deutlich profitabler als die Mitarbeiter im Konzernschnitt. Dies könnte ebenfalls ein starkes Indiz für eine Finanzierungsgesellschaft sein, da zu vermuten ist, dass diese nur einen relativ geringen Personalbedarf haben, da die Fremdkapitalvergabe leicht skalierbar sein sollte.

Weitere Indizien dafür, dass die identifizierten Gesellschaften Finanzierungsgesellschaften sein könnten, kann zudem der Vergleich der Gruppe der Finanzierungsgesellschaften mit allen anderen im Datensatz enthaltenen Gesellschaften geben. In Table 43 sind daher einige Kennzahlen im Vergleich der Gruppen aufgeführt.

Table 43. Weitere Kennzahlen der Finanzierungs- und Nicht-Finanzierungsgesellschaften.

	Verhältnis Bilanzsumme zu Mitarbeiteranzahl (Mio. €)	Anteil Ford. ggü. verb. Unt. und liquider Mittel an Bilanzsumme	Verhältnis Forderungen aus Lieferung und Leistung zu Bilanzsumme	Eigenkapitalquote	Verhältnis Finanzergebnis zu operativem Ergebnis	Verhältnis Gewinn pro Mitarbeiter der Tochterges. zum Konzern	Effektive Steuerquote
Finanzierungsges.	118	99%	0%	97%	10	73	2%
Nicht-Finanzierungsges.	0,3	19%	19%	35%	0	1	24%

Als Finanzierungsgesellschaften werden die in Table 42 identifizierten sieben Gesellschaften aufgeführt. Die anderen 146 Gesellschaften werden unter den Nicht-Finanzierungsgesellschaften subsumiert. Die Werte entsprechen jeweils dem Mittelwert des Medians der Jahre 2011–2014.

Auffällig ist hierbei, dass die Kennzahlen, die den Gewinn und die Bilanzsumme ins Verhältnis zur Mitarbeiteranzahl setzen, für die Finanzierungsgesellschaften deutlich höher sind. Die Mitarbeiter der sieben identifizierten Gesellschaften sind also nicht nur deutlich profitabler, die Gesellschaften weisen im Vergleich zur Mitarbeiteranzahl auch eine sehr hohe Bilanzsumme auf. Beides deutet in Verbindung mit dem sehr hohen Anteil an Forderungen gegenüber verbundenen Gesellschaften und Beständen an liquiden Mitteln an der Bilanzsumme darauf hin, dass diese sieben Gesellschaften zur Gewinnverlagerung durch Finanzierung genutzt werden. Für ein Ausnutzen des NID Regimes durch die Finanzierungsgesellschaften spricht zudem die deutlich höhere Eigenkapitalquote der Finanzierungsgesellschaften. Des Weiteren verfügen die Finanzierungsgesellschaften auch nicht über Forderungen aus Lieferungen und Leistungen und das Verhältnis des Finanzergebnisses zum operativen Ergebnis ist deutlich höher. Beides sind Hinweise dafür, dass die Finanzierungsgesellschaften nicht oder nur in geringem Umfang operativ tätig sind. Zudem ist die effektive Steuerquote der Finanzierungsgesellschaften deutlich niedriger. Auch wenn dies auf eine Vielzahl an Gründen, wie beispielsweise steuerfreien Einnahmen, zurückzuführen sein könnte, deutet es doch zumindest darauf hin, dass diese Gesellschaften das NID Regime ausnutzen, um ihre Steuerlast drastisch zu senken.

Allerdings ist es nicht nur möglich, konzerninterne Finanzierung durch eigenständige Finanzierungsgesellschaften durchzuführen. Genauso könnte die Finanzierungsfunktion durch eine operativ tätige Tochtergesellschaft durchgeführt werden. Im nächsten Schritt werden daher die relativ strikten Annahmen über das Verhältnis von Finanzergebnis zu operativem Ergebnis gelockert, um auch Tochtergesellschaften in Belgien identifizieren zu können, die operativ tätig sind und gleichzeitig als Finanzierungsgesellschaft fungieren. Es wird nach zusätzlichen Gesellschaften gesucht, die in allen vier betrachteten Jahren mindestens 25% der Bilanzsumme in Forderungen gegenüber verbundenen Unternehmen und liquiden Mitteln aufweisen. Zudem wird wiederum eine Mindestbilanzsumme von 1% der jeweiligen Konzernbilanzsumme in allen vier Jahren vorausgesetzt. Anhand dieser

Kriterien lassen sich sieben weitere Gesellschaften identifizieren, die in Table 44 dargestellt sind.

Table 44. Bilanzpositionen und Kennzahlen operativ tätiger Finanzierungsgesellschaften.

Konzern	Bilanzsumme (Mio. €)	Anteil Ford. ggü. verb. Unt. an Bilanzsumme	Anteil liquider Mittel an Bilanzsumme	Eigenkapitalquote	Mitarbeiteranzahl	Verhältnis Gewinn pro Mitarbeiter der Tochterges. zum Konzern	Effektive Steuerquote
Aurubis AG	986	51%	1%	80%	488	0	13%
Continental AG	423	68%	0%	83%	488	4	19%
Evonik Ind. AG	398	37%	0%	74%	1.025	1	19%
	391	0%	65%	82%	2	696	26%[d]
Jungheinrich AG	34	0%	33%	24%	174	1	35%
Lanxess AG	858	55%	7%	37%	914	0	11%
STADA Arzn. AG	106	4%	54%	49%	96	9	33%

Aufgeführt sind alle DAX und MDAX Konzerne mit operativ tätigen Finanzierungsgesellschaften für 2011–2014. Die Beteiligung beträgt in allen Fällen mindestens 99,99%. Die angewandten Kriterien sind für alle vier Jahre (1) eine Mindestbilanzsumme der Gesellschaft von 1% der jeweiligen Konzernbilanzsumme und (2) ein Anteil der Forderungen gegenüber verbundenen Unternehmen, die nicht aus Lieferung und Leistung stammen (wie in Unterkapitel 6.3 dargelegt), und der liquiden Mittel von mindestens 25% der Bilanzsumme. Die Werte entsprechen dem arithmetischen Mittel der Jahre 2011–2014.

[d] Diese Gesellschaft der Evonik Industries AG wird aufgrund ihrer relativ hohen effektiven Steuerquote nicht in Table 42 als Finanzierungsgesellschaft identifiziert.

Beim Vergleich von Table 42 mit Table 44 fällt die Mitarbeiteranzahl ins Auge, die im Durchschnitt bei den operativ tätigen Finanzierungsgesellschaften höher ist. Korrespondierend ist der Gewinn pro Mitarbeiter im Vergleich niedriger, mit Ausnahme einer Tochtergesellschaft der Evonik Industries AG. Die Gesellschaften können aber trotz ihrer teilweise hohen Eigenkapitalquoten und hohen Forderungen gegenüber verbundenen Unternehmen an der Bilanzsumme nicht als Finanzierungsgesellschaften in Table 42 identifiziert werden, da entweder das Finanzergebnis das operative Ergebnis nicht in allen vier Jahren übersteigt oder die Summe aus Forderungen gegenüber verbundenen Unternehmen und Bestände an liquiden Mitteln an der 50% Schwelle scheitert.

Um zu überprüfen, ob die strikte Definition einer Finanzierungsgesellschaft weitere Gesellschaften von einer Identifikation ausschließt, zeigt Table 45 weitere, bisher noch nicht identifizierte Gesellschaften. Es wird nicht mehr auf die ökonomische Signifikanz der Gesellschaft für den Konzern (Mindestbilanzsumme der Gesellschaft kann unter 1% der jeweiligen Konzernbilanzsumme liegen, muss aber mindestens 10 Mio. Euro betragen) und die effektive Steuerquote abgestellt (maximale effektive Steuerquote kann über 20% liegen). Zudem müssen die weiteren Kriterien (Anteil der Forderungen gegenüber verbundenen Unternehmen, die nicht aus Lieferung und Leistung stammen, und der liquiden Mittel von mindestens 50% der Bilanzsumme sowie ein Finanzergebnis, welches das operative Ergebnis übersteigt) nur in einem der vier Jahre erfüllt sein.

Table 45. Bilanzpositionen und Kennzahlen der Finanzierungsgesellschaften (erweiterte Definition).

Konzern	Bilanz-summe (Mio. €)	Anteil Ford. ggü. verb. Unt. an Bilanzsumme	Anteil liquider Mittel an Bi-lanzsumme	Eigen-kapital-quote	Mitar-beiter-anzahl	Verhältnis Gewinn pro Mitarbeiter der Tochterges. zum Konzern	Effek-tive Steuer-quote
BMW AG	597	1%	99%	99%	25	2	3%
Metro Group AG	90	56%	20%	11%	105	39	1%
Siemens AG	43	32%	0%	94%	1	134	–1%

Aufgeführt sind alle zusätzlichen Finanzierungsgesellschaften der DAX und MDAX Konzerne nach einer erweiterten Definition. Die angewandten Kriterien sind für mindestens ein Jahr (1) ein Anteil der Forderungen gegenüber verbundenen Unternehmen, die nicht aus Lieferung und Leistung stammen (wie in Unterkapitel 6.3 dargelegt), und der liquiden Mittel von mindestens 50% der Bilanzsumme, (2) ein Finanzergebnis, welches das operative Ergebnis übersteigt, sowie (3) eine Bilanzsumme der Gesellschaft von mindestens 10 Mio. Euro. Die Werte entsprechen dem arithmetischen Mittel der Jahre 2011–2014.

Die in Table 45 aufgeführten Gesellschaften wurden bislang ausgeschlossen, da sie für den Konzern ökonomisch unbedeutend sind. Die auffälligste Gesellschaft ist ein Coordination Center der BWM AG, die über ausschließlich eigenkapitalfinanzierte liquide Mittel verfügt. Diese Mittel scheinen jedoch in der Gesellschaft zu verbleiben und nicht als konzerninterne Darlehen vergeben zu werden. Ebenfalls auffällig ist die Tochtergesellschaft der Siemens AG mit hoher Eigenkapitalquote und niedriger Steuerquote sowie niedriger Mitarbeiteranzahl. Allerdings machen die internen Forderungen und liquiden Mittel in Summe nur durchschnittlich ein Drittel der Bilanzsumme aus. Die Tochtergesellschaft der Metro Group AG verfügt zwar über hohe Bestände an Forderungen und liquiden Mitteln, aber auch über eine hohe Mitarbeiteranzahl sowie niedrige Eigenkapitalquote. Eine Finanzierungstätigkeit kann daher nicht ausgeschlossen, aber ein vollständiges Ausnutzen des NID Regimes kann nicht angenommen werden.

6.4.2 Approximation der Gewinnverlagerung und Steuervermeidung

Im vorherigen Unterkapitel wurden Finanzierungsgesellschaften identifiziert. Konkrete Rückschlüsse auf das Ausmaß der möglichen Gewinnverlagerung lassen die obigen Analysen nicht zu. Dies liegt unter anderem daran, dass die Forderungen keinen konkreten Konzerngesellschaften zugeordnet werden können und die Zinssätze der Darlehen nicht bekannt sind.

Doch auch mit den vorhandenen Informationen lassen sich Werte berechnen, die das Ausmaß der Gewinnverlagerung und des Steueraufkommensverlustes für die beteiligten Staaten zumindest approximieren können. Nimmt man an, dass die (operativ tätigen) Finanzierungsgesellschaften zur Gewinnverlagerung mittels Fremdfinanzierung genutzt werden, so entspricht der jeweilige Zinsertrag der Obergrenze der Gewinnverlagerung in die belgische Gesellschaft. Die Steuerersparnis durch Zinsabzug der jeweiligen Konzerngesellschaft j ermittelt sich dann wie folgt:

$$Steuerersparnis^{j} = i^{j} * D^{j} * s^{j}. \quad (6.4)$$

Da jedoch der Ort der jeweiligen Konzerngesellschaft und folglich der Steuersatz s^{j} ebenso wie die Darlehenshöhe D^{j} und der Zinssatz i^{j} unbekannt bleiben, muss die Steuerersparnis auf Konzernebene wie folgt geschätzt werden:[131]

$$Steuerersparnis^{Konzern} = FI^{BE} * s^{Konzern} - Steuerzahlung^{BE}. \quad (6.5)$$

Hierbei entspricht FI^{BE} dem Finanzertrag der belgischen Tochtergesellschaft, welcher um den sonstigen Finanzertrag (z.B. Erträge aus Währungseffekten) gekürzt wurde, sodass der Zinsertrag übrig bleibt.[132] $s^{Konzern}$ entspricht der effektiven Konzernsteuerquote, die ein sinnvoller Maßstab ist, um die gesparten Steuern in den Tochtergesellschaften außerhalb Belgiens zu approximieren, da sie die durchschnittliche Steuerbelastung im Konzern abbildet. Alternativ wird für $s^{Konzern}$ der deutsche Steuersatz (30,175%) angenommen, der zum einen die Steuerbelastung in Hochsteuerländern, aus denen sich Gewinnverlagerung besonders lohnt, approximiert und zum anderen die Steuerlast auf Gewinne im Sitzstaat der Konzerne bestimmt. $Steuerzahlung^{BE}$ entspricht der Steuerzahlung der belgischen Gesellschaft und kann dem Jahresabschluss direkt entnommen werden.

