

Christian Steffens

Taxes, Investments and Asset Pricing
An Empirical Analysis

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

Dekan:	Dr. Jürgen M. Schneider
Referent:	Prof. Dr. Ulrich Schreiber
Korreferent:	Prof. Dr. Johannes Voget
Tag der mündlichen Prüfung:	11. März 2015

Acknowledgements

Foremost, I would like to express my deepest appreciation and thanks to my academic supervisor, *Professor Dr. Ulrich Schreiber*. He has been a tremendous mentor for me. I would like to thank him for encouraging my research and granting me the academic freedom to fully exploit my personal potential. His advice on both research as well as on my career have been priceless.

I am very grateful to *Professor Dr. Johannes Voget* for serving as the second referee of my doctoral thesis. It has been a special honor to work with him. He continually and persuasively conveyed a spirit of adventure in regard to empirical tax research and without his supervision and constant help this dissertation would not have been possible.

I also express my sincere gratitude to *Professor Dr. Martin Ruf* who took me by the hand when my empirical knowledge was still very limited. I would like to thank him for teaching me so much and for his continuous support of my doctoral studies and research.

My sincere thanks also go to *Dipl.-Volksw. Thomas Belz* for being the best colleague and co-author I can imagine. It was a pleasure and a great experience to work with him.

I thank all my colleagues for the great working atmosphere, their constant support and all the fun we had in the last four years.

Finally, a special thanks to my family. Words cannot express how grateful I am to my mother and father for all of the sacrifices that they made on my behalf.

Mannheim, April 2015

Christian Steffens

Table of Contents

TABLE OF CONTENTS.....	1
LIST OF FIGURES	4
LIST OF TABLES	5
1 General Introduction	7
2 Introduction to Databases	10
3 Literature Review.....	19
3.1 Taxes and M&A Activities	19
3.1.1 Taxation as a Determinant of M&A.....	20
3.1.2 Taxes and M&A Pricing	22
3.1.3 M&A Tax Planning.....	24
3.2 M&A and Tax Loss Carry-Forwards	26
3.3 Capital Gains Taxation.....	29
3.3.1 Capitalization effect	30
3.3.2 Lock-in effect	31
4 Tax Avoidance as a Driver of Mergers and Acquisitions?	35
4.1 Introduction	36
4.2 Tax avoidance as a driver of mergers and acquisitions.....	39
4.2.1 Effective Tax Rate (ETR)	40
4.2.2 Transfer pricing	41
4.2.3 Debt shifting.....	42
4.3 Empirical Analysis	44
4.3.1 Data	44
4.3.2 Econometric Approach.....	47
4.4 Results	51
4.4.1 Descriptive Evidence.....	51
4.4.2 Main Results.....	54
4.4.3 Sensitivity Analyses	60
4.4.3.1 Group taxation.....	60

4.4.3.2	Exact Matching	62
4.5	Conclusion.....	64
4.6	Appendix	65
4.7	References	67
5	Restricted Tax Loss Transfer and Business Cycle Effects	71
5.1	Introduction	72
5.2	Literature Review and Hypotheses Development	75
5.2.1	Taxes and Loss-Acquisitions	75
5.2.2	Taxes and Firm Entry	77
5.2.3	Value-relevance of Losses and Firm Exit	80
5.3	Data	82
5.3.1	Database	82
5.3.2	Dataset.....	82
5.4	Loss M&As – Test of Effectiveness	84
5.4.1	M&A Rate	84
5.4.2	Test of Effectiveness	85
5.5	Firm Entry and Firm Exit	92
5.5.1	Base Case	92
5.5.2	Loss-Probability	100
5.5.3	Synthetic Control Groups.....	104
5.6	Discussion of Results	113
5.7	Conclusion.....	115
5.8	Appendix	117
5.9	References	122
6	Capital Gains Taxes and Long-term Return Reversal: Evidence from Pole to Pole	129
6.1	Introduction	130
6.2	Lock-in Hypothesis	133
6.3	The U.S. Case.....	135
6.3.1	Data and Methodology	135
6.3.2	Results	139
6.4	Capital Gains Taxes and Long-term Return Reversal around the World	145
6.4.1	Return Reversal from Pole to Pole	145

6.4.2	Capital Gains Taxes as a Driver of Long-term Return Reversal.....	152
6.4.3	Return Reversal and International Market Integration.....	159
6.4.3.1	Home Bias and National Tax Rates	160
6.4.3.2	International Capital Gains Tax Rates	165
6.5	Conclusion.....	168
6.6	Appendix	170
6.7	References	175
7	Overall Conclusion.....	181
8	Full List of References	183

List of Figures

Figure 2-1: Global Deals by Volume and Value	11
Figure 2-2: Top Five Global Acquirer Countries and Target Countries by Deal Value	12
Figure 2-3: Development of ETR, Leverage and Profitability over Time	13
Figure 2-4: Development of Entry and Exit Rates over Time	14
Figure 2-5: Average Annual Returns for the U.S. and the other OECD Countries	16
Figure 2-6: Average Annual Returns for the U.S. and Dow Jones Industrial	18
Figure 2-7: Average Annual Returns for the OECD, Euro Stoxx 50 and Nikkei 225	18
Figure 4-1: Illustration of Debt Shifting	43
Figure 4-2: Regional Origin of Acquirers of European Target Firms.....	46
Figure 4-3: Target Effective Tax Rate (ETR) pre and post Deal	52
Figure 4-4: Target Profitability pre and post Deal	53
Figure 4-5: Target Leverage pre and post Deal.....	53
Figure 4-6: Debt Push Down Strategy in Group Tax Regimes.....	61
Figure 5-1: Entry Rates and Exit Rates over Time	94
Figure 5-2: Comparison of Entry Rates – Treatment Unit vs. Synthetic Control Unit.....	107
Figure 5-3: Comparison of Exit Rates – Treatment Unit vs. Synthetic Control Unit.....	111
Figure 5-4: Appendix C - Placebo Studies – Entry Rate Gap	121
Figure 5-5: Appendix C - Placebo Studies – Exit Rate Gap	121

List of Tables

Table 4-1: Descriptive Statistics	45
Table 4-2: Selection Equation	50
Table 4-3: Balancing Property - All	51
Table 4-4: Average Effective Tax Rate.....	55
Table 4-5: Average Effective Tax Rate: tax vs. non-tax aggressive Acquirer.....	56
Table 4-6: Average Profitability	57
Table 4-7: High-tax and Low-tax Targets	58
Table 4-8: High-tax vs. Low-tax Target - Minimum Tax Rate of the Group	59
Table 4-9: Average Leverage	60
Table 4-10: Average Leverage - Countries without Group Taxation Regimes	62
Table 4-11: Exact Matching	63
Table 4-12: Appendix - Variable Definition	65
Table 5-1: Descriptive Statistics of M&A Rates.....	85
Table 5-2: Descriptive Statistics of Control Variables.....	87
Table 5-3: M&A Rate Regression Results	88
Table 5-4: Descriptive Statistics of Entry Rates and Exit Rates	93
Table 5-5: Entry Rate Regression	96
Table 5-6: Exit Rate Regression.....	99
Table 5-7: Entry Rates and Loss-Probability	102
Table 5-8: Exit Rates and Loss-Probability	103
Table 5-9: Weights for Synthetic Entry Control Groups	105
Table 5-10: Predictor Means for Entry before the Tax Reforms	106
Table 5-11: Synthetic Difference-in-Difference Entry Estimates.....	108
Table 5-12: Weights for Synthetic Exit Control Groups.....	109
Table 5-13: Predictor Means for Exit before the Tax Reforms.....	110
Table 5-14: Synthetic Difference-in-Difference Exit Estimates	112
Table 5-15: Appendix A - Variable Definition	117
Table 5-18: Appendix B - Reforms.....	120
Table 6-1: Stock Return Reversal based on the Traditional Reversal Measure.....	140
Table 6-2: Stock Return Reversal based on the Capital Gains Tax Burden Measure.....	142
Table 6-3: Risk-adjusted Stock Return Reversal	144
Table 6-4: Country Overview	147

Table 6-5: International Long-term Return Reversal	149
Table 6-6: Winner Stock Return Reversal	155
Table 6-7: Loser Stock Return Reversal	158
Table 6-8: Home Bias and Domestic Equity Holdings	162
Table 6-9: Domestic Equity Holdings Regression	164
Table 6-10: Weighted Average Foreign Capital Gains Tax Regression	167
Table 6-11: Appendix - Domestic Equity Holding and Loser Reversal	170
Table 6-12: Appendix - Weighted Average Foreign Corporate Capital Gains Tax.....	171
Table 6-13: Appendix - Variable Definition	172

1 General Introduction

This doctoral thesis consists of three empirical papers on the influence of taxes on acquisitions, investment decisions and asset pricing. All three studies pursue the goal to enhance the understanding of the interaction of taxes and economic decision making. In all essays a wide variety of econometric models is applied to gain further insights into the economic meaning of taxes and quantitatively test theoretical predictions of the influence of taxes on investment behavior and asset prices.

Investment defined as the accumulation of new capital in a business is the fundamental source of firm value and the driver of economic growth. Taxes play a major role for investment decisions as they directly affect an investment project's profitability. Companies, policy makers and private investors devote considerable attention to taxes and their consequences for investments. Asset prices convey information on market expectations and market risk, drive economic fluctuations and help allocating resources. In recent years we have witnessed extreme developments in asset prices including strong boom and bust periods in security markets and historically low interest rates. As a result, it has become more important to understand the influence of taxes on asset price movements in order to incorporate their effects into policy decisions and portfolio considerations. Ultimately, what the effects of taxes on investments and asset prices are is an empirical question.

The three essays cover different fields of corporate and individual investments as well as the area of security pricing. The first essay "*Tax Avoidance as a Driver of Mergers & Acquisitions?*" tests if acquirers systematically implement tax planning strategies at target-level. The second paper "*Restricted Tax Loss Transfer and Business Cycle Effects*" examines the question how limitations to passing on losses through acquisitions adversely affect investor behavior. The last study "*Capital Gains Taxes and Long-term Return Reversal: Evidence from Pole to Pole*" extends the scope of the previous two essays by focusing on shareholder-level taxation. It investigates the link between capital gains taxes and anomalous stock price changes. All papers are based on sound underlying economic theories and serve the mere purpose to provide empirical evidence of analytical expectations. That way, theoretical predictions are either statistically validated or might have to be reconsidered in the light of unexpected empirical results.

The Empirical findings presented in this thesis are equally interesting for different groups of market participants. They could help investors to understand how M&A-tax planning is realized and what the consequences of tax-driven corporate takeovers are. They could also provide guidance for policy makers on the design of anti-avoidance rules and help to reconcile the objective of revenue sufficiency with the need to set investment incentives. In addition, they might serve as blueprints for tax-efficient trading strategies and enhance the understanding of tax-driven price reactions.

Every paper is an independent scientific study with its own research question, systematic outlines, descriptive statistics and empirical results. In order to set a common conceptual framework for all three essays this thesis is extended by three additional components.

The first component presents a concise overview of the different databases that are used throughout this thesis. It presents descriptive statistics of key data elements to ensure the comparability and validity of the various data sources.

The second element comprises a literature review of the different areas of tax research covered by the three papers. It outlines the historical development of the different strands of literature, distinguishes between various fields of empirical tax research and briefly describes the individual contributions of the three empirical studies to those research areas.

The third component is a concise summary of the main results of all three papers and presents thoughts for future research.

For the construction of the numerous datasets I made use of five commercial databases and gathered information from a broad range of other freely-available data sources. All datasets are combinations of comprehensive micro-level data and additional macroeconomic variables. Every dataset is individually structured to meet the specific data requirements of each research project. Those datasets enable me to explore various sources of variation in order to draw inferences from time-series and cross-sectional changes.

Empirical research consists to a considerable extent of data preparation and statistical programming to be able to draw meaningful economic inferences. All statistical results presented in this thesis are based on extensive programming codes in the statistical software package *Stata*. The programming codes are not included since their full length would be outside the scope of this thesis. But I gladly provide all programming codes upon request.

Empirical research is a challenging and rewarding discipline. It requires considerable time and effort to identify economic effects and interpret the corresponding results. I am grateful that I got the opportunity to work on interesting research projects in an interdisciplinary field with a group of excellent scientists. I hope that I was able to make a little contribution to economic research in general and to empirical tax research in particular.

2 Introduction to Databases

This chapter gives a broad overview of the five different databases that were used to collect the data and to construct the different datasets which are the fundamental groundwork for all three studies. Most of the freely-accessible or commercial databases are offered by private or public data providers in cooperation with many institutional, governmental or other information vendors. Despite related data sources or similar methods of data collection, most of these databases differ with respect to data type, data items, data availability and data structure.

Most databases commonly used in empirical tax research or related fields focus on the same data types such as financial accounting data, security prices or data on firm transactions. In addition, some databases also provide data on other closely related topics such as corporate structures, analysts' forecasts or market research.

Databases that in principle offer the same informational content often differ with respect to the number and the definition of data items that contain the information.¹ The more precise the definitions are and the finer the subdivisions of the variables are set the more reliable econometric conclusions can be drawn.

Despite the growing number of data sources that have constantly improved data availability over the last two decades, no database can offer a universal coverage of all available data. Data is mostly limited by data type, geographic coverage, the time period covered or the preservation of historical observations. As a consequence, mostly a combination of various data sources is necessary to construct a comprehensive and powerful dataset.

In order to provide data that can be easily accessed, searched and retrieved, databases usually convert the collected data into a standardized format that ensures the comparability of the same data items across different categories e.g. countries, currencies or time periods. However, almost every database applies its own individual data structure, which leads to major differences in search criteria, download modes and identification variables. Those database-specific mismatches impede the construction of combined datasets from different databases. Considering the existence of a wide variety of databases and the large number of inconsistencies and missing common links between them, the database choice can significantly affect the final empirical results.²

¹ For instance, the Amadeus database offers the item "taxes paid" which contains "cash taxes paid" and "deferred taxes". In contrast, Compustat North America offers the same information subdivided into two separate tax variables. The same can be observed for various other balance sheet or income statement items.

² Several studies examine the suitability of databases for academic research and identify possible database bias-

The three empirical studies are based on data from the Zephyr M&A database, the Amadeus database, the Orbis database, Thomson Reuters' Datastream and the Center for Research in Security Prices (CRSP) database.

The Zephyr database provided by Bureau van Dijk offers information on corporate mergers and acquisitions, IPOs, private equity deals and venture capital deals with pan-European transactions dating back to 1997 and U.S. deals starting in 2001. Zephyr is updated on a daily basis and currently contains over one million worldwide transactions for both public and private companies. The database contains information on pending, withdrawn, rumored, announced as well as completed deals. The individual deal records describe the acquiring firm and the target company along with descriptive information on the deal itself. Transactions are categorized by companies involved in a deal (i.e. bidders, targets and vendors), geography, time period, deal status, deal type and deal structure. Furthermore, Zephyr offers a value-based classification that includes deal value, bid premium and target value. Zephyr is used as data source for numerous scientific M&A reports and indices (e.g. The ZEW-Zephyr M&A Report, the ZEW-Zephyr M&A-Index, the Zephyr Annual M&A Report).

Figure 2-1: Global Deals by Volume and Value

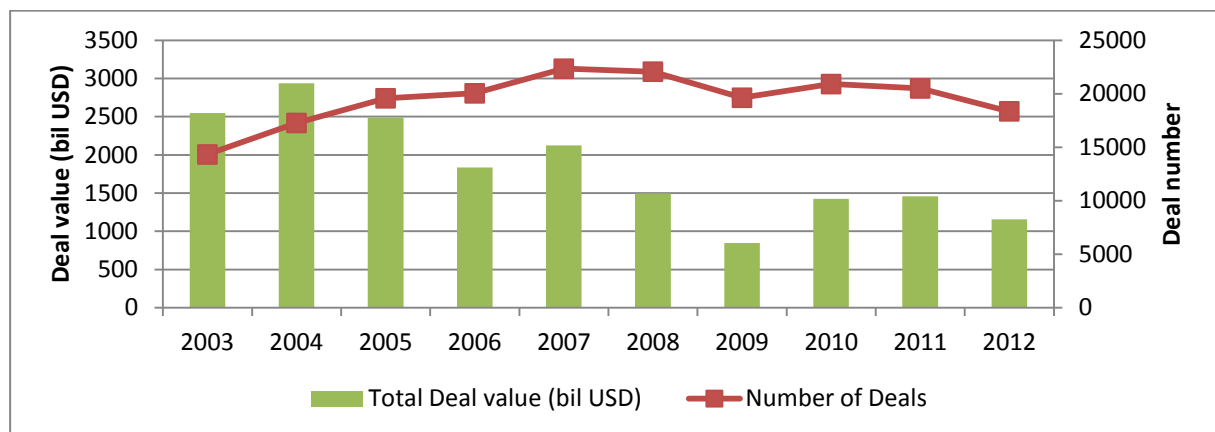


Figure 2-1 is based on a Zephyr download from May 2013. It shows all worldwide completed 100 % acquisitions. Deal value is in billions of US Dollar.

Figure 2-1 shows the development of worldwide completed 100 % acquisitions in terms of deal value and number of deals for the last 10 years. The total number of transactions and the overall deal values are below common levels found in aggregated studies because Figure 2-1

es. Among others, Lara, Osma and Noguera (2006) analyze whether the choice of database has an effect on the results of empirical studies in general. Ince and Porter (2006) evaluate Thomson Reuters' Datastream for the use in studies involving large numbers of individual equities. Rosenberg and Houghlet (1974) compare different return data available from the CRSP database and the Compustat database.

only displays a subpart of all available deal types. In comparison to the Zephyr Annual M&A Report 2013 my dataset contains on average about 30 % of the total deal values and roughly 25 % of the overall number of deals. However, the general evolvement over time is very similar to the trends described by the report. All in all, the dataset can be viewed as a representative sample of international M&A activities.

Figure 2-2: Top Five Global Acquirer Countries and Target Countries by Deal Value

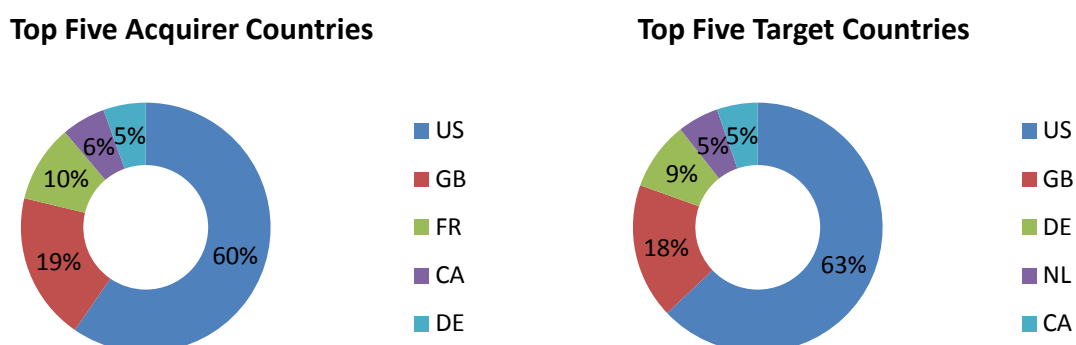


Figure 2-2 is based on the years 2003 to 2012 from a Zephyr download from May 2013. The top five acquirer countries and top five target countries refer to the overall deal values of worldwide completed 100 % acquisitions.

Figure 2-2 shows that companies based in the U.S. were with a relative share of 60 % the most important worldwide acquirers. At the same time the U.S. with a portion of 63 % was the most favorable target country in the last 10 years. The U.K. with a relative share of 19 % of all acquirers and 18 % of all targets is ranked second in a worldwide context but clearly tops the European ranking in terms of buyers and targets. France, Canada and Germany are traditionally also very active M&A markets. This accumulated overview largely corresponds to other M&A reports for the last decade.³

The Bureau van Dijk Amadeus database contains standard financial accounting information, general descriptive information, industry classifications and ownership information on over 21 million European companies including various legal forms and size categories. The database further distinguishes between listed and unlisted firms and provides unconsolidated as well as consolidated accounts. The Amadeus database predominantly covers private limited companies and the coverage varies largely by country with a focus on Eastern and Central

³ The alternative ranking based on the number of worldwide acquisitions shows similar results.

European companies.⁴ Financial institutions and insurance companies are not included in Amadeus database but are available from the Orbis database. All financial accounting information is provided in a standardized format for 26 balance sheet items, 26 profit and loss accounting items and 32 standard ratios to ensure comparability across companies and countries. The database includes up to ten years of historical financial statement information for every active company. Earlier information on financial accounts is not preserved. Historical information on inactive firms is deleted from the database after five years of non-reporting. However, this time span can increase due to a time lag in the updating process of the database.

Figure 2-3: Development of ETR, Leverage and Profitability over Time

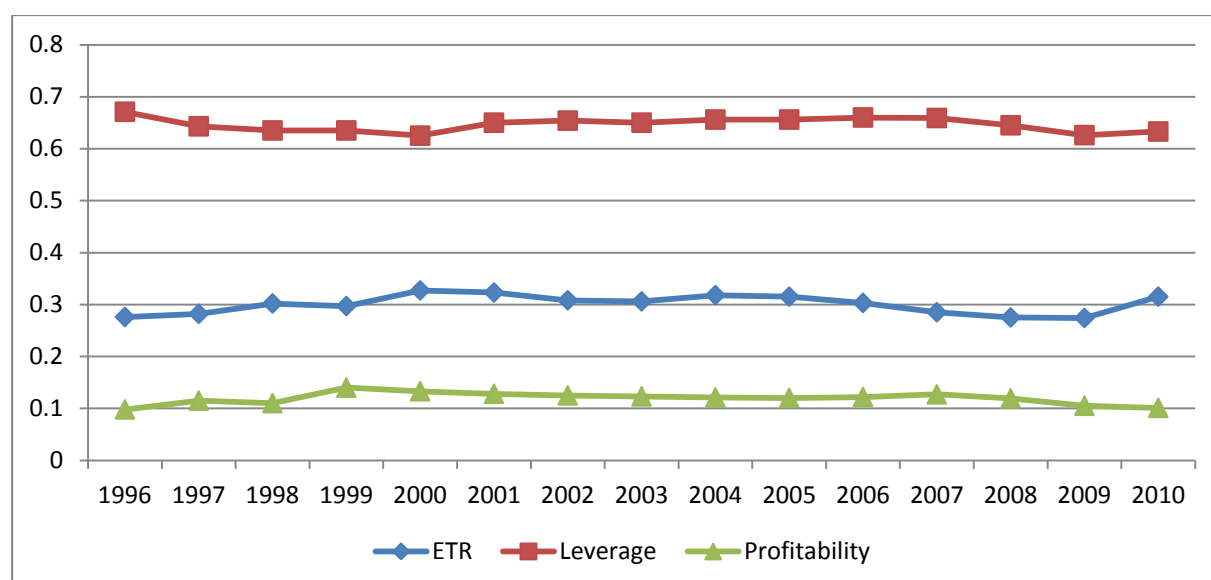


Figure 2-3 is based on an Amadeus download from September 2011. It only considers unconsolidated account data for corporations. The effective tax rate (ETR) is calculated as tax expense divided by pre-tax income. Leverage is calculated as total liabilities over total assets. Profitability is calculated as earnings before interest and taxes (EBIT) over total assets. All variables are averaged over all companies and countries in the dataset.

All three variables move on a fairly stable level and follow a constant trend over time almost without any noticeable ups and downs. The effective tax burdens with respect to European corporations move between 27.6 % in 1996 and 32.7 % in 2010. The steady decline in the average statutory corporate tax rate for European companies over the last twenty years is not reflected as the reduction in tax rates has usually been accompanied by a broadening of the

⁴ Overview of countries covered by the Amadeus Database: Albania, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Rep. of Macedonia, Malta, Rep. of Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.

national tax bases.⁵ In addition, a large portion of the sample consists of U.K. companies that face a relatively large effective tax burden compared to other European firms. The average level of debt financing is about 64 % and corresponds to the average leverage documented in other studies using the Amadeus database.⁶ Any rapid changes in the average capital structure would not be expected as a firm's composition of debt and equity is traditionally sticky and not instantly adjusted in the short-run. The average profitability remains between values of 9.8 % and 14 % at a rather conservative level. The generally low volatility implies a constant and reliable data collection process. The limited preservation of historical data does not cause major inconsistencies within the database. Moreover, possible outliers or false reporting do not appear to drive the variables over time.

The Orbis database is also provided by Bureau van Dijk and basically shares the same data attributes and data items as the Amadeus database. In contrast, the data coverage of the Orbis database is not limited to European companies but contains a worldwide sample of firms. It provides information on roughly 120 million worldwide companies including the U.S. and Asia. The database includes public and private firms, listed and unlisted companies, and also covers financial institutions.

Figure 2-4: Development of Entry and Exit Rates over Time

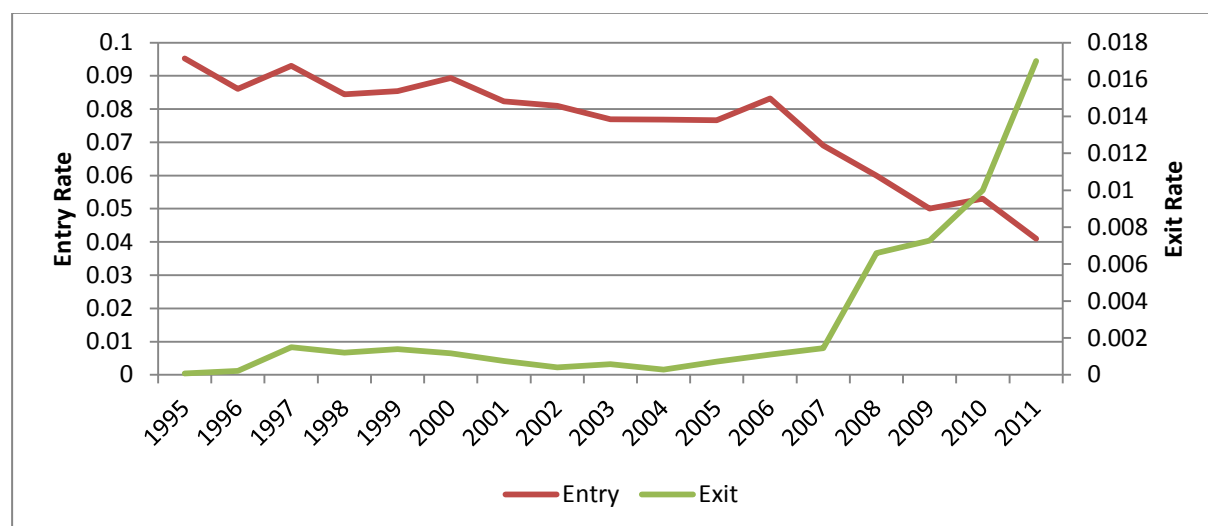


Figure 2-4 is based on an Orbis download from December 2013. Entry rate is defined as all newly founded corporations over all existing corporations. Exit rate is defined as all newly inactive loss corporations divided by the sum of all active corporations.

⁵ See “Taxation Trends in the European Union” 2014 edition by Eurostat for descriptive statistics on the development of corporate tax rates.

⁶ Compare: Huizinga and Leaven (2008); Huizinga, Leaven and Nicodeme (2008).

In contrast to the Amadeus database, basic company information of inactive companies is permanently preserved in the database which ensures full historical coverage of all business activities.

The level of firm entries and firm exits remains constant over time until 2007. The annual average entry rates revolve around an overall average of 8.8 % and are comparable to entry rates in the literature for similar time periods.⁷ The average exit rate is significantly below commonly found exit rates due to a data-related clearing process.⁸ The financial crisis in combination with certain data restrictions can be identified as a possible driver of the sudden decrease in firm entries and at the same time as an explanation for the steep rise in firm exits after 2007.⁹

In general, firm-level information from all three Bureau van Dijk databases can be linked via a specific Bureau van Dijk company identification number (BvD ID Number). This code allows the combination of M&A data, group structure information and financial accounting information across European and worldwide companies within the closed BvD system. Unfortunately, some companies have been subject to BvD ID Number changes and the BvD ID Number is not applicable to other databases. These limitations considerably restrict the practical use of the identification code.

Thomson Reuters' Datastream is a global financial database covering equities, stock market indices, company financials, interest rates, exchange rates and economic data for 215 countries and 60 markets. The database provides current and historical time series data. Datastream is updated daily and historical equity information goes back to 1973. Datastream exclusively covers listed firms and maintains prices, returns, trading volumes, market capitalizations and dividend data for approximately 100,000 active companies and 103,000 inactive companies. Delisted firms are kept in the database and the last valid data point is constantly repeated. For the main developed markets Thomson Reuters claims full coverage of all traded equity securities by the Datastream database.

⁷ Da Rin, Di Giacomo and Sembenelli (2011); Klapper, Laeven and Rajan (2006).

⁸ OECD Entrepreneurship at a Glance Report 2013.

⁹ The database is continuously updated but observations in recent years tend to be underrepresented for some time until the new data is added to the database. As a consequence, new firms are not recorded yet and the smaller number of overall observations in later periods magnifies the increase in exit rates at the end of the sample period.

The CRSP database provides security-level data on current and historical prices, market capitalizations, outstanding shares and trading volumes of more than 29,000 companies traded on the NYSE, the NYSE Arca, the NYSE MKT (formerly AMEX) or the NASDAQ. Time series data goes partly back to 1925 for monthly and daily stock data depending on the stock exchange.¹⁰ CRSP includes information on actively traded and currently inactive shares.

Figure 2-5: Average Annual Returns for the U.S. and the other OECD Countries

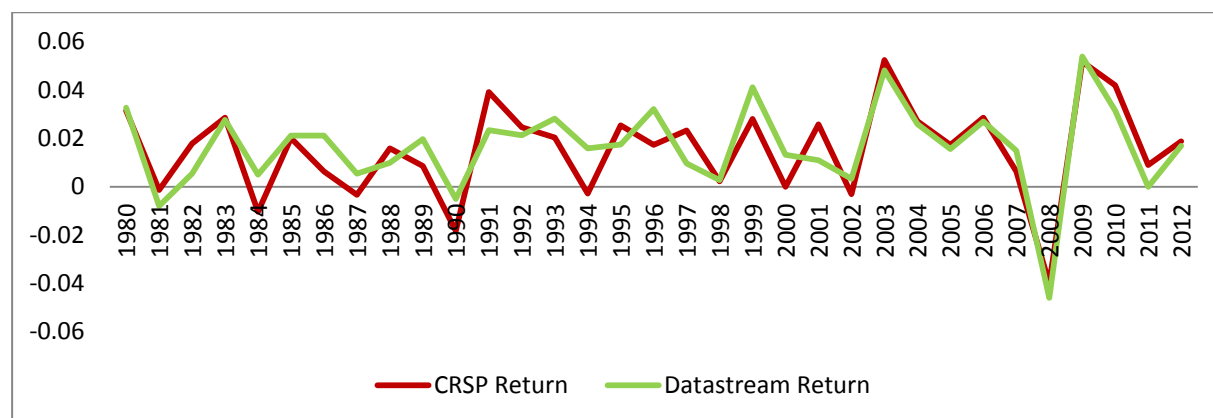


Figure 2-5 is based on a CRSP download from September 2014 and a Datastream download from March 2014. The CRSP returns are the annual averages of the average monthly returns for all U.S. companies. The Datastream returns are the annual averages of the average monthly returns for all OECD companies excluding the U.S. and including Hong Kong.

Figure 2-5 depicts the evolvement of the average annual stock returns of U.S. companies and other OECD companies over time. Both average return rates follow the same global market trends. Despite the two different data sources the final return data shows parallel trends over almost the entire sample period. The Figure clearly shows the latest major stock market crashes: The early 1990s recession, the burst of the internet bubble in 2002 and the financial crisis in 2008. Correspondingly, the following periods of recovery of the worldwide stock markets are also reflected in both datasets.

To confirm the validity of my return data I compare the trajectories of both return trends to the development of three representative world stock indexes. The average annual stock returns of the Dow Jones Industrial Average Index, the Euro Stoxx 50 Index and the Nikkei 225 Index in comparison to my return data are shown in Figure 2-6 and Figure 2-7. I can find the same global market movements in all three major stock return indexes. However, my company based stock returns show more volatility and more extreme peaks and low points than the

¹⁰ Information on securities traded on the NYSE goes back as far as December 1925. NYSE MKT coverage begins in July 1962. NYSE Arca daily and monthly data begins in March 2006 and NASDAQ data goes back as early as December 1972.

respective indexes. Those differences in fluctuations are mainly driven by the different sets of companies used to calculate the stock return averages. The self-constructed datasets most likely contain a larger number of smaller companies that are active in more volatile markets or more risky industries with a higher degree of fluctuation in their stock returns relative to the hand-picked sample of companies represented by the three indexes.

Nevertheless, the different indexes broadly follow the same trends as the microlevel-based return data. Overall, the two datasets seem to be reliable samples of international stock price changes over time.

Figure 2-6: Average Annual Returns for the U.S. and Dow Jones Industrial

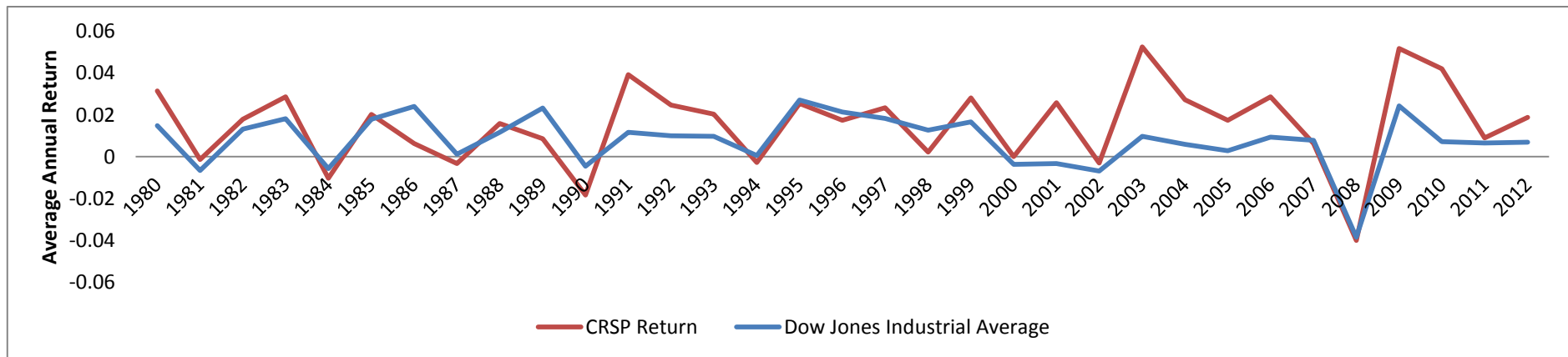


Figure 2-6 is based on a CRSP download from September 2014 and monthly price data of the Dow Jones Industrial Average Return Index from Datastream. Monthly returns are averaged on an annual basis.

Figure 2-7: Average Annual Returns for the OECD, Euro Stoxx 50 and Nikkei 225

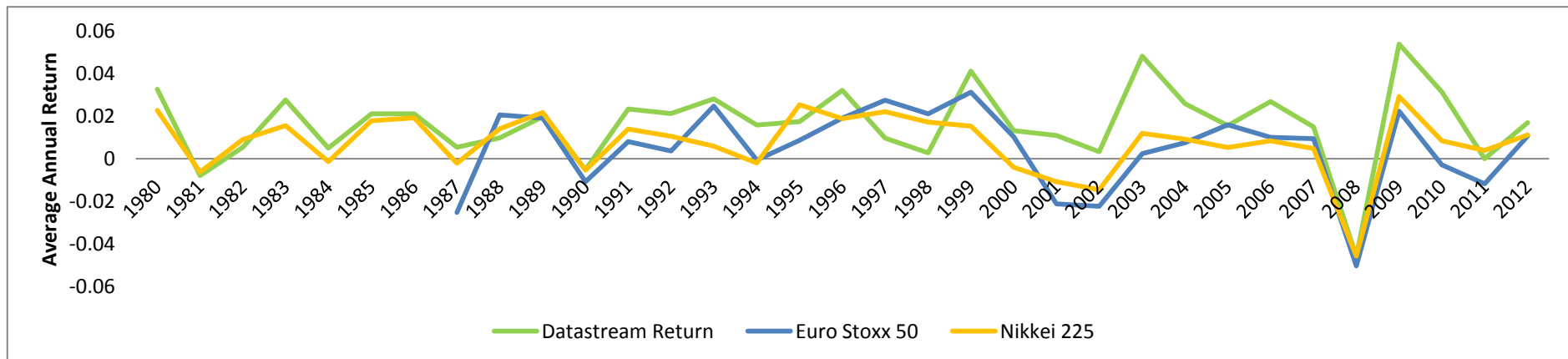


Figure 2-7 is based on a Datastream download from March 2014 and monthly price data of the Euro Stoxx 50 Index and the Nikkei 225 Index from Datastream. Monthly returns are averaged on an annual basis.

3 Literature Review

This chapter provides a chronologically as well as systematically structured overview of previous empirical tax research in all the different fields that the three papers touch upon.

The literature review covers the areas of taxes and mergers and acquisitions (M&A) in general, the acquisition of tax loss-carrying targets, and the effects of capital gains taxes on stock prices.

Its purpose is twofold. First, it presents and categorizes a number of selected empirical studies that all have substantially contributed to the academic discussion on the interaction of taxes with investment decisions and asset prices. It outlines the development in these different areas from the first walking attempts of empirical tax research to the current state of the literature today. This overview does not simply recite an exhaustive list of earlier empirical studies but rather introduces the essential corner stones of quantitative tax research.

Secondly, it briefly describes how the three papers fit into the different strands of literature and what their individual contributions are.

3.1 Taxes and M&A Activities

In general, mergers and acquisitions (M&A) lead to a reallocation of ownership and control rights over companies. However, market frictions such as taxes, agency problems or information asymmetries may affect or even distort an economically desirable change in control. The empirical literature on the effects of taxes on M&A activities is well established and for the purpose of this doctoral thesis can be broadly divided into three different categories. First, taxes are viewed as determinants of the magnitude and the direction of M&As. Thus, they not only influence the location of the target but also affect the choice of the acquirer. Second, taxes affect acquisition premiums and at the same time have implications for the value creation through company reorganizations. Third, certain attributes of a tax system might enhance M&A tax planning activities. In addition, acquisitions themselves can create new tax planning opportunities through artificial deal structures or specific deal types.

This conceptual overview of empirical research covers national transactions as well as international M&As as one form of business investments but does not focus on the impact of taxation on foreign direct investments (FDI) in general.¹¹

¹¹ By definition FDI consist of international mergers and acquisitions, green field investments, retained earnings by foreign subsidiaries and loans granted from domestic parent companies to their foreign subsidiaries. Feld and

3.1.1 Taxation as a Determinant of M&A

Early empirical work on the impact of taxation on the acquisition decision solely concentrates on potential tax benefits associated with acquiring a target company and provides rather mixed evidence for tax savings being motives underlying an acquisition.¹² Auerbach and Reishus (1987, 1988a) provide first insights into the role of taxes for M&As. Their descriptive analyses find tax benefits in about 20 percent of all acquisitions in their samples.¹³ Their findings do not indicate that potential tax savings drive the acquisition decision. Consequently, they draw the conclusion that their results cannot be interpreted as unambiguous evidence of the importance of taxes for M&As in general. In a third study, Auerbach and Reishus (1988b) compare tax benefits of U.S. mergers with the counterfactual benefits of non-taken place “pseudomergers”. Again they only find mixed evidence of the relevance of taxes for the merger decision. In all their studies Auerbach and Reishus strictly distinguish between either target-based or acquirer-based tax effects and restrict their samples to purely national transactions. These first empirical studies do not allow comprehensive causal inferences but serve as starting point for subsequent research.

Scholes and Wolfson (1990) decisively extend prior empirical literature by including the interplay of domestic taxation and foreign tax systems in their analysis of international reorganizations. They present evidence that the increase in the U.S. effective tax burden caused by the Tax Reform Act of 1986 (TRA 86) induced acquisitions by investors from worldwide tax regimes.¹⁴ Thus, investors from credit countries benefit from a competitive advantage relative to U.S. or territorial investors. As a consequence, later studies broaden the scope of their inquiries and examine the determinants of cross-border M&As including a wide variety of domestic and international tax-related aspects.¹⁵

An important strand of this literature focuses on the influence of the investor’s home country tax system. Collins, Kemsley and Shackelford (1995) challenge Scholes and Wolfson’s

Heckemeyer (2011), de Mooij and Ederveen (2003) and de Mooij and Ederveen (2008) provide comprehensive surveys of the literature on the impact of taxation on FDI.

¹² The academic discussion of tax motivations of mergers and acquisitions can be traced back to Lintner (1971) Jensen and Ruback (1983) and Gilson, Scholes and Wolfson (1987).

¹³ Auerbach and Reishus (1987, 1988a) focus on three types of potential tax benefits: increased utilization of tax losses and tax credits, increased depreciation deductions and increased interest deductions.

¹⁴ In his pioneering work, Hartman (1984) already describes the influence of international taxation on FDI.

¹⁵ Erel, Liao and Weisbach (2012) and Rossi and Volpin (2004) provide comprehensive overviews of non-tax determinants of international mergers and acquisitions.

(1990) conclusions and test if the necessary conditions for their “tax-hypothesis” are valid. They do not find supporting empirical evidence that differences between investors from worldwide tax regimes and from territorial countries explain the surge of M&A activities in the U.S. after the TRA 86.

Di Giovanni (2005) considers the effect of target host country taxes. In his gravity model of international M&A flows he explicitly controls for the existence of bilateral tax treaties and other common variables between target and acquirer country.¹⁶ He finds that the existence of such tax treaties increases M&A activities which he primarily attributes to the elimination of international double taxation as impediment to cross-border M&As.

Herger, Kotsogiannis and MacCorrison (2011) consider the combined effect of target host country taxation and the U.S. credit system on U.S. outbound acquisitions. Their results suggest that accounting for international aspects such as foreign tax credits and international double taxation reduces the adverse effect of high foreign tax rates on U.S. outbound acquisitions.

Arulampalam, Devereux and Liberini (2012) also take into account the acquirer’s home country tax system and pay particular attention to the role of corporate tax rates in the target country. Their findings generally suggest a negative relation between a country’s corporate tax rate and its likelihood of hosting acquisition targets. But according to their results the magnitude of this negative impact of corporate tax rates varies with deal type, the tax system and structural characteristics of the acquirer.

Feld, Ruf, Scheuering, Schreiber and Voget (2013) examine how a tax credit system through additional repatriation taxes potentially impedes international acquisitions. They use the Japanese and U.K. tax reforms as natural experiments to show that worldwide tax systems lead to a competitive disadvantage in acquiring a foreign firm.¹⁷

Other studies explicitly consider the different components of FDI. Swenson (2000) disaggregates overall FDI activities and shows that higher U.S. state taxes exert a more adverse effect

¹⁶ Gravity models are regularly used in economics to analyze bilateral trade statistics. Its implications are based on the simple intuition that trade flows between two countries should be inversely related to the distance between the two countries and other common variables.

¹⁷ See Musgrave (1969), Desai and Hines (2003) and Becker and Fuest (2010) for the theoretical background on the discussion of international tax systems and their efficiency implications.

on greenfield investments than on M&A activities. But this effect exists for both territorial and residential investors. Hebous, Ruf and Weichenrieder (2011) use German firm level data and also find (from the perspective of a territorial country) that greenfield investments respond more sensitively to higher taxes than acquisitions.

The combined results of these empirical studies strongly suggest that tax considerations play a major role in the acquisition process and that higher taxes impede possible transactions. It becomes obvious that the analysis of taxes as a determinant of firm acquisitions should not only consider national tax consequences but also take into account the interaction of domestic and foreign tax rules.

3.1.2 Taxes and M&A Pricing

As part of the acquisition process, the buying side and the selling side both consider all value-reducing and value-enhancing elements of a deal including the effect of taxes. Therefore, potential tax costs as well as tax benefits should be reflected in the acquisition price. Empirical studies attempt to detect those tax-related pricing implications.

Henning, Shaw and Stock (2000) examine the impact of deal-related tax liabilities generated from different types of taxable acquisitions, imposed either on the acquirer or the target and its shareholders. Their findings suggest that additional taxes lead to higher purchase prices consistent with the acquirer bearing the tax costs of an acquisition. Thus, higher prices can include a compensation for target shareholders' additional tax burden but do not reflect higher tax costs imposed on the acquirer.

In a tax planning model Erickson and Wang (2007) demonstrate that the acquisition of an S corporation is ideally completed using a step-up in the target's tax basis. In order to benefit from the additional tax savings an acquirer is willing to compensate the target firm's shareholders for their cooperation in the acquisition process through a higher purchase price. A comparable tax structure would not be beneficial in case of a C corporation because the incremental tax costs of a step-up would exceed the potential tax savings. In line with these theoretical deal structures their empirical analysis shows supporting evidence of S corporations gaining a tax-driven acquisition price premium relative to comparable C corporations.

From the target shareholder's perspective Ayers, Lefanowicz and Robinson (2003) compare the acquisition premiums of taxable cash-for-stock acquisitions to those of tax-free stock-for-

stock acquisitions across time. They find capital gains taxes to increase the cost of acquisitions as shareholders require compensation for giving up the option to defer capital gains taxes.¹⁸

In sum, the results of all these studies imply that the tax incidence of a deal remains at the acquirer level.

Huizinga, Voget and Wagner (2012) use international M&A deals to estimate the effect of international taxation on bid-premiums and on acquiring-firm excess stock returns to determine who finally carries the weight of the additional tax layer. In contrast to the above studies, they find that takeover bid-premiums are adjusted downwards reflecting a complete capitalization of the increased tax burden whereas excess returns remain unchanged. Consequently, target-firm shareholders bear the entire burden of the increased tax costs.

Further studies analyze if and how taxes contribute to M&A value creation. Those wealth gains through potential tax benefits should also be reflected in acquisition prices.

Kaplan (1989) examines the importance of tax benefits as part of the overall wealth gain in management buy outs. He shows that non-debt tax shields such as higher depreciation deductions and tax benefits from employee stock option plans represent a substantial portion of the acquisition premiums.

In contrast, Devos, Kadapakkam and Krishnamurthy (2009) test if financial synergies in the form of interest tax shields are part of an overall gain to stockholders from mergers. They conclude that tax savings due to interest deductibility cannot be seen as a major source of merger gains relative to enhanced production efficiency or increased market power.

Latest research examines the link between wealth gains from M&As and tax planning activities. Chow, Klassen and Liu (2013) test how an acquirer's tax aggressiveness relative to the target's tax aggressiveness may be a driver of value creation in M&As. They show that tax-related acquisition gains vary depending on the different levels of tax aggressive behavior between the acquirer and the target. Col and Errunza (2014) explore the valuation consequences of presumably tax motivated acquisitions. They measure announcement period returns of acquirers of tax haven targets to evaluate the market reactions to assumed future tax

¹⁸ This relationship between the mode of acquisition and capital gains taxes has already been pointed out by Brown and Ryngaert (1991).

avoidance strategies. They find that acquirers of tax haven targets have lower returns relative to acquirers of non-tax havens targets which they attribute to potential agency costs and taxpayer backlash.

As a result, taxes seem to be a value-relevant factor in the pricing process of M&As. They affect prices on the demand-side and the supply-side. Several studies confirm that taxes as a cost factor matter for M&A pricing. Whereas the question of how the overall tax burden of an acquisition is shared among the deal participants cannot be unambiguously answered. In addition, studies that test if tax benefits are also part of the aggregate wealth gain in an acquisition show only mixed evidence.

3.1.3 M&A Tax Planning

Real world M&A patterns suggest that tax planning may directly influence mergers and acquisitions and that company reorganizations are used to take advantage of tax saving strategies.

The relevance of tax planning considerations in deciding on the deal type and on the financing method is analyzed by Erickson (1998). He combines various tax characteristics of the acquirer firm and the target firm to test their impact on the transaction structure and financing method. Consistent with predicted tax incentives at the acquirer level, he finds that high-tax acquirers are more likely to choose debt-financed cash-deals in comparison to tax-free stock-deals. Whereas target's tax attributes turn out to be negligible. Dhaliwal, Newberry and Weaver (2005) also test for the acquirer's financing method but in addition control for internal funding. Their results suggest that debt-financing increases in the marginal tax benefits received from borrowings. Scheuering (2013) extends previous studies by explicitly examining cross-border European acquisitions. His results suggest that the probability of a debt financed deal increases in the acquirer's home country tax rate.

Given the above results, empirical evidence indicates that tax incentives affect an acquirer's preferred acquisition structure and the financing choice.

In addition, acquisitions can be viewed as another vehicle that increases tax planning opportunities. Huizinga and Voget (2009) provide empirical evidence that the organizational form

of cross-border mergers is chosen to minimize the repatriation tax burden of dividends. They consider withholding taxes on dividends and the tax system of the home country to show that countries that impose a higher tax burden on distributed profits are less likely to become the host country of the parent company of the newly created multinational firm.

Several papers deal with the related issue of corporate inversions. An inversion describes the expatriation of a company's headquarter in order to move its legal domicile to a foreign country for tax purposes. Empirical studies provide evidence that this special case of an international acquisition is mainly tax driven. Desai and Hines (2002) show that U.S. inverting firms face relatively low foreign tax rates which corresponds to the desire to avoid additional taxes on repatriated income due to the U.S. worldwide tax system. Furthermore, they identify capital gains taxes at the level of the shareholders as possible counterbalance to the perceived tax benefits and find that capital gains realizations are taken into account in the inversion decision.

Seida and Wempe (2004) suggest that the elimination of U.S. taxes on U.S. earnings is a more important source of U.S. inversions relative to the elimination of U.S. taxes on foreign income. They find that U.S. inversions generally result in considerable reductions in the ETR and attribute those tax savings to stripping of U.S. earnings via intercompany debt. In their study of market reactions to inversion announcements Cloyd, Mills and Weaver (2003) do not find any empirical evidence that suggests price increases in response to planned inversions. Their results imply that the market does not perceive future tax benefits to outweigh potential tax cost and non-tax costs associated with these transactions.¹⁹

Voget (2011) extends the prior literature by testing an international sample of headquarter relocations. His results show that specific tax attributes such as the existence of a CFC rule or the type of tax system influence a company's likelihood to relocate its headquarter.

In sum, it can be concluded that empirical research shows that tax characteristics of the acquirer can affect deal structure and deal financing in order to minimize the overall tax burden. Differences between worldwide and territorial systems and other attributes of international tax

¹⁹ All three U.S. studies face a paucity of data. Seida and Wempe (2004) use a set of 12 corporate inversions, Desai and Hines (2002) identify 26 corporate inversions and Cloyd, Mills and Weaver (2003) establish a dataset of 20 inversions. This lack of sufficient data and the limited focus of those studies make it difficult to draw universal conclusions with respect to the effect of taxes on firm relocations.

systems have been shown to lead to artificial acquisition structures that predominantly aim at reducing or avoiding taxes on repatriated profits. At the same time, (international) company reorganizations seem to facilitate new tax planning opportunities.

The study “*Tax Avoidance as a Driver of Mergers and Acquisitions?*” is primarily a contribution to empirical tax research on tax planning. I identify and test three specific tax planning channels at the level of the target. Different types of acquisitions are used as external events to test if an ownership change causes the targets’ effective tax burden to decrease.²⁰

I also add to the literature on determinants of M&A activities. My results suggest that an acquirer’s ability to effectively apply tax planning strategies at the level of the target can be understood as a potential driver of acquisitions.

In addition, I provide a possible explanation for how acquisitions can lead to an overall gain in value through effective tax planning. Furthermore, acquirers’ varying ability to reduce the potential target’s tax burden should also be reflected in negotiations and the price building process.

