Fiscal Policy Decision-Making: New Evidence on its Determinants and Effects on Public Opinion

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Contents

Chapter 1

Introduction

This thesis consists of four essays centred around the issue of decision-making in fiscal policy. Chapter 2 studies the preferences of European politicians towards corporate tax harmonisation by means of minimum taxes. Chapter 3 analyses the political determinants of corporate tax setting in Europe over the past 30 years. In Chapter 4, the focus is shifted to the local level and questions related to policy interactions of local governments are studied. In Chapter 5, the political consequences of fiscal policy decisions are disclosed; in particular, the effects of regional policy transfers of the European Union (EU) on the public opinion are studied.

The thesis' main objective is to study the positive foundations of decisions in fiscal policy, in particular corporate taxation. Fiscal policy decisions are made by individuals who pursue their specific objective functions and who process information based on a variety of external influences. The economic literature has identified and studied three major (broadly defined) determinants of decision-making, which are a common theme in the following chapters: (i) self-interest, (ii) political ideology and (iii) individual characteristics (for extensive reviews of the literature, see Persson and Tabellini, 2000; Mueller, 2003). In addition, the literature has increasingly emphasised the fact that, in integrated markets, decisions are rarely made in isolation; thus, politicians' perceptions of external pressures and the resulting strategic interactions with other governments have to be added to this list. Although they can hardly be regarded as a goal in its own right as will be shown below, they have motivated a further specific strand of literature. In essence, all chapters of this dissertation are centred around these broad categories of policy determinants and intend to deepen our understanding of these influences.

In the following chapters, these determinants are tackled differently with regard to content and methodology. In the political economic literature, a great importance is ascribed to the influence of individual *self-interest* on political decision-making, in particular in the public choice theory. This first motivation of politicians is summarised by Persson and Tabellini (2000: 10) as follows: "politicians [can be assumed] to be purely self-

interested: they care about being in office per se, or about the rents they receive. They choose policy so as to further these goals, but otherwise do not care about what policy is implemented. In this case, we say that politicians are *opportunistic*". Lots of empirical evidence has already confirmed that politicians make their decisions along these lines so that they reflect the median voter's preferences, in particular in order to increase their probability of reelection. This political self-interest is a central theme of all chapters. For example, the empirical evidence presented in Chapter 2 suggests that the preferences of politicians at the European level concerning the limitation of corporate tax competition are driven by their electorates' interests. Yet, there is one important element of this literature which has received significantly less attention in the empirical literature: the link between – possibly opportunistic – political actions and the actual effect on the electorate's opinion. This link is studied in Chapter 5 in greater detail for the case of the allocation of regional transfers – which is considered a prime example of opportunistic policy in the literature – and their effect on the citizens' attitude towards the EU.

The second prominent perspective on politicians' motivation comes from partisan theory (see, e.g., Hibbs, 1977). Persson and Tabellini (2000: 10) summarise that "we can assume that politicians care about the well-being of particular groups in society and choose policy so as to maximise a social welfare function that puts disproportionate weight on these groups". This partisan view suggests that politicians are motivated by the outcome of their policy which is reflected in an important influence of *ideological preferences* on their decision-making. The main innovation of this thesis concerning the consideration of political ideology in fiscal policy decision-making is mainly methodological. The empirical partisan politics literature from economics almost thoroughly approximates the ideology of politicians by the simple use of dummy variables which differentiate between left-wing and right-wing. In the chapters of this thesis, several more advanced approaches to the measurement of ideology are presented and employed. These measures reflect the fast progress in the estimation of policy preferences of political actors which has been made in the political science literature (see, e.g., the overview in Debus, 2009). As will be demonstrated, such innovative measures offer specific advantages depending on the respective research question. In Chapter 2, data from individual roll-call votes in the European Parliament (Hix and Noury, 2009) as well as from expert surveys (Benoit and Laver, 2006) is applied in order to appraise the ideological positions of the parliamentarians. In Chapter 3, an innovative measure of ideology derived from content analysis of party manifestos (Klingemann et al., 2006) is used to assess the ideological positions of national legislatures in Europe. In Chapter 5, individual left-right self-placement of citizens is used in order to appraise the ideological preferences of European regions. In all these cases, strong evidence for an important role of ideological preferences can be found, thus underlining the relevance of partisan theory for fiscal policy decision-making.

Only in recent years, the literature has begun to study *individual characteristics* as a further possible determinant of economic policy decision-making. There is some empiri-

cal evidence which suggests that the identity of political leaders affects policy outcomes (see, e.g., Jones and Olken, 2005). In particular, the literature has identified – in very different settings – a certain role of individual characteristics, such as the politician's gender (Chattopadhyay and Duflo, 2004), the gender of his children (Washington, 2008), his educational and professional background (Dreher et al., 2009; O'Roark and Wood, 2011) and his service length in the parliament (Stratmann, 2000). The findings in this thesis give further empirical support to the relevance of such individual characteristics. In Chapter 2, it is demonstrated that the educational background as well as the socialisation in the European Parliament – i.e., the adoption of more pro-European positions in the course of the term in office – affects the politicians' preferences for corporate tax harmonisation. In Chapter 3, some evidence is found that the educational background of the heads of European governments influences their corporate tax setting behaviour.

Another explanation of political actions which has attracted increasing interest in the past years is the *strategic interaction* between governments. Such interactions are obviously not a motivation of political decisions for their own sake, but have to be regarded as the result of further constraints which limit the room to manoeuvre for decision-makers. These constraints can be created by increasing factor mobility, which typically leads to self-reinforcing processes, such as the often discussed "race to the bottom" in taxation, or by a high degree of attentiveness of the own electorate to the situation in other constituencies ("yardstick competition"). Both kinds of influences induce opportunistic politicians to take decisions in other constituencies into account; such behaviour typically leads to spatial policy interdependencies, which have mainly attracted the interest of the empirical literature (see, e.g., Revelli, 2005). One prominent example is the strategic interaction of European governments in the choice of corporate tax rates (Devereux et al., 2008), which is taken up in Chapter 3. Another main issue in the empirical literature is the interaction of local governments, which is studied in Chapter 4 in greater detail. The thesis extends this literature in two directions. First, it points out the econometric problems related to the disregard of boundaries in the empirical analyses of spatial policy interdependence in local public policies. Second, it studies the "true" structure of local competition, which can be shown to be quite distinct from the structure which is typically assumed in the theoretical literature on corporate tax competition. Based on our findings, a theoretical model is developed which incorporates the specific characteristics of local tax competition and, thus, introduces a theoretical perspective to the so far largely "empirical-based" literature on local fiscal interactions.

In the remainder of this introduction, I give a short overview over the objectives and results of the four remaining chapters of my thesis.

Chapter 2 studies the preferences of European politicians towards corporate tax harmonisation by means of minimum tax rates.[1]

[1] This chapter is based on the paper "The Political Economy of Corporate Tax Harmonization — Why

Political representatives repeatedly argue that globalisation might lead to a destructive competition, which would result in a "race to the bottom" of corporate tax rates and an insufficient financial endowment of the public authorities. Setting minimum tax rates is a way of mitigating this pressure from tax competition. In this chapter, we explore the factors which shape the support of politicians with respect to corporate tax coordination in the EU. While there exists a vast literature on the controversial issue whether corporate tax coordination is capable of improving welfare or not as compared to unrestricted competition (see, e.g., Wilson and Wildasin, 2004), the positive question on the driving forces of harmonisation processes has largely been ignored. This chapter contributes to filling this gap.

In a first step, a number of hypotheses are derived mainly from the theoretical tax competition literature and different approaches from political science. Individual factors can be derived from ideological preferences towards the role of the government and national sovereignty as well as from the personal background, such as education. Country-specific factors mainly arise from different national preferences as well as from the extent to which a country can benefit from the autonomy to pursue an independent tax policy.