Ist die Eigenkapitalquote größer als der Anteil der Forderungen gegenüber verbundenen Unternehmen an der Bilanzsumme, kann die Steuerzahlung bezogen auf den Finanzertrag gekürzt um die NID alternativ wie folgt berechnet werden:[133]

$$Steuerzahlung^{BE} = \quad (6.6)$$

$$s_K^{BE} * [max\ (FI^{BE} - \min(n * EK; Gewinn\ vor\ Steuern); 0)].$$

Ist die Eigenkapitalquote kleiner als der Anteil der Forderungen gegenüber verbundenen Unternehmen an der Bilanzsumme, ergibt sich eine Steuerzahlung von

[131] In dieser Gleichung laufen zwei Effekte aus der Schätzung gegeneinander. Erstens stammt FI nicht ausschließlich aus konzerninternen Darlehen. Die identifizierten Finanzierungsgesellschaften haben jedoch zum größten Teil nahezu 100% Forderungen gegenüber verbundenen Unternehmen, sodass – nach Kürzung des sonstigen Finanzertrags – davon ausgegangen werden kann, dass der Finanzertrag nahezu ausschließlich aus Zinserträgen besteht. Eine Überschätzung der Steuerersparnis dürfte damit ausgeschlossen sein. Zweitens enthält die effektive Steuerquote des Konzerns die Steuerersparnis der belgischen Gesellschaft bereits. Da vor allem Gewinne aus Hochsteuerländern nach Belgien verlagert werden dürften, sollte die Verwendung der effektiven Konzernsteuerquote die tatsächliche Steuerersparnis unterschätzen.

[132] Diese Kürzung wird vorgenommen, da sonstiger Finanzertrag, wie z.B. Erträge aus Währungseffekten, nicht zu korrespondierendem Zinsaufwand im Konzernverbund geführt hat. Darüber hinaus wird angenommen, dass sonstiger Finanzertrag nicht bei der Gewinnverlagerung berücksichtigt wird und exogen ist. Deswegen wird nur der reine Zinsertrag in den folgenden Berechnungen betrachtet.

[133] Diese Forderungen gegenüber verbundenen Unternehmen sind per Annahme zu 100% eigenkapitalfinanziert.

$$Steuerzahlung^{BE} = s_K^{BE} * \left[max\left(FI^{BE} - FE^{BE} * \frac{Ford.gg\ddot{u}.verb.Unt.-EK}{FK} - min(n * EK, Gewinn\ vor\ Steuern); 0\right)\right]. \quad (6.7)$$

Hinter dem im Vergleich zu Gleichung (6.6) eingefügten Teil der Steuerzahlung in Gleichung (6.7) steckt die Idee, dass bei einer kleineren Eigenkapitalquote ein Teil der ausgegebenen Forderungen gegenüber verbundenen Unternehmen durch Fremdkapital (FK) finanziert sein muss ($Ford.gg\ddot{u}.verb.Unt.-EK$). Auf diesen Teil entfällt wiederum Zinsaufwand (FE^{BE}). Folglich wird in Höhe des Zinsaufwands auf den Anteil der nicht durch Eigenkapital unterlegten Forderungen gegenüber verbundenen Unternehmen am Fremdkapital eine Gewinnkorrektur vorgenommen.

Table 46 stellt die berechneten maximalen Gewinnverlagerungen, also den Finanzertrag gekürzt um sonstigen Finanzertrag der jeweiligen belgischen Tochtergesellschaft, sowie die Steuerersparnis auf Basis von Gleichung (6.5) dar.

Auffällig ist, dass das Verhältnis der tatsächlichen Steuerersparnis (Spalte 5) zu der maximalen Gewinnverlagerung (Spalte 2) von 19,6% recht hoch ist. Bei einer durchschnittlichen effektiven Konzernsteuerquote der DAX und MDAX Konzerne von 28% in den Jahren 2011 bis 2014 bedeutet dies, dass das Steuersparpotential zu einem großen Teil ausgenutzt wird. Allerdings könnte das Steuersparpotential noch höher ausfallen, wenn der durchschnittliche Körperschaftsteuersatz in den Staaten, in denen die Zinsaufwendungen anfallen, höher ist als die effektive Konzernsteuerquote im jeweiligen Jahr. Dieser Effekt ist in Spalte 6 sichtbar, da hier mit einem deutschen Steuersatz von 30,175% für alle Konzerne in allen Jahren gerechnet wird. In diesem Fall steigt der Anteil auf 26,5%.

Table 46. Approximation der Gewinnverlagerung und Steuervermeidung auf Konzernebene.

Konzern	Maximale Gewinnverlagerung (Mio. €)	Anteil Gewinnverlagerung am Konzerngewinn vor Steuern	Approximierte Steuerersparnis aus Konzernfremdfinanzierung (Mio. €) auf Basis der effektiven Konzernsteuerquote	Berechnete Steuerersparnis mit tatsächlichen Steuerzahlungen (Mio. €) auf Basis der effektiven Konzernsteuerquote	Berechnete Steuerersparnis mit tatsächlichen Steuerzahlungen (Mio. €) auf Basis des deutschen Steuersatzes
Finanzierungsgesellschaften					
BASF SE	260	4%	57	55	77
Bayer AG	302	8%	66	56	74
Beiersdorf AG	1	0%	0	0	0
HeidelbergCement AG	45	6%	9	9	13
K+S AG	77	12%	15	8	11
Symrise AG	3	1%	1	1	1
Volkswagen AG	167	1%	35	35	50
Operativ tätige Finanzierungsgesellschaften					
Aurubis AG	22	5%	6	6	7
Continental AG	6	0%	1	1	2
Evonik Ind. AG	1	0%	0	0	0
	12	1%	2	3	3
Jungheinrich AG	0	0%	0	0	0
Lanxess AG	17	5%	3	4	4
STADA Arzn. AG	0	0%	0	0	0
Gesamt	**914**	**3%[e]**	**195**	**179**	**242**

Aufgeführt sind alle Gesellschaften, die in Table 42 und Table 44 als (operativ tätige) Finanzierungsgesellschaften identifiziert wurden. Die dargestellten Werte entsprechen dem arithmetischen Mittel der Jahre 2011–2014 der jeweiligen Gesellschaft. In Spalte 2 ist die maximale Gewinnverlagerung berechnet als Finanzertrag abzüglich sonstigem Finanzertrag dieser Gesellschaften dargestellt. In Spalte 3 ist der Anteil des maximal in die belgische Tochtergesellschaft verlagerten Gewinns am gesamten Konzerngewinn dargestellt. In Spalte 4 ist die approximierte Steuerersparnis – wie in Gleichungen (6.5), (6.6) und (6.7) – dargestellt. In Spalte 5 ist die Steuerersparnis auf Basis der tatsächlichen Steuerzahlungen der Gesellschaften dargestellt (Gewinnverlagerung * effektive Konzernsteuerquote – tatsächliche Steuerzahlung). Die tatsächliche Steuerzahlung wurde für die operativ tätigen Finanzierungsgesellschaften berechnet, indem die Steuerzahlung der Gesellschaft mit dem Verhältnis des Finanzergebnisses zur Summe aus operativem Ergebnis und Finanzergebnis multipliziert wurde, um eine Steuerzahlung nur für den Finanzierungsteil der Gesellschaft zu approximieren. In Spalte 6 ist das Ergebnis der fünften Spalte mit dem statuarischen deutschen Steuersatz in Höhe von 30,175% für alle Jahre anstelle der jeweiligen effektiven Konzernsteuerquote berechnet.

[e] Dieser Wert entspricht dem arithmetischen Mittel der Anteile der Gewinnverlagerung am Konzerngewinn der identifizierten Gesellschaften über die Jahre 2011–2014.

Bei genauerer Betrachtung von Table 46 fällt zudem auf, dass die approximierte Steuerersparnis in Spalte 4 der auf Basis der tatsächlichen Steuerzahlungen berechneten Steuerersparnis in Spalte 5 nahe kommt. Da die approximierte Steuerersparnis nur die Möglichkeit einer Steuersenkung durch das NID Regime berücksichtigt, scheinen diese Gesellschaften (für ihren Finanzierungsteil) über das NID Regime hinaus keine weiteren Steuerplanungsmodelle, welche die Steuerlast der belgischen Gesellschaft weiter reduzieren könnten, zu verfolgen. In Verbindung mit Table 42 zeigt sich somit, dass die in Unterkapitel 6.2.2 beschriebene idealtypische Finanzierungsgesellschaft auch tatsächlich von deutschen Konzernen umgesetzt wird. Das NID Regime scheint also durchaus die beschriebenen Anreize für die Gründung einer Finanzierungsgesellschaft in Belgien zu bieten.

Auffällig ist allerdings auch, dass die absolute Höhe der Steuerersparnis der (operativ tätigen) Finanzierungsgesellschaften mit 179 bis 242 Mio. Euro relativ niedrig ist. Dies liegt insbesondere daran, dass die absolute Höhe der (maximalen) nach Belgien verlagerten Gewinne mit durchschnittlich 914 Mio. Euro für alle identifizierten Gesellschaften zusammen nicht sonderlich hoch ist. Gemessen am Konzerngewinn vor Steuern entspricht dies 3% der gesamten Gewinne der Konzerne. Insgesamt lässt sich somit konstatieren, dass einige DAX und MDAX Konzerne in Belgien mit diesem Steuerplanungsmodell zwar effizient Steuern sparen, dies allerdings nur in einem geringen Umfang betreiben. Eine Unterschätzung dieses Umfanges kann jedoch nicht ausgeschlossen werden, da nicht bekannt ist, aus welchen Konzerngesellschaften Gewinne verlagert werden.

Es sind drei mögliche Erklärungen für den geringen identifizierten Umfang der Steuerersparnis durch Gewinnverlagerung denkbar: Erstens zeigt die bisherige Literatur, dass die aggregierte Gewinnverlagerung deutscher Konzerne niedrig ist. So weist beispielsweise Finke (2013) lediglich einen Betrag von 10 Mrd. Euro für alle deutschen Konzerne aus. Zudem weisen Riedel et al. (2015) nach, dass die Steuer-Sensitivität des ausgewiesenen Einkommens in der betrachteten Periode von 1999 bis 2009 rückläufig ist. Zweitens stellen Heckemeyer and Overesch (2017) in einer Meta-Studie fest, dass 70% der Gewinnverlagerung nicht auf die steueroptimale Finanzierung grenzüberschreitender Investitionen, sondern auf eine steueroptimale Strukturierung von Transaktionen im Konzern, wie etwa grenzüberschreitende Lizensierungsvereinbarungen, zurückzuführen ist. Derartige Steuerplanungsmodelle (z.B. „Double Irish with a Dutch Sandwich“) werden von Pinkernell (2012), Sullivan (2012) und Fuest et al. (2013) beschrieben. Letztere stellen fest, dass die Unternehmen, die ihre Steuerlast drastisch reduzieren, allesamt IP aufweisen. Diese Studien legen somit den Schluss nahe, dass Fremdfinanzierung eine eher untergeordnete Rolle bei der Gewinnverlagerung spielt. Drittens besteht natürlich auch die Möglichkeit, dass Konzerne bereits Fremdfinanzierungsstrukturen in anderen Staaten als Belgien etabliert haben und diese aus internen Erwägungen nicht verlagern wollen.[134]

6.4.3 Approximation der Steueraufkommenswirkung für Belgien

Die vorhergehenden Ausführungen legen den Schluss nahe, dass das NID Regime für Finanzierungsgesellschaften nur geringe Anreizwirkungen entfaltet. Welche Steueraufkommenswirkung das NID Regime für Belgien im vorliegenden Datensatz hat, soll im Folgenden approximiert werden.

Hierzu wird die These aufgestellt, dass die identifizierten Finanzierungsgesellschaften aus Table 42 entweder gar nicht in Belgien wären (für die Finanzierungsgesellschaften) oder

[134] Ein Beispiel hierfür liefert Bergin (2013), der zeigt, dass die SAP SE eine Finanzierungsgesellschaft in Irland unterhält.

keine Finanzierungsfunktion ausüben würden (für die auch operativ tätigen Finanzierungsgesellschaften).[135] Folglich kann das Steueraufkommen ermittelt werden, das diese Gesellschaften aus ihrer Finanzierungstätigkeit generieren, indem die tatsächliche Steuerzahlung dieser Gesellschaften für ihre Finanzierungstätigkeit summiert wird. Dies entspricht den Steuermehreinnahmen Belgiens durch das NID Regime. Auf der anderen Seite sieht sich Belgien mit Steuermindereinnahmen durch all die Gesellschaften konfrontiert, die nicht durch steuerliche Anreize durch das NID Regime in Belgien tätig werden, aber dennoch vom NID Regime profitieren. Die Aufkommenswirkungen für die Körperschaftsteuer sind in Table 47 dargestellt.