3.2 M&A and Tax Loss Carry-Forwards

The acquisition of unutilized tax shields in the form of tax loss carry-forwards can be seen as one of the most frequently discussed tax synergies of a business combination.

In this respect, empirical research considers the utilization of tax losses as one factor that could motivate an acquisition. In a series of studies Auerbach and Reishus (1987, 1988a, 1988b) analyze if tax benefits through the increased use of tax losses are possible drivers of acquisitions. Their overall findings suggest that tax losses may not be an important factor in the acquisition decision relative to other tax related factors.

However, most empirical papers concentrate on the value implications of tax loss carry-forwards. These studies either examine the meaning of tax losses for target prices from the market perspective or investigate the valuation of a target’s tax loss carry-forward from the participating firms’ perspectives.

²⁰ In a related study, Blouin, Collins and Shackelford (2005) using a dataset of actual U.S. corporate tax returns test if the domicile of an acquirer has a direct impact on the post-acquisition taxable income of its target. They find no evidence that the taxable income of a target of a foreign acquisition declines more compared to the taxable income of a target of a purely domestic transaction.

With respect to market pricing, there have been several event studies of stock returns around the announcement of a pending acquisition that provide partly conflicting results. Haw, Pastena and Lilien (1987) show that the cumulative abnormal returns around the acquisition announcement of financially distressed firms with a tax loss carry-forward exceed the acquisition premiums for firms without a tax loss carry-forward. They interpret their results as empirical evidence of an excess premium for future tax savings. For tax-free acquisitions Hayn (1989) also finds that potential tax benefits stemming from unused tax losses positively affect the abnormal returns of the acquiring company and the target company during the announcement period.

Plummer and Robinson (1990) directly compare firms carrying a tax loss with firms not having any loss carry-forwards and do not find a significant difference in announcement period returns. Furthermore, Crawford and Lechner (1996) apply a two stage model to disentangle a direct and an anticipated effect of the target's tax attributes on the acquisition premium. They find a negative association between a loss carry-forward and the premium.²¹

Comparable to the conclusions drawn from a market perspective, the findings based on participating firms' perspectives reveal similarly inconsistent empirical evidence. On the one hand Henning, Shaw and Stock (2000) use actual purchase prices to determine how the acquirer compensates target shareholders for the potential use of a target's tax loss. They conclude that there is only little evidence that an acquirer pays for the value of a loss carry-forward. Chiang, Stammerjohan and Englebrecht (2014) confirm the findings by Henning, Shaw and Stock (2000) to some extent as they do not find acquirers to assign a particular value to a target's tax loss carry-forward. However, they demonstrate that an acquirer is willing to pay more for a tax loss that could be used in the near future than for a tax loss that is only usable in the long-run.

Despite the broad range of literature on the valuation of loss carry-forwards in M&A activities the price implications of a limitation to loss transfers have been mostly neglected. Among the previously introduced papers only the studies by Plummer and Robinson (1990) and Chiang, Stammerjohan and Englebrecht (2014) indirectly consider the pricing effect of a restriction to the transfer of tax losses through acquisitions. The event study by Moore and Pruitt (1987)

²¹ By dividing the estimated effect, Crawford and Lechner (1996) take into account the probability of a target being subject to an acquisition. If the market anticipates the announcement of an acquisition, it already impounds the value of a loss carry-forward in the pre-announcement price. Consequently, as the likelihood of a take-over increases the eventual response of the price in the announcement period becomes less pronounced.

directly tests for the value-relevance of a limitation to loss transfers. They present two key findings: First, in line with parts of the aforementioned literature they show that tax losses represent a portion of a loss firm's market value. Second, the tightening of the U.S. anti-loss transfer legislation (Section 382 IRC) during the Tax Reform Act 1976 significantly reduced the present value of loss firms.²²

Possible other economically relevant consequences of limitations to the transfer of tax loss-carry-forwards have not been subject to serious empirical research yet.

With my paper "*Restricted Tax Loss Transfer and Business Cycle Effects*" I intend to fill that void. I examine the impact of "anti-loss trafficking" restrictions on the entry and exit behavior of firms by combining investors' risk considerations with the value-implications of a restricted utilization of tax losses.

First, I test for the effectiveness of those limitations before I study their economic consequences for investments. I examine if the introduction of a limited transfer of tax losses discourages firm entries and at the same time accelerates market exits of loss firms by devaluing loss carry-forwards.

The paper is the first study that directly examines how loss trafficking restrictions affect the frequency of deals involving loss-carrying targets. Thereby, it contributes to the broad literature on mergers and acquisitions in general and to research on the value relevance of tax loss compensation rules in particular.

The paper also adds to current research on investment incentives and how tax loss legislation directly or indirectly impacts on investment behavior.²³

Moreover, the paper extends the scope of the current literature on firm exits by considering tradable tax losses as valuable assets that may help to defer or even avoid firm terminations.

²² Moore and Pruitt (1987) present early empirical indications of the meaning of loss limitation rules which is supported by anecdotal evidence. Examples of actual business transactions underline the importance of these rules in the pricing process. The unexpected lifting of some of the loss limitation rules for financial institutions in the U.S. after the financial crisis in 2008 lead Wells Fargo as the eventual acquirer of Wachovia to offer a much higher price than the previously announced price by Citigroup. See Crowell Moring Financial Services Alert dated October 6, 2008 "Tax Notice Drives Wachovia Takeover Turmoil".

²³ Empirical literature dealing with the impact of tax loss treatment on investment behavior is still rare. See Dreßler and Oversch (2013) and Edgerton (2010) as examples of empirical research.

3.3 Capital Gains Taxation

Capital gains taxation influences investor behavior as individuals rationally respond to tax provisions in order to minimize the tax burden of investment income.²⁴ Taxes on capital gains decisively influence investors' trading strategies and eventually affect stock prices. The overall effect of capital gains taxation on share prices can be broadly divided into a supply-side effect and a demand-side effect.

On the supply-side, shareholders of appreciated shares must decide to either hold on to their shares and postpone taxation until realization or to sell the shares and trigger the taxation of embedded gains.²⁵ From this perspective, capital gains taxes are viewed as transaction costs that impose a disincentive to sell a stock. Consequently, shareholders require a higher price to sell the assets. This effect of capital gains taxes on the supply-side is referred to as the "lock-in effect". It implies that a cut in current capital gains tax rates will lead to a corresponding decline in share prices.

On the demand-side, buyers of shares demand a lower price as an indirect compensation for anticipated taxes on future gains from selling the acquired shares. This impact is referred to as the "capitalization effect" since future tax costs are considered in the bidder's current price. Thus, the "capitalization effect" predicts that share prices will rise when expected future capital gains taxes are reduced.

The net effect of the "lock-in effect" and the "capitalization effect" on asset prices is ambiguous as both effects operate in opposing directions. But it is important to note that both effects are characterized by a timing difference. While the "capitalization effect" refers to an anticipated future tax burden, the "lock-in effect" is based on the realization of current capital gains.

²⁴ The following overview only focuses on capital gains with respect to stocks. I do not cover the literature on the taxation of capital gains of other types of property. Moreover, I also neglect possible effects on the trading volume of shares.

²⁵ There is also a third option: Avoiding paying capital gains taxes at all. This can be achieved either through death, donation to charity, setting off capital gains with capital losses or benefiting from a tax free roll-over of capital gains from the sale of qualified stocks.

3.3.1 Capitalization effect

Empirical evidence of how the “capitalization effect” influences stock prices is still scarce. One of the main problems of empirical research regarding the distortionary effect of capital gains taxes is the determination of the taxable base. Guenther and Willenborg (1999) take advantage of information provided in the course of an initial public offering (IPO) in order to examine stock price changes after a U.S. tax law amendment in 1993. They show that U.S. IPO issue prices of small business stocks that qualify for the newly introduced preferential capital gains tax treatment are relatively higher than stock prices of a “tax-neutral” comparison group. The result implies that companies can directly benefit from a decrease in capital gains tax rates through lower costs of capital.²⁶

Lang and Shackelford (2000) apply a capital market event study around the U.S. capital gains tax cut in 1997 to assess the impact of capital gains taxes on U.S. stock prices. Their analysis is the first study to control for the value-relevance of capital gains taxes by including the dividend-yield. Companies with a higher dividend-yield leave less taxable base to the reduced tax rate and therefore should be less affected. Consistent with a reduced impact on share prices, they show for the week of the budget accord that mean returns for non-dividend paying firms significantly exceed mean-returns for dividend-paying firms, which corresponds to a “capitalization effect” of an expected decrease in capital gains taxes.

Sialm (2009) investigates the relation between equity prices and the aggregated effective tax burden of investment income including capital gains taxes and dividend taxes for the U.S. stock market. Over the period 1913 to 2006 he documents a statistically significant capitalization of effective tax rates in stock valuation.

Huizinga, Voget and Wagner (2013) study the impact of capital gains taxes on takeover prices in cross-border M&As. They show that acquirers in countries with a higher capital gains tax rate tend to pay lower acquisition prices. They estimate that acquirer capital gains taxes lead to a reduction in target prices of approximately 5 %. Their results suggest a capitalization of future capital gains taxes in equity prices.

²⁶ The downside of this approach is that papers taking advantage of IPOs are difficult to generalize because IPOs are very unique settings to investigate. Compare Blouin, Raedy and Shackelford (2003) for reasons why a generalization of such results is not possible.

3.3.2 Lock-in effect

Research on the supply-side “lock-in effect” seems to be more developed. Theoretical models as well as empirical research draw a clearer picture of how sellers’ considerations of capital gains taxes affect trading behavior and assets prices.

Feldstein, Slemrod and Yitzhaki (1980) document in a pure cross-sectional analysis for the year 1973 that the likelihood of stock sales decreases in the capital gains tax burden. Similarly, Landsman and Shackelford (1995) use the RJR Nabisco leveraged buyout as case study to show that shareholders with a lower stock basis and thus with higher potential capital gains tender their shares later at a higher price.

Later studies apply more advanced research settings by specifically exploring differences between short-term and long-term capital gains tax rates, by taking into account the personal capital gains tax liabilities and by including capital losses in their analyses.

Reese (1998) is among the first studies that documents that differences between long-term and short-term classifications of assets can affect share prices and trading volume. He finds that the group of IPO stocks that appreciated prior to long-term qualification experience a significant reduction in returns and a clear increase in trading volume after the long-term qualification date. These findings are consistent with initially boosted share prices by higher short-term capital gains tax rates that defer the realization of capital gains and a following surge in selling pressure at the lower long-term rate.

Shackelford and Verrecchia (2002) develop a three period model in which the difference between short-term and long-term capital gains tax rates (“intertemporal tax discontinuity”) forces investors to choose between an optimal tax strategy and an optimal risk strategy. Intuitively, investors can either reduce the overweight position in an appreciated stock today and pay the higher short-term capital gains tax or delay the sale and pay the lower long-term capital gains tax at a later point in time. They show that holding period incentives constrain the supply of equity and induce price pressure in the market. They explicitly exclude capital losses from their model.

Blouin, Raedy and Shackelford (2003) build on the work by Shackelford and Verrecchia (2002) and show that the described price and volume movements for appreciated stocks can be detected empirically. They examine share prices and trading volume around quarterly earnings announcements and additions to the S&P 500 as independent events that provide new information to the market and that are generally associated with substantial portfolio rebalancing. They find an increase in prices and a corresponding decline in trading volume. The reduction of the trading volume is understood as a “seller’s strike” by holders of appreciated stocks. They do not find any evidence of accelerating the sale of depreciated stocks though.

The studies by Ayers, Lefanowicz and Robinson (2003) and Jin (2006) consider the personal capital gains tax liability of company owners and investors to identify possible price reactions to locked-in capital gains. Comparable to the dividend-yield as an indirect measure of the magnitude of the “lock-in effect” on share prices, Ayers, Lefanowicz and Robinson (2003) take into account the ownership structure of a target. They include the level of institutional ownership of an acquisition target to more precisely capture any tax-driven price pressure. They present empirical evidence for a positive association between capital gains taxes and acquisition premiums for taxable acquisitions. This relation is weaker for targets that are more heavily owned by tax-exempt institutions.

Jin (2006) uses information on institutions’ client bases to construct treatment and control groups. He expects especially institutions that serve primarily tax-sensitive clients to exhibit tax-sensitive selling behavior.²⁷ He finds evidence for tax related underselling of appreciated stocks by institutions that predominantly serve tax-sensitive clients. For tax-insensitive investors he cannot identify a comparable effect.

The only attempt so far to reconcile the supply-side “lock-in effect” with the opposing demand-side “capitalization effect” is the study by Dai, Maydew, Shackelford and Zhang (2008). They find evidence of both a “capitalization effect” and a “lock-in effect”. In an event study based on the U.S. tax reform in 1997 it can be shown that in the week before the effective capital gains tax rate cut the “capitalization effect” dominates the “lock-in effect” as investors already anticipate the future tax benefits and drive up stock returns. In contrast, in the week after the rate reduction, the “lock-in effect” outweighs the “capitalization effect” as sellers with embedded capital gains are more likely to sell shares and simultaneously depress stock returns.

²⁷ Compare Jin (2006, p. 1403 to 1406) for further insights on the classification procedure.

They conclude that both effects coexist and vary with respect to the timing around a capital gains tax change. Beyond the scope of the aforementioned literature, there are several papers that examine the link between capital gains taxes and financial market anomalies.

Poterba and Weisbenner (2001) examine if tax-motivated year-end security sales can be an explanation for the turn-of-the-year effect.²⁸ Intuitively, investors have an incentive to realize capital losses before year-end to ensure the realization of tax benefits in the current tax year and to take advantage of a higher short-term capital gains tax rate. After the turn of the year the selling pressure abates and prices start rising again. They explore the difference between long-term and short-term capital gains tax rates across three different U.S. tax regimes from 1963 to 1996.²⁹ Their results suggest that tax-loss selling also contributes to the turn-of-the-year return anomaly.

Grinblatt and Moskowitz (2004) examine changes in the maximum short-term capital gains tax rate across different U.S. tax regimes to analyze December and January returns. Their findings also point to year-end tax-loss selling as a potential explanation for the relation between past and future returns.

Grinblatt and Keloharju (2004) use a dataset on all stock trades and stock holdings of all Finnish households and institutions to analyze the patterns of selling and repurchase of stocks around the end of the year. They argue that tax-motivated year-end selling of loss shares should be associated with a disproportionately large number of wash sales at the end of the year.³⁰ Their empirical results show that Finnish investors realize a relatively large portion of their embedded capital losses at the end of the calendar year. In addition, they observe many immediate repurchases of the same stocks by these investors in December. In contrast to other studies, Grinblatt and Keloharju (2004) provide a direct link between return patterns and investor behavior while explicitly controlling for window dressing as an alternative explanations.

²⁸ The turn-of-the-year effect (also called “January effect”) refers to the phenomenon of (depreciated) stocks trading at lower prices at the end of the calendar year followed by rising prices and abnormally high returns in January.

²⁹ Their identification strategy is based on the theoretical work by Constantinides (1983, 1984) who derives explicit trading strategies to optimally realize capital losses. In his timing option model he shows that in the presence of a short-term capital gains tax rate that exceeds the long-term capital gains tax rate, it is optimal for an investor to realize the loss as short-term and realize gains as long-term.

³⁰ The term „wash sales“ refers to sales with the intention to repurchase in the immediate future. The Finnish tax law does not contain an explicit wash sales restriction. Ritter (1988) first hypothesized that wash sales should be directly tied to tax-motivated sales.

Klein (1999, 2001, 2004) develops a general equilibrium model of asset pricing including capital gains taxes. He shows that capital gains taxes on appreciated stocks drive share prices up which eventually leads to lower expected returns. He argues that the “lock-in effect” can be viewed as a possible explanation for the long-term return reversal anomaly.³¹ George and Hwang (2007) use a U.S. panel to test this lock-in hypothesis against an alternative explanation for long-term return reversal. They present empirical evidence that is in line with capital gains taxes being the driver of negatively serially correlated stock returns.

The study “*Capital Gains Taxes and Long-term Return Reversal: Evidence from Pole to Pole*” examines the relationship between capital gains taxes and negative autocorrelation of stock returns in the long-run. In this respect, my study contributes to a growing literature in three ways:

First, the study provides further (indirect) empirical evidence for increased share prices due to locked-in embedded capital gains.

Second, the study builds on prior research analyzing capital gains tax rate differences and examining the effects of capital losses to find robust empirical evidence for tax-motivated trading strategies leading to unusual return patterns.

Third, I test the theoretically predicted effect of capital gains taxes on stock price changes from a multinational perspective considering cross-country investment relations. Thereby, the paper goes beyond the scope of all single country analyses or former multinational studies on the link between capital gains taxes and stock return reversal.

³¹ Long-term return reversal describes the negative autocorrelation of stock returns over a three to five years investment horizon.

Working Paper I

4 Tax Avoidance as a Driver of Mergers and Acquisitions?³²

Abstract: Following a merger or acquisition, a target firm's effective tax rate decreases on average by 3 percentage points. This decline is as high as 8 percentage points when the acquiring firm is tax aggressive. Further, target firm profitability decreases, particularly in the case of targets having a higher statutory tax rate than the acquirer. These results point to acquiring firms' ability to more effectively lower target firms' tax burdens after the deal takes place being a potential driver of the deal. On the contrary I do not find a change in target leverage post deal. The latter finding I attribute to the existence of group taxation regimes in many countries, which makes it more efficient to use a highly levered holding company to acquire the target instead of altering the leverage of the target itself.

Keywords: Tax accounting, mergers and acquisitions, tax management, propensity score matching

JEL Classification: M41; G34; H25

³² This paper is joint work with Prof. Dr. Martin Ruf (Tübingen University), Prof. Leslie Robinson Phd (Tuck School of Business at Dartmouth) and Thomas Belz (Mannheim University).

4.1 Introduction

Mergers and acquisitions are an increasingly important form of business investment. The value of cross-border deals rose by 53 percent in 2011 to \$526 billion, compared to cross-border Greenfield investment projects valued at \$904 billion during that same year (UNCTAD 2012). Thus, understanding the drivers of mergers and acquisitions is a key part of understanding the drivers of business investment in general.

Mergers and acquisitions take place primarily because of ‘ownership advantages’. Ownership advantages arise when a change in ownership of the target firm is expected to provide a source of value creation, either by increasing the target’s expected future cash flows or decreasing risk. For instance, the acquirer may believe that it is able to manage the target better than the seller. Such ownership advantages are expected to improve future cash flows, enabling the acquirer to outbid the reservation price of the initial owner and increase the likelihood that the deal takes place.

There are many possible sources of ownership advantages. While there is an extensive literature on the change in operating performance following mergers and acquisitions (see Martynova and Renneboog (2008) for a survey), the potential importance of tax management has been ignored. Lowering the target firm’s tax burden is one important way that an acquiring firm can generate ownership advantages. The average firm-level effective tax rate in my sample is around 34 percent, suggesting governments lay claim to one third of pre-tax profits. If the acquirer believes it is able to minimize the target’s taxes more efficiently than the initial owner, it will expect to generate a higher after-tax cash flow.

I investigate changes in the tax avoidance of targets in a sample of European mergers and acquisitions taking place between 1996 and 2009, using propensity score matching to estimate the average treatment effect. As a unique feature of my analysis I observe operating and financial data of the ‘stand-alone’ target firm before *and after the deal* by using unconsolidated accounting data. Since I focus on European mergers and acquisitions the new tax basis of the corporation’s assets post-acquisition is identical to the tax basis of the corporation’s assets pre-acquisition. A step-up in the acquired assets is impossible and cannot bias my results. This is not true in the United States, since the Section 338 election allows to treat share deals as taxable asset purchases resulting in a step up. However, regulations comparable to Section 338 are not available in any of the countries I consider in my sample.

Specifically, I compare three indicators of tax avoidance at the target – effective tax rate, profitability, and leverage – before and after the deal. My results generally show that target tax avoidance improves, resulting in lower tax payments post deal. Thus, more efficient tax management by acquirers could be a driver of mergers and acquisitions.

I first examine the potential role of acquirers in target tax avoidance following both national (acquirer and target are resident in the same country) and international (acquirer and target are resident in a different country) deals. The indicator of tax avoidance that I examine is the target firm's (accounting) effective tax rate (ETR), or tax expense divided by pre-tax income. This measure reflects tax management that generates permanent book-tax differences in the target firm.³³ I find an average decrease in a target's ETR post-deal of 3 percentage points. Moreover, this decrease is especially pronounced – around 8 percentage points – following deals by tax aggressive acquirers having themselves a relatively low ETR. Thus, acquirers appear to play a significant role in determining the level of tax avoidance that a target undertakes once it becomes part of the group.

I also examine the potential role of acquirers in target tax avoidance that is only possible following international deals. While reductions in a target firm's ETR imply more efficient tax management at the target firm by the acquirer, ownership advantages also arise if the target firm enjoys new opportunities to reduce its tax burden by being part of a multinational group. I examine two prominent international tax planning strategies – transfer pricing and debt shifting. Here, I do not focus on the target firm's ETR because these strategies would not impact such a measure.³⁴

To examine the use of transfer pricing, I investigate changes in target profitability. Consistent with Ravenscraft and Scherer (1989) and Clark and Ofek (1994) I find a decrease in target profitability post deal in general. Splitting the sample between high tax and low tax targets (targets facing a higher or lower statutory tax rate than the acquirer, respectively), I find a decrease in profitability only in high tax targets. This result points to international tax planning (i.e., transfer pricing) by the acquirer contributing to the observed decrease in target profitability following mergers and acquisitions.

³³ Permanent differences arise when a transaction affects taxable income but not book income, or vice versa. A favorable tax planning strategy would be one that lowers taxable income without lowering book income.

³⁴ If a multinational firm uses transfer prices or debt shifting to re-allocate target profits to other members of the group, this affects both the target's book and taxable income. While these strategies may impact the consolidated ETR of the multinational firm, they will not impact the individual target firm's ETR.

To examine the use of debt shifting, I investigate changes in target leverage. While I do not find a significant change in target leverage post deal, I find empirical evidence consistent with use of ‘debt push-down’ strategies being the possible reason for this finding. In countries offering group taxation, a promising tax strategy related to mergers and acquisitions is to load a holding company with debt in order to acquire the target. As a result, the leverage of the holding company increases, while the leverage of the target remains unchanged. Group taxation then allows for consolidation when computing taxable income such that the interest expense of the holding company offsets the earnings of the target (see Section 4.3.1 for further discussion).³⁵

My study is related to three distinct strands of literature. First, there is a growing literature that considers the role of tax avoidance in mergers and acquisitions.³⁶ Kaplan (1989) and Devos, Kadapakkam, and Krishnamurthy (2009) estimate the extent to which tax savings are responsible for merger gains. Blouin, Collins, and Shackelford (2005) examine changes in taxable income of U.S.-domiciled firms after being acquired by foreign firms. Martin, Wang, and Zou (2012) examine the link between target tax aggressiveness and acquisition premiums. Chow, Klassen, and Liu (2013) and Col and Errunza (2014) examine announcement returns of targets and acquirers to determine whether anticipated (future) tax avoidance is an underlying source of merger gains. These last two studies are most closely related to mine, though neither study examines the precise channel through which tax avoidance occurs post-deal. My study documents increased tax avoidance of targets post deal with respect to the target’s ETR and international profit shifting.

Second, there is extensive literature evaluating the operating performance following mergers and acquisitions as reviewed in Martynova and Renneboog (2008). The empirical evidence is mixed – 14 out of 26 studies report a post-merger decline in the operating returns of merged firms, 7 papers show insignificant changes in profitability and only 5 papers provide evidence of a significantly positive increase. Only two studies – Ravenscraft and Scherer (1989) and Clark and Ofek (1994) – focus on the post-merger operating performance of the target as I do. I find a decrease in target operating performance following takeovers (consistent with their results) and provide tax motivated transfer pricing as a partial explanation for this finding.

³⁵ See “Kastljós: Álverin koma sér hjá skattgreiðslum“ by Helgi Seljan, Icelandic National Television Commentary, March 2013, for a discussion of this strategy in Iceland by large U.S. multinational firms.

³⁶ There is also a literature that considers taxes as a source of value creation in mergers and acquisitions, however, it focuses on taxes at the transaction-level (e.g., Auerbach and Reishus, (1987); Erickson, (1998)).

Third, there is a large literature on tax planning, e.g. Chen, Chen, Cheng, and Shevlin (2010) with respect to ETRs, Desai, Foley, and Hines (2004) with respect to international debt shifting and Huizinga and Laeven (2008) for international transfer pricing. I contribute to this literature by using mergers and acquisitions as a new setting in which to identify tax motivated international profit and debt shifting.

My study points to the economic importance of tax avoidance as a driver of mergers and acquisitions. Aside from improving a firm's after-tax profit, effective tax management may be important for a firm looking to prevent a hostile takeover. Potential acquirers with more efficient tax management may be able to competitively bid for target firms. My results also give rise to tax policy concerns. If some types of tax avoidance are only available to multinational groups (e.g., transfer pricing), then international acquirers may enjoy an exclusive ownership advantage with respect to national targets. As a result tax systems could force national firms in international takeovers.

Section 2 develops testable hypotheses. Section 3 describes the empirical methodology and the data. Section 4 presents empirical results. Section 5 concludes.

4.2 Tax avoidance as a driver of mergers and acquisitions

The initial owner of a firm will sell the firm if the offer price exceeds his reservation price (see Hansen 1987). The initial owner's reservation price is equal to the capitalized earnings value $\frac{x}{r}$ of the expected cash x from keeping the firm, where r is the discount rate. The expected cash x^* of a potential acquirer may differ due to non-tax reasons (e.g. synergies, see Weston et al. (2004), p. 130, for potential non-tax reasons for such differences) or due to tax reasons. Regardless of the reasons, if a potential acquirer expects to generate a greater cash flow from owning the firm than the initial owner ($x^* > x$) he has an ownership advantage (see Becker and Fuest (2010); Desai and Hines (2003)). The resulting capitalized earnings value of the acquirer is $\frac{x^*}{r}$, the maximum offer price the acquirer is willing to bid. If a potential acquirer has an ownership advantage the offer price of the acquirer exceeds the reservation price of the initial owner, implying that the deal will take place when $\frac{x^*}{r} > \frac{x}{r}$.

There are several economically significant tax reasons that a potential acquirer would expect higher cash flows than those generated by the initial owner. First, both national and interna-

tional deals may provide an acquirer with the ability to lower a target's ETR through more effective tax management at the level of the target itself. Second, in the case of international deals, an acquirer may be able to re-allocate the income of a target facing a relatively high tax rate to another member of the multinational group where the income is taxed at a lower rate. This is typically accomplished through transfer pricing or debt shifting. I next describe each measure of tax avoidance in turn.

4.2.1 Effective Tax Rate (ETR)

Accounting ETRs are widely employed to measure the tax avoidance of firms (see summary provided in Hanlon and Heitzman (2010) and as examples the studies of Chen et al. (2010); Dyreng, Hanlon, and Maydew (2010); Phillips (2003); Rego (2003); Mills, Erickson, and Maydew (1998)).³⁷ An accounting ETR is impacted by tax planning strategies that generate permanent book-tax differences. Examples (see Chen et al. (2010)) of such tax planning are investments in tax-exempt or tax-favored assets, participation in tax shelters that give rise to losses for tax purposes but not for book purposes, the use of tax credits or the use of favorable depreciation schemes available for tax purposes only. Scholes et al. (2009), pp. 39-40, provide a comprehensive overview of possible book-tax differences. Moreover, I rely on a three-period average measure to mitigate the effects of transitory changes in annual ETRs.³⁸ Such tax avoidance is possible for national as well as multinational firms. If a target's tax avoidance improves after an acquisition, I expect to observe a drop in the target's ETR.

If the target's effective tax rate ETR^* post-deal is lower than the target's ETR pre-acquisition, and a potential acquirer and initial owner are equally capable of generating the same pre-tax book income (denoted BI) at the level of the target, then the expected after-tax cash flow for a potential acquirer is $x^* = (1-ETR^*)BI$ and for the initial owner is $x = (1-ETR)BI$. Due to the lower ETR ($ETR^* < ETR$) the deal will take place because $\frac{x^*}{r} = \frac{(1-ETR^*)BI}{r} > \frac{x}{r} = \frac{(1-ETR)BI}{r}$. Empirically, if I find a lower target ETR post deal, then improved target tax avoidance by the acquirer could be a driver of the deal.

³⁷ My ETR measure comes from Amadeus (see Section 3.1 for a discussion of my data source) and is defined as tax expense (TAXA) divided by pre-tax book income (PLBT).

³⁸ Dyreng, Hanlon and Maydew (2008) and Klassen and LapLante (2012) recognize that multi-year measures of ETRs are an improvement over single year measures. I settle on a three-year measure in my study to avoid a significant reduction in my sample size though, in some analyses, those authors consider longer periods.

Moreover, acquiring firms differ in their tax aggressiveness. Since acquirers will benefit from their tax planning experience when restructuring the target's affairs in a tax efficient manner³⁹, I expect to observe a larger decrease in a target's ETR following acquisitions by tax aggressive acquirers. I thus differentiate acquirers with respect to their ETR pre-acquisition. I consider acquirers having an ETR below the country specific sample average as especially tax aggressive.

4.2.2 Transfer pricing

The ability to set transfer prices on intra-firm trade provides multinational firms with flexibility as to how to allocate income across national jurisdictions imposing different tax rates (see Huizinga and Laeven, (2008)). The possibilities to shift profits potentially increase substantially following an international deal.⁴⁰ For instance, firms can alter prices charged on intragroup services or deliveries, or even create new intragroup services or deliveries. There is no data available on intragroup services and deliveries, or their pricing in Amadeus. So, I follow the literature on tax-motivated transfer pricing and relate a firm's profitability to its tax incentives to shift income via transfer pricing.

Profit shifting generates tax savings when income is shifted from high-tax locations to low-tax locations. International deals offer the possibility to shift profits out of the target's taxing jurisdiction for the first time. The resulting tax savings of the acquirer may constitute the ownership advantage necessary to acquire the target. The target's book income is reduced by profits shifted away (PS), while the book income of another multinational group member offering a lower tax rate τ^{PS} is increased. If the resulting new capitalized earnings value of the firm is higher than the reservation price, the deal takes place $\left(\frac{x^*}{r} = \frac{(1-\tau)(BI-PS)+(1-\tau^{PS})PS}{r} > \frac{x}{r}\right)$.

First, I compare the effect of national versus international takeovers on a target's profitability. In order to separate changes in target profitability arising from transfer pricing (as opposed to debt shifting), I focus on profitability defined as earnings *before interest* and taxes (EBIT) over total assets (see Huizinga and Laeven (2008)). If the opportunity to shift profits out of

³⁹ The argument in Dyreng, Hanlon, and Maydew (2010), that top executives have effects on their firms' tax avoidance, is similar. Also see Chow, Klassen, and Liu (2013), Col and Errunza (2014).

⁴⁰ I recognize there may be opportunities to shift profits after a national deal in order to take advantage of various *sub national* rates. However, profit shifting is a significant source of tax savings in multinational firms, and hence, more likely to motivate an international deal.

the target motivated the deal, I expect to observe a decrease in the target's profitability. This decrease should be especially pronounced following international deals.

Next, I differentiate with respect to the statutory tax rate of the acquirer versus the target. If the acquirer faces a lower statutory tax rate than the target, I expect a decrease in target profitability (if instead the target's tax rate is lower, the acquirer may locate additional profits which would increase target profitability). I also examine whether target profitability decreases when any member of the acquirer's multinational group (and hence new group of the target) faces a lower statutory rate than the target.

4.2.3 Debt shifting

Firm owners may choose to finance their operations with either debt or equity. For tax purposes dividends paid on equity in general do not lower taxable income, while interest paid on debt is tax deductible. From the tax perspective of the debtor, greater interest payments would be expected to reduce its tax burden. Thus, the use of debt finance at the level of the target as a debtor is tax advantageous (see Huizinga, Laeven, and Nicodeme (2008)).

On the contrary this conclusion may reverse at the level of the creditor. Taxes due on dividend earnings at the level of the firm owner are frequently lower than taxes due on interest earnings. Overall the use of debt finance is thus only a worthwhile policy, if the tax rate on the resulting interest earnings is sufficiently low or even zero.

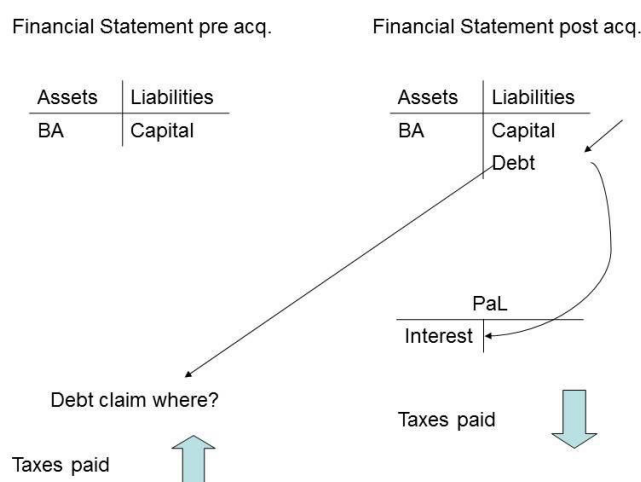
Internally⁴¹ debt financing a target will not result in a lower ETR but instead in a reduction of book income and an increase in interest income II available to the firm owner. If the tax rate on interest income τ^i at the level of the creditor is lower than the firm's statutory tax rate⁴² τ , the tax load on the firm's earnings decreases and the resulting new capitalized earnings value of the target is $\frac{(1-\tau)(BI-II)+(1-\tau^i)II}{r}$. If the new capitalized earnings value of the firm exceeds the reservation price of the initial owner $\left(\frac{x^*}{r} = \frac{(1-\tau)(BI-II)+(1-\tau^i)II}{r} > \frac{x}{r}\right)$, the deal will take place.

⁴¹ It is easier to illustrate the argument relying on internal debt finance. However, using external debt financing gives similar results: Replacing equity with external debt finance in the target allows the acquirer to use the released equity in a tax-favored location instead. This results in similar tax savings.

⁴² To simplify the argument I assume that book income is equal to taxable income. I can thus use the firm's statutory tax rate (which is relevant for debt and profit shifting incentives) in the formulas instead of the ETR.

In a domestic setting the available tax rate on interest income typically is not lower than the corporate tax rate. On the contrary multinational groups benefit from the set of available corporate tax rates worldwide in establishing group members in low tax countries (see Huizinga et al. (2008)), including many zero taxed tax havens (see Hines and Rice (1994)). Figure 4-1 illustrates the argument.

Figure 4-1: Illustration of Debt Shifting



If a firm uses debt instead of equity to finance its operations, the resulting interest expenses will affect book as well as taxable income. Thus nominator and denominator of the ETR are likewise affected. The ETR will not or at least incompletely reflect the use of debt finance. Instead I investigate this issue considering the change in a target's leverage (total debt over total assets) following an acquisition.

If a target's tax avoidance improves after an acquisition, I expect to observe an increase in the target's leverage. This increase should be more pronounced following international mergers and acquisitions. Then a purely national target without the opportunity to debt shift income to group members in low tax countries becomes part of a multinational group due to the acquisition. Within the group of international mergers & acquisitions I expect to observe an especially pronounced increase in the target leverage, if the acquirer or any group member of the acquirer's multinational group has a lower tax rate than the target.

The latter two channels for tax avoidance following an international deal may give rise tax policy concerns. Since in most cases purely national firms or groups can neither use debt shifting nor transfer pricing to significantly lower their tax burden (or the costs of doing so are prohibitively high), international acquirers have a systematic tax driven ownership advantage allowing them to acquire such targets. This may contribute to the empirical finding of multinational networks trading at a premium relative to a benchmark portfolio of purely national firms (see Creal, Rogers, Robinson and Zechman (2014)).

4.3 Empirical Analysis

4.3.1 Data

I extract all mergers and acquisitions taking place between 1996 and 2009 from the Bureau van Dijk Zephyr database that result in a 100 percent ownership change in the target firm. I then merge the resulting targets with the Bureau van Dijk Amadeus database containing unconsolidated financial data for European firms, allowing me to evaluate changes in the target's ETR, profitability and leverage both before and after the deal.

I then delete targets with unlimited liability, since such firms are typically organized as partnerships, leaving as my focus target corporations only. Pursuant to an acquisition a partnership's assets may be stepped up resulting in higher depreciation and lower tax payments, possibly distorting my results (see Erickson and Wang (2000)). In the United States it is possible to structure an acquisition as an asset deal even if shares in a corporation are acquired following Section 338. However, this is not the case for my study since I focus on a sample of European mergers and acquisitions excluding the United States from the sample of target countries. In none of the target countries in my sample it is possible to structure a share deal as an asset deal for tax purposes as in the United States (see KPMG Taxation of Cross-Border Mergers and Acquisitions and IFBD Country Analysis). Since I restrict my sample to 100 % acquisitions of shares in corporations the new tax basis of the corporation's assets post-acquisition is identical to the tax basis of the corporation's assets pre-acquisition. A step-up in the acquired assets is thus impossible and cannot bias my results.

After these steps I am left with 1,440 targets for which I observe financial statements three years before and one year after the deal. To these I add all firms available in Amadeus between 1996 and 2009 offering at least five consecutive financial statements as potential

matches. I then delete all firms showing losses, since the tax planning incentives of loss firms are less clear-cut (see De Simone and Seidman (2014)). Out of the remaining 1,078 targets only 832 offer information on all regressors of the selection equation, thus 832 targets and 1.97 million potential matches enter the selection equation. Table 4-1 provides descriptive statistics for all variables used in the selection equation. Out of the 832 targets entering the selection equation, only 529 offer information on the outcome variables – the 3-year averages⁴³ of ETR, profitability and leverage after the deal.

Table 4-1: Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
ETR (av)	1970957	0.338	0.217	0.000	1.000
Profitability (av)	1970957	0.102	0.123	-0.367	0.620
Leverage (av)	1970957	0.683	0.255	0.051	1.692
Cash (av)	1970957	0.121	0.141	0.000	0.698
High Growth	1970957	0.072	0.259	0.000	1.000
Log (Total Assets) (av)	1970957	14.389	1.763	8.685	19.038
Research Intensity (av)	1970957	0.024	0.061	0.000	0.462
Tangibility (av)	1970957	0.299	0.243	0.000	0.951
Inventories (av)	1970957	0.207	0.216	0.000	0.939
Capital Expenditures	1970957	0.064	0.174	-0.519	0.752
Stocks Traded	1970957	81.741	64.947	0.035	367.043
Log (Labor Force)	1970957	16.652	0.964	12.019	18.121
Exports	1970957	35.682	14.300	24.414	99.145
Log (GDP)	1970957	10.017	0.508	8.471	10.896
Spending on Education	1970957	4.732	0.964	2.400	7.635
Inflation Rate	1970957	0.044	0.045	-0.011	0.456

Note: For the definitions and the sources of the variables see the Appendix.

Since in some cases, I anticipate especially pronounced changes in tax avoidance after international deals, I group the mergers and acquisitions in my sample into national and international. I start with information on the identity and residence of target, acquirer and vendor from Zephyr as far as available. I then identify any group members of the vendor or acquirer using the Amadeus owner database⁴⁴.

⁴³ Thus, I consider only outcomes of targets for which I observe financial statements three years before and three years after the deal.

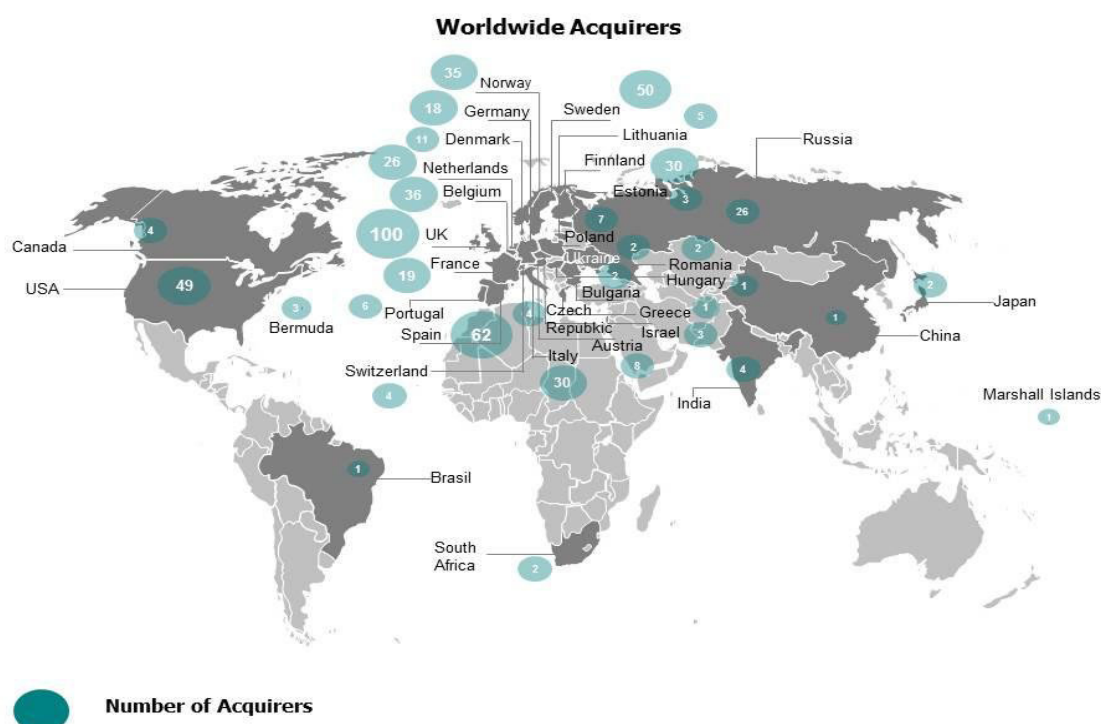
⁴⁴ Firms are identified as group members, if the group parent has a total ownership in the firm exceeding 90 percent. Unfortunately the Amadeus owner database is incomplete and I am not able to observe all group members of the acquirer and the vendor. I thus may classify deals erroneously as national in some cases. I use information on the vendor to identify the group structure of the target, since the Amadeus owner database does not provide historical ownership data. Group members of the target identified using the Amadeus owner database are members of the new group established following the acquisition of the target.

This leaves me with the following four cases: (1) International - International (target belonging to an international group was acquired by an international group); (2) National - National (stand-alone target or target belonging to a national group was acquired by a stand-alone acquirer or by a national group); (3) National - International (stand-alone target or target belonging to a national group was acquired by an international group); (4) International - National (target belonging to an international group was acquired by a stand-alone acquirer or a national group).

In case (1) and case (2) following my arguments in section 2 there is no change in tax incentives with respect to transfer pricing or debt shifting. Since case (2) is by far more frequent, I classify this kind of deals as national. In case (3) I expect increased tax incentives for transfer pricing and debt shifting. I classify these deals as internationals. Finally in case (4) I expect decreased tax incentives. However, since I observe only 19 deals of this type I ignore case (4) for the empirical analysis.

Figure 4-2 gives an overview of the regional origin of acquirers in my sample. By far the most acquirers come from the U.K. Interestingly, U.S. acquirers are important, even though I consider a sample of European targets only. This is consistent with other studies on international mergers and acquisitions, where typically the U.S. and the U.K. are the countries with the most acquirers (see e.g. Huizinga and Voget (2009)).

Figure 4-2: Regional Origin of Acquirers of European Target Firms



4.3.2 Econometric Approach

If I observe a change in any of my variables of interest (ETR, leverage or profitability) after a deal, I would like to attribute those changes to changes in target tax avoidance carried out by the acquirer. To rule out the possibility that the change would have otherwise occurred requires a counterfactual framework. That is, I observe the change in my variables of interest after the deal and I would like to compare this to the change, if the deal had not taken place. Since it is not possible to observe this counterfactual outcome, I employ propensity score matching to construct a counterfactual control group.

The idea of propensity score matching is to identify firms being ideally identical to the target firms besides for the fact of not being sold. This is an econometric effort to replicate as close as possible the laboratory conditions available in natural sciences: There is a population of identical examination units out of which one part receives a treatment and the others not. The observed difference in the outcome variables of interest is then due to the treatment. The treatment in question here is the sale of the target firm.

Matching based on the propensity score works in two steps (see e.g. Wooldridge (2002), Chapter 18). First, I run a probit regression evaluating the probability to become a target conditional on a vector of observed covariates (selection equation). Based on the regression results I predict the probability to become a target for each firm in my sample.

Second, there are four matching methods (nearest neighbor matching, radius matching, caliper matching and kernel matching) available in order to match each treated firm with one or several control firms using the results of the selection equation. The idea is to match each target with a non-sold firm having the same probability of becoming a target based on the results of the selection equation.

Nearest neighbor matching matches to each treated firm the control firm with the closest propensity score. Caliper matching is a variation of nearest neighbor matching. It matches treatment firms with control firms only if the propensity score of both firms is within a predefined radius. By imposing a maximum tolerance level of the distance between treated and control firms, caliper matching attempts to improve the overall matching quality. Instead of matching one of the treated firms with its closest control firm within a radius, radius matching selects all the firms that fall within the predefined caliper. Kernel matching uses all available controls as matches, but uses weights inversely proportional to the distance between the propensity scores of treated firms and available controls. In order to make use of my large set of potential matches, I focus primarily on radius and kernel matching.

For a given propensity score, exposure to treatment is supposed to be random and therefore treated and control units should be on average observationally identical. I check this balancing property and compare the difference in the regressors of the selection equation between the sold (treatment group) and the non-sold (control group) firms. If the balancing property holds, the difference in these regressors should be considerably smaller after matching than before. Since I control for all variables typically employed for predicting targets in the literature, I expect to fulfill this condition.

Formally (see Wooldridge (2002), pp. 604-621), I am interested in measuring the average treatment effect of the treated $ATT_1 = E(y_1 - y_0 | w = 1)$. Variable y_1 denotes the outcome (in my case the change in the ETR, the leverage or the profitability) with treatment and y_0 the outcome without treatment. W is a binary variable indicating participation ($w = 1$) in treatment (in my case being acquired) or not ($w = 0$).

A simple approach to estimate ATT_1 would be to compare the mean of the outcome variable between sold and non-sold firms. However, such an approach is only possible if there is no self-selection into treatment: $E(y_1 | w = 1) = E(y_1)$ and $E(y_0 | w = 0) = E(y_0)$. Self-selection into treatment in my case could e.g. occur if firms having a low leverage or a high ETR are especially attractive targets. Starting from low leverage an increase in leverage is more likely to occur. Equivalently starting from a high ETR a decrease is more likely to occur. Then the observed change is not actually due to treatment but instead due to specific firms selecting into treatment. It is thus crucial that I eliminate this possibility to interpret my results.

While due to self-selection mean independence typically does not hold ($E(y_1 | w = 1) \neq E(y_1)$ and $E(y_0 | w = 0) \neq E(y_0)$), the core idea of matching is to assume mean independence conditional on a vector of covariates \mathbf{x} : $E(y_1 | w = 1, \mathbf{x}) = E(y_0)$ and $E(y_0 | w = 0, \mathbf{x}) = E(y_0)$. If selection into treatment is determined by the covariates \mathbf{x} , then controlling for these covariates allows for a meaningful comparison of outcomes between treated and non-treated firms.

I follow Rosenbaum and Rubin (1983) and predict the likelihood of being a target using a probit regression (selection equation) for all firms in my sample. The predicted probability for being acquired (the propensity score) is then the basis for finding actual targets versus non-targets with statistically identical covariates \mathbf{x} . The balancing property shows whether this procedure is successful or not.

Table 4-2 presents the results of the selection equation and the variables appearing in the model are defined in the Appendix. I use a probit estimation where the dependent variable is

one if a firm becomes a target and zero otherwise. Targets involved in international deals could systematically differ from targets involved in national deals. I thus consider international and national takeovers as separate treatments. The matching procedure then guarantees the comparability between targets and matches irrespective of their involvement in international or national takeovers. In the second column and third column of Table 4-2 I present the respective probit regression results. Similarly, I consider the takeovers of tax aggressive vs. non-tax aggressive acquirers as separate treatments.

In the selection equation I use a profitability measure to proxy for a firm's management efficiency as proposed in Palepu (1986). Profitability is earnings before interest and taxes (EBIT) over total assets and has a positive effect on takeover probability. Further I follow Palepu (1986) in using the log of total assets as a measure for the size of the firm. I find an increase in the likelihood to become a target with size.

Following Dietrich and Sorensen (1984) I use the firm's leverage (total debt over total assets) and capital expenditures (change over three periods in fixed assets over total assets) as controls. While Dietrich and Sorensen (1984) find no significant effects for these controls, I find leverage to have a positive, and capital expenditures to have a negative, effect on takeover probability. I further find a firm's cash holdings as a share of total assets to have a negative effect.

High growth is a dummy for firms with an above sample mean increase over three periods in total assets and affects takeover positively. Research intensity is intangible assets over total assets and only affects the international takeover probability. Tangibility defined as fixed assets over total assets has a negative effect. In addition I use inventories as a share of total assets as an indicator for firms active in trade, and find a negative effect. I include a dummy for listed firms, since listed firms may be more difficult to acquire.

All target specific controls besides for high growth and capital expenditures enter as the average over the three years preceding the takeover and are marked by (av.). Thus the value of the controls should not yet be influenced by the takeover. I control for the target's macroeconomic environment (see Erel, Liao, and Weisbach (2012)) using stocks traded, log labor force, target country exports, log GDP, spending on education and the inflation rate. All macroeconomic controls are lagged. I additionally control for the effective tax rate (ETR), but I do not find a significant effect. In order to control for unobserved heterogeneity, I use country, industry and time specific effects.

Table 4-2: Selection Equation

VARIABLES	Panel A All	Panel B International	Panel C National
ETR	-0.098 (-1.34)	-0.045 (0.43)	-0.108 (-1.14)
Profitability	0.502*** (4.84)	0.742*** (5.61)	0.168 (1.11)
Leverage (av)	0.073 (1.61)	0.082 (1.34)	0.032 (0.51)
Cash (av)	-0.156* (-1.88)	-0.191* (-1.77)	-0.117 (-1.02)
High Growth	0.100** (2.26)	0.050 (0.86)	0.155** (2.52)
Log (total Assets)	0.150*** (23.29)	0.147*** (17.07)	0.128*** (14.75)
Research Intensity	0.280** (1.98)	0.375** (2.07)	0.208 (1.08)
Tangibility (av)	-0.217*** (-4.29)	-0.334*** (-4.93)	-0.095 (-1.40)
Inventories (av)	-0.303*** (4.29)	-0.316*** (-3.50)	-0.248*** (-2.93)
Capital Expenditures	-0.293*** (-4.67)	-0.156* (-1.88)	-0.368*** (-4.34)
Listed	-0.458*** (-2.95)	-0.549** (-1.98)	-0.650** (-2.30)
Stocks Traded	0.001*** (2.66)	0.001* (1.93)	0.001* (1.94)
Log (Labor Force)	2.392*** (3.22)	3.264*** (3.21)	1.345 (1.33)
Exports	0.021** (2.25)	0.021 (1.48)	0.019* (1.78)
Log (GDP)	1.141*** (3.35)	0.618 (1.23)	1.330*** (2.96)
Spending on Education	0.036 (0.55)	-0.008 (-0.10)	0.052 (0.51)
Inflation Rate	-2.904*** (-3.12)	-4.326*** (-3.40)	-1.197 (-0.88)
Country Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes
Number of Observations	1,970,957	1,896,339	1,951,755

Note: Results from probit regressions. The dependent variable is one if a firm becomes a target and zero otherwise in the column labeled 'All'. The dependent variable is one if a firm becomes a target due to an international takeover and zero otherwise in the column labeled 'International'. The dependent variable is one if a firm becomes a target due to a national takeover and zero otherwise in the column labeled 'National'. For the definition and the sources of the variables see the Appendix. T-statistics based on robust standard errors in parentheses. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4-3 shows the balancing property based on radius matching taking all deals as treatments. Through the matching I achieve a significant reduction in bias. Thus, I believe the matching procedure works fairly well in my case.

