Discussion Paper No. 12-040

The Impact of Corporate Taxes on Investment

An Explanatory Empirical Analysis for Interested Practitioners

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ZEW

Zentrum für Europäische Wirtschaftsforschung GmbH

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Non-Technical Summary

Investment behavior is influenced by corporate taxation. High taxes hinder investment, whereas low tax rates favor it, especially within a context of cross-border direct investment. This claim is backed by a broad array of highly credible scientific literature. Nevertheless, in the public debate of tax practitioners, it can by no means be considered part of the common consensus. Whilst focusing on other determinants of direct investment sometimes any relevance of the taxation factor is denied. This paper has two overall goals: first, to empirically work out the effect of taxes on investment behavior and second, to document which requirements need to be fulfilled to arrive at a sound conclusion.

The applied Microdatabase Direct Investment (MiDi) by the German Federal Bank covers the direct investment development of German parent companies abroad and that of foreign parent companies in Germany. The paper is structured in a mirror image style covering both of these investment directions. The timeline in question consists of 13 years and ranges from 1996 to 2008. The paper considers firm heterogeneity regarding their respective profit and loss histories and additionally analyzes the tax incentive to establish holding companies. As a robustness check, findings on Germany as a whole are supplemented by a subsample of the strongly export orientated federal state Baden-Württemberg.

The descriptive analysis shows the rapid growth of both inbound and outbound international investment activity in the observed period from 1996 to 2008. The development of Baden-Württemberg corporations has largely been the same as that of Germany as a whole. Since estimations require a minimum amount of variation and different comparison groups, proving the tax rate effect on investment here is only possible in the outbound case, but not in the inbound case.

From the outbound case, I conclude that a by 10 percentage points increased corporate tax rate causes a 5.32% reduction in investment, measured by fixed assets. Accordingly, a by 10 percentage points lower corporate tax rate leads to about 5% higher investments. In a second step, I find empirical evidence that companies with an existing loss carryforward are less concerned with tax rates in their investment decisions. About half of the negative tax rate effect is compensated for firms with an existing loss carryforward. For firms with loss carryforwards, a tax rate increase of ten percentage points therefore only leads to a reduction in investment by 2.54%.

The third step extends the empirical analysis into the research field concerned with corporations' structures. Especially holding companies are set up by multinational corporations in tax favorable destinations in order for investments to be able to be structured optimally regarding tax. A decrease of ten percentage points in a country's corporate tax rate causes an increase in the share of holding companies in all subsidiaries in that location by 0.55%. The effect is even stronger regarding withholding taxes. A ten percentage point decrease in withholding taxes causes an increase of 0.80% in holding companies relative to all kinds of subsidiaries.

Das Wichtigste in Kürze

Unternehmenssteuern beeinflussen das Investitionsverhalten. Hohe Steuern bremsen und niedrige Steuern begünstigen Investitionen, gerade auch im grenzüberschreitenden Kontext von Direktinvestitionen. Dies kann inzwischen als ein überzeugend abgesicherter Befund einer breiten wissenschaftlichen Literatur gelten. Gleichwohl genießt diese Einsicht in der öffentlichen und steuerpolitischen Debatte noch keineswegs einen breiten Konsens. In der Konzentration auf andere Investitionstreiber wird die Relevanz der Steuern zuweilen negiert. Dieses Papier verfolgt zwei Ziele: erstens, den Steuereffekt auf das Investitionsverhalten empirisch herauszuarbeiten und zweitens aufzuzeigen, welche Voraussetzungen für belastbare Ergebnisse erfüllt sein müssen.

Die hier verwendete Mikrodatenbank Direktinvestitionen (MiDi) der Deutschen Bundesbank berücksichtigt Direktinvestitionen deutscher Muttergesellschaften im Ausland und ausländischer Muttergesellschaften in Deutschland. Das Papier ist spiegelbildlich aufgebaut und behandelt so beide Investitionsrichtungen. Der Betrachtungszeitraum umfasst die 13 Jahre von 1996-2008. Das Papier geht auf die Firmenheterogenität hinsichtlich deren Gewinn- und Verlusthistorie ein und untersucht zusätzlich den Steueranreiz für Holdinggründungen. Der gesamtdeutsche Befund wird mit den Daten eines spezifischen und besonders exportorientierten Bundeslandes, Baden-Württemberg, kontrastiert, um Hinweise auf die Allgemeingültigkeit der Befunde zu gewinnen.

Die deskriptive Auswertung zeigt allgemein die rasante Zunahme der internationalen Investitionsaktivitäten im Untersuchungszeitraum 1996 bis 2008. Die Entwicklung der Unternehmen Baden-Württembergs entspricht weitgehend derjenigen in Gesamtdeutschland. Da Schätzungen ein Mindestmaß an Variation bzw. unterschiedlichen Vergleichsgruppen erfordern, ist der Nachweis des Steuersatzeffektes auf Investitionen nur im Outbound-Fall, nicht jedoch im Inbound-Fall möglich.

Der Outbound-Fall zeigt, dass ein um 10 Prozentpunkte höherer Unternehmenssteuersatz um 5,32% geringere Investitionen in Gestalt von Sachanlagen bewirkt. Entsprechend bewirkt ein um 10 Prozentpunkte niedrigerer Unternehmenssteuersatz um etwa 5% höhere Investitionen. In einem zweiten Schritt finde ich empirische Evidenz, dass Firmen mit bestehenden Verlustvorträgen bei ihren Investitionsentscheidungen weniger steuersensitiv sind. Bei Firmen mit bestehenden Verlustvorträgen wird rund die Hälfte des negativen Steuereffekts kompensiert. Ein um zehn Prozentpunkte höherer Steuersatz führt also nur zu einem Investitionsrückgang von 2,54%.

Im dritten Schritt weitet die empirische Analyse den Blick auf das Forschungsfeld der Konzernstrukturen. Insbesondere Holdinggesellschaften werden von multinationalen Gesellschaften häufig in steuerlich attraktiven Standorten errichtet, um so die Investitionen steueroptimal zu strukturieren. Ein um zehn Prozentpunkte niedrigerer Unternehmenssteuersatz erhöht den Anteil der Holdings an allen Formen von Tochtergesellschaften eines Standorts um 0,55%. Bezüglich der Quellensteuer ist der Effekt noch stärker. Eine um zehn Prozentpunkte niedrigere Quellensteuer führt relativ zu allen Arten von Tochtergesellschaften zu 0,80% mehr Holdings.

The Impact of Corporate Taxes on Investment*

- An explanatory empirical analysis for interested practitioners -

Daniel Dreßler**

June 2012

Abstract: The scientific literature provides evidence for an impact of company taxes on investments. Practitioners, however, have a skeptical view on the meaning of this effect. This paper builds the bridge between research and the interested practice by providing detailed descriptives and clearly showing how the effects are derived. It analyzes the development of German multinationals' direct investments abroad and of foreign multinationals' investments in Germany from 1996 till 2008. A split along federal states is applied. Starting from the analysis of the basic tax effect, the paper also covers current research topics when analyzing the impact of existing loss carryforwards and when tracing holding structures. The descriptive statistics already show that cross-border investments have increased strongly. The development of Baden-Württemberg mainly corresponds to that of Germany. The impact of taxation on investments is negative. A ten percentage points higher corporate tax rate leads to about five percent lower investments, measured by fixed assets. This effect is smaller for those companies which show loss carryforwards. A lower tax rate at a specific location especially seems to attract holding companies, which are applied for tax efficient group structuring.

Keywords: Corporate Taxation, Foreign Direct Investment, Empirical Analysis, Multinational Firms

JEL Classification: F23, H25, H32

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1. Introduction

Investment behavior is influenced by corporate taxation. High taxes hinder investment, whereas low tax rates favor it, especially within a context of cross-border direct investment. This claim is backed by a broad array of highly credible scientific literature.[1] Nevertheless, in the public debate of tax practitioners, it can by no means be considered part of the common consensus. Time and time again other determinants of direct investment are highlighted. The latter may stem from a desire for market development, whereby any relevance of the taxation factor is denied. Should a car manufacturer identify China as an emerging market, the medium-sized company supplying it has no other option but to invest there. It has to do so regardless of China's taxation policy. The great strength of the econometric discipline lies in its capacity to incorporate different effects such as the suspected 'China Effect' in its mathematical models.

Within such a framework this paper seeks to identify the econometric and micro economical approaches best suited for verifying the effect of taxation on direct investment behavior. Such is without neglecting any other influencing factors and recognizing areas that continue to exemplify problematic results. An analysis of German inbound and outbound direct investment is added. Findings on Germany as a whole are observed in contrast with the data of the strongly export orientated federal state Baden-Württemberg. This comparison indicates the overall validity of the findings. The paper considers firm's heterogeneity regarding their respective profit and loss histories and may therefore be considered part of the cutting edge of current research efforts. With its analysis of holding companies and associated corporate group structuring this paper enters into a field that requires further detailed research in coming years.