In our empirical approach, we focus on a particularly interesting group, namely the Members of the European Parliament (MEP) and make use of a self-conducted survey among MEP, which included a question dealing directly with the desirability of EU-wide obligatory minimum corporate tax rates. Moreover, this study makes additional use of a similar survey of the Bundestag to analyse differences between the attitudes of national and European representatives. The results confirm an important role of ideology: left-wing and pro-European politicians tend to favour minimum tax rates. But we also demonstrate that both further individual characteristics as well as national interests are important determinants for the politicians' attitudes towards reducing tax competition by means of minimum tax rates. Individual characteristics, such as education and the length of membership in the EP, show the expected effect. National interests play an important role as well, which is most notably the case for the current national level of corporate taxation. Moreover, the citizens' preference for social equality transpires to have an impact on the politicians' attitude towards tax competition, while some other predictions from tax competition models seem to play a minor role. Our EP-Bundestag comparison shows that German politicians on the national level do not show different preferences towards tax rate harmonisation.

Chapter 3 studies the effects of political factors, mainly partisanship, on corporate taxes over the past 30 years — a period of intensifying competitive pressure in Europe.[2]

The broad literature focussing on the effects of globalisation and strategic interactions

Do European Politicians (Dis)like Minimum Tax Rates?" which is joint work with Friedrich Heinemann.

[2]This chapter is based on the paper "Partisan Politics in Corporate Taxation" and is joint work with Marc Debus.

on corporate tax competition (e.g., Slemrod, 2004; Devereux et al., 2008; Overesch and Rincke, forthcoming) has widely neglected an impact of political factors. In this chapter, we analyse the effects of political factors on corporate taxation and, in particular, the impact of partisanship.

In a first step, we show in a simple theoretical framework based on Zodrow and Mieszkowski (1986) how political ideologies can impact on decisions on corporate tax rates. Assuming heterogeneous decision-makers driven by self-interest in the political outcome and a probabilistic voting model, two channels can be identified which point at different tax reaction functions of left-wing and right-wing politicians: differences in public good preferences as well as ideological or personal biases in the perception of capital mobility (Heinemann and Janeba, 2011). Both channels imply that right-wing incumbents set lower corporate tax rates. Moreover, the prediction can be made that an increasing intensity of competition reduces the partisan bias in corporate tax setting.

In the empirical section, we make use of highly innovative data on ideological positions. These positions are derived from the Comparative Manifesto Project (CMP) data set, which is based on the content analysis of party manifestos (Klingemann et al., 2006). This data enables much more sophisticated analyses of partisan politics than the data usually applied in public finance. Applying panel data for 32 European countries since 1979, we can detect a significant positive effect of left-wing legislatures on corporate tax rates. This effect, however, is diminishing over time. Beyond this ideological effect, we identify two further political factors which interfere with the general pressure on cutting tax rates: the fragmentation of government as well as the educational background of the respective head of government. Moreover, our analysis by means of disaggregated ideology measures reveals that especially the parties' attitudes towards the welfare state are a most relevant factor which has a strong positive effect on corporate tax rates.

Chapter 4 focuses on fiscal competition at the local level. It covers two questions related to the literature on spatial policy interdependence: first, the consideration of boundaries in empirical analyses; and second, the structure of competition in the theoretical modelling of local corporate tax competition.[3]

Many studies of spatial policy interdependence in (local) fiscal policies – such as Brueckner and Saavedra (2001) or Buettner (2003) – concentrate on the relations between jurisdictions within a single region. These works usually disregard possible extra-regional effects. In the first part of the chapter, we evaluate the validity of such restrictions by focusing on competition for mobile capital. With respect to local corporate tax com-

[3]The content of this chapter is based on two separate papers. Section 4.2 and 4.3 are based on the paper "Politicians' Opinions on Rivals in the Competition for Firms: An Empirical Analysis of Reference Points Near a Border" which is joint work with Benny Geys. Section 4.4 and 4.5 are based on the paper "Tax and the City – A Theory of Local Tax Competition and Evidence for Germany", which is joint work with Eckhard Janeba.

petition, the intensity of competition for mobile capital between jurisdictions should determine their intensity of strategic interactions in business tax policy. Yet, as the underlying reality (i.e., competitive forces) is hard to measure objectively, politicians' beliefs about what is real are especially likely to become of crucial importance. For this purpose, we study German local politicians' assessments of their jurisdictions' main competitors in the struggle to attract firms.

Our empirical results are based on both OLS and natural spline regressions using survey data from over 700 German municipal leaders in the state of Baden-Württemberg. They show that most politicians perceive other municipalities within their own state as the strongest competitive force. Yet, a crucial caveat to this finding concerns municipalities 'near' a border, in which politicians also perceive a strong competitive threat from across the border. This corroborates the idea that municipalities near a border have a broader reference group than is commonly assumed in the existing literature. Moreover, the importance of borders as a dividing line varies depending on the type of border. First, ceteris paribus, their effect is weaker (i.e., less constraining) for national than for international borders: this means decision-makers in municipalities up to roughly 20km from the border take competition with jurisdictions beyond the border into consideration when a national, inter-regional border is concerned, while the equivalent effect of an international border ceases after approximately 12.5km. Second, in our sample the French-German border is shown to have a stronger effect than the Swiss-German border. One tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU). Alternatively, it could reflect Switzerland's more aggressive corporate tax policy. Overall, our findings suggest that geographically close municipalities perceive each other as competitors for mobile capital regardless of the state or country where they are located.

These findings imply a likelihood of obtaining biased estimates in studies of local policy interactions if one refrains from taking these inter-border links into account. This problem is known as the 'boundary value problem' or 'edge effect' and has been discussed extensively in the early theoretical spatial econometrics literature (see, e.g., Anselin, 1988), but has widely been neglected in applied works. We suggest a need to refine the commonly used contiguity- and distance-based neighbourhood matrices by treating border-municipalities differently from in-land ones to avoid biased estimations of spatial interactions.

In the second part of the chapter, we again use the survey responses to study the "true" spatial structure of local tax competition. Based on these responses, we can empirically identify the reference group for local business tax policy decisions. The size of the jurisdiction and, in particular, its economic function turn out to be the important determinants of the decision-maker's perception of the intensity of competition. In particular, respondents from urban centres perceive a much higher intensity of competition for firms

with respect to competing jurisdictions which are distant or even located in other countries. Our empirical findings confirm the assumption of the empirical literature about the importance of neighbourhood competition, but it also shows that another important factor is missing. In particular, the assumption of the empirical literature that competition takes place only among neighbours is at odds with the theoretical approaches where all jurisdictions compete simultaneously. The existing standard models, however, are incapable of explaining the empirical particularities of local competition.

These empirical findings motivate our sequential tax competition model, which builds on Borck (2003), but extends this model by considering a rich competition structure. Essentially, we assume a number of metropolitan regions which each consist of one city centre and a number of surrounding (rural) jurisdictions. The model has two levels of competition for mobile capital: first, cities simultaneously compete for mobile capital by setting their tax policies (which can be interpreted as competition for large scale investments, such as headquarters); second, rural areas compete simultaneously for capital within its metropolitan area (which corresponds to the neighbourhood competition). We then compare the outcome of the model to a traditional tax competition model in which all governments decide simultaneously.

We are especially interested in the effects of a rise in the number of metropolitan regions, which represents the increase in competition, for example through globalisation, Eastern enlargement of the EU or German unification. It is shown that in both types of models the capital tax rates of the cities converge to zero, while for rural areas it only converges to zero in the simultaneous model, but stays positive in the sequential model. Moreover, in the sequential model, cities are more affected by an increase in external competition than hinterlands, since they reduce capital tax rates more and shift more from mobile capital to immobile labour taxation. In contrast to models like Bucovetsky (1991), our results imply that larger jurisdictions do not necessarily rely more on capital taxes when they face strong competition with more distant competitors. Based on tax data from Baden-Württemberg, we show that several of the predictions from the sequential model are in line with the development of tax rates in the past 20 years.

In Chapter 5, it is studied empirically whether the citizens reward politicians for receiving regional transfers.[4]

The theoretical literature (e.g., Dixit and Londregan, 1996) suggests that upper-tier governments have an incentive to strategically allocate regional transfers in order to affect the electorate's opinion. This implies that citizens in targeted regions are aware of this intended benefit and that they reward the benefactor for it. In this chapter, the reaction of the citizens is studied, which has not found much consideration in the empirical

[4]This chapter is based on my paper "Can Regional Transfers Buy Public Support? Evidence from EU Structural Policy".

literature until now (with the exception of Levitt and Snyder, 1997). In particular, the chapter focuses on the regional policy of the European Union as a special case of regional transfer policies with an immense scope and regionally targeted benefits. In this policy area, the European institutions, especially the Commission, act as benefactor and, apparently, also intend to increase the public support for European integration (Begg, 2008). The effects of these targeted transfers on the public support for the EU are studied by combining a rich data set on the regional allocation of structural funds payments with opinion survey data.