Table 4-3: Balancing Property - All

Variable	Mean		Bias in %	Bias Reduction in %	t-test	
	Treated	Control			t-stat	p-value
ETR (av)	0.284	0.283	0.5	98.4	0.09	0.924
Profitability (av)	0.103	0.113	-7.6	-352.6	-1.25	0.213
Leverage (av)	0.646	0.640	2.7	83.5	0.44	0.661
Cash (av)	0.115	0.127	-8.5	-251.8	-1.33	0.184
High Growth	0.165	0.166	-0.4	98.0	-0.06	0.950
Log (Total Assets) (av)	15.952	15.760	11.6	88.6	1.92	0.055*
Research Intensity (av)	0.030	0.027	3.8	52.9	0.57	0.571
Tangibility (av)	0.350	0.335	5.9	69.3	0.93	0.352
Inventories (av)	0.153	0.153	-0.1	99.5	-0.03	0.979
Capital Expenditures	0.044	0.051	-3.6	74.7	-0.55	0.579
Listed	0.006	0.006	-0.6	-195.5	-0.09	0.927
Stocks Traded	80.994	82.158	-2.1	92.0	-0.33	0.744
Log (Labor Force)	16.182	16.175	0.7	98.4	0.10	0.920
Exports	39.14	39.637	-3.2	87.5	-0.47	0.636
Log (GDP)	10.108	10.114	-1.3	96.0	-0.25	0.806
Spending on Education	5.415	5.439	-2.2	96.3	-0.33	0.744
Inflation Rate	0.027	0.027	0.6	98.8	0.12	0.902

Note: For the definition and the sources of the variables see the Appendix.

4.4 Results

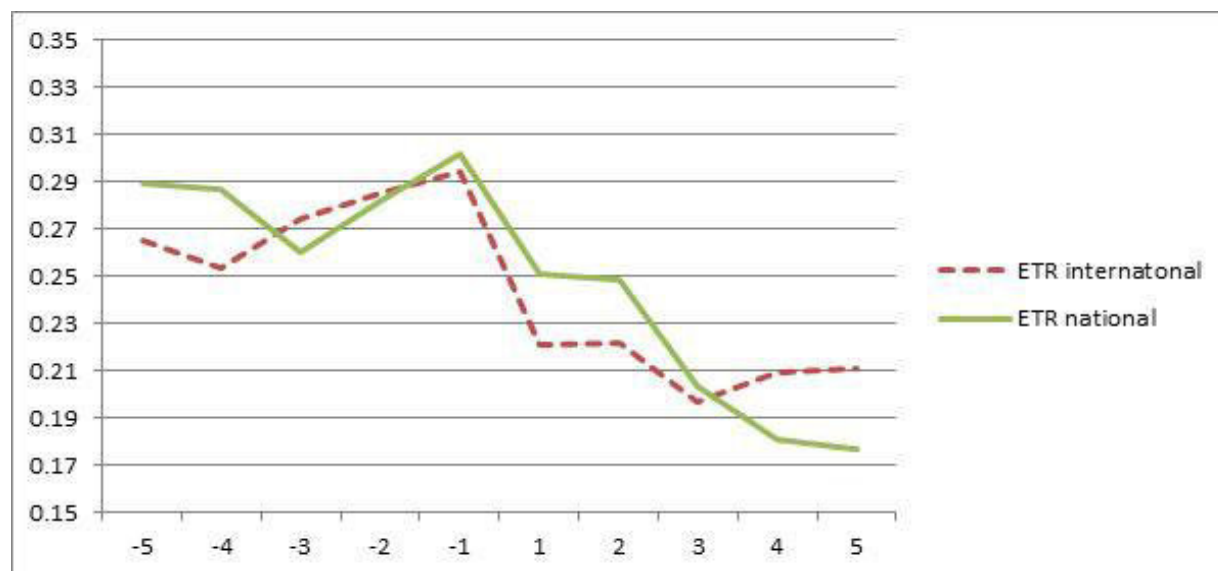
4.4.1 Descriptive Evidence

I start by providing some descriptive evidence on changes in indicators of a target's tax avoidance behavior following a takeover. Figure 4-3 shows the evolution of the mean target ETRs (defined as tax expense divided by pre-tax income) starting from five periods pre-deal to five periods post-deal.⁴⁵ Zero is defined as the point of time where the deal is completed. Pre-deal the ETR fluctuates around 28 percent.

⁴⁵ For calculating the mean target ETR I consider all target observations available. The mean is thus based on fewer observations e.g. for the period five pre deal. I do not show the 3-year average here, because e.g. the period -1 result would already be affected by the deal.

Post-deal the level of the ETR decreases and fluctuates around 20 percent. This holds for both national (solid green line) and international (dashed red line) mergers and acquisitions. Figure 4-3 provides some evidence for a decreased ETR following mergers and acquisitions.

Figure 4-3: Target Effective Tax Rate (ETR) pre and post Deal

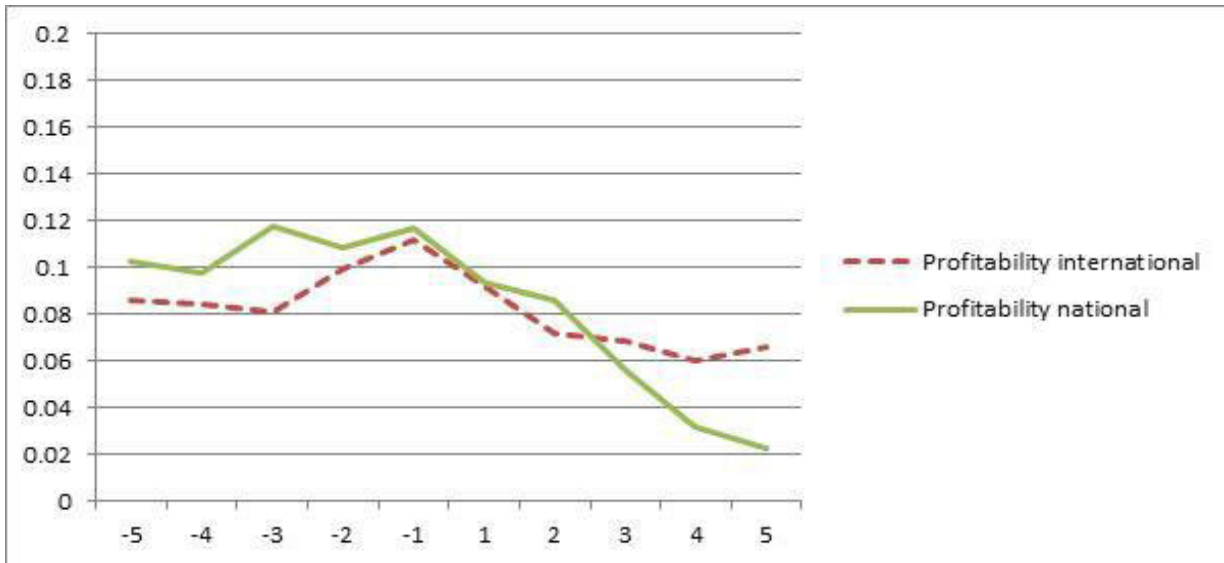


Note: The effective tax rate (ETR) is tax expense (Amadeus: TAXA) divided by pre-tax income (Amadeus: PLBT). The figure shows the mean ETR across all target observations available in a certain period. Period -5 is 5 years pre deal and period 5 is 5 years post deal. In an international deal, the acquirer and target are resident in a different country. In a national deal, the acquirer and target are resident in the same country. Source: Bureau van Dijk Amadeus database.

Figure 4-4 shows in the same manner the evolution of target profitability (defined as earnings before interest and taxes over total assets) starting from five periods pre-deal to five periods post-deal. There is some initial evidence for a drop following the acquisition at point of time zero. This holds for national as well as international mergers and acquisitions. Target profitability fluctuates around 9 percent pre-deal and 5 percent post-deal.

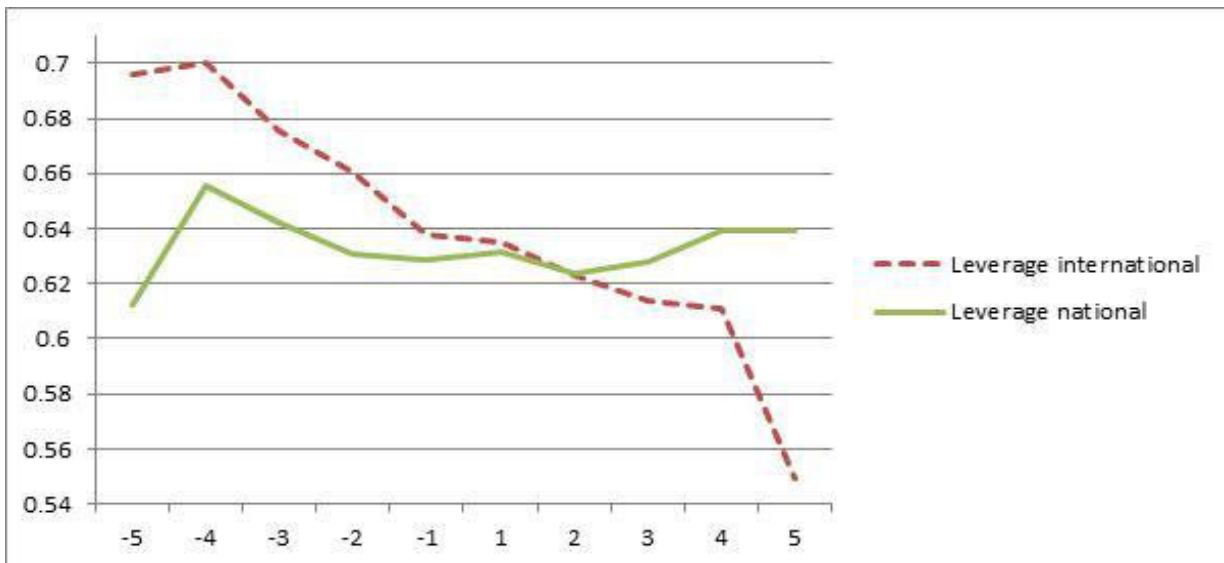
Figure 4-5 shows the evolution of target leverage (defined as total debt over total assets). Target leverage decreases steadily from five periods pre-deal to five periods post-deal for international mergers and acquisitions. There is no clear trend for national takeovers.

Figure 4-4: Target Profitability pre and post Deal



Note: Profitability is earnings before interest and taxes divided by total assets. The figure shows the mean profitability across all target observations available in a certain period. Period -5 is 5 years pre deal, and period 5 is 5 years post deal. In an international deal, the acquirer and target are resident in a different country. In a national deal, the acquirer and target are resident in the same country. Source: Bureau van Dijk Amadeus database.

Figure 4-5: Target Leverage pre and post Deal



Note: Leverage is total liabilities divided by total assets. The figure shows the mean leverage across all target observations available in a certain period. Period -5 is 5 years pre deal and period 5 is 5 years post deal. In an international deal, the acquirer and target are resident in a different country. In a national deal, the acquirer and target are resident in the same country. Source: Bureau van Dijk Amadeus database.

All these figures provide suggestive evidence on the evolution of a target's ETR, profitability and leverage post-deal. However, it is not possible to conclude on mergers and acquisitions being causal for the observed evolution. It may well be the case that the observed evolution of a target's ETR, profitability and leverage post-deal would have occurred irrespective of the target being sold to a new owner. To interpret such a causal relationship I employ more sophisticated econometrics as described above in Section 3.2. Using propensity score matching, I separate the change post-deal of a target's ETR, profitability and leverage caused by mergers and acquisitions from the change that most likely would have occurred irrespective of the transaction.

Since I include the average effective tax rate in the selection equation, the starting level of the ETR is identical for targets and non-targets as a result of the matching procedure as reported in Table 4-3. The reported coefficients in Table 4-4 and 4-5 of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in ETR (comparing the average pre- and post-deal level). The same argument holds for the other outcome variables in Table 4-6 to 4-11.

4.4.2 Main Results

Table 4-4 shows the average effect of treatment on a target's average ETR in the three years following the takeover based on propensity score matching. Comparing targets and similar non-targets, I find a decrease in the ETR. This result holds irrespective of the matching algorithm – radius or kernel – and irrespective of whether treatment is defined as all, only international or only national takeovers. The reduction is around 3 percentage points for all takeovers.

A target's tax avoidance increases post-deal. The resulting reduction in tax payments is able to generate an ownership advantage. The observed decrease of the ETR cannot be due to a step up of the target's assets, since I focus exclusively on corporations as targets. If at all with corporations as targets a step up should occur with respect to the shares at the level of the shareholder (see Erickson and Wang (2000)), which would not affect the ETR.

Table 4-4: Average Effective Tax Rate

Matching Algorithm	All	International	National
Radius	-0.030*** (-4.30)	-0.032*** (-3.27)	-0.025** (-2.52)
Kernel	-0.037*** (-5.23)	-0.049*** (-4.94)	-0.042*** (-4.18)
Number of Treated	529	249	262
Number of Untreated	1,180,076	1,142,988	1,169,431

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average effective tax rate (ETR) is defined as a firm's average ETR in the three years following the takeover. Since I include the average effective tax rate in the selection equation, the starting level of the ETR is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in ETR (comparing the average pre- and post-deal level). The 'All' column reports the coefficient based on the selection equation in Table 4-2 that considers all takeovers as treatments, the 'International' column reports the coefficient based on the selection equation in Table 4-2 that considers only international takeovers as treatments, and the 'National' column reports the coefficient based on the selection equation in Table 4-2 that considers only national takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4-5 presents the average effect of treatment on a target's average ETR in the three years following the takeover, depending on the acquirer's tax aggressiveness. Tax aggressive acquirers are acquirers with a 3-year mean ETR below the acquirer country specific sample 3-year mean ETR in the same time period. I find a larger decrease in a target's ETR following an acquisition by a tax aggressive acquirer. While the decrease is around 8 percentage points (radius matching) or even 10 percentage points (kernel matching) following an acquisition by a tax aggressive acquirer, it is insignificant following an acquisition by a non-tax aggressive acquirer in the case of radius matching and only around 4 percentage points in the case of kernel matching. Acquirers appear to use their tax planning expertise to restructure the target's affairs in a tax efficient manner.

Table 4-5: Average Effective Tax Rate: tax vs. non-tax aggressive Acquirer

Matching Algorithm	Tax aggressive Acquirer	Non-tax aggressive Acquirer
Radius	-0.075*** (-3.09)	-0.012 (-0.56)
Kernel	-0.104*** (-4.29)	-0.040* (-1.84)
Number of Treated	50	57
Number of Untreated	1,091,839	1,107,403

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average effective tax rate (ETR) is defined as a firm's average ETR in the three years following the takeover. Since I include the average effective tax rate in the selection equation, the starting level of the ETR is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in ETR (comparing the average pre- and post-deal level). The column tax aggressive acquirer gives the coefficient considering only takeovers by tax aggressive acquirers as treatments, the column non-tax aggressive acquirers gives the coefficient considering only takeovers by non-tax aggressive acquirers as treatments. Tax aggressive acquirers are acquirers with a three-year mean ETR below the acquirer country specific sample three-year mean ETR in the same time period. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4-6 presents the results with respect to the change in average target profitability in the three years following the takeover. Consistent with Ravenscraft and Scherer (1989) and Clark and Ofek (1994) I observe a decrease in target profitability. I find a systematic larger decrease following international takeovers in comparison to national deals as I would expect from a tax perspective.

Table 4-6: Average Profitability

Matching Algorithm	All	International	National
Radius	-0.015*** (-2.73)	-0.018** (-2.08)	-0.012* (-1.67)
Kernel	-0.014** (-2.50)	-0.015* (-1.70)	-0.010 (-1.42)
Number of Treated	530	249	262
Number of Untreated	1,180,076	1,142,988	1,169,431

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average profitability is defined as a firm's average EBIT over total assets in the three years following the takeover. Since I include average profitability in the selection equation, the starting level of average profitability is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in average profitability (comparing the average pre- and post-deal level). The 'All' column results are based on the selection equation in Table 4-2 that considers all takeovers as treatments, the 'International' column results are based on the selection equation in Table 4-2 that considers only international takeovers as treatments, and the 'National' column results are based on the selection equation in Table 4-2 that considers only national takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Thus, I further differentiate takeovers with respect to the relative tax rates of the target versus the acquirer in Table 4-7. Targets facing a higher statutory tax rate relative to their acquirer are high-tax targets, and they are low-tax targets otherwise. Only in the case of a high-tax target is shifting profits out of the target an advisable strategy for the acquirer. Consistent with this expectation, I observe a decrease in target profitability for high-tax targets, while I do not find any significant change for low-tax targets. Finally, acquirers do not appear to shift profits into low-tax targets.⁴⁶

⁴⁶ This result may also be due to noise in the data. I precisely identify the group of high tax targets. However, due to incomplete information on the acquirer's group structure I may erroneously classify targets as low tax. This makes the correct identification of tax planning more difficult in this case.

Table 4-7: High-tax and Low-tax Targets

Matching Algorithm	High-tax Targets	Low-tax Target
Average Profitability		
Radius	-0.052*** (-3.59)	-0.006 (-0.60)
Kernel	-0.047*** (-3.27)	-0.003 (-0.33)
Number of Treated	65	184
Number of Untreated	1,142,988	1,142,988
Average Leverage		
Radius	0.045* (1.77)	0.030* (1.72)
Kernel	0.027 (1.06)	0.016 (0.92)
Number of Treated	65	184
Number of Untreated	1,142,988	1,142,988

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average profitability is defined as a firm's average earnings before interest and taxes (EBIT) over total assets in the three years following the takeover. The outcome variable average leverage is defined as a firm's average total liabilities over total assets in the three years following the takeover. Since I include average profitability and average leverage in the selection equation, the starting level of average profitability and average leverage is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in average profitability and average leverage (comparing the average pre- and post-deal level). The column high tax gives the results for high tax targets, the column low tax the results for low tax targets. Targets having a statutory rate above the acquirer's tax rate are defined as high tax targets. They are low tax targets otherwise. Results are based on the selection equation in Table 4-2 that considers all takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4-8 alternately uses information on the acquirer's group structure obtained from the Amadeus owner database to differentiate between high-tax targets and low-tax targets. Targets having a statutory tax rate above the minimum tax rate faced by any member of the acquirer's group are now defined as high-tax targets. They are low-tax targets otherwise. Again, I find a significant decrease in target profitability for high-tax targets only. For legal (e.g. because of controlled foreign corporation rules) as well as practical reasons (e.g. because of established business relationships between the acquirer and the target) it is easier to shift profits from the target to the acquirer directly instead of shifting profits to a low-tax group member of the acquirer. I thus observe a lower point estimate for the decrease in profitability in Table 4-8 compared to Table 4-7.

Table 4-8: High-tax vs. Low-tax Target - Minimum Tax Rate of the Group

Matching Algorithm	High-tax Targets	Low-tax Target
Average Profitability		
Radius	-0.027*** (-2.67)	-0.007 (-0.53)
Kernel	-0.024** (-2.33)	-0.004 (-0.32)
Number of Treated	130	119
Number of Untreated	1,142,988	1,142,988
Average Leverage		
Radius	0.027 (1.50)	0.041* (1.79)
Kernel	0.008 (0.48)	0.030 (1.32)
Number of Treated	130	119
Number of Untreated	1,142,988	1,142,988

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average profitability is defined as a firm's average earnings before interest and taxes (EBIT) over total assets in the three years following the takeover. The outcome variable average leverage is defined as a firm's average total liabilities over total assets in the three years following the takeover. Since I include average profitability and average leverage in the selection equation, the starting level of average profitability and average leverage is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in average profitability and average leverage (comparing the average pre- and post-deal level). The column high tax gives the results for high tax targets, the column low tax the results for low tax targets. Targets having a statutory rate above the acquirer's tax rate are defined as high tax targets. They are low tax targets otherwise. Results are based on the selection equation in Table 4-2 that considers all takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 4-9 finally presents the results with respect to changes in the 3-year average leverage in the years following the takeover. While I find some evidence for an increase in leverage based for all deals, I do not find a systematically larger increase following international takeovers, as I would expect from a tax perspective. I neither find significant changes if I differentiate between high tax and low tax targets as in Table 4-7. Thus, Table 4-9 provides no evidence for a tax-motivated increase in target leverage.

Table 4-9: Average Leverage

Matching Algorithm	All	International	National
Radius	0.031*** (3.02)	0.034** (2.34)	0.031** (2.03)
Kernel	0.025** (2.42)	0.019 (1.31)	0.015 (0.99)
Number of Treated	530	249	262
Number of Untreated	1,180,076	1,142,988	1,169,431

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average leverage is defined as a firm's average total liabilities over total assets in the three years following the takeover. Since I include average leverage in the selection equation, the starting level of average leverage is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in average leverage (comparing the average pre- and post-deal level). The 'All' column reports the coefficient based on the selection equation in Table 4-2 that considers all takeovers as treatments, the 'International' column reports the coefficient based on the selection equation in Table 4-2 that considers only international takeovers as treatments, and the 'National' column reports the coefficient based on the selection equation in Table 4-2 that considers only national takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

4.4.3 Sensitivity Analyses

4.4.3.1 Group taxation

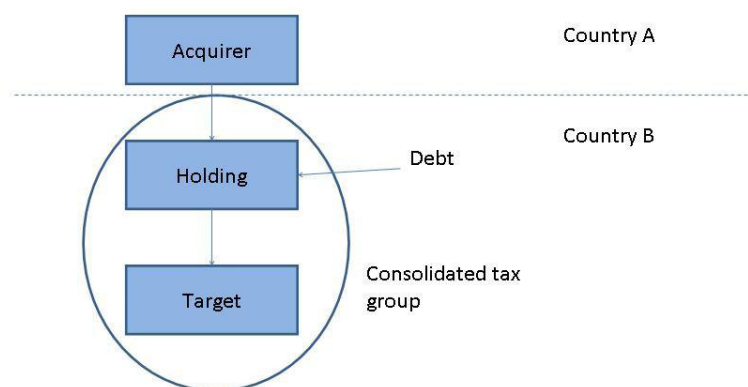
It is difficult to load a target with additional debt post-deal. While it is in general possible to load such debt on a target's books, the critical issue is what to do with the excess liquidity generated in doing so. Raising debt to finance the deal would be a natural candidate. However, such debt cannot enter on the books of the target, since these financial means are employed to acquire the target itself. The only feasible possibility is to distribute the retained earnings of the target and replace them with debt. This may however cause taxes on the distributions. Further, pre-deal creditors of the target may oppose to such a strategy, since it worsens their position in the case of default. My results finding no significant change in target leverage post deal indicate that this strategy is not employed on a large scale due to such costs of debt finance

A more tax efficient and widely applied (see Ruf (2011)) strategy is to acquire targets not directly, but instead via a holding set up in the same country as the target (debt push-down). Figure 4-6 illustrates such a strategy.⁴⁷ As the advantage of this strategy it is possible to load

⁴⁷ See also Delauriere (2011), Brincker (2008), and <http://www.mondaq.com/x/539/Audit/Dutch+Debtpushdown+Structures> for a discussion of the use of debt push-

the holding with debt in order to acquire the target. After the transaction the holding's interest expenses on the debt to acquire the target are consolidated with the target's earnings making use of group taxation regimes. The debt of the holding acts as if it were target debt. This reduces the incentive to load the target with debt itself and could be an explanation for me not finding clear evidence for an increase in target leverage following mergers and acquisitions.

Figure 4-6: Debt Push Down Strategy in Group Tax Regimes



In order to test this possibility, I consider targets located in countries offering no group taxation separately.⁴⁸ In such countries the debt push down strategy does not work. Since it is not possible to load an acquiring holding tax efficiently with debt in such countries, there should be a stronger incentive to load the target itself with debt. Indeed – when focusing on targets in countries with no group taxation regime only – I find evidence for target leverage to increase after the takeover as presented in Table 4-10. Target leverage increases by around 8 percentage points. Acquirers loading holdings instead of targets with debt in countries offering group taxation could thus be an explanation for me finding no effect on target leverage above. I am not able to split up the results in national and international mergers and acquisitions in Table 4-10, since the sample of targets in countries without group taxation regimes is too small to do so.

down structures.

⁴⁸In my sample these are (101) targets located in Belgium (60), Bulgaria (5), Czech Republic (14), Estonia (5), Lithuania (4), Romania (10) and Slovakia (3).

Table 4-10: Average Leverage - Countries without Group Taxation Regimes

Matching Algorithm	All
Radius	0.082*** (3.32)
Kernel	0.075*** (3.07)
Number of Treated	101
Number of Untreated	166,499

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. The outcome variable average leverage is defined as a firm's average total liabilities over total assets in the three years following the takeover. Since I include average leverage in the selection equation, the starting level of average leverage is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in average leverage (comparing the average pre- and post-deal level). Results are based on the selection equation in Table 4-2 that considers all takeovers as treatments and on a sample including only countries without a group taxation regime. In my sample these are Belgium, Bulgaria, Czech Republic, Estonia, Lithuania, Romania and Slovakia. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

4.4.3.2 Exact Matching

As a robustness check I employ three exact matching procedures: for countries, for industries and for country-years. I thus only match targets and controls from the same country in the first case, from the same industry in the second case and from the same country and year in the third case. Table 4-11 shows the radius matching results. Results do not materially change compared to section 4.2. I still observe evidence for a decreased ETR following mergers and acquisitions. I find some evidence for a decrease in profitability and an increase in leverage. However, I neither find a systematic larger decrease in profitability nor a larger increase in leverage following international takeovers as I would expect from a tax perspective.

Table 4-11: Exact Matching

Matching Algorithm	Country-specific		
	ALL	International	National
Average ETR Radius	-0.033*** (-3.26)	-0.036** (-2.54)	-0.027* (-1.83)
Average Profitability Radius	-0.016** (-2.17)	-0.019 (-1.63)	-0.010 (-1.00)
Average Leverage Radius	0.033** (2.24)	0.031 (1.52)	0.035 (1.62)
	Industry-specific		
	ALL	International	National
Average ETR Radius	-0.029*** (-2.93)	-0.033** (-2.33)	-0.025* (-1.72)
Average Profitability Radius	-0.014* (-1.93)	-0.018 (-1.56)	-0.011 (-1.15)
Average Leverage Radius	0.032** (2.17)	0.034 (1.62)	0.033 (1.53)
	Country-Year-specific		
	ALL	International	National
Average ETR Radius	-0.032*** (-3.18)	-0.036** (-2.50)	-0.027* (-1.89)
Average Profitability Radius	-0.016** (-2.08)	-0.016 (-1.39)	-0.011 (-1.10)
Average Leverage Radius	0.032** (2.20)	0.032 (1.55)	0.035 (1.61)

Note: I report coefficients that correspond to the average treatment effect on the treated (ATT); T-statistics in parentheses. Results are propensity score matching results after exact matching according to country, industry or country-year. The outcome variable average ETR is defined as a firm's average ETR in the three years following the takeover. The outcome variable average profitability is defined as a firm's average EBIT over total assets in the three years following the takeover. The outcome variable average leverage is defined as a firm's average total liabilities over total assets in the three years following the takeover. Since I include all outcome variables in the selection equation, the starting level of outcome variables is identical for targets and non-targets. The reported coefficients of the average treatment effect on the treated are thus equivalent to the average treatment effect on the treated with respect to the change in outcome variables (comparing the average pre- and post-deal level). The 'All' column results are based on the selection equation in Table 4-2 that considers all takeovers as treatments, the 'International' column results are based on the selection equation in Table 4-2 that considers only international takeovers as treatments, and the 'National' column results are based on the selection equation in Table 4-2 that considers only national takeovers as treatments. The symbols ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively

4.5 Conclusion

More tax avoidance within targets post-acquisition increases the cash flow available to acquirers, allowing acquirers to outbid initial owners. Tax avoidance is one possible driver of mergers and acquisitions. I investigate the change in the tax avoidance of targets post-acquisition using a sample of European mergers and acquisitions taking place between 1996 and 2009.

I consider three aspects of tax avoidance: First, a target's effective tax rate (ETR) as a measure reflecting aggressive tax planning through permanent book-tax differences; second, target profitability as a proxy to measure tax induced profit shifting; third, target leverage as an indicator for tax induced debt shifting.

A target's ETR decreases by 3-percentage points post deal and even by 8 percentage points if the acquirer is particularly tax aggressive. Further target profitability decreases following mergers and acquisitions. This decrease is especially pronounced for targets having a higher statutory tax rate than the acquirer. Tax induced profit shifting is one explanation for the empirical finding of decreased target profitability.

I do not find evidence for changes in target leverage post deal in general. However, I find empirical evidence for group taxation being an explanation for this finding: Restricting my sample to targets from countries without group taxation regimes results in a significant increase in leverage post deal. In countries offering group taxation regimes acquirers may prefer to load the acquiring holding instead of the target itself with debt. This results in similar tax savings, but is easier to achieve.

4.6 Appendix

Table 4-12: Appendix - Variable Definition

Variable Name	Definition
ETR (av)	A firm's tax expense (TAXA) divided by pre-tax income (PLBT) (3-year average; for targets defined for the three years pre-deal (selection equation) and the three years post-deal (outcome variable)). The ETR is winsorized into the (0,1) interval. <i>Source: Bureau van Dijk Amadeus Database.</i>
Profitability (av)	A firm's Earnings before interest and tax (EBIT)/Total assets (3-year average; for targets defined for the three years pre-deal (selection equation) and the three years post-deal (outcome variable)); <i>Source: Bureau van Dijk Amadeus Database.</i>
Leverage (av)	A firm's Total liabilities/Total assets (3-year average; for targets defined for the three years pre-deal (selection equation) and the three years post-deal (outcome variable)). <i>Source: Bureau van Dijk Amadeus Database.</i>
Cash (av)	A firm's (Cash + Cash equivalents)/Total assets (3-year average). <i>Source: Bureau van Dijk Amadeus Database.</i>
High Growth	Dummy variable that takes on the value 1 for a firm whose annual growth rate of "Total assets" is above the average growth rate and 0 otherwise.
Log (Total Assets) (av)	Natural logarithm of a firm's Total assets (3-year average). <i>Source: Bureau van Dijk Amadeus Database.</i>
Research intensity (av)	A firm's Intangible assets/Total assets (3-year average). <i>Source: Bureau van Dijk Amadeus Database.</i>
Tangibility (av)	A firm's Fixed assets/ Total assets (3-year average). <i>Source: Bureau van Dijk Amadeus Database.</i>

Table 4-12 – continued

Variable Name	Definition
Inventories (av)	A firm's Inventory/Total assets (3-year average). <i>Source: Bureau van Dijk Amadeus Database.</i>
Capital Expenditures	Difference in a firm's fixed assets between one year and three years preceding the acquisition / Total assets. <i>Source: Bureau van Dijk Amadeus Database.</i>
Listed	Dummy variable that takes the value 1 for listed stocks and 0 otherwise. <i>Source: Bureau van Dijk Amadeus Database.</i>
Stocks Traded	Ratio of stock market capitalization to GDP of the target country. <i>Source: World Development Indicators, Worldbank Database.</i>
Log (Labor Force)	Total labor force comprises people aged 15 and older who meet the International Labour Organization definition of the economically active population (logarithm). <i>Source: World Development Indicators, Worldbank Database.</i>
Exports	Ratio of Exports of goods and services to GDP of the target country. <i>Source: World Development Indicators, Worldbank Database.</i>
Log (GDP)	The natural logarithm of the target's country purchase price parity (ppp) converted GDP per capita. <i>Source: Penn World Tables.</i>
Spending on Education	Ratio of Public expenditure on education to GDP of the target country. <i>Source: World Development Indicators, Worldbank Database.</i>
Inflation Rate	Inflation as measured by the consumer price index of the target country. <i>Source: World Development Indicators, Worldbank Database.</i>

Note: All averages (avg.) are calculated for the three years preceding the acquisition. All macroeconomic variables refer to the year preceding the acquisition. All financial data is winsorized at the 1% level.

4.7 References

- Auerbach, A. J. and Poterba, J. M. (1987): Tax-Loss Carry-forwards and Corporate Tax Incentives, *The Effects of Taxation on Capital Accumulation*, M. Feldstein (ed.), Chicago: University of Chicago Press, 305-338.
- Becker, J. and Fuest, C. (2010): Taxing foreign profits with international mergers and acquisitions, *International Economic Review* 51 (1), 171-186.
- Blouin, J. L., Collins, J. H. and Shackelford, D. A. (2005): Does acquisition by non-U.S. shareholders cause U.S. firms to pay less tax?, *Journal of the American Taxation Association* 27 (1), 25–38.
- Brincker, E. (2008). Debt push-down facilities smoothen BEE deals. *Business Law & Tax Review*, July.
- Chen, S., Chen, X., Cheng, Q. and Shevlin, T. (2010): Are family firms more tax aggressive than non-family firms?, *Journal of Financial Economics* 95 (1), 41–61.
- Chow, K. C., Klassen, K. and Liu, Y. (2013): Shareholder wealth effects of tax aggressiveness transfer, University of Waterloo Working Paper.
- Clark, K. and Ofek, E. (1994): Mergers as a means of restructuring distressed firms: An empirical investigation, *Journal of Financial & Quantitative Analysis* 29 (4), 541-565.
- Col, B. and Errunza, V. (2014): Havenly acquisitions, McGill University Working Paper.
- Creal, D., Robinson, L., Rogers, J. and Zechman, S. (2014): The multinational advantage, Chicago Booth Paper No. 11-37.
- Delauriere, J. (2011): U.S. debt push-down in a French subsidiary – The good and the bad, *Tax Analysts*, March 9, 2011.
- Desai, M. A., Foley, F. and Hines, J. R. Jr. (2004): A multinational perspective on capital structure choice and internal capital markets, *Journal of Finance* 59 (6), 2451–2487.
- Desai, M. A. and Hines, J. R. Jr. (2003): Evaluating international tax reforms, *National Tax Journal* 56 (3), 487-502.
- De Simone, L., Klassen K. and Seidman, J. (2014): Unprofitable affiliates and income shifting behavior, Stanford University Working Paper.
- Devos, E., Kadapakkam, P. and Krishnamurthy, S. (2009): How do mergers create value? A comparison of taxes, market power, and efficiency improvements as explanations for synergies, *Review of Financial Studies* 22 (3), 1179–1211.
- Dietrich, J. and Sorensen, E. (1984). An application of logit analysis to prediction of merger targets, *Journal of Business Research* 12 (3), 393–402.

- Dyreng, S., Hanlon, M. and Maydew, E. (2010): The effects of executives on corporate tax avoidance, *The Accounting Review* 85 (4), 1163–1189.
- Dyreng, S., Hanlon, M. and Maydew, E. (2008): Long-run corporate tax avoidance, *The Accounting Review* 83 (1), 61–82.
- Erel, I., Liao, R. C. and Weisbach, M. S. (2012): Determinants of cross-border mergers and acquisitions, *Journal of Finance* 67 (3), 1045–1082.
- Erickson, M. (1998): The effect of taxes of the structure of corporate acquisitions, *Journal of Accounting Research* 36 (2), 279–298.
- Erickson, M. and Wang, S. (2007): Tax Benefits as a Source of Merger Premiums in Acquisitions of Private Corporations, *The Accounting Review* 82 (2), 359 – 387.
- Hanlon, M. and Heitzman, S. (2010): A review of tax research, *Journal of Accounting & Economics* 50 (2/3), 127–178.
- Hansen, R. (1987): A theory for the choice of exchange medium in mergers and acquisitions, *Journal of Business* 60 (1), 75–95.
- Hines, J. and Rice, E. (1994): Fiscal paradise: Foreign tax havens and American business, *Quarterly Journal of Economics* 109 (1), 149–182.
- Huizinga, H. and Voget, J. (2009): International taxation and the direction and volume of cross-border M&As, *Journal of Finance* 64 (3), 1217–1249.
- Huizinga, H. and Laeven, L. (2008): International profit shifting within multinationals: A multi-country perspective, *Journal of Public Economics* 92 (5/6), 1164–1182.
- Huizinga, H., Laeven, L. and Nicodeme, G. (2008): Capital structure and international debt shifting, *Journal of Financial Economics* 88 (1), 80–118.
- IFBD, Country Analysis, accessed online at <http://www.ibfd.org/IBFD-Tax-Portal/Country-Analyses> in May 2014.
- Kaplan, S. (1989): Management buyouts: Evidence on taxes as a source of value, *Journal of Finance* 44 (3), 611–632.
- Klassen, K. and LaPlante, S. (2012): Are U.S. multinational corporations becoming more aggressive income shifters?, *Journal of Accounting Research* 50 (5), 1245–1286.
- KPMG, Taxation of Cross-Border Mergers and Acquisitions, accessed online at <https://www.kpmg.com/global/en/issuesandinsights/articlespublications/cross-border-mergers-acquisitions/Pages/default.aspx> in May 2014.
- Martin, X., Wang C. and Zou, H. (2012): Does target tax aggressiveness matter in corporate takeovers? SSRN Working Paper.
- Martynova, M. and Renneboog, L. (2008): A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance* 32 (10), 2148–2177.

- Mills, L., Erickson, M. and Maydew, E. (1998): Investments in tax planning, *Journal of the American Taxation Association* 20 (1), 1–20.
- Palepu, K. (1986): Predicting takeover targets, *Journal of Accounting & Economics* 8 (1), 3–35.
- Phillips, J. (2003): Corporate tax-planning effectiveness: The role of compensation-based incentives, *The Accounting Review* 78 (3), 847–874.
- Ravenscraft, D. and Scherer, F. (1989): The profitability of mergers. *International Journal of Industrial Organization* 7 (1), 101–116.
- Rego, S. (2003): Tax avoidance activities of U.S. multinational corporations, *Contemporary Accounting Research* 20 (4), 805–855.
- Rosenbaum, P. and Rubin, D. (1983): The central role of the propensity score in observational studies for causal effects, *Biometrika* 70 (1), 41–55.
- Ruf, M. (2011): Why is the response of multinationals’ capital structure choice to tax incentives that low? Some possible explanations, *Finanzarchiv* 67 (2), 123–144.
- Scholes, M. S., Wolfson, M., Erickson, M., Maydew, E. and Shevlin, T. (2009): *Taxes and Business Strategy A Planning Approach* (4 ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- UNCTAD (2012): World Investment Report 2012, Geneva: United Nations Conference on Trade and Development.
- Weston, J., Mitchell, M. and Mulherin, J. (2004): Takeovers, restructuring, and corporate governance (4 ed.), Upper Saddle River, NJ: Pearson Prentice Hall.
- Wooldridge, J. M. (2002): *Econometric Analysis of Cross Section and Panel Data*, Cambridge, Mass.: MIT Press.

Working Paper II

5 Restricted Tax Loss Transfer and Business Cycle Effects⁴⁹

Abstract: Tax loss compensation rules serve as a mechanism of risk-sharing between the government and the tax payers and are usually subject to various restrictions. “Anti-loss trafficking” rules that limit the indirect transfer of tax losses in the form of mergers and acquisitions can be especially harmful as they might render all taxable losses completely useless. They negatively affect the risk-return relation of potential investors and at the same time lead to a devaluation of existing tax losses. I study whether the introduction of a limitation to loss transfers has an adverse effect on firm entries and if it increases the rate of firm exits. My results suggest that such rules are not viewed as considerable entry barriers by investors as the rate of newly incorporated companies remains largely unaffected. But I find supporting evidence that transfer limitations spur market exits of loss carrying firms.

Keywords: loss trafficking, mergers and acquisitions, investments, firm entry, firm exit

JEL Classification: L26; G11; G33; G34; H25; H26

⁴⁹ This paper is based on a joint research idea with Prof. Dr. Johannes Voget (Mannheim University) and Thomas Belz (Mannheim University).

5.1 Introduction

The amount of worldwide reported corporate tax losses has been constantly rising over the last decade. According to the latest OECD Report on corporate losses, reported tax losses nearly doubled between the years 2000 and 2009. In 2009 loss carry-forwards among OECD countries reached up to 21 percent of the annual GDP.⁵⁰ These alarming figures underline the vast economic meaning of the treatment of tax losses for investors, corporations and fiscal authorities. The questions of how and when losses are considered for tax purposes have several economic implications. The treatment of tax losses not only influences ongoing business decisions such as the place of investment or the choice of legal form but is also considered at both ends of the business life cycle as it affects firm entries and firm exits.

I examine the question if the imposition of a limitation to loss transfers for tax purposes has an adverse effect on the entry rate of new firms and at the same time increases the rate of firm exits.

Since Schumpeter's theory on creative destruction (Schumpeter (1911)) the important role of firm entries and firm exits as crucial determinants of economic growth is widely recognized. Recent studies have focused on the direct effects of several economic, institutional, legal or firm-specific variables on firm entry rates and firm exit rates (see Dunne, Roberts and Samuelson (1988), Bertrand and Kramarz (2002), Djankov, LaPorta, Lopez-de-Silanes and Shleifer (2002), Johnson, MacMillan and Woodruff (2002), Scarpetta, Hemmings, Tressel and Woo (2002), Desai, Gompers and Lerner (2003), Klapper, Laeven and Rajan (2006), Djankov, Ganser, MacLiesh, Ramalho and Shleifer (2010), Kaplan, Piedra and Seira (2011), Da Rin, Di Giacomo and Sembenelli (2011)). Among all those empirical studies the tax treatment of losses has received surprisingly little attention.

In general, most corporate tax systems share common features regarding loss compensation rules such as the asymmetric treatment of taxable profits and losses. Profits are taxed as earned while an immediate tax refund in the case of losses is usually not granted.⁵¹

⁵⁰ The 2011 OECD report on "Corporate Loss Utilization through aggressive tax planning" provides statistics on the size and development of corporate losses among OECD countries. For further evidence and potential explanations for the U.S. compare Auerbach (2007) and Altshuler, Auerbach, Cooper and Knittel (2008).

⁵¹ The asymmetric tax treatment of profits and losses is subject to a broad range of analytical as well as empirical studies such as Auerbach (1986), Altshuler and Auerbach (1990), Devereux, Keen and Schiantarelli (1994), Cooper and Knittel (2010).

Instead, losses can be carried-over to previous (carry-back) or subsequent (carry-forward) periods. In most countries tax loss carry-overs are subject to further restrictions. Many national tax codes contain sections that limit the indirect transfer of tax losses in the form of a merger or an acquisition. These limitations aim at counteracting aggressive tax planning schemes on losses so called “loss trafficking” and are commonly triggered by a change of ownership or a change in activity. “Trafficking” in losses describes transactions that merely take place for targets’ net operating losses (NOL) and not for legitimate business purposes. But restricting the transfer of tax losses may also indirectly affect the entire business life cycle of an economy.

As first noted by Domar and Musgrave (1944) loss-compensation rules serve as a mechanism of risk-sharing between the investor and the government (see also Tobin (1958)). The government either benefits from an investor’s profits or participates in its losses. Any limitation to the use of NOL reduces the risk the state has to bear but leaves its share in taxable profits unchanged. This is especially true if NOL are expected to expire in the future unused and yet cannot be transferred. This would completely devalue the NOL for the investor.

I argue that the potential threat of ultimately losing possible tax savings exerts two detrimental effects. First, it worsens the ex-ante risk and return relation for an investor and makes potentially profitable business activities less attractive. Second, it devalues the existing NOL of an ongoing business. Loss-carrying firms’ chance to recover is reduced as the limitation renders tax losses ultimately useless for further business purposes. Consequently, the probability of an earlier discontinuance of a company’s activities increases. Based on these grounds I expect that the introduction of a limitation to passing on losses after a change in ownership decreases entry rates and at the same time increases the rate of firm exits.

The identification strategy follows a two-step approach: I first test for the effectiveness of the restrictions. I analyze if the introduction of such a restriction makes the acquisition of loss firms less attractive and therefore reduces the number of acquisitions of loss-carrying targets. In the second part, I study the investment effects of the newly introduced limitations. I try to answer the question how firm entry rates and firm exits rates are influenced by restricted tax loss transfers.

I use a comprehensive panel dataset that covers the rate of acquisitions of loss-carrying targets, entry-rates and exit-rates of 17 countries across 72 industries in the period 1995 to 2012.

Such a cross-country investigation allows me to apply time-series analyses of the effects of the new restrictions. This enables me to disentangle the tax effects from many potentially confounding country- or year specific factors.

Based on my first tests, none of the newly introduced transfer restrictions proves to be especially effective. Further results do not suggest an adverse effect on entry rates neither at the aggregated level nor do I find solid supporting evidence at the level of individual countries. Regarding exit rates, my base case results suggest a significant increase in the average exit rates. I report extensive robustness tests for my results. First, as tax legislation is extremely country-specific and often complex to model in econometric analysis I subdivide the overall effect of the different tax reforms into individual country-specific components. I also change the sample period of my analysis to show that data availability is not the driver of my results. I complement these checks by controlling for other country-specific loss compensation rules. Second, I run regressions in which I consider industry-specific loss probabilities to account for variation in investment behavior across different industries. Third, the choice of an appropriate control group is crucial for any comparative study. In order to rule out the possibility of any biased conclusions based on poor comparisons I check the robustness of my results by assigning customized control groups to the different treatment countries. I further validate the quality of these especially designed control units by a battery of placebo studies.

The above mentioned checks confirm my initial findings. Limitations to loss transfers do not seem to negatively influence entrepreneurial activities. However, firm exits appear to be spurred to some extent by newly imposed transfer restrictions.

My study contributes to the current literature in three ways: First, to the best of my knowledge this is the first paper that examines whether limitations to the transfer of tax losses are effective in reducing the frequency of loss acquisitions.

Second, empirical studies on the economic meaning of tax losses on investment decisions are still rare. Dreßler and Overesch (2011) show that in industries which are relatively likely to encounter losses the treatment of NOL for tax purposes is considered in the investment decision. Whereas Devereux, Keen and Schiantarelli (1994) do not find any significant investment effects of loss compensation regulations. Edgerton (2010) observes different investment responses to tax incentives depending on the tax status of the firms. I add to this strand of literature by treating restrictions to loss transfers as another possible barrier to entrepreneurship.

Third, based on my interpretation of a tradable NOL as a valuable asset I enrich the current literature on firm exit behavior by adding a new possible factor that might drive firm dissolutions.

The paper proceeds as follows: the next section gives a literature review and describes the development of my hypotheses. Section 3 describes my data. In Section 4 the estimation methodology and analyses are discussed and my results are presented. Conclusions are drawn in Section 5.

5.2 Literature Review and Hypotheses Development

5.2.1 Taxes and Loss-Acquisitions

Rules and regulations that are targeted at “loss trafficking” are supposed to stop purely tax driven mergers and acquisitions (M&A) without any underlying sound economic reasons. The mere intention of such tax planning transactions is the reduction of the overall corporate tax burden.

The typical tax planning strategy that is supposed to be prevented by those “anti-loss trafficking” rules can be described as follows: First, a company that carries a loss for tax purposes is fully sold to a new owner in the form of a share deal. As a consequence, the new owner does not only gain control of the acquired company but also of its losses. Only corporations or other legal forms that have their own business sphere can carry losses independently from their owners. In case of other legal forms that are not treated as separate legal entities losses are inextricably linked with the owners of the businesses and cannot be treated independently.⁵² In a next step, receivables, other interest bearing assets or patents are transferred to the newly acquired entity in order to redirect related interest income or royalty income to the unused tax losses.

This taxable income can now be offset against the available losses. Those losses are still used in the hands of the taxpayer who generated the losses in the first place but the acquirer can indirectly take advantage of the acquired losses.⁵³

⁵² The “same entity” tax policy implies that loss utilization is strictly confined to the entity that incurred the loss. Donnelly and Young (2002) provide an extensive discussion on the various concepts of tax loss utilization and its economic implications.

⁵³ Such tax planning strategies imply that an acquirer is not interested in the original business activities of the target and usually does not inject new equity capital to have the target carry on its actual business.

Most national tax rules that aim at such tax planning structures are usually triggered by a certain percentage change in ownership of a loss-carrying company. The ownership change can be combined with several other legal requirements such as a change of activity, a change in the type of income or changes in the employment structure to further specify an underlying tax motivation. If an acquisition of a loss-carrying target fulfills these requirements a purely tax-driven transaction is assumed and losses of the target that existed prior to the deal cannot be utilized for tax purposes after the transaction.

Given the above considerations, any potential acquirer of a company does not only buy assets, liabilities or unrecorded synergies but also acquires the option of future tax savings. Thus, the taxable loss also represents a valuable asset to the acquirer that is considered in the price negotiation process. In case of a transfer restriction, the unutilized loss of the potential target firm can be subject to a complete devaluation, assuming that the loss-carrying company itself will not be able to utilize its losses in the future.⁵⁴ The unused tax losses also lose their value to any potential acquirer since it cannot gain any future tax savings. As a consequence, the maximum offer price the acquirer is willing to bid is reduced and the acquisition of loss firms is systematically discouraged.⁵⁵

Early empirical evidence by Moore and Pruitt (1987) confirm such a loss in value. First, they show that tax losses represent a portion of a loss firm's market value. Second, they demonstrate that a tightening of the anti-loss transfer legislation significantly reduces the present value of loss firms. Later empirical studies by Henning, Shaw and Stock (2000) and Chiang, Stammerjohan and Englebrecht (2014) also consider possible restrictions to loss transfers in estimating the effects of tax losses on acquisition prices.

Based on the above considerations of a limited usage of tax losses and depressed acquisition prices my first hypothesis is:

H1: Introducing a restriction to the transfer of tax losses reduces the acquisition rate of loss-carrying companies.

⁵⁴ Auerbach and Poterba (1987) argue that such a loss in value is caused by restrictions on the preservation of loss carry-forwards.

⁵⁵ The restriction can reduce the bidder's price down to zero if the target contains zero net assets and no future positive cash flows are expected. From the seller's perspective a tax-driven lock-out effect is prevented (Schreiber (2014)).

5.2.2 Taxes and Firm Entry

Tax policy can have potentially positive as well as negative effects on business start-ups and entrepreneurship. Recent studies have identified four different channels through which various aspects of a tax system can affect the entrepreneurial decision.⁵⁶

The first one refers to the effective tax burden. Da Rin, Di Giacomo and Sembenelli (2011) use a panel data set of 17 European countries to examine the effect of effective corporate tax rates on firm entry by controlling for possible endogeneity concerns. They report a negative effect of corporate income taxation on entry rates. In a related study Djankov, Ganser, MacLiesh, Ramalho and Shleifer (2010) use a survey based cross-section of 85 countries. They also find a negative association between the effective corporate tax burden of a chosen “standard company” and entry rates. Both studies deliver empirical evidence of the predicted adverse effect of corporate taxation on entry rates as predicted in the models by Romer (1994) and Appelbaum and Katz (1996).

The second channel describes the relationship between the tax burden of self-employed income and taxes on wage income. The relative tax burden can encourage more entrepreneurial activities by taxing self-employment income more favorably than alternative wage income as an employee. Schuetze (2000) and Bruce (2000) examine the effect of such tax differences on employment rates. In both studies it can be shown how differential taxation can affect self-employment activities suggesting that higher tax rates on wages may increase the self-employment rate.⁵⁷

Capital gains taxation is the third channel. At the moment of entry the investor already takes into account the tax burden of the exit option. Capital gains taxation plays an especially important role in the context of venture capital investments. Poterba (1989) describes the possible shift from labor income to capital gains income when capital gains are subject to a lower tax burden.