The foundational data shows the direct investment development of German parent companies abroad and that of foreign parent companies in Germany. Only limited liability companies are considered. The paper is structured in a mirror image style: The first part examines outbound investment and the second inbound investment. Both start off with a presentation of descriptive nature. The timeline for direct investment is shown for Germany as one and for the individual federal states. Special attention will be paid to the foreign investment of Baden-Württemberg firms and any investment of foreign firms within Baden-Württemberg. The timeline in question consists of 13 years and ranges from

1. So called meta studies summarize results of past investigations into the effect of tax on direct investment. Hereby they calculate the average 'to be expected effect'. See De Mooij und Ederveen (2003) and Feld und Heckemeyer (2011).

1996 to 2008. This paper makes a conscious effort not to formulate an economic analysis of the most recent economic crisis, but instead strives to highlight the overall trend of investment developments. The effect of taxation will be examined by means of a linear estimation method, which allows for the econometric function to be derived in a transparent way. The empirical section will firstly examine the effect of corporate taxes on investment. Then existing tax loss carryforwards and investment structure decisions will also be illuminated.

2. Influence of corporate taxation on investment behavior

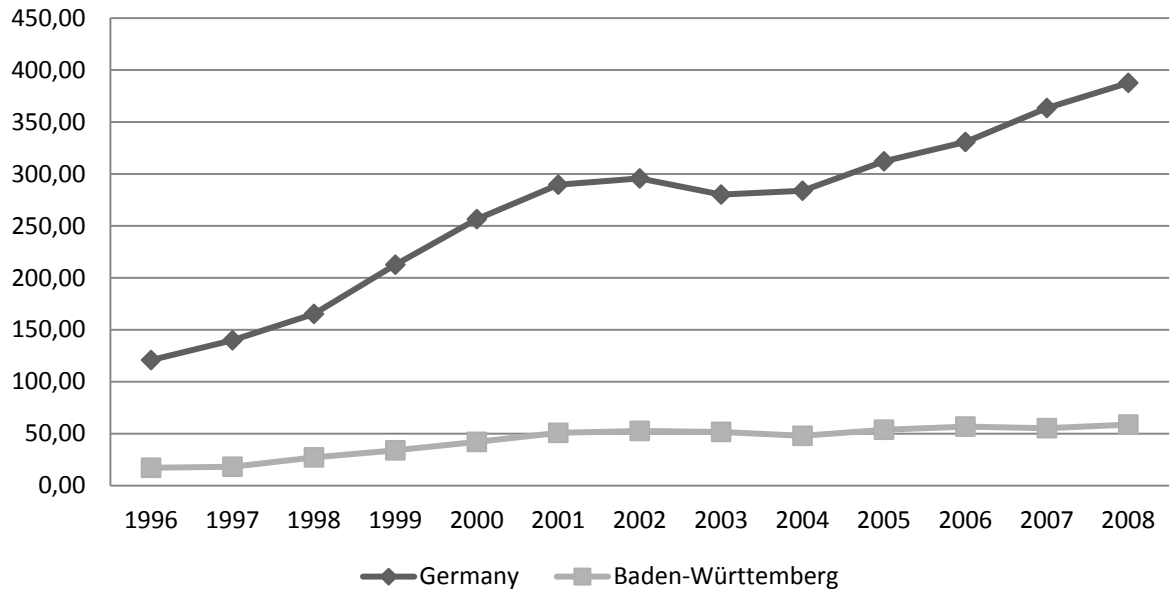
2.1 Investment of German companies abroad

This paper's first analytical step will look at German parent corporations' investment abroad. The analysis is based on micro data. Unlike with aggregated macro-economic data, micro data analyses bears the advantage that recognized characteristics of corporations can be taken into account. Investment is primarily a flow value. When looking at individual corporations' investment abroad however, stock values will have to be used, since only these are observable on the balance sheets. The dynamic will at a later stage be developed by econometrical estimations using the difference in observed stock values between two successive years. The resulting descriptive evaluation shows the development of the stock value 'fixed assets' and hereby reveals the extent to which German parent corporations are invested abroad. Intangible assets are included only to the degree to which they are activated on the balance sheets.

2.1.1 Investment development

Chart 1 illustrates the basic trend from 1996 to 2008 for Germany and Baden-Württemberg. The chart is based on the German Federal Bank's microdatabase direct investment (MiDi). It is mandatory for investors to report any cross border activity if their involvement constitutes 10% or more and the balance sheet of the respective foreign subsidiary exceeds 3 million euros. These foreign subsidiary balance sheets are made available in standardized form on an annual basis. The fixed asset values are taken from these balance sheets. As can be seen, fixed assets of German corporations abroad have increased by more than a threefold factor (3.25) from 120 bn. euros in 1996 to 390 bn. euros in 2008. Multinationals based in Baden-Württemberg have increased their assets abroad by an even higher factor of 3.4: from 17 bn. euros to 59 bn. euros in the last 13 years.

Chart 1: Outbound fixed assets in bn. euros



The ascent of both curves can be explained by the increase in subsidiaries abroad and the increased amount of assets these subsidiaries have at their disposal. In 1996, the average foreign subsidiary had 13.6 bn. euros in fixed assets. By 2008, this figure had increased to 21.5 bn. euros. From 1996 to 2008, the number of counted foreign subsidiaries increased from 8,870 to 18,013.

The number of foreign subsidiaries of Baden-Württemberg companies has increased from 1,572 in 1996 to 3,641 in 2008. The average asset values of these subsidiaries has also seen an increase from 10.9 bn. euros in 1996 to 16.1 bn euros in 2008. The average foreign subsidiary asset value of Baden-Württemberg's corporations is lower than that of Germany as a whole; possibly because numerous medium or even small sized Baden-Württemberg corporations have foreign subsidiaries.

Chart 1 shows that foreign investment has increased. It would be mere speculation to make the drop in corporate tax rates responsible for this increase in foreign direct investment. Other plausible reasons include the increased economic performance of foreign locations, increased inflation or currency effects. When analyzing tax effects, it is also unsuitable to differentiate between target countries, since their tax rates vary over time and between one another. If anything, only an average effect may be identified.

2.1.2 Comparing investment in the different German federal states

Chart 2 shows in regular six year intervals which German federal states the investments into foreign subsidiaries stem from.[2] Baden-Württemberg's share increases from 14% in 1996 to 18% in 2002 and eventually comes to 15% in 2008. Nordrhein-Westfahlen based companies have the highest share of foreign subsidiary investment in all 3 years. Although Hessen's share has decreased somewhat, one must keep in mind that banks are not included in the observations.

As seen in chart 1, the overall volume of investments has increased substantially. The volume of chart 2's first diagram corresponds to the 120 bn. euros from chart 1. The same goes for chart 2's third diagram and the 390 bn. euros from 2008. In 2002, the overall assets held by foreign subsidiaries were some 296 bn. euros.

Looking at Baden-Württemberg, the percentages translate to 17.2 bn. euros (=14%) in 1996, 52.7 bn. euros (=18%) in 2002 and 58.7 bn. euros (=15%) in 2008. The volume of foreign investment by corporations in Bayern and Baden-Württemberg are fairly similar. Niedersachsen comes 5th with regards to foreign investment followed by Hamburg, Rheinland-Pfalz and Berlin.

Chart 2a: Outbound fixed assets 1996

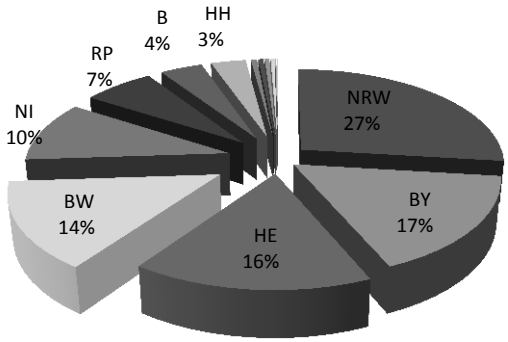


Chart 2b: Outbound fixed assets 2002

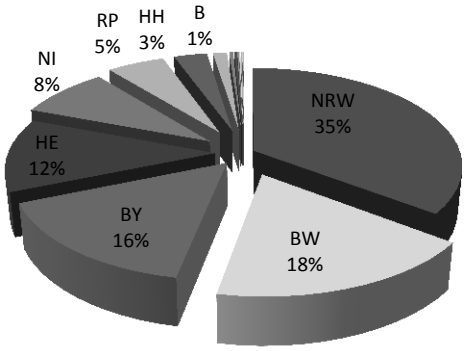
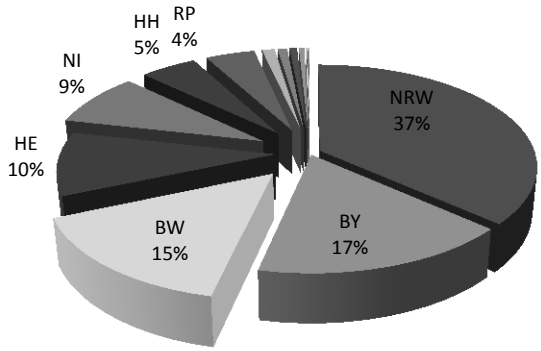