Table 47. Approximation der Steuermehr- und Steuermindereinnahmen durch Ausnutzung des NID Regimes in Belgien durch die identifizierten Finanzierungsgesellschaften.

	2014	2013	2012	2011
Steuermehreinnahmen Belgiens durch NID Regime in Mio. Euro[f]	28	34	39	24
Steuermindereinnahmen Belgiens durch NID Regime in Mio. Euro	–39	–49	–61	–60
Approximierte Steueraufkommensveränderung in Mio. Euro	–11	–15	–22	–36

Aufgeführt sind die berechneten Steuermehreinnahmen, die sich durch Multiplikation des belgischen Körperschaftsteuersatzes mit der Summe aus dem Zinsertrag der belgischen Finanzierungsgesellschaften abzüglich der Steuerermäßigung durch das NID Regime ergeben. Die Steuermindereinnahmen ergeben sich aus der Summe des jeweiligen Eigenkapitals der Nicht-Finanzierungsgesellschaften der DAX und MDAX Konzerne in Belgien multipliziert mit dem Satz des NID Regimes und dem belgischen Körperschaftsteuersatz des jeweiligen Jahres.

[f] Vor Einführung des NID Regimes gab es eine Vorgängerregelung (Coordination Center Regime), die mit einer Verlängerung um maximal zehn Jahre noch bis ins Jahr 2015 anwendbar war. Eine Nutzung des NID Regimes ist ausgeschlossen, wenn man noch von der Vorgängerregelung profitiert. Daher werden alle Gesellschaften ausgeschlossen, die im Namen „Coordination Center" führen. Die in Table 42 identifizierte Tochtergesellschaft der BASF SE ist eine von zwei im Datensatz enthaltenen Unternehmen, die diesen Namenszusatz führen. Die zweite Gesellschaft ist die in Table 45 identifizierte Tochtergesellschaft der BMW AG.

Es zeigt sich, dass Belgien in allen vier Jahren einen Verlust des Körperschaftsteueraufkommens hat.[136] Zudem fällt auf, dass dieser Verlust in den vier Jahren rückläufig ist, was auch auf die sinkenden Eigenkapital-Zinssätze des NID Regimes im hier betrachteten Zeitraum zurückzuführen ist (vgl. Table 40). Es ist jedoch anzumerken, dass diese Rechnung außer Acht lässt, dass auch bei den Nicht-Finanzierungsgesellschaften steuerliche Anreize durch das NID Regime bestehen können und dass es Spillover-Effekte geben dürfte (z.B. Lohnsteuermehreinnahmen durch zusätzliche Arbeitsplätze). Der vorliegende Datensatz ermöglicht jedoch keine Betrachtung

[135] Wie Table A 7 im Anhang (Appendix to Section 6) zu entnehmen ist, bestehen einige der identifizierten Gesellschaften schon länger als das NID Regime in Belgien angewandt wird. Falls diese Gesellschaften nicht wegen des Coordination Center Regimes, der Vorgängerregelung des NID Regimes, gegründet wurden, besteht die Möglichkeit, dass diese Gesellschaften auch aus nicht-steuerlichen Gründen in Belgien aktiv sind. Allerdings dürften sich die Mitnahmeeffekte in Grenzen halten, da die Finanzierungsgesellschaften keine andere Tätigkeit auszuüben scheinen. Mögliche Mitnahmeeffekte der operativ tätigen Finanzierungsgesellschaften haben auf die Schätzungen ebenfalls keinen Einfluss, da der Steuereffekt lediglich für den Finanzierungsteil geschätzt wird.

[136] Finke et al. (2014) simulieren auch für Deutschland, dass die Einführung eines NID Regimes einen Rückgang des Steueraufkommens aus Körperschaftsteuer, Gewerbesteuer und Solidaritätszuschlag zur Folge hätte. Die Studie berechnet den Rückgang insgesamt auf durchschnittlich 18% (9 Mrd. Euro) und betrachtet die Jahre 2005–2007.

dieser Effekte. Die Steuermindereinnahmen Belgiens sind daher nur als grobe Abschätzung zu verstehen.

6.4.4 Robustheitsanalyse

In Unterkapitel 6.4.1 werden sieben DAX und MDAX Konzerne mit Finanzierungsgesellschaften identifiziert. Die Ausführungen in Unterkapitel 6.2 zu der Vorteilhaftigkeit Belgiens als Finanzierungsstandort hätten eine höhere Zahl an Konzernen vermuten lassen. Im Folgenden werden deswegen mittels Amadeus zwei Robustheitsanalysen vorgenommen: Zum einen soll untersucht werden, ob die betrachteten Konzerne über Finanzierungsgesellschaften in anderen EU-Mitgliedstaaten[137] verfügen; zum anderen soll untersucht werden, ob in Frankreich ansässige Konzerne über belgische Finanzierungsgesellschaften verfügen.[138]

Es ist anzumerken, dass Amadeus keinen so hohen Detailgrad wie der oben verwendete Datensatz bietet. Insbesondere gibt es keine Position zu Forderungen gegenüber verbundenen Unternehmen, welche eine entscheidende Position zur Identifikation von Finanzierungsgesellschaften darstellt. Diese Forderungen können nur grob mittels der Position „sonstiges Anlagevermögen“ approximiert werden. Aufgrund der unspezifischen Position ist zu erwarten, dass ein Teil der mittels Amadeus identifizierten Finanzierungsgesellschaften keine tatsächlichen Finanzierungsgesellschaften sind, da sich hinter der Position „sonstiges Anlagevermögen“ beispielsweise auch Beteiligungen an verbundenen Unternehmen verbergen können.

Für den ersten Test werden alle in Amadeus vorhandenen, europäischen Tochtergesellschaften der deutschen Konzerne betrachtet. Für den zweiten Test werden alle verfügbaren belgischen Tochtergesellschaften der in Amadeus vorhandenen französischen Konzerne betrachtet.

Table 48 zeigt, dass unter Anwendung derselben Bedingungen wie in Unterkapitel 6.4.1 fünf Finanzierungsgesellschaften deutscher Konzerne in EU-Mitgliedstaaten identifiziert werden, wovon zwei in Belgien sind und bereits oben identifiziert wurden. Die anderen Gesellschaften sitzen in Deutschland, den Niederlanden und Spanien. Es wird eine Tochtergesellschaft in Belgien eines französischen Konzerns ermittelt. Diese Tochtergesellschaft weist jedoch mit 17% eine niedrige Eigenkapitalquote auf, was vermuten lässt, dass diese das NID Regime in Belgien nur in geringem Maße ausnutzt.

[137] Der Fokus liegt auf EU-Mitgliedstaaten, da Amadeus nur für europäische Unternehmen Finanzdaten enthält.
[138] Es wird Frankreich als Vergleichsland gewählt, da es ebenso wie Deutschland eine gemeinsame Grenze mit Belgien hat und jeweils eine gemeinsame Sprache gesprochen wird. Zudem ist Frankreich eine vergleichbar große Volkswirtschaft wie Deutschland: Im Jahr 2014 betrug das Bruttoinlandsprodukt in Frankreich (Deutschland) 2,83 (3,87) Billionen USD.

Table 48. Bilanzpositionen und Kennzahlen von DAX und MDAX Konzernen mit europäischen Finanzierungsgesellschaften und von französischen Konzernen mit belgischen Finanzierungsgesellschaften.

Konzern	Staat	Bilanz-summe (Mio. €)	Anteil Ford. ggü. verb. Unt. an Bi-lanzsumme[g]	Anteil liquider Mittel an Bi-lanzsumme	Eigen-kapital-quote	Mitar-beiter-anzahl	Verhältnis Gewinn pro Mitarbeiter der Tochterges. zum Konzern	Effek-tive Steuer-quote
DAX und MDAX Konzerne mit europäischen Finanzierungsgesellschaften								
BASF SE	BE	15.755	100%	10%	92%	217	5	2%
BASF SE	NL	9.589	86%	0%	88%	665	33	0%
Bayer AG	BE	9.980	97%	0%	91%	805	11	6%
Beiersdorf AG	ES	159	96%	0%	98%	8	100	1%
Beiersdorf AG	DE	554	82%	7%	64%	906	3	18%
Französische Konzerne mit europäischen Finanzierungsgesellschaften								
Edenred	BE	1.163	94%	2%	17%	156	8	3%

Aufgeführt sind alle DAX und MDAX Konzerne mit europäischen Finanzierungsgesellschaften. Für die französischen Konzerne sind alle belgischen Finanzierungsgesellschaften aufgeführt. Die Beteiligung beträgt in allen Fällen mindestens 90%. Die angewandten Kriterien sind für alle vier Jahre (1) eine Mindestbilanzsumme der Gesellschaft von 1% der jeweiligen Konzernbilanzsumme, (2) eine maximale effektive Steuerquote von 20%, (3) ein Anteil des sonstigen Anlagevermögens von mindestens 50% der Bilanzsumme sowie (4) ein Finanzergebnis, welches das operative Ergebnis übersteigt. Die Werte entsprechen dem arithmetischen Mittel der Jahre 2011–2014.

[g] Die Forderungen gegenüber verbundenen Unternehmen können nur grob mittels der in Amadeus angegebenen Position „sonstiges Anlagevermögen" approximiert werden.

Insgesamt ist festzustellen, dass mit Amadeus nur sehr wenige Finanzierungsgesellschaften identifiziert werden können. Dies kann natürlich daran liegen, dass die deutschen und französischen Konzerne tatsächlich nur über wenige Finanzierungsgesellschaften in Europa bzw. Belgien verfügen. Überraschend ist aber insbesondere, dass für die deutlich größere Grundgesamtheit an französischen Konzernen lediglich eine belgische Finanzierungsgesellschaft identifiziert wird. Zudem können fünf der sieben in Unterkapitel 6.4.1 identifizierten belgischen Finanzierungsgesellschaften deutscher Konzerne nicht mit Amadeus identifiziert werden. Dies legt den Schluss nahe, dass Amadeus den Fallstudien-Datensatz unvollständig abdeckt. Zudem können aufgrund der geringeren Detailtiefe von Amadeus auch fälschlicherweise identifizierte Unternehmen enthalten sein.

Zusammenfassend gesagt legen diese zwei Robustheitsanalysen den Schluss nahe, dass die vorgestellte Fallstudie deutlich präzisere Ergebnisse liefert als eine Untersuchung, die sich lediglich auf Daten aus Amadeus stützt.

6.5 Zusammenfassung

Diese Fallstudie zeigt, dass einige DAX und MDAX Konzerne Steuerplanung in Belgien mittels des NID Regimes effizient betreiben. Es werden sieben Finanzierungsgesellschaften sowie sieben auch operativ tätige Finanzierungsgesellschaften identifiziert. Es ist auffällig, dass die Finanzierungsgesellschaften neben einer sehr niedrigen effektiven Steuerquote und einem sehr hohen Verhältnis von Zinserträgen zu operativem Ergebnis ein über 73-fach

höheres Verhältnis von Gewinn pro Mitarbeiter der Finanzierungsgesellschaft zum Konzern aufweisen als die Nicht-Finanzierungsgesellschaften. Daneben weisen die Finanzierungsgesellschaften eine hohe Eigenkapitalquote auf.

Mit den vorliegenden Daten kann die Gewinnverlagerung und die daraus resultierende Steuerersparnis approximiert werden. Unsere Schätzungen ergeben, dass die identifizierten Konzerne jährlich Gewinne in Höhe von 914 Mio. Euro durch konzerninterne Fremdfinanzierung nach Belgien verlagern, woraus eine Steuerersparnis von jährlich zwischen 179 und 242 Mio. Euro resultiert. Auffällig an der beobachteten Gewinnverlagerung ist, dass die Konzerne das sich ergebende Steuersparpotential aus den verlagerten Gewinnen nahezu vollständig ausschöpfen: Es wird durchschnittlich eine Steuerersparnis von 20% bis 27% der verlagerten Gewinne erzielt. Allerdings kann der verwendete Schätzansatz das Volumen der Steuerersparnis unterschätzen, da nicht bekannt ist, aus welchen Konzerngesellschaften Gewinne verlagert werden, und folglich nur mit der effektiven Konzernsteuerquote gerechnet werden kann.

Setzt man jedoch die Höhe der verlagerten Gewinne ins Verhältnis zu den Konzerngewinnen, so fällt auf, dass dieses Verhältnis mit etwa 3% sehr niedrig ist. Die Konzerne scheinen also mittels Fremdfinanzierung in Belgien keine ökonomisch bedeutsame Gewinnverlagerung zu betreiben. Im Einklang damit stellen andere empirische Untersuchungen eine allgemein niedrige Gewinnverlagerung deutscher Konzerne sowie eine untergeordnete Rolle der konzerninternen Fremdfinanzierung im Vergleich zu anderen konzerninternen Transaktionen, wie beispielsweise Lizenzierungen, fest.