⁵⁶ The following literature review covers entrepreneurship with respect to all legal firm types. Within the scope of my empirical analysis I later only consider corporate firm entries. Compare Gentry and Hubbard (2005) for an alternative literature review.

⁵⁷ Given a series of papers by Carroll, Holtz-Eakin, Rider and Rosen (2000a, 2000b, and 2001) the effect of income taxation on ongoing entrepreneurial activity seems far from clear. Their studies examine whether taxes affect decisions of entrepreneurs. They find that lower marginal tax rates reduce income, investments and hiring.

The tax system and its effect on risk-taking is the last channel. Starting its own company is a risky business. A tax system can affect an investor's willingness to take on risk in various ways.⁵⁸ Domar and Musgrave (1944) examine the effect of a proportional tax on risky assets for risk-averse investors. They describe the mechanism of risk-sharing with the government. A higher marginal tax rate and therefore more potential risk-sharing eventually makes higher entrepreneurial risk-taking more attractive assuming a complete offset of losses.⁵⁹

In a next step, extending these early approaches Gentry and Hubbard (2004a, 2004b) focus on the effects of tax progressivity on entry into entrepreneurship. They argue that the marginal tax rate alone does not necessarily capture the entire effect of a tax system on entrepreneurship. They examine if nonlinearities in the tax system encourage or discourage potential entrepreneurs. They find significant evidence that the convexity of a tax schedule negatively affects entrepreneurship suggesting that asymmetric taxes on different investment outcomes discourage risk-taking.

Cullen and Gordon (2007) formalize how taxation affects the incorporation decision. They model three distinct modes through which the tax system can influence the entry decision in the form of a corporation. Those three modes have potentially countervailing effects on the decision to incorporate which leads to an unclear final outcome. The first effect captures the benefits from being able to shift business income but not wage income from the personal to the corporate tax schedule, it is therefore referred to as the "income-shifting" effect. It primarily measures the extent to which taxes can be saved through incorporation but does not capture any risk considerations. In terms of risk, taxes can reduce the costs of bearing risk for two reasons: the "risk-subsidy" effect and the "risk-sharing" effect. The former depends on the progressivity of the effective tax schedule whereas the latter is determined by the marginal tax rate with given predefined loss compensation rules. The overall reduction in risk crucially depends on the investor's ability to offset losses.⁶⁰

⁵⁸ Poterba (2001) provides a summary of this strand of literature.

⁵⁹ Sandmo (1969) and Stiglitz (1976) extend their results and directly apply them to entrepreneurial decisions. They reach the same conclusion under the assumptions of constant returns to scale in production and fully debt financed investments. Mossin (1968) and Mintz (1981) conclude that a full loss offset has either no or a positive effect on investments in risky projects.

⁶⁰ In Domar and Musgrave's (1944) proportional tax rate model the risk-sharing effect is fully described by the tax rate t and the respective loss offset. Cullen and Gordon (2007) generalize this effect in their risk-sharing term for nonlinear tax schedules. The reduced risk premium due to a risk-sharing effect is essentially based on the possibility to offset losses. If losses cannot be offset at all, the investor bears the entire risk and risk-sharing does not take place. On the other hand a complete loss compensation will let the government fully participate in the losses.

Any tax loss that cannot be utilized hampers the risk-sharing effect of a tax system. The risk premium inherent in every uncertain investment is not reduced, since the government only participates in a positive outcome but does not take its share in a loss. Consequently, undertaking risky investments is discouraged. This holds for investments in individual assets or for the entrepreneurial decision itself. In all cases the investment decision depends on the yield and the risk involved.

Based on the idea of a risk-sharing effect as described in the model by Cullen and Gordon (2007) I argue that tax rules that effectively restrict the transfer of tax losses reduce the amount of overall risk-sharing between investors and the state and thus discourage corporate entrepreneurial activities. Intuitively, a rationale investor does not only consider the effects of an asymmetric treatment of a NOL but also the final use of a possible loss in case of a future market exit. The possibility of a future monetization of remaining losses through a sale reduces an investor's ex-ante risk premium and consequently encourages entrepreneurial risk-taking. Whereas, any limitation to the transfer of losses reduces the return relative to the risk involved and makes a firm entry less attractive.

Tax authorities usually point to the fact, that limitations to the transfer of losses are intended to prevent purely tax driven transactions and to ensure that loss relief is only granted to the person that economically incurred the loss. However, the political debate usually ignores the above described consequences for entrepreneurial decision making.

For all countries that introduced a restriction to loss transfers I would expect a decrease in entry rates after the implementation. However, if a national restriction is considered especially effective in discouraging acquisitions of loss-carrying companies based on my first analysis I would expect a more pronounced adverse effect on entry rates. Based on the above considerations I set up the following hypothesis:

H2: Introducing a restriction to the transfer of tax losses reduces the firm entry rate.

5.2.3 Value-relevance of Losses and Firm Exit

In order to fully understand the impact of restricted tax loss transfers on firm dynamics it is also necessary to look at the exit decision of firms. As the restricted transfer of a NOL hampers the entry decision it also encourages the dissolution of companies. Previous empirical literature on determinants of firm exits has primarily focused on legal or institutional conditions, industry-specific determinants or firm-specific factors.

Desai, Gompers and Lerner (2003) examine the impact of the legal and institutional framework on the exit decision. They find that fairness, property rights, legal formalism and the interference of courts are all associated with a reduction in exit rates.

Many studies predominantly look at the special meaning of industries and industry-specific determinants with respect to exit decisions. Dunne, Roberts and Samuelson (1988) and Samaniego (2009) find a high correlation between entry and exit rates across industries, suggesting that both are determined by the same industry-specific factors. Huyghebaert and van de Gucht (2004) find that the exit probability of start-ups in highly competitive industries is higher compared to other industries and that a high degree of leverage amplifies this effect.

Firm-specific attributes such as age and size have also been subject to intense scrutiny. Along these lines, Mata, Portugal and Guimaraes (1995) find a negative impact of firm size on the failure rate and show evidence that the growth rate is negatively associated with the probability of survival. Harhoff, Stahl and Woywode (1998) examine the effect of different legal forms on insolvency rates of West German firms. They show that firms with limited liability face higher insolvency rates than comparable firms with full liability. Furthermore, they study how the age of the owner of the firm affects the probability of liquidation or insolvency.

Another strand of literature identifies different forms of firm exits and examines if and how they are affected by various economic and firm-specific factors. The study by Schary (1991) is the first empirical analysis that differentiates between different modes of exit and tests whether these forms have common economic determinants. She finds that firm-specific factors determine the exit decision and that differences exist between the various forms of exit.⁶¹

⁶¹ When talking about firm exits, the empirical literature usually distinguishes between three possible exit channels: The first one is a voluntary liquidation and the second one an involuntary bankruptcy. In both cases a busi-

Chang and Singh (1999) identify significantly different drivers for the mode of exit and the exit decision itself.

I argue that a limited transfer of losses can also be seen as another legal factor that influences a firm's exit decision. Every owner of a company that is in an overall loss position faces the decision to either terminate the business or to carry on the business activities in order to become profitable again and to make up for prior losses. For such a company, a taxable loss is a valuable asset since it can be carried forward in time and enables the company to reduce its future tax burden.⁶²

However, a company can only take advantage of those prior losses if it generates sufficient future taxable income. If this is not the case and the company is not able to utilize the losses in the future the owner can still sell the company as a kind of "shell" containing the loss. As future tax savings can be sold the downside risk of running a loss firm with the potential threat of even higher future losses is reduced and the owner of a loss-carrying company may be more willing to continue the business. Even though the company might not be able to benefit from future tax savings itself, the taxable loss still has an inherent value to the firm as it serves as a remaining valuable asset not recorded on the balance sheet.

As a consequence of a limitation to the transfer of tax losses, any unutilized loss of a firm may be subject to a complete devaluation, assuming that the loss-carrying company itself will not be able to utilize its loss in the future. The costs of failure increase for the owner of a loss firm as the company cannot resort to its tax losses as last tradable or lendable asset anymore. Thus, running a firm in a loss position becomes more risky and the probability of an earlier liquidation or bankruptcy increases. Therefore, I expect any introduction of restrictions to loss carry-overs to increase the exit rate of loss-carrying firms through dissolution. Again, in those countries with particularly effective rules I would anticipate a more distinct rise in firm exits rates. This leads to my third hypothesis:

H3: Introducing a restriction to the transfer of tax losses increases the firm exit rate of loss firms.

ness is ultimately dissolved by selling off all its remaining assets and eventually ceases to exist. The third channel is a complete acquisition or a merger of the company.

⁶² A loss carry-back would be even more valuable since it leads to an immediate tax refund of previously paid taxes.

5.3 Data

5.3.1 Database

My main data source is the Orbis database published by Bureau van Dijk. Orbis covers company accounts from over 200 countries worldwide. It contains a wide range of firm-level micro data such as general contact information, financial information, legal company information, industry classification codes, the date of incorporation, activity status and corporate ownership information. Overall, it contains information on over 120 million companies. Bureau van Dijk works with over 100 data providers most of which are chambers of commerce, company registries and other private data providers to ensure a comprehensive and constantly maintained and updated coverage. Orbis combines the information from the various sources and checks them for consistency on a monthly basis.

A distinct feature of the Orbis database is the preservation of historical company information. Once a company has been included into the database, Orbis keeps its key company level information even after five consecutive years of no reporting. This ensures a complete coverage beyond the scope of only active firms.⁶³ This historical data enables me to construct a comprehensive dataset of firm entries and firm exits that covers all active as well as inactive firms. Due to the preservation of all firms - regardless of their reporting status - the dataset allows me to circumvent the potential survivorship bias caused by continuous removal of no reporting or inactive firms.⁶⁴

5.3.2 Dataset

I use the 2013 internet version of Orbis to construct my dataset of 17 countries. I restrict my dataset to the period 1995 to 2012. It is important to note that the coverage of the Orbis database varies over time. Therefore I choose the year 1995 as my starting point since data up to the end of the eighties is partly very scarce and lacks reliability. But since the beginning of the nineties, Bureau van Dijk has made major efforts to expand the coverage of its different databases to ensure a richer and more representative firm coverage.⁶⁵

My dataset contains four countries which introduced restrictions to the transferability of tax

⁶³ In contrast to the Amadeus database: here firms are removed from the database after five years of no reporting (Klapper et al. (2006)).

⁶⁴ Klapper et al. (2006) explain the potential problem of deleting inactive firms after five years of no reporting.

⁶⁵ However, those expansions also make earlier data less comparable.

losses between 1995 and 2012, namely Brazil, the Czech Republic, Mexico and Japan.⁶⁶ The remaining 13 countries do not limit the transfer of losses by any means for the entire sample period.⁶⁷

By constructing the dataset I follow the steps outlined by Klapper, Laeven and Rajan (2006). I start with roughly 27 million firms for all relevant countries for the years 1995 to 2012. I include all available size categories in my sample to make sure to cover all possible firm entries.⁶⁸ In order to ensure a consistent and comparable dataset I drop all observations that do not provide any information on the country of seat, the date of incorporation, the legal liability status of the entity's owners, the activity status of the company, any identification information of the company, and any information on the last available year of reporting.

Furthermore, I restrict the sample only to those legal forms that do protect all their owners from legal liability. Consequently, all types of sole proprietorships, partnerships and limited partnerships are excluded from the sample. Since Orbis provides unconsolidated and consolidated financial statements I exclude all consolidated firm observations in order to avoid double-counting firms. In a next step I exclude all firm observations that do not provide any information on the industry classification.⁶⁹ I further exclude the following industries: agriculture, fishing, mining, utilities in Europe, financial services, public sector, education in Europe, health and social sector, activities of households, extraterritorial organizations and any non-classified industries based on the 2-digit SIC code.⁷⁰

In a next step I combine the financial statement data with an international M&A Dataset from the Bureau van Dijk's Zephyr M&A Database. My M&A Dataset covers 94,125 deals announced between 1990 and 2012 and completed by the end of 2012. I only consider acquisitions that result in a 100 percent ownership change in the target firm. Mergers, leverage buyouts, management buyouts and other forms of restructuring are not considered.

⁶⁶ Appendix B lists the countries and the respective tax reforms that contain restrictions on the transfer of tax losses.

⁶⁷ Countries that did not limit the transfer of losses up to the end of 2012: Argentina, Switzerland, Estonia, Greece, Croatia, Iceland, Korea, Norway, Poland, Romania, Russia, Slovakia, Turkey.

⁶⁸ Small firms are excluded from the analysis of loss M&As and firm exits. I exclude small firms since historical financial statement information is poorly covered and would lead to an uneven and non representative sample of loss M&As and firm exits.

⁶⁹ Firms are excluded that neither have a SIC classification nor a NAICS classification.

⁷⁰ Those industries are subject to special regulations, country-specific distributions or highly specialized activities. See Klapper et al. (2006) for a discussion.

My final sample size varies from period to period. The sample consists of 101,692 incorporated companies in 1995. Sample size rises to a maximum of 284,586 companies in Year 2006. My last sample period 2012 still contains 85,522 companies. Over the entire sample period I observe 6,310 completed acquisitions of incorporated firms.

5.4 Loss M&As – Test of Effectiveness

5.4.1 M&A Rate

I calculate the M&A rates of loss-carrying target companies for all country-industry-year observations over the entire sample period from 1995 to 2012 across all 17 countries. The M&A rate is calculated as follows:

$$\text{Loss-Acquisition-Rate}_{ist} = \frac{\text{Loss – Acquisitions}_{ist}}{\text{All Acquisitions}_{ist}}$$

The numerator is defined as all loss-acquisitions in a given country i in industry s and in year t .⁷¹ Loss-acquisitions is the number of all companies that carry a loss in the period of the transaction and are subject to a 100 percent ownership change in the form of an acquisition according to Bureau von Dijks Zephir Database. Loss-acquisitions are scaled by the number of all M&A transactions that take place in the respective country-industry-year combination (Erel, Liao and Weisbach (2012)). In calculating the rate I only consider incorporated companies that provide limited liability status for the owners of the firm.

Table 5-1 summarizes the M&A rates for all countries. For my group of treatment countries the Czech Republic and Japan show with 3.4 % and 1.9 % respectively, the highest average rates of loss acquisitions whereas Brazil has the lowest M&A rate at 0.7 %. Overall, the average M&A rate of loss-carrying targets across the entire sample is 1.7 %. For the two control countries Argentina and Switzerland I have no loss M&A observations during my sample period. These relatively low percentages already indicate that takeovers of loss firms are rare events in the market of corporate control.

⁷¹ Industry refers to the 2 digit SIC Code level.

Table 5-1: Descriptive Statistics of M&A Rates

Variable: M&A Rate	Observations	Mean	Standard Deviation	Minimum	Maximum
Argentina	101	0	0	0	0
Brazil	889	0.0078	0.081	0	1
Croatia	785	0.0144	0.115	0	1
Czech Republic	629	0.0339	0.174	0	1
Estonia	513	0.0117	0.108	0	1
Greece	692	0.0152	0.121	0	1
Iceland	583	0.0034	0.058	0	1
Japan	858	0.0196	0.132	0	1
Korea	552	0.0018	0.042	0	1
Mexico	819	0.0109	0.101	0	1
Norway	515	0.0620	0.217	0	1
Poland	651	0.0365	0.177	0	1
Romania	719	0.0148	0.119	0	1
Russia	968	0.0543	0.183	0	1
Slovakia	683	0.0078	0.086	0	1
Switzerland	167	0	0	0	0
Turkey	921	0.0018	0.043	0	1

5.4.2 Test of Effectiveness

In my analysis of the effectiveness of “anti-loss trafficking” rules I follow a panel estimation approach in order to take advantage of the longitudinal variation in my dataset. I apply a model with fixed effects to control for any unobserved time-constant heterogeneity. Standard errors are clustered at the country-industry level. The model is

$$Y_{ist} = \beta_0 + \beta_1 \text{Afterreform}_{it} + \beta_2 X_{it} + \text{Year}_t + v_{is} + \varepsilon_{ist}$$

The dependent variable Y_{ist} is the country-industry-year specific M&A rate of loss companies. Afterreform_{it} is my policy indicator that is equal to 1 for country i after it implements a limitation to loss transfers and zero otherwise.⁷² X_{it} is a vector of measured independent control variables that vary across country and time. Year_t is a year-specific effect and v_{is} captures all country-industry-specific time-invariant heterogeneity. Finally, ε_{ist} stands for all idi-

⁷² In additional settings I also exclude the periods of the reforms from the empirical analysis to avoid spurious results due to unclear effects in the year of implementation. In order to validate my results I have also run tests with up to the last two periods before the reform excluded. The results do not significantly change.

osyncratic disturbances that change across country, industry sector and time (Wooldridge 2010, p. 285). The coefficient β_1 of Afterreform_{it} captures the effect of the change in tax policy on the rate of loss-acquisitions. This estimator is not contaminated by influences of any time-constant, unobserved country/industry characteristics that affect the M&A rate as well as the sample groups in which countries are selected.

Examples of such characteristics could be the underlying political or institutional environment for M&A activities, industry-specific incentives or obstacles, or regional differences in the cultural attitude towards M&As. The model implicitly controls for all those variables by subtracting a country-industry mean from each observation. This ensures that the effects which I attribute to the treatment are not spurious results of the types of country/industry combinations that receive those treatments.⁷³

Vector X_{it} contains various control variables to account for the possibility that the random samples within each group have systematically different characteristics in the period before the policy change and afterwards (Wooldridge 2010, p. 148). I control for various country-specific determinants of M&A activity such as macroeconomic factors, the institutional framework (Erel, Liao and Weisbach (2012), Huizinga and Voget (2009); Rossi and Volpin (2004), La Porta, Lopez-de-Silanes and Shleifer (2002)) and national tax rules (Ayers, Lefanowicz, and Robinson (2003)). Descriptive statistics of the control variables can be found in Table 5-2.

⁷³ The unobserved individual effects are coefficients on dummies for each country/industry combination. Treating the individual effects as estimated parameters is mathematically the same as estimating in deviations from means. First the country/industry averages are calculated and then subtracted from each country/industry observation individually thereby deleting all unobserved individual effects.

Table 5-2: Descriptive Statistics of Control Variables

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
GDP per Capita	12975	9.311	0.965	7.003	11.51
GDP Growth	12628	2.939	3.931	-10.89	9.486
Inflation	12667	10.03	21.02	-0.900	197.5
Interest rate	11754	10.48	15.66	0.042	80.74
Stock/GDP	12975	3.435	1.050	-1.824	5.735
Credit/GDP	12522	3.868	0.864	1.970	5.767
Corporate Income Tax Rate	12975	0.289	0.078	0.150	0.514
Personal Income Tax Rate	12975	0.359	0.103	0.130	0.600
Loss Carry-Forward	12716	14.79	26.72	2	∞
Overall Score	12967	63.15	8.709	42.90	81.90
Voice and Accountability	12260	0.635	0.636	-0.965	1.754
Political Stability	12260	0.324	0.793	-1.462	1.545
Government Effectiveness	12260	0.665	0.723	-0.766	2.218
Regulatory Quality	12260	0.632	0.635	-0.964	1.843
Control of Corruption	12260	0.474	0.870	-1.126	1.988
Rule of Law	12260	0.420	0.907	-1.088	2.441
Entry Time	12475	37.23	33.23	4.5	152
Entry Cost	12475	13.16	9.618	0.9	36.8

Note: For the definitions and sources of the variables see Appendix A.

In column one of Table 5-3, the combined effect of all reforms is estimated. According to my results, the coefficient on the reform dummy is not significantly different from zero, which suggests that all four reforms taken together do not reduce the rate of acquired loss-firms. This net effect implicitly assumes that all four anti-avoidance rules are identically designed and apply to the same type of transactions.

However, national “anti-loss trafficking” rules are individually structured and are not necessarily equally effective. Many national restrictions only apply under certain circumstances and national tax codes also provide possible exceptions. These exceptions generally relate to a lack of tax avoiding motives or internal reorganizations.⁷⁴

In the reform of 2007 the Mexican tax legislator implemented a very rigorous rule that is meant to considerably impede the transfer of losses in the case of restructuring. The restriction is triggered by any type of restructuring activity without any percentage threshold of the change in ownership. A transfer may only be possible if multiple requirements are cumulatively fulfilled and the Mexican tax authorities grant their approval.

⁷⁴ Further exceptions refer to the preservation of employment, an unchanged income structure of the target or other economic or financial reasons. In these cases, an economically justified deal is assumed.

Table 5-3: M&A Rate Regression Results

VARIABLES	(1) M&A Rate	(2) M&A Rate	(3) M&A Rate	(4) M&A Rate
Reform	0.00738 (0.991)			
Interaction Brazil				0.485*** (2.873)
Interaction Mexico				-0.555 (-0.590)
Interaction Japan				0.00966 (0.0208)
Interaction Czech Republic				0.576 (0.706)
Brazil		-0.00912 (-1.466)	-0.00205 (-0.364)	-0.153** (-2.487)
Mexico		-0.00343 (-0.321)	0.00452 (0.442)	0.164 (0.605)
Japan		0.0124 (0.961)	0.0247** (2.085)	0.0197 (0.106)
Czech Republic		0.0109 (0.751)	0.0181 (1.260)	-0.108 (-0.643)
GDP percap	0.0270*** (3.670)	0.0252*** (3.082)	0.0327*** (4.432)	0.0270*** (3.709)
GDP Growth	0.000650* (1.845)	0.000665* (1.885)	0.000656* (1.867)	0.000527 (1.482)
Inflation	-0.000110 (-1.588)	-7.78e-05 (-1.182)	-1.61e-05 (-0.265)	-7.72e-06 (-0.128)
Interest rate	0.000908*** (6.840)	0.000850*** (6.427)	0.000655*** (5.750)	0.000622*** (5.462)
Stock/GDP	0.00217 (0.913)	0.00268 (1.137)	0.00712*** (2.971)	0.00659*** (2.764)
Credit/GDP	-0.00154 (-0.343)	-0.000945 (-0.204)	-0.00505 (-1.039)	-0.00506 (-1.038)
Overall Score	-0.000769** (-2.108)	-0.000691* (-1.820)	-0.00107*** (-2.970)	-0.00136*** (-3.662)
LCF			0.000553*** (4.084)	0.000604*** (4.426)
Corporate Tax Rate				-0.115*** (-4.414)
Observations	11.524	11.524	11.304	11.304
Number of panel	1.026	1.026	1.026	1.026
Adjusted R-squared	0.029	0.029	0.033	0.034

The reported estimates are from fixed effects panel regressions. The dependent variable is the ratio of acquired loss companies to the total number of acquisitions over the period 1995 to 2012, by the two-digit SIC industry code and by country. Definitions and sources of all my control variables can be found in the Appendix. All controls are winsorized at the 1% and 99% level. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country/industry level.

A similarly strict rule can be found in Brazil. Brazil introduced its limitation to loss transfers as part of the Budget Law 1999. After the slightest change in ownership that cannot be sufficiently justified by real financial or economic reasons combined with a change in activities a carry-over of losses is not possible anymore.⁷⁵

According to the Japanese anti-avoidance rule, introduced as part of the tax reform of 2006, a loss carry-over is not possible if more than 50 % of the shares in a loss making company are acquired and a so called “special event” occurs.⁷⁶ Furthermore, the Japanese corporation tax law explicitly mentions and restricts possible other types of transactions that might be used to circumvent the previous provisions such as mergers. Given the relatively narrow definition I would classify the Japanese rules as less restrictive than the rules in Mexico and Brazil.

In the Czech Republic a loss transfer is generally restricted as soon as a change in ownership of more than 25 % takes place and the “Income structure test” is not passed.⁷⁷ However, the income structure test is not uniformly applied to all legal forms and thus leaves enough room to circumvent the restriction.⁷⁸ In addition the Czech anti-avoidance rules also allow for a wide range of exceptions that still enable an acquirer to take advantage of an unrestricted loss transfer after an ownership change. Most notably, on the merger or demerger of a company, a rollover of tax losses of a dissolving company is possible under certain circumstances. Therefore, I consider the Czech rule as the least effective anti-avoidance measure.

In order to account for these different reforms individually I allow for separate effects in columns two and three of Table 5-3. None of the reforms leads to a constant reduction in M&A rates. In Brazil the influence of the reform is consistently negative but not significantly different from zero. Despite their strict nature, neither the Mexican nor the Japanese rules negatively affect the rate of loss-acquisitions. The Czech reform does not show a significant impact either.

⁷⁵ According to Brazilian tax law an acquisition of a bankrupt company is justified by legitimate economic motives if some of its activities continue to be carried on or some of the employees are retained.

⁷⁶ For instance, a “special event” that triggers a restriction of loss carry-overs is defined as quitting its previous business and starting a new business in a scale substantially larger than the previous business within 5 years from the date of the share acquisition.

⁷⁷ The income structure test is passed if the company proves that at least 80 % of the income has been generated by the same activities as the activities performed in the period during which the losses were incurred. Income that is recorded as extraordinary income pursuant to Czech accounting standards is not taken into account for the purposes of the test.

⁷⁸ For instance, special testing rules apply to a Czech joint-stock company that has issued bearer shares.

In column four I additionally consider the value relevance of a tax loss for the acquirer. As higher corporate tax rates increase the value of tax losses I assume a higher level of loss acquisitions before the reform and thus a more pronounced decline afterwards depending on the corporate tax rate. However, Brazil shows a significant positive synergy between the implementation of the anti-avoidance rule and corporate tax rates. The interaction terms for the other tax reforms do not seem to have an effect on acquisition behavior.

In sum, I cannot identify any country whose “anti-loss trafficking” rules appear to have sufficient “bite” to permanently reduce the rate of loss acquisitions after the reform.

Most of the macroeconomic control variables show the expected signs. A stronger growth in GDP and a higher level of GDP lead to more acquisition activities in general and also to more loss-acquisitions. Higher interest rates imply greater risk of financial distress and consequently cause an increase in potential loss-carrying targets. A more stable political and institutional environment measured by the aggregated political stability indicator (*Overall Score*) is generally associated with fewer bankruptcies and a lower M&A rate of loss firms. A longer time span for tax loss carry-forwards increases the attractiveness of loss-carrying targets and thus lets the M&A rate rise.

In all four treatment countries I find rules and regulations concerning the passing on of losses that are characterized by a clearly stated set of legal conditions that have to be met and generally do not provide much room for ambiguous legal interpretations. Nevertheless, while controlling for various economic and institutional explanatory factors, the results indicate that the analyzed reforms in Brazil, Mexico, Japan and the Czech Republic do not lead to a consistent reduction in the rate of loss-acquisitions.

These results can either be attributed to shortcomings in the identification strategy and the used M&A-measure or they indicate that most of the “anti-loss trafficking” regulations fail to stop tax driven loss acquisitions.

Although I apply a detailed and thorough data cleaning procedure I cannot rule out the possibility that I might also consider unaffected deals in my analysis. That would be the case if I accidentally include firms with positive taxable income in my measure since I only use accounting information to identify loss firms. Consequently, my M&A rate would not decrease. Alternatively, acquisitions of loss firms for legitimate business purposes are hard to separate

from purely tax-motivated deals. In the former case, an ownership change should be harmless to any later use of tax losses and thus no reduction in the rates should be observed either.

Furthermore, it might also be the case that I unintentionally leave out affected deals before the reform because the coverage of finished 100 % acquisitions is still incomplete. Thus, the number of tax-driven deals before the reforms could be too small in my sample in which case I would not expect to find a significant decline in the observed rate.

In addition, even if an acquisition is carried out for tax planning purposes, rational deal participants are expected to take advantage of the wide variety of exceptions in the different tax codes in order to ensure a later use of tax losses. This also holds true if creative tax planning finds ways to circumvent loss transfer limitations through alternative transaction types such as mergers or step-by-step acquisitions.

Moreover, the most rigorous tax rule fails to unfold with its full impact if it lacks effective enforcement and control. An issue I cannot directly control for but that could be reflected in my results.

In all discussed cases, it is not surprising that a test of effectiveness leaves me with no meaningful results. The subsequent analyses of the consequences of these tax rules for real economic activities might shed further light on the meaning of loss transfer restrictions.

5.5 Firm Entry and Firm Exit

5.5.1 Base Case

I calculate entry rates for incorporated firms for all country-industry-year observations. The entry-rates are determined for the period 1995 to 2012 across all 17 countries. I measure new firm entries as in Klapper, Laeven and Rajan (2006):

$$\text{Entry-Rate}_{ist} = \frac{\text{New entrants}_{ist}}{\text{All active incumbents}_{ist}}$$

The numerator is defined as the number of all newly incorporated firms in a given country-industry-year combination. The denominator captures all active incumbents. Active incumbents in year t are defined as all companies that are already incorporated in year t . This contains two groups of companies: First, companies whose year of incorporation is year t . Second, all companies with their date of incorporation before year t which are either still recorded as active companies or have their last reported information at least one period after year t . Thereby, I only include companies that have reported filings for at least two consecutive years to avoid counting any frivolous or illegitimate filings. I exclude all entry rates for which I have less than 5 firms in a given country-industry-year combination to ensure that the different entry rates are more comparable (Da Rin, Di Giacomo and Sembenelli (2011)).

The exit rate is defined as the rate of loss-carrying companies being dissolved either through liquidation or bankruptcy in a given country-industry-year combination. I calculate the exit rate for period t as the number of loss firms that are in my sample in a given year $t-1$ but are not in the sample in the following year t , divided by the total number of existing firms in year $t-1$. The definition follows Desai, Gompers and Lerner (2003):

$$\text{Exit-Rate}_{ist} = \frac{\text{Loss - Exits}_{ist}}{\text{All active incumbents}_{is,t-1}}$$

The definition of loss firms is intended to filter out firms that not only carry losses for financial reporting purposes but also on their tax accounts. Therefore, loss firms are defined as companies that report a non-positive accounting profit in combination with either a negative (tax refund) or a zero tax burden. Existing firms are all those firms for which I have reporting information in a given period.

Table 5-4: Descriptive Statistics of Entry Rates and Exit Rates

Country	Entry Rate		Exit Rate	
	Observations	Mean	Observations	Mean
Argentina	850	0.0322	619	0.0304
Brazil	833	0.0421	835	0.0325
Czech Republic	323	0.094	846	0.0252
Estonia	272	0.126	484	0.0164
Greece	697	0.0397	794	0.0268
Croatia	782	0.0584	894	0.0078
Iceland	561	0.101	589	0.0216
Japan	935	0.0291	978	0.0238
Korea	561	0.1169	851	0.0168
Mexico	799	0.033	766	0.0361
Norway	561	0.0879	435	0.0265
Poland	663	0.0856	754	0.0455
Romania	17	0.093	726	0.0228
Russia	816	0.12	1044	0.0344
Slovakia	17	0.091	770	0.0358
Switzerland	799	0.0798	776	0.0022
Turkey	255	0.0067	1157	0.0494

In Table 5-4 I report descriptive statistics for entry rates and exit rates by country. In my sample, Turkey, Japan, Mexico and Argentina show the lowest entry rates whereas Estonia, Russia, Korea and Iceland have on average the highest entry rates. Overall, my estimated average entry rates are nearly identical to the estimates in Da Rin, Di Giacomo and Sembenelli (2011) and on average about 3 percentage points below the estimates in Klapper, Laeven and Rajan (2006). However, my estimated entry rates are comparable to those of Klapper, Laeven and Rajan (2006) for the respective years and countries. Differences to earlier studies in average entry rates are especially caused by varying estimation periods and a different coverage of countries. For example, my sample includes only parts of Europe and also contains other industrialized countries, whereas former studies exclusively focus on European countries. The average rate of loss firms exiting a market is with roughly 2.6 % lower than the entry rate and also below the usual firm death rates.⁷⁹ This is mainly due to my restrictive definition of loss firms that is meant to identify firms that carry losses for tax purposes and to the sole consideration of incorporated companies.

⁷⁹ According to the OECD Entrepreneurship at a Glance Report 2011, the average exit rates in the manufacturing and service sector range from 18 percent to 3 percent for the year 2011.

In addition, I only take into account bankruptcies or liquidations as the relevant modes of exit and no other forms such as acquisitions or mergers. Consequently, I only measure the number of corporations that terminate their business activities out of a (tax) loss situation which drastically reduces the number of relevant firm deaths.

In my sample, Turkey, Poland, Mexico and Slovakia have the highest exit rates of loss companies with averages between 3.5 % and 4.5 %. Korea, Estonia and Croatia can be found at the other end of the spectrum. Because my measures of firm entry and firm exit heavily depend on data availability and regional coverage I control for country, industry and time specific effects in my following analyses.

Figure 5-1 shows the developments of the mean entry rates and mean exit rates over time and across all countries and industries.

Figure 5-1: Entry Rates and Exit Rates over Time



The mean entry rates are characterized by a clear downward trend. For the period 1995 to 2012 both groups move around an entry level of 6 % to 10 % which is comparable to the results in Da Rin, Di Giacomo and Sembenelli (2011). The entry rates at the beginning of my estimation period are slightly higher which can partly be explained by the reduced number of observations. The mean entry rates of the control countries exceed the corresponding average treatment entry rates over the entire sample period which implies generally slower dynamics in firm entries in the treatment countries. This points to a possible self-selection bias as treatment countries already experience lower entry rates even before the first reform in 2000.

The following analysis will indirectly control for such pre-reform differences. In general, the parallel trend between treatment and control countries becomes obvious and visualizes the comparability of these two groups. Figure 5-1 also shows the comparable evolvement of firm

exit rates over time. The average exit rates of treatment and control countries move at a level between 1 % and 2 %. Beginning in period 2008, exit rates experience a sharp increase. This rise of firm exits across all countries is in line with the decline in the number of new firms for the same time span. Both developments are due to a non-representative number of firms in later periods which amplifies the effect of firm exits and gives the impression of fewer firm entries.⁸⁰ In addition, the developments of entry rates and exit rates reflect the economic downturn during the financial crises and the subsequent worldwide struggle for recovery in the aftermath.

I want to answer the question how the introduction of a limitation to loss transfers affects firm entries and firm exits. As in the specification before I run a fixed effects panel regression with country-industry-year specific entry rates or exit rates as dependent variables. The model eliminates all the individual-specific effects at the country-industry-level before estimating the impact of the reforms. Table 5-5 shows the results for entry rates.

Column one summarizes my combined results. Without differentiating between the different treatment countries I aggregate the effect of all four reforms. In contrast to my expectations of a negative influence of the tax policy changes, I do not find a significant impact. Breaking down the initially aggregated effect into the different treatment countries will help me to attribute the suggested overall effect on entry rates to the individual country-specific reforms. In columns two and three I include a dummy variable for every national tax reform.

The country-specific effects give a mixed picture. On the one hand regression two reveals that the Mexican and the Brazilian reforms lead to a constant decrease in entry rates. The results are significant at the 1% level and show a decline between roughly 2.0 percentage points and 2.5 percentage points. On the other hand, the Japanese and the Czech reforms suggest a significant increase in entry rates.

These results remain constant when I include an additional control for tax loss carry-forwards in column three.

⁸⁰ The Orbis Database completes latest firm information with a certain delay. As a consequence, recent firm years are on average underrepresented. New firms entries are not recorded yet and existing firms are not updated yet.

Table 5-5: Entry Rate Regression

VARIABLES	(1) Entry Rate	(2) Entry Rate	(3) Entry Rate
Reform	0.000152 (0.0536)		
Mexico		-0.0254*** (-6.475)	-0.0201*** (-5.314)
Brazil		-0.0196*** (-4.258)	-0.0140*** (-3.058)
Japan		0.0246*** (7.241)	0.0305*** (8.625)
Czech Republic		0.0203*** (2.899)	0.0294*** (4.242)
GDP percap	-0.0126*** (-3.851)	-0.0110*** (-3.219)	-0.0135*** (-4.096)
GDP Growth	0.00165*** (6.405)	0.00178*** (7.144)	0.00171*** (7.123)
Inflation	-0.000176*** (-3.010)	-0.000123*** (-2.222)	-0.000111*** (-1.979)
Credit/GDP	0.00167 (0.435)	0.00218 (0.549)	0.00136 (0.355)
Stock/GDP	-0.00342*** (-2.595)	-0.000575 (-0.428)	-0.00362** (-2.560)
Interest rate	0.000435*** (3.598)	0.000361*** (3.083)	0.000308*** (2.619)
Personal Tax Rate	0.0562*** (3.746)	0.0521*** (3.657)	0.000873 (0.0690)
Corporate Tax Rate	-0.0729*** (-4.914)	-0.0254 (-1.643)	0.0123 (0.770)
Time	-0.000104 (-1.318)	-0.000391*** (-3.914)	-0.000316*** (-3.350)
Cost	-0.00153*** (-3.579)	-0.00235*** (-6.101)	-0.00286*** (-8.167)
Overall Score	0.00153*** (8.085)	0.00186*** (9.448)	0.00148*** (7.633)
LCF			0.00166*** (9.730)
Observations	8.714	8.714	8.484
Number of panel	548	548	548
Adjusted R-squared	0.237	0.255	0.320

The reported estimates are from fixed effects panel regressions. The dependent variable is the ratio of new firm to total firms over the period 1995 to 2012, by the two-digit SIC industry Code and by country. Definitions and sources of all control variables can be found in the Appendix. All controls are winsorized at the 1% and 99% level. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country/industry level.

I include four different sets of control variables: First, I control for country-time varying macroeconomic effects. The second set contains the overall score of economic freedoms that covers a variety of international policy indicators constructed by the Heritage Foundation (Klapper, Laeven and Rajan (2006), Claessens and Leaven (2003)). Third, I include entry barriers in the form of start-up time and start-up costs as described by Djankov et al. (2002). The last set of variables consists of different tax aspects of a country such as the corporation tax rate, the personal income tax rate and tax loss compensation rules. The impact of the control variables can be summarized as follows:

A higher level of economic development as measured by GDP per capita generally shows lower rates of entrepreneurial activities. This finding is consistent with the results in Egger, Keuschnigg and Winner (2009). In their model a higher level of per-capita GDP is associated with higher wage expectations that c.p. reduce the likelihood to incorporate. In contrast, the GDP growth rate has significant positive effects as a more dynamically growing economy is associated with more entrepreneurial activities.

In my first setting the adverse investment effect of higher corporate tax rates becomes obvious. The maximum time span of a loss carry-forward for tax purposes directly refers to the risk and return relation for any potential investor. The longer a tax loss can be used, the better for the investor. Thus, I can identify a significant positive effect on firm entries.

Increased time and costs of establishing a new company show a significant negative effect on firm entries. Higher entry costs and more time consuming legislative procedures as measures of the regulatory environment are associated with lower entry rates as shown by Klapper, Laeven and Rajan (2006).

The aggregate score of the political and institutional environment has a significant positive influence on entry rates which is in line with previous results in the empirical literature (Da Rin, Di Giacomo and Sembenelli (2011)).

In sum, the results do not provide consistent supporting evidence for my second hypothesis on firm entries. Two out of four countries show a significant reduction in entry rates whereas the other two reforms suggest a significant increase.

With respect to firm exits, I expect the implementation of a limitation to loss transfers to increase the rate of firm exits. The rationale behind my last hypothesis is based on the idea that financially distressed firms cannot resort to their tax losses as last available collateral anymore. Taxable losses are rendered useless for potential acquirers and also as available financial funds. Therefore, a firm exit through liquidation or bankruptcy becomes more likely than an acquisition or an economic recovery. The regression results are summarized in Table 5-6.

In my aggregate regression in column one, I find a significant increase in exit rates. This initial result of the combined effect supports my third hypothesis. However, the disproportionate increase in exit rates at the end of my sample period could introduce a severe bias into my results. To confirm my previous estimates I exclude the periods 2009 to 2012 from the regression in column two. I still find a significant increase in exit rates of about 0.6 percentage points.

As I split up the overall estimate into the effects of the four different reforms in the treatment countries I find that the reforms in Brazil and the Czech Republic lead to a rise in firm exits of loss-carrying companies.⁸¹ The results for Mexico and Japan are not statistically different from zero. In Column four I include two additional tax variables to control for the corporate tax rates and the possibility to carry tax losses forward. In general, all my previous results remain constant implying an adverse effect of the Brazilian and the Czech reforms on the life expectancy of loss firms.

With regard to the control variables, tax systems that apply generous loss compensation rules ease the situation for financially distressed firms. Consequently the exit rate is significantly reduced as tax losses can be carried forward for a longer period of time.

GDP per capita has a consistently positive effect on the frequency of firm exits. As a country has already reached a relatively high level of economic development more firm exits could be caused by intensified competition and by the fact that growth in mature economies is rather driven by within-firm efficiency improvements and by market exits of less established or obsolete firms (Rincon and Vecchi (2003)).

The interest rate represents the costs of debt financing and has a significantly positive impact on firm exits. Higher financing cost increase the risk of financial distress and thus the probability of firm death.

⁸¹ Regressions two to four are all based on the reduced sample period from 1995 to 2008.

Table 5-6: Exit Rate Regression

VARIABLES	(1) Exit Rate	(2) Exit Rate	(3) Exit Rate	(4) Exit Rate
Reform Countries	0.0440*** (9.481)	0.00595*** (4.239)		
Mexico			0.000149 (0.0233)	-0.000606 (-0.0947)
Brazil			0.0118*** (5.994)	0.0137*** (6.294)
Japan			0.00347 (1.390)	0.00313 (1.266)
Czech Republic			0.00469*** (2.718)	0.00309* (1.791)
GDP percap	0.0267*** (5.767)	0.00804*** (4.420)	0.00820*** (4.292)	0.00851*** (4.302)
GDP Growth	0.00101*** (4.267)	0.000550*** (3.722)	0.000528*** (3.705)	0.000702*** (4.301)
Interest rate	5.17e-05 (0.646)	0.000367*** (5.253)	0.000363*** (5.239)	0.000390*** (5.206)
Inflation	7.70e-05*** (2.808)	-6.48e-05*** (-3.124)	-6.95e-05*** (-3.347)	-7.68e-05*** (-3.386)
Credit/GDP	0.0109*** (3.082)	0.00597*** (4.866)	0.00551*** (4.556)	0.00484*** (3.696)
Voice and Accountability	-0.0406*** (-9.080)	-0.0166*** (-5.875)	-0.0175*** (-6.175)	-0.0198*** (-5.313)
Political Stability	-0.00962* (-1.787)	0.00261 (1.618)	0.00185 (1.136)	0.00260 (1.473)
Government Effectiveness	-0.0308*** (-4.793)	-0.00302 (-1.034)	-0.00254 (-0.888)	-0.00418 (-1.495)
Regulatory Quality	-0.0102*** (-2.929)	0.0104*** (4.747)	0.0116*** (5.023)	0.0132*** (5.619)
Rule of Law	0.0415*** (4.274)	-0.00758** (-2.086)	-0.00770** (-2.112)	-0.00977** (-2.402)
Control of Corruption	0.0242*** (3.962)	0.00358** (2.448)	0.00392*** (2.675)	0.00381** (2.471)
Corporate Tax Rate				-0.0107 (-1.515)
LCF				-5.12e-05*** (-6.505)
Observations	10.366	8.160	8.160	7.679
Number of panel	813	813	813	813
Adjusted R-squared	0.243	0.133	0.134	0.144

The reported estimates are from fixed effects panel regressions. The dependent variable is the ratio of liquidated or bankrupt firms to total firms over the period 1995 to 2012 in column one and 1995 to 2008 in columns two to four, by two-digit SIC industry Code and by country. Definitions and sources of all control variables can be found in the Appendix. All controls are winsorized at the 1% and 99% level. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country/industry level.

The baseline results as well as further specifications confirm my third hypothesis. I find a significant positive association between the introduction of restrictions to tax loss transfers and firm exits. The Brazilian “anti-loss trafficking” rule is the only one that meets my expectations with respect to firm entries and firm exits. It leads to a reduction in entry rates and to a corresponding increase in exit rates. The remaining results taken together show rather mixed empirical evidence.

In order to more clearly identify a causal relationship I need to more accurately single out particularly affected firm groups. I next test my results to alternative specification strategies.

First, the probability of facing a loss situation could heavily depend on the industry and thus could lead to very different industry-specific effects. In particular, I seek to address the issue that may be only investments or loss firms in certain industries react to the new tax rules.

Second, a broad cross-country specification might not be precise enough to identify the impact of a single change in national tax rules. The quality of my estimations crucially depends on how well the outcome variables of my control countries resemble the outcome variables of my treatment countries. Instead of relying on a natural sample of control countries, creating a tailor made comparison group might generate more reliable results. Hence, I construct for every reform country an aggregated comparison group and compare the differences in the variables of interest.

5.5.2 Loss-Probability

The first robustness check is based on a measure of industry-specific risk. The relative risk positions of different industries provide a possibility to further distinguish between industry-specific influences. In order to capture this effect I include the industry-specific loss-probability in my regression model and estimate the effects on entry rates and exit rates at the country-industry level. Industries with higher loss-probability should reflect a more pronounced impact on both entry rates as well as exit rates. Loss-probability is defined as the ratio of loss making companies to all companies by country, industry and year (Dreßler and Overesch (2013)). For new firm entries the coefficients on the aggregated interaction term and on the individual country interactions are expected to be negative. Investors planning to invest in a sector that bears a relatively high risk of facing a loss situation are expected to be more considerate or more careful when it comes to potential business risks. In contrast, the corre-

sponding coefficients for firm exits are expected to be positive. While the reduction in entry rates is based on investors' anticipation of future risks, the increase in firm exits is the consequence of firms' missing opportunities to recover from losses. The higher the probability of incurring a loss the more likely a firm termination becomes.

Table 5-7 presents my industry-specific outcomes for firm entries. The aggregated term and the country-specific reform dummies are interacted with the industry-specific loss-probabilities to capture the combined effect of the introduction of a loss transfer restriction and the risk of incurring losses in a particular sector.

The coefficient on the aggregated term in column one and most of the combined country coefficients in column two do not show a significant impact depending on the industry-specific loss-probability. In comparison to the analysis from Table 5-5, my results do not suggest a significant effect of the Mexican reform. The interaction term for Brazil suggests a significant positive impact which contradicts previous estimates for the Brazilian reform.

My robustness checks in Table 5-8 confirm the previous effects on firm exits. The effect over all reforms suggests a significant increase in firm exits for industries with a relatively high risk of having losses. When I break down the overall effect, I can attribute the rise in firm terminations to the Brazilian and the Japanese reforms. Since I only include the periods 1995 to 2008 I can be fairly certain that I do not capture any data-driven upward trends.

Based on industry-specific loss-probabilities I do not find any supporting evidence for a reliably negative influence on firm entries. But my estimates verify the positive impact on exit rates.

So far, I can conclude that the introductions of various "anti-loss trafficking" rules do not have a clear negative effect on national firm entries. But regarding their influence on firm exits I find a consistent and significant positive overall effect of 0.6 percentage points.

To rule out the possibility that my universal panel approach unintentionally ignores systematic differences between my treatment and control units I focus on each treatment country individually in comparison to an aggregated control group.

Table 5-7: Entry Rates and Loss-Probability

VARIABLES	(1) Entry Rate	(2) Entry Rate
Reform	0.00908*** (2.735)	
Interaction	0.0648 (1.020)	
Interaction Mexico		0.0311 (0.775)
Interaction Brazil		0.426*** (3.161)
Interaction Japan		0.0666 (0.832)
Interaction Czech Republic		0.198 (1.624)
Loss Probability	-0.0136 (-0.846)	-0.0395** (-2.260)
GDP percap	-0.00765* (-1.955)	-0.0285*** (-10.55)
GDP Growth	0.00150*** (5.702)	0.00181*** (9.612)
Inflation	-7.75e-05 (-1.317)	-0.000215*** (-3.350)
Credit/GDP	-0.00279 (-0.603)	0.00146 (0.345)
Stock/GDP	-0.00732*** (-4.688)	-0.00638*** (-4.258)
Interest rate	0.000162 (1.323)	0.000279*** (2.614)
Personal Tax Rate	0.00346 (0.201)	-0.00617 (-0.319)
Corporate Tax Rate	-0.0388** (-2.492)	0.0661*** (4.400)
Time	-7.26e-06 (-0.0885)	0.000101 (1.204)
Cost	-0.00203*** (-5.602)	0.000605* (1.703)
Overall Score	0.00124*** (5.772)	0.00198*** (8.701)
LCF	0.00161*** (10.31)	0.00149*** (9.509)
Observations	7.475	7.475
Number of panel	539	539
Adjusted R-squared	0.329	0.254

The reported estimates are from fixed effects panel regressions. The dependent variable is the ratio of new firms to total firms over the period 1995 to 2012, by two-digit SIC industry Code and by country. Definitions and sources of all control variables can be found in the Appendix. Individual reform dummies are neglected for brevity. All controls are winsorized at the 1% and 99% level. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country/industry level.

Table 5-8: Exit Rates and Loss-Probability

VARIABLES	(1) Exit Rate	(2) Exit Rate
Reform	-0.0161 (-1.108)	
Interaction Reform	0.449*** (2.734)	
Interaction Mexico		-0.229 (-0.762)
Interaction Brazil		1.649*** (2.859)
Interaction Japan		0.798* (1.706)
Interaction Czech Republic		-0.308 (-0.582)
Loss Probability	-0.279*** (-3.396)	-0.279*** (-3.388)
GDP percap	-0.0147* (-1.796)	-0.0135* (-1.849)
GDP Growth	0.00213*** (3.616)	0.00220*** (3.801)
Interest rate	0.00132*** (5.269)	0.00135*** (5.562)
Inflation	-0.000295*** (-4.308)	-0.000290*** (-4.056)
Credit/GDP	0.0307*** (3.261)	0.0296*** (3.321)
Voice and Accountability	-0.0273*** (-3.438)	-0.0262*** (-3.606)
Political Stability	0.0244** (2.458)	0.0292*** (2.962)
Government Effectiveness	-0.0146 (-1.246)	-0.0155 (-1.272)
Regulatory Quality	0.000793 (0.0826)	-0.00228 (-0.268)
Rule of Law	-0.0308 (-1.631)	-0.0315* (-1.670)
Control of Corruption	0.0793*** (4.914)	0.0778*** (4.835)
Corporate Tax Rate	-0.116** (-1.977)	-0.126** (-2.010)
LCF	-0.000175** (-2.010)	-0.000167* (-1.914)
Observations	7.355	7.355
Number of panel	813	813
Adjusted R-squared	0.132	0.133

The reported estimates are from fixed effects panel regressions. The dependent variable is the ratio of liquidated or bankrupt firms to total firms over the period 1995 to 2008 by the two-digit SIC industry Code and by country. Definitions and sources of all control variables can be found in the Appendix. Individual reform dummies are neglected for brevity. All controls are winsorized at the 1% and 99% level. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country/industry level.

5.5.3 Synthetic Control Groups

In the last step, I apply a recently implemented approach for comparative case studies to improve the quality of my comparison groups. Using aggregate entities as units of studies (as in my case countries) usually bears the problem of finding suitable single comparisons (George and Bennet (2005), Gerring (2007)). The selection of comparison units is very crucial for comparative studies since using inappropriate comparisons might lead to erroneous conclusions. If treatment and comparison units are not sufficiently similar, then any differences in outcomes between these two groups may only reflect initial disparities in their characteristics (George and Bennet (2005)).