Chart 2c: Outbound fixed assets 2008



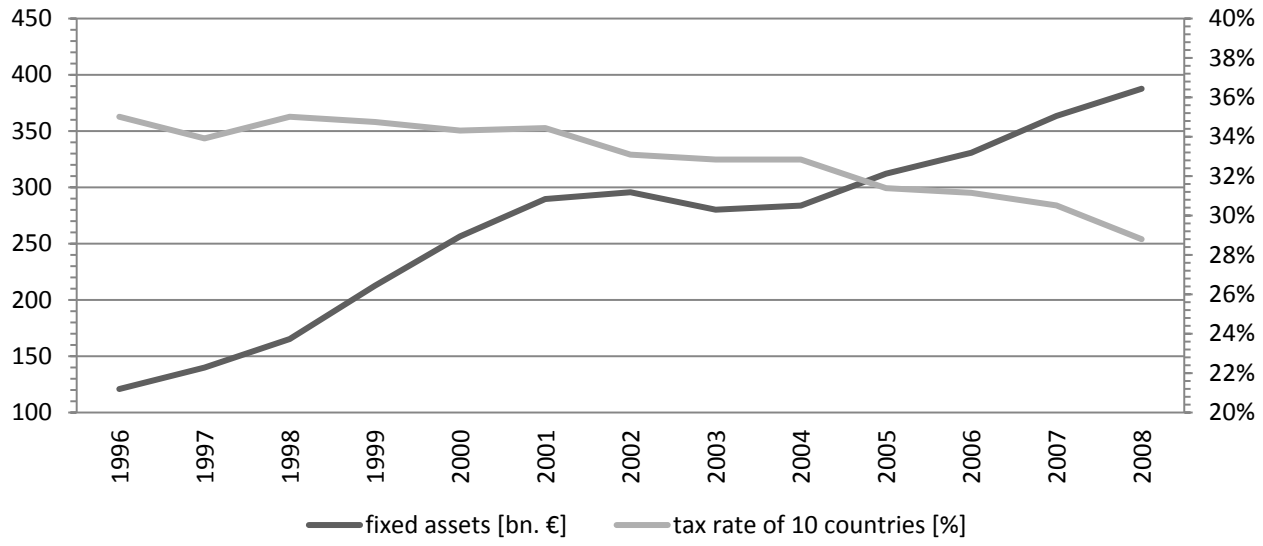
2. It is worth pointing out that the described increase in German assets abroad from 1996 to 2008 may be subject to the influence of exchange rate effects. Towards the end of 1996, most investment targets of German investors' balance sheets were in foreign currency and had to be converted to D-Mark. As a result, some of the changes in investment may merely be due to fluctuating exchange rates rather than actual investment activity. The Bundesbank has converted D-Mark values into euro values for the years 1996 to 1998.

2.1.3 Corporate Tax development

So far investments have only been looked at in terms of assets held by foreign subsidiaries. Considering the fact that ultimately the effect of corporate tax rates on investment is to be determined, the development of corporate tax rates has to be shown. Chart 3 illustrates the development of corporate tax rates some of those countries with the highest average stock of assets invested by German parent corporations. The investment development is also graphed for purposes of comparison.

What can be seen in chart 3 is that whilst investment is on the rise, the average corporate tax rate of all countries falls. As a result, the used average corporate tax rate is reduced to that of the most relevant countries only, since a changing corporate tax rate in a country that receives no German investment may otherwise distort the picture. The corporate tax rate used in the chart is calculated out of that of 10 different countries. Included are those that traditionally receive a lot of investment from German companies such as France, Great-Britain, the Netherlands, Austria, Spain and the USA. The BRIC nations are represented by Brazil, China and Russia. Singapore completes the 10-country-list as a popular holding location. In 1999, the average of these countries' corporate tax rates was 35.0%. By 2008 it had sunk to a level of 28.0%. Investment increased, whereas average corporate taxation rates fell.

Chart 3: Outbound fixed assets in bn. euros – all export countries



A credible effect may not yet be derived from this chart. One may for instance argue that should investment increase for reasons other than corporate tax rate changes, they would still have to be carried out somewhere. A parallel decrease in corporate tax rates may

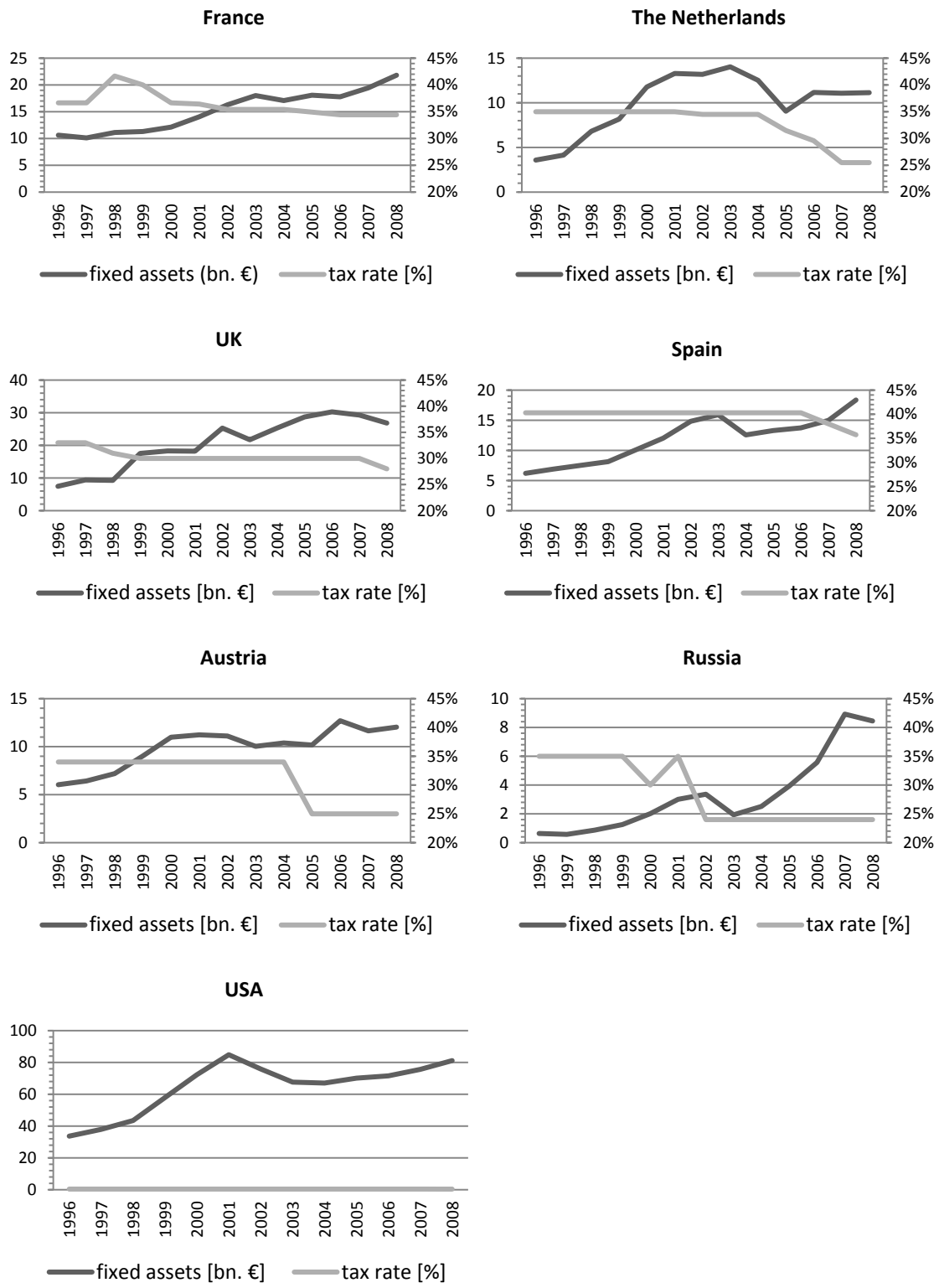
possibly be coincidental. On a descriptive level a clearer picture may be obtained if both the development of outbound investments as well as tax rates are shown per target country. Such is realized in chart 4.

In chart 4, the (prior to this point) hidden thought of competition between the countries has now been incorporated. Perhaps multinational corporations have already decided to increase their foreign activity. The second step may be concerned with the question of where such an expansion may take place. This expansion could mean the expansion of existing subsidiaries or the setting up of additional new ones. The potential target countries are therefore in competition over such investments. A low or decreasing tax rate may function as a beneficial argument in such a competition.

Chart 4 is made up of ten different diagrams, each of which show the development of investment and the corporate tax rate in a different country. In each of those countries the extent of investment by German corporations is larger in 2008 than it was in 1996. In nine out of these ten countries the corporate tax rate is lower in 2008 than it was in 1996. An overall trend exists. Brazil's increased corporate tax rate marks an exception: From 25% in 1996 to 34% in 2008. It is nevertheless apparent that the amount of change as well as the actual trail of the curves differ from country to country. Most countries show a consistent increase in incoming investment. Brazil, the Netherlands, Spain and the USA however also show temporary declines.

In Austria, Spain and the USA, the corporate tax rate has been cut only once throughout the relevant time period. The other countries have cut their rate in several steps. Brazil, France and Russia's rates have seen periods of temporary increase. With a drop of 18 percentage points from 43% in 1996 to 25% in 2008 China records the largest corporate tax rate cut. China is followed by the Netherlands who cut their rate by 9.5 percentage points. Countries with an also significant cut rate of 9 percentage points are Brazil, Austria, Russia and Singapore. One must not overlook, however, that both the initial 1996 rate and the 2008 rate of corporate taxation significantly differ between the respective countries. In France, Spain and the USA, the corporate tax rate remains between 34% and 41% throughout the entire time period, whereas Singapore for example decreased its rate from 27% in 1996 to 18% in 2008.