In einer groben Schätzung wird gezeigt, dass das NID Regime bezogen auf die Aktivitäten der DAX und MDAX Konzerne für Belgien insoweit ein Verlustgeschäft ist, als die Körperschaftsteuerverluste durch das NID Regime nicht durch die zusätzlichen Körperschaftsteuereinnahmen der Finanzierungsgesellschaften ausgeglichen werden.

Weitere interessante Forschungsansätze zum NID Regime könnten darin bestehen, die tatsächliche Gewinnverlagerung multinationaler Konzerne und die damit verbundene Aufkommenswirkung für Belgien noch präziser zu schätzen. Darüber hinaus könnten belgische Finanzierungsgesellschaften anderer europäischer Konzerne untersucht werden, um festzustellen, ob die für deutsche Konzerne identifizierte geringe Nutzung Belgiens als Finanzierungsstandort auch für andere Staaten bestätigt werden kann. Des Weiteren könnte die Attraktivität Belgiens für nicht-europäische Konzerne im Vergleich zu europäischen Konzernen untersucht werden. Zudem wäre es interessant zu analysieren, ob Finanzierungsaktivität in multinationalen Konzernen eine hohe Mobilität aufweist. Dazu bietet sich etwa die Einführung des NID Regimes im Jahr 2006 in Belgien ebenso an wie die abnehmende Attraktivität des belgischen NID Regimes durch stetig sinkende Eigenkapital-Zinssätze (für 2017 beträgt der Satz nur noch 1,131%).

7 Main Conclusions

Profit shifting by MNEs is of high interest in tax research and in the public debate. In this thesis, I take three perspectives on profit shifting that have not yet received much attention in empirical tax research. Thereby, I contribute to research in several ways and provide interesting insights for policy makers.

In my first perspective, I analyze the effects of R&D intensity and firm size on firm ETRs in a meta-regression analysis. I observe heterogeneous results on these effects in primary studies and provide a negative consensus estimate on the relation between R&D intensity and ETR and a positive estimate on the size-ETR relation. Further, I identify sources of bias and variation that significantly influence the effects. In additional analyses, I find that a profit shifting and a tax accounting effect, as well as R&D tax credits, drive the relation between R&D intensity and ETR. For the size-ETR relation, I find that profit shifting related elements, social acceptance of hierarchies and governance issues drive this relation.

Future research could further explore the findings of my additional analyses. In particular, due to the aggregated level of the meta-data set, I am not able to explore in detail which specific firm characteristics drive the profit shifting and tax accounting effect and how different designs of R&D tax credits across countries affect the relation between R&D intensity and ETR. Regarding additional analyses on the size-ETR relation, future research could extend my work on profit shifting related elements that drive this relation. For example, future research could analyze whether firms' size-ETR relation depends on the specific industry of firms as profit shifting opportunities may vary between industries.

In my second perspective, I analyze the influence of corporate taxation systems on cross-border M&A activity, a relationship where relatively little empirical research has been undertaken so far. I find that exempting foreign dividends in the acquirer country increases M&A prices while capital gains taxation in the acquirer country has no effect on M&A prices. As most countries have changed their taxation system from a credit system to an exemption system for foreign dividends over the last years, these findings are interesting for US tax policy makers, who are currently considering a change to the exemption system. Further, I detect that limiting profit shifting opportunities via CFC rules negatively affects M&A activity. Against this background, the mandatory EU-wide implementation of CFC rules by 2019 can be seen critically as this implementation may lead to competitive disadvantages of European firms on the global cross-border M&A market.

Future research could address and quantify the economic and tax revenue effects of my suggestion to implement a dividends exemption system without CFC rules. In the short run, governments will potentially face tax revenue losses; however, empirical literature shows positive economic spillover effects of extensive cross-border M&A activity on

domestic investment. Hence, in the long-term, an exemption system without CFC rules, which is found to boost cross-border M&A activity, may lead to efficiency gains, an increase in domestic investment, and tax revenue gains.

In my third perspective, I analyze whether German DAX and MDAX MNEs implement Belgian finance companies to benefit from the Belgian NID regime. I detect seven finance companies, a rather low number given the proximity of Belgium to Germany and the relative ease of implementing such financing structures. Still, the findings are of interest for German and Belgian tax policy makers as I detect that profits of around one billion Euro are shifted to Belgium within these MNEs each year. However, given that non-finance companies also benefit from the NID regime, this regime does not necessarily lead to tax revenue gains for Belgium. For the considered data set, I calculate that Belgium makes an overall tax revenue loss of around 36 million Euro annually due to the NID regime.

Future research could extend this analysis by investigating whether MNEs from other European countries use the Belgian NID regime to a greater or lesser extent than German MNEs. Further, future research could analyze the regime's attractiveness for non-European MNEs as Belgium may be an attractive holding location for non-European MNEs for their European business activities. However, constantly decreasing NID interest deduction rates over the past years may mitigate Belgium's attractiveness as a holding location.

In summary, my thesis analyzes the intensely discussed topic of MNE-wide profit shifting. I provide further insights into the topic by finding that profit shifting related firm characteristics affect firms' ETRs and that large German MNEs set up Belgian finance companies as profit shifting vehicles. Further, I find that anti profit shifting measures, in particular CFC rules, distort cross-border M&A activity, a highly important form of FDI.

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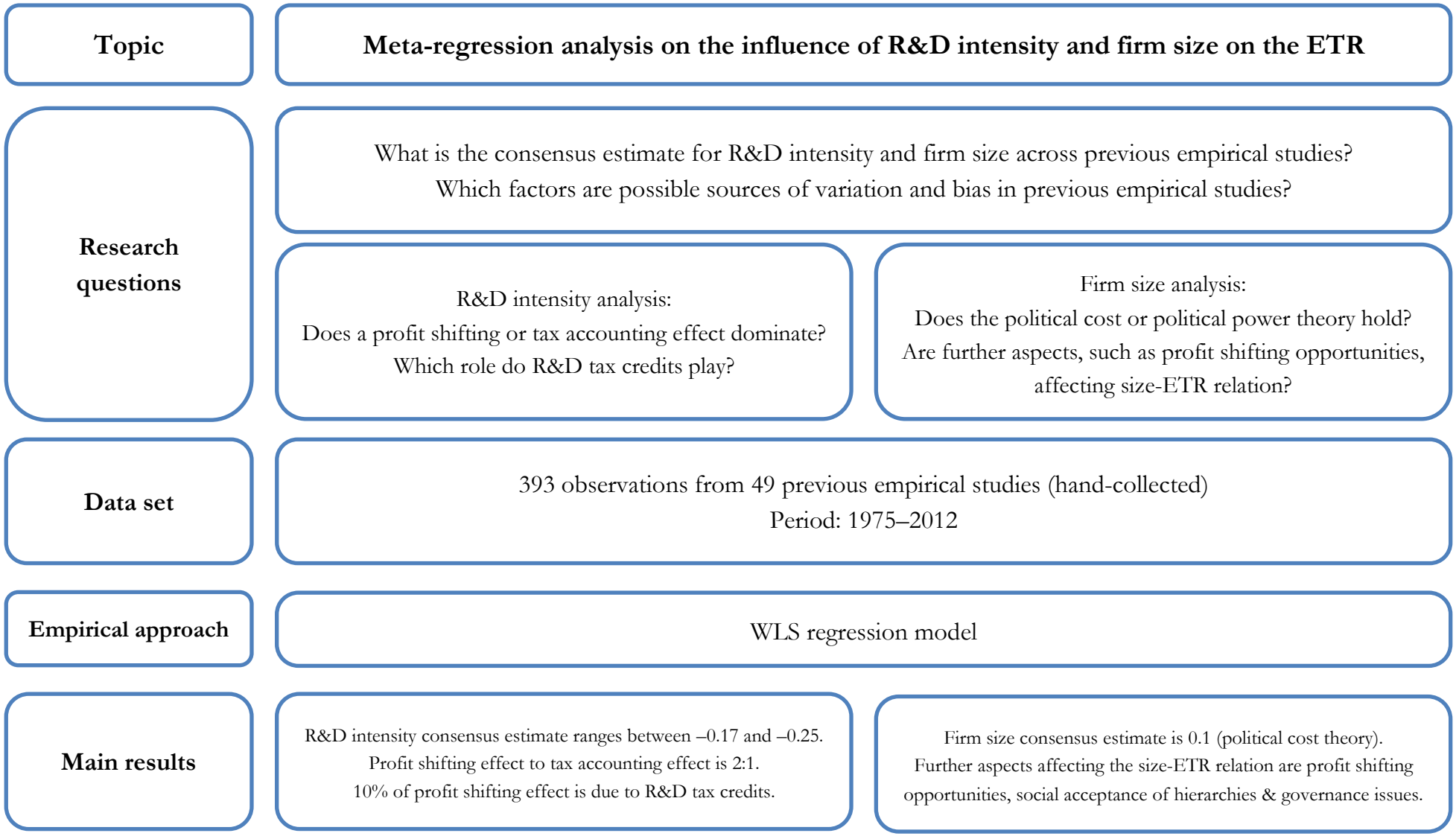
Appendices

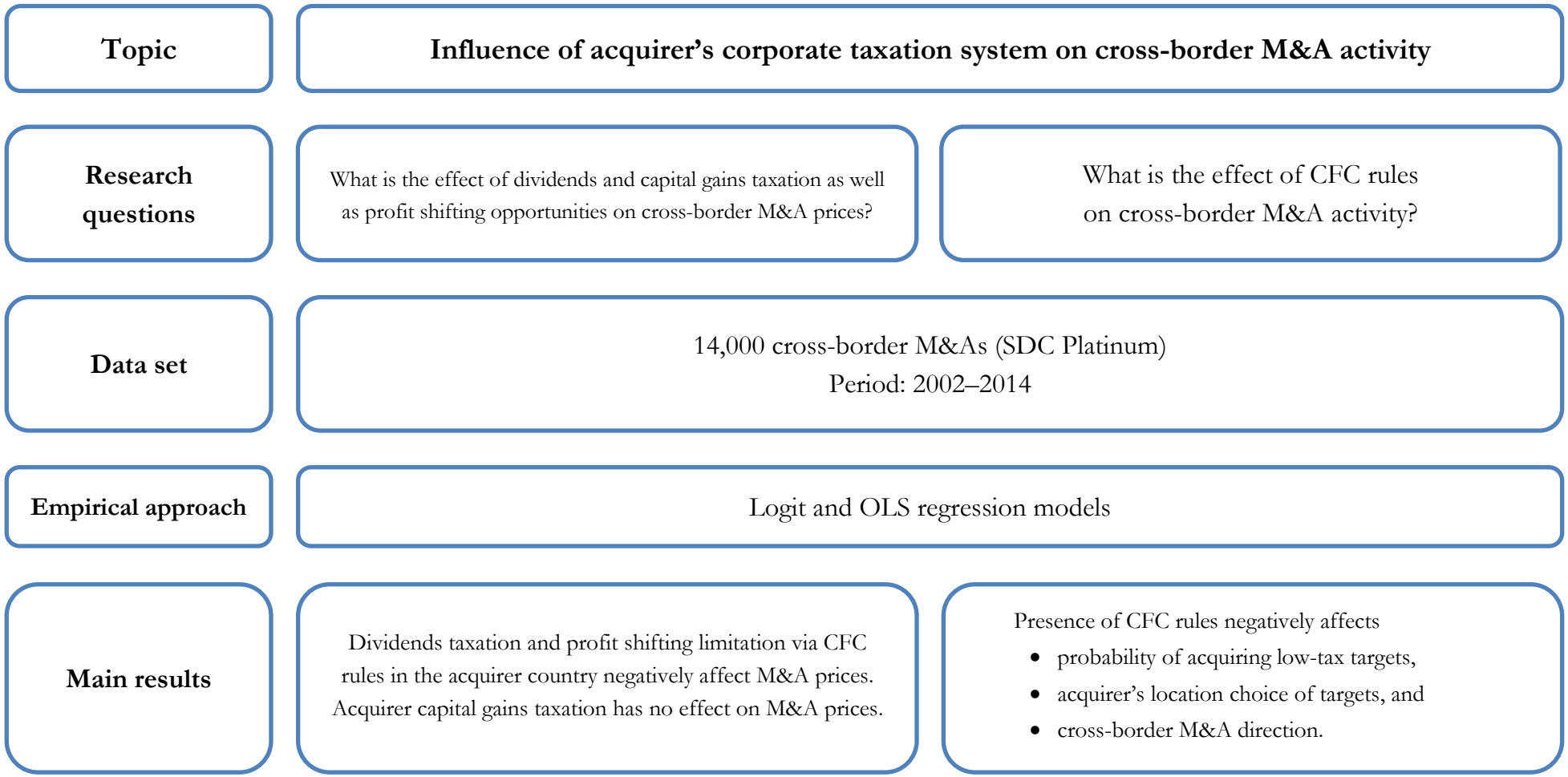
Appendix to Section 1

Figure A 1. Synopsis of Sections 2 and 3.