The synthetic control method is based on the idea that a combination of comparison units most likely does a better job than any single comparison unit (Abadie, Diamond and Hainmueller (2014)). The synthetic control method chooses a comparison unit as a weighted average of all potential comparison units that best resembles the characteristics of the treatment unit during the pre-treatment period (Abadie and Gardeazabal (2003), Abadie, Diamond and Hainmueller (2010)). In other words, country specific weights W are chosen to minimize the discrepancy

$$\|X_1 - X_0 W\|_V = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$$

between the pre-treatment characteristics of treatment country X_1 and the pre-treatment characteristics of the untreated countries X_0 . Variable v assigns larger weights to pre-treatment variables that have larger predictive power on the outcome variable.⁸² That way, the post-intervention outcomes for the constructed comparison unit is meant to approximate the counterfactual of the treatment case without the intervention.⁸³

The group of thirteen countries that have not implemented a limitation to loss transfers is the so called “donor pool”. From this reservoir of potential comparison units I construct a synthetic control unit for each treatment country. The synthetic Japan, Mexico, Czech Republic or Brazil replicate either the counterfactual entry rate trends or the counterfactual exit rate

⁸² An optimal choice of V assigns weights that minimize the mean squared prediction error (MSPE) of the outcome variable in the pretreatment period (Abadie and Gardeazabl (2003)). For a more formal derivation and discussion of the method compare Abadie, Diamond and Hainmueller (2014).

⁸³ In contrast to the fixed effects model used in my base line regressions, this approach also allows the effects of unobservable confounding factors to vary with time (Billmeier and Nannicini (2013)).

trends that the reform countries would have had in the absence of any “loss-trafficking” legislation.

Table 5-9 shows the synthetic control weights of each country in the synthetic versions of the reform countries for entry rates. Depending on the various characteristics that describe the development of entry rates four slightly different sets of control countries are chosen. The entry rate trend for the synthetic Japan is best resembled by a combination of Switzerland and Greece. Whereas trends of the synthetic versions of the Czech Republic and Brazil are each weighted averages of five different control countries. Countries such as Iceland or Russia are not considered in the estimation of the synthetic control groups.

Table 5-9: Weights for Synthetic Entry Control Groups

Country	Synthetic Japan	Synthetic Mexico	Synthetic Czech Republic	Synthetic Brazil
Argentina	0	0.529	0.098	0.634
Switzerland	0.114	0	0.335	0
Estonia	0	0	0	0.13
Greece	0.886	0.289	0.123	0.111
Croatia	0	0	0	0.097
Iceland	0	0	0	0
Korea	0	0	0.196	0
Norway	0	0	0	0.028
Poland	0	0.098	0	0
Romania	0	0	0	0
Russia	0	0	0	0
Slovakia	0	0	0.248	0
Turkey	0	0.084	0	0

Table 5-10 compares the pre-reform characteristics of the treatment units to those of their synthetic control groups. Similar to a matching estimator, the similarities of or the discrepancies between the different outcome predictors demonstrate the affinity between the countries exposed to the treatment of interest and their synthetic counterparts. Across the majority of my predictors I can conclude that the treatment countries are closely resembled by their synthetic counterparts which serve as suitable comparison groups.

Table 5-10: Predictor Means for Entry before the Tax Reforms

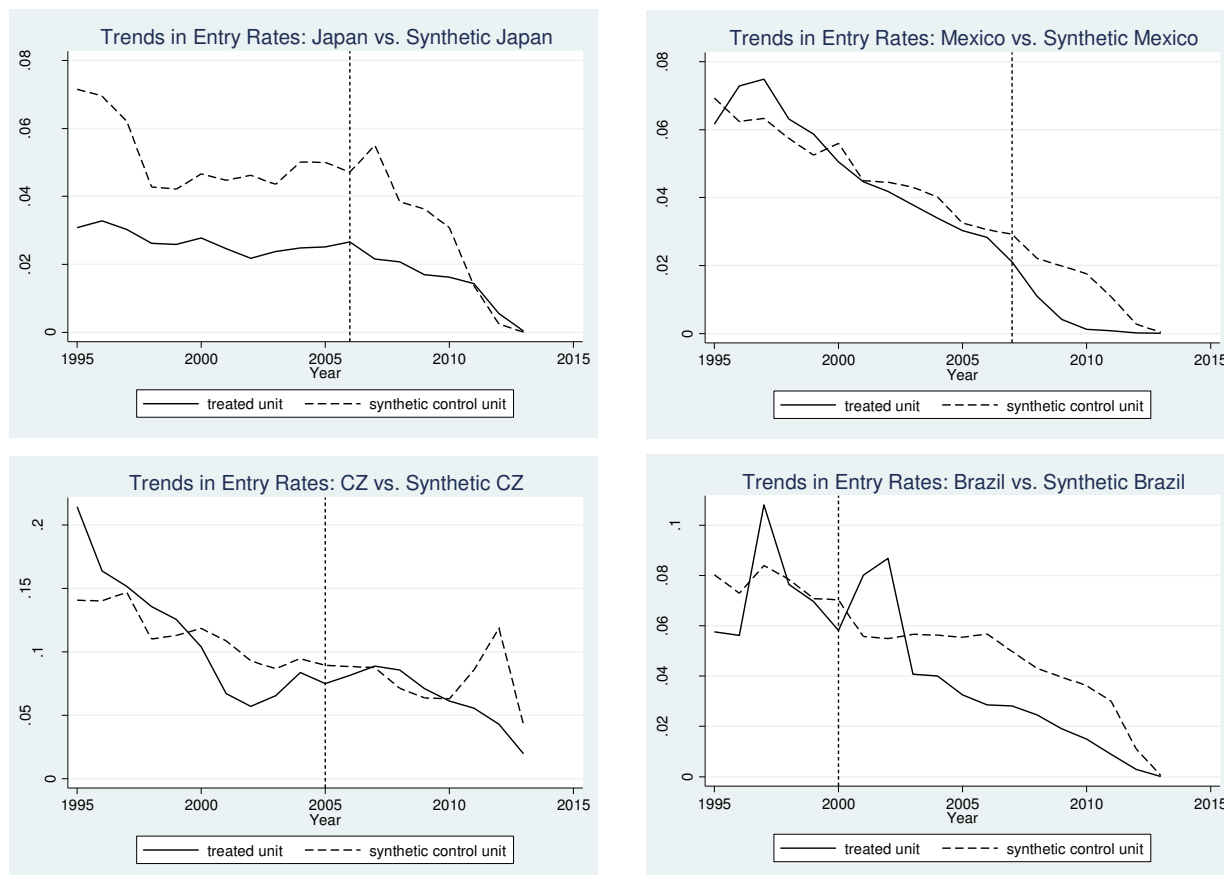
Variable	Japan	Synthetic Japan	Mexico	Synthetic Mexico
GDP per Capita	10.5158	9.8521	8.7527	9.0918
GDP Growth	0.8632	1.5052	2.6166	2.5925
Inflation	0.2575	3.1198	5.1170	7.9079
Interest rate	2.2055	5.7921	2.5583	10.703
Credit/GDP	5.2607	4.2069	9.3052	8.2703
Corporate Tax Rate	0.4341	0.3263	0.3216	0.3223
Entry Time	31	37.9896	58	48.5366
Entry Cost	10.6909	29.1022	29.1416	20.9189
Loss Carry Forward	5.7272	6.9483	10	4.9396
Overall Score	69.5181	74.5924	61.825	62.3452
	Czech Republic	Synthetic Czech Republic	Brazil	Synthetic Brazil
GDP per Capita	9.2507	9.9037	8.6005	9.1414
GDP Growth	2.8026	2.9420	3.0309	2.6480
Inflation	2.6759	3.2649	6.7202	6.7686
Interest rate	9.3098	9.3207	6.7389	12.2039
Credit/GDP	3.8577	4.3747	3.6814	3.3162
Corporate Tax Rate	0.2838	0.2832	0.3322	0.3302
Entry Time	40	47.087	152	59.907
Entry Cost	10	10.1937	13.1	12.2831
Loss Carry Forward	6.8	6.8262	∞	5.135
Overall Score	68.26	68.2792	53.14	68.7801

In general, the underlying optimization procedure primarily matches variables with the highest predictive power. The remaining country characteristics that are considered less important in approximating the trajectory of the outcome variable might show weaker pretreatment fits. Therefore, it would be misleading to expect the same matching quality for all variables and interpret infrequent discrepancies as an overall misfit.⁸⁴

⁸⁴ For instance, Entry Cost for Japan is only assigned a relative weight of 0.000567 whereas GDP per capita has a weight of 0.344. Similarly, in the case of Mexico, Interest rate is only weighted with 0.00547 in contrast to GDP per capita with a relative weight of 0.083. Underlying weights are not shown for brevity.

Figure 5-2 plots the trends in entry rates of the reform countries and the fictitious trends of the synthetic comparison groups.

Figure 5-2: Comparison of Entry Rates – Treatment Unit vs. Synthetic Control Unit



Part one displays the trajectory of Japan and its synthetic counterpart for the period 1995 to 2012. The synthetic comparison group reproduces the entry rate for Japan to a considerable extent. Both entry rates basically follow the same trend over the entire pre-2006 period. From 2006 onwards both lines only diverge unsubstantially. After 2006, the synthetic entry rate continues roughly at the same level as before the reform while the treatment entry rate slightly decelerates under the assumed effect of the tax reform.

The consistent decrease in both entry rates for Mexico illustrates a time lag between the actual number of new firm entries and the availability of firm data on Orbis. Nevertheless, the synthetic trend sufficiently replicates actual firm entries before the reform in 2007. During the after-reform period the Mexican entry rate follows a more pronounced decline than its synthetic counterpart.

But this decrease already starts before the reform which either indicates an anticipative effect on new incorporations or suggests that firm entries are unrelated to the reform.⁸⁵

The graphical illustration for the Czech Republic does not suggest a pronounced negative effect of the introduction of an “anti-loss trafficking” rule on firm entries. Both trends remain largely unaffected by the 2005 tax reform and thus do not imply any reaction of the development in entry rates.

Since the pre-reform period for Brazil is limited to only five years the overall fit of the two trends is bound to be weaker. A comparison of the two after-reform trajectories does not suggest a causal relationship between the reform in 2000 and a reduction in the relative frequency of new companies.

Table 5-11 shows the corresponding regression results from a simple difference-in-difference estimator based on the treatment entry rates and their synthetic counterparts. I find no significant decrease in entry rates in any reform country in comparison to their synthetic control units. The significant decrease after the different reforms is most likely caused by the overall downward slopping entry rate trends. These results are just the numerical affirmation of what the graphical findings already indicate. In sum, the combined null results of my two robustness checks cast further doubt on a suspected detrimental effect on entry rates.

Table 5-11: Synthetic Difference-in-Difference Entry Estimates

VARIABLES	(1) Japan	(2) Mexico	(3) Czech Republic	(4) Brazil
Interaction	0.0105 (1.307)	-0.0108 (-1.402)	-0.0149 (-0.763)	-0.00783 (-0.628)
Treatment	-0.0250*** (-7.256)	0.000148 (0.0247)	0.00158 (0.0898)	-0.00373 (-0.405)
After Reform	-0.0198** (-2.609)	-0.0327*** (-6.358)	-0.0318*** (-3.419)	-0.0300*** (-6.133)
Constant	0.0518*** (15.70)	0.0497*** (13.72)	0.115*** (16.95)	0.0774*** (33.93)
Observations	36	36	36	36
Adjusted R-squared	0.591	0.662	0.249	0.368

Robust t-statistics in parentheses with *** p<0.01, ** p<0.05, * p<0.1. The estimates are based on the period 1995 to 2008.

⁸⁵ This falling trend could also be reflected in the significant decline in entry rates after the Mexican reform reported in Table 5-5.

Table 5-12 displays the weights of each control country in the synthetic versions for exit rates. The country combinations are slightly different from those in Table 5-9. This is mainly due to another set of pre-treatment characteristics that determine the development in exit rate trends. Furthermore, it also indicates that common country factors have varying impacts on the two rates. Therefore, different control units are picked to simulate the best possible counterfactual development in exit rates.

Table 5-12: Weights for Synthetic Exit Control Groups

Country	Synthetic Japan	Synthetic Mexico	Synthetic Czech Re- public	Synthetic Brazil
Argentina	0	0	0	0
Switzerland	0.363	0.504	0.074	0.158
Estonia	0	0	0.405	0
Greece	0.235	0	0	0
Croatia	0	0.168	0	0
Iceland	0	0	0	0
Korea	0.307	0	0	0.357
Norway	0	0	0	0
Poland	0	0	0	0
Romania	0	0	0	0
Russia	0	0	0	0.485
Slovakia	0.095	0.265	0.087	0
Turkey	0	0.063	0.434	0

Table 5-13 contains the comparison of the pre-reform characteristics of the four treatment countries and their respective synthetic counterparts. As before, the relative importance of the individual variables is also reflected by the matching quality. The pre-intervention mean squared prediction error (MSPE) serves as a measure of the goodness-of-fit. It reflects the average of the squared discrepancies between the outcome variable in a treatment country and in its synthetic counterpart.

The aggregated MSPE over all four treatment countries is only 0.0268 for exit rates in contrast to 0.0818 for entry rates. This suggests that the overall fit across all four treatment countries is better for exit rates than for entry rates. However, for both outcome variables the squared differences are sufficiently low to ensure valid conclusions.

Table 5-13: Predictor Means for Exit before the Tax Reforms

Variable	Japan	Synthetic Japan	Mexico	Synthetic Mexico
GDP per Capita	10.4654	9.8175	8.5742	9.3709
GDP Growth	1.1087	3.3489	2.9591	3.1824
Inflation	0.2575	2.5481	5.1170	5.2346
Interest rate	2.2055	8.3624	1.8059	20.391
Credit/GDP	5.3061	4.4588	2.9648	3.9788
Corporate Tax Rate	0.4539	0.3035	0.3375	0.3403
Accountability	0.9779	1.0487	0.1430	0.6419
Political Stability	1.0949	0.8224	0.4168	0.1232
Government Effect	1.1440	1.1856	0.2033	0.8433
Regulatory Quality	0.7748	1.0607	0.3618	0.5765
Rule of Law	1.2583	1.1691	0.4932	0.5997
Control of Corruption	1.0677	1.0501	0.2912	0.5123
	Czech Republic	Synthetic Czech Republic	Brazil	Synthetic Brazil
GDP per Capita	8.8284	9.3424	8.4424	8.7086
GDP Growth	2.9292	3.0187	2.0465	1.3902
Inflation	2.6759	4.1271	6.7202	7.7292
Interest rate	9.3098	15.134	6.7389	12.047
Credit/GDP	3.8456	4.0326	3.6085	3.4499
Corporate Tax Rate	0.341	0.3406	0.306	0.3437
Accountability	0.9047	0.9036	0.1359	0.2319
Political Stability	0.7597	0.6203	0.2114	0.2173
Government Effect	0.7450	1.0205	0.0935	0.1781
Regulatory Quality	0.9965	0.7928	0.3997	0.2173
Rule of Law	0.7790	0.7217	0.3170	0.1091
Control of Corruption	0.4084	0.7024	0.0235	0.0232

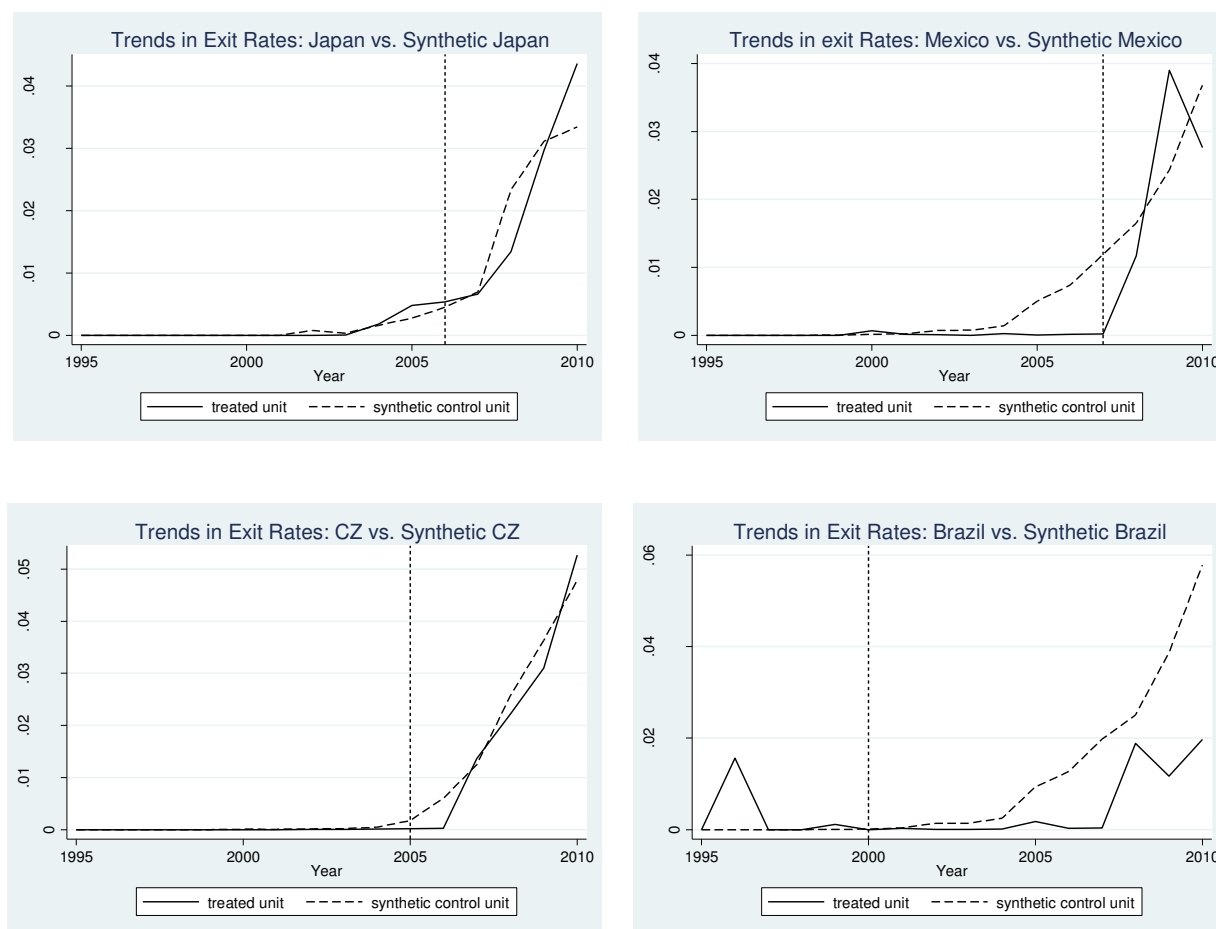
Figure 5-3 depicts the development in exit rates of loss firms for the treatment units and their synthetic control units. For all four treatment countries the small number of non-zero observations leads to an almost identical development of exit rates until the years 2003.

When the Japanese anti-avoidance rule was introduced in 2006 both rates were roughly at the same level. In later periods the treatment exit rate does not show a more drastic increase than its synthetic counterpart.

In Mexico, the exit rate trend sharply rises directly after the reform whereas the comparison trend can be described by a rather constant increase beginning in 2004. Yet, in the post-reform periods the rate of firm exits of the treatment unit is not consistently higher than the rate in the control group.

For the Czech Republic I find a similar picture. For post-reform periods a more pronounced increase in treated firm exits in comparison to the tailored control group cannot be observed. In the case of Brazil a direct reaction of both exit rates immediately after the reform is not observable. The later development rather indicates a higher rate of firm exits for the synthetic control unit and thus does not meet my expectations.

Figure 5-3: Comparison of Exit Rates – Treatment Unit vs. Synthetic Control Unit



The general increase in the periods after 2008 is predominantly caused by an incomplete coverage of financial statement data for younger firm years and does not reflect the actual rate of firm terminations in either group.

In Table 5-14 my numerical estimation results are depicted. For none of my treatment countries a significant increase in exit rates can be shown. On the contrary, the exit rates in Brazil suggest a significant decrease for the post-reform periods.

Table 5-14: Synthetic Difference-in-Difference Exit Estimates

VARIABLES	(1) Japan	(2) Mexico	(3) Czech Republic	(4) Brazil
Interaction	-0.00322 (-0.566)	-0.00708 (-1.482)	-0.00235 (-0.334)	-0.00901* (-1.868)
Treatment	0.000107 (0.197)	-0.00119 (-1.672)	-7.78e-05 (-1.568)	0.00335 (1.127)
After Reform	0.0111** (2.123)	0.0129*** (6.837)	0.0114** (2.332)	0.00807** (2.556)
Constant	0.000495* (1.774)	0.00130* (1.828)	9.55e-05* (1.988)	4.42e-06 (1.035)
Observations	28	28	28	28
Adjusted R-squared	0.563	0.697	0.407	0.073

Robust t-statistics in parentheses with *** p<0.01, ** p<0.05, * p<0.1. The estimates are based on the period 1995 to 2008

The insignificant results are in line with the graphical presentations in Figure 5-3. Given the above results and the lack of pre-intervention observations I cannot confirm a significant increase in exit rates based on a country-by-country comparison.

To further validate my results I apply placebo experiments. Following Abadie, Diamond and Hainmüller (2010) I implement cross-sectional placebo tests. The basic principle is to sequentially apply the synthetic control algorithm to every country in the donor pool and compare the placebo effects to my base line effects. The results can be found in Appendix C. I display the estimated differences between every country in the donor pool and its respective synthetic control group for entry rates and exit rates. The red line stands for the estimated (entry rate or exit rate) gap between the actual treatment country compared to its synthetic control group. Across all my placebo tests I find no clear differences between the entry rate gaps (or exit rate gaps) of my actual treatment countries and the iteratively chosen control countries. The treatment trends do not show more or less pronounced increases or decreases in comparison to the non-reform units. Hence, my overall impression of not finding consistent results for entry rates nor exit rates does not seem to be coincidental.

Overall, the results from the graphical and numerical analyses of treatment and synthetic control groups do not suggest any effect of loss transfer limitations on entry rates. Empirical results of accelerated firm terminations are also rather scarce and do not confirm earlier findings.

5.6 Discussion of Results

The ambiguous results for the effects of a restriction to loss transfers on entry rates or exit rates do not enable me to draw obvious conclusions. The partly conflicting findings do not support the theoretical adverse effect on entry rates nor do they provide clear empirical evidence of the hypothesized increase in firm exits. The observed inconsistencies across my baseline estimates and robustness checks could be the consequence of various factors that are implicitly or explicitly not taken into account in the above analyses:

First, as my descriptive analysis already suggests, acquisitions of loss-carrying targets are very rare events compared to ownership changes with respect to profitable firms. Furthermore, companies in a loss situation can hardly ever be sold in the first place as transaction costs probably outweigh possible tax savings. Consequently, the possibility of eventually selling a taxable loss might not play a role in the initial investment decision at all and does not affect the decision to terminate an ongoing business either.

Second, the “Achilles Heel” of every difference-in-difference estimation is the assumed parallel trend of the outcome variable between the treatment and the control group. As shown in Figure 5-1, I can be fairly confident that the common trend assumption is sufficiently met in the aggregate. However, since most limitations were implemented as part of larger amendments to national tax systems I cannot rule out the possibility that other changes at the same time had an influence on entrepreneurial activities or firm dissolutions. For instance, tax reliefs or non-tax related subsidies which I do not control for could cause a substantial increase in entry rates that overcompensates a negative effect of loss transfer restrictions.

Third, it is far from clear if the implementation of “anti-loss trafficking” restrictions can be understood as a constant barrier to entrepreneurship or as a constant threat to loss-carrying firms. In my empirical model a remaining and consistent effect on entry rates and exit rates is assumed. Any temporary shocks to firm entries or firm exits would not or only partly be captured by the applied estimator that reflects the development of both rates over the entire post-reform period. Initial decreases in entry rates or primary increases in exit rates due to a limitation to loss transfers could be overcompensated by later reforms or policy changes. In addition, any unobserved or unmeasured macroeconomic factors affecting entrepreneurship or firm deaths in treatment and control countries differently could also introduce another estima-

tion bias. For instance, the Czech Republic joined the European Union in May 2004 which meant a major overhaul to its political, institutional and economic systems. These amendments could possibly interfere with the expected effects of a tax reform in 2005 and bias my results.

The results concerning the market exit of loss firms show quite consistent and significant findings in contrast to my estimates for firm entries. These different findings can be attributed to economic reasons and to irrational investment behavior:

First of all, investors rather react to new tax loss legislations when firms are already in a troublesome loss situation rather than anticipating a potential increase in risk. In other words, taking into account a theoretical future loss situation is barely found in any business plan. Whereas existing losses are viewed as a direct burden for the company and have to be directly dealt with.

Furthermore, an identification approach based on the industry level might not be precise enough to capture the effect on firm entries. Especially investors with a high degree of strategic and rational investment behavior are required to consider such sophisticated tax rules in their business plans. For example, venture capital investments can be expected to take into account loss compensation rules in case of a negative outcome and to react more sensitively to tax law amendments. An econometric model that simply distinguishes between different industries might not be able to pinpoint such strategic investments.

In addition, the estimation of how entry rates are affected by the introduction of “anti-loss trafficking” rules might be subject to additional shortcomings. Despite an effective “loss trafficking” restriction, every potential investor has the possibility to indirectly benefit from a loss in its incorporated firm if the national tax code allows for an impairment write-off from the book value of the recorded shares. Thereby, the loss in firm value at the company level is also reflected in a reduction of the value of shares at the level of the investor. Thus, losses generated at the company level reduce the investor’s personal tax burden and let the state participate in the investor’s risk. If such an indirect loss recognition is possible a restriction to loss transfers does not necessarily cause the investors to suffer from an ex-ante higher risk of investing. Risky projects are not discouraged and entrepreneurial activities should suffer to a lesser extent.

Besides economic drivers, further explanations of (excess) firm entries can also be found in behavioral economics. Past research has shown that entrepreneurs are susceptible to certain judgmental biases. The most prominent for which this has been shown is the overconfidence bias. Overconfidence is understood as the overestimation of one's own ability relative to others. In the empirical literature overconfidence has been identified as a recurring characteristic among entrepreneurs and as an important driver to start a business.⁸⁶ For example, using a sample of 2,994 entrepreneurs, Cooper, Woo and Dunkelberg (1988) find that 81 % of them rate their chances to succeed at least 70 % and about one third of them is entirely certain to succeed. Different empirical studies suggest that excess entrepreneurial entry into markets is causally linked to overconfidence (Busenitz and Barney (1997), Camerer and Lovallo (1999), Forbes (2005), Koellinger, Minniti and Schade (2007)). Furthermore, empirical evidence suggests that overconfidence also has predictive power in explaining over-investment and commitment to risky projects (Hayward and Hambrick (1997), Simon and Houghton (2003)).

Another psychologically based explanation describes the phenomenon of self-focus in entry decisions. Investors concentrate on their own capabilities, strengths and weaknesses but do not put equal weight to external factors such as competitive assessment when starting their business. They show a very limited and imperfect perception of competition or market capacity (Cypert and March (1963), Moore, Oesch and Zietsma (2007)).

Overconfidence as well as self-focus could be other possible reasons for not observing the hypothesized adverse effects on entry rates.

5.7 Conclusion

In this study I use a comprehensive panel data set of 17 European and non-European countries to analyze the effects of restrictions to tax loss transfers on firm entries and firm exits. Most countries do not allow companies to pass on tax losses as part of an acquisition when a change in ownership takes place and the loss would be indirectly transferred to another tax payer. Even though, these restrictions are mainly targeted at tax-driven “loss trafficking”, they should also affect the entrepreneurial risk-return considerations of potential firm entries and alter firms' exit behavior.

⁸⁶ Based on their findings of probabilistically poor but socially useful gambles made by entrepreneurs, Dosi and Lovallo (1997) describe entrepreneurs as “optimistic martyrs”.

In the first step of my analysis, I test whether the introduction of limited loss transfers in my different treatment countries significantly reduces the number of loss-acquisitions. According to my results none of the four examined rules proves to be especially effective in reducing the relative frequency of loss-acquisitions. These results can either be understood as a consequence of my identification strategy or they can be attributed to weak implementations or insufficient enforcements of anti-avoidance rules.

In a next step I extend the scope of my analysis and directly study the effects on firm entries and firm exits. I argue with respect to entry rates that any limitation to loss transfers causes the entry rates to decline since the relative risk of an investment is increased. However, neither my baseline analysis nor several robustness checks reveal a consistent detrimental impact on entry rates.

For a distressed firm a restriction on loss transfers leads to a devaluation of unutilized losses and thereby increases the cost of failure for the owner of the loss-firm. Thus, I expect such a limitation to lead to an increase in the rate of firm exits. My base case results suggest an average increase in the mean rate of firm dissolutions by about 0.6 percentage points. On a single country basis, the Brazilian and the Czech “anti-loss trafficking” rules are shown to be the drivers of the overall effect. However, in subsequent tests my initial findings can only be confirmed to a limited extent.

I discuss various reasons for my partly conflicting outcomes and identify the unclear economic relevance of loss acquisitions, other national tax rules, specialized investments and irrational investment behavior along with the anticipative character of future tax losses as possible identification issues.

Nevertheless, taking my results at face value implies very interesting policy conclusions. On the one hand, according to my results burdening private investors with additional restrictions to loss compensation does not come at the cost of reduced investment activities. That means that the state can protect its tax revenue without imposing new barriers to firm entries. On the other hand, the devaluation of tax losses seems to speed up the natural selection process at the end of the life span of unsuccessful business ventures. Failed business concepts are sorted out more quickly and resources can be sooner reallocated to more promising investments. But it remains an open question whether the loss of a tradable tax asset just stops putting off the inevitable for doomed business ventures or if potentially profitable businesses are deprived of their chance to recover.

5.8 Appendix

Table 5-15: Appendix A - Variable Definition

Variable	Definition	Source
GDP per Capita	Gross Domestic Product of country i divided by midyear population of country i (logarithm).	World Development Indicators Worldbank 2014
GDP Growth	Annual percentage growth rate of gross domestic product of country i.	World Development Indicators Worldbank 2014
Inflation	Inflation as measured by the consumer price index reflecting the annual percentage change in the cost of the average consumer.	World Development Indicators Worldbank 2014
Interest rate	Rate paid by commercial or similar banks for demand, time or saving deposits in percent.	World Development Indicators Worldbank 2014
Stock/GDP	Ratio of stock market capitalization to GDP of country i (logarithm).	World Development Indicators Worldbank 2014
Credit/GDP	Ratio of domestic credit to the private sector to GDP of country i (logarithm).	World Development Indicators Worldbank 2014

Table 5-15 – continued

Variable	Definition	Source
Corporate Tax Rate	The top corporate income tax rate in country i.	Author's computation on data from Ernst & Young's "Worldwide Corporate Tax Guide
Personal Tax Rate	The top personal income tax rate in country i.	Author's computation on data from Ernst & Young's "Worldwide Corporate Tax Guide
Voice and Accountability	Measuring perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and a free media.	World Bank's Worldwide Governance Indicators
Political Stability	Measuring perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including political violence and terrorism.	World Bank's Worldwide Governance Indicators
Government Effectiveness	Measuring the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank's Worldwide Governance Indicators
Regulatory Quality	Measuring perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank's Worldwide Governance Indicators

Table 5-15 - continued

Variable	Definition	Source
Control of Corruption	Measuring perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as ‘capture’ of the state by elites and private interests.	World Bank’s Worldwide Governance Indicators
Rule of Law	Measuring perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police and the courts, as well as the likelihood of crime and violence.	World Bank’s Worldwide Governance Indicators
Overall Score	A country’s overall economic freedom score is a simple average of its scores on the 10 individual freedoms.	Index of Economic Freedoms by the Heritage Foundation
Loss Carry-Forward	The number of years a company is allowed to carry losses forward in time for corporate tax purposes.	Author’s computation on data from Ernst & Young’s “Worldwide Corporate Tax Guide, and from the IBFD Country Analysis
Time	Average number of days required to start a business in country i.	World Bank Doing Business Database 2014
Cost	Average cost of starting a business as % of income per capital in country i.	World Bank Doing Business Database 2014

Appendix B

Table 5-16: Appendix B - Reforms

Country	Year of Reform	Reform
Brazil	2000	Budget Law 1999/2000
Czech Republic	2005	Changes to Corporate and Personal Taxation 2005
Mexico	2007	Tax Reform of 2007
Japan	2006	Tax Reform of 2006

Appendix C

Figure 5-4: Appendix C - Placebo Studies – Entry Rate Gap⁸⁷

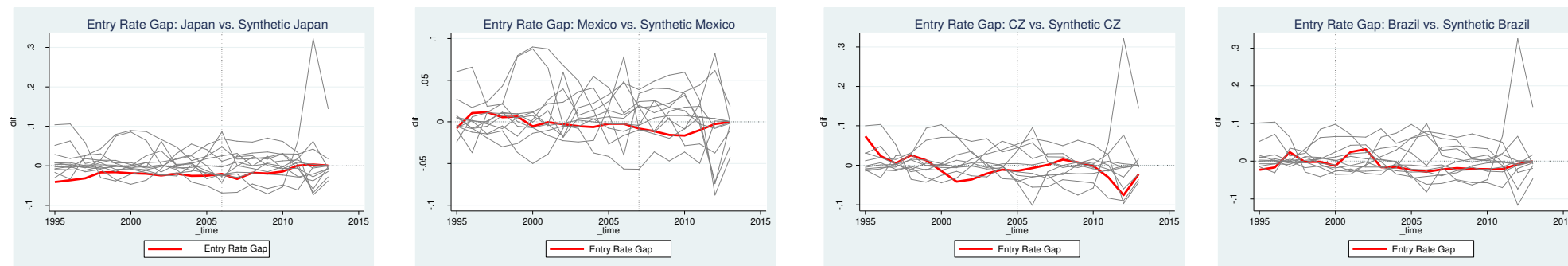
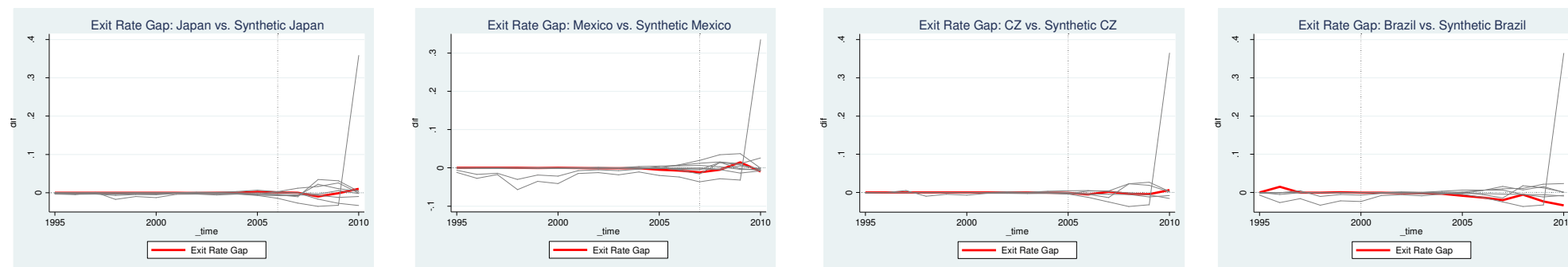


Figure 5-5: Appendix C - Placebo Studies – Exit Rate Gap⁸⁸



⁸⁷ Entry Rate Gap is defined as the entry rate of the treatment country minus the entry rate of the synthetic control unit.

⁸⁸ Exit Rate Gap is defined as the exit rate of the treatment country minus the exit rate of the synthetic control unit.

5.9 References

- Abadie, A., Diamond, A. and Hainmüller, J. (2014): Comparative Politics and the Synthetic Control Methods, Working Paper.
- Abadie, A., Diamond, A. and Hainmüller, J. (2010): Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program, *Journal of the American Statistical Association* 105(490), 493-505.
- Abadie, A. and Gardeazabal, J. (2003): The Economic Cost of Conflict: A Case Study of the Basque Country, *American Economic Review* 93 (1), 112-132.
- Altshuler, R., Auerbach, A. J., Cooper, M. and Knittel, M. (2009): Understanding U.S. Corporate Tax losses, *Tax Policy and the Economy* 23, Jeffrey R. Brown and James M. Poterba (eds), University of Chicago, 73-122.
- Altshuler, R. and Auerbach, A. J. (1990): The significance of tax law asymmetries: an empirical investigation, *The Quarterly Journal of Economics* 105, 61-86.
- Appelbaum, E. and Katz, E. (1996): Asymmetric Taxation and the Theory of the Competitive Firm Under Uncertainty, *Canadian Journal of Economics* 20, 357-369.
- Auerbach, A. J. (2007): Why Have Corporate Tax Revenues Declined? Another Look, *CESifo Economic Studies* 53 (June), 153-71.
- Auerbach, A. J. (1986): The Dynamic Effects of Tax Law asymmetries, *Review of economic studies*, 205-225.
- Auerbach, A. J. and Poterba, J. M. (1987): Tax-Loss Carry-forwards and Corporate Tax Incentives, *The Effects of Taxation on Capital Accumulation*, M. Feldstein (ed.), Chicago: University of Chicago Press, 305-338.
- Ayers, B. C., Lefanowicz, C. E. and Robinson, J.R. (2003): Shareholder taxes in acquisition premiums: The effect of capital gains taxation, *Journal of Finance* 58, 2783-2801.
- Bennet, A. and Elman, C. (2006): Qualitative Research: Recent Development in Case Study Methods, *Annual Review of Political Science* 9, 455-476.
- Bertrand, M. and Kramarz, F. (2002): Does entry regulation hinder job creation? Evidence from the French retail industry, *Quarterly Journal of Economics* 117, 1369-1413.
- Billmeier, A. and Nannicini, T. (2013): Assessing economic liberalization episodes: a synthetic control approach, *The Review of Economics and Statistics*, 983-1001.
- Bruce, D. (2000): Effects of the United States tax system on transitions into self-employment, *Labour Tax* 7, 545-574.

- Busentiz, L. and Barney, J. (1997): Differences between entrepreneurs and managers in large organizations: biases and heuristics in strategic decision making, *Journal of Business Venturing* 12 (1), 9-30.
- Camerer, C. F. and Lovo, D. (1999): Overconfidence and excess entry: An experimental approach, *American Economic Review* 89, 306-318.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2001): Personal Income Taxes and the Growth of Small Firms, *Tax Policy and the Economy, Volume 15*, James Poterba (ed.), Cambridge: MIT Press, 2001.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2000a): The Economic Consequences of Taxing the Rich, *Entrepreneurs, Income Taxes, and Investment, Does Atlas Shrug?* Joel Slemrod (ed.), Cambridge: Harvard University Press.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2000b): Income Taxes and Entrepreneurs' Use of Labor, *Journal of Labor Economics* 18, 324-351.
- Chang, S. J. and Singh, H. (1999): The impact of modes of entry and resource fit on modes of exit by multi-business firms, *Strategic Management Journal*, No. 20, 1019-1035.
- Chiang, W-C., Stammerjohan, W. and Englebrecht, T. D. (2014): Pricing target NOLs in mergers and acquisitions from the participating firms' perspective, *Advances in Accounting, incorporating Advances in International Accounting* 30, 32-42.
- Claessens, S and Leaven, L, (2003): Financial development, property rights and growth, *Journal of Finance* 58, 2401-2436.
- Cooper, M. G. and Knittel, M. J. (2010): The implications of tax asymmetry for U.S. corporations, *National Tax Journal* 63, 33-62.
- Cooper, A.C., Woo, C.Y. and Dunkelberg, W. C. (1988): Entrepreneurs' perceived chances for success, *Journal of Business Venturing* 3, 97-108.
- Cullen, J. B. and Gordon, R. H. (2007): Taxes and entrepreneurial risk-taking: theory and evidence for the U.S., *Journal of Public Economics*, 1479-1505.
- Cypert, R. and March, J. (1963): *A behavioral Theory of the Firm*, Prentice Hall, Upper Saddle River NJ.
- Da Rin, M., Di Giacomo, M. and Sembenelli, A. (2011): Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe, *Journal of Public Economics*, 95 (9), 1048-1066.
- Desai, M. A., Gompers, P. and Lerner, J. (2003): Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe. Working Paper No. 10165, National Bureau of Economic Research.
- Devereux, M. P., Keen, M. and Schiantarelli, F. (1994): Corporation tax asymmetries and investment, *Journal of Public Economics*, 53 (3), 395-418.

- Djankov, S., Ganser, T., MacLiesh, C., Ramalho, R. and Shleifer, A. (2010): The Effect of Corporate Taxes on Investment and Entrepreneurship, *American Economic Journal: Macroeconomics*, 2 (3), 31-64.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2002): The regulation of entry, *The Quarterly Journal of Economics* 117 (1), 1-37.
- Domar, E. D. and Musgrave, R. A. (1944): Proportional Income Taxation and Risk-Taking, *The Quarterly Journal of Economics*, 58 (3), 388-422.
- Donelly, M. and Young, A. (2002): Policy Options for Tax Loss Treatment: How does Canada Compare, *Canadian Tax Journal*, 429-488.
- Dosi, G. and Lovallo, D. (1997): Rational Entrepreneurs are optimistic martyrs? Some considerations on technological regimes, corporate entries and the evolutionary role of decision biases, *Technological Innovation: Oversight and Foresight*, Garud, R., Nayyar, P. Shapira, Z. (eds.), Cambridge University Press, 41-68.
- Dreßler, Daniel and Overesch, Michael, (2013): Investment impact of tax loss treatment—empirical insights from a panel of multinationals, *International Tax and Public Finance* 20, 513-543.
- Dunne, T., Roberts, M.J. and Samuelson, L. (1988): Patterns of firm entry and exit in U.S. manufacturing industries, *RAND Journal of Economics* 19 (4), 495-515.
- Edgerton, J. (2010): Investment incentives and corporate tax asymmetries, *Journal of Public Economics*, 94 (11–12), 936–952.
- Egger, P., Keuschnigg, C. and Winner, H. (2009): Incorporation and taxation: theory and firm-level evidence, CED-Ifo Working Paper 2685.
- Erel, I., Liao, R. C. and Weisbach, M. S. (2012): Determinants of cross-border mergers and acquisitions, *Journal of Finance* 67 (3), 1045-1082.
- Forbes, D. P. (2005): Are some entrepreneurs more overconfident than others?, *Journal of Business Venturing* 20, 623-640.
- Gentry, W. M. and Hubbard, R. G. (2005): “Success Taxes”, Entrepreneurial Entry, and Innovation, *Innovation Policy and the Economy Volume 5*, The MIT Press, 87-108.
- Gentry, W. M. and Hubbard, R. G. (2004a): The effects of progressive income taxation on job turnover, *Journal of Public Economics* 88, 2301-2322.
- Gentry, W. M. and Hubbard, R. G. (2004b): Tax Policy and Entry into Entrepreneurship, mimeo, Columbia University.
- George, A. L. and Bennet, A. (2005): Case Studies and Theory Development in the Social Science. Cambridge MA, MIT Press.

- Gerring, J. (2007): Case Study Research: Principles and Practices, Cambridge, Cambridge University Press.
- Gordon, R. H. (1998): Can High Personal Tax Rates Encourage Entrepreneurial Activity?, *Palgrave Macmillan Journals – International Monetary Fund*, 49-80.
- Harhoff, D., Stahl, K. and Woywode, M. (1998): Legal Form, Growth and Exit of West German firms – empirical results for manufacturing construction, trade and service industries, *The Journal of Industrial Economics* 46 (4), 453-488.
- Hayward, M. L. A. and Hambrick, D. C. (1997): Explaining the premiums paid in large acquisitions: evidence of CEO hubris, *Administrative Science Quarterly* 42, 103-127.
- Henning, S. L., Shaw, W. H. and Stock, T. (2000): The Effect of Taxes on Acquisition Price and Transaction Structure, *The Journal of the American Taxation Association* 22, 1-17.
- Huizinga, H. and Voget, J. (2009): International taxation and the direction and volume of cross-border M&As, *Journal of Finance* 64 (3), 1217-1249.
- Huyghebaert, N. and van de Gucht, L. (2004): Incumbent Strategic Behavior in financial markets and the Exit of entrepreneurial start-ups, *Strategic Management Journal* 25, 669-688.
- Johnson, S., MacMillan, J. and Woodruff, C. (2002): Property rights and finance, *American Economic Review* 92, 1335–1356.
- Kaplan, D. S., Piedra, E. and Seira, E. (2011): Entry regulation and business start-ups: Evidence from Mexico, *Journal of Public Economics* 95 (11-12), 1501-1515.
- Klapper, L., Laeven, L. and Rajan, R. (2006): Entry regulation as a barrier to entrepreneurship, *Journal of Financial Economics* 82 (3), 591-629.
- Koellinger, P., Minniti, M. and Schade, C. (2007): “I Think I can, I think I can”: Overconfidence and entrepreneurial behavior, *Journal of Economic Psychology* 28, 502-527.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. W. (2002): Investor protection and corporate valuation, *Journal of Finance* 57, 1147–1170.
- Mata, J., Portugal, P., and Guimaraes, P. (1995): The survival of new plants: Start-up conditions and post-entry evolution, *International Journal of Industrial Organization* 13, 459-481.
- Mintz, Jack M. (1981): Some additional results on investment, risk-taking and full loss offset corporate taxation with interest deductibility, *The Quarterly Journal of Economics*, 63-642.
- Moore, D. A., Oesch, J. M., and Zietsma, C. (2007): What Competition? Myopic Self-Focus in Market-Entry Decisions, *Organization Science* 18 (3), 440-454.

- Moore, N. H. and Pruitt, S. W. (1987): The Market Pricing of Net Operating Loss Carryforwards: Implications of the Tax Motivations of Mergers, *The Journal of Financial Research* 10 (2), 153-160.
- OECD (2011): Corporate Loss Utilization through Aggressive Tax Planning, OECD Publishing.
- OECD (2011): Entrepreneurship at a Glance Report 2011, OECD Publishing.
- Poitevin, M. (1998): Effects of the Fiscal Treatment of Tax Losses on the Efficiency of Markets and the Incidence of Mergers, CIRANO, Série Scientifique.
- Poterba, J. M. (2001): Taxation, Risk-Taking and Household Portfolio Behavior, NBER Working Paper No. 8340.
- Poterba, J. M. (1989): Capital Gains Tax Policy towards Entrepreneurship, *National Tax Journal*, 375-389.
- Rincon, A. and Vecchi, M. (2003): Productivity Performance at the Company Level, Chapter V of EU Productivity and Competitiveness: An Industry Perspective, European Commission, Brussels.
- Romer, P. (1994): New goods, old theory and the welfare cost of trade restrictions, *Journal of Development Economics* 43 (1), 25-45.
- Rossi, S- and Volpin, P. F. (2004): Cross-Country Determinants of Mergers and Acquisitions, *Journal of Financial Economics* 74, 277-304.
- Samaniego, R. M. (2009): Entry, Exit and Investment-Specific Technical Change, *The American Economic Review* 100 (1), 164-192.
- Sandmo, A. (1969): Capital Risk, Consumption and Portfolio Choice, *Econometrica* 37, 586 - 599.
- Scarpetta, S., Hemmings, P., Tressel, T. and Woo, J. (2002), The role of policy and institutions for productivity and firm dynamics: evidence from micro and industry data. Unpublished Working Paper, OECD.
- Schary, M. A. (1991): The Probability of Exit, *The RAND Journal of Economics* 22 (3), 339-353.
- Schreiber, U. (2014): Haftungsbeschränkung und steuerliche Verlustverrechnung, *Rechnungslegung, Prüfung und Unternehmensbewertung: Festschrift für Prof. Dr. Dr. h. c. Wolfgang Ballwieser*, Dobler, M., Hachmeister, D. and Kuhner, C. (eds.), Stuttgart, 761-776.
- Schuetze, H. J. (2000): Taxes, economic conditions and recent trends in male self-employment: a Canada–US comparison, *Labour Economics* 7, 504-544.
- Schumpeter, J. A. (1911): Theorie Der Wirtschaftlichen Entwicklung. Duncker & Humblot, Leipzig.

- Simon, M., Houghton, S. M. (2003): The relationship between overconfidence and the introduction of risky products: evidence from a field study, *Academy of Management Journal* 46, 139-150.
- Stiglitz, J. (1976): The corporation Tax, *Journal of Public Economics* 5, 303-311.
- Tobin, J. (1958): "Liquidity Preference as Behavior Towards Risk", *Review of Economic Studies* 25, 65-86.
- Wooldridge, J. M. (2010): *Econometric Analysis of Cross Section and Panel Data*, Second Edition, Cambridge MIT Press.

Working Paper III

6 Capital Gains Taxes and Long-term Return Reversal: Evidence from Pole to Pole⁸⁹

Abstract: This paper examines whether capital gains taxes can explain long-term return reversal in a global context. I first show that capital gains taxes have a significant effect on stock returns in the U.S. stock market. Next, the scope of my analysis is extended and the significant effect of capital gains taxes is confirmed in a large panel of countries controlling for other possible drivers. I distinguish between winner and loser stocks and find supportive evidence of asymmetric return reactions due to capital gains taxes. I also consider the ongoing integration of financial markets by taking into account the diversification of domestic equity portfolios as well as the allocation of international equity holdings. My results suggest that the effect of domestic capital gains taxes becomes stronger as the share of domestic equity holdings increases. Furthermore, I present empirical evidence that foreign capital gains taxes also affect stock prices.

Keywords: capital gains tax, stock return reversal, equity portfolio, market integration

JEL Classification: H24; G12; G15

⁸⁹ This paper is joint work with Prof. Dr. Harry Huizinga (Tilburg University) and Prof. Dr. Johannes Voget (Mannheim University).

6.1 Introduction

Over the course of the last 30 years a large body of empirical literature has found negative serial correlation of stock price changes over longer investment horizons (De Bondt and Thaler (1985, 1987), Poterba and Summers (1988), Chan (1988), Ball and Kothari (1989), Jones (1993), Ball, Kothari and Shanken (1995), Jegadeesh and Titman (2001), George and Hwang (2007)). The most important implication of the observed reversal of stock returns is the predictability of stock prices that questions stock market efficiency. While it is widely accepted that investors who follow a contrarian portfolio strategy: i.e. selling recent “winners” and buying recent “losers” can beat the market, the reason what causes the observed negative autocorrelation of price changes still remains a controversial issue.

Traditional explanations can be broadly divided into three schools of thought that are not mutually exclusive: psychological-based theories of irrational investor behavior, measurement errors in an efficient market environment and compensation for risk among rational market participants.⁹⁰

First, behavioral explanations generally relax the assumption of investors as completely rational information processors. De Bondt and Thaler (1985, 1987) attribute their findings to stock prices that tend to initially overshoot their innate fundamental values after a series of good news which must be corrected in the long-run and thus leads to reversing return patterns. Daniel, Hirshleifer and Subrahmanyam (1998), Barberis, Shleifer and Vishny (1998) and Hong and Stein (1999) model this market overreaction hypothesis based on different psychological evidence.

Second, assuming market efficiency many studies argue that the observed correlation arises from different types of market frictions. Lo and MacKinlay (1990) attribute contrarian profits to cross-autocorrelation between stocks and reject possible market overreactions. Conrad and Kaul (1993) identify measurement issues in stock market prices as another potential source of negative autocorrelation. Furthermore, nonsynchronous trading strategies (Boudoukh, Richardson and Whitelaw (1994)) or data snooping biases (Conrad, Cooper and Kaul (2003)) are suggested as alternative explanations.

⁹⁰ Compare Boudoukh, Richardson and Whitelaw (1994) for a comparison of the different strands of literature.

Third, in a series of papers Fama and French (1988, 1993, 1995, 1996, 1998) argue that investors following contrarian investment strategies based on firm-specific characteristics bear a higher fundamental risk. Consistent with this, Fama and French (1995) document that stocks with high book-to-market ratios face higher distress costs and relatively lower expected earnings. Reverting stock returns that lead to excess portfolio returns of contrarian investment strategies simply reflect compensation for this risk. Chan (1988) and Ball and Kothari (1989) also argue in favor of a risk-based explanation.