Chart 4: Outbound fixed assets on a per country basis in bn. euros



An effect of tax on investment may on the basis of these pictures be suspected, but not determined with absolute certainty. The strong 2005 increase in investment in Austria may well have been driven by the parallel cuts in corporate taxes. The tax cuts from 2004 onwards in the Netherlands could feasibly have been responsible for stopping the downwards trend of investment. Considering a certain time lag in corporations' investment behavior, the increased investment in Russia may also be attributed to decreased tax rates.

Much like before, the one point of critique regarding the charts' credibility is the lack of attention directed towards other factors possibly influencing investment. In order to tackle this problem, econometric estimation methods need to be drawn upon.

2.1.4 Empirical investigating into the effect of tax rates on investment

The estimation's merit depends on the extent and precision with which all the factors influencing investment are included. Two approaches allow several of these influencing factors to be covered without having to collect any data. First of all, it seems very likely that a foreign subsidiary with a large amount of assets in one year will also have such a high level of assets in the following year. Therefore, instead of using the absolute level of assets, the first differences between investments serve as the dependent variable. In order to formulate a valid statement, all explanatory (= independent) variables have to be applied in first differences as well. Therefore, it is the tax rate difference between two years and not the tax rate itself that is included in the estimation.[3]

The second approach neutralizes business cycle fluctuations and other extraordinary temporal effects. This is accomplished with the help of so-called annual dummies. For every year a variable is created that is one for this exact year and zero for all others. The effect of unusually high investment in 1999 for example would be recorded by the annual dummy for 1999. Usage of annual dummies would only prove to be problematic if all tax rate cuts were to occur in a single year. As can be seen from the above charts, this is not the case.

Beyond these specification details, additional factors driving investment have to be thought of; for instance GDP, firm's profitability and inflation. Country dummies may not be used here, as annual dummies and country dummies together would cover up any tax rate

3. See Wooldridge (2009) S. 393 ff. for a more technical explanation of the estimation in first differences.

effects. The remaining option is to check for characteristics of the individual countries. This means including individual influence factors in the estimation procedure. As outlined above, these are applied in first differences.

GDP is supposed to be the most important control variable. The first difference detects GDP growth. It may represent a proxy for the size or development of the foreign target market. Controlled hereby is amongst others the talked about 'China-Effect'. GDP per capita is also taken into account, which provides an insight into the extent to which domestic consumers can actually afford the given produce. At the same time it serves as a proxy for labor costs. The individual firm's profitability of the currently considered period and the preceding period are also taken into account. One may assume a company that was profitable in the foregone period to invest more than an unprofitable company. As a standard controlling instance, the inflation rate is also included. Larger currency fluctuations may have an effect on the values of the fixed assets, as these have been converted into euro values. A currency variable is therefore created. It is standardized to the euro's exchange rate deviation for the reference year of 1996. After all, different countries bear different levels of risk regarding investment. These investment risks are represented by the OECD's country risk measure, which is also incorporated in the estimation procedure. Unlike in the first graph of chart 4 where only ten counties are considered, now 51 countries are included in the estimation. The ten original ones from the earlier estimation are among these 51 countries. They comprise of the four BRIC countries, the 29 OECD member states of 2008, the 8 EU member states that are not part of the OECD as well as ten other countries.[4] For each of these countries the annual tax rate and the annual investment level is recorded. To ensure that the estimation focuses on those corporate groups with a genuine influence regarding decisions, a parallel focus on direct participation of 100% or directly held majority participation is put in place. The following table 0 shows a descriptive analysis based on the observations used in the estimations as well as a description of the variables.

4. The BRIC states are Brazil, China, India and Russia. The 2008 OECD members are Australia, Belgium, Denmark, Finland, France, Greece, Great Britain, Island, Ireland, Italy, Japan, Canada, Luxemburg, Mexico, New-Zealand, the Netherlands, Norway, Austria, Poland, Portugal, the Slovak Republic, South-Korea, the Czech Republic, Hungary, Spain, Sweden, Switzerland, Turkey and the United States of America. The added EU member states are Bulgaria, Estonia, Latvia, Lithuania, Malta, Slovenia, Rumania, and Cyprus. The additional ten countries are Bosnia and Herzegovina, Chile, Hong Kong, Israel, Croatia, Serbia, Singapore, South-Africa, Thailand and the United Arab Emirates.

Table 0: Descriptive Statistics

Variable	Definition	Mean	Std. Def.
Fixed Assets	Total assets reported in the financial statements; measured in EUR '000.	11,430.38	61,491.70
Tax Rate	Statutory profit tax rate.	0.3118	0.0749
Withholding Tax	Withholding tax on dividends for the respective country/country pair.	0.0208	0.0450
Profitability	Profit or loss for the financial year as reported by the balance sheet divided by total assets before current profits.	0.0432	0.1260
BaWü-Dummy	Binary Variable indicating whether a subsidiary is situated in Baden-Württemberg (1) or not (0).	0.2280	0.4195
Loss carryforward exists	Binary variable indicating whether a subsidiary has a loss carryfroward (1) or not (0).	0.2929	0.4551
GDP	Gross Domestic Product measured in billion current USD.	1,761.30	3,083.17
GDP per Capita	Gross Domestic Product per home country national; measured in current USD '000.	26,593.69	15,231.48
Inflation Rate	Inflation rate based on consumer prices (in %)	3.2160	4.7186
OECD Country Risk	OECD Country Risk Classification Method measures the country credit risk. Risk categories span from a low credit risk (0) to a high credit risk (7).	0.7394	1.3499
Currency Fluctuation	Exchange rate deviation from the euro. 1996 is nominated to 1.	1.2552	1.3482

The information is based on the 54,426 observations covered in the outbound estimations. The firm-specific variables are from the direct investment databank of the Deutsche Bundesbank. The tax variables are taken from the International Tax Handbook of the IBFD as well as the Worldwide Corporate Tax Guides of Ernst & Young. The *Gross Domestic Product*, the *Gross Domestic Product per Capita* and the *Inflation Rate* as well as the *Currency Fluctuation* are from the World Development Indicators Version 2011. The *Country Risk* rating is based on information from the OECD.

The following contains three tables with regression results. They are thematically structured and build on one another in that the first investigates the overall effect of tax on investment and the two following it concentrate on more detailed and in depth questions. The overall way to read these tables is identical and briefly summarized in the following. The dependent variable is the volume of fixed assets (table 1 and 2) or a measure that indicates whether a subsidiary is a holding company or not (table 3).

The tax rates used in the estimation are the statutory ones (nominal rates). The influence of special aspects on the tax base, such as a varying ways of tax loss recognition[5], are deliberately not made part of a general and straight forward approximated solution.[6]

[5] See Jacob, Pasedag und Wagner (2011) for a discussion of the relationship between the tax rate and loss carryforwards.

[6] See Devereux und Griffith (2003) for a detailed path to creating effective tax rates. Elschner, Heckemeyer und Spengel (2011) use this method to calculate effective tax rates for European Union member states from 1998 to 2009. Becker und Fuest (2006) show that the attractiveness of a location may vary according to according to the chosen level of effective tax.

Regression table 1: Overall tax rate effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax Rate	-.532***	-.460***	-.520***	-.453***	-.657***	-.629**	-.482***	-.428***
	(.120)	(.134)	(.103)	(.116)	(.245)	(.260)	(.132)	(.148)
BaWü-Dummy							.025	-.031
							(.081)	(.085)
BaWü x Tax Rate							-.242	-.153
							(.225)	(.239)
Fixed Assets previous period		.486***		.478***		.418***		.486***
		(.043)		(.037)		(.081)		(.043)
ln (Gross Domestic Product)	-.337	.648	-.347	.501	.008	1.32***	-.337	.647
	(.267)	(.540)	(.246)	(.503)	(.218)	(.430)	(.269)	(.543)
ln (GDP per Capita)	1.10***	-.274	1.08***	-.121	.756***	-.880*	1.10***	-.273
	(.265)	(.538)	(.245)	(.499)	(.240)	(.474)	(.267)	(.541)
Profitability	-.053		-.047		-.060		-.053	
	(.038)		(.034)		(.084)		(.038)	
Profitability previous period	.096***		.104***		.123**		.096***	
	(.029)		(.027)		(.063)		(.029)	
Inflation Rate	-.071	-.014	-.028	.022	-.154	-.042	-.071	-.014
	(.064)	(.033)	(.021)	(.024)	(.146)	(.163)	(.064)	(.033)
OECD Country Risk	-.014	-.007	-.018*	-.009	-.021	-.012	-.014	-.007
	(.011)	(.012)	(.009)	(.010)	(.024)	(.026)	(.011)	(.012)
Currency Fluctuation	.054***	.021**	.050***	.023**	.041	.019	.054***	.021**
	(.012)	(.011)	(.011)	(.010)	(.032)	(.031)	(.012)	(.011)
Exclusively BaWü					✓	✓		
100% participation only	✓	✓			✓	✓	✓	✓
Majority participation only			✓	✓				
Direct participation only	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Observations	54,426	54,426	66,452	66,452	12,310	12,310	54,426	54,426
AR(1)-Test		.000		.000		.000		.000
AR(2)-Test		.470		.493		.232		.470

Dependent variable: ln (assets). The *year dummies* from 1997 to 2008 are included but not reported. Robust standard errors are in brackets. *, ** and *** point to significance of 10%, 5% and 1%. The numbers assigned to autocorrelation for the AR(1)- and AR(2)-Tests are p-values.