Source: Own illustration.

Figure A 2. Synopsis of Sections 4 and 5.



Source: Own illustration.

Figure A 3. Synopsis of Section 6.

Topic	**Case study on Belgian finance companies of DAX and MDAX MNEs**
Research questions	Do DAX and MDAX MNEs use Belgian finance companies? What is the amount of shifted profits and saved tax payments due to applying the NID regime? What is the implication for Belgium's tax revenue due to the NID regime?
Data set	All 153 majority-owned Belgian subsidiaries of DAX and MDAX MNEs (hand-collected) Period: 2011–2014
Empirical approach	Descriptive case study
Main results	DAX and MDAX MNEs have 14 Belgian finance companies; seven of them seem to be also operationally active. Circa 1 billion Euro profits are shifted to Belgium by DAX and MDAX MNEs annually, which save 242 million Euro taxes. In this data set, the approximate annual loss of Belgium due to the NID regime is up to 36 million Euro.

Source: Own illustration.

Appendix to Section 3

Table A 1. Grouping of 49 primary studies regarding direction of size-ETR relation.

Studies reporting non-significant size-ETR relation	Average sample year	Studies reporting significantly positive size-ETR relation	Average sample year	Studies reporting significantly negative size-ETR relation	Average sample year	Studies reporting significantly positive and negative size-ETR relation	Average sample year
Jacob (1996)	1989	Gupta and Mills (2002)	1993	Mills et al. (1998)	1991	Gupta and Newberry (1997)	1986
Harris and Feeny (1999)	1995	Wilkinson et al. (2001)	1993	Harris and Feeny (2003)	1996	Kim and Limpaphayom (1998)	1990
Phillips (2003)	1997	Rego (2003)	1994	Guha (2007)	1997	Buijink et al. (1999)	1993
McGuire et al. (2014)	1999	Robinson et al. (2010)	1999	Jennings et al. (2012)	1997	Janssen (2003)	1997
Liu and Cao (2007)	2002	Noor et al. (2010)	2000	Chen et al. (2010)Chen et al. (2010)	1998	Chyz et al. (2013)	1999
Armstrong et al. (2012)	2004	Fernández-Rodríguez and Martínez-Arias (2012)	2001	Richardson and Lanis (2007)	2000	Hoopes et al. (2012)	2000
Hoi et al. (2013)	2006	Richter et al. (2009)	2001	Boone et al. (2013)	2001	Kubick et al. (2015)	2002
Taylor and Richardson (2012)	2008	Higgins et al. (2015)	2002	Huseynov and Klamm (2012)	2004	Gallemore and Labro (2015)	2002
Lanis and Richardson (2012)	2009	Wu et al. (2013)	2003	Lee and Swenson (2012)	2006	Wu et al. (2012a)	2004
		Wu et al. (2012b)	2003			Donohoe (2015)	2004
		Zeng (2010)	2003			Fernández-Rodríguez and Martínez-Arias (2014)	2005
		Mills et al. (2013)	2004				
		Jaafar and Thornton (2015)	2005				
		Dyreng et al. (2016)	2005				
		Klassen et al. (2014)	2006				
		McGuire et al. (2012)	2006				
		Lazăr (2014)	2006				
		Hope et al. (2013)	2006				
		Kraft (2014)	2008				
		Herbert and Overesch (2014)	2010				

The level of statistical significance is at 10% level (two-sided).

Table A 2. Definitions, data sources and summary statistics of country-specific indices.

Country-specific index	Description	Directionality	Source	No. of obs.	Mean	Std. dev.	Min.	Max.
Power Distance Index	Measures the social acceptance of hierarchies in a certain country	less acceptance to more acceptance of hierarchies	Hofstede and Hofstede	385	49.883	19.836	11.000	104.000
Transparency Index	Measures whether economic, social, and political information is available to all relevant stakeholders in a timely and reliable way in a certain country	less transparent to more transparent	Williams	367	67.738	14.140	37.000	81.000

Appendix to Section 4

A.4.1 Model adjustments

A.4.1.1 Creating capital gains instead of capital losses

In reality, one can observe that some investors, such as private equity investors, buy targets to restructure them and sell them (possibly at a profit) a few years later. Obviously, these investors know already at the planning stage of an acquisition that they do not want to keep the target until it ceases to exist. As these investors likely realize capital gains and not capital losses upon the sale, capital gains taxation imposes a tax payment instead of a tax repayment to them. Therefore, for this special group of acquirers, it is reasonable to question the assumption of creating a capital loss.

This question is theoretically addressed in the following paragraphs. In short, adjusting our model to a two period model with subsequent acquisitions, we demonstrate that assuming capital losses is still reasonable, even if the first acquirer sells the target after one period. In particular, we show that capital gains only occur under one of the following rather unlikely circumstances: a) The first acquirer has a very high power in negotiations, resulting in paying a very low M&A price to the original seller and receiving a very high M&A price from the second acquirer, or b) the target creates an (overall) loss during the holding period of the first acquirer and profits afterwards. However, within the scope of our model, higher synergies and/or preferential tax treatment of the second acquirer are not an explanation as the second acquirer would have acquired the target in the first place.

The model will be adjusted as follows: Acquirer A from Country A wants to acquire the target at the beginning of the first period and plans to sell this firm to acquirer B from Country B at the end of the first period. Acquirer B then plans to liquidate the target at the end of the second period. This transforms the model into a two period model with two acquisitions taking place. The reservation price of the first acquirer (A) therefore looks as follows under the full profit shifting assumption:

$$P_{Acq,A}^{fullPS} = \left(\varepsilon + \Delta_{Acq,A}\right) \cdot \frac{\left(1-\tau^{THA}\right)\cdot\alpha^{A,THA}\cdot\left(1-\tau^{A}\right)}{1+r} + \frac{P_{Acq,B}^{fullPS} - \left(P_{Acq,B}^{fullPS} - P_{Acq,A}^{fullPS}\right)\cdot\tau^{A,CG}\cdot\beta^{A}}{1+r}. \quad (4.7)$$

Rearranging equation (4.7) yields:

$$P_{Acq,A}^{fullPS} = \left(\varepsilon + \Delta_{Acq,A}\right) \cdot \frac{\left(1-\tau^{THA}\right)\cdot\alpha^{A,THA}\cdot\left(1-\tau^{A}\right)}{1+r-\tau^{A,CG}\cdot\beta^{A}} + \frac{P_{Acq,B}^{fullPS}\cdot\left(1-\tau^{A,CG}\cdot\beta^{A}\right)}{1+r-\tau^{A,CG}\cdot\beta^{A}}. \quad (4.8)$$

Equation (4.8) shows that the value increasing effect of the book value depreciation still remains. Additionally, a second effect is now introduced, which results in an additional

value increase associated with the M&A price acquirer A receives for selling the target to acquirer B. This second value increasing effect is reduced by the tax imposed on the capital gains. As long as the reservation price of acquirer B is positive ($P_{Acq,B}^{fullPS} > 0$), this value increasing effect is present.

In the considered two period model, acquirer A's alternative to selling the firm to acquirer B is to hold the participation in the target until the end of the second period and then liquidate the target. Consequently, acquirer A's alternative reservation price calculation under the assumption of immediate repatriation is:

$$P_{Acq,A}^{fullPS} = \left(\varepsilon + \Delta_{Acq,A}\right) \cdot \frac{(1+r)^2-1}{r} \cdot \frac{(1-\tau^{THA}) \cdot \alpha^{A,THA} \cdot (1-\tau^{A})}{(1+r)^2-\tau^{A,CG}\beta^{A}}. \tag{4.9}$$

Setting equations (4.8) and (4.9) equal results in the following minimum M&A price that acquirer B must pay so that the proposed deal structure is beneficial for acquirer A:

$$P_{Acq,B}^{fullPS} \geq \left(\varepsilon + \Delta_{Acq,A}\right) \cdot (1-\tau^{THA}) \cdot \alpha^{A,THA} \cdot (1-\tau^{A}) \cdot \frac{1+r}{(1+r)^2-\tau^{A,CG} \cdot \beta^{A}}. \tag{4.10}$$

Acquirer B's reservation price at the end of the first period can be drawn from equation (4.1) plugging in $t = 1$. It then looks as follows:

$$P_{Acq,B}^{fullPS} = \left(\varepsilon + \Delta_{Acq,B}\right) \cdot \frac{(1-\tau^{THB}) \cdot \alpha^{B,THB} \cdot (1-\tau^{B})}{1+r-\tau^{B,CG} \cdot \beta^{B}}. \tag{4.11}$$

Setting equations (4.10) and (4.11) equal yields the following condition:

$$\left(\varepsilon + \Delta_{Acq,B}\right) \cdot (1-\tau^{THB}) \cdot \alpha^{B,THB} \cdot (1-\tau^{B}) \cdot \frac{1}{1+r-\tau^{B,CG} \cdot \beta^{B}} \tag{4.12}$$

$$\geq \left(\varepsilon + \Delta_{Acq,A}\right) \cdot (1-\tau^{THA}) \cdot \alpha^{A,THA} \cdot (1-\tau^{A}) \cdot \frac{1+r}{(1+r)^2-\tau^{A,CG} \cdot \beta^{A}}.$$

There could be two reasons why acquirer B's reservation price (left side of equation (4.12)) exceeds the minimum reservation price that acquirer A needs (right side of equation (4.12)). It could be that acquirer B's taxation system is more favorable[139] or that acquirer B creates a higher synergy[140]. However, both of these assumptions are rather unlikely as acquirer B would be the preferred bidder at the beginning of the first period and acquirer A would never be successful in acquiring the target. Therefore, it is reasonable to assume that the synergies of acquirer A and B as well as their taxation systems are identical. Consequently, equation (4.12) collapses to:

$$\frac{1}{1+r-\tau^{A,CG} \cdot \beta^{A}} \geq \frac{1+r}{(1+r)^2-\tau^{A,CG} \cdot \beta^{A}}. \tag{4.13}$$

[139] $\frac{(1-\tau^{THB}) \cdot \alpha^{B,THB} \cdot (1-\tau^{B})}{1+r-\tau^{B,CG} \cdot \beta^{B}} \geq \frac{(1-\tau^{THA}) \cdot \alpha^{A,THA} \cdot (1-\tau^{A}) \cdot (1+r)}{(1+r)^2-\tau^{A,CG} \cdot \beta^{A}}$

[140] $\Delta_{Acq,B} \geq \Delta_{Acq,A}$

As a result, acquirer B's reservation price equals the required price by acquirer A only if either interest rates are zero ($r = 0$) or if capital gains are exempted ($\beta^A = 0$). Under these assumptions, acquirer B's reservation price cannot exceed the minimum reservation price demanded by acquirer A and, therefore, acquirer A will always create capital losses upon disposal at the end of the first period. However, capital losses are lower than the ones A would face upon liquidation at the end of the second period. The reasoning behind this result is that capital gains taxation occurs either twice after one period (acquirer A realizes a capital loss at the end of the first period and acquirer B realizes a capital loss at the end of the second period) or only once after two periods (acquirer A keeps the target). Consequently, either the time value of money must be identical (interest rate is zero) or capital gains taxation has no value (capital gains are untaxed).

Given that interest rates are positive and capital gains are taxed, acquirer B's reservation price will always be lower than acquirer A's reservation price if he intends to sell. The value increasing effect of the sale remains present, but acquirer A still realizes a capital loss upon the sale. The only difference between the setting with and without subsequent acquisitions is that the overall capital loss is split up between acquirer A and acquirer B in the setting with subsequent acquisitions.

Given this analysis, it seems as if there could never be capital gains upon a sale. This of course is not true. First, assume that the target generates an overall loss until sold and profits thereafter. In this case, capital gains could occur as the price acquirer A is willing to pay at the beginning of the first period is lower than the price acquirer B is willing to pay at the end of the first period. Second, assume that acquirer A pays a lower M&A price for the target than his reservation price due to high negotiation power. Consequently, acquirer A's reservation price decreases (and subsequently his tax payment upon disposal increases), while acquirer B's reservation price must not be affected at all. Modelling this implies that acquirer A already knows the final M&A price paid for the target while determining his reservation price. However, this assumption contradicts the idea of determining a reservation price.

To sum up, capital gains should not occur within the scope of our model if the target is profitable and acquirer A pays his reservation price. Consequently, subsequent acquisitions can maximally lead to an indifference between selling and keeping the target and this indifference occurs only if either interest rates are zero or capital gains are exempted.