In the empirical section, it is shown that the regional transfers have positive impact on the public opinion which turns out to be sizeable. An increase of per capita transfers by 100 Euro increases the probability of being supportive of the EU to the extent of approximately 5 to 15%. Moreover, this is the first paper to be able to analyse the chain of causation which leads from regional transfers to public opinion in a more detailed way. In particular, the relevance of the individual's awareness of being a beneficiary is scrutinised. First, it is found that the awareness of being a beneficiary of transfers is conditional on a number of further socio-economic characteristics. Education plays an important role; higher educated peoples' awareness reacts stronger to regional transfers than lower educated people. Second, the awareness of being a beneficiary of transfers is generally reflected in higher public support for the EU. Informed people have a 4% higher probability of having a positive opinion of the EU. This effect, however, is also heterogeneous and depends on the channel of information. A sizeable effect is mainly detected for those citizens who are direct recipients of EU funds. Other information sources (TV, information signs) also have a positive but much smaller effect whereas a negative effect is found in those cases where the respondent is acquainted with other people who are direct recipients of funds.

The thesis is organised in such a way that the chapters can be read independently of each other. All references are collected in the bibliography.

Chapter 2

Political Preferences for Tax Harmonisation

2.1 Introduction

Corporate tax harmonisation is a much discussed subject in politics. Supported by the findings of neoclassical standard tax competition models, political representatives repeatedly argue that globalisation might lead to a destructive competition which would result in a "race to the bottom" of tax rates and an insufficient financial endowment of the public authorities. However, an international coordination of corporate tax policies is difficult in practice since individual actors may usually gain from a unilateral deviation of their tax policy.

One existing supranational institution which could ensure a coordinated tax policy of a subgroup of nations is the European Union. In Europe, there are pronounced concerns about the consequences of corporate tax competition, especially since the accession of Central and Eastern European countries with low corporate taxes to the EU. Although the Ruding Report on Company Taxation (Commission of the European Communities, 1992) already proposed to introduce an EU-wide obligatory corporate tax rate of 30% in the year 1992, European legislators have been remarkably calm regarding advances in this direction in the past years. Nevertheless, both in the political debate and in the economic literature, it is still a debated issue whether the European level should get involved in this area and restrict tax competition by means of an obligatory minimum corporate tax rate.

While there exists a vast theoretical and empirical literature on the controversial issue whether corporate tax coordination is capable of improving welfare or not as compared to unrestricted competition, the positive question on the driving forces of harmonisation processes has largely been ignored. Despite the fact that a few authors have formulated certain presumptions on the conditions under which harmonisation takes place as well

as the probable view of decision makers in parliaments, rigorous empirical tests on such hypotheses are missing. This chapter contributes to filling this gap. We want to explore the preference-shaping factors of policy actors with respect to their position on corporate tax coordination in general and on an EU-wide minimum tax in particular.

There are a number of factors which can be expected to influence attitudes in this regard, both on the individual and on the country-specific level. Individual factors can mainly be derived from ideological preferences, as it may be assumed that the attitudes towards the role of the government and national sovereignty have an influence; however, they can also be derived from personal background such as education. Country-specific factors arise from different attitudes towards the size of the national welfare state and national tax autonomy, as well as the extent to which a country can benefit from the autonomy to pursue an independent tax policy.

In our approach, we rely on the use of an elite survey among parliamentarians[1], an approach which is quite common in political science but has not been applied frequently in public economics (e.g., Ashworth and Heyndels 1997, 2000; Heinemann and Janeba, 2011). As it is one of our prime concerns to identify aspects which are related to national characteristics, we chose the Members of the European Parliament (MEP) as our target group. Although these politicians do not have a direct say in the corporate tax policies of today, they constitute an interesting subject of research. In contrast to national parliaments, where all parliamentarians share the same national perspective and analyses can only focus on differences in ideology and individual background of the parliamentarians, in the EP perceptions from all 27 EU member states come together. Compared to analyses involving representatives from several different national parliaments, the focus on MEPs offers the advantage that they operate in the identical institutional environment. For this reason, their attitudes cannot assumed to be biased due to specific characteristics of national parliaments. Members of different national parliaments might have a different degree of knowledge of the issue (whereas MEPs have similar levels of information due to cooperation in supranational political groups and committees), different national reelection concerns due to asynchronous legislative terms (whereas in the EP elections take place simultaneously in all countries) and constituency-specific interests (whereas all MEPs are elected under proportional representation from party lists, even in countries such as the UK that apply a plurality voting system in national elections).

We make use of a unique data base: a self-conducted survey among MEPs, which asked directly for the desirability of EU-wide obligatory minimum corporate tax rates. Moreover, this study makes additional use of an analogous survey, which was directed at members of the German parliament, the Bundestag. This comparison is helpful, since these parliamentarians have, in contrast to the MEPs, the competence to decide on cor-

[1]Elite surveys on members of the executive branch of government, such as heads of government or ministers, are quasi unfeasible at the national level due to very low rates of response and econometrically unhelpful due to too few observations.

porate taxation issues. In order to draw more general conclusions which are not only restricted to MEPs, one has to assume that politicians of a given country and party are 'similar'. The similarity of attitudes towards tax harmonisation will be analysed in the empirical section for German politicians from these different parliaments. Based on these databases our study is the first to shed light on the positive question of how to comprehend the diversity of attitudes of politicians on corporate tax competition and to understand the lack of harmonisation even in an integrated economic area such as the EU.

The main results of this chapter can be summarised as follows. The important role of ideology can be confirmed, but we also demonstrate that both further individual characteristics as well as national interests proxied by country variables are important determinants for the politicians' attitudes towards limiting corporate tax competition by means of minimum tax rates. It is mainly parliamentarians from countries which exhibit a high corporate tax burden today who express their approval for minimum tax rates. Several predictions of theory derived from tax competition models can be confirmed, while others do not find support. However, no evidence can be found that the attitude of German representatives of the Bundestag differs from that of their counterparts in the European Parliament.

The structure of the chapter is as follows: in section 2.2, the theoretical background for our analysis is presented, which is mainly based on the literature on tax competition and on several approaches from the political science literature. On this basis, our testable approach to preference formation is developed in section 2.3. In section 2.4, the surveys of members of the European Parliament and the German Bundestag are described and descriptive findings are presented. Section 2.5 presents the empirical analysis and the estimation results. Section 2.6 concludes.

2.2 Theoretical background

2.2.1 Tax harmonisation

The theoretical literature on tax coordination in the European Union, such as Zodrow (2003) or Oates (2001), has until now mainly focussed on the normative question whether coordination of tax policies is welfare-increasing compared to competition. Although we want to switch over to a positive perspective, this normative literature lays some of the foundations for the subsequent hypotheses concerning the politicians' attitudes towards tax coordination. In this literature, which originated from the seminal contribution by Zodrow and Mieszkowski (1986), tax coordination gets its support from the view which regards corporate tax competition as being detrimental, as it is often described as a "race to the bottom". Following this view, countries underbid each other's corporate tax

rates in order to attract capital. An overall loss of welfare occurs where a coordinated approach could yield a better result for all players. The typical result of these standard tax competition models is a suboptimal low level of public expenditures, which puts pressure on the welfare state and endangers its financing base. In its application to EU tax policy, Zodrow (2003: 655) therefore concludes that "the standard tax competition model suggests a potential role for tax rate harmonisation in a union".