The Baden-Württemberg-Dummy is 0, unless the parent corporation of the subsidiary in question is based in Baden-Württemberg. The year dummies are not reported, but are nevertheless part of every estimation.

Panel estimation procedures are applied. In order to show the robustness of the results, the instrument variable estimations following Arellano and Bond (1991) (even columns in table 1) are run in addition to the standard OLS procedure (odd columns in table 1). For the instrument variable estimation the assets of the foregone period serve as the explanatory variable of the assets for the current period.[7] All estimations are in first differences. This means that for both the dependent variable and the independent variables the difference to the prior year is used. This procedure has the advantage that it causes the size

[7] See Cameron und Trivedi (2009) S. 287 ff. for a general explanation of the Arellano Bond estimator.

heterogeneity of the different subsidiaries to play a minimal role only. The procedure also highlights any changes a country may experience, such as a falling tax rate or rapidly growing GDP.

Looking at regression table 1, it becomes apparent that taxes have in fact, as analytically expected a negative effect on investment.[8] The tax rate effect on assets as a dependent variable is negative for all eight specifications as well as highly significant.[9] The coefficients are semi-elasticities, given that the assets enter the equation in logarithm form and the tax rate doesn't. This means that a tax rate increase of one percentage point leads to a decrease in investment by half a percent. A by 10 percentage points higher (lower) corporate tax rate means a decrease (increase) of about 5 percent in investment. The extent of the observed effect is fairly constant and ranges from -.428 in column 8 to -.657 in column 5. In analogue terms: A by one percentage point higher corporate tax rate causes an investment reduction of between 0.428% and 0.657%. The effects show no systematic differences between the statistical estimation method and the dynamic one or between the recognition of 100% participations and majority participations.

The first four columns of regression table 1 make all observations part of the estimation without differentiating between the different federal states. The estimations in columns (5) and (6) are based only on those subsidiaries, whose parent corporations are based in Baden-Württemberg. This explains the significantly smaller amount of observations included in the estimations of these two columns. Looking at the coefficient alone, columns (5) and (6) seem to indicate multinationals from Baden-Württemberg to be particularly tax sensitive. Columns (7) and (8) check, whether such is actually the case on a statistically relevant level. The estimations in columns (7) and (8) therefore include all corporations and two additional variables. The BaWü-dummy marks those parent corporations that are situated in Baden-Württemberg. If it was positive and significant, it would mean that systematically more investment stems from Baden-Württemberg than is the case for the other federal states. The coefficient is insignificant, which renders any interpretation of its seize or sign redundant. The second new independent variable is the interaction term. It is the product of the BaWü-dummy and the tax rate and is also not significant. A statistically significant deviation of the tax rate sensitivity of Baden-

[8] See e.g. Keuschnigg (2008) for an analytical derivation of the effect average tax rate and marginal effective tax rate on cross-border investment decision.

[9] The respective valid tax rate of the foreign subsidiary is applied. Becker, Fuest and Spengel (2006) show that investment calculations on the basis of the whole group's average tax rate may lead to other decisions.

Württemberg based parent corporations in particular may therefore not be identified. The numerically larger effect in columns (5) and (6) is thus predominantly a result of the changed assembly, and/or the reduced extent of the sample. Baden-Württemberg based international parent corporations do not systematically differ in the way they include the tax rate effect in their investment calculations to parent corporations from other federal states.

Regarding the control variables, it becomes clear that profitability and assets of the foregone period have a significant and positive effect on investment in the current period. To be more precise, considerable increases in profitability and/or in assets of the prior period have a significant effect on the growth of assets in the current period because the estimation is in first differences. What is particularly interesting is the fact that profitability of the current period is insignificant, whilst that of the previous period is always highly significant. This seems intuitively sensible, since the money gained in the recent past may be used for new assets, whereas any gains from the current period have not yet been given the chance to be designated or decided upon. The temporal shift by one period can be explained by the fact that any signal indicating a certain subsidiary to be a lucrative investment opportunity will have to find its way to the parent corporation in Germany before any kind of investment can be authorized. For the effect of growing assets from the preceding period on current asset growth, the carried out aspects regarding profitability count as analogue.

A higher GDP per capita causes higher investment in some estimations. This can be explained by the following. An increasingly wealthy state becomes ever more attractive as a target market and thus receives more investment. Looking at the currency variable, the significant coefficient implies that one ought to check for this effect, too. As expected, the OECD country risk rating is negative. This is because countries with a high risk rating receive rather little investment. The effect is, however, rarely of significance. The frequent insignificance may be traced back to the lack of third world high level risk countries within the 51 countries that the estimations are based on.

Regression table 2: Lower tax rate effect if loss carryforwards exist

	(1)	(2)	(3)	(4)	(5)	(6)
Tax Rate	-.637***	-.553***	-.612***	-.523***	-.636***	-.608***
	(.124)	(.140)	(.107)	(.120)	(.124)	(.107)
Loss carryforward (LC) exists	-.108***	-.102**	-.101***	-.088**	-.107***	-.100***
	(.040)	(.048)	(.036)	(.042)	(.040)	(.036)
LC exists x Tax Rate	.310***	.299**	.281***	.240*	.304**	.259**
	(.120)	(.144)	(.109)	(.129)	(.122)	(.110)
BaWü-Dummy					-.054	-.052
					(.035)	(.040)
BaWü x Tax Rate					-.024	-.084
					(.064)	(.059)
Fixed Assets previous period		.485***		.478***		
		(.042)		(.037)		
ln (Gross Domestic Product GDP)	-.332	.654	-.342	.505	-.333	-.343
	(.268)	(.536)	(.247)	(.498)	(.268)	(.247)
ln (GDP per Capita)	1.10***	-.292	1.07***	-.137	1.10***	1.07***
	(.266)	(.534)	(.245)	(.494)	(.266)	(.245)
Profitability	-.050	.075*	-.043	.072*	-.050	-.043
	(.038)	(.042)	(.034)	(.038)	(.038)	(.034)
Profitability previous period	.093***	.191***	.099***	.187***	.093***	.099***
	(.029)	(.034)	(.027)	(.031)	(.029)	(.027)
Inflation Rate	-.071	-.013	-.028	-.021	-.071	-.028
	(.064)	(.032)	(.021)	(.024)	(.064)	(.021)
OECD Country Risk	-.013	-.007	-.018*	-.009	-.013	-.018*
	(.011)	(.012)	(.009)	(.010)	(.011)	(.009)
Currency Fluctuation	.054***	.021*	.050***	.023**	.054***	.050***
	(.012)	(.011)	(.011)	(.010)	(.012)	(.011)
100% participation only	✓	✓			✓	
Majority participation only			✓	✓		✓
Direct participation only	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓
Observations	54.426	54.426	66.452	66.452	54.426	66.452
AR(1)-Test		.000		.000		
AR(2)-Test		.540		.562		

Dependent variable: ln (assets). The *Year Dummies* from 1997 to 2008 are included but not reported. Robust standard errors are in brackets. *, ** and *** point to significance of 10%, 5% and 1%. The numbers assigned to autocorrelation for the AR(1)- and AR(2)-Tests are p-values.

In regression table 1 the overall tax rate effect is investigated. Firms' heterogeneity has largely been considered, since micro-data of individual corporations and not investment numbers aggregated into country or annual level have been used for the estimations. When investigating the tax rate effect on investment, it would be rather helpful to be able to isolate corporations that are either very strongly or not at all affected by the tax rate. The latter kind could theoretically be foreign subsidiaries that are granted a period free of taxation, a so called 'tax holiday'. The identification of such subsidiaries is difficult, since such incentives are currently mostly handled on an individual base. Such exemption from

taxation should also not be granted to too many subsidiaries. There is nonetheless another way through which corporations more or less affected by taxes can be identified. The tax rate is significantly less relevant for corporations with loss carryforwards. After all, they have the possibility to guard their profits from being taxed by using some or all losses carried forward from past periods.[10] Table 2 shows the results of estimations that follow such a distributive approach.

The number of observations in regression table 2 show that again all the subsidiaries are included in the estimations. The control variables match the ones in regression table 1. The dependent variable is still represented by tangible and intangible assets. The newly added dummy variable *loss carryforward exists* is 1 if the subsidiary can transfer losses from the previous period. Otherwise it is zero. As anticipated, the effect is significantly negative, which means the subsidiaries with an existing loss carryforward invest around 10% more than those without. This could be because the parent corporation has reacted to its subsidiary's recent failings and is subsequently making less means for investment available. It could also be down to the subsidiary's internal financing's lack of investment means.[11]

The focus will now shift towards the newly introduced interaction term *LC exists x Tax Rate.* It records the extent to which the existence of a loss carryforward influences the tax elasticity of investment. It may be observed, at first glance, that as in table 1 the single tax rate effect is negative and highly significant for all estimation procedures. The interaction term runs contrary to the tax rate effect. The coefficient of *LC exists x Tax Rate* is consistently positive and significant. The tax rate maintains its overall negative effect on firms with loss carryforwards. This effect, however, is significantly lower with such subsidiaries. About half of the negative tax rate effect is compensated in the presence of a loss carryforward. In column (1), the pure tax rate effect is -0.637 and the interaction term is 0.310. The sum of the effect hereby comes to merely -0.327. A by one percentage point increased tax rate will only lead to a 0.327% reduction of the parent corporation's investment into a subsidiary. The results in columns (2), (3) and (4) and those in column (1) are qualitatively roughly equivalent.