A.4.1.2 Costs of profit shifting

Under the full profit assumption, we assume that profits can be shifted without costs from the target to the tax haven subsidiary. However, several empirical (e.g., Swenson (2000), Huizinga and Laeven (2008), Maffini (2012), Markle (2016)) and theoretical papers assume

that profit shifting imposes costs. Therefore, full profit shifting might be an assumption that is too far reaching. Following a strand of theoretical literature that focuses on the costs of profit shifting via transfer pricing adjustments (e.g., Haufler and Schjelderup (2000), Johannesen (2010), Becker and Fuest (2012), Devereux et al. (2015)), we include an increasing convex cost function for profit shifting denote by $C(\Pi_{Acq})$. Thereby, costs for tax advisors to declare such price adjustments or possible fines to be paid should be covered by our cost function. The cost function is zero for no profit shifting ($C(\Pi_{Acq}) = 0;\ \Pi_{Acq} = 0$) and positive for any positive values of profit shifting ($C(\Pi_{Acq}) > 0;\ \Pi_{Acq} > 0$). Further, it is important to know in which countries costs arise and what their tax treatment looks like. Obviously, declaration costs should arise between the countries involved in profit shifting. In our model, this includes the target country (T) and the tax haven country of the MNE (TH). Additionally, costs might arise in the country where the MNE is located (A). All costs should, in principle, be deductible for tax purposes. However, some costs (e.g., fines) are often non-deductible. Consequently, a portion of the costs can also be assumed to be non-deductible. As a result, the cost function looks as follows:

$$C(\Pi_{Acq}) = \chi^{T}_{Acq}(\Pi_{Acq}) + \chi^{TH}_{Acq}(\Pi_{Acq}) + \chi^{A}_{Acq}(\Pi_{Acq}) + \phi_{Acq}(\Pi_{Acq}). \tag{4.14}$$

χ^{j}_{Acq} indicates the costs deductible for tax purposes in country *j*. ϕ_{Acq} denotes the costs of profit shifting that are non-deductible and is simply the difference between all costs and the costs deductible for tax purposes in the other countries.[141]

Taking into account this cost function, the acquirer's reservation price looks as follows:

$$P_{Acq} = \frac{[(\varepsilon+\Delta_{Acq}-\Pi_{Acq}-\chi^{T}_{Acq})]\cdot(1-\tau^{T})\cdot(1-\tau^{T}_{WHT})\cdot\alpha^{A,T}\cdot(1-\tau^{A})}{(1+r)^{t}-\tau^{A,CG}\beta^{A}}\cdot TVF_t + \tag{4.15}$$

$$\frac{(\Pi_{Acq}-\chi^{TH}_{Acq})\cdot(1-\tau^{TH})\cdot\alpha^{A,TH}\cdot(1-\tau^{A})}{(1+r)^{t}-\tau^{A,CG}\beta^{A}}\cdot TVF_t - \frac{\chi^{A}_{Acq}\cdot(1-\tau^{A})-\phi_{Acq}}{(1+r)^{t}-\tau^{A,CG}\beta^{A}}\cdot TVF_t.$$

Without specifying the cost function in more detail, it is now impossible to calculate the indifference price of the acquirer. We assume that the height of profit shifting costs depend on specific provisions in the respective country's law. Consequently, the cost function will be potentially different for each combination of acquirer, target and tax haven countries, depending on provisions for example for interest deductibility, transfer pricing regulations or CFC rules. For the full profit assumption in our empirical analysis, we argue that costs for profit shifting arising in the target country are captured by dummy variables controlling for limitations on debt financing and transfer pricing manipulations. Additionally, we argue that no or just very low costs should be created in the tax haven, as high profit shifting costs in the tax haven would contradict its attractiveness. Costs in the residence country of

[141] These costs occur per definition in Country A. This simplification has the effect that there is no difference between tax base and profit that can be paid out as dividends.

the acquirer—if at all related directly to the shifting—should be captured by implementing tax haven specific tax rates taken from the CFC rules of that country. Therefore, only non-deductible costs are left. As good tax planning involves not paying fines—and these are the most likely type of tax planning costs that are non-deductible—we expect non-deductible costs to be rather small. Consequently, we are able to take costs of profit shifting into account in the empirical application without specifying the cost function in more detail.

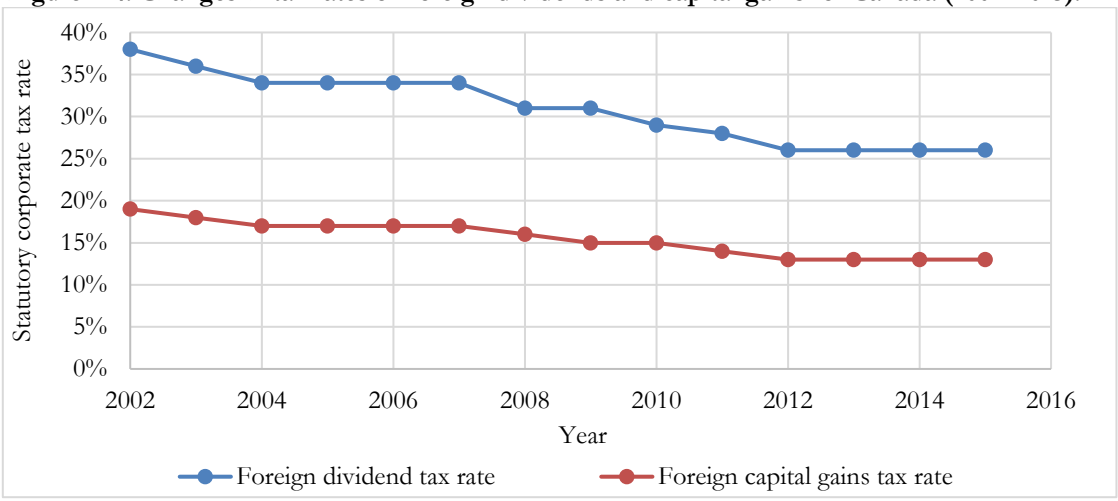
A.4.2 Tables and Figures

Table A 3. Overview of countries applying the four corporate taxation systems.

Capital gains \ Dividends	Credit method	Exemption method
Credit method	Argentina, Brazil, Canada, Chile, China, India, Indonesia, Israel, *Japan (until 2008)*, *Malta (until 2006)*, Mexico, *Norway (until 2003)*, Poland, *Portugal (until 2013)*, Republic of Korea, Romania, *South Africa (until 2004)*, *Turkey (until 2005)*, United States	*Australia (until 2003)*, Croatia, *Estonia (from 2008)**, Hungary, *Iceland (until 2007)*, *Italy (until 2003)*, *Japan (from 2009)*, Latvia, Lithuania, *Russian Federation (from 2008)***, *Slovenia (from 2006)*, *South Africa (from 2005)*, *Sweden (until 2002)*
Exemption method	*New Zealand (until 2008)*, *United Kingdom (until 2008)*	*Australia (from 2004)*, Austria, Belgium, Cyprus, Denmark, *France (from 2007)****, Germany, *Iceland (from 2008)*, *Italy (from 2004)*, Luxembourg, *Malta (from 2007)*, Netherlands, *New Zealand (from 2009)*, *Norway (from 2004)*, *Portugal (from 2014)*, *Slovenia (until 2005)*, Spain, *Sweden (from 2003)*, Switzerland, *Turkey (from 2006)*, *United Kingdom (from 2009)*

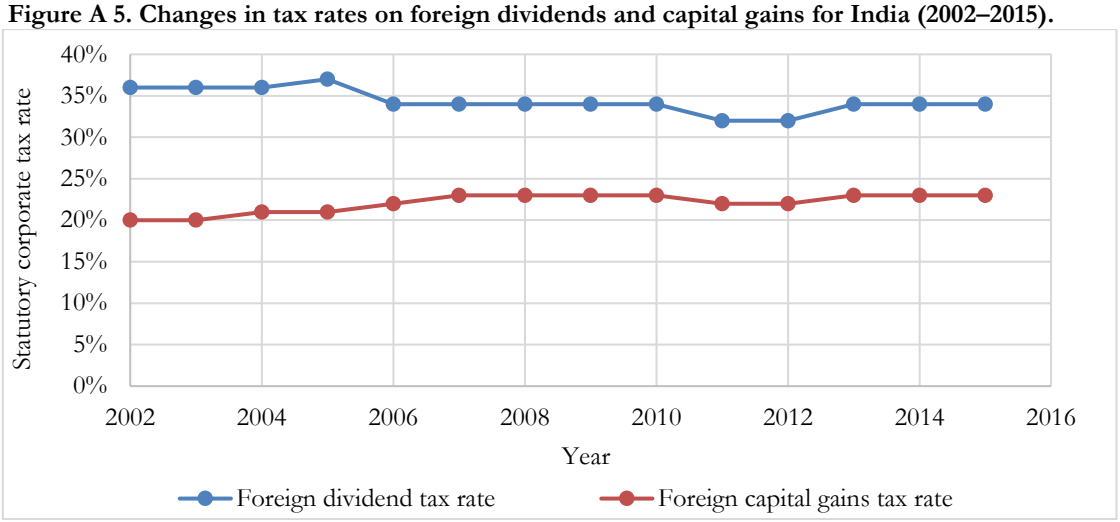
*Estonia deducted foreign capital gains taxes until 2007 and is therefore not included before 2008.
**Russian Federation operated a no relief system with regards to dividends until 2007 and is therefore not included before 2008.
***France deducted foreign capital gains taxes until 2006 and is therefore not included before 2007.

Figure A 4. Changes in tax rates on foreign dividends and capital gains for Canada (2002–2015).



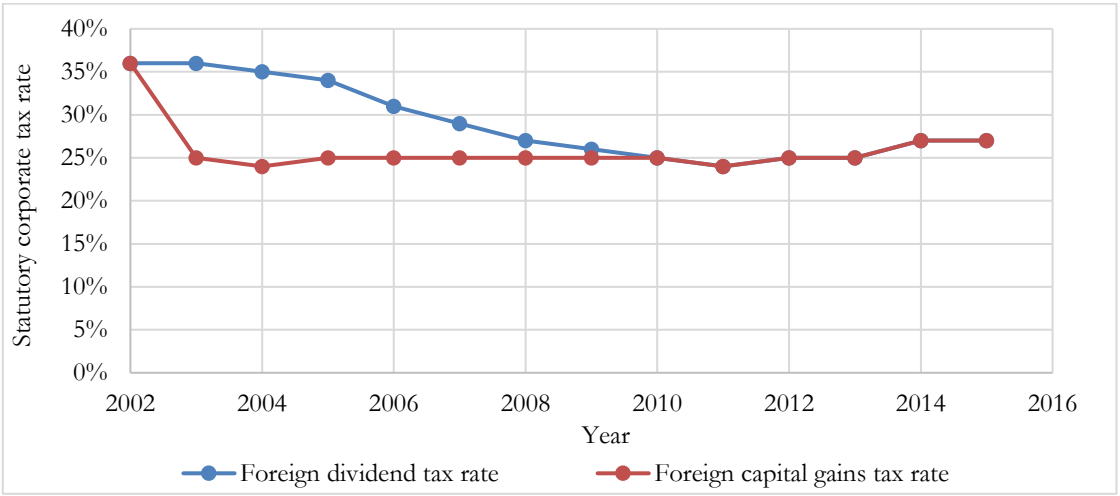
Source: Corporate taxation system data set.

Figure A 5. Changes in tax rates on foreign dividends and capital gains for India (2002–2015).



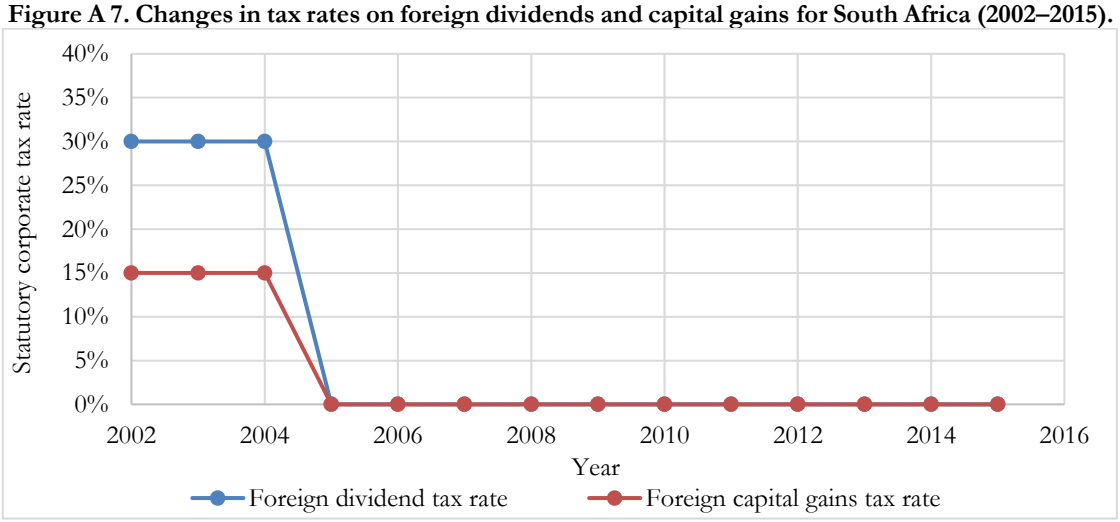
Source: Corporate taxation system data set.

Figure A 6. Changes in tax rates on foreign dividends and capital gains for Israel (2002–2015).



Source: Corporate taxation system data set.