An alternative factor that could also explain reverting stock returns and that is in line with rational investment behavior but has received relatively little attention in the literature is investors' reaction to tax incentives. As Klein (1999, 2001) and George and Hwang (2007) show, return reversals can also be understood as the result of a rational model of tax avoidance. As capital gains are only taxed when realized, investors have a natural incentive to delay selling stocks with embedded capital gains. Prices of shares with locked-in capital gains are elevated relative to shares that have no embedded capital gains. As a result, inflated share prices imply lower expected returns as prices mean-revert to their fundamental values.

This paper seeks to provide independent support for the idea of capital gains taxes contributing to the phenomenon of long-term stock return reversal. Since empirical studies on the relationship between taxes and asset prices predominantly focus on the U.S. market, I start with a purely national analysis of U.S. stocks as my base case. I construct investment portfolios based on a measure of fictitious capital gains tax burdens to test the lock-in hypothesis of return reversal. I consider embedded capital gains and different long-term and short-term capital gains tax rates over a period from 1960 to 2012. I find that winner portfolios as defined by my tax-based measure exhibit significant reversals over a five year period and that those reversals are robust to risk-adjusted returns. In line with the expected effect of capital gains taxes I do not find any corresponding reversals of loser stocks. This reflects the asymmetric nature of the lock-in hypothesis.

In a next step I use an international dataset to provide “out of sample” evidence of stock return reversal and its relation to capital gains taxes. In different panel regressions I exploit time-series variations in long-term and short-term capital gains tax rates across 151 international tax reforms in 31 countries between 1985 and 2012. During this period the statutory capital gains tax rates range from a maximum of 80 % to a minimum of 0 %. In addition to

taxes I consider multiple other variables that are related to return reversal and that vary across countries and over time. These variables are intended to capture the effects of stock market development and information flows which are suggested by behavioral decision theory. Furthermore, I consider variables that are associated with risk-based explanations such as the value-growth theory or stock market volatility. I separately test for the influence of taxes on winner reversal and loser reversal to disentangle these different effects.

I find that especially long-term capital gains taxes have a significant positive effect on winner reversal. This relation is confirmed controlling for different sets of country characteristics. In addition, I demonstrate that an influence of capital gains taxes on loser reversal cannot be shown over the course of the entire fiscal year but is especially pronounced during the first month of a country's tax year. An increased difference between short-term and long-term capital gains taxes leads to more reversal in loser stocks at the beginning of the tax year. This confirms the relation between stock returns around the turn of the fiscal year and tax-loss selling strategies documented by Poterba and Weisbenner (2001) or Grinblatt and Keloharju (2004).

To further examine the link between stock return reversals and shareholder taxation I take into account the growing cross-border diversification of equity portfolios. Many studies have shown that investors allocate a relatively large fraction of their wealth to domestic equities and only hold modest amounts of foreign equities in their portfolios, a phenomenon known as "home bias" (French and Poterba (1991), Cooper and Kaplanis (1994), Tesar and Werner (1995)). Such a preference for domestic stocks is a vital prerequisite for an analysis of capital gains taxes and national stock returns in a purely domestic context.

However, there is ample empirical evidence that suggests that a home bias of equity portfolios has substantially decreased at a global level and shows a recent surge in international financial market integration (Amadi (2004), Baele Pungulescu and Horst (2007), Sørensen, Wu, Yosha and Zhu (2007)). To capture the effect of international portfolio diversification I test how variations in the proportion of domestic equity holdings change the effect of domestic capital gains taxes on return reversal.

My results show that an increase in domestic equity holdings strengthens the effect of domestic capital gains taxes on winner reversal. In addition, I decompose a country's equity liabilities into its individual investment flows to estimate the average capital gains tax burden of domestic equities held by foreign investors. As I control for foreign capital gains taxes I still

find a positive synergy between the share of domestically held stocks and domestic capital gains taxes. In addition, foreign capital gains taxes also seem to affect returns in domestic stocks.

In sum, my results provide empirical evidence for the meaning of capital gains taxes for long-term stock return reversal from a purely national as well as an international perspective. I confirm findings by George and Hwang (2007) and contribute to the literature by underlining the importance of capital gains taxes for security pricing. I also extend earlier international studies of long-term return reversal by explicitly considering cross-country portfolio diversification as well as international financial market integration.

The remainder of this paper is organized as follows. Section two discusses the lock-in hypothesis. Section three focuses on the U.S. case and presents results. In Section four I analyze stock return reversals from a global perspective. The data is described and numerous results are provided. Finally, section five concludes.

6.2 Lock-in Hypothesis

The lock-in hypothesis is based on the fact that taxes on capital gains are only levied upon realization. This leads to initially inflated stock prices that decrease again at a later point in time.

Klein (1999, 2001) formalizes in his model the relationship between taxes on capital gains and reversal of stock returns. The intuition can be summarized as follows:

Stocks that have positive returns also provide their shareholders with embedded capital gains. Investors with accrued capital gains will sell fewer shares to benefit from delaying tax payments. In that sense, the lock-in effect refers to the incentive to hold appreciated shares in order to defer capital gains taxes until realization. But there is no comparable reduction in demand for those shares, since buying “successful” shares does not trigger capital gains taxes. Thus, stocks with embedded capital gains are traded at a higher equilibrium price that induces shareholders to more selling of locked-in shares and eventually restores market equilibrium (see e.g. Landsman and Shackelford (1995)).

The premium at which locked-in shares are traded must be sufficiently high to compensate the shareholders to forgo the value of postponing the tax payments. As stock prices increase expected future returns decrease which leads to a slowly dissipating return reversal. According to Klein (1999, 2001) the magnitude of the increase in prices and the extent of the subsequent return reversal depend on the size of the average accrued capital gain per share, the length of the investment horizon and the nominal tax rate on capital gains.⁹¹ He shows that larger embedded capital gains, a longer investment horizon and higher tax rates lead to a more elevated share price and consequently to a more pronounced return reversal.

This result also implies that shareholders are willing to continue to hold the initial shareholding even if expected returns on a stock are lower than returns on alternative investments.⁹²

It is important to note, that the lock-in hypothesis predicts long-term return reversal for stocks with embedded capital gains but not for stocks with embedded capital losses. A stock with an embedded capital loss is not traded at a lower price than an identical stock with no embedded capital loss since a potential buyer should be willing to pay the same market price for both stocks. A shareholder does not need to require a discount for a stock with an embedded capital loss in order to sell the stock. Thus, empirical tests of return reversal should indicate that the lock-in effect of a capital loss is not opposite of that of a capital gain. However, return reversal of loser stocks at the beginning of the fiscal year can be attributed to tax-loss selling at the end of the previous fiscal year (Poterba and Weisbenner (2001), Grinblatt and Keloharju (2004)).

Overall, the lock-in hypothesis is characterized by two central predictions: First, the magnitude and length of a stock's return reversal depend, among other things, on the size of the embedded capital gains and the level of the nominal tax rate. Second, there is an asymmetry between the effects of capital gains and capital losses on long-term return reversal. Long-term return reversal is expected to occur for stocks with accrued capital gains whereas stocks with embedded capital losses should not exhibit reverting patterns throughout the year. But I would expect loser stocks to show a positive price reaction around the turn of the fiscal year.

⁹¹ Klein (1999) illustrates the adverse effect of capital gains taxes on expected returns in a CAPM-type pricing model.

⁹² This effect is documented by Auerbach (1991).

6.3 The U.S. Case

In the first step of my analysis I apply a commonly used procedure for stock classification to verify the profitability of contrarian investment strategies in general and to separately examine stock return patterns of winner portfolios and loser portfolios. I use the U.S. stock market as the largest and most versatile financial market in the world to gain initial estimates of an expected stock return reversal. The results serve as base case estimates that are compared with the effects documented in other studies and that are later considered in the subsequent international analysis. Moreover, I more explicitly test for the validity of the lock-in hypothesis by applying a tax-based measure that takes into account an estimation of accrued capital gains and the effect of different capital gains tax rates.

6.3.1 Data and Methodology

I obtain monthly prices, returns and information on market capitalization for all equity securities traded on the NYSE, the NYSE Arca, the NYSE MKT (formerly AMEX) or the NASDAQ from the Center for Research in Security Prices (CRSP) over the period 1960 to 2012. All prices are adjusted for stock splits and stock dividends and monthly prices stand for the last trading day of each month. I consider active and inactive companies that have at least 61 consecutive months of price data. The final dataset consists of 12,198 firms.

Information on capital gains tax rates, special tax regimes, grandfathering rules, tax reforms and tax holidays for the period 1960 to 2012 are all hand-collected from The Ernst Young Worldwide Corporate Tax Guide, The European Tax Handbook, The IBFD Tax News Services, The IBFD Country Analysis, The IBFD Annual Reports and various other sources.

I use two different measures to identify return reversal that are both based on a 5-year horizon. For each month t I use the previous 60 months (ranking period) to form winner and loser portfolios that are held for the subsequent 60 months (holding period). The measures are used to identify winner and loser portfolios for each month t . The development of the returns of these winner and loser portfolios over the next 60 months holding period is seen as an indicator of return reversal.

In general, return reversal is understood as winner portfolios showing a significant negative development in returns in the future and loser portfolios that exhibit a significant positive development in future returns.

The first measure can be seen as a traditional return measure and is simply a stock's return over the entire portfolio ranking period t to $t-60$. It is used to identify the general tendency of stock returns to reverse within a 5-year horizon.

$$RM_t = \frac{P_t - P_{t-60}}{P_{t-60}}$$

This traditional return measure (RM) treats winner and loser portfolios symmetrically and does not distinguish between different theoretical explanations for return reversals. The RM measure is meant to capture any negative autocorrelation in stock returns irrespective of its source.

The following measure is designed to approximate the potential capital gains tax burden of a stock over a period of 5 years to test the lock-in hypothesis. It reflects the combined impact of embedded capital gains and the applicable capital gains tax rates on stock prices and the expected reversal of returns as described in Klein (1999).

$$CGTB_t = \sum_{k=1}^K \omega_{t-k} \left(\frac{P_t - P_{t-k}}{P_{t-k}} \right) TR_t^{\text{short}} + \sum_{n=K+1}^{60} \omega_{t-n} \left(\frac{P_t - P_{t-n}}{P_{t-n}} \right) TR_t^{\text{long}}$$

where $\omega_{t-k} = 1$ if $P_t > P_{t-k}$ and $\omega_{t-k} = 0$ otherwise and correspondingly where $\omega_{t-n} = 1$ if $P_t > P_{t-n}$ and $\omega_{t-n} = 0$ otherwise. The capital gains tax burden measure (CGTB) calculates a fictitious tax burden of a stock that would be sold in period t . I subdivide ranking period capital gains into short-term gains (1 to K) and long-term gains ($K+1$ to 60). The first sum captures all positive gains that fall within the short-term horizon multiplied by the valid short-term capital gains tax rate in period t . The second term sums up all older capital gains that qualify for long-term treatment multiplied by the current long-term capital gains tax rate in period t . I use personal capital gains tax rates that are applicable to individuals for selling shares in exchange for cash. Thus, my estimates are based on two underlying assumptions:

First, investors do not receive equity in exchange for their shares since taxes on those capital gains would be deferred. Secondly, I assume that the marginal investor is a taxable natural person and not an institutional investor.⁹³

Moreover, the CGTB measure assumes that shares are acquired evenly over the period t to $t-60$ and attributes a zero tax burden to embedded capital losses. Thus, I do not explicitly consider the possibility of loss compensation over time. Besides other possible drivers of return reversal the CGTB measure is expected to more accurately predict the tax-driven portion of winner return reversal than the RM measure. Most importantly, in contrast to the RM measure the CGTB measure should not capture any loser reversal outside January since capital gains taxes do not lead to a reverting discount in share prices.⁹⁴

The following analysis is based on three steps: First, every stock is categorized as winner or loser stock for each calendar month t from January 1965 to December 2012. An individual stock is considered a winner (loser) in month t if its value of the respective measure ranks in the top (bottom) 10 % of all stocks in month t . For each measure, winner (loser) stocks get a winner (loser) dummy set to one for month t . Otherwise the winner (loser) dummy variable takes the value zero.⁹⁵

Second, I use Fama-MacBeth (1973) cross-sectional regressions to estimate the contribution of a particular portfolio formed in month $t-j$ to a stock's return in month t . This enables me to isolate the returns to a particular investment strategy while controlling for other factors affecting returns. I control for the effects of firm size, bid-ask bounce and momentum trading.

⁹³ Throughout the entire study I assume that individuals keeping shares in their private portfolios are the relevant group of price setting investors whose tax burden matters for equity pricing. Academic studies (i.e. Bennet, Sias and Starks (2003)) document that the proportion of equities held by institutional investors has hovered around 50 percent during the last decade which indirectly suggests the alternative use of corporate capital gains taxes to test the effect on stock returns. However, the share of institutional holdings consists to a considerable extent of tax-free institutions (i.e. pension funds) and mutual fund equity holdings for which the corporate capital gains tax rate is usually not applicable. Mutual funds are required to pass through essentially all of their capital gains to be taxed at the level of the receiving clients. As they manage assets on behalf of their clients, who primarily are individual investors, in most cases the individual capital gains tax is applicable. Thus, corporate capital gains taxes would not necessarily capture the effect of the marginal investor.

⁹⁴ According to IRC Section 441 Subtitle A Chapter 1: A tax payer must choose a fiscal year for personal income tax purposes. He can freely choose any annual accounting period which is usually the calendar year. Under certain circumstances a taxpayer is even forced to use the calendar year. Hence, I use the calendar year as the relevant period for my tests.

⁹⁵ The 10 % ranking rule follows Jegadeesh and Titman (2001) and George and Hwang (2007).

Furthermore, the Fama-MacBeth approach allows me to examine abnormal returns not only over a 60-months holding period but also across different subintervals. I run the following cross-sectional regression 60-times $\{j = 1 \text{ to } T = 60\}$ over all stocks for each calendar month t between February 1965 and December 2012.⁹⁶

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-1} + b_{2jt}\text{size}_{i,t-1} + b_{3jt}52wkW_{i,t-j} + b_{4jt}52wkL_{i,t-j} + b_{5jt}MIW_{i,t-j} + b_{6jt}MIL_{i,t-j} + \varepsilon_{ijt}$$

R_{it} is the raw return to stock i in month t . $MIW_{i,t-j}$ ($MIL_{i,t-j}$) are dummy variables that equal 1 if stock i is a winner (loser) in month $t-j$ according to one of my two measures applied and zero otherwise. My first control variable is a stock's previous month's market capitalization $\text{size}_{i,t-1}$, as small stocks tend to outperform large stocks. Furthermore I include the previous month's return $R_{i,t-1}$ that captures the effect of a possible bid-ask bounce (Conrad and Kaul (1993)). And I consider the 52-week high momentum measures $52wkW_{i,t-j}$ and $52wkL_{i,t-j}$ to control for any short-term momentum effects.⁹⁷

Third, for every calendar month t the average return over the entire holding period of 60 months can be expressed as the equal-weighted average return of the individual coefficients for winner stocks $S_{5t} = \frac{1}{60} \sum_{j=1}^{60} b_{5jt}$ and loser stocks $S_{6t} = \frac{1}{60} \sum_{j=1}^{60} b_{6jt}$ estimated from 60 separate cross-sectional regressions for each month $j = 1, \dots, 60$. The coefficient estimates of each independent variable can be averaged either over the entire 60 months holding period or over different subintervals $j = 1, \dots, 12$; $j = 13, \dots, 24$; $j = 25, \dots, 36$; $j = 37, \dots, 48$; $j = 49, \dots, 60$ to capture the effect of a slowly diminishing reversal.

The time series means of the averaged estimates S_{5t} and S_{6t} and the accompanying t-statistics calculated from the time series are reported in the tables.⁹⁸ The coefficients and estimates of the other variables can be interpreted correspondingly.

⁹⁶ The earliest month in my dataset is January 1960. As I need a ranking period of 5 years to categorize a stock as winner or loser for every month, January 1965 is the first month for which I can identify winner and loser stocks.

⁹⁷ The 52-week high momentum measure is defined in George and Hwang (2004).

⁹⁸ Time series means are based on the period between February 1965 and December 2012.

6.3.2 Results

I begin with the results for the traditional measure in Table 6-1. All results are reported in percent per month over five subintervals and the entire 5-year holding period. Following Grinblatt and Moskowitz (2004) and George and Hwang (2007) I report results including and excluding January. My estimations confirm previous findings in showing strong empirical evidence of long-term stock return reversal. The 5-years winners in column 11 show a significant reversal of 0.14 %. The aggregated performance of a contrarian investment strategy measured as the return to loser portfolios minus winner portfolios is roughly 0.529 % per month over the 60 months period. This figure almost exactly matches the 31.9 % for a five year period reported by DeBondt and Thaler (1987). The effect is slightly less than the estimated 0.56 % by George and Hwang (2007) but more than a return of 0.29 % per month measured by Jegadeesh and Titman (2001). Across the different subintervals winner reversal can be observed beginning in the first period. The magnitude of winner reversal is constantly decreasing starting in the second period with 0.204 % down to an insignificant 0.096 % in the fifth period.

I also report a significant reversal in loser stocks for the individual subperiods as well as for the entire holding period. I estimate an average monthly loser reversal of the 5-year horizon of 0.387 % (column 11). These findings correspond to estimates by DeBondt and Thaler (1985, 1987) and confirm my interpretation of RM as a measure that captures an overall reversal effect for both winner portfolios and loser portfolios. Comparable to the results in George and Hwang (2007) loser returns outside January are less pronounced than those including all calendar months even though positive loser returns are statistically significant in both settings.

The decline in magnitude of loser reversals outside January can point to individual investors selling shares with accrued capital losses at year-end. Realized losses can be used to offset realized capital gains or other non-gain income.⁹⁹ As taxes are calculated on a calendar year basis, realizing capital losses before year-end accelerates tax benefits by one year. As a consequence, prices decline at the turn of the year under the selling pressure followed by an abnormal rise in share prices after the turn of the year (Dyl (1977); Poterba and Weisbenner (2001); Grinblatt and Keloharju (2004); Grinblatt and Moskowitz (2004)).

⁹⁹ The loss offset of capital losses with other non-gain income is usually limited in amount.

Table 6-1: Stock Return Reversal based on the Traditional Reversal Measure

	(1) Monthly Return (1;12)	(2) Monthly Return (1;12) Excluding January	(3) Monthly Return (13;24)	(4) Monthly Return (13;24) Excluding January	(5) Monthly Return (25;36)	(6) Monthly Return (25;36) Excluding January	(7) Monthly Return (37;48)	(8) Monthly Return (37;48) Excluding January	(9) Monthly Return (49;60)	(10) Monthly Return (49;60) Excluding January	(11) Monthly Return (1;60)	(12) Monthly Return (1;60) Excluding January
Intercept	1.034 (6.184)	0.7799 (3.7244)	1.001 (5.958)	0.7446 (3.5563)	1.037 (6.207)	0.7427 (3.5602)	1.059 (6.340)	0.7356 (3.5412)	1.084 (6.536)	0.7367 (3.5442)	1.032 (6.160)	0.7450 (3.5767)
R	-5.987 (-17.88)	-4.7374 (-13.15)	-5.962 (-17.38)	-4.6523 (-12.58)	-5.934 (-17.08)	-4.4982 (-11.81)	-5.861 (-16.82)	-4.4418 (-11.55)	-5.731 (-16.28)	-4.4085 (-11.10)	-5.883 (-17.05)	-4.5304 (-12.06)
Size	-0.008 (-0.427)	0.0606 (2.7100)	0.000 (0.015)	0.0724 (3.1411)	-0.008 (-0.410)	0.0668 (2.8315)	-0.015 (-0.743)	0.0593 (2.5162)	-0.020 (-1.004)	0.0531 (2.2586)	-0.011 (-0.564)	0.0626 (2.7165)
Moment-W	0.004 (0.148)	0.0253 (0.7849)	-0.060 (-3.442)	-0.0255 (-1.3985)	-0.013 (-0.880)	0.0083 (0.4397)	-0.037 (-2.661)	-0.0423 (-2.3855)	-0.040 (-2.947)	-0.0478 (-3.0487)	-0.030 (-3.178)	-0.0202 (-1.8419)
Moment-L	-0.037 (-0.351)	-0.4792 (-3.6991)	0.295 (3.354)	0.0071 (0.0647)	0.229 (2.853)	0.0164 (0.1603)	0.201 (2.460)	0.0592 (0.5803)	0.245 (3.353)	0.1349 (1.4586)	0.224 (3.159)	-0.0135 (-0.1560)
Return-W	-0.147 (-1.917)	-0.2049 (-2.0137)	-0.204 (-2.996)	-0.2585 (-2.9191)	-0.149 (-2.345)	-0.2159 (-2.5696)	-0.099 (-1.585)	-0.1146 (-1.4185)	-0.096 (-1.574)	-0.1126 (-1.4712)	-0.142 (-2.448)	-0.1792 (-2.3571)
Return-L	0.666 (6.593)	0.4195 (3.4964)	0.540 (6.401)	0.3830 (3.5826)	0.344 (4.810)	0.2275 (2.4871)	0.277 (4.086)	0.1932 (2.2479)	0.222 (3.486)	0.1567 (1.9388)	0.387 (6.206)	0.2629 (3.4196)

For each month 60 ($j=1,2,\dots,60$) cross-sectional regressions of the form $R_{it} = b_{0,jt} + b_{1,jt}R_{i,t-1} + b_{2,jt}\text{size}_{i,t-1} + b_{3,jt}52\text{wk}W_{i,t-j} + b_{4,jt}52\text{wk}L_{i,t-j} + b_{5,jt}M1W_{i,t-j} + b_{6,jt}M1L_{i,t-j} + \epsilon_{ijt}$ are estimated. R_{it} is the raw return to stock i in month t . $R_{i,t-1}$ and $\text{size}_{i,t-1}$ are the return and natural logarithm of market capitalization of stock i in month $t-1$ net of the month $t-1$ cross sectional mean. $52\text{wk}W_{i,t-j}$ ($52\text{wk}L_{i,t-j}$) is the 52-week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 10 % in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 1,2,\dots,12$ in columns labelled (1,12), $j = 13,14,\dots,24$ for columns labelled (13;24) and so forth. The numbers reported in the tables are the time-series averages of these averages in percent per month. The accompanying t -statistics are in parentheses and calculated from the time series.

My findings that loser reversals have higher returns including January are consistent with results by Grinblatt and Moskowitz (2004) and DeBondt and Thaler (1987) who attribute excess January returns to tax-loss selling behavior. However, the fact that my estimates show significant loser reversals across all periods (with and without January) indicates that return reversal is not exclusively driven by rational tax incentives.

Overall, my results confirm the existence of return reversals for winner stocks as well as loser stocks. To test if taxes can really be viewed as contributory factor to long-term return reversal I apply my CGTB measure to rank stocks into winner and loser portfolios. According to the lock-in hypothesis I would expect winner return reversal as predicted by Klein (1999) but no loser reversal except for a positive turn-off the year effect.

Table 6-2 reports results for winner and loser reversal based on the CGTB measure. The return to a zero investment portfolio over the 5-year period including January is 0.301 % (column 11) which is less than the overall return measured by RM. This confirms that the CGTB measure only capture a fraction of the total amount of return reversal. It reflects the portion of negative autocorrelation that is associated with capital gains taxes and implies that the CGTB measure is less effective at measuring other sources of stock return reversal.

Decomposing winner reversal into the different subperiods of the investment horizon reveals that the reversal effect slowly wears off as time goes on. I find significant negative returns to winners over the first three periods and insignificant returns for the intervals four and five (columns 7 and 9). This downward trend is in line with Klein's (1999) description of a slowly dissipating reversal over time.

With respect to loser stocks, in column 11, I find a clearly significant positive return for the overall period on loser stocks. Most notably, as I exclude January from my analysis (column 12) I do not detect a significant loser reversal anymore which corresponds to a tax related explanation of long-term return reversals. The lock-in hypothesis does not predict prices of loser stocks to rebound to their equilibrium price due to capital gains tax. The observed loser reversal in column 11 is attributed to tax-loss selling pressure that reverses in January. For the other investment periods I do not find any significant loser reversals when January is excluded with the exception of period 5 (column 10).

Table 6-2: Stock Return Reversal based on the Capital Gains Tax Burden Measure

	(1) Monthly Return (1;12)	(2) Monthly Return (1;12) Excluding January	(3) Monthly Return (13;24)	(4) Monthly Return (13;24) Excluding January	(5) Monthly Return (25;36)	(6) Monthly Return (25;36) Excluding January	(7) Monthly Return (37;48)	(8) Monthly Return (37;48) Excluding January	(9) Monthly Return (49;60)	(10) Monthly Return (49;60) Excluding January	(11) Monthly Return (1;60)	(12) Monthly Return (1;60) Excluding January
Intercept	1.1635 (5.1717)	0.8227 (4.7790)	1.1327 (5.0379)	0.7803 (4.5291)	1.1275 (5.0230)	0.7641 (4.4544)	1.1075 (4.9710)	0.7481 (4.3978)	1.0966 (4.9306)	0.7367 (4.3234)	1.1206 (5.0135)	0.7656 (4.4771)
R	-5.6297 (-14.07)	-4.6628 (-16.10)	-5.6573 (-13.72)	-4.6225 (-15.42)	-5.5628 (-13.04)	-4.4869 (-14.50)	-5.4947 (-12.83)	-4.4325 (-14.13)	-5.4345 (-12.45)	-4.4064 (-13.62)	-5.5460 (-13.23)	-4.5094 (-14.79)
Size	-0.0431 (-1.534)	0.0479 (2.4914)	-0.0326 (-1.155)	0.0640 (3.2948)	-0.0373 (-1.306)	0.0616 (3.1471)	-0.0396 (-1.396)	0.0569 (2.9109)	-0.0431 (-1.540)	0.0518 (2.6667)	-0.0386 (-1.376)	0.0572 (2.9693)
Moment-W	-0.0156 (-0.487)	0.0208 (0.8249)	-0.0559 (-2.675)	-0.0250 (-1.7176)	-0.0084 (-0.425)	0.0170 (1.1112)	-0.0455 (-2.470)	-0.0346 (-2.3659)	-0.0538 (-3.247)	-0.0465 (-3.6161)	-0.0385 (-3.217)	-0.0168 (-1.8612)
Moment-L	0.2497 (1.5235)	-0.3151 (-2.6575)	0.4386 (3.2163)	0.0909 (0.9021)	0.2727 (2.2673)	0.0413 (0.4545)	0.2664 (2.1815)	0.0774 (0.8575)	0.3023 (2.8321)	0.1437 (1.7802)	0.3134 (2.8452)	0.0370 (0.4562)
Return-W	-0.2777 (-2.388)	-0.1922 (-2.0798)	-0.3360 (-3.385)	-0.3346 (-4.2233)	-0.2320 (-2.549)	-0.2880 (-3.9548)	-0.0702 (-0.795)	-0.1541 (-2.2352)	0.0063 (0.0696)	-0.0793 (-1.1476)	-0.1693 (-2.046)	-0.2112 (-3.2177)
Return-L	0.0202 (0.2585)	-0.1770 (0.9328)	0.2206 (3.1606)	0.0465 (0.9747)	0.1420 (2.2888)	0.0475 (0.9747)	0.1018 (1.6701)	0.0674 (1.3794)	0.1087 (1.8254)	0.1261 (2.7043)	0.1317 (2.8336)	0.0402 (1.1347)

For each month 60 ($j=1,2,\dots,60$) cross-sectional regressions of the form $R_{it} = b_{0,jt} + b_{1,jt}R_{i,t-1} + b_{2,jt}\text{size}_{i,t-1} + b_{3,jt}52\text{wk}W_{i,t-j} + b_{4,jt}52\text{wk}L_{i,t-j} + b_{5,jt}M1W_{i,t-j} + b_{6,jt}M1L_{i,t-j} + \epsilon_{ijt}$ are estimated. R_{it} is the raw return to stock i in month t . $R_{i,t-1}$ and $\text{size}_{i,t-1}$ are the return and natural logarithm of market capitalization of stock i in month $t-1$ net of the month $t-1$ cross sectional mean. $52\text{wk}W_{i,t-j}$ ($52\text{wk}L_{i,t-j}$) is the 52-week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 10 % in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 1,2,\dots,12$ in columns labelled (1,12), $j = 13,14,\dots,24$ for columns labelled (13;24) and so forth. The numbers reported in the tables are the time-series averages of these averages in percent per month. The accompanying t -statistics are in parentheses and calculated from the time series.

As another finding, including January over the entire 5-year period leads to reduced negative return reversals for winner stocks. This implies that tax-loss selling also puts positive price pressure on winner stocks in January. Ritter (1988) describes with his “parking-the-proceeds hypothesis” how funds from year-end tax loss selling are reinvested. Individuals do not immediately reinvest their proceeds from the sales but rather “park” those until January. According to Ritter (1988) funds are most intensively reinvested in small stocks that are characterized by a greater degree of volatility and are therefore more likely to become winner or loser stocks.¹⁰⁰ Consequently, upward price pressure should be especially pronounced for the top or bottom 10 % of my stocks which is line with my results.

Next, I test if significant reversals in returns are not only bound to raw returns but can also be found for risk-adjusted returns. Fama and French (1993, 1996) and Zhang (2005) argue that contrarian excess returns are the consequence of rational value investment strategies that bear higher fundamental risk than conventional glamour strategies.

In order to obtain risk-adjusted returns I run time-series regressions of the averages (e.g. S_{5t} or S_{6t}) from the cross-sectional regressions on the contemporaneous Fama-French (1993) factors (one regression for each average). Risk-adjusted returns are the intercepts from these time-series regressions.

The estimates in Table 6-3 confirm my previous results. I find a slowly dissipating winner reversal across the different subintervals with significant negative returns. Over the entire 5-year holding period winner reversal is significant at the one percent level with the exclusion of January leading to a slightly more negative coefficient.

Whereas, significant loser reversals are almost completely absent when applying risk-adjusted returns. An overall effect in column 11 can be found which again seems to be mainly driven by turn of the year tax loss selling, since the corresponding results without January (column 12) do not show significant loser return reversal. I can conclude that as far as greater systematic risk affects excess returns of contrarian investment strategies it does not completely subsume the effect of capital gains taxation.

¹⁰⁰ In contrast to individual investors, Gompers and Metrick (2001) document that institutional investors prefer „larger, more liquid stocks“ considering the period 1980 to 1996 in their study. Bennett, Sias and Starks (2003) also find that portfolios of institutional investors tend to be overweight in large-capitalization stocks.

Table 6-3: Risk-adjusted Stock Return Reversal

	(1) Monthly Return (1;12)	(2) Monthly Return (1;12) Excluding January	(3) Monthly Return (13;24)	(4) Monthly Return (13;24) Excluding January	(5) Monthly Return (25;36)	(6) Monthly Return (25;36) Excluding January	(7) Monthly Return (37;48)	(8) Monthly Return (37;48) Excluding January	(9) Monthly Return (49;60)	(10) Monthly Return (49;60) Excluding January	(11) Monthly Return (1;60)	(12) Monthly Return (1;60) Excluding January
Return-W	-0.1445 (-1.958)	-0.1370 (-1.8506)	-0.3049 (-4.6218)	-0.3226 (-4.7336)	-0.2552 (-3.9371)	-0.3036 (-4.5394)	-0.1104 (-1.7604)	-0.1747 (-2.8352)	-0.0379 (-0.5837)	-0.0873 (-1.3606)	-0.1729 (-3.6722)	-0.2112 (-4.5234)
Return-L	-0.0537 (-0.706)	-0.2140 (-3.0602)	0.1364 (2.0420)	0.0029 (0.0476)	0.0758 (1.2941)	0.0051 (0.0852)	0.0647 (1.0906)	0.0250 (0.4139)	0.0932 (1.4939)	0.0999 (1.6598)	0.0739 (1.7168)	0.0017 (0.0418)

For each month 60 ($j=1,2,\dots,60$) cross sectional regressions of the form $R_{it} = b_{0,jt} + b_{1,jt}R_{i,t-1} + b_{2,jt}\text{size}_{i,t-1} + b_{3,jt}52\text{wk}W_{i,t-j} + b_{4,jt}52\text{wk}L_{i,t-j} + b_{5,jt}M1W_{i,t-j} + b_{6,jt}M1L_{i,t-j} + \varepsilon_{ijt}$ are estimated. R_{it} is the raw return to stock i in month t . $R_{i,t-1}$ and $\text{size}_{i,t-1}$ are the return and natural logarithm of market capitalization of stock i in month $t-1$ net of the month $t-1$ cross sectional mean. $52\text{wk}W_{i,t-j}$ ($52\text{wk}L_{i,t-j}$) is the 52-week high winner (loser) dummy that takes the value of one if the 52-week high measure for stock i is ranked in the top (bottom) 10 % in month $t-j$, and zero otherwise. The 52-week high measure in month $t-j$ is the ratio of the price level in month $t-j$ to the maximum price achieved in months $t-j-12$ to $t-j$. The coefficient estimates of a given independent variable are averaged over $j = 1,2,\dots,12$ in columns labelled (1,12), $j = 13,14,\dots,24$ for columns labelled (13;24) and so on. To obtain risk-adjusted returns, I further run time-series regressions of these averages on the Fama-French three factor model $R_i = a_i + b_i(R_m - R_f) + s_i\text{SMB} + h_i\text{HML} + e_i$. SMB and HML are size and value factors respectively according to Fama and French (1993). The numbers reported for risk-adjusted returns are the intercepts a_i from these time-series regressions. They are in percent per month and their t-statistics are in parentheses. Coefficients on control variables are omitted for brevity.

In sum, all my results suggest that long-term return reversal is a present phenomenon in the U.S. stock market for both winner and loser stocks. Furthermore, capital gains taxes appear to contribute to this anomaly as they burden accrued capital gains with additional costs and set incentives to sell stocks with accrued capital losses at the end of the tax year.

So far, differences between my reversal measures and different estimates for winner and loser stocks can be viewed as indirect evidence for the effect of capital gains taxes on the reversal of stock returns. The tests in the following section intend to more directly identify the role of capital gains taxes. I examine how stock return reversal can be attributed to capital gains taxes in a global context while exploring the variation in tax rates across multiple international tax reforms and controlling for other potential explanatory factors.

6.4 Capital Gains Taxes and Long-term Return Reversal around the World

6.4.1 Return Reversal from Pole to Pole

In this section I seek to show that a reliable link between capital gains taxes and stock return reversal exists and that this association persists not only for a limited U.S. sample but also in a global setting. An international testing strategy enables me to take advantage of the diverse composition of international equity markets, different regional trading behaviors, multiple tax regimes and other time-varying characteristics. I show that mean-reverting stock returns are a global phenomenon and not only the consequence of possibly biased estimates of heavily explored U.S. data. In this respect, Conrad, Cooper and Kaul (2003) explicitly attribute significant returns to contrarian investment strategies with U.S. stocks to extensive data snooping of U.S. stock market data. To overcome such claims, especially Jegadeesh and Titman (2001) point out the importance of “out of sample” testing of contrarian profits in order to verify the robustness of previous studies since the U.S. stock market may not be universal.

Empirical evidence of long-term return reversal has been found in equity markets throughout the world in many developed and developing countries. As shown in studies by Dissanaik (1999), Schiereck, DeBondt and Weber (1999), Nam, Pyun and Kim (2003), Wongchotti and Pyun (2005), MacInish, Ding, Pyun and Wongchoti (2008) and Wu and Li (2011) long-term return reversal is persistent and economically relevant in many European and Asian markets. Given the available international evidence of profitable contrarian investment strategies, data mining seems to be an unlikely explanation. However, despite the broad range of comprehen-

sive studies examining the various competing explanations there has been no cross-country analysis testing the relevance of the capital gains tax lock-in hypothesis.

I use my previous U.S. dataset from the CRSP database and merge this data with stock market data for 34 international equity markets from Datastream. The combined dataset covers monthly security prices, returns and market values of all listed common stocks in the 34 OECD countries and Hong Kong for the years 1973 to 2012.¹⁰¹ Cross-listed stocks are eliminated from the dataset and only the major stock type is kept in case an equity security has more than one type of stocks issued. The datasets contains active as well as inactive companies.

I combine the stock market data with a comprehensive dataset of international capital gains tax rates. I focus on capital gains tax rates of individual shareholders. In accordance with the assumptions from the previous chapter I use the tax rates that apply to individuals for taxable cash deals. In addition, I only use taxes that apply to listed shares and to non-substantial shareholdings.¹⁰² I distinguish between long-term and short-term tax rates. All in all my data covers 151 major and minor tax reforms over a time span of up to 50 years.

To mitigate potential issues regarding the quality of the stock market data from Datastream I screen out numerous observations. The entire clean-up procedure follows Ince and Porter (2006), Griffin, Kelly and Nardari (2010) and Schmidt, von Arx, Schrimpf, Wagner and Ziegler (2011). The major clearing steps include eliminating price dummy records for delisted stocks, screening company names for suspicious words that might indicate non-equity securities and comparing Thomson Reuters' market values with self-computed market capitalizations. My final dataset contains only 30 OECD countries and Hong Kong. I exclude Estonia, Iceland, Luxembourg and Slovenia from my sample since their remaining stock market data is not sufficient to calculate meaningful reversal measures.

Table 6-4 lists the countries included along with the individual time periods covered after the clearing procedure. Table 6-4 also reports total market values of all stocks and the number of firms at the beginning and end of my sampling periods. My final dataset for the year 2012 contains 22,853 companies that represent a market value of 32,672,686 million U.S. Dollar.

¹⁰¹ U.S. data ranges from 1960 to 2012.

¹⁰² In some countries the applicable tax rate depends on the size of the shareholding and if a stock is traded at an official stock exchange. My assumptions seem to be reasonable since I only have data on listed stocks and focus on individuals whose shareholdings tend to be relatively small.

Table 6-4: Country Overview

Country	Period	Beginning		End	
		Number of firms	Market capitalization	Number of firms	Market capitalization
Australia	1973 - 2012	3	214	1,959	1,038,712
Austria	1980 - 2012	2	304	63	84,933
Belgium	1973 - 2012	2	367	98	216,108
Canada	1973 - 2012	56	56,522	5,062	1,580,692
Chile	1989 - 2012	48	5,748	65	228,254
Czech Republic	1993 - 2012	28	5,139	67	377,461
Denmark	1974 - 2012	1	155	113	176,327
Finland	1987 - 2012	2	4,594	72	138,522
France	1973 - 2012	2	1,597	1,399	1,455,404
Germany	1973 - 2012	1	269	993	1,177,044
Greece	1988 - 2012	36	2,016	170	29,432
Hong Kong	1973 - 2012	22	35,584	701	1,368,820
Hungary	1996 - 2012	5	1,475	75	30,577
Ireland	1973 - 2012	1	78	33	65,272
Israel	1986 - 2012	49	175	348	61,352
Italy	1973 - 2012	4	1,415	186	459,691
Japan	1973 - 2012	16	5,160	2,204	3,289,382
Korea	1980 - 2012	3	445	600	763,184
Mexico	1987 - 2012	1	24	86	372,380
Netherlands	1973 - 2012	3	106	66	376,362
New Zealand	1986 - 2012	4	4,628	97	35,429
Norway	1973 - 2012	2	620	255	237,540
Poland	1991 - 2012	4	168	306	111,723
Portugal	1988 - 2012	27	11,519	52	59,286
Slovak Republic	1996 - 2012	2	1,228	105	27,062
Spain	1986 - 2012	6	5,436	99	545,694
Sweden	1982 - 2012	23	35,045	545	439,561
Switzerland	1973 - 2012	2	143	132	1,061,976
Turkey	1988 - 2012	23	9,811	168	163,613
United Kingdom	1973 - 2012	40	66,841	3,173	2,792,843
United States	1960 - 2012	1,565	4,779,525	3,561	13,908,050
SUM		1,983	5,036,351	22,853	32,672,686

The data consists of individual stocks of 31 developed countries around the world. U.S. data is obtained from the CRSP database. Data on the remaining countries is collected from Datastream. I only include common equity stocks and major stock types. Cross-listed stocks are excluded from my dataset. Market capitalization is displayed in millions of U.S. Dollar.

I use the traditional reversal measure (RM) from the previous chapter to calculate estimates of long-term return reversal for winner and loser stocks. The estimates of the RM variables from the cross-sectional regressions are averaged over the entire 5-year holding period to capture an overall reversal effect. Since I need a reasonable number of stocks per year and country to form winner and loser portfolios I only keep those country-year observations with a minimum of 20 stocks.

Table 6-5 displays reversal estimates based on raw returns and on risk-adjusted returns after hedging out the Fama-French (1993) factor exposures. In general, throughout my entire sample I find ample empirical evidence of both winner reversal and loser reversal. The magnitude of the aggregate effect ranges from 1.3 % per month in Greece to an insignificant 0.28 % per month in Finland for raw return winner reversal. Loser reversal is especially pronounced in the Slovak Republic with 2.76 %. Countries such as Ireland or Italy show no significant loser reversal. Results for my risk-adjusted estimates confirm the economic and statistical significance for most of the countries. In comparison to previous international studies my results seem to reconcile most of the earlier findings.

Antoniou, Galariotis and Spyrou (2005) show that negative serial correlation is present in Athens stock exchange securities for both raw returns and risk-adjusted returns. I also find consistently significant return reversal for my Greece subsample.

Schiereck, DeBondt and Weber (1999) find excess returns of contrarian investment strategies for portfolios of the major German companies listed on the Frankfurt stock exchange between 1961 and 1991. Their results document an especially pronounced return to loser portfolios compared to winners over the entire sample period. They show that risk or firm-specific factors do not easily account for their findings and suggest psychological reasons based on investors' overreaction. My findings generally confirm the existence of winner and loser return reversal in the German stock market even though I do not detect a disproportionately high positive return on loser stocks.

In their study of overreaction and return reversal for the G-7 countries Baytas and Cakici (1999) find significant negative winner reversal for all members except the U.K.

Table 6-5: International Long-term Return Reversal

Country	Winner Reversal	Risk-adjusted Winner Reversal	Loser Reversal	Risk-adjusted Loser Reversal
Australia	-0.82 (-3.66259)	-0.89 (-3.3049)	6.22 (1.3325)	1.98 (10.613)
Austria	-0.54 (-3.5135)	-0.74 (-3.2816)	0.64 (5.5211)	0.68 (4.2224)
Belgium	-0.57 (-5.2198)	-0.85 (-4.754)	0.48 (4.4118)	0.57 (5.9773)
Canada	-1.08 (-7.3118)	-0.78 (-4.0619)	1.58 (15.539)	1.76 (13.057)
Chile	-0.85 (-5.9853)	-0.84 (-4.429)	1.4 (6.3229)	1.31 (4.4266)
Czech Republic	-0.94 (-4.0591)	-0.102 (-2.9848)	0.61 (3.7273)	0.59 (2.3167)
Denmark	-0.42 (-2.8073)	-0.71 (-3.3412)	0.41 (2.1762)	0.76 (3.02)
Finland	-0.28 (-0.8812)	-0.23 (-0.5299)	0.91 (6.2013)	0.84 (4.72)
France	-0.69 (-5.3158)	-0.78 (-6.172)	1.28 (9.1329)	1.37 (8.39)
Germany	-0.95 (-6.676)	-1.4 (-7.5046)	0.8 (6.206)	1.03 (11.216)
Greece	-1.3 (-6.41379)	-1.13 (-5.476)	1.41 (6.973)	1.37 (5.0241)
Hong Kong	-1.1 (-6.9256)	-1.12 (-5.3493)	1.22 (6.6316)	1.33 (8.4037)
Hungary	-0.49 (-5.7111)	-0.5 (-3.5132)	-0.94 (-1.147)	-0.91 (-0.713)
Ireland	-0.38 (-1.8686)	-0.59 (-2.0414)	0.45 (0.6818)	0.0128 (4.3277)
Israel	-0.81 (-3.7266)	-0.89 (-4.2021)	1.13 (7.6482)	1.07 (6.496)
Italy	-0.48 (-3.4598)	-0.77 (-3.6808)	-0.01 (-0.5291)	0.86 (5.3249)
Japan	-0.45 (-6.4214)	-0.55 (-7.2235)	1.03 (3.7173)	0.68 (8.4229)
Korea	-0.48 (-6.3533)	-0.66 (-5.5935)	1.04 (10.332)	1.36 (10.104)
Mexico	-1.05 (-4.9234)	-1.16 (-4.0472)	0.97 (6.4163)	0.74 (4.3099)
Netherlands	-0.49 (-3.1607)	-0.73 (-3.1825)	0.66 (2.7203)	0.71 (4.2833)

Table 6-5 - continued

Country	Winner Reversal	Risk-adjusted Winner Reversal	Loser Reversal	Risk-adjusted Loser Reversal
New Zealand	-0.37 (-1.2007)	-0.65 (-1.5711)	1.03 (5.9132)	1.12 (5.0732)
Norway	-0.56 (-3.6156)	-0.63 (-3.9943)	1.18 (8.8281)	1.23 (7.4905)
Poland	-1.05 (-6.4202)	-1.15 (-4.921)	1.05 (3.0258)	0.85 (1.9347)
Portugal	-0.29 (-1.1319)	-0.22 (-0.7126)	0.97 (3.9441)	1 (2.7587)
Slovak Republic	-0.42 (-1.1715)	-0.71 (-0.8325)	2.76 (3.9363)	2.49 (2.1961)
Spain	-0.58 (-3.8381)	-0.6 (-3.1853)	0.67 (8.0701)	0.64 (6.04779)
Sweden	-0.91 (-4.85)	-0.88 (-3.7165)	0.86 (8.0493)	0.99 (7.8923)
Switzerland	-0.56 (-3.8102)	-0.98 (-4.0235)	0.73 (2.2501)	0.91 (6.6012)
Turkey	-0.88 (-2.6921)	-0.87 (-2.034)	2.17 (6.2766)	1.44 (4.2484)
United Kingdom	-1.07 (-5.2576)	-0.92 (-6.4453)	1.42 (9.0426)	1.03 (12.1591)
United States	-0.142 (-2.448)	-0.1803 (-4.6548)	0.387 (6.206)	0.2833 (4.7374)

The coefficient estimates of the RM-winner and RM-loser measures are averaged over $j = 1, 2, \dots, 60$ periods. The numbers reported in the tables are the time-series averages of these averages in percent per month. The accompanying t-statistics are in parentheses and calculated from the time series. Risk-adjusted returns are obtained from time-series regressions of these averages on the Fama-French (1993) three factor model. The numbers reported for risk-adjusted returns are the intercepts from these time-series regressions. They are in percent per month and their t-statistics are in parentheses.

Significant loser reversal is only identified for Japan, Germany and the U.K. In contrast to their results, I report significant winner and loser return reversal of comparable magnitudes in all seven countries.

There is a wide range of studies that examine profits to contrarian investment strategies in Asian-Pacific stock markets. Most if these studies confirm the existence of serially correlated returns over shorter horizons. Nam, Pyun and Kim (2003) find for nine Asian stock markets (including Australia, Hong Kong, Japan and Korea) significant reverting stock return patterns and show that it takes longer for positive returns to revert than for negative returns. They interpret their results as the consequence of irrational mispricing behavior of investors.

MacInish, Ding, Pyun and Wongchoti (2008) find evidence of short-term winner reversal in Hong Kong, Japan and Korea among others. However, following a contrarian investment

strategy proves to be profitable only in Japan. Chou, Wei and Chung (2007) show that over varying ranking and holding horizons significant long-term contrarian profits persist in the Japanese stock market. Their results are robust to partitioning the sample period into bull- and bear market subperiods and to controlling for risk. In particular, reversal of loser portfolios creates monthly returns of about 1 % for almost all cases which exactly matches my estimates. Although I focus on longer holding periods my results are generally in line with the previous literature. The estimates suggest significant long-term winner reversal for Australia, Hong Kong, Korea and Japan. Significant positive returns on loser portfolios can be found for equity markets in Hong Kong, Japan, Korea and New Zealand.¹⁰³

Outside the U.S. equity market long-term stock return reversal has been most intensively analyzed for the U.K. stock market. Clare and Thomas (1995) find long-term return reversal for a sample of U.K. stocks from 1955 to 1990 which they attribute to the overreaction hypothesis. Dissanaike (1999) identifies reversal while controlling for different measures of time-varying betas. Galariotis, Holmes and Ma (2007) also provide evidence of profitable contrarian investment strategies but show that excess returns can be fully explained by the Fama-French (1993) three factor model. Most recently, Wu and Li (2011) test competing explanations for return reversal and conclude that firm-factors as used by Fama-French (1993, 1996) are superior to the overreaction hypothesis or the lock-in hypothesis in predicting return reversal in U.K. stocks. All studies identify clear evidence of stock return reversal which is further confirmed by my estimates. Winner reversals as well as loser reversals are highly significant at the one percent level for raw returns and risk-adjusted returns.

In sum, my numbers underline the existence of long-term return reversal as a financial market phenomenon that can be found in the U.S. stock market and in many other international equity markets. My estimates serve as an initial glance at the magnitude and frequency of international return reversals without drawing further inferences. Since I also detect significant return reversal in countries that do not levy taxes on capital gains (e.g. Hong Kong, Switzerland, the Netherlands) I conduct a series of subsequent tests controlling for other explanatory variables to shed further light on a possible link between capital gains taxes and long-term return reversal.

¹⁰³ Further empirical evidence can be found in Gaunt (2000) for the Australian stock market and in Bowman and Iverson (1998) for the New Zealand stock market.

6.4.2 Capital Gains Taxes as a Driver of Long-term Return Reversal

If long-term winner portfolios around the world earn negative expected returns due to regional investment behavior, time-varying risk factors or capital gains taxation then country-specific capital gains tax rates and country-specific control variables should do well in capturing variation in return reversal. To investigate the relation between capital gains taxes and winner reversal I estimate the following panel regression with fixed effects:

$$WR_{ct} = \beta_0 + \beta_1 ATR_{ct}^{\text{short}} + \beta_2 ATR_{ct}^{\text{long}} + A_{cy}\gamma_1 + M_{ct}\gamma_2 + Y_y\gamma_3 + v_c + \varepsilon_{ct}$$

where the subscript c and t stand for country and month respectively. WR_{ct} is the equal-weighted 5-year average return of the individual coefficients for winner stocks in country c in month t .¹⁰⁴ ATR_{ct}^{short} stands for the 5-year average short-term capital gains tax rate based on month $t-1$ to $t-60$. While ATR_{ct}^{long} represents the 5-year average long-term capital gains tax rate over the same time period.¹⁰⁵ Both moving averages intend to capture a causal relationship between an initially tax-driven inflation of stock prices and subsequently measured return reversals over the entire holding period.¹⁰⁶ $A_{cy}\gamma_1$ and $M_{ct}\gamma_2$ are vectors of control variables that vary annually and monthly, respectively.¹⁰⁷ Y_y is a full set of time-fixed dummies to filter out year-specific effects. v_c is the unknown intercept for each entity and ε_{ct} is the error term. My control variables follow rational risk-based pricing models and psychological-based behavioral theories on security pricing. I expect time-series differences in the average values of these variables to explain differences in winner returns across countries.

In terms of rational explanations of return reversal Fama and French (1993, 1995, 1996) argue that reverting stock returns are consistent with time-varying economic risk premiums. Investors in value stocks that are characterized by low prices relative to a measure of intrinsic value tend to bear higher risks. Higher future returns are simply compensation for this increased risk

¹⁰⁴ WR_{ct} is equivalent to $S_{5t} = \frac{1}{60} \sum_{j=1}^{60} b_{5jt}$ for country c in month t when the RM-measure is applied.

¹⁰⁵ The time period on which the average capital gains tax rates are based on corresponds to the holding period for the average return.