This unambiguously positive view towards tax competition is however contested by the literature initiated by Brennan and Buchanan (1980). It does not have the premise of benevolent governments as traditional tax models, but instead assumes governments which are to a certain extent driven by the aim of budget maximisation. Then, tax competition can counteract their tendency to overspend (see, e.g., Edwards and Keen, 1996), thus resulting in positive welfare effects. In contrast to the bulk of the theoretical approaches which model harmonisation as a coordinated tax increase in all countries, some further papers pay attention to the institutional design and consider minimum tax rates as a specific – and in the EU probably the most feasible – form of tax policy coordination.[2] However, the welfare consequences of a minimum tax are not less ambiguous than in case of the more general tax competition models. In the following section 2.3, we will discuss some further aspects of seminal tax competition models which are of importance to the derivation of our testable hypotheses, including the implications of asymmetric tax competition and new economic geography models. Overall, the theoretical literature on the welfare effects of tax competition is so extensive that a more comprehensive discussion would go beyond the scope of this contribution.[3]

One major difference between this normative literature on tax harmonisation and our approach is the fact that in the former the group of (potentially) harmonising countries is taken as exogenously given, while we want to identify the rationales behind the harmonisation process. In our contribution, we confront these normative predictions with the positive driving forces of tax harmonisation. A small strand of theoretical literature explains this endogenous formation of groups of harmonising countries. Cardarelli et al. (2002) and Itayaa et al. (2008) study this question in a repeated interactions model and derive conditions under which countries coordinate their tax policies. In particular they show that this coordination cannot prevail under the existence of strong regional asymmetries. However, countries tend to stick to harmonisation if their citizens have a high preference for public goods.

[2]Examples are Grazzini and van Ypersele (2003), López et al. (1998) and Fuest and Huber (1999).

[3]For more complete surveys of the overall literature, please refer to Wilson and Wildasin (2004) or Fuest et al. (2005).

2.2.2 Political actors

The literature surveyed so far looks at countries and their tax policy decisions in a highly aggregate way and largely abstracts from individual political decision makers and their actual interests and constraints. In this respect, our study follows a distinctly different approach by trying to identify what shapes the tax harmonisation preferences of policy makers. In the political-economic literature there are few related works. One notable exception are Frey and Eichenberger (1996) who argue that members of parliament generally have an interest in the harmonisation of tax policy, as it enables them to form cartels in order to cement their importance and power.

With regard to parliamentary decision making, some special features of the European Parliament are of interest as the group of MEPs is in the centre of our investigation in order to disclose the role of national interests. The relevant empirical literature from political science offers some first insights. This literature mainly centres on the question whether MEPs vote along a (European) political group rather than along country lines. Recent contributions in this area on past European Parliaments are mainly from Hix and co-authors (see Hix, 2002; Hix et al., 2007). They empirically analyse roll-call votes in the EP for different periods and find that group cohesion of voting behaviour in the EP clearly exceeds national cohesion. The most recent analysis of voting behaviour in the first half of the Sixth European Parliament (2004-2005) shows that this pattern has hardly changed even after the accession of the new member states (see Hix and Noury, 2009). Interestingly enough, the authors find that national cohesion is relatively more important for budgetary votes which is a policy area with pronounced national interests, while Aspinwall (2002) shows that the dominating role of group cohesion does not hold for policy areas with strong and heterogeneously defined national interests such as foreign policy.[4] This receives further support from most recent findings by Kaniovski and Mueller (2011). They show that national differences in citizens' preferences have some explanatory power for the voting patterns in the EP, but this is generally modest. However, they conclude that "on issues that are likely to be particularly salient for EU citizens, their representatives appear to be voting more in accordance with their citizens' preferences than for other sorts of issues, and less in accordance with the representatives own ideologies". This suggests that in policy areas where a strong national interest exists, a lower level of group cohesion in the EP may be expected. This finding is of high relevance to the question at hand: as corporate tax policy is still regarded as an unambiguous national instrument of policy, an intervention by the EU can easily conflict with national interests.

Compared to the roll-call (i.e. recorded) vote literature, our direct survey of MEPs' stated preferences has a clear advantage since it enables a more direct identification of individual policy preferences, whereas actual voting can be a highly distorted signal

[4]Unfortunately, separate analyses for tax related votes do not exist because the EP has hardly any say in tax issues.

for preferences. It is quite customary for parties to impose informal sanctions on their members for defecting votes. Since only non-anonymous votes are open for empirical analysis, the resulting bias should be substantial. However, in contrast to the political science literature where surveys of decision makers are quite customary, there are rarely any works from public economics which use this method to analyse politicians' attitudes by this means. Notable exceptions are Ashworth and Heyndels (1997) and Ashworth and Heyndels (2000), who analyse the preferences of Flemish local politicians, which they stated in a survey, towards the level of taxation and tax reforms. In an accompanying paper which also focuses directly on individually stated policy preferences in the European Parliament, Heinemann et al. (2009) make use of other items of the same survey as this chapter and analyse the EU parliamentarians' attitudes towards the conceivable reform of the EU budget in general, and explicitly examine their attitudes towards the introduction of an EU tax. This analysis shows that for this particular question, not only ideology plays a role, but also country interests. Among these there is the financial net payer position, the new versus old member dimension and a country's tax competitiveness (for corporate taxation). This intrinsic conflict for an MEP between national interest and individual ideological position paves the way for the following analyses.

2.3 Tax policy attitude formation

The literature overview above gives us some first intuitions on the politicians' attitudes towards corporate tax coordination. The political economic perspective indicates that there is a strong incentive to harmonise tax policies because – from that perspective – politicians strive to form cartels in order to increase their room for manoeuvre. Exemplary might be harmonisation of consumption taxes. At the EU level, minimum tax rates already exist for excise taxes and the value added tax, which has been fixed since its introduction in 1992 at a level of 15%.[5] Its level is decided jointly every two years by the Council after proposal of the European Commission and confirmation of the EP, which shifts the competence in this area entirely from the national to the European level. Similarly, and regardless of how the institutional arrangement would actually look like, corporate tax coordination would undoubtedly mean a shift of competencies from the national level to the European level. However, although it is usually assumed in the political science literature that the EP tends to be more pro-integrationist than national parliaments, empirical evidence by Scully (2005) refutes this view. Based on surveys of European and national parliamentarians, he cannot find pronounced differences in the attitudes towards European integration between these two groups of politicians. How-

[5]Minimum VAT rates are for two reasons hardly comparable with minimum corporate tax rates and will not be discussed in this chapter in further detail: 1. tax competition is of minor importance for consumption goods than for capital due to lower mobility, and 2., the minimum VAT rate is set in the EU at a very low level and many exemptions are granted, so that it is barely restrictive for the member states.

ever, one might still object against a generalisation of the our findings that socialisation in the EP might impact the results. The significance of this objection will be studied by adding German parliamentarians at the federal level to our analysis.

We expect a considerable degree of heterogeneity among politicians on the issue of tax harmonisation. As the theoretical literature shows, it is a very controversial issue – even among economists – whether a coordination of corporate tax rates would be welfare improving in the EU, or not. However, even in case of a potential overall welfare increase through tax harmonisation, this might be difficult to implement in the real world. It would be difficult to create a compensation mechanism favouring those countries which benefit from a unilateral deviation of their tax policy (see Brøchner et al. (2007)). According to the view of many tax competition models, a politician's attitude would then depend on his jurisdiction's median voter preferences (or those of the representative household) in order to maximise votes. This implies that he will support harmonisation in case the median voter benefits from it compared to the status quo, and reject it otherwise.

Poole and Rosenthal (1996), who analyse the voting behaviour in the US Senate, term this approach to decision-making the "principal-agent" approach. In this view, the politicians are agents who act on behalf of their principal with the aim to maximise their utility mainly by striving for re-election. In these models, the principal is usually modelled as the median voter of the representative's constituency. However, various contributions both from economic and political science analysing legislators' decision-making reject the uniqueness of this "principal-agent approach" which explicitly or implicitly stands on the basis of most theoretical approaches in tax competition models. In addition to that, Poole and Rosenthal (1996) identify a second class of explanations, which can be termed the "ideological" approach. With the "ideological" perspective (which is much more common in political science than in economics), a politician's position is described on a certain ideological continuum. The classical example for such a continuum is the range from left to right; another one which is of high relevance for European politics is the range from pro to contra European integration. Thus, a politician's location along that specific dimension should influence his attitudes and voting behaviour, even though this can easily interfere with his vote maximisation objective.

In addition to the interests of the constituency and the ideological position, individual characteristics are a further determinant in attitude formation. Studies on the formation of economic beliefs (e.g. Caplan (2002); Blendon et al. (1997)) suggest that education or socio-economic characteristics of an individual can play a role, while Heinemann and Janeba (2011) show that this is also relevant for belief formation of members of a parliament. This also implies that a MEP's field of specialisation should matter, because members of the committee responsible for economic affairs ("Committee on Economic and Monetary Affairs" in the EU, ECON) might have a different view on issues such as tax policy.