Figure A 7. Changes in tax rates on foreign dividends and capital gains for South Africa (2002–2015).



Source: Corporate taxation system data set.

Table A 4. Liquidity effects with indefinite profit retention, profit shifting and tax credit in MNE's residence country.

		$t = 1$	$t = 2 \dots t = n$
Tax haven	Profit after taxes	$(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})$	$(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})$
	+ Interest income after taxes		$(n-1) \cdot (\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})^2 \cdot r$
	./. Dividends paid out		$(n-1) \cdot (\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})^2 \cdot r$
	= Cash flow (value increase)	$(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})$	$(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})$
MNE	New loan	D_{Acq}	$n \cdot D_{Acq}$
	./. Repayment of old loan		$(n-1) \cdot D_{Acq}$
	./. Interest expense		$(n-1) \cdot D_{Acq} \cdot r$
	+ Dividends received		$(n-1) \cdot (\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})^2 \cdot r$
	./. Taxes		$\left[\left((\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) - D_{Acq}\right) \cdot (n-1) \cdot r\right] \cdot \tau^{A} - min\left[(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) \cdot (n-1) \cdot r \cdot \tau^{TH}; \left[\left((\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) - D_{Acq}\right) \cdot (n-1) \cdot r\right] \cdot \tau^{A}\right]$
	= Cash flow (distribution)	D_{Acq}	$D_{Acq} + \left((\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH})^2 - D_{Acq}\right) \cdot (n-1) \cdot r - \left\{\left[\left((\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) - D_{Acq}\right) \cdot (n-1) \cdot r\right] \cdot \tau^{A} - min\left[(\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) \cdot (n-1) \cdot r \cdot \tau^{TH}; \left[\left((\varepsilon + \Delta_{Acq}) \cdot (1 - \tau^{TH}) - D_{Acq}\right) \cdot (n-1) \cdot r\right] \cdot \tau^{A}\right]\right\}$

Appendix to Section 5

Table A 5. Supplemental regression results for candidate acquirer country fixed effects interacted with target-specific financial data.

Regression (3) of Table 31		Regression (4) of Table 31		Regression (5) of Table 31	
*Australia*TargetAssets*	–0.1275**	*Australia*TargetSales*	–0.1167***	*Australia*TargetEBITDA*	–0.1229*
	(0.0526)		(0.0417)		(0.0696)
*Austria*TargetAssets*	0.0927	*Austria*TargetSales*	0.0242	*Austria*TargetEBITDA*	0.2592**
	(0.0960)		(0.0851)		(0.1150)
*Belgium*TargetAssets*	0.0394	*Belgium*TargetSales*	–0.0256	*Belgium*TargetEBITDA*	0.0561
	(0.0890)		(0.0693)		(0.1021)
*Canada*TargetAssets*	–0.1606***	*Canada*TargetSales*	–0.1735***	*Canada*TargetEBITDA*	–0.1486**
	(0.0541)		(0.0380)		(0.0643)
*China*TargetAssets*	0.0502	*China*TargetSales*	–0.0781	*China*TargetEBITDA*	–0.0301
	(0.0579)		(0.0507)		(0.1096)
*Denmark*TargetAssets*	0.0591	*Denmark*TargetSales*	0.0749	*Denmark*TargetEBITDA*	0.0275
	(0.1467)		(0.1215)		(0.1813)
*Finland*TargetAssets*	–0.0130	*Finland*TargetSales*	–0.1980***	*Finland*TargetEBITDA*	0.0561
	(0.1863)		(0.0728)		(0.0490)
*France*TargetAssets*	0.1841***	*France*TargetSales*	0.1561***	*France*TargetEBITDA*	0.1999***
	(0.0477)		(0.0420)		(0.0603)
*Germany*TargetAssets*	0.1779***	*Germany*TargetSales*	0.1239***	*Germany*TargetEBITDA*	0.2245***
	(0.0482)		(0.0479)		(0.0636)
*HongKong*TargetAssets*	–0.0375	*HongKong*TargetSales*	–0.0809*	*HongKong*TargetEBITDA*	–0.0597
	(0.0544)		(0.0477)		(0.0725)
*India*TargetAssets*	–0.1437**	*India*TargetSales*	–0.0593	*India*TargetEBITDA*	–0.3182***
	(0.0591)		(0.0369)		(0.0755)
*Ireland*TargetAssets*	–0.1022**	*Ireland*TargetSales*	–0.0565	*Ireland*TargetEBITDA*	–0.1737**
	(0.0504)		(0.0410)		(0.0714)
*Israel*TargetAssets*	–0.0013	*Israel*TargetSales*	–0.0859	*Israel*TargetEBITDA*	0.0781
	(0.0810)		(0.0572)		(0.1288)
*Italy*TargetAssets*	0.0162	*Italy*TargetSales*	0.0067	*Italy*TargetEBITDA*	0.0309
	(0.0585)		(0.0457)		(0.0794)
*Japan*TargetAssets*	0.1112**	*Japan*TargetSales*	0.1007**	*Japan*TargetEBITDA*	0.0818
	(0.0461)		(0.0404)		(0.0696)
*KoreaRep*TargetAssets*	0.0875	*KoreaRep*TargetSales*	–0.0338	*KoreaRep*TargetEBITDA*	0.2206
	(0.1026)		(0.0893)		(0.2751)
*Malaysia*TargetAssets*	–0.1075	*Malaysia*TargetSales*	–0.1171*	*Malaysia*TargetEBITDA*	–0.2086
	(0.1090)		(0.0707)		(0.1310)
*Netherlands*TargetAssets*	0.1765***	*Netherlands*TargetSales*	0.0893*	*Netherlands*TargetEBITDA*	0.1696**
	(0.0504)		(0.0458)		(0.0699)
*NewZealand*TargetAssets*	–0.0111	*NewZealand*TargetSales*	0.2038**	*NewZealand*TargetEBITDA*	–0.1343
	(0.1395)		(0.0951)		(0.1243)
*Norway*TargetAssets*	–0.2134***	*Norway*TargetSales*	–0.1773***	*Norway*TargetEBITDA*	–0.2307**
	(0.0732)		(0.0423)		(0.1167)
*RussianFederation*TargetAssets*	0.0481	*RussianFederation*TargetSales*	–0.1325	*RussianFederation*TargetEBITDA*	0.2715
	(0.2429)		(0.1597)		(0.1787)
*Singapore*TargetAssets*	–0.0009	*Singapore*TargetSales*	–0.0877	*Singapore*TargetEBITDA*	–0.0784
	(0.0640)		(0.0580)		(0.0812)
*Spain*TargetAssets*	0.2229***	*Spain*TargetSales*	0.1261**	*Spain*TargetEBITDA*	0.1338
	(0.0759)		(0.0589)		(0.0972)
*Sweden*TargetAssets*	0.3177***	*Sweden*TargetSales*	–0.0665	*Sweden*TargetEBITDA*	0.0543
	(0.1215)		(0.0901)		(0.1561)
*Switzerland*TargetAssets*	0.1798***	*Switzerland*TargetSales*	0.0347	*Switzerland*TargetEBITDA*	0.1748**
	(0.0563)		(0.0557)		(0.0872)
*UnitedKingdom*TargetAssets*	–0.0638	*UnitedKingdom*TargetSales*	–0.1709***	*UnitedKingdom*TargetEBITDA*	–0.0150
	(0.0475)		(0.0314)		(0.0577)
*Australia*TargetROA*	0.0451				
	(0.1562)				
*Austria*TargetROA*	–0.3821**				
	(0.1873)				
*Belgium*TargetROA*	0.0782				
	(0.3381)				
*Canada*TargetROA*	0.0885				
	(0.2366)				
*China*TargetROA*	–0.3323**				
	(0.1653)				
*Denmark*TargetROA*	0.3034				
	(0.2514)				
*Finland*TargetROA*	0.4007**				
	(0.1818)				
*France*TargetROA*	0.1699				
	(0.1596)				
*Germany*TargetROA*	–0.3493**				
	(0.1597)				
*HongKong*TargetROA*	0.0771				
	(0.1329)				

(*Continued*)

Table A 5. *Continued.*

*India*TargetROA*	0.0564
	(0.1776)
*Ireland*TargetROA*	0.2417*
	(0.1374)
*Israel*TargetROA*	–0.3429**
	(0.1377)
*Italy*TargetROA*	–0.1279
	(0.1952)
*Japan*TargetROA*	0.4780***
	(0.1482)
*KoreaRep*TargetROA*	–0.3778**
	(0.1693)
*Malaysia*TargetROA*	0.1243
	(0.1701)
*Netherlands*TargetROA*	0.3409
	(0.2256)
*NewZealand*TargetROA*	0.3107**
	(0.1298)
*Norway*TargetROA*	–0.0062
	(0.1873)
*RussianFederation*TargetROA*	0.1880
	(0.3663)
*Singapore*TargetROA*	–0.2435*
	(0.1407)
*Spain*TargetROA*	0.1719
	(0.2793)
*Sweden*TargetROA*	7.1903**
	(3.2794)
*Switzerland*TargetROA*	–0.2943*
	(0.1715)
*UnitedKingdom*TargetROA*	0.2905**
	(0.1420)

Table reports supplemental results from regressions (3), (4) and (5) of Table 31. In particular, the coefficient of the interaction between candidate acquirer country fixed effects with target-specific consolidated financial data (target total assets, target ROA, target net sales and target EBITDA) are shown. In all regressions, the USA represent the base category. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

Table A 6. Supplemental regression results for candidate target country fixed effects interacted with acquirer-specific financial data.

Regression (3) of Table 35		Regression (4) of Table 35		Regression (5) of Table 35	
*Australia*AcquirerAssets*	–0.0867***	*Australia*AcquirerSales*	–0.0542***	*Australia*AcquirerEBITDA*	–0.0819***
	(0.0194)		(0.0199)		(0.0230)
*Belgium*AcquirerAssets*	–0.0737**	*Belgium*AcquirerSales*	–0.0633**	*Belgium*AcquirerEBITDA*	–0.1133***
	(0.0302)		(0.0301)		(0.0389)
*Brazil*AcquirerAssets*	0.0321	*Brazil*AcquirerSales*	0.1174***	*Brazil*AcquirerEBITDA*	0.1288***
	(0.0301)		(0.0373)		(0.0361)
*Canada*AcquirerAssets*	–0.1900***	*Canada*AcquirerSales*	–0.1707***	*Canada*AcquirerEBITDA*	–0.1391***
	(0.0244)		(0.0245)		(0.0298)
*China*AcquirerAssets*	–0.1894***	*China*AcquirerSales*	–0.1697***	*China*AcquirerEBITDA*	–0.1784***
	(0.0212)		(0.0201)		(0.0279)
*Denmark*AcquirerAssets*	–0.0393	*Denmark*AcquirerSales*	–0.0148	*Denmark*AcquirerEBITDA*	–0.0599
	(0.0754)		(0.0855)		(0.0968)
*Finland*AcquirerAssets*	–0.0406	*Finland*AcquirerSales*	0.0486	*Finland*AcquirerEBITDA*	–0.1441
	(0.0725)		(0.0660)		(0.1023)
*France*AcquirerAssets*	–0.0699***	*France*AcquirerSales*	–0.0638***	*France*AcquirerEBITDA*	–0.1531***
	(0.0168)		(0.0174)		(0.0216)
*Germany*AcquirerAssets*	–0.0929***	*Germany*AcquirerSales*	–0.0944***	*Germany*AcquirerEBITDA*	–0.1481***
	(0.0156)		(0.0160)		(0.0196)
*HongKong*AcquirerAssets*	–0.2496***	*HongKong*AcquirerSales*	–0.2166***	*HongKong*AcquirerEBITDA*	–0.2576***
	(0.0345)		(0.0277)		(0.0399)
*India*AcquirerAssets*	0.0178	*India*AcquirerSales*	0.0684*	*India*AcquirerEBITDA*	0.0444
	(0.0334)		(0.0371)		(0.0420)
*Ireland*AcquirerAssets*	–0.0215	*Ireland*AcquirerSales*	–0.0067	*Ireland*AcquirerEBITDA*	–0.0489
	(0.0349)		(0.0344)		(0.0421)
*Italy*AcquirerAssets*	0.0233	*Italy*AcquirerSales*	0.0241	*Italy*AcquirerEBITDA*	–0.0159
	(0.0291)		(0.0300)		(0.0359)
*Japan*AcquirerAssets*	0.0125	*Japan*AcquirerSales*	–0.0390	*Japan*AcquirerEBITDA*	–0.0462
	(0.0403)		(0.0456)		(0.0554)
*KoreaRep*AcquirerAssets*	0.0294	*KoreaRep*AcquirerSales*	0.0095	*KoreaRep*AcquirerEBITDA*	0.0552
	(0.0504)		(0.0494)		(0.0542)
*Malaysia*AcquirerAssets*	–0.2115***	*Malaysia*AcquirerSales*	–0.1429***	*Malaysia*AcquirerEBITDA*	–0.2109***
	(0.0426)		(0.0421)		(0.0558)
*Mexico*AcquirerAssets*	–0.3658***	*Mexico*AcquirerSales*	–0.1508***	*Mexico*AcquirerEBITDA*	–0.0526
	(0.0316)		(0.0437)		(0.0550)
*Netherlands*AcquirerAssets*	–0.0799***	*Netherlands*AcquirerSales*	–0.0567***	*Netherlands*AcquirerEBITDA*	–0.1291***
	(0.0209)		(0.0215)		(0.0259)
*NewZealand*AcquirerAssets*	–0.1727***	*NewZealand*AcquirerSales*	–0.1197***	*NewZealand*AcquirerEBITDA*	–0.3288***
	(0.0307)		(0.0266)		(0.0381)
*Norway*AcquirerAssets*	–0.1155***	*Norway*AcquirerSales*	–0.0915***	*Norway*AcquirerEBITDA*	–0.1021***
	(0.0273)		(0.0262)		(0.0340)
*Poland*AcquirerAssets*	–0.0356	*Poland*AcquirerSales*	–0.0602	*Poland*AcquirerEBITDA*	–0.0928*
	(0.0452)		(0.0441)		(0.0500)
*RussianFederation*AcquirerAssets*	–0.0841	*RussianFederation*AcquirerSales*	–0.1421**	*RussianFederation*AcquirerEBITDA*	–0.0242
	(0.0558)		(0.0607)		(0.0884)
*Singapore*AcquirerAssets*	–0.1589***	*Singapore*AcquirerSales*	–0.1096***	*Singapore*AcquirerEBITDA*	–0.1836***
	(0.0315)		(0.0268)		(0.0356)
*SouthAfrica*AcquirerAssets*	–0.1952***	*SouthAfrica*AcquirerSales*	–0.1524***	*SouthAfrica*AcquirerEBITDA*	–0.1421***
	(0.0376)		(0.0371)		(0.0543)
*Spain*AcquirerAssets*	–0.0371	*Spain*AcquirerSales*	–0.0328	*Spain*AcquirerEBITDA*	–0.0454
	(0.0317)		(0.0312)		(0.0358)
*Switzerland*AcquirerAssets*	–0.0841***	*Switzerland*AcquirerSales*	–0.0741***	*Switzerland*AcquirerEBITDA*	–0.0619*
	(0.0264)		(0.0285)		(0.0350)
*UnitedKingdom*AcquirerAssets*	–0.0884***	*UnitedKingdom*AcquirerSales*	–0.0762***	*UnitedKingdom*AcquirerEBITDA*	–0.1113***
	(0.0174)		(0.0179)		(0.0214)
*Australia*AcquirerROA*	–0.0370				
	(0.0295)				
*Belgium*AcquirerROA*	0.0158***				
	(0.0057)				
*Brazil*AcquirerROA*	–0.0375				
	(0.0277)				
*Canada*AcquirerROA*	–0.0413				
	(0.0390)				
*China*AcquirerROA*	–0.0043				
	(0.0112)				
*Denmark*AcquirerROA*	0.0424				
	(0.5075)				
*Finland*AcquirerROA*	–0.1937				
	(0.1496)				
*France*AcquirerROA*	0.0021				
	(0.0058)				
*Germany*AcquirerROA*	0.0108**				
	(0.0053)				
*HongKong*AcquirerROA*	–0.0648*				
	(0.0355)				