¹⁰⁶ Grandfathering rules that maintain a former tax status of shares being acquired under an old tax regime could lead to spurious results because the applicable tax rates do not correspond to the average return reversal during the estimation period. I exclude all observations after tax reforms preserving the former tax status.

¹⁰⁷ Chui, Titman and Wei (2010) apply a similar approach in a cross-sectional setting.

position. In contrast, investors in high-growth glamour stocks tend to receive lower expected returns. I include the ratio of book value to market value (*BM*) as a control variable for risk-induced excess returns to value versus growth investment strategies. Return volatility (*RV*) as another measure of risk that is also associated with reversal profits (Fama and French (1988), Haugen, Talmor and Tourous (1991) and Ball, Kothari and Shanken (1995) among others) is considered as well.

A different strand of literature models long-term return reversal as the consequence of cognitive biases and the interaction between investors that lead to underreaction and overreaction in stock prices (Daniel, Hirshleifer and Subrahmanyam (1998), Barberis, Shleifer and Vishny (1998) and Hong and Stein (1999)).¹⁰⁸ From a behavioral viewpoint all theories center around the question how the markets absorb new information. The development and the integrity of a stock market essentially determine the flow of information and how easily information can be processed by investors. I follow Stulz and Williamson (2003) by using total private credit to GDP (*Credit*) as a measure of financial market development. To measure market integrity I include the Freedom from Corruption Index (*Corr*) and the Property Rights Index (*PR*) both published by the Heritage Foundation.

I also consider firm size (*SZ*) as it seems reasonable that the diffusion of firm-specific information increases in firm size (Hong, Lim and Stein (2000)). In addition I include GDP per Capital (*GDP*) and GDP Growth (*GDPG*) as further controls that generally characterize the condition of an economy and its stock market.¹⁰⁹

The fixed effects approach at the country-level enables me to consider time-varying country-characteristics and to simultaneously control for all time-invariant differences between the various countries. Those differences would include institutional settings and trading practices that are associated with potential measurement problems or data issues leading to falsely interpreted return reversals (Lo and MacKinley (1990), Conrad and Kaul (1993), Ball, Kothari and Shanken (1995)). Cultural differences are another dimension that could directly affect serial correlation of returns. The social psychology literature distinguishes between individualistic and collectivistic cultures and suggests a direct link between the degree of individualism and overoptimistic or overconfident behavior (Markus and Kitayama (1991), Heine,

¹⁰⁸ Daniel, Hirshleifer and Subrahmanyam (1998) base their model on investors' *overconfidence* and variations of confidence arising from *biased self-attribution*. Whereas, Barberis, Shleifer and Vishny (1998) and Hong and Stein (1999) build their theoretical models on the psychological phenomena of *conservatism* and *representativeness heuristic*.

¹⁰⁹ The Appendix contains all variable definitions.

Lehman, Markus and Kitayama (1999) and Hofstede (2001)).¹¹⁰ Both are identified in behavioral finance models as main drivers of investors' overreaction (Daniel, Hirshleifer and Subrahmanyam (1998)). Thus, my regression estimates are not contaminated by country-specific investment behavior.

Panel A in Table 6-6 reports the results for capital gains tax rates and a set of variables that are related to rational risk adjustments. The results from the panel regression reveal that the coefficient on the average long-term capital gains tax rate ATR^{long} is negative and significant at the 10 % level. Since winner reversal is defined negatively, a negative coefficient on ATR^{long} indicates an increase in average monthly return reversal in long-term capital gains taxes. The taxation of short-term gains does not have a significant effect.

In Panel B I consider a group of control variables that are associated with behavioral reversal models. My regression results indicate that taxes on long-term capital gains still have a significant influence on long-term return reversal. An increase in the ATR^{long} by one percentage point leads to an average increase in monthly winner reversal of 0.033 percentage points.

Panel C reports the results when all my control variables are considered jointly. Similar to the effect size in Panel B, the coefficient on ATR^{long} indicates an average increase in monthly winner reversal of 0.031 percentage points. For an overall cross-country average of winner reversal of 0.67 % per month this increase translates into a rise in average winner reversal of 4.42 %.

¹¹⁰ In individualistic cultures, individuals tend to view themselves as "autonomous, independent person" (Markus and Kitayama (1991), while in collectivistic cultures, individuals view themselves "not as separate from the social context but as more connected and less differentiated from others" (Markus and Kitayama (1991), Chui, Titman and Wei (2010)).

Table 6-6: Winner Stock Return Reversal

VARIABLES	Panel A WR	Panel B WR	Panel C WR
ATR ^{long}	-0.0194* (-1.881)	-0.0334** (-2.031)	-0.0313* (-1.892)
ATR ^{short}	0.00160 (0.247)	0.00452 (0.341)	0.00334 (0.250)
GDP	-2.13e-07 (-1.509)	-2.51e-08 (-0.125)	-5.69e-09 (-0.0282)
GDPG	0.000353 (1.524)	0.000513 (1.497)	0.000444 (1.268)
SZ		-0.000374 (-1.198)	-0.000357 (-1.141)
Corr		-6.96e-05 (-0.818)	-6.65e-05 (-0.782)
PR		8.56e-05 (0.641)	6.36e-05 (0.468)
Credit		-4.17e-06 (-0.108)	-7.97e-06 (-0.205)
RV	-2.98e-09 (-0.436)		2.68e-08 (0.752)
BM	0.00139 (0.397)		-0.00586 (-0.870)
Observations	8,014	4,370	4,370
Number of Countries	31	29	29

The average 5-year monthly return of winner portfolios is regressed on the average 5-year long-term and short-term capital gains tax rates and on different sets of explanatory variables. Winner reversal is characterized by a negative sign. Panel A shows results related to risk-based variables. Panel B reports results with respect to behavioral variables and Panel C shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

The next section tests the flip side of the reversal coin. In general, capital gains taxes are not supposed to have any explanatory power with respect to loser reversals as embedded capital losses do not lead to a discount in share prices in case of a stock sale. However, tax incentives can cause investors to disproportionally sell loser stocks at the end of a tax year which induces upward price pressure at the beginning of the following fiscal year and thus leads to reverting return patterns.

Constantinides (1984) demonstrates when transaction costs are greater than zero and the short-term rate exceeds the long-term rate on capital gains, it can be optimal for an investor to realize accrued capital losses before they qualify for long-term treatment or before the end of the year. The earlier moment of the two is decisive. It can be concluded that the incentive to

realize a capital loss is increasing in the difference between short-term and long-term capital gains tax rates (Poterba and Weisbenner (2001)). Based on this timing option model I test if the tax rate difference $\text{Diff}_{cy}^{\text{TR}} = \text{TR}_{cy}^{\text{short}} - \text{TR}_{cy}^{\text{long}}$ has a positive effect on loser reversal after the turn of the year. In contrast to the previous analysis of winner reversal I only consider the difference between the current tax rates. Backward looking 5-year averages are not relevant since the tax-loss selling decision is based on the present tax rates.

Descriptive evidence already suggests a particularly pronounced positive return of loser stocks in January. The cross-country average loser reversal based on the entire fiscal year is 0.94 % per month. In comparison, the cross-country average loser reversal only with respect to the first month of a country's fiscal year is roughly 1.59 % which is statistically larger than the overall year estimate at a 5 % level.¹¹¹

The commonly used term “January effect” that describes an unusually large increase in returns at the beginning of a year can be misleading for a tax-based analysis because fiscal years for personal income tax purposes are not necessarily identical to the calendar year. More precisely, my hypothesis suggests positive returns to loser portfolios at the beginning of the fiscal year. To capture the turn-of-the-fiscal-year effect the following regressions only include the first month of a country's tax year.¹¹² The dependent variable WR_{ct} is replaced by LR_{ct} the equal-weighted 5-year average return of the individual coefficients for loser stocks in month t for country c .

Table 6-7 starts in Panel A with a comparison of the effect on capital gains taxes on loser and winner reversal. For that purpose Panel A in Table 6-7 replicates Panel D from Table 6-6 including all months but using loser reversal as dependent variable. As predicted by the lock-in hypothesis I do neither find a significant impact of the long-term rates nor of the short-term rates. This result implies that the significant effect of ATR^{long} on winner reversal is not caused by omitted variables. Furthermore, based on the significant increase in winner reversal from Table 6-6 and on the finding that loser reversal seems to be unaffected over the course of

¹¹¹ One-tailed p-value for the t-test (Average Loser Reversal First Month – Average Loser Reversal Entire Fiscal Year) > 0 is equal to 0.0157 with a respective t-value of 2.1581.

¹¹² Most countries have tax years that correspond to the calendar year. However, there are some noteworthy exceptions: Fiscal years in Hong Kong, New Zealand and the U.K. run from April to March. In Australia the tax year goes from July to June. In Canada and the U.S. the fiscal year typically runs from January to December, but tax payers can choose alternative tax reporting periods. The fiscal year in Ireland used to run from April to March until 2001. Ireland effectively changed to a tax year matching the calendar year in 2003.

the entire fiscal year, a one percentage point higher average long-term capital gains tax rate would imply a rise in the average return to a contrarian investment strategy of roughly 2 %.¹¹³ Intuitively, selling winner stocks with a greater risk of negative expected returns and at the same time investing in largely unaffected loser stocks would create on average a higher net yield.

In Panels B to D I focus on the reduced sample only containing the first month of the tax year. Panel B shows no significant effect of the tax rate difference considering rational risk factors. Controlling for variables suggested in behavioral research Panel C shows that the coefficient on Diff^{TR} is positive and significant at the 1 % level. The results imply a more pronounced return reversal of loser stocks at the beginning of a tax year as short-term capital losses become more valuable relative to long-term losses. This finding is confirmed in Panel D after considering all relevant control factors. An one percentage point increase in the tax rate difference implies an increase in January return reversals of loser portfolios of 0.125 percentage points.

Overall, my results of the impact of capital gains tax rates and tax rate differences on stock return reversals suggest that among other behavioral-based explanations or risk-related associations rational investors' tax-avoidance behavior should also be viewed as a relevant driver of reverting stock returns.

¹¹³ The average return to a contrarian investment strategy over all countries would be about 1.61 % ($0.0094 - (-0.0067)$). An increase in the average capital gains tax rate by one percentage point would lead to an increased winner reversal of (-0.00701) and thus to an overall return of 1.643 %. The calculation ignores the effect of larger loser reversals at the beginning of a fiscal year.

Table 6-7: Loser Stock Return Reversal

VARIABLES	Panel A LR	Panel B LR	Panel C LR	Panel D LR
ATR ^{long}	-0.0158 (-0.780)			
ATR ^{short}	-0.00221 (-0.136)			
Diff ^{TR}		0.0470 (1.483)	0.126*** (2.708)	0.125*** (2.651)
GDP	-3.15e-07 (-1.277)	2.77e-07 (0.348)	-4.41e-07 (-0.417)	-3.75e-07 (-0.354)
GDPG	0.000295 (0.689)	0.00142 (1.009)	0.000122 (0.0644)	-0.000306 (-0.153)
SZ	-0.000162 (-0.424)		-7.47e-05 (-0.0494)	-8.04e-05 (-0.0532)
Corr	-2.79e-05 (-0.268)		-0.000443 (-0.798)	-0.000465 (-0.835)
PR	0.000225 (1.357)		0.000583 (0.762)	0.000498 (0.642)
Credit	3.53e-05 (0.744)		6.99e-05 (0.335)	7.42e-05 (0.352)
RV	1.78e-08 (0.407)	5.75e-08 (0.331)		3.78e-09 (0.0200)
BM	-0.00118 (-0.144)	-0.0232 (-1.207)		-0.0239 (-0.719)
Observations	4,370	700	445	445
Number of Countries	31	31	29	29

In Panel A the average 5-year monthly return of loser portfolios is regressed on the average 5-year long-term and short-term capital gains tax rates and on a full set of explanatory variables. Loser reversal is characterized by a positive sign. In Panel B the average 5-year monthly return of loser portfolios is regressed on the difference between the current short-term and long-term capital gains tax rates and a set of risk-based variables. Panel C reports results with respect to behavioral variables and Panel D shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

6.4.3 Return Reversal and International Market Integration

So far I have treated national equity markets as independent objects that exist and act next to each other but do not interact in any form. It is easy to argue that a purely domestic examination of taxes and equity stock markets is not a sufficient setting to draw valid empirical conclusions in times of global investment flows and international market integration.

To test the relevance of capital gains taxes for stock return reversal in the light of cross-border investment activities I also take into account the degree of domestic equity holdings as well as the possible effect of foreign capital gains taxes on domestic equity prices.

It has been long known that most investors hold a disproportionately large amount of domestic stocks in their portfolios while shying away from investing in foreign stocks. This lack of international portfolio diversification is commonly known as “home bias” and has been well documented for equity markets around the world (see e.g. French and Poterba (1991), Tesar and Werner (1998), Ahearne, Grier and Warnock (2004)). The fact that investors predominantly invest in domestic stocks not only underlines the importance of national capital gains taxes for the development of stock returns but also conveniently justifies the analysis of taxes and equity prices in a purely domestic context.

However, as there are plenty of confirmative findings of overinvestment in domestic stocks there is also unambiguous empirical evidence that an equity home bias has significantly decreased over the course of the last two decades. Amadi (2004) shows for a group of industrialized countries including the U.K. and the U.S. that investors’ share of foreign equity holdings more than quintupled from 1986 to 2001. Sørensen, Wu, Yosha and Zhu (2007) confirm the upward trend in foreign diversification for 24 OECD countries between 1993 and 2003. One of their results indicates that the ratio of foreign equity investments to GDP for the U.S. stock market more than doubled during this period.¹¹⁴

The finance literature has come up with a host of possible explanations for the sharp decline in home bias ranging from easier access to information, free trade developments, an increase in emerging markets to more international mutual fund investments. This surge in equity market integration requires an examination of the combined effect of investment behavior and international capital gains taxes on stock return reversal.

¹¹⁴ For further empirical evidence see Baele, Pungulescu and Horst (2007).

I consider this recent development in cross-border investments in my analysis in two ways: First, I include in my regression model the share of domestic equity investments. That is the market value of domestic equity investments relative to the overall stock market capitalization of a particular country. I expect an increase in the effect of domestic capital gains taxes on stock returns as the share of domestic equity holdings grows. Second, I also add a weighted average foreign capital gains tax rate with weights being the individual foreign investment inflows in a particular country. Similar to domestic capital gains taxes, a higher average foreign capital gains tax rate should lead to locked-in embedded capital gains and thus increase the magnitude of return reversal.

6.4.3.1 Home Bias and National Tax Rates

In this subsection I test if the internationalization of investment portfolios changes the impact of national capital gains taxes on national stock returns. In a purely national setting, capital gains of domestically issued stocks held by domestic shareholders are only subject to national capital gains taxes. In case of the alienation of domestic shares held by foreign investors multiple jurisdictions may exert the right to levy taxes. The allocation of those taxing rights with respect to the proportion of national stocks held by international investors depends on unilateral as well as bilateral taxing rules. In Article 13, paragraph 5, the OECD Model Treaty (correspondingly, Article 13, paragraph 6 of the UN Model Treaty) deals with the allocation of taxing rights with regard to gains from the alienation of shares.¹¹⁵

In principle, both conventions allocate an exclusive taxing right to the country of residence of the person who realizes the gain. Consequently, share prices of the internationally held portion of domestic stocks are not affected by domestic tax rates. Based on the assumption that countries generally follow the principles laid out in the OECD Model Treaty or the UN Model Treaty, I hypothesize that an increase in the relative share of domestically owned stocks will let the domestic capital gains tax rates exert a greater impact on stock price reversal.¹¹⁶

¹¹⁵ Article 13, paragraph 5 of the OECD Model Treaty regards the taxation of gains from the alienation of any property other than that referred to in paragraph 1, 2, 3 and 4 which also includes shares. I ignore special provisions in Article 13, paragraph 4 of the OECD Model Treaty regarding gains from the alienation of shares in “land-rich” companies. In this respect I do not consider Article 13, paragraph 4 of the UN Model Treaty either. Furthermore, I neglect in Article 13, paragraph 5 of the UN Model Treaty the special treatment of the alienation of shares if the investor exceeds a certain percentage threshold of shares, at any time during the 12-month period preceding the alienation of those shares.

¹¹⁶ I relax this assumption in section 6.4.3.2.

I measure the domestically owned part of stocks in country c in year y as

$$\text{Equity}_{c,y}^{\text{Home}} = 1 - \frac{\text{Foreign Equity Liability}_{c,y}}{\text{Market Capitalization}_{c,y}}$$

Foreign equity liabilities are domestically issued stocks held by foreign investors. The foreign equity holdings data comes from the International Financial Services database, which is compiled by the International Monetary Fund. The International Investment Positions as reported in the International Financial Statistics and the Balance of Payments Statistics contain information on foreign equity assets and foreign equity liabilities for over eighty countries and cover the years 1980 to 2012. The total market capitalization is the aggregated market value of all traded stocks in country c . Market capitalization is based on market values of the Datastream Global Index for each country.¹¹⁷

Table 6-8 contains the standard measure of equity home bias and the share of domestic equity holdings ($\text{Equity}_{c,y}^{\text{Home}}$) of all countries for varying time periods covered by my data. The descriptive statistics show the clear decline in equity home bias that is described in the literature.¹¹⁸ The average equity home bias declines from roughly 85 % to 57.9 % at the end of the sample period. The development of the equity home bias measure documents the ongoing equity market integration.¹¹⁹ Furthermore, the changes in domestic equity holdings across almost all countries also indicate an increased international diversification in national equity portfolios. At the beginning of the different sample periods the average share of domestically held stocks is about 74.2 % and decreases to 56.6 % by the End of 2012.

¹¹⁷ The Datastream Global Index does not contain any market values for the following countries: Czech Republic, Ireland, Israel and Slovak Republic. I use data on a country's overall market capitalization from the World Bank instead.

¹¹⁸ The equity home bias measure applied in this study is used in numerous articles, such as Warnock (2002), Sørensen, Wu, Yosha and Zhu (2007) and Baele, Pungulescu and Horst (2007).

¹¹⁹ A meaningful equity home bias measure for Ireland could not be calculated because foreign equity liabilities exceed the sum of market capitalization and foreign equity assets. This corresponds to (negative) zero domestic equity holdings. In other word, Irish investors do not invest in Ireland but only hold foreign stocks and Irish stocks are completely held by foreign investors. This corresponds to Ireland being a major center for offshore mutual funds and to empirical findings by Chan, Covrig and Ng (2005).

Table 6-8: Home Bias and Domestic Equity Holdings

Country	Period	Equity Home Bias		Domestic Equity Holdings	
		Start	End	Start	End
Australia	1986 - 2012	0.726	0.644	0.560	0.615
Austria	1988 - 2012	0.815	0.356	0.942	0.455
Belgium	1981 - 2012	0.569	0.340	0.948	0.563
Canada	1980 - 2012	0.814	0.612	0.748	0.730
Chile	1996 - 2012	0.975	0.681	0.835	0.877
Czech Republic	1994 - 2012	0.932	0.731	0.776	0.759
Denmark	1991 - 2012	0.751	0.295	0.872	0.391
Finland	1988 - 2012	0.988	0.302	0.793	0.442
France	1989 - 2012	0.870	0.596	0.862	0.571
Germany	1980 - 2012	0.905	0.550	0.840	0.598
Greece	1998 - 2012	0.928	0.717	0.850	0.647
Hong Kong	2000 - 2012	0.821	0.588	0.750	0.671
Hungary	1997 - 2012	0.997	0.594	0.833	0.447
Ireland	1980 - 2012	-	-	0.000	0.000
Israel	1994 - 2012	0.988	0.684	0.912	0.612
Italy	1980 - 2012	0.804	0.498	1.000	0.735
Japan	1995 - 2012	0.935	0.750	0.910	0.707
Korea	2001 - 2012	0.979	0.797	0.593	0.524
Mexico	2009 - 2012	0.811	0.863	0.605	0.673
Netherlands	1982 - 2012	0.584	0.061	0.443	0.095
New Zealand	1990 - 2012	0.974	0.458	0.856	0.749
Norway	1998 - 2012	0.626	0.788	0.225	0.628
Poland	1997 - 2012	0.999	0.890	0.545	0.666
Portugal	1994 - 2012	0.738	0.441	0.671	0.379
Slovak Republic	1996 - 2012	0.925	0.668	0.972	0.907
Spain	1988 - 2012	0.973	0.720	0.822	0.567
Sweden	1984 - 2012	0.808	0.371	0.775	0.492
Switzerland	1988 - 2012	0.666	0.388	0.534	0.306
Turkey	1996 - 2012	1.000	0.997	0.791	0.568
United Kingdom	1980 - 2012	0.682	0.491	0.871	0.497
United States	1980 - 2012	0.925	0.498	0.882	0.673

The data is based on the International Investment Positions reported in the International Financial Statistics and the Balance of Payments Statistics compiled by the International Monetary Fund. The Equity Home Bias of country c is calculated as $1 - (\text{Foreign Portfolio Holdings} / \text{World Portfolio Share})$. Foreign Portfolio Holdings = foreign equity assets held by country c / (stock market capitalization of country c + foreign equity assets held by country c - foreign equity liabilities of country c). World Portfolio Share = $1 - (\text{stock market capitalization of country } c / \text{stock market capitalization of the world})$. The measure is normalized between 1 and 0. It takes the value 1 when the domestic investors hold only domestic shares. It takes the value of 0 when the actual foreign portfolio holdings are equal to the world portfolio share. Domestic Equity Holdings of country c are calculated as $1 - (\text{foreign equity liabilities of country } c / \text{stock market capitalization of country } c)$.

Table 6-9 reports the coefficients and t-statistics for three panel regressions with winner return reversal WR_{ct} as dependent variable. The variable $Equity^{Home}$ is the proportion of domestic equity holdings relative to the overall domestic market capitalization. The interaction term $Inter^{long}$ ($Inter^{short}$) is the combined effect of the share of domestically held stocks with the average 5-year long-term (short-term) capital gains tax rate. I would expect a negative sign on its coefficient as higher taxes imply a more drastic lock-in effect and a higher share of domestically owned stocks magnifies the impact of national tax rates. In Panel A of Table 6-9 the interaction term of long-term rate and domestic equity holdings has a negative coefficient that is significant at the 10 % level while controlling for risk-related factors. In Panel B I include behavioral characteristics. The coefficient on the short-term interaction term is negative and significantly different from zero which is in line with my hypothesized combined effect. This relation is confirmed in Panel C when I control for all relevant factors that may impact on return reversal.

Corresponding to my previous tests I also examine the impact of taxes on positive loser reversal. The table is shown in the Appendix. The results are based on the first month of a country's tax year and generally support my findings. The estimates in Panel B suggest that the difference between both tax rates becomes more relevant for the turn of the tax year effect on loser reversal as the national share of equity holdings increases.

In sum, the negative coefficient on the interaction term shows the expected positive synergy between domestic capital gains taxes and domestic equity holdings on stock return reversal. As predicted, national share holdings enhance the effect of capital gains taxes on stock prices. This effect is particularly pronounced for short-term capital gains tax rates since capital gains on shareholdings not qualifying for preferential long-term treatment are subject to a tax burden that is on average 10 percentage points higher.

Table 6-9: Domestic Equity Holdings Regression

VARIABLES	Panel A WR	Panel B WR	Panel C WR
ATR ^{long}	0.0529** (2.164)	0.0194 (0.655)	0.0198 (0.670)
Inter ^{long}	-0.0569* (-1.862)	-0.0293 (-0.749)	-0.0288 (-0.736)
ATR ^{short}	0.00295 (0.188)	0.0803*** (3.456)	0.0787*** (3.382)
Inter ^{short}	-0.0124 (-0.685)	-0.0832*** (-3.071)	-0.0833*** (-3.075)
Equity ^{Home}	0.00965* (1.794)	0.0100 (1.494)	0.0105 (1.560)
GDP	-3.43e-08 (-0.250)	5.27e-08 (0.327)	4.21e-08 (0.260)
GDPG	0.00084*** (2.967)	0.000213 (0.645)	0.000299 (0.874)
SZ		-0.000468** (-2.019)	-0.000460** (-1.985)
Corr		-8.38e-05 (-0.943)	-8.19e-05 (-0.921)
PR		0.000191 (1.484)	0.000212 (1.623)
Credit		-1.39e-05 (-0.430)	-1.52e-05 (-0.469)
RV	-2.23e-09 (-0.349)		1.83e-08 (0.532)
BM	0.00233 (0.532)		0.00514 (0.981)
Observations	6,839	4,980	4,980
Number of Countries	30	29	29

The average 5-year monthly return of winner portfolios is regressed on the average 5-year long-term and short-term capital gains tax rates and on different sets of explanatory variables. The interaction terms are defined as: $\text{Inter}^{\text{long}} = \text{ATR}^{\text{long}} * \text{Equity}^{\text{Home}}$ and $\text{Inter}^{\text{short}} = \text{ATR}^{\text{short}} * \text{Equity}^{\text{Home}}$. Winner reversal is characterized by a negative sign. Panel A shows results related to risk-based variables. Panel B reports results with respect to behavioral variables and Panel C shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

6.4.3.2 International Capital Gains Tax Rates

In this section I extend the previous analysis by explicitly controlling for foreign capital gains taxes. Foreign capital gains taxes can influence stock prices of domestic securities if the taxing right of a realized gain is allocated to the seller's foreign country of residence. To measure the effect of foreign capital gains tax rates I consider the foreign statutory tax rate on capital gains as well as the amount of domestic investments by foreign investors in each country. I calculate two weighted average foreign capital gains tax rates (short-term and long-term) with weights being the amounts of the individual equity liabilities towards each foreign country.

For the purpose of illustration I use a simple three country example: Companies located in Country A issue stocks with a market value of 100. Stocks with a value of 20 are held by investors resident in country B and stocks with a value of 10 are held by investors resident in country C. The remaining stocks are held by domestic investors in country A. The double tax treaties between the three countries are based on the OECD Model Convention. The capital gains tax rate in country B is 10 % and the tax rate in country C amounts to 25 %. Consequently, in case of a sale, country A's domestic stocks held by foreign investors would be subject to a weighted average foreign capital gains tax rate of $(20 \cdot 0.1 + 10 \cdot 0.25) / 30 = 0.15$.

I use data from the Coordinated Portfolio Investment Survey (CPIS) provided by the International Monetary Fund to gain an accurate picture of a country's composition of foreign equity liabilities. CPIS records bilateral portfolio equity allocations covering over 60 investor countries for the period 1997 to 2012.¹²⁰

In order to disentangle the influences of domestic and foreign capital gains taxes I need to make sure that the taxing rights are exclusively allocated to the country of resident of the alienator of the shares as it is stipulated in the OECD Model Treaty (or the UN Model Treaty). It is common practice for countries to use the OECD Model Treaty as a blue print for individual bilateral tax treaties and basically apply the same allocation rules. The overwhelming majority of double taxation conventions follow the tax principles described in the OECD Model

¹²⁰ Since information is only available for 1997 and 2001 to 2012, I interpolate the data for the years 1998 to 2000. To avoid issues regarding the representativeness of the data I require each source country to have a minimum of at least 10 billion U.S. Dollar in foreign equity holdings. I also exclude Ireland as popular financial center since the allocation of equity investments channeled through financial centers is not possible. In addition, I exclude Australia and New Zealand as source countries because of many missing values due to confidentiality (Vermeulen (2013)). A careful treatment of the data is pointed out by Lane and Milesi-Feretti (2007).

Convention. However, some bilateral treaties deviate from that path and contain alternative allocation rules. In addition, by far not all countries have concluded double tax treaties with their trading partners. In those cases the national tax rules apply.

I relax the assumption from the previous section that the principles from the OECD Model treaty generally apply to all countries in my sample but instead individually check all bilateral equity investment relations. Country-pairs are only included in the calculation of the weighted average foreign capital gains tax rates if an effective double tax treaty exists and if such a treaty attributes the taxing right of an alienation of shares to the alienator's country of residence. Based on these criteria I exclude 73 bilateral investment relations from my sample due to missing treaty agreements or alternative allocation rules.¹²¹ The allocation of taxing rights regarding the remaining equity holdings is purely based on the place of residence of the shareholders and thus does not inhibit my estimations.

The settings in Table 6-10 Panels A to C are comparable with the regressions in Panels A to C from Table 6-9 but contain additional controls for foreign short-term and long-term capital gains tax rates. The results in all three settings suggest that higher domestic short-term tax rates lead to more winner stock return reversal and that this effect increases in domestic shareholdings. I can also confirm the validity of the lock-in hypothesis from an international perspective. Estimates reveal a significant positive impact of foreign long-term capital gains taxes on domestic winner return reversal. The results remain robust across all three estimation settings.

So far all estimates are based on the assumption that the marginal investor is an individual investor and that only the personal capital gains tax matters for equity pricing. However, institutional investors tend to be the predominant cross-border equity holders as they tend to have better access to information and more sophisticated investment strategies.¹²²

¹²¹ For example, I exclude the bilateral investment relation between Germany and Chile since both countries have not concluded a double taxation convention. Similarly, I exclude the bilateral investment relation between Australia and Italy from the calculation of the average weighted foreign capital gains tax rate as it says in the double tax treaty: "Gains from the alienation of shares or corporate rights in a company which is a resident of Italy for the purposes of Italian tax, derived by an individual who is a resident of Australia, may be taxed in Italy."

¹²² Grinblatt and Keloharju (2000) show that the degree of sophistication matters when studying investor behavior.

Table 6-10: Weighted Average Foreign Capital Gains Tax Regression

VARIABLES	Panel A WR	Panel B WR	Panel C WR
ATR ^{long}	-0.0177 (-0.650)	-0.0256 (-0.925)	-0.0244 (-0.879)
Inter ^{long}	0.0433 (1.241)	0.0352 (0.957)	0.0359 (0.977)
ATR ^{short}	0.0716*** (2.955)	0.0784*** (3.159)	0.0787*** (3.170)
Inter ^{short}	-0.101*** (-3.575)	-0.110*** (-3.807)	-0.110*** (-3.811)
WFATR ^{long}	-0.0559* (-1.709)	-0.0559* (-1.675)	-0.0578* (-1.730)
WFATR ^{short}	0.0382 (0.685)	0.0104 (0.183)	0.0224 (0.390)
Equity ^{Home}	3.21e-05 (0.00425)	0.000322 (0.0419)	0.00130 (0.168)
GDP	1.21e-08 (0.0825)	-1.33e-07 (-0.822)	-1.26e-07 (-0.780)
GDPG	9.09e-05 (0.240)	5.35e-05 (0.136)	0.000198 (0.491)
SZ		-0.000652*** (-3.130)	-0.000627*** (-3.002)
Corr		-0.000238 (-1.415)	-0.000215 (-1.273)
PR		0.000163 (1.212)	0.000187 (1.383)
Credit		3.95e-05 (0.982)	3.59e-05 (0.891)
RV	-2.23e-09 (-0.0785)		-1.93e-09 (-0.0674)
BM	0.00952* (1.758)		0.00836 (1.502)
Observations	2,947	2,865	2,865
Number of Countries	21	21	21

The average 5-year monthly return of winner portfolios is regressed on the average 5-year long-term and short-term capital gains tax rates, the weighted average 5-year foreign long-term and short-term capital gains tax rate and on different sets of explanatory variables. The interaction terms are defined as: $Inter^{long} = ATR^{long} * Equity^{Home}$ and $Inter^{short} = ATR^{short} * Equity^{Home}$. $WFATR^{long}$ ($WFATR^{short}$) stands for the average weighted foreign long-term (short-term) capital gains tax rate. Winner reversal is characterized by a negative sign. Panel A shows results related to risk-based variables. Panel B reports results with respect to behavioral variables and Panel C shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

Ferreira and Matos (2008) report that nearly 40 % of the entire world stock market capitalization are held at equal shares by U.S.-based institutions and non-U.S.-institutions.

Thus, in an international context the marginal investor does not necessarily have to be a natural person but can also be an institutional investor that is subject to corporate capital gains taxes. To test this alternative explanation I also run the regressions in Table 6-10 with weighted average foreign corporate capital gains tax rates. Results are shown in the Appendix. The impact of domestic short-term capital gains taxes remains consistent and highly significant while the results do not suggest any effect of foreign corporate capital gains taxes. This supports my base case assumption that corporate capital gains taxes are not relevant for stock prices. Studies by He, Ng and Wang (2004) and Dahlquist and Robertsson (2001) suggest that different types of institutional investors such as corporations, insurance companies or mutual investment funds engage in similar trading strategies. Thus, my findings indicate that international investments through mutual funds let natural persons also become price setting investors for cross-border security holdings whose tax burdens are eventually reflected in stock price reactions.

6.5 Conclusion

This study presents a comprehensive and thorough international analysis of the effect of capital gains taxation on long-term stock return reversal. It is first to seek evidence of a link between taxes and reverting stock return patterns for the U.S. stock market. Classifying portfolios based on a tax-specific measure reveals different results for winner and loser stocks. While I find significant return reversal for winner stocks as predicted by theoretical models (Klein (1999, 2001)) I do not find a corresponding effect with respect to loser portfolios. This asymmetric return reaction supports the lock-in hypothesis of capital gains taxes. Most interestingly, in line with previous findings of end-of-year tax-loss selling strategies I can show that loser reversal is only prevalent in January which underlines the meaning of capital gains taxes for equity pricing.

In contrast to earlier studies in the literature I test the influence of capital gains taxes on stock returns in a global setting. This enables me to take advantage of 31 different tax systems and multiple changes in tax rates over a time span of up to 50 years. My analysis provides robust

empirical evidence of capital gains taxes being a contributory factor to reverting stock returns when controlling for various sets of other explanatory factors. Again, I distinguish between winner and loser stocks. Capital gains taxes are significantly associated with a decline in returns of appreciated stocks in the long-run. I do not detect a similar relation between capital gains taxes and stocks with embedded capital losses as predicted by the lock-in hypothesis. However, an increased difference between long-term and short-term capital gains tax rates raises the selling pressure at the end of the tax year and eventually leads to a more pronounced return reversal of loser stocks.

The evidence motivates me to broaden the scope of my analysis and also take into account international portfolio diversification. I investigate whether the degree of domestic shareholdings changes the effect of domestic taxes on stock returns. The results show that national shareholdings enhance the effect of domestic capital gains taxes on stock price changes. This conclusion can also be drawn with respect to loser reversals and differences between domestic long-term and short-term tax rates.

Finally, I consider the composition of international equity holdings and test if foreign capital gains taxes also have an impact on stock return reversal similar to domestic taxes. According to my results I can also confirm the lock-in hypothesis for foreign capital gains taxes. Taking into account the relative share of national as well as international equity investments shows that domestic and foreign capital gains taxes systematically affect changes in stock prices.

Overall, my results imply that besides investor overreaction, risk compensation and measurement issues rational investors' response to tax incentives can be seen as another factor driving the reversion of stock returns in the long-run.

6.6 Appendix

Table 6-11: Appendix - Domestic Equity Holding and Loser Reversal

VARIABLES	Panel A LR	Panel B LR	Panel C LR
Diff ^{TR}	-0.0217 (-0.738)	-0.0349 (-0.915)	-0.0421 (-1.078)
Inter ^{short}	0.0334 (0.286)	0.285* (1.657)	0.282 (1.638)
Equity ^{Home}	0.00965* (1.794)	0.0100 (1.494)	0.0105 (1.560)
GDP	2.67e-07 (0.292)	-4.55e-07 (-0.409)	-3.80e-07 (-0.340)
GDPG	0.00179 (1.003)	-0.000392 (-0.175)	-0.000974 (-0.418)
Size		2.21e-05 (0.0143)	5.59e-07 (0.000360)
Corr		-0.000499 (-0.836)	-0.000523 (-0.873)
PR		0.000460 (0.539)	0.000339 (0.392)
Credit		4.60e-05 (0.205)	5.65e-05 (0.250)
RV	3.59e-08 (0.193)		-1.61e-08 (-0.0816)
BM	-0.0359 (-1.432)		-0.0342 (-0.932)
Observations	607	422	422
Number of Countries	30	29	29

The average 5-year monthly return of loser portfolios is regressed on the difference between the current short-term and long-term capital gains tax rates and on different sets of explanatory variables. The interaction term is defined as: $\text{Inter}^{\text{Dif}} = \text{Diff}^{\text{TR}} * \text{Equity}^{\text{Home}}$. Loser reversal is characterized by a positive sign. Panel A shows results related to risk-based variables. Panel B reports results with respect to behavioral variables and Panel C shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

Table 6-12: Appendix - Weighted Average Foreign Corporate Capital Gains Tax

VARIABLES	Panel A WR	Panel B WR	Panel C WR
ATR ^{long}	0.00226 (0.0745)	-0.0143 (-0.466)	-0.0120 (-0.390)
Inter ^{long}	0.0108 (0.264)	0.0112 (0.264)	0.0112 (0.263)
ATR ^{short}	0.0652** (2.321)	0.0740** (2.566)	0.0754*** (2.613)
Inter ^{short}	-0.0953*** (-2.633)	-0.107*** (-2.902)	-0.109*** (-2.959)
WFCATR ^{long}	-0.207 (-0.254)	0.159 (0.192)	0.177 (0.214)
WFCATR ^{short}	0.253 (0.310)	-0.139 (-0.167)	-0.168 (-0.201)
Equity ^{Home}	0.00291 (0.383)	0.00247 (0.322)	0.00413 (0.534)
GDP	1.31e-08 (0.0910)	-1.51e-07 (-0.937)	-1.63e-07 (-1.013)
GDPG	-0.000111 (-0.273)	-0.000170 (-0.397)	-7.77e-05 (-0.180)
Size		-0.000606*** (-2.907)	-0.000607*** (-2.911)
Corr		-0.000195 (-1.242)	-0.000202 (-1.287)
PR		0.000184 (1.427)	0.000212 (1.626)
Credit		4.55e-05 (1.183)	4.02e-05 (1.040)
RV	3.95e-09 (0.144)		3.67e-09 (0.134)
BM	0.00793 (1.411)		0.00874 (1.514)
Observations	3,048	2,964	2,964
Number of Countries	21	21	21

The average 5-year monthly return of winner portfolios is regressed on the average 5-year long-term and short-term capital gains tax rates, the weighted average 5-year foreign long-term and short-term capital gains tax rate and on different sets of explanatory variables. The interaction terms are defined as: $Inter^{long} = ATR^{long} * Equity^{Home}$ and $Inter^{short} = ATR^{short} * Equity^{Home}$. WFCATR^{long} (WFCATR^{short}) stands for the average weighted foreign corporate long-term (short-term) capital gains tax rate. Winner reversal is characterized by a negative sign. Panel A shows results related to risk-based variables. Panel B reports results with respect to behavioral variables and Panel C shows results with respect to all explanatory variables. T-statistics are in parentheses. The symbols *, **, *** indicate significance at the 10 %, 5 % and 1 % level, respectively. Standard errors are clustered at country level.

Table 6-13: Appendix - Variable Definition

Variable	Definition	Source
$size_{i,t-1}$	The natural logarithm of market capitalization of stock i in month $t-1$ net of month $t-1$ cross sectional mean.	CRSP
$52wkW_{i,t-j}$	52-week high measure equals one if $\frac{P_{i,t-j}}{high_{i,t-j}}$ is ranked among the top 10 % of all stocks in month $t-j$, and zero otherwise, where $P_{i,t-j}$ is the price of stock i at the end of month $t-j$ and $high_{i,t-j}$ is the highest month-end price of stock i during the 12-month period that ends on the last day of the month $t-j$.	CRSP
$52wkL_{i,t-j}$	52-week low measure equals one if $\frac{P_{i,t-j}}{high_{i,t-j}}$ is ranked among the bottom 10 % of all stocks in month $t-j$, and zero otherwise, where $P_{i,t-j}$ is the price of stock i at the end of month $t-j$ and $high_{i,t-j}$ is the highest month-end price of stock i during the 12-month period that ends on the last day of the month $t-j$.	CRSP
ATR_{ct}^{short}	The average of the statutory short-term capital gains tax rates for the period month $t-1$ to month $t-60$ in country c	Own calculation
ATR_{ct}^{long}	The average of the statutory long-term capital gains tax rates for the period month $t-1$ to month $t-60$ in country c .	Own calculation
WR_{ct}	The equal-weighted average return of the individual coefficients for winner stocks $S_{5t} = \frac{1}{60} \sum_{j=1}^{60} b_{5jt}$ in month t in country c .	Own calculation
LR_{ct}	The equal-weighted average return of the individual coefficients for loser stocks $S_{6t} = \frac{1}{60} \sum_{j=1}^{60} b_{6jt}$ in month t in country c .	Own calculation
TR_{cy}^{short}	The statutory short term capital gains tax rate in country c for year y .	IBFD
TR_{cy}^{long}	The statutory short term capital gains tax rate in country c for year y .	IBFD

Table 6-13 - continued

Variable	Definition	Source
$\text{Diff}_{cy}^{\text{TR}}$	Difference between the statutory short-term capital gains tax rate and the statutory long-term capital gains tax rate in country c for year y.	Own calculation
$\text{WFATR}_{cy}^{\text{long}}$	$\text{WFATR}_{cy}^{\text{long}} = \frac{\sum_{i=1}^n w_i \text{TR}_{iy}^{\text{long}}}{\sum_{i=1}^n w_i}$ with weights w_i being the market value of stocks in country c held by investors from country i in year y. $\text{TR}_{iy}^{\text{long}}$ is the statutory long-term capital gains tax rate in country i in year y.	International Monetary Fund
$\text{WFATR}_{cy}^{\text{short}}$	$\text{WFATR}_{cy}^{\text{short}} = \frac{\sum_{i=1}^n w_i \text{TR}_{iy}^{\text{short}}}{\sum_{i=1}^n w_i}$ with weights w_i being the market value of stocks in country c held by investors from country i in year y. $\text{TR}_{iy}^{\text{short}}$ is the statutory short-term capital gains tax rate in country i in year y.	International Monetary Fund
$\text{Equity}_{c,y}^{\text{Home}}$	Domestic Equity Holdings of country c are calculated as $1 - (\text{foreign equity liabilities of country c} / \text{stock market capitalization of country c})$.	International Monetary Fund
$\text{Equity Home Bias}_{c,y}$	The Equity Home Bias of country c is calculated as $1 - (\text{Foreign Portfolio Holdings} / \text{World Portfolio Share})$. $\text{Foreign Portfolio Holdings} = \text{foreign equity assets held by country c} / (\text{stock market capitalization of country c} + \text{foreign equity assets held by country c} - \text{foreign equity liabilities of country c})$. $\text{World Portfolio Share} = 1 - (\text{stock market capitalization of country c} / \text{stock market capitalization of the world})$. The measure is normalized between 1 and 0.	International Monetary Fund
GDP_{cy}	Gross domestic product (GDP) per capita in country c in year y.	Worldbank
GDPG_{cy}	Gross domestic product (GDP) growth rate in country c in year y.	Worldbank
SZ_{cy}	SZ of country c in year y is the median of the average size of firms in that country. The average size of a firm in year y is the average of the monthly market capitalization of this firm in year y.	Datastream and CRSP

Table 6-13 - continued

Variable	Definition	Source
$Corr_{cy}$	Corruption erodes economic freedom by introducing insecurity and uncertainty into economic relationships. The score for this component is derived primarily from Transparency International's Corruption Perceptions Index (CPI) for 2011, which measures the level of corruption in 183 countries. It ranges from 0 to 10.	The Heritage Foundation
PR_{cy}	The property rights Index is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It measures the degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. It ranges from 0 to 100.	The Heritage Foundation
$Credit_{cy}$	Total private credit of country c in year y divided by this country's GDP in year y .	Worldbank
RV_{ct}	Market volatility for country c in month t is $V_{ct} = \frac{1}{n} \sum_{i=1}^n R_{it}^2$, where R_{it}^2 is the squared return on stock i in month t .	Datastream and CRSP
BM_{ct}	BM is the book-to-market ratio of the Datastream Global index of country c in month t .	Datastream

6.7 References

- Ahearne, A. G., Grier, W. L. and Warnock, F. E. (2004): Information Costs and Home Bias: An Analysis of U.S. holdings of foreign equities, *Journal of International Economics* 62, 313-336.
- Amadi, A. (2004): Equity Home Bias: A disappearing Phenomenon? Working Paper.
- Antoniou, A., Galariotis, E. C. and Spyrou, S. I. (2005): Contrarian Profits and the Overreaction Hypothesis: The Case of the Athens Stock Exchange, *European Financial Management* 11 (1), 71-98.
- Auerbach, A. J. (1991): Retrospective Capital Gains Taxation, *The American Economic Review* 81 (1), 167-178.
- Baele, L., Pungulescu, C. and Horst, J. T. (2007): Model uncertainty, financial market integration and the home bias puzzle, *Journal of International Money and Finance* 26, 606-630.
- Ball, R., Kothari, S. P. and Shanken, R. (1995): Problems in measuring portfolio performance: An application to contrarian investment strategies, *Journal of Financial Economics* 38, 79-107.
- Ball, R. and Kothari, S. P. (1989): Nonstationary Expected Returns – Implications for Tests of Market Efficiency and Serial Correlation in Returns, *Journal of Financial Economics* 25, 51-74.
- Barberis, N., Shleifer, A. and Vishny, R. (1998): A model of investor sentiment, *Journal of Financial Economics* 49, 307-343.
- Baytas, A. and Cakici, N. (1999): Do markets overreact: International evidence. *Journal of Banking and Finance* 23, 1121-1144.
- Bennett, J. A., Sias, R. W. and Starks, L. T. (2003): Greener Pastures and the Impact of Dynamic Institutional Preferences, *The Review of Financial Studies* 16, 1203-1238.
- Boudoukh, J., Richardson, M. P. and Whitelaw, R. F. (1994): A Tale of Three Schools: Insights on Autocorrelations of Short-Horizon Stock Returns, *The Review of Financial Studies* 7 (3), 539-573.
- Bowman, R. G. and Iverson, D. (1998): Short-run Overreaction in the New Zealand stock market, *Pacific-Basin Finance Journal* 6, 475-491.
- Chan, K., Covrig, V. and Ng, L. (2005): What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide, *The Journal of Finance* 60 (3), 1495-1533.
- Chan, K. and Covrig, V. (1988): On the Contrarian Investment Strategy, *The Journal of Business* 61 (2), 147-163.

- Chou, P-H., Wei, K.C. J. and Chung, H. (2007): Sources of contrarian profits in the Japanese stock market, *Journal of Empirical Finance* 14, 261-286.
- Chui, A. C. W., Titman, S. and Wei, K. C. J. (2010): Individualism and Momentum around the World, *The Journal of Finance* 65 (1), 361-391.
- Clare, A. and Thomas, S. (1995): The Overreaction Hypothesis and the UK Stock Market, *Journal of Business Finance and Accounting* 22 (7), 961-973.
- Conrad, J., Cooper, M. and Kaul, G. (2003): Value versus Glamour, *The Journal of Finance* 58 (5), 1969-1995.
- Conrad, J. and Kaul, G. (1998): An Anatomy of Trading Strategies, *The Review of Financial Studies* 11 (3), 489-519.
- Conrad, J. and Kaul, G. (1993): Long-term Market Overreaction or Biases in Computed Returns, *The Journal of Finance* 48 (1), 39-63.
- Constantinides, G. M. (1984): Optimal Stock Trading with Personal Taxes – Implications for Prices and the Abnormal January Returns, *Journal of Financial Economics* 13, 65-89.
- Cooper, I. and Kaplanis, E. (1994): Home Bias in Equity Portfolios, Inflation Hedging, and International Capital Market Equilibrium, *Review of Financial Studies* 7, 45-60.
- Dahlquist, M. and Robertsson, G. (2001): Direct foreign ownership, institutional investors, and firm characteristics, *Journal of Financial Economics* 59, 413-440.
- Daniel, K., Hirshleifer, D. and Subrahmanyam, A. (1998): Investor Psychology and Security Markets Under – and Overreaction, *The Journal of Finance* 53 (6), 1839-1885.
- DeBondt, W. F. M. and Thaler, R. H. (1987): Further Evidence on Investor Overreaction and Stock Market Seasonality, *The Journal of Finance* 42 (3), 557-581.
- DeBondt, W. F. M. and Thaler, R. H. (1985): Does the Stock Market Overreact? *The Journal of Finance* 40 (3), 793-805.
- Dissanaike, G. (1999): Long-term stock price reversal in the U.K.: Evidence from regression tests, *British Accounting Review* 31, 373-385.
- Dyl, E. (1977): Capital gains taxation and year-end stock market behavior, *The Journal of Finance* 32, 165-175.
- Ernst and Young, Worldwide Corporate Tax, 2001-2010, Ernst and Young International.
- Fama, E. F. and French, K. R. (1998): Value versus growth: The international evidence, *The Journal of Finance* 53, 1975-1999.
- Fama, E. F. and French, K. R. (1996): Multifactor Explanations of Asset Pricing Anomalies, *The Journal of Finance* 51 (1), 55-84.

- Fama, E. F. and French, K. R. (1995): Size and book-to-market factors in earnings and returns, *The Journal of Finance* 50, 131-155
- Fama, E. F. and French, K. R. (1993): Common risk factors in the returns of stocks and bonds, *Journal of Financial Economics* 33, 3-56.
- Fama, E. F. and French, K. R. (1988): Permanent and Temporary Components of Stock Prices, *The Journal of Political Economy* 96 (2), 246-273.
- Fama, E. F. and MacBeth, J. (1973): Risk, return and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607-636.
- Ferreira, M. A. and Matos, P. (2008): The colors of Investors' money: The role of institutional investors around the world, *Journal of Financial Economics* 88, 499-533.
- French, K. R. and Poterba, J.M. (1991): Investor Diversification and International Equity Markets, *American Economic Review* (81), 222-226.
- Galariotis, E. C., Holmes, P. and Ma, X. S. (2007): Contrarian and Momentum Profitability revisited: Evidence from the London Stock Exchange 1964-2005, *Journal of Multinational Financial Management* 17 (5), 432-447.
- Gaunt, C. (2000): Overreaction in the Australian equity market: 1974-1997, *Pacific-Basin Finance Journal* 8, 375-398.
- George, T. J. and Hwang, C-Y. (2007): Long-term Return Reversal: Overreaction or Taxes?, *The Journal of Finance* 62 (6), 2865-2894.
- George, T. J. and Hwang, C-Y. (2004): The 52-Week High and Momentum Investing, *The Journal of Finance* 59 (5), 2145-2176.
- Gompers, P. A. and Metrick, A. (2001): Institutional Investors and Equity Prices, *The Quarterly Journal of Economics*, 229-359.
- Griffin, J. M., Kelly, P. J. and Nardari, F. (2010): Do Market Efficiency Measures Yield Correct Inferences? A Comparison of Developed and Emerging Markets, *Review of Financial Studies* 23, 3226-3277.
- Grinblatt, M. and Moskowitz, T. J. (2004): Predicting stock price movements from past returns: the role of consistency and tax-loss selling, *Journal of Financial Economics* 71, 541-579.
- Grinblatt, M. and Keloharju, M. (2004): Tax-loss trading and wash sales, *Journal of Financial Economics* 71, 51-76.
- Grinblatt, M. and Keloharju, M. (2001): How Distance, Language, and Culture Influence Stockholdings and Trades, *The Journal of Finance* 56 (3), 1053-1073.
- Grinblatt, M. and Keloharju, M. (2000): The Investment Behavior and Performance of various Investor Types: a study of Finland's unique data set, *Journal of Financial Economics* 55, 43-67.