These different approaches to attitude formation imply that the general opinion of a politician on the desirability of coordination of EU corporate tax policy in general, and EU-wide obligatory minimum corporate tax rates in particular, should depend on the following factors:

a) *member-state characteristics* are a proxy for (potential) national benefits from tax harmonisation which are relevant to the interests of national voters who are represented by the MEP according to the "principal-agent approach",

b) his/her *ideological position* according to the "ideological approach",

c) *individual characteristics* which are related to the individual politician's education, his informative situation linked, e.g., to his field of policy specialisation or socio-economic characteristics such as age or gender.

In the following, we will formulate several hypotheses on the determinants of the attitudes of the MEPs in light of this theory.

2.3.1 Country characteristics

As discussed in section 2.2, the relevant theoretical literature regarding tax competition is mainly of a normative character, discussing the welfare effects of tax competition compared to different kinds of harmonisation. Nevertheless, these findings allow us to draw some conclusions for the question at hand, i.e., which national characteristics are important for the national voters' attitudes towards tax competition and thus shape the attitude of politicians who act as their principals.

A first aspect in this regard deals with the voters' perceptions of the likely consequences of unrestricted tax competition as predicted by standard tax competition models. As Sinn (1994) remarks, declining public revenues as a consequence of tax competition especially threaten the sustainability of pure systems of income redistribution. However, the attitude towards income redistribution differs systematically between countries (see, e.g., Corneo and Grüner (2002), or Alesina and Angeletos (2005)), which gives rise to different perceptions of the costs of tax competition. Citizens of countries with high preferences for income redistribution would suffer most from a downwards pressure on national tax revenues, as they would have to fear that this might result in a level of welfare expenditures which is suboptimal low from their perspective. This consideration leads to the following hypothesis on the politicians' attitudes:

Hypothesis 2.1a. *Representatives from countries where the citizens have a high preference for social equality tend to be more supportive of minimum corporate tax rates.*

Early extensions of the classic Zodrow-Mieszkowski framework gave up their assumption of symmetric countries, but emphasised the importance of asymmetries in population. Seminal models with asymmetries in the population introduced by Bucovetsky (1991) and Wilson (1991) demonstrate the advantages of small regions in situations where tax

competition exists. This led to a literature which disputed the view that tax coordination eventually leads to all countries being better off as implied by the prisoner's dilemma model. As Bucovetsky (2009) shows in his model, small countries might gain from tax competition. Consequently, small countries benefit from free-riding in the case of partial tax harmonisation of the bigger countries by staying outside the union and setting low tax rates. Consider the following hypothesis derived from tax competition models with asymmetric country size:

Hypothesis 2.1b. *Representatives from small countries should oppose minimum corporate tax rates more strongly than their counterparts from larger countries.*

One further more recent view towards tax competition comes from "new economic geography" models, which introduce the "agglomeration" argument (Baldwin and Krugman (2004)). According to this, firms tend to cluster together in higher developed regions or countries ("core countries") due to positive externalities of spatial concentration. This enables these countries to sustain a higher tax burden on companies than the less-developed countries in the periphery, as the former do not have to fear capital outflows due to their agglomeration advantages. This implicates that the core countries would be able to increase their agglomeration tax rents in case tax competition was reduced. In the Baldwin/Krugman model the introduction of a tax floor would benefit the core countries, as these can increase their agglomeration rents through an even higher level of taxation than without any coordination. We propose:

Hypothesis 2.1c. *Representatives from countries which exhibit high agglomeration effects tend to be more supportive of obligatory minimum corporate tax rates.*

Furthermore, the current level of corporate taxation in a country can be expected to be of importance. Countries which exhibit a high level of corporate taxation even today would not be affected by a minimum tax rate as soon as their current tax rate is higher. They would even benefit from it as it reduces the gap to other countries which exhibit low tax rates today. This would eventually reduce the stress of competition on their economy. Peralta and van Ypersele (2006) show analytically in a tax competition model that minimum tax rates are never unanimously accepted because they would cause an increase in the gross price of capital in the bound countries, thus, making these countries lose from it, although leading to an overall increase of production. The incentive of a majority of highly taxed countries to impose their level of taxation on the minority of low taxed countries in a federation in order to decrease their competitiveness is closely related to the "strategy of raising rivals' costs", which is known from the political economy of industrial organisation (see Vaubel (2006)). This leads us to the following hypothesis:

Hypothesis 2.1d. *Representatives from countries which currently exhibit a high tax burden on companies tend to be supportive of obligatory minimum corporate tax rates.*

One further aspect derived from tax competition models concerns the mobility of capital. Apparently, the degree of competition a country is exposed to, and hence its attitude

towards tax harmonisation, largely depends on the mobility of its local capital stock. Carlsen et al. (2005) formalise this claim and show analytically that low mobility of the local industry alleviates the pressure a jurisdiction faces from tax competition and leads to a higher tax level.[6] As real capital is not as mobile as other investments, countries with a high share of real capital are expected not to be exposed to corporate tax competition to the same degree as other countries, so that they have less to gain from a retrenchment of tax competition through minimum tax rates. The following hypothesis results:

Hypothesis 2.1e. *Representatives from countries with a high share of real capital tend to be less supportive of obligatory minimum corporate tax rates.*

Apart from these predictions derived from various tax competition models, one further hypothesis regarding national interests, which should have an impact within the principal-agent approach, can be made. This is directly linked to the voters' attitudes towards European integration in general and European tax competencies in particular. Apart from the economic advantages and disadvantages discussed so far, the citizens in the EU member states can also be expected to differ in their attitudes towards tax coordination due to different attitudes towards European integration or diverging national attitudes regarding taxation. According to the principal-agent approach, a politician who is concerned about his re-election will not only incorporate the "economic" national advantages and disadvantages of tax coordination in his decision, but the subjective attitudes of his constituency as well. Therefore, we propose:

Hypothesis 2.1f. *Representatives from countries whose citizens express antipathy towards an increase of competencies of the European level in the area of taxation tend to be less supportive of obligatory minimum corporate tax rates.*

2.3.2 Ideological position

As discussed above, political science literature puts a lot of effort into the measurement of ideological positions and their implications for decision making and group cohesion. The approaches to measurement of ideological positions are manifold: they are inter alia calculated from roll-call votes, expert surveys and wording of party manifestos. Generally, the left-right scale is found to be of decisive character in the mapping of ideological positions. This dimension is also of high relevance for the matter of tax competition, as the border between left and right positions runs along their attitudes toward the economic role of public policy (see Benoit and Laver (2006)): left-wing representatives show more support for redistribution and a larger welfare state, while right-wing representatives are more inclined to lower taxation and a liberal, "laissez faire" economic policy. From this differentiation in the views towards the role of the state, it can easily be derived that left-wing politicians have to be more worried that tax

[6] Empirically, the authors confirm that Norwegian municipalities which experience high firm mobility tend to have a lower level of taxation.

competition might result in a deterioration of public revenues, as standard tax models suggest, which leads us to the following hypothesis:

Hypothesis 2.2a. *Left-wing representatives tend to be more supportive of minimum corporate tax rates than right-wing representatives.*

With regard to the European Parliament, a further dimension has been found to be of major importance in political science, which is the attitude towards European integration measured on an anti-/ pro-Europe policies scale (see Hix and Noury (2009)). Politicians defined as anti-Europe refuse the transfer of additional competencies to the European level. Therefore, they have to be worried that minimum corporate tax rates are a first step to a centralisation of tax policies, and thus a reduction of national sovereignty. This gives us the following additional hypothesis for the ideology of MEPs:

Hypothesis 2.2b. *Representatives who show an anti-Europe attitude tend to have a more opposing view towards obligatory minimum corporate tax rates.*

2.3.3 Individual characteristics

Some further predictions connected to individual characteristics of parliamentarians can predominantly be derived from the political science literature. In many works of political science literature, policy preferences of MEPs are not regarded to be exogenously determined and stable, but that the affiliation in the EP changes their attitudes in favour of more pro-integrationist positions (see Scully (2005)). We derive a first prediction on the MEPs' attitudes towards EU-wide minimum statutory tax rates:

Hypothesis 2.3a. *The support for tax coordination increases with the number of years spent in the EP.*

Additionally, the effect of expertise in business and economics is interesting. As discussed above, no clear-cut conclusion can be drawn in theory whether harmonisation of corporate taxation in the EU would be welfare-improving or welfare-decreasing. Irrespective of the missing consensus of experts on this normative question, we expect a negative attitude of economists towards tax coordination due to a more liberal perspective on the subject. This can be justified by several empirical findings that confirm that this population group is generally more supportive of competition and deregulation than other groups, as already indicated by Caplan (2002) based on survey data for the U.S. Most recent evidence comes from Dreher et al. (2009), who show that, among 500 political leaders from 73 countries, the group of trained economists has significantly introduced more market liberal reforms than the rest, as well as O'Roark and Wood (2011) who demonstrate that economists in the U.S. senate were less likely to vote in favour of increasing regulation in the labour market in form of minimum wages. These recent findings give support to the following expectation:

Hypothesis 2.3b. *Representatives who have a final degree in economics or business*

administration are expected to have a negative attitude towards tax harmonisation.