(*Continued*)

Table A 6. *Continued.*

*India*AcquirerROA*	–0.0484
	(0.0374)
*Ireland*AcquirerROA*	–0.0134
	(0.0453)
*Italy*AcquirerROA*	–0.0068
	(0.0254)
*Japan*AcquirerROA*	–0.0642*
	(0.0346)
*KoreaRep*AcquirerROA*	–0.0577*
	(0.0337)
*Malaysia*AcquirerROA*	0.0007
	(0.0079)
*Mexico*AcquirerROA*	–0.0010
	(0.0081)
*Netherlands*AcquirerROA*	–0.0154
	(0.0531)
*NewZealand*AcquirerROA*	0.0195
	(0.0137)
*Norway*AcquirerROA*	–0.0151
	(0.0344)
*Poland*AcquirerROA*	–0.0394
	(0.0410)
*RussianFederation*AcquirerROA*	–0.0564*
	(0.0339)
*Singapore*AcquirerROA*	–0.0539
	(0.0349)
*SouthAfrica*AcquirerROA*	0.0006
	(0.0076)
*Spain*AcquirerROA*	–0.0365
	(0.0386)
*Switzerland*AcquirerROA*	0.0027
	(0.0058)
*UnitedKingdom*AcquirerROA*	–0.0098
	(0.0196)

Table reports supplemental results from regressions (3), (4) and (5) of Table 35. In particular, the coefficient of the interaction between candidate target country fixed effects with acquirer-specific consolidated financial data (acquirer total assets, acquirer ROA, acquirer net sales and acquirer EBITDA) are shown. In all regressions, the USA represent the base category. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively. Robust standard errors are provided in parentheses.

Appendix to Section 6

Table A 7. Überblick über Finanzierungsgesellschaften sowie weitere Bilanzdaten und Kennzahlen.

Konzern	Name der Tochtergesellschaft	Bilanz-summe (Mio. €)	Ford. ggü. verb. Unt. (Mio. €)	Operativer Ertrag (Mio. €)	Finanzerlö-se (Mio. €)	Gewinn vor Steuern (Mio. €)	Steuer-aufwand (Mio. €)	Effektive Steuer-quote	Mitarbei-teranzahl	Grün-dungs-jahr
Jahr 2014										
Finanzierungsgesellschaften										
BASF SE	BASF Belgium Coordination Center	15.39	15.224	120	756	113	0	0%	244	2003
Bayer AG	Bayer Antwerpen	14.005	13.412	1.163	1.095	310	15	5%	794	1991
Beiersdorf AG	Beiersdorf Finance									2007
HeidelbergCement AG	CBR International Services	1.417	1.408	2	41	40	0	1%	7	1991
K+S AG	K+S Finance Belgium	2.126	1.083	0	75	74	13	17%	3	2009
Symrise AG	Symrise Group Finance Holding 2	94	92	0	3	3	0	5%	1	2010
Volkswagen AG	Volkswagen Group Services	21.546	20.828	40	237	189	0	0%	61	1991
Operativ tätige Finanzierungsgesellschaften										
Aurubis AG	Aurubis Belgium	895	470	2.279	19	–4	0	1%	518	2005
Continental AG	Continental Automotive Benelux	440	292	256	6	–9	0	1%	492	2010
Evonik Industries AG	Evonik Degussa Antwerpen	459	193	680	0	35	7	19%	1.040	1991
	Evonik Oxeno Antwerpen	445	0	663	5	25	6	22%	3	2002
Jungheinrich AG	Jungheinrich	35	0	62	0	3	1	35%	186	1991
Lanxess AG	Lanxess	729	400	669	68	–31	2	–5%	887	2004
STADA Arzn. AG	Eurogenerics	184	30	162	1	20	6	30%	126	1991
Jahr 2013										
Finanzierungsgesellschaften										
BASF SE	BASF Belgium Coordination Center	14.977	14.758	120	565	16	0	0%	240	2003
Bayer AG	Bayer Antwerpen	8.965	8.289	1.122	721	279	21	7%	803	1991
Beiersdorf AG	Beiersdorf Finance	107	78	0	0	0	0	3%	1	2007
HeidelbergCement AG	CBR International Services	1.377	1.367	2	41	40	0	1%	8	1991
K+S AG	K+S Finance Belgium	1.812	1.166	0	75	74	13	18%	3	2009
Symrise AG	Symrise Group Finance Holding 2	102	101	0	3	3	0	6%	1	2010
Volkswagen AG	Volkswagen Group Services	21.028	19.601	40	212	158	0	0%	58	1991
Operativ tätige Finanzierungsgesellschaften										
Aurubis AG	Aurubis Belgium	966	492	2.554	33	21	3	12%	502	2005
Continental AG	Continental Automotive Benelux	420	279	199	7	15	3	20%	499	2010
Evonik Industries AG	Evonik Degussa Antwerpen	422	159	600	0	37	7	20%	1.031	1991
	Evonik Oxeno Antwerpen	408	0	696	6	46	12	27%	2	2002
Jungheinrich AG	Jungheinrich	32	0	62	0	3	1	37%	178	1991
Lanxess AG	Lanxess	688	380	703	109	–50	1	–1%	916	2004
STADA Arzn. AG	Eurogenerics	85	0	155	0	10	4	35%	87	1991

(*Continued*)

Table A 7. ***Continued.***

Jahr 2012										
Finanzierungsgesellschaften										
BASF SE	BASF Belgium Coordination Center	14.673	14.512	111	1.343	77	3	4%	221	2003
Bayer AG	Bayer Antwerpen	8.585	8.054	1.167	575	309	23	8%	811	1991
Beiersdorf AG	Beiersdorf Finance	107	83	0	0	0	0	0%	1	2007
HeidelbergCement AG	CBR International Services	1.338	1.308	159	47	43	0	1%	10	1991
K+S AG	K+S Finance Belgium	1.83	1.36	0	81	80	14	17%	3	2009
Symrise AG	Symrise Group Finance Holding 2	88	87	0	3	3	0	1%	1	2010
Volkswagen AG	Volkswagen Group Services	17.564	15.888	42	246	153	0	0%	57	1991
Operativ tätige Finanzierungsgesellschaften										
Aurubis AG	Aurubis Belgium	1.062	602	2.836	39	47	6	14%	473	2005
Continental AG	Continental Automotive Benelux	421	263	231	10	56	15	26%	481	2010
Evonik Industries AG	Evonik Degussa Antwerpen	374	131	576	1	36	7	20%	1.023	1991
	Evonik Oxeno Antwerpen	368	0	697	19	74	23	30%	1	2002
Jungheinrich AG	Jungheinrich	33	0	57	0	3	1	36%	170	1991
Lanxess AG	Lanxess	1.026	691	750	172	29	7	25%	922	2004
STADA Arzn. AG	Eurogenerics	80	0	150	0	13	4	33%	88	1991
Jahr 2011										
Finanzierungsgesellschaften										
BASF SE	BASF Belgium Coordination Center	17.981	17.916	53	1.003	96	3	3%	161	2003
Bayer AG	Bayer Antwerpen	8.365	7.979	1.029	612	255	11	4%	813	1991
Beiersdorf AG	Beiersdorf Finance	107	27	0	1	1	0	0%	1	2007
HeidelbergCement AG	CBR International Services	1.296	1.242	163	52	48	0	0%	11	1991
K+S AG	K+S Finance Belgium	1.798	1.262	0	79	79	12	15%	3	2009
Symrise AG	Symrise Group Finance Holding 2	84	83	0	3	3	0	9%	1	2010
Volkswagen AG	Volkswagen Group Services	17.186	13.773	38	249	141	0	0%	49	1991
Operativ tätige Finanzierungsgesellschaften										
Aurubis AG	Aurubis Belgium	1.021	442	3.112	37	42	11	27%	460	2005
Continental AG	Continental Automotive Benelux	410	307	284	8	73	21	29%	478	2010
Evonik Industries AG	Evonik Degussa Antwerpen	337	108	555	3	30	5	18%	1.007	1991
	Evonik Oxeno Antwerpen	342	0	666	17	65	15	24%	1	2002
Jungheinrich AG	Jungheinrich	36	0	58	0	3	1	34%	161	1991
Lanxess AG	Lanxess	987	431	730	124	63	17	27%	930	2004
STADA Arzn. AG	Eurogenerics	76	0	154	0	18	6	33%	83	1991

Als Gründungsjahr wurde das erste Jahr eingetragen, für das ein Jahresabschluss bei der Bilanzzentrale der Belgischen Nationalbank (Central Balance Sheet Office of the National Bank of Belgium) hinterlegt ist. Für Jahre vor 1991 gibt es keine Abschlüsse.

Curriculum Vitae

Name	Dominik von Hagen
Title	Master of Science (M.Sc.)

Education

Since November 2013	Mannheim University Ph.D. Candidate and Academic Researcher at the Chair of Business Administration and Taxation (Professor Dr. Ulrich Schreiber)
August 2010—July 2013	Mannheim University Master-Studies in Business Administration Scholarship of Konrad-Adenauer-Foundation
August 2009—December 2009	Lancaster University (United Kingdom) Summer School and Erasmus Exchange Studies
August 2007—July 2010	Mannheim University Bachelor-Studies in Business Administration Scholarship of Konrad-Adenauer-Foundation
January 2003—April 2003	Glenstal Abbey School (Limerick, Ireland) Student Exchange
August 1998—July 2007	St.-Ursula-Gymnasium Attendorn Degree: Bilinguales Abitur (Bilingual High School Diploma)

Professional experience

June 2008—July 2012	Internships at the following companies BASF South East Asia Pte Ltd (Singapore), E.ON SE, KPMG AG, BASF SE, Walter Stauffenberg GmbH & Co. KG