[10] The effect of losses in the context of taxation has long been researched on a theoretical and an analytical level. See Altshuler und Auerbach (1990), Niemann (2004). In recent times the topic has found its way into the empirical literature. See Edgerton (2010) as well as Dreßler und Overesch (2010).

[11] Since losses in the foreign subsidiary are isolated with regards to tax, those losses may generally not be accounted for by partners, nor with those partners in or outside the country. See Herzig (2005).

It is plausible for the existing loss carryforward to compensate the tax rate effect to a partial extent only. Firstly, the subsidiaries' loss carryforwards will eventually be used up. Secondly, some countries enforce a minimum taxation regulation. Hereby only partial netting out is possible. Thirdly, loss carryforwards may expire due to temporal restrictions or any kind of restructuring. In columns (5) and (6) the BaWü dummy and its interaction with the tax rate is added. As seen in the first regression table, the manner in which Baden-Württemberg parent corporations invest in their subsidiaries does not systematically differ to that of the parent corporations in other federal states. The effort regarding the tax rate effect or the compensating impact of existing loss carryforwards are as a result also applicable to Baden-Württemberg firms. Very high detected volumes of unused loss carryforwards of German and foreign corporations suggest that this aspect is by no means an exotic or peripheral topic.[12]

The first two regression tables show the effect of corporate taxation on the level of investment, which is measured in fixed assets. Multinational corporations have the opportunity to decide on the amount of fixed assets as well as to structure their investments into different special forms. The amount invested is hereby of less importance. It is much more the way in which these investments are embedded in the corporation's network that is relevant. The third section of this empirical part focuses on such analyses of corporations' structures. An obvious example of such structures will be picked out and examined.

The assets considered above are primarily found in producing subsidiaries. The production site choice may be subject to various non-tax related arguments. Despite the fact that the implemented control variables largely control for the influence of such aspects, it would be interesting to analyze those firms that are chiefly driven by tax factors, as opposed to any other kind of influencing factors. Holding companies can be viewed as such a form of subsidiary. When establishing such a holding company, a corporation will be swayed especially by tax related arguments. In comparison, tax related arguments will carry much less weight in an argument over where to actually produce. In locations that are favorable from a tax point of view, the number of holding companies in proportion to all observed subsidiaries should be high.[13]

[12] In 2004 the German Ministry of Finance declared a loss allocation potential of over 250bn. euros. See Müller-Gatermann (2004) p. 467.

[13] Heckemeyer and Spengel (2008) deliver an estimation of the extent of profit transfers of multinational corporations. Such transfer for tax reasons are sensible from production sites with a high tax rate to holding companies in a low tax rate location.

Regression table 3: Low tax rate countries as preferred locations for holding companies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tax Rate	-.037***	-.031***	-.055**	-.071***	-.037***	-.031***	-.055**	-.070***
	(.013)	(.011)	(.023)	(.021)	(.013)	(.011)	(.023)	(.021)
Withholding Tax					-.080***	-.090***	.028	.007
					(.013)	(.012)	(.031)	(.027)
ln (Gross Domestic Product GDP)	.013***	.011***	.012***	.013***	.013***	.011***	.012***	.013***
	(.001)	(.001)	(.002)	(.001)	(.001)	(.001)	(.002)	(.001)
ln (GDP per Capita)	.002	.006***	-.002	.002	.002	.007***	-.002**	.002
	(.002)	(.001)	(.003)	(.002)	(.002)	(.001)	(.003)	(.002)
Profitability	-.010	-.011**	-.018	-.004	-.010*	-.011**	-.017	-.004
	(.006)	(.005)	(.011)	(.010)	(.006)	(.005)	(.011)	(.010)
Inflation Rate	.017	.013*	.056***	.048**	.019*	.016**	.054***	.047**
	(.011)	(.007)	(.021)	(.019)	(.011)	(.007)	(.021)	(.019)
OECD Country Risk	-.003**	-.002***	-.003	-.002	-.002**	-.002**	-.003	-.002
	(.001)	(.001)	(.002)	(.002)	(.001)	(.001)	(.002)	(.002)
Currency Fluctuation	-.003***	-.002***	-.002**	-.002***	-.002***	-.001***	-.002***	-.002***
	(.000)	(.000)	(.001)	(.001)	(.000)	(.000)	(.001)	(.001)
Exclusively BaWü			✓	✓			✓	✓
100% participation only	✓		✓		✓		✓	
Majority participation only		✓		✓		✓		✓
Direct participation only	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Observations	82.063	101.484	17.953	21.682	81.917	101.292	17.931	21.652

Dependent variable: Dummy for the existence (1) or non-existence (0) of a holding company. The Year Dummies from 1997 to 2008 are included but not reported. Robust standard errors are in brackets. *, ** and *** point to significance of 10%, 5% and 1%.

A detailed analysis would answer such a question with a counter variable model.[14] Here, the basic linear estimation should be sufficient to show that the effect exists. The estimations of regression table 3 are thus based on the standard method OLS.[15] Dynamic estimations with a past parameter and instrumentation are not appropriate here, as it is not a growing set (like with the investment) that is being examined. It is for the same reason, that the estimations here are not (like in the first two tables) in first differences.

The dependent variable in table 3 is a dummy which is one if the observed subsidiary is a holding company. It is zero if the subsidiary is a production company or a service company without a holding function. As can be seen from regression table 3, the tax rate effect is negative and highly significant for all specifications. This means that in locations with a low tax rate the fraction of holding companies in relation to the number of subsidiaries is relatively high. The results confirm the hypothesis that when looking for a location for a

[14] See Winkelmann (2008) for a technical explanation of such counting variable models.

[15] See Angrist und Pischke (2009) p. 25 ff. for the suitability of the standard OLS procedure for an approximate solution for such a question or for a general execution see v. Auer (2007) p. 13 ff.

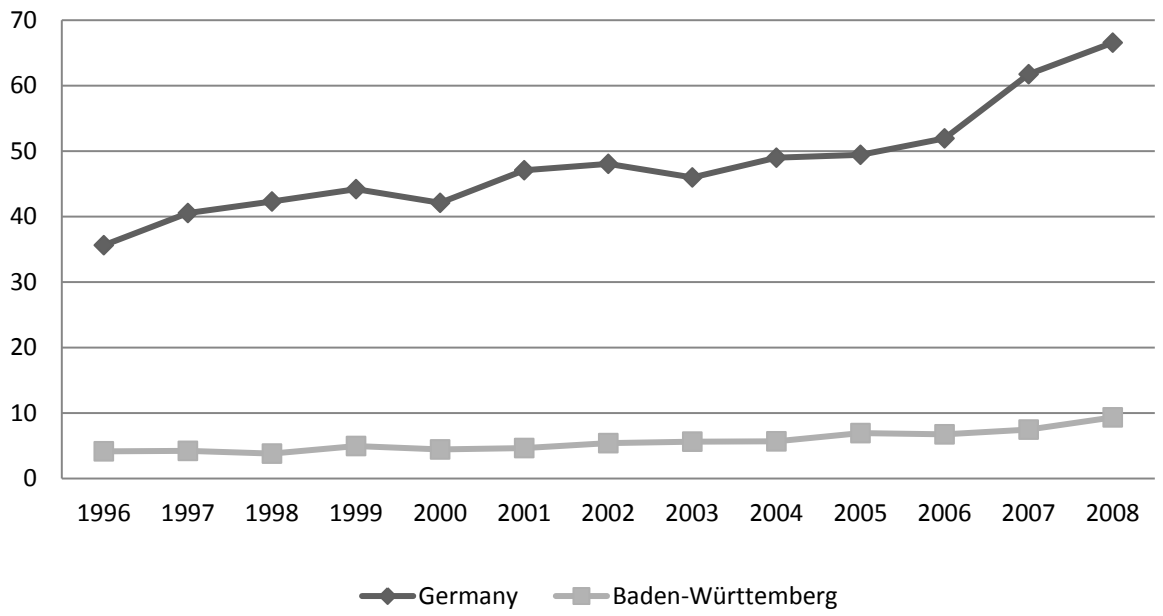
holding company, low tax rates are particularly important. The coefficient of -0.031 in column (2) indicates that a corporate tax rate cut of one percentage point causes the share of holdings with all subsidiaries to increase by 0.031%. Across all estimations, a 10 percentage point tax rate drop brings about an increase in the share of holdings of about 0.5%. Despite being numerically small, this effect is nevertheless statistically significant. One must not forget that a corporate holding company can easily assemble dozens of production subsidiaries. This means that already one or a few holdings suffice for a group to set up a tax efficient structure.