It is the objective of the following empirical part to test for the actual relevance of this variety of hypotheses based on our survey results.

2.4 Survey descriptions

The first survey which we will refer to was conducted by the authors among the members of the European Parliament between March and July 2007. The parliamentarians were addressed with written letters, which were sent out in five different languages: German, French, Polish, Spanish, and English. Where available, MEPs were addressed with letters and questionnaires in their mother tongue or in English otherwise. We received responses from 158 members who filled out their questionnaires. The overall response rate was 20.1 per cent and differed significantly between political groups and countries (see Appendix, Tables 2.6 and 2.7). We received responses from all but two small member countries (Estonia and Malta). The question which we exploit in the next sections is the following:

What is your attitude towards the following statement: "The EU should agree on EU-wide obligatory minimum corporate tax rates"?

The answer scale ranged from -4 ("very negative") to +4 ("very positive").

In addition to this survey, a second survey will be consulted, which was conducted between November 2006 and February 2007 among representatives in the German parliament (Bundestag), and allows us to study whether there are differences in the attitudes of politicians at the European and the national level.[7] In this survey, a question regarding the desirability of EU-wide obligatory minimum corporate tax rates was included as well. As this question was formulated almost with the identical wording and had the same scale, it is highly comparable to the question at hand. This enables us to analyse two different data sets: first, only the responses from the members of the European Parliament in order to uncover the impact of national interests, and second, a pooled sample of responses only from German politicians, both from the EP and the Bundestag, to disentangle differences between both parliaments.

It is important to note that the issue at hand, i.e., the introduction of minimum corporate tax rates at the EU level, was not very high on the political agenda in both parliaments at the time of the surveys, and that our question is therefore rather of a general nature. This entails that to our knowledge there did not exist any recent formal decisions at the level of the political groups at the time of the survey, such as party manifestos, which might be reflected in the survey responses due to parliamentary party discipline.

[7] That survey mainly focussed on the politicians' perceptions of restrictions to tax policy due to globalisation (for details, see Heinemann and Janeba, 2011).

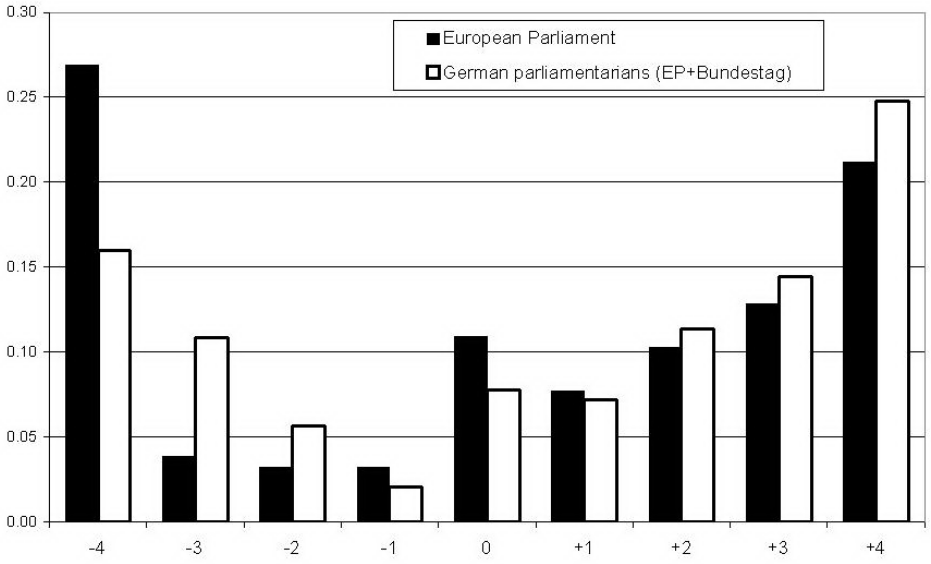

Figure 2.1: Survey: distribution of responses

Moreover, the divergency of responses within factions which will be presented in the following also indicates that the responses reflect individual attitudes and not formally specified party positions.

A visual inspection of the survey results from both samples shows a highly polarised attitude towards minimum tax rates (see Figure 2.1). The two prevalent answer categories are the two extremes, either complete rejection or complete approval. This pattern is even more pronounced for the EP sample concerning the negative answer categories. Table 2.1 presents the corresponding descriptive statistics of our analysis. As can been taken from the total mean value of +0.22, the politicians are altogether in favour of a minimum EU-wide obligatory corporation tax rate but only rather modestly. The large standard deviation points to a substantial heterogeneity of views among the politicians, which puts our analysis on a sound basis (total std. dev.: 3.14).

Comparing means among different indicators uncovers interesting first insights: the attitudes towards minimum tax rates differ with high significance across countries as well as political groups. Strong opponents of the country classification come from Poland, the Czech Republic, and the UK. Strong proponents come from Portugal, Austria, and Belgium. Politically speaking, the minimum taxation is mostly refused by politicians belonging to parties that either want to retain the national sovereignty (UEN) or are simply opposed to the EU and to any further integration (IND/DEM).[8] As expected, the minimum taxation receives the most support from politicians of left-wing parties, namely Greens-EFA, the socialist PES, and the GUE-NGL (the most far-left political group in the EP). Surprisingly, the mean closest to zero is generated by the liberal

[8]Indicative ideological positions of the political groups are stated in Table 2.6 in the appendix. A comprehensive overview of the political groups in the EP can be found in Corbett et al. (2007)

Table 2.1: Comparisons of means, EP participants

	Observations	Mean	Std. Dev.	Min	Max
Classified by country					
AT	7	2.57	2.94	-4	4
BE	6	2.17	3.13	-4	4
CZ	5	-2.20	2.68	-4	2
DE	39	0.51	2.89	-4	4
FR	16	1.25	2.74	-4	4
GB	12	-2.00	3.44	-4	4
HU	5	2.00	0.71	1	3
IT	8	1.75	1.39	0	3
PL	10	-2.60	2.37	-4	2
PT	7	2.86	1.46	0	4
Other[1]	41	-0.46	3.19	-4	4
Total	156	0.22	3.14	-4	4
ANOVA, P-Value for F-Test: 0.0000					
Classified by political group					
ALDE	18	-0.11	3.43	-4	4
EPP-ED	53	-0.72	3.10	-4	4
GUE-NGL	5	1.40	2.41	-1	4
IND/DEM	7	-3.71	0.76	-4	-2
IST	4	1.00	3.83	-4	4
NI	3	-4.00	0.00	-4	-4
PES	50	2.02	2.02	-4	4
Greens-EFA	6	3.17	1.17	1	4
UEN	10	-1.80	2.94	-4	3
ANOVA, P-Value for F-Test: 0.0000					
Classified by accession date (2004)					
EU-15	120	0.7	3.07	-4	4
new members	36	-1.36	2.86	-4	4
ANOVA, P-Value for F-Test: 0.0005					
Classified by final degree in business admin. or economics					
Yes	40	-0.65	3.25	-4	4
No	115	0.50	3.06	-4	4
ANOVA, P-Value for F-Test: 0.0449					

[1] only countries with number of observations ≥ 5 are listed individually

Table 2.2: Comparisons of means, EP and Bundestag participants

	Observations	Mean	Std. Dev.	Min	Max
Classified by political group					
FDP (ALDE)	36	-2.31	2.56	-4	4
CDU/CSU (EPP-ED)	72	-0.54	2.73	-4	4
Die Linke (GUE/NGL)	29	3.28	1.13	0	4
SPD (PES)	42	2.67	1.82	-2	4
Bündnis 90/ Die Grünen (The Greens/EFA)	15	2.40	1.12	0	4
ANOVA, P-Value for F-Test: 0.0000					
Classified by final degree in business admin. or economics					
Yes	40	-0.55	3.26	-4	4
No	154	0.93	2.91	-4	4
ANOVA, P-Value for F-Test: 0.0058					
Classified by origin from Eastern Germany					
Yes	38	.61	2.80	-4	4
No	156	0.38	3.05	-4	4
ANOVA, P-Value for F-Test: 0.0259					
Classified by member of European Parliament					
Yes	39	0.51	2.89	-4	4
No	155	0.65	3.08	-4	4
ANOVA, P-Value for F-Test: 0.7994					

ALDE group; the members from the Christian democrat/conservative EPP-ED group are slightly opposed to the idea of minimum corporate tax rates.