- Haugen, R. A., Talmor, E. and Torous, W. N. (1991): The Effect of Volatility Changes on the Level of Stock Prices and Subsequent Expected Returns, *The Journal of Finance* 46 (3), 985-1007.
- He, J., Ng, L. and Wang, Q. (2004): Quarterly Trading Patterns of Financial Institutions, *The Journal of Business* 77 (3), 493-509.
- Heine, S. J., Lehman, D. J., Markus, H. R. and Kitayama, S. (1999): Is there a Universal Need for Positive Self-Regard, *Psychological Review* 106 (4), 766-794.
- Hofstede, Geert (2001): Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations, Second Edition, Sage Publication, Beverly Hills, California.
- Hong, H., Lim, T. and Stein, J. C. (2000): Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies, *The Journal of Finance* 55 (1), 265-295.
- Hong, H. and Stein, J. C. (1999): A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets, *The Journal of Finance* 54 (6), 2144-2184.
- IBFD, Country Analysis, accessed online at <http://www.ibfd.org/IBFD-Tax-Portal/Country-Analyses> in May 2014.
- IBFD, Tax News Services, accessed online at http://online.ibfd.org/kbase/#topic=d&N=3+10+4913&WT.i_s_type=Navigation&ownSubscription=true&Ne=4912&colid=4913&Ns=sort_news_date%257C1%257C%257Csort_country_one%257C0%257C%257Csort_country_two%257C0%257C%257Cfile-name%257C0&rpp=25 in May 2014
- IBFD, The European Tax Handbook, 1990-2012.
- IBFD, Annual Reports, 1970-1986.
- Ince, O. S. and Porter, B. R. (2006): Individual Equity Return Data from Thomson Datastream: Handle with Care!, *The Journal of Financial Research* 29 (4), 463-479.
- Jegadeesh, N. and Titman, S. (2001): Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *The Journal of Finance* 61 (2), 699-720.
- Jegadeesh, N. and Titman, S. (1993): Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *The Journal of Finance* 48 (1), 65-91.
- Jones, S. L. (1993): Another look at time-varying risk and return in a long-horizon contrarian strategy, *Journal of Financial Economics* 33, 119-144.
- Klein, P. (2004): The capital gain lock-in effect and perfect substitutes, *Journal of Public Economics* 88, 2765-2783.
- Klein, P. (2001): The capital gain lock-in effect and long-horizon return reversal, *Journal of Financial Economics* 59, 33-62.

- Klein, P. (1999): The capital gain lock-in effect and equilibrium returns, *Journal of Public Economics* 71, 355-378.
- Landsman, W. R. and Shackelford, D. A. (1995): The Lock-in effect of Capital Gains Taxes: Evidence form the RJR Nabisco Leveraged Buyout, *National Tax Journal* 48 (2), 245-259.
- Lane, P. R. and Milesi-Ferretti, G. M. (2007): The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, *Journal of International Economics* 73 (2), 223-250.
- Lo, A. A. and MacKinlay, A. C. (1990): When are Contrarian Profits due to Stock Market Overreaction?, *The Review of Financial Studies* 3 (2), 175-205.
- MacInish, T. H., Ding, D. K., Pyun, C. S. and Wongchoti, U. (2008): Short-horizon contrarian and momentum strategies in Asian markets: An integrated analysis, *International Review of Financial Analysis* 17, 312-329.
- Markus, H. R. and Kitayama, S. (1991): Culture and the self: Implication for Cognition, Emotion, and Motivation, *Psychological Review* 98, 224-253.
- Nam, K., Pyun, C. S. and Kim, S-W. (2003): Is asymmetric mean-reverting pattern in stock returns systematic? Evidence from Pacific-basin markets in the short-horizon. *International Financial Markets, Institutions and Money* 13, 418-502.
- Poterba, J. M. and Weisbenner, S. J. (2001): Capital Gains Tax Rules, Tax-loss Trading, and Turn-of-the-year Returns, *The Journal of Finance* 56 (1), 353-368.
- Poterba, J. M. and Summers, L. H. (1988): Mean Reversion in Stock Prices, *Journal of Financial Economics* 22, 27-59.
- Ritter, J. R. (1988): The Buying and Selling Behavior of Individual Investors at the Turn of the Year, *The Journal of Finance* 43 (3), 701-717.
- Schiereck, D., De Bondt, W. F. M. and Weber, M. (1999): Contrarian and Momentum Strategies in Germany, *Financial Analyst Journal* 55, 104-116.
- Schmidt, P. S. von Arx, U., Schrimpf, A., Wagner, A. F. and Ziegler, A. (2011): On the Construction of Common Size, Value and Momentum Factors in International Stock Markets: A Guide with Applications, ETH Economic Working Paper Series.
- Sorensen, B. E., Wu, Y-T, Yosha, O. and Zhu, Y. (2007): Home Bias and international risk sharing: Twin puzzles separated at birth, *Journal of International Money and Finance* 26, 587-605.
- Stulz, R. M. and Williamson, R. (2003): Culture, Openness, and Finance, *Journal of Financial Economics* 70, 313-349.
- Tesar, L. and Werner, I. (1998): The Internalization of Securities Markets since the 1987 Crash, *Brookings-Wharton Papers in Financial Services*, 283-349.

- Tesar, L. and Werner, I. (1995): Home Bias and High Turnover, *Journal of International Money and Finance* 14, 467-492.
- Vermeulen, R. (2013): International diversification during the financial crisis: A blessing for equity investors, *Journal of International Money and Finance* 35, 104-123.
- Wongchoti, U. and Pyun, C. S. (2005): Risk-adjusted Long-term Contrarian Profits: Evidence from Non-S&P 500 High-Volume Stocks, *The Financial Review* 40, 335-359.
- Wu, Y. and Li, Y. (2011): Long-term return reversals – Value and growth or tax? UK evidence, *Journal of International Financial Market, Institutions and Money* 21, 347-368.

7 Overall Conclusion

The focus of this doctoral thesis is on the effects of taxes on investment decisions and asset prices. Based on three scientific studies I examine the effect of tax planning possibilities on M&As, how restrictions to loss transfers influence the decisions to start or to terminate a business and if capital gains taxes lead to reverting stock returns in the long-run. The results of all three papers taken together underline the economic meaning of taxes for investors' choices in the private marketplace.

The first paper tests for the use of tax avoidance strategies at the level of acquisition targets. I distinguish between three different tax planning channels and find empirical evidence for tax planning through permanent book-tax differences and tax-driven profit shifting via transfer pricing at the target post-deal. The results imply that acquirers that are able to implement tax planning strategies at the target level gain an ownership advantage over the initial owner. Thus, the deal takes place due to tax planning opportunities.

The results also imply that international acquirers might gain a competitive advantage over national bidders since purely domestic companies do not have access to cross-border tax planning opportunities. The same line of reasoning applies to international acquirers located in high-tax countries that cannot benefit from profit shifting into low taxed subsidiaries.

Future research on taxes and M&A activities could deal with the relocation of real economic activities in contrast to shifting of taxable profits in the presence of effective anti-avoidance rules. In addition, international tax planning opportunities could also affect multinationals' group structures.

In the second study I test if a purely M&A-related tax rule also exerts further detrimental effects on investment decisions. I analyze the effects of "anti-loss trafficking" regulations on the relative frequency of firm entries and the rate of firm exits. According to my initial tests, none of the examined anti-avoidance rules significantly reduces the number of loss-acquisitions. The subsequent analysis of the investment effects delivers mixed results: On the one hand the findings suggest that the entry decision is not adversely affected by restrictions to loss transfers. On the other hand, the base case results indicate that the frequency of terminated loss firms increases after newly introduced limitations.

The results could be helpful for policy makers in two ways: First, the effectiveness and design of anti-avoidance rules can be best evaluated in the light of real world statistical results. Con-

sequently, possible shortcomings of individual tax rules can be more directly addressed. Second, the results might draw more attention to formerly neglected economic effects of “anti-loss trafficking” rules and help to sensitize tax legislators for future tax policy endeavors. Future research could further examine the economic meaning of loss-acquisitions in general and analyze what groups of investors pay attention to “loss trafficking” restrictions. Such an in-depth analysis of the investment effects would require a more detailed classification of initial investments and access to confidential tax accounting data to reliably identify loss-firms.

The third essay is an international study of the effect of capital gains taxes on stock return patterns. I test if the taxation of capital gains can be viewed as a cause of negative autocorrelation of stock returns over long-term investment horizons. The results suggest that domestic as well as foreign capital gains taxes influence the development of long-term stock returns in a systematic way. These findings correspond to results in numerous other studies suggesting an economically relevant effect of shareholder taxation on expected returns.

Insights on how taxes determine asset prices can help policy makers to ensure financial market stability. Moreover, the impact of taxes on prices and what information they contain about the future are helpful for investors to optimize long-term portfolio structures and engage in tax-efficient trading strategies.

However, an intensified use of detailed shareholder level information would further contribute to the literature. Considering ownership data would help to differentiate between multiple groups of shareholders and to pinpoint the effect of taxes on asset prices. Furthermore, loss-compensation rule offer another source of variation to be exploited to gain further insights into shareholder trading behavior and asset prices.

The entire body of empirical evidence presented in my thesis rests on commonly applied levels of statistical significance. Based on the usual test-statistics, hypotheses are either rejected or confirmative empirical evidence is found. These tests of statistical significance are a vital part of quantitative research. However, scientific problems of testing and measurement and interpretation should not be reduced to statistical significance. Researchers should primarily ask the question “How much?” and not the question “whether” in scientific inquiries that are concerned with the size and importance of relationships (Ziliak and MacCloskey (2008)).

8 Full List of References

- Abadie, A., Diamond, A. and Hainmüller, J. (2014): Comparative Politics and the Synthetic Control Methods, Working Paper.
- Abadie, A., Diamond, A. and Hainmüller, J. (2010): Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program, *Journal of the American Statistical Association* 105(490), 493-505.
- Abadie, A. and Gardeazabal, J. (2003): The Economic Cost of Conflict: A Case Study of the Basque Country, *American Economic Review* 93 (1), 112-132.
- Ahearne, A. G., Grier, W. L. and Warnock, F. E. (2004): Information Costs and Home Bias: An Analysis of U.S. holdings of foreign equities, *Journal of International Economics* 62, 313-336.
- Altshuler, R., Auerbach, A. J., Cooper, M. and Knittel, M. (2009): Understanding U.S. Corporate Tax losses, *Tax Policy and the Economy* 23, Jeffrey R. Brown and James M. Poterba (eds), University of Chicago, 73-122.
- Altshuler, R. and Auerbach, A. J. (1990): The significance of tax law asymmetries: an empirical investigation, *The Quarterly Journal of Economics* 105, 61-86.
- Amadi, A. (2004): Equity Home Bias: A disappearing Phenomenon? Working Paper.
- Antoniou, A., Galariotis, E. C. and Spyrou, S. I. (2005): Contrarian Profits and the Overreaction Hypothesis: The Case of the Athens Stock Exchange, *European Financial Management* 11 (1), 71-98.
- Appelbaum, E. and Katz, E. (1996): Asymmetric Taxation and the Theory of the Competitive Firm Under Uncertainty, *Canadian Journal of Economics* 20, 357-369.
- Arulampalam, W., Devereux, M. P. and Liberini, F. (2012): Taxes and the Location of Targets, Working Paper.
- Auerbach, A. J. (2007): Why Have Corporate Tax Revenues Declined? Another Look, *CESifo Economic Studies* 53 (June), 153-71.
- Auerbach, A. J. (1991): Retrospective Capital Gains Taxation, *The American Economic Review* 81 (1), 167-178.
- Auerbach, A. J. (1986): The Dynamic Effects of Tax Law asymmetries, *Review of economic studies*, 205-225.
- Auerbach, A. J. and Poterba, J. M. (1987): Tax-Loss Carry-forwards and Corporate Tax Incentives, *The Effects of Taxation on Capital Accumulation*, M. Feldstein (ed.), Chicago: University of Chicago Press, 305-338.

- Auerbach, A. J. and Reishus, D. (1988a): Taxes and the Merger Decision, *Knights, raiders and Targets: The Impact of the Hostile Takeover*, John C. Coffee, Jr, Louis Lowenstein and Susan Rose-Ackerman (eds.), Oxford University Press, 300-313.
- Auerbach, A. J. and Reishus, D. (1988b): The Effects of Taxation on the Merger Decision, *Corporate Takeover, Causes and Consequences*, Alan J. Auerbach (ed.), 157-190.
- Auerbach, A. J. and Reishus, D. (1987): The Impact of Taxation on Mergers and Acquisitions, *Merger and Acquisitions*, Alan J. Auerbach (ed.), University of Chicago Press, 69-86.
- Ayers, B. C., Lefanowicz, C. E. and Robinson J. R. (2003): Shareholder taxes in acquisition premiums: The effect of capital gains taxation, *Journal of Finance* 58, 2783–2801.
- Baele, L., Pungulescu, C. and Horst, J. T. (2007): Model uncertainty, financial market integration and the home bias puzzle, *Journal of International Money and Finance* 26, 606-630.
- Ball, R., Kothari, S. P. and Shanken, R. (1995): Problems in measuring portfolio performance: An application to contrarian investment strategies, *Journal of Financial Economics* 38, 79-107.
- Ball, R. and Kothari, S. P. (1989): Nonstationary Expected Returns – Implications for Tests of Market Efficiency and Serial Correlation in Returns, *Journal of Financial Economics* 25, 51-74.
- Barberis, N., Shleifer, A. and Vishny, R. (1998): A model of investor sentiment, *Journal of Financial Economics* 49, 307-343.
- Baytas, A. and Cakici, N. (1999): Do markets overreact: International evidence. *Journal of Banking and Finance* 23, 1121-1144.
- Becker, J. and Fuest C. (2010): Taxing foreign profits with international mergers and acquisitions, *International Economic Review* 51 (1), 171-186.
- Bennet, A. and Elman, C. (2006): Qualitative Research: Recent Development in Case Study Methods, *Annual Review of Political Science* 9, 455-476.
- Bennett, J. A., Sias, R. W. and Starks L. T. (2003): Greener Pastures and the Impact of Dynamic Institutional Preferences, *The Review of Financial Studies* 16, 1203-1238.
- Bertrand, M. and Kramarz, F. (2002): Does entry regulation hinder job creation? Evidence from the French retail industry, *Quarterly Journal of Economics* 117, 1369-1413.
- Billmeier, A. and Nannicini, T. (2013): Assessing economic liberalization episodes: a synthetic control approach, *The Review of Economics and Statistics*, 983-1001.
- Blouin, J. L., Collins, J. H. and Shackelford, D. A. (2005): Does acquisition by non-U.S. shareholders cause U.S. firms to pay less tax?, *Journal of the American Taxation Association* 27 (1), 25–38.

- Blouin, J. L., Raedy, J. S. and Shackelford, D. A. (2003): Capital Gains Taxes and Equity Trading: Empirical Evidence, *Journal of Accounting Research* 41 (4), 611-651.
- Boudoukh, J., Richardson, M. P. and Whitelaw, R. F. (1994): A Tale of Three Schools: Insights on Autocorrelations of Short-Horizon Stock Returns, *The Review of Financial Studies* 7 (3), 539-573.
- Bowman, R. G. and Iverson, D. (1998): Short-run Overreaction in the New Zealand stock market, *Pacific-Basin Finance Journal* 6, 475-491.
- Brincker, E. (2008). Debt push-down facilities smoothen BEE deals. *Business Law & Tax Review*, July.
- Brown, D. T. and Ryngaert, M. D. (1991): The Mode of Acquisition in Takeovers: Taxes and Asymmetric Information, *The Journal of Finance* 46 (2), 653-669.
- Bruce, Donald: (2000): Effects of the United States tax system on transitions into self-employment, *Labour Tax* 7, 545-574.
- Busentiz, L. and Barney, J. (1997): Differences between entrepreneurs and managers in large organizations: biases and heuristics in strategic decision making, *Journal of Business Venturing* 12 (1), 9-30.
- Camerer, C. F. and Lovallo, D. (1999): Overconfidence and excess entry: An experimental approach, *American Economic Review* 89, 306-318.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2001): Personal Income Taxes and the Growth of Small Firms, *Tax Policy and the Economy, Volume 15*, James Poterba (ed.), Cambridge: MIT Press, 2001.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2000a): The Economic Consequences of Taxing the Rich, *Entrepreneurs, Income Taxes, and Investment, Does Atlas Shrug?* Joel Slemrod (ed.), Cambridge: Harvard University Press.
- Carroll, R., Holtz-Eakin, D., Rider, M. and Rosen, H. S. (2000b): Income Taxes and Entrepreneurs' Use of Labor, *Journal of Labor Economics* 18, 324-351.
- Chan, K. and Covrig, V. (1988): On the Contrarian Investment Strategy, *The Journal of Business* 61 (2), 147-163.
- Chan, K., Covrig, V. and Ng, L. (2005): What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide, *The Journal of Finance* 60 (3), 1495-1533.
- Chang, S. J. and Singh, H. (1999): The impact of modes of entry and resource fit on modes of exit by multi-business firms, *Strategic Management Journal*, No. 20, 1019-1035.
- Chen, S., Chen, X., Cheng, Q. and Shevlin, T. (2010): Are family firms more tax aggressive than non-family firms?, *Journal of Financial Economics* 95 (1), 41-61.

- Chiang, W-C, Stammerjohan, W. and Englebrecht, T. D. (2014): Pricing target NOLs in mergers and acquisitions from the participating firms' perspective, *Advances in Accounting, incorporating Advances in International Accounting* 30, 32-42.
- Chou, P-H., Wei, K. C. J. and Chung, H. (2007): Sources of contrarian profits in the Japanese stock market, *Journal of Empirical Finance* 14, 261-286.
- Chow, K. C., Klassen K. and Liu, Y. (2013): Shareholder wealth effects of tax aggressiveness transfer, University of Waterloo Working Paper.
- Chui, A. C. W., Titman, S. and Wei, K.C. J. (2010): Individualism and Momentum around the World, *The Journal of Finance* 65 (1), 361-391.
- Claessens, S and Leaven, L, (2003): Financial development, property rights and growth, *Journal of Finance* 58, 2401-2436.
- Clare, A. and Thomas, S. (1995): The Overreaction Hypothesis and the UK Stock Market, *Journal of Business Finance and Accounting* 22 (7), 961-973.
- Clark, K. and Ofek E. (1994): Mergers as a means of restructuring distressed firms: An empirical investigation, *Journal of Financial & Quantitative Analysis* 29 (4), 541-565.
- Cloyed, B. C., Mills, L. F. and Weaver, C. D. (2003): Firm Valuation Effects of the Expatriation of U.S. Corporations to Tax-Haven Countries, *The Journal of the American Taxation Association* 25, 87-109.
- Col, B. and Errunza, V. (2014): Havenly acquisitions, McGill University Working Paper.
- Collins, J. H., Kemsley, D. and Shackelford, D. A. (1995): Tax Reform and Foreign Acquisitions: A Microanalysis, *National Tax Journal* 48 (1), 1-21.
- Conrad, J., Cooper, M. and Kaul, G. (2003): Value versus Glamour, *The Journal of Finance* 58 (5), 1969-1995.
- Conrad, J. and Kaul, G. (1998): An Anatomy of Trading Strategies, *The Review of Financial Studies* 11 (3), 489-519.
- Conrad, J. and Kaul, G. (1993): Long-term Market Overreaction or Biases in Computed Returns, *The Journal of Finance* 48 (1), 39-63.
- Constantinides, G. M. (1984): Optimal Stock Trading with Personal Taxes – Implications for Prices and the Abnormal January Returns, *Journal of Financial Economics* 13, 65-89.
- Constantinides, G. M. (1983): Capital Market Equilibrium with Personal Tax, *Econometrica* 51 (3), 611-636.
- Cooper, M. G. and Knittel, M. J. (2010): The implications of tax asymmetry for U.S. corporations, *National Tax Journal* 63, 33-62.
- Cooper, I. and Kaplanis, E. (1994): Home Bias in Equity Portfolios, Inflation Hedging, and International Capital Market Equilibrium, *Review of Financial Studies* 7, 45-60.

- Cooper, A.C., Woo, C.Y. and Dunkelberg, W.C. (1988): Entrepreneurs' perceived chances for success, *Journal of Business Venturing* 3, 97-108.
- Crawford, D. and Lechner, T. (1996): Takeover Premiums and Anticipated Merger Gains in the Market for Corporate Control, *Journal of Business Finance and Accounting* 23 (5), 807-829.
- Creal, D., Robinson, L., Rogers, J. and Zechman, S. (2014): The multinational advantage, Chicago Booth Paper No. 11-37.
- Crowell Moring Financial Services Alert: Tax Notice drives Wachovia Takeover Turmoil, <http://www.crowell.com/NewsEvents/AlertsNewsletters/Financial-Services-Alert/Tax-Notice-Drives-Wachovia-Takeover-Turmoil>
- Cullen, J. B. and Gordon, R. H. (2007): Taxes and entrepreneurial risk-taking: theory and evidence for the U.S., *Journal of Public Economics*, 1479-1505.
- Cypert, R. and March, J. (1963): A behavioral Theory of the Firm, Prentice Hall, Upper Saddle River NJ.
- Da Rin, M., Di Giacomo, M. and Sembenelli, A. (2011): Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe, *Journal of Public Economics* 95 (9), 1048-1066.
- Dahlquist, M. and Robertsson, G. (2001): Direct foreign ownership, institutional investors, and firm characteristics, *Journal of Financial Economics* 59, 413-440.
- Dai, Z., Maydew, E., Shackelford, D. A. and Zhang, H. H. (2008): Capital Gains Taxes and Asset Prices: Capitalization or Lock-in?, *The Journal of Finance* 63 (2), 709-742.
- Daniel, K., Hirshleifer, D. and Subrahmanyam, A. (1998): Investor Psychology and Security Markets Under – and Overreaction, *The Journal of Finance* 53 (6), 1839-1885.
- DeBondt, W. F. M. and Thaler, R. H. (1987): Further Evidence on Investor Overreaction and Stock Market Seasonality, *The Journal of Finance* 42 (3), 557-581.
- DeBondt, W. F. M. and Thaler, R. H. (1985): Does the Stock Market Overreact? *The Journal of Finance* 40 (3), 793-805.
- Delauriere, J. (2011): U.S. debt push-down in a French subsidiary – The good and the bad, *Tax Analysts*, March 9, 2011.
- De Mooij, R. A. and Ederveen, S. (2008): Corporate tax elasticities: a reader's guide to empirical findings, *Oxford Review of Economic Policy* 24 (4), 680-697.
- De Mooij, R. A. and Ederveen, S. (2003): Taxation and Foreign Direct Investment: A Synthesis of Empirical Research, *International Tax and Public Policy* 10, 673-693.
- Desai, M. A., Foley, F. and Hines, J. R. Jr. (2004): A multinational perspective on capital structure choice and internal capital markets, *Journal of Finance* 59 (6), 2451–2487.

- Desai, M. A. and Hines, J. R. Jr. (2003): Evaluating international tax reforms, *National Tax Journal* 56 (3), 487-502.
- Desai, M. A., Gompers, P. and Lerner, J. (2003): Institutions, capital constraints and entrepreneurial firm dynamics: Evidence from Europe. Working Paper No. 10165, National Bureau of Economic Research.
- Desai, M. A. and Hines, J. R. Jr. (2002): Expectations and Expatriations: tracing the Causes and Consequences of Corporate Inversions, *National Tax Journal* 55 (3), 409-440.
- De Simone, L., Klassen, K. and Seidman, J. (2014): Unprofitable affiliates and income shifting behavior, Stanford University Working Paper.
- Devereux, M. P., Keen, M. and Schiantarelli, F. (1994): Corporation tax asymmetries and investment, *Journal of Public Economics*, 53 (3), 395-418.
- Devos, E., Kadapakkam, P. and Krishnamurthy, S. (2009): How do mergers create value? A comparison of taxes, market power, and efficiency improvements as explanations for synergies, *Review of Financial Studies* 22 (3), 1179-1211.
- Dhaliwal, D. S., Newberry, K. J. and Weaver, C. D. (2005): Corporate Taxes and Financing Methods for Taxable Acquisitions, *Contemporary Accounting Research* 22 (1), 1-30.
- Dietrich, J. and Sorensen, E. (1984). An application of logit analysis to prediction of merger targets, *Journal of Business Research* 12 (3), 393-402.
- Di Giovanni, J. (2005): What drives capital flows? The case of cross-border M&A activity and financial deepening, *Journal of International Economics* 65, 127-149.
- Dissanaike, G. (1999): Long-term stock price reversal in the U.K.: Evidence from regression tests, *British Accounting Review* 31, 373-385.
- Djankov, S., Ganser, T., MacLiesh, C., Ramalho, R. and Shleifer, A. (2010): The Effect of Corporate Taxes on Investment and Entrepreneurship, *American Economic Journal: Macroeconomics*, 2 (3), 31-64.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2002): The regulation of entry, *The Quarterly Journal of Economics* 117 (1), 1-37.
- Domar, E. D. and Musgrave, R. A. (1944): Proportional Income Taxation and Risk-Taking, *The Quarterly Journal of Economics*, 58 (3), 388-422.
- Donelly, M. and Young, A. (2002): Policy Options for Tax Loss Treatment: How does Canada Compare, *Canadian Tax Journal*, 429-488.
- Dosi, G. and Lovallo, D. (1997): Rational Entrepreneurs are optimistic martyrs? Some considerations on technological regimes, corporate entries and the evolutionary role of decision biases, *Technological Innovation: Oversight and Foresight*, Garud, R., Nayyar, P. Shapira, Z. (eds.), Cambridge University Press, 41-68.

- Dreßler, Daniel and Overesch, Michael, (2013): Investment impact of tax loss treatment—empirical insights from a panel of multinationals, *International Tax and Public Finance* 20, 513-543.
- Dunne, T., Roberts, M.J. and Samuelson, L. (1988): Patterns of firm entry and exit in U.S. manufacturing industries, *RAND Journal of Economics* 19 (4), 495-515.
- Dyl, Edward (1977): Capital gains taxation and year-end stock market behavior, *The Journal of Finance* 32, 165-175.
- Dyreng, S., Hanlon, M. and Maydew, E. (2010): The effects of executives on corporate tax avoidance, *The Accounting Review* 85 (4), 1163-1189.
- Dyreng, S., Hanlon, M. and Maydew, E. (2008): Long-run corporate tax avoidance, *The Accounting Review* 83 (1), 61-82.
- Edgerton, J. (2010): Investment incentives and corporate tax asymmetries, *Journal of Public Economics*, 94 (11–12), 936–952.
- Egger, P., Keuschnigg, C. and Winner, H. (2009): Incorporation and taxation: theory and firm-level evidence, CED-Ifo Working Paper 2685.
- Erel, I., Liao, R. C. and Weisbach, M. S. (2012): Determinants of cross-border mergers and acquisitions, *Journal of Finance* 67 (3), 1045–1082.
- Erickson, M. (1998): The effect of taxes of the structure of corporate acquisitions, *Journal of Accounting Research* 36 (2), 279–298.
- Erickson, M. and Wang, S. (2007): Tax Benefits as a Source of Merger Premiums in Acquisitions of Private Corporations, *The Accounting Review* 82 (2), 359-387.
- Erickson, M. and Wang, S. (2000): The effect of transaction structure on price: Evidence from subsidiary sales, *Journal of Accounting and Economics* 30, 59-97.
- Ernst and Young, Worldwide Corporate Tax, 2001-2010, Ernst and Young International.
- Eurostat (2014): Taxation Trends in the European Union, 2014 Edition.
- Fama, E. F. and French, K. R. (1998): Value versus growth: The international evidence, *The Journal of Finance* 53, 1975-1999.
- Fama, E. F. and French, K. R. (1996): Multifactor Explanations of Asset Pricing Anomalies, *The Journal of Finance* 51 (1), 55-84.
- Fama, E. F. and French, K. R. (1995): Size and book-to-market factors in earnings and returns, *The Journal of Finance* 50, 131-155
- Fama, E. F. and French, K. R. (1993): Common risk factors in the returns of stocks and bonds, *Journal of Financial Economics* 33, 3-56.

- Fama, E. F. and French, K. R. (1988): Permanent and Temporary Components of Stock Prices, *The Journal of Political Economy* 96 (2), 246-273.
- Fama, E. F. and MacBeth J. (1973): Risk, return and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607-636.
- Feld, L. P., Ruf, M., Scheuering, U., Schreiber, U. and Voget, J. (2013): Effects of Territorial and Worldwide Corporation Tax Systems on Outbound M&As, ZEW Discussion Paper No. 13 – 088.
- Feld, L. P. and Heckemeyer, J. H. (2011): FDI and Taxation: A Meta-Study, *Journal of Economic Surveys* 25 (2), 233-272.
- Feldstein, M., Slemrod, J. and Yitzhaki, S. (1980): The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains, *The Quarterly Journal of Economics*, 777-791.
- Ferreira, M. A. and Matos, P. (2008): The colors of Investors' money: The role of institutional investors around the world, *Journal of Financial Economics* 88, 499-533.
- Forbes, D. P. (2005): Are some entrepreneurs more overconfident than others?, *Journal of Business Venturing* 20, 623-640.
- French, K. R. and Poterba, J.M. (1991): Investor Diversification and International Equity Markets, *American Economic Review* (81), 222-226.
- Galariotis, E. C., Holmes, P. and Ma, X. S. (2007): Contrarian and Momentum Profitability revisited: Evidence from the London Stock Exchange 1964-2005, *Journal of Multinational Financial Management* 17 (5), 432-447.
- Gaunt, C. (2000): Overreaction in the Australian equity market: 1974-1997, *Pacific-Basin Finance Journal* 8, 375-398.
- Gentry, W. M. and Hubbard, R. G. (2005): "Success Taxes", Entrepreneurial Entry, and Innovation, *Innovation Policy and the Economy Volume 5*, The MIT Press, 87-108.
- Gentry, W. M. and Hubbard, R. G. (2004a): The effects of progressive income taxation on job turnover, *Journal of Public Economics* 88, 2301-2322.
- Gentry, W. M. and Hubbard, R. G. (2004b): Tax Policy and Entry into Entrepreneurship, mimeo, Columbia University.
- George, T. J. and Hwang, C-Y. (2007): Long-term Return Reversal: Overreaction or Taxes?, *The Journal of Finance* 62 (6), 2865-2894.
- George, T. J. and Hwang, C-Y. (2004): The 52-Week High and Momentum Investing, *The Journal of Finance* 59 (5), 2145-2176.
- George, A. L. and Bennet, A. (2005): Case Studies and Theory Development in the Social Science. Cambridge MA, MIT Press.

- Gerring, J. (2007): Case Study Research: Principles and Practices, Cambridge, Cambridge University Press.
- Gilson, R. J., Scholes, M. S. and Wolfson, M. A. (1987): Taxation and the Dynamics of Corporate Control: The Uncertain Case for Tax-Motivated Acquisitions, *Knights, raiders and Targets: The Impact of the Hostile Takeover*, John C. Coffee, Jr, Louis Lowenstein and Susan Rose-Ackerman (eds.), Oxford University Press, 271-299.
- Gompers, P. A. and Metrick, A. (2001): Institutional Investors and Equity Prices, *The Quarterly Journal of Economics*, 229-359.
- Gordon, R. H. (1998): Can High Personal Tax Rates Encourage Entrepreneurial Activity?, *Palgrave Macmillan Journals – International Monetary Fund*, 49-80.
- Griffin, J. M., Kelly, P. J. and Nardari, F. (2010): Do Market Efficiency Measures Yield Correct Inferences? A Comparison of Developed and Emerging Markets, *Review of Financial Studies* 23, 3226-3277.
- Grinblatt, M. and Moskowitz, T. J. (2004): Predicting stock price movements from past returns: the role of consistency and tax-loss selling, *Journal of Financial Economics* 71, 541-579.
- Grinblatt, M. and Keloharju, M. (2004): Tax-loss trading and wash sales, *Journal of Financial Economics* 71, 51-76.
- Grinblatt, M. and Keloharju, M. (2001): How Distance, Language, and Culture Influence Stockholdings and Trades, *The Journal of Finance* 56 (3), 1053-1073.
- Grinblatt, M. and Keloharju, M. (2000): The Investment Behavior and Performance of various Investor Types: a study of Finland's unique data set, *Journal of Financial Economics* 55, 43-67.
- Guenther, D. A. and Willenborg, M. (1999): Capital gains tax rates and the cost of capital for small business: evidence from the IPO market, *Journal of Financial Economics* 53, 385-408.
- Hanlon, M. and Heitzman, S. (2010): A review of tax research, *Journal of Accounting & Economics* 50 (2/3), 127-178.
- Hansen, R. (1987): A theory for the choice of exchange medium in mergers and acquisitions, *Journal of Business* 60 (1), 75-95.
- Harhoff, D., Stahl, K. and Woywode, M. (1998): Legal Form, Growth and Exit of West German firms – empirical results for manufacturing construction, trade and service industries, *The Journal of Industrial Economics* 46 (4), 453-488.
- Hartman, D. G. (1984): Tax Policy and Foreign Direct Investment in the United States, *National Tax Journal* 37, 475-487.

- Haugen, R. A., Talmor, E. and Torous, W. N. (1991): The Effect of Volatility Changes on the Level of Stock Prices and Subsequent Expected Returns, *The Journal of Finance* 46 (3), 985-1007.
- Haw, I-M, Pastena, V. and Lilien, S. (1987): The Association between Market-Based Merger Premiums and Firms' Financial Position Prior to Merger, *Journal of Accounting, Auditing and Finance*, 24-42.
- Hayn, C. (1989): Tax Attributes as Determinants of Shareholder Gains in Corporate Acquisitions, *Journal of Financial Economics* 23, 121-153.
- Hayward, M. L. A. and Hambrick, D. C. (1997): Explaining the premiums paid in large acquisitions: evidence of CEO hubris, *Administrative Science Quarterly* 42, 103-127.
- He, J., Ng, L. and Wang, Q. (2004): Quarterly Trading Patterns of Financial Institutions, *The Journal of Business* 77 (3), 493-509.
- Hebous, S., Ruf, M. and Weichenrieder, A. J. (2011): The Effects of Taxation on the Location Decision of Multinational Firms: M&A versus Greenfield Investments, *National Tax Journal* 64 (3), 817-838.
- Heine, S. J., Lehman, D. J., Markus, H. R. and Kitayama, S. (1999): Is there a Universal Need for Positive Self-Regard, *Psychological Review* 106 (4), 766-794.
- Henning, S. L., Shaw, W. H. and Stock, T. (2000): The Effect of Taxes on Acquisition Price and Transaction Structure, *The Journal of the American Taxation Association* 22, 1-17.
- Herger, N., Kotsogiannis, C., and MacCorriston, S. (2011): International Taxation and FDI Strategies: Evidence from U.S. Cross-Border Acquisitions, Discussion Paper.
- Hines, J. and Rice, E. (1994): Fiscal paradise: Foreign tax havens and American business, *Quarterly Journal of Economics* 109 (1), 149-182.
- Hofstede, Geert (2001): Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations, Second Edition, Sage Publication, Beverly Hills, California.
- Hong, H., Lim, T. and Stein, J. C. (2000): Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies, *The Journal of Finance* 55 (1), 265-295.
- Hong, H. and Stein, J. C. (1999): A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets, *The Journal of Finance* 54 (6), 2144-2184.
- Huizinga, H., Voget, J. and Wagner, W. (2013): Capital Gains Taxation and the Cost of Capital: Evidence from unanticipated Cross-border Transfer of Tax Bases, Working Paper.
- Huizinga, H., Voget, J. and Wagner, W. (2012): Who bears the burden of international taxation? Evidence from cross-border M&As, *Journal of International Economics* 88, 186-197.
- Huizinga, H. and Voget, J. (2009): International taxation and the direction and volume of cross-border M&As, *Journal of Finance* 64 (3), 1217-1249.

- Huizinga, H. and Laeven, L. (2008): International profit shifting within multinationals: A multi-country perspective, *Journal of Public Economics* 92 (5/6), 1164–1182.
- Huizinga, H., Laeven, L. and Nicodeme, G. (2008): Capital structure and international debt shifting, *Journal of Financial Economics* 88 (1), 80-118.
- Huyghebaert, N. and van de Gucht, L. (2004): Incumbent Strategic Behavior in financial markets and the Exit of entrepreneurial start-ups, *Strategic Management Journal* 25, 669-688.
- IBFD, Country Analysis, accessed online at <http://www.ibfd.org/IBFD-Tax-Portal/Country-Analyses> in May 2014.
- IBFD, Annual Reports, 1970-1986.
- IBFD, Tax News Services, accessed online at http://online.ibfd.org/kbase/#topic=d&N=3+10+4913&WT.i_s_type=Navigation&ownSubscription=true&Ne=4912&colid=4913&Ns=sort_news_date%257C1%257C%257Csort_country_one%257C0%257C%257Csort_country_two%257C0%257C%257Cfile-name%257C0&rpp=25 in May 2014.
- IBFD, The European Tax Handbook, 1990-2012.
- Ince, O. S. and Porter, B. R. (2006): Individual Equity Return Data from Thomson Datastream: Handle with Care!, *The Journal of Financial Research* 29 (4), 463-479.
- Jegadeesh, N. and Titman, S. (2001): Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *The Journal of Finance* 61 (2), 699-720.
- Jegadeesh, N. and Titman, S. (1993): Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *The Journal of Finance* 48 (1), 65-91.
- Jensen, M. C. and Ruback, R. S. (1983): The Market for Corporate Control, *Journal of Financial Economics* 11, 5-50.
- Jin, L. (2006): Capital Gains Tax Overhang and Price Pressure, *The Journal of Finance* 61 (3), 1399-1431.
- Johnson, S., MacMillan, J. and Woodruff, C. (2002): Property rights and finance, *American Economic Review* 92, 1335–1356.
- Jones, S. L. (1993): Another look at time-varying risk and return in a long-horizon contrarian strategy, *Journal of Financial Economics* 33, 119-144.
- Kaplan, S. (1989): Management buyouts: Evidence on taxes as a source of value, *Journal of Finance* 44 (3), 611–632.
- Kaplan, D. S., Piedra, E. and Seira, E. (2011): Entry regulation and business start-ups: Evidence from Mexico, *Journal of Public Economics* 95 (11-12), 1501-1515.

- Klapper, L., Laeven, L. and Rajan, R. (2006): Entry regulation as a barrier to entrepreneurship, *Journal of Financial Economics* 82 (3), 591-629.
- Klassen, K. and LaPlante, S. (2012): Are U.S. multinational corporations becoming more aggressive income shifters?, *Journal of Accounting Research* 50 (5), 1245-1286.
- Klein, P. (2004): The capital gain lock-in effect and perfect substitutes, *Journal of Public Economics* 88, 2765-2783.
- Klein, P. (2001): The capital gain lock-in effect and long-horizon return reversal, *Journal of Financial Economics* 59, 33-62.
- Klein, P. (1999): The capital gain lock-in effect and equilibrium returns, *Journal of Public Economics* 71, 355-378.
- Koellinger, P., Minniti, M. and Schade, C. (2007): “I Think I can, I think I can”: Overconfidence and entrepreneurial behavior, *Journal of Economic Psychology* 28, 502-527.
- KPMG, Taxation of Cross-Border Mergers and Acquisitions, accessed online at <https://www.kpmg.com/global/en/issuesandinsights/articlespublications/cross-border-mergers-acquisitions/Pages/default.aspx> in May 2014.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. W. (2002): Investor protection and corporate valuation, *Journal of Finance* 57, 1147–1170.
- Landsman, W. R. and Shackelford, D. A. (1995): The Lock-in effect of Capital Gains Taxes: Evidence from the RJR Nabisco Leveraged Buyout, *National Tax Journal* 48 (2), 245-259.
- Lane, P. R. and Milesi-Ferretti, G. M. (2007): The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, *Journal of International Economics* 73 (2), 223-250.
- Lang, M. H. and Shackelford, D. A. (2000): Capitalization of capital gains taxes: evidence from stock price reactions to the 1997 rate reduction, *Journal of Public Economics* 76, 69 - 85.
- Lara, J. M. G., Osma, B. G. and Noguer, B. G. (2006): Effects of Database Choice on International Accounting research, *Abacus* 42 (3/4), 426-454.
- Lintner, J. (1971): Expectations, Mergers and Equilibrium in Purely Competitive Markets, *The American Economic Review* 61 (2), 101-111.
- Lo, A. A. and MacKinlay, A. C. (1990): When are Contrarian Profits due to Stock Market Overreaction?, *The Review of Financial Studies* 3 (2), 175-205.
- Markus, H. R. and Kitayama, S. (1991): Culture and the self: Implication for Cognition, Emotion, and Motivation, *Psychological Review* 98, 224-253.
- Martin, X., Wang C. and Zou, H. (2012): Does target tax aggressiveness matter in corporate takeovers? SSRN Working Paper.

- Martynova, M. and Renneboog, L. (2008): A century of corporate takeovers: What have we learned and where do we stand?, *Journal of Banking & Finance* 32 (10), 2148–2177.
- Mata, J., Portugal P., and Guimaraes, P. (1995): The survival of new plants: Start-up conditions and post-entry evolution, *International Journal of Industrial Organization* 13, 459-481.
- Mills, L., Erickson M. and Maydew, E. (1998): Investments in tax planning, *Journal of the American Taxation Association* 20 (1), 1–20.
- Mintz, Jack M. (1981): Some additional results on investment, risk-taking and full loss offset corporate taxation with interest deductibility, *The Quarterly Journal of Economics*, 63-642.
- Moore, D. A., Oesch, J. M., and Zietsma, C. (2007): What Competition? Myopic Self-Focus in Market-Entry Decisions, *Organization Science* 18 (3), 440-454.
- Moore, N. H. and Pruitt, S. W. (1987): The Market Pricing of Net Operating Loss Carryforwards: Implications of the Tax Motivations of Mergers, *The Journal of Financial Research* 10 (2), 153-160.
- Mossin, J. (1968): Taxation and Risk-Taking: An expected Utility Approach, *Economica, New Series*, 74-82.
- Musgrave, P. B. (1969): United States Taxation of Foreign Investment Income: Issues and Arguments, Cambridge, MA, International Tax Program, Harvard Law School.
- Nam, K., Pyun, C. S. and Kim, S-W. (2003): Is asymmetric mean-reverting pattern in stock returns systematic? Evidence from Pacific-basin markets in the short-horizon. *International Financial Markets, Institutions and Money* 13, 418-502.
- OECD (2011): Corporate Loss Utilization through Aggressive Tax Planning, OECD Publishing.
- OECD (2013): Entrepreneurship at a Glance Report 2013, OECD Publishing.
- OECD (2011): Entrepreneurship at a Glance Report 2011, OECD Publishing.
- Palepu, K. (1986): Predicting takeover targets, *Journal of Accounting & Economics* 8 (1), 3–35.
- Phillips, J. (2003): Corporate tax-planning effectiveness: The role of compensation-based incentives, *The Accounting Review* 78 (3), 847–874.
- Plummer, E. and Robinson, J. R. (1990): Capital Market Evidence of Windfalls from the Acquisition of Tax Carryovers, *National Tax Journal* 43 (4), 481-489.
- Poitevin, M. (1998): Effects of the Fiscal Treatment of Tax Losses on the Efficiency of Markets and the Incidence of Mergers, CIRANO, Série Scientifique.

- Poterba, J. M. (2001): Taxation, Risk-Taking and Household Portfolio Behavior, NBER Working Paper No. 8340.
- Poterba, J. M. (1989): Capital Gains Tax Policy towards Entrepreneurship, *National Tax Journal*, 375-389.
- Poterba, J. M. and Weisbenner, S. J. (2001): Capital Gains Tax Rules, Tax-loss Trading, and Turn-of-the-year Returns, *The Journal of Finance* 56 (1), 353-368.
- Poterba, J. M. and Summers, L. H. (1988): Mean Reversion in Stock Prices, *Journal of Financial Economics* 22, 27-59.
- Ravenscraft, D. and Scherer, F. (1989): The profitability of mergers. *International Journal of Industrial Organization* 7 (1), 101-116.
- Reese, W. A. Jr. (1998): Capital Gains taxation and Stock Market Activity: Evidence from IPOs, *The Journal of Finance* 53 (5), 1799-1819.
- Rego, S. (2003): Tax avoidance activities of U.S. multinational corporations, *Contemporary Accounting Research* 20 (4), 805-855.
- Rincon, A. and Vecchi, M. (2003): Productivity Performance at the Company Level, Chapter V of EU Productivity and Competitiveness: An Industry Perspective, European Commission, Brussels.
- Ritter, J. R. (1988): The Buying and Selling Behavior of Individual Investors at the Turn of the Year, *The Journal of Finance* 43 (3), 701-717.
- Romer, P. (1994): New goods, old theory and the welfare cost of trade restrictions, *Journal of Development Economics* 43 (1), 25-45.
- Rosenbaum, P. and Rubin, D. (1983): The central role of the propensity score in observational studies for causal effects, *Biometrika* 70 (1), 41-55.
- Rosenberg, B. and Houglet, M. (1974): Error Rates in CRSP and Compustat Data Bases and Their Implications, *The Journal of Finance* 29 (4), 1303-1310.
- Rossi, S. and Volpin, P. F. (2004): Cross-Country Determinants of Mergers and Acquisitions, *Journal of Financial Economics* 74, 277-304.
- Ruf, M. (2011): Why is the response of multinationals' capital structure choice to tax incentives that low? Some possible explanations, *Finanzarchiv* 67 (2), 123-144.
- Samaniego, R. M. (2009): Entry, Exit and Investment-Specific Technical Change, *The American Economic Review* 100 (1), 164-192.
- Sandmo, A. (1969): Capital Risk, Consumption and Portfolio Choice, *Econometrica* 37, 586 - 599.

- Scarpetta, S., Hemmings, P., Tressel, T. and Woo, J. (2002), The role of policy and institutions for productivity and firm dynamics: evidence from micro and industry data. Unpublished Working Paper, OECD.
- Schary, M. A. (1991): The Probability of Exit, *The RAND Journal of Economics* 22 (3), 339-353.
- Scheuring, U. (2014): M&A and the Tax Benefits of Debt-Financing, ZWE Discussion Paper 14-019.
- Schiereck, D., De Bondt, W. F. M. and Weber, M. (1999): Contrarian and Momentum Strategies in Germany, *Financial Analyst Journal* 55, 104-116.
- Schmidt, P. S. von Arx, U., Schrimpf, A., Wagner, A. F. and Ziegler, A. (2011): On the Construction of Common Size, Value and Momentum Factors in International Stock Markets: A Guide with Applications, ETH Economic Working Paper Series.
- Scholes, M. S., Wolfson, M., Erickson, M., Maydew E. and Shevlin, T. (2009): *Taxes and Business Strategy A Planning Approach* (4 ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Scholes, M. S. and Wolfson, M. A. (1990): The Effects of Changes in Tax Laws on Corporate Reorganization Activity, *Journal of Business* 63 (1), 141-164.
- Schreiber, U. (2014): Haftungsbeschränkung und steuerliche Verlustverrechnung, *Rechnungslegung, Prüfung und Unternehmensbewertung: Festschrift für Prof. Dr. Dr. h. c. Wolfgang Ballwieser*, Dobler, M., Hachmeister, D. and Kuhner, C. (eds.), Stuttgart, 761-776.
- Schuetze, H. J. (2000): Taxes, economic conditions and recent trends in male self-employment: a Canada–US comparison, *Labour Economics* 7, 504-544.
- Schumpeter, J. A. (1911): *Theorie Der Wirtschaftlichen Entwicklung*. Duncker & Humblot, Leipzig.
- Seida, J. A. and Wempe, W. F. (2004): Effective Tax Rate Changes and Earnings Stripping Following Corporate Inversions, *National Tax Journal* 57 (4), 805-828.
- Shackelford, D. A. and Verrecchia, R. E. (2002): Intertemporal Tax Discontinuities, *Journal of Accounting Research* 40 (1), 205-222.
- Sialm, C. (2009): Tax Changes and Asset Pricing, *The American Economic Review* 99 (4), 1356-1383.
- Simon, M., Houghton, S. M. (2003): The relationship between overconfidence and the introduction of risky products: evidence form a field study, *Academy of Management Journal* 46, 139-150.
- Sorensen, B. E., Wu, Y-T, Yosha, O. and Zhu, Y. (2007): Home Bias and international risk sharing: Twin puzzles separated at birth, *Journal of International Money and Finance* 26, 587-605.

- Stiglitz, J. (1976): The corporation Tax, *Journal of Public Economics* 5, 303-311.
- Stulz, R. M. and Williamson, R. (2003): Culture, Openness, and Finance, *Journal of Financial Economics* 70, 313-349.
- Swenson, D. L. (2000): Transaction Type and the Effect of Taxes on the Distribution of Foreign Direct Investment, *International Taxation and Multinational Activity*, Hines, James R., Jr. (ed.), University of Chicago Press, Chicago, 89-112.
- Tesar, L. and Werner, I. (1998): The Internalization of Securities Markets since the 1987 Crash, *Brookings-Wharton Papers in Financial Services*, 283-349.
- Tesar, L. and Werner, I. (1995): Home Bias and High Turnover, *Journal of International Money and Finance* 14, 467-492.
- Tobin, J. (1958): "Liquidity Preference as Behavior Towards Risk", *Review of Economic Studies* 25, 65-86.
- UNCTAD (2012): World Investment Report 2012, Geneva: United Nations Conference on Trade and Development.
- Vermeulen, R. (2013): International diversification during the financial crisis: A blessing for equity investors, *Journal of International Money and Finance* 35, 104-123.
- Voget, J. (2011): Relocation of headquarters and international taxation, *Journal of Public Economics* 95, 1067-1081.
- Weston, J., Mitchell, M. and Mulherin J. (2004): Takeovers, restructuring, and corporate governance (4 ed.), Upper Saddle River, NJ: Pearson Prentice Hall.
- Wooldridge, J. M. (2010): Econometric Analysis of Cross Section and Panel Data, Second Edition, Cambridge MIT Press.
- Wooldridge, J. M. (2002): Econometric Analysis of Cross Section and Panel Data, Cambridge, Mass.: MIT Press.
- Wongchoti, U. and Pyun, C. S. (2005): Risk-adjusted Long-term Contrarian Profits: Evidence from Non-S&P 500 High-Volume Stocks, *The Financial Review* 40, 335-359.
- Wu, Y. and Li, Y. (2011): Long-term return reversals – Value and growth or tax? UK evidence, *Journal of International Financial Market, Institutions and Money* 21, 347-368.
- Zephyr (2013): Zephyr Annual M&A Report Global 2013, Bureau van Dijk.
- Ziliak, S. T. and MacCloskey, D. H. (2008): The Cult of Statistical Significance – How the Standard Error costs us Jobs, Justice and Lives, The University of Michigan Press.

Lebenslauf

Name: Christian Steffens
Titel: Dipl.-Kfm.
Staatsangehörigkeit: deutsch

Berufliche Tätigkeit:

November 2011 – August 2015 Universität Mannheim
Wissenschaftlicher Mitarbeiter am Lehrstuhl für Allgemeine Betriebswirtschaftslehre und Betriebswirtschaftliche Steuerlehre, Prof. Dr. Ulrich Schreiber

Ausbildung

September 2010 – Februar 2015 Universität Mannheim
Promotion am Lehrstuhl für Allgemeine Betriebswirtschaftslehre und Betriebswirtschaftliche Steuerlehre, Prof. Dr. Ulrich Schreiber

Juli 2008 – Dezember 2008 University of Florida at Gainesville
1 Semester integriertes Auslandsstudium der BWL

Februar 2005 – Juni 2010 Universität Mannheim
Studium der Betriebswirtschaftslehre
Abschluss als Diplom-Kaufmann mit der Note "sehr gut"
Spezialisierungen: Wirtschaftsprüfung, Steuern, Steuerrecht

April 2004 – Dezember 2004 Cambridge Aspect ILA, UK
Sprachkurs

März 2004 Theresianum Mainz
Abschluss Abitur