The corporate tax rate will play a big role in any holding company location decision. Additionally, further taxes might play an essential role, once profits are repatriated home to the German parent corporation. This so called *withholding tax* is thus added in columns (5) to (8). Columns (5) and (6) show that a low withholding tax attracts holdings. This effect is considerably stronger than that of the corporate tax rate. A one percent increase in holdings (relative to all recorded subsidiaries in that country and year) is caused by a reduction in the withholding tax by 10 percentage points. In columns (7) and (8) this effect is no longer detectable. As mentioned earlier, these results are based on the significantly smaller Baden-Württemberg sample. As a result they are not particularly reliable. With regards to the overall tax rate effect, there is no systematic difference in the way companies from Baden-Württemberg and those from other federal states calculate and plan their structures. This observation falls in line with the above analysis.

2.2 Foreign corporations' investment in Germany

Section 2.1 looked at the tax rate effect on investments of German parent corporations in their foreign subsidiaries. This section will focus on the reverse. It will illuminate where and how foreign corporations are invested in Germany. Generally speaking, the effects taken from the earlier estimation results should also show up for investment into Germany – so called inbound investments. The descriptive structure is the mirror image of that of part 2.1. The estimations, however, will show that there is much less potential for identification with the inbound part. The reasons for this will be explained in that respective section. The econometric section of this part is less about gaining thematic results than demonstrating why empirical analyses under certain conditions may not be conclusive.

Chart 5: Inbound fixed assets in bn. euros



2.2.1 Investment development

The media likes to name and portray Germany as the 'Export World Champion'. The products sold abroad measure is what is mostly to be meant with this. The comparison between chart 5 and chart 1 shows that the world champion title would also apply when looking at German companies' assets. German companies are much more heavily invested abroad than foreign companies are invested in Germany. Chart 1 shows a range from 120bn euros in 1996 to 390 bn. euros in 2008. Chart 5 shows that the foreign corporations' assets in Germany have gone from only 35.6bn euros in 1996 to 66.5bn euros in 2008. The

numbers have doubled in size for the whole of Germany. Baden-Württemberg has seen an increase by a factor of 2.27, from 4.1bn euros to 9.3bn euros.

The increased aggregated level of investment can be traced back to the enlarged average size and number of foreign companies' subsidiaries in Germany. In 1996 there where 3,927 such subsidiaries in Germany. By 2008 that number had risen to 4,619. The average size of a subsidiary was 9.1bn euros in 1996 and 14.4bn euros by 2008. The number of subsidiaries has risen by only 17.7% compared to the 58% that they have increased in average size. The aggregated growth is therefore mainly caused by the latter effect.

2.2.2 Comparing investment in the different German federal states

Analogous to chart 2 from the outbound investment part 2.1, chart 6 shows in regular intervals for the years 1996, 2002 and 2008 what share of the investment by foreign companies goes to which federal state. As before, it is the fixed assets which are analyzed. The four large federal states Nordrhein-Westfahlen, Baden-Württemberg, Hessen and Bayern share two thirds of the total amount of foreign assets between them. Chart 5 shows that investment into Baden-Württemberg has increased by more than that into Germany as a whole. As a result, Baden-Württemberg's share has increased from 12% in 1996 to 14% in 2008. The overall volume has gone from 35.6bn. euros in 1996 to 48.1bn euros in 2002 to 66.5bn euros in 2008. Of this 4.1bn euros in 1996, 5.4bn euros in 2002 and 9.3bn euros in 2008 have gone to Baden-Württemberg.

Chart 6a: Inbound fixed assets 1996

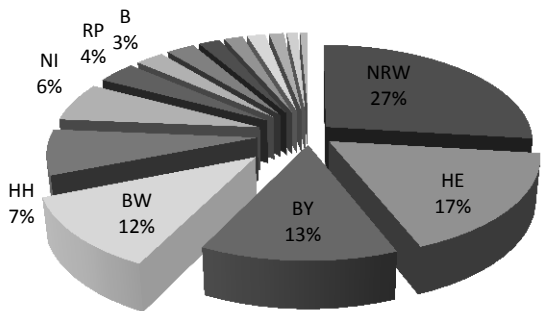


Chart 6b: Inbound fixed assets 2002

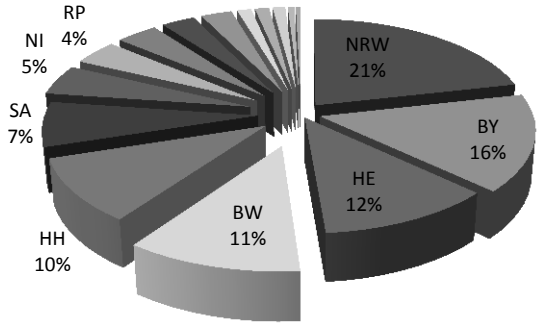
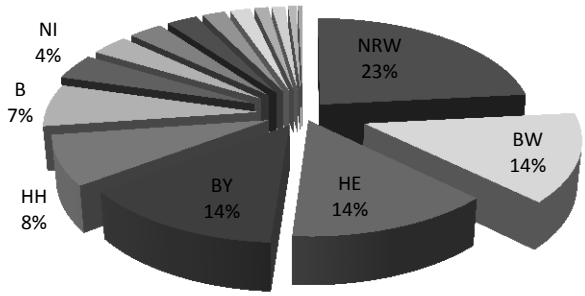


Chart 6c: Inbound fixed assets 2008



2.2.3 Corporate Tax development

The German corporate tax rate has been lowered in several steps throughout the thirteen year observation period. The tax-induced attractiveness of investing in Germany is identical for all foreign corporations. Chart 7 shows the corporate tax rate development: A reduction from 57.25% in 1996 to 30.95% in 2008. Solidarity surcharge as well as a uniform trade tax multiplier of 410% has been taken into account here. There is no differentiation according to trade tax, because putting federal city states and larger ones on the same level regarding average trade tax would result in misleading impressions.

Chart 7: Inbound fixed assets in bn. euros

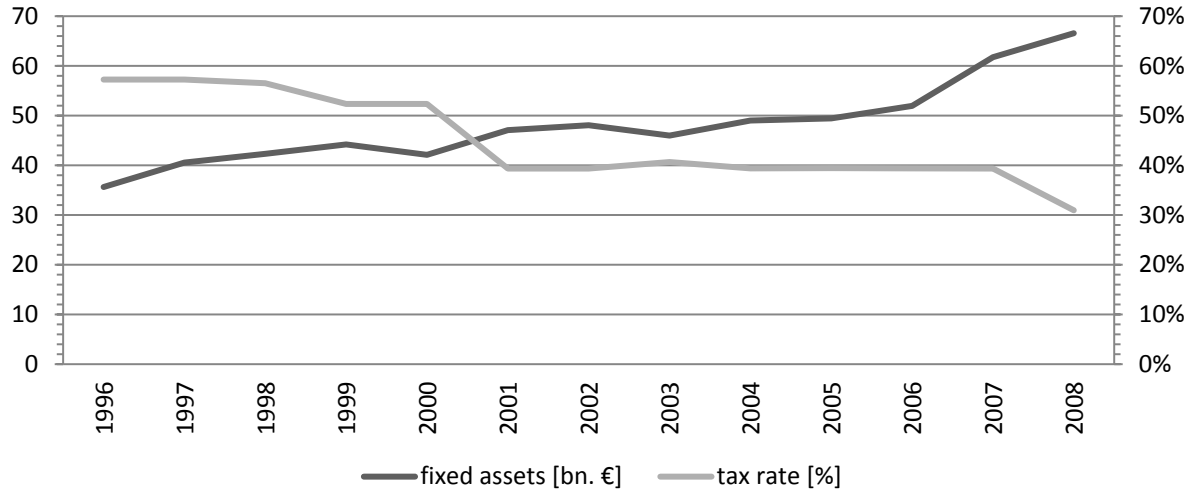
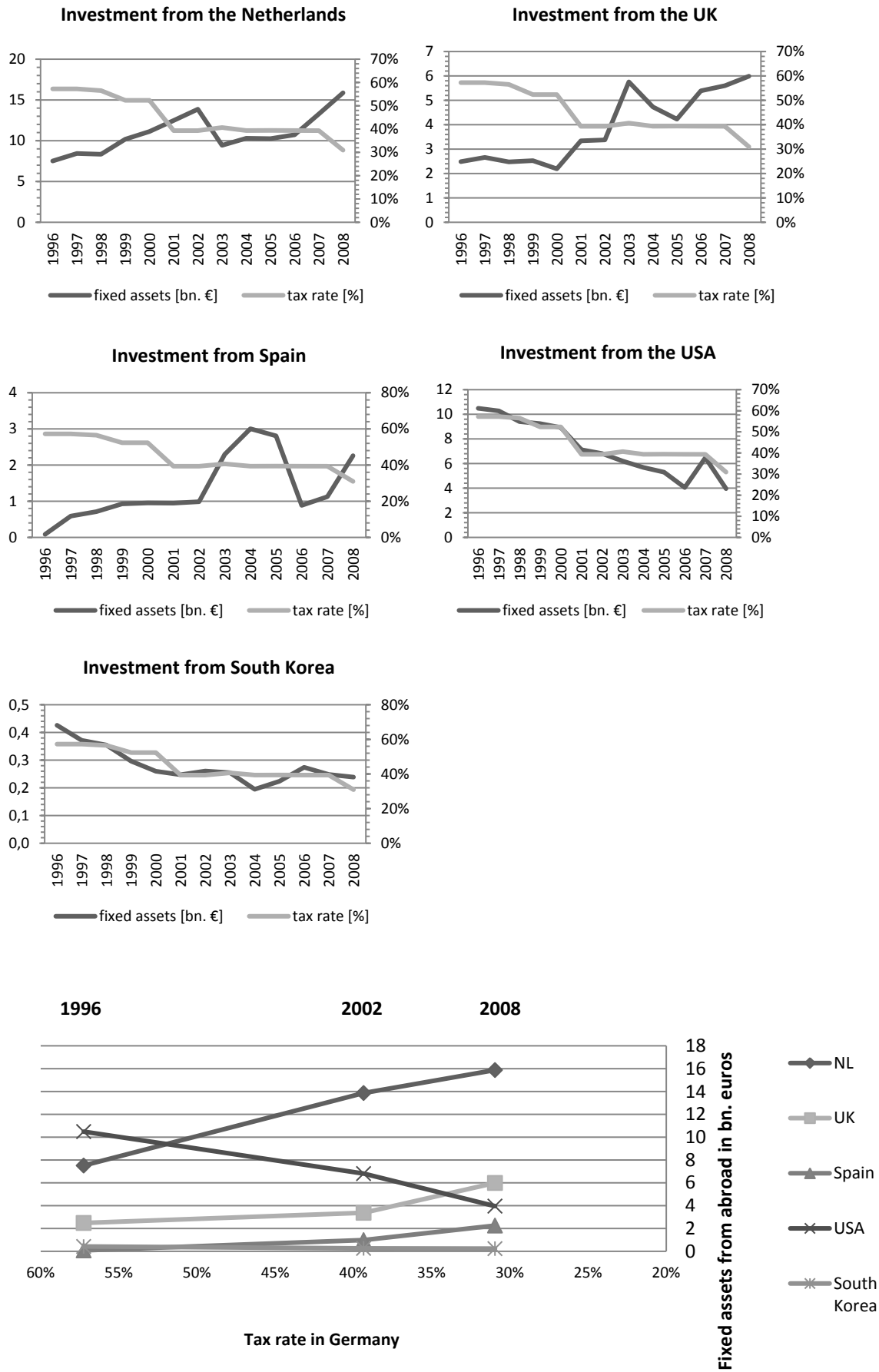