Classified by the accession date of the politicians' country of origin (i.e., EU15-member states vs. new members), it is noticeable that new member states politicians clearly oppose the minimum taxation. This might be due to the fact that the new member states today have a low level of corporate taxation, or the lower socialisation effect of their MEPs. Politicians with a final degree in economics or business administration slightly oppose the minimum taxation, while those with another educational background are slightly in favour of it.

The results for the pooled data set consisting only of the German members of the EP and the Bundestag are shown in Table 2.2. Here, the German members of the liberal ALDE group, the FDP, show by far the strongest opposition towards minimum tax rates. Again, the left parties (SPD, Bündnis 90/Die Grünen, Die Linke) offer much support for tax coordination. An interesting conclusion can be drawn from the standard deviations: these are in all cases lower than in the EP, which indicates that the cohesion of policy preferences within the groups of the EP is smaller than that within the German parties.

Parliamentarians with a final degree in business administration or economics again offer less support for minimum tax rates, which confirms the results for the EP. Politicians from Eastern Germany are more supportive; this, however, can also be due to the fact

that the overwhelming majority of politicians of the left-wing party Die Linke come from this part of the country. Finally, judged from the very high p-value for the F-Test for equal attitudes, there is no significant difference between the attitudes of members of the EP and members of the Bundestag observable from descriptive statistics.

2.5 Econometric testing

In the following, multivariate testing aims at identifying the relevant drivers of the EU parliamentarians' attitudes towards corporate tax coordination by means of EU-wide obligatory minimum rates, and at disentangling the attitudes of politicians of the EU level and politicians at a national level in this regard.

2.5.1 Method

In the following empirical analyses, an ordered probit approach will be applied. This approach is appropriate, as the answers on the question under investigation were made on a scale from -4 to +4 ("very negative" to "very positive").

An apparent problem of our econometric procedure, which is generally connected to survey data, is the selection bias. In empirical political science literature, the problem of missing data in expert surveys has received much attention. However, as King et al. (2001) point out, these concerns mainly relate to "item non-response", i.e., respondents answer some of the questions and not others. In this case, missing data can cause serious biases. However, our missing data problem is exclusively due to "unit non-response", which means that some of the chosen sample individuals refuse to be interviewed. However, in our survey, practically all respondents answered the tax minimum tax question. Since the questionnaire's main focus was not on corporate tax competition (only one out of seven questions was dedicated to this issue), unit non-response can hardly be attributed to this aspect either. King et al. (2001) specify that unlike item non-response, unit non-responses usually do not introduce much bias into analyses.

Nevertheless, we have to take this issue seriously as our data set may not be representative of the underlying population, which may be inferred from the response rates which differ both between member states as well as between political groups. However, since we are interested in conditional effects (such as the impact of national characteristics or ideology), the use of regression techniques takes account of these inconveniences. Biased results may only emerge in the special case of an unobservable variable driving the response rate and of this variable being correlated with an included explanatory variable. However, similar to most other empirical research designs, we cannot exclude this problem, but we do not see any theoretical indication why this should be the case in our empirical design. Moreover, our set of explanatory variables covers a wide spectrum of

aspects, so that this risk should be limited.

Nevertheless, in the analysis for the EP we apply a weighted estimator where weights correct for the sample's selection bias with respect to both country and political group representation. This means that underrepresented observations receive a larger weight than overrepresented cases. Furthermore, we allow for clustering of error terms among MEPs from one political group to cope with problems from the possible omission of unobservable determinants.

2.5.2 Variable definition

According to our hypotheses formulated above, we make use of variables along three dimensions, which comprise country characteristics (which depict specific national interests according to the "principal-agent approach"), political ideology (according to the "ideological approach") and individual characteristics (which quantify experience, education, or political specialisation). Moreover, in addition to those variables which are under investigation, several control variables are introduced which mainly capture individual characteristics for which no clear theoretical expectations exist. In our testing, we make use of the following variables.[9]

Country characteristics

The hypotheses formulated with regard to the principal-agent approach are tested by means of several national characteristics. National preference for redistribution and social equality is proxied by representative survey results from Eurobarometer (European Commission, 2007d). The variable *Preference for social equality* reflects the share of citizens who answered in the survey that "social equality and solidarity" is a value to be preserved and reinforced the most, above other values, such as peace, cultural diversity or entrepreneurship, for instance. Hence, the point of reference of this indicator is not the current level of social equality in the society (Then, the question would be "Do you want more or less equality than today?"), but it is rather an abstract preferential comparison with other positive societal values.

For the corporate tax burden, we employ statutory corporate income tax rates (*CITR*). We also experimented with effective average tax rates (*EATR*) according to the model of Devereux and Griffith (1999). These are calculated for a profitable investment project and take account of both statutory tax rates and the detailed provisions of the tax law such as depreciation provisions. While the latter is a more accurate measure for the tax burden, the former is probably more familiar to politicians and can be expected to have a higher impact on their perceptions. However, due to the high correlation between these two measures, the results do not vary significantly. Moreover, the measure *Other*

[9]The sources can be found in Tables 2.8 and 2.9 in the appendix.

revenues is added, which reflects the amount that indirect taxes, social contributions and further revenues contribute to the national budget as a share of GDP. This variable reflects the national dependency on the revenues from corporate taxation, as it can be expected that a country which covers a bigger part of its public expenditure through indirect taxes does not have to worry about corporate tax competition to the same degree.

The agglomeration argument is analysed by means of a self-constructed national *accessibility* measure. This is defined as the population-weighted average of potential accessibility by road of the regions within the respective country. The underlying indicator from the European Spatial Planning Observation Network (ESPON (2007)) can be regarded as a proxy for the size of the market area which the local producers within a certain region are faced with.[10] To account for differences in the stock of real capital, the gross value added (GVA) of industry as share of the total GVA (whose lion's share is the contribution of the services sector) is used (*GVA industry*). The size of the countries is captured by the number of inhabitants (*Size*).[11]

The variable *national support for EU tax responsibility* is measured by means of a survey conducted by Eurobarometer, which asked citizens in the member states whether decisions in the area of taxation should be made by the national governments, or jointly within the European Union (European Commission, 2007a). The variable reflects the national share of responses in favour of decisions being made jointly within the European Union.

As a further control variable, a dummy for EU-15 (*EU-15 member*) was introduced. The twelve new member states, mainly from Central and Eastern Europe, have common properties related to their relatively short historical experience of political autonomy, which is probably also relevant for their view on tax competition. It might be expected that these countries are particularly keen on retaining their tax autonomy, so that the sign of the dummy for the old member states is expected to be positive. Finally, national wealth is added as a control variable; it is proxied by the GDP per capita in purchasing power (*GDP per capita*) in 2006.

Ideology

The variables concerning ideology dimensions are taken from the political science literature on the measurement of ideology. They provide a more straightforward analysis of

[10] In particular, the value of the indicator is calculated by summing up the population of all European regions weighted by the time needed to travel there by car in the basis year 2006. This value is then standardised by dividing it by the European average, which is set at 100; see Vickerman et al. (1999) for an overview of accessibility indicators. The regional values vary from 1.3 for Dodecanese (a peripheric Greek archipelago) to 235.4 for the city of Leverkusen in North Rhine-Westphalia, Germany.