Chart 7 demonstrates that investment, as measured by assets held in Germany, has risen whilst the combined corporate tax rate has fallen. A tax rate effect on investment may not reliably be derived from this. If the tax rate in other countries has fallen by more than that in Germany, investors may have looked elsewhere out of tax concern. Investment may also have risen for completely tax-unrelated reasons. Analogous to the outbound observations aspects like GDP, firm profitability and inflation would have to be considered.

As mentioned above, all foreign corporations see the German tax rate development in the same way. This is why the diagrams in chart 8 all have an identical tax rate development. Chart 8 shows the reduction in the German corporate tax burden on the investment development for five chosen countries.

Chart 8 shows, that investment by foreign corporations has developed differently depending on in which foreign country the investing corporation is located. The Netherlands, Great Britain and Spain hold more assets in Germany in 2008 than they did in 1996.

Chart 8: Inbound fixed assets on a per country basis in bn. Euros



German assets held by US and South-Korean corporations have, on the other hand been receding. The different scaling is something to watch out for here. In 2008, US corporations hold 3.7bn euros in German assets, whereas companies from Spain only hold 3.1bn euros. With 6bn euros, the investment coming from Great Britain exceeds that coming directly from the US.

It is worth pointing out that US corporations for example may execute their investments in Germany via an intermediary company based in a different country. Since this would have an effect on the statistic, the single country trends must not be overrated. On aggregate (refer to chart 7) this aspect will not be visible.

The investment from the Netherlands, Great Britain and Spain suggest a possible positive correlation between a reduced tax rate and higher investment. Such, on the other hand, is not implied by the charts of the USA and South-Korea.

The last illustration of chart 8 is a summary of all the diagrams in chart 8. It provides an overview on the basis of a standardized scale. The decreasing investment directly from the USA is particularly prominent. In contrast, investment coming from the Netherlands has been growing significantly. As pointed out above, this could be down to US-corporations' increased tendency to use the Netherlands as a location for their intermediary companies as executors of their investment into Germany. If this is the case, then the two opposing effects would balance each other out. It is a well known fact that the Netherlands are generally a popular holding company location (see Mintz und Weichenrieder, 2010). In order to hereby explain the trend, the attractiveness of such a structure would have to have increased dramatically over the years.

The German corporate tax rate for the years 1996, 2002 and 2008 is on the X-axis. An upward sloping straight line would suggest the expected indirectly proportional relationship between tax rate and investment. A downward sloping straight line, as in the USA case, would suggest a counterintuitive proportional relationship. An actual effect may not be derived from such a chart, since not all tax-unrelated influences are included.

2.2.4 Empirical investigation into the effect of tax on investment

The tax rate effect based on outbound investment has been proven in several estimations in section 2.1. This effect should also generally apply for inbound investment. Upon further deliberation it becomes clear, that a possibly existent tax rate effect on inbound investment

cannot be proven via the estimation procedures outlined above. Becker, Fuest and Hemmelgarn (2006) have attempted to prove this effect. They investigated the effect of the 2000 corporate tax reform, by looking at average values before and after the reform. A negative effect of tax on inbound investment is detected. The authors themselves point out that the magnitude of the identified effect is surprisingly large.

In the case of outbound investment, considerable variations are present. This is because during the same years the respective countries have different tax rates, which they change at different times and to varying extents. For the inbound case, only unitary features of Germany (e.g. the German tax rate) can be drawn upon. As a result, there is not such a large scope for explanation. When trying to evaluate the tax effect on investment, the inbound case lacks an alternative investment opportunity in one or more additional countries. The outbound case and its 51 possible destination countries provide such an investment opportunity. An evaluation of the effect using our model based on international variations is hardly possible for the inbound case, as it lacks comparable measures. An estimation for the inbound case promises little success, as insufficient variation regarding the tax rates and control variables persist. An estimation for the inbound part is for these reasons deliberately not presented here.

3. Summary and outlook

The paper shows empirically that corporate taxes have a negative effect on investment. It highlights particularly which conclusions can be drawn from what approaches. The descriptive charts on annual investment may serve as a first starting point only. Reliable proof concerning the sought after tax effects may only be obtained by means of estimation procedures. Since estimations require a minimum amount of variation and different comparison groups, proving the tax rate effect on investment was only possible in the outbound case and not the inbound one.

The development of direct investment by German parent corporations abroad and that of foreign corporations in Germany from 1996 to 2008 has been examined. Especially the descriptive analysis has segmented inbound and outbound investments for the different federal states. The descriptive analysis shows the rapid growth of international investment activity in the observed period from 1996 to 2008. The development of Baden-Württemberg corporations has largely been the same as that of Germany as a whole. The empirical level also shows that Baden-Württemberg corporations' investment calculations do not significantly differ to those of corporations from the rest of Germany.

The empirics exclusively focus on the outbound case. The estimations proceed in three different steps. The first step shows that the effect of corporate tax on the investment volume is negative. A by 10 percentage points increased (reduced) corporate tax rate causes a 5.32 percent reduction (increase) in investment, measured by fixed assets.

The second step provides the analysis of empirical evidence for the fact that companies with an existing loss carryforward are less concerned with tax rates in their investment decisions. About half of the negative tax rate effect is compensated for firms with an existing loss carryforward. If the pure tax rate effect is -0.553 and the interaction term of an existing loss carryforward and the tax rate is 0.299, the summated effect is merely -0.254. A tax rate increase of one percentage point therefore only leads to a reduction in investment by 0.254%.

The third step extends the empirical analysis into the research field concerned with corporations' structures. Especially holding companies are set up by multinational corporations in tax favorable destinations in order for investments to be able to be structured optimally regarding tax. Regression table 3 provides evidence for the idea that locations with a reasonably low corporate tax rate and low withholding taxes boast a relatively high number of holding companies. A decrease of ten percentage points in a country's corporate tax rate causes an increase in the share of holding companies in all subsidiaries in that location by 0.55%. The effect is even stronger regarding withholding taxes. A ten percentage point decrease in withholding taxes causes an increase of 0.80% of holding companies relative to all kinds of subsidiaries. The relationship between tax and corporations' structures is a field containing lots of future research questions. A more detailed competency in this field is relevant for tax policy, as it uncovers dodging reactions that are hidden from view when only investment numbers are looked at.

The inbound case looks at foreign parent corporations` investment into their subsidiaries in Germany. It shows why an analysis based on estimations would not deliver meaningful results in this subset. The reason for this is the lack of variation of the relevant variables necessary for such an approach. The detailed descriptive analysis already leads to the conclusion that cross border investment into Germany has increased throughout the observed time period.[16] A clear conclusion about whether this is because of the fallen corporate tax rate or other factors may not be drawn.

[16] Especially the 2008 corporate tax rate reform and its reduction of the corporate tax rate from 25% to 15% could have attracted investors. There are, however, critics who claim that this effect of the reform has only a small reductive effect on the tax burden. See Radulescu und Stimmelmayr (2008).

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