[11] It has also been experimented with the total national GDP as an indicator for a country's size; the results do not differ much due to the high correlation between the two variables.

the hypotheses on ideology than a simple use of party dummies. The individual scores for the members of the EP are taken from Hix and Noury (2009), who analyse the roll call votes from the first half of the sixth European Parliament and apply a scaling technique to the individual voting behaviour.[12] These enable us to test the hypotheses regarding the politicians' ideologies directly.[13] The two variables assess each MEP's ideology concerning the two dimensions *left/right* and *anti-/pro-Europe* based on his voting behaviour (recorded roll-call votes) in the first half of the sixth European Parliament: *left/right* measures the general left-right dimension, ranging from -1 (left) to +1 (right); *anti-/pro-Europe* reflects the attitude towards European integration with the same scale (-1: anti-Europe; +1: pro-Europe).

Moreover, a measure of national party positions from Benoit and Laver (2006) is used in the empirical analysis. For the Bundestag, no individual data on the ideological positions of the representatives is available, so for the sample of all German representatives only this measure can be used. Compared to the Hix/Noury measure presented above, this measure is different in its composition: it is based on expert interviews and not on the purely technical analysis of roll-call votes. However, this data has the advantage that it offers more dimensions than the two dimensions of the Hix/Noury data set. In addition to the general left-right definition (*left/right (party)*) focussing not only on economic but also on social grounds (such as abortion or homosexuality), a more specific series asks for the location of each party on an economic policy dimension. This dimension (*taxes vs. spending (party)*) refers to the substantive extremes of "promoting raising taxes to increase public services" and "promoting cutting public services to cut taxes", which exactly conforms to our expected main ideological driver for tax harmonisation preferences.[14] In addition, the party groups' views towards European integration (*anti-/pro-Europe (party)*) are included as well in the Benoit/Laver data set, in which one dimension (denoted as "EU authority" in their book) focuses on the attitude towards an increase of the range of areas in which the EU can set the policy agenda. All dimensions are measured on a scale ranging from zero (left and anti-EU, respectively) to twenty (right and integration friendly, respectively).[15]

[12]The values for ten 10 MEPs are missing in the Hix/Noury-dataset. Instead, the values for the average of the respective country's political group members were inserted.

[13]In addition, it was experimented with political group dummies as a proxy for ideology. The results regarding the effects of membership in different political groups confirm the descriptive findings; the overall results for the other variables remain constant.

[14]Few missing values had to be replaced by the values for the respective political group in the EP from McElroy and Benoit (2007) which applies the same methodology.

[15]The *anti-/pro-Europe (party)* variable had to be rescaled to be comparable with the EP dataset, as in the original contribution a high value indicates an anti-EU attitude.

Individual characteristics, education and information

Apparently, the socialisation effect can best be captured by the length of membership in parliament (*Years in EP*). In addition, *Member of ECON committee*, the EP committee on economic and monetary affairs, has been added; this dummy points at the specialisation of MEPs in the domain of tax policy and can also be seen as a proxy for socialisation. Members of this committee are expected to show more involvement in the ambition of the European level to obtain additional competencies in the area of tax policy. For the members of the Bundestag, the dummy takes the value of one for members of its pendant to ECON, the "Finanzausschuss".

The dummy *Business/Economic studies* takes the value of one for MEPs who declare in their CVs (available on the website of the EP) to have studied business administration or economics. This can be regarded as an expert effect, as these MEPs should have informative advantages with respect to the scientific debate concerning tax competition as well as with respect to economics in general.

Age and *gender* of the parliamentarians are added as control variables; with respect to these personal characteristics we do not have particular expectations about the sign of the effects.

2.5.3 Results for the European Parliament

In Tables 2.3 to 2.4, the results for the dataset containing the members from the EP are depicted. The dependent variable are the answers to the question concerning the desirability of EU-wide obligatory minimum corporate tax rates as presented in section 2.4. Specifications (1) to (5) differ with respect to the included country variables: in regression (1), no country variables are included. In regression (2), all country variables are included, and in (3), country variables of (2) which turn out to be insignificant at the 10% level are excluded. As some of the hypotheses presented above suggest that the CITR is affected by several of the other exogenous country variables, the problem of multicollinearity might appear. Therefore, this variable is excluded in specification (4) due to the possibility of multicollinearity. In (5), the non-significant variables from (4) are excluded. Finally, specification (6) uses different data to measure ideologies as will be explained below.

A highly significant impact of ideology on attitudes towards EU tax coordination can be found as a robust result of all specifications using individual ideology data. The results confirm our assumptions: In all specifications, the *left/right* dimension is highly significant, indicating that MEPs with a left-wing ideology are more supportive of tax harmonisation than those with a right-wing ideology. However, one has to bear in mind that this rough measure of the left/right-dimension (which is more of a technical nature as discussed above) does not only incorporate the politician's view towards the role

Table 2.3: Regression results for European Parliament

Variable	(1) Coefficient	(1) Marg. effect	(2) Coefficient	(2) Marg. effect	(3) Coefficient	(3) Marg. effect
Ideology						
Left/right	-1.873***	-0.450	-2.200***	-0.400	-2.121***	-0.413
	(0.529)		(0.680)		(0.650)	
Anti-/pro-Europe	0.683***	0.164	0.424*	0.079	0.454*	0.088
	(0.166)		(0.219)		(0.238)	
Further individual characteristics						
Age	0.013*	0.003	0.004	0.001	0.006	0.001
	(0.007)		(0.010)		(0.011)	
Gender (male)	-0.624*	-0.174	-0.463	-0.100	-0.455	-0.102
	(0.358)		(0.383)		(0.313)	
Years in EP	0.064**	0.015	0.071***	0.013	0.058***	0.011
	(0.025)		(0.021)		(0.020)	
Member of ECON committee	0.589***	0.165	0.587***	0.133	0.606***	0.144
	(0.131)		(0.144)		(0.170)	
Business / Economic studies	-0.537***	-0.117	-0.474**	-0.080	-0.438**	-0.078
	(0.185)		(0.194)		(0.223)	
Country characteristics						
CITR			8.209***	1.525	4.985**	0.971
			(3.143)		(1.950)	
Preference for social equality			6.156***	1.143	5.067**	0.987
			(1.428)		(2.389)	
Size			-0.369***	-0.068	-0.298*	-0.058
			(0.138)		(0.156)	
GDP per capita			-0.006	-0.001		
			(0.007)			
Accessibility			0.001	0.000		
			(0.004)			
GVA industry			-0.084***	-0.015	-0.066***	-0.013
			(0.017)		(0.015)	
EU-15 member			-0.534	-0.118		
			(0.410)			
Other revenues			-4.910	-0.912	-3.866*	-0.753
			(3.859)		(2.166)	
National support of EU tax responsibilities			0.972	0.181		
			(1.515)			
Observations	156		156		156	
$Prob\,chi^2$	0.0000		0.0000		0.0000	
$PseudoR^2$	0.1442		0.2202		0.2087	

Marginal effects are calculated for answer class +4 (strongest support for an obligatory minimum tax rate).

of the state in the area of economics (economic policy left/right dimension), but also his view towards social policy, so that these two dimensions partly interfere with each other on the general left/right dimension. To disentangle these effects, in specification (6) the survey-based values for the ideological positions of the national parties from Benoit and Laver (2006) are used.[16] The two measures for the left-right dimension are jointly different from zero with a very high significance (p-value: 0.000). However, only the measure concerning the economic policy position *taxes vs. spending* appears individually significant in the regression.

The *anti-/pro-Europe* dimension is in line with expectations as well: politicians with a more pro-Europe attitude are more in favour of minimum tax rates than opponents

[16]Unfortunately, data for the positions towards European integration is not consistently available from the Benoit and Laver (2006) data set for most countries.

Table 2.4: Regression results for European Parliament (continued)

	(4)		(5)		(6)	
Variable	Coefficient	Marg. effect	Coefficient	Marg. effect	Coefficient	Marg. effect
Ideology						
Left/right	-2.223***	-0.423	-1.986***	-0.409		
	(0.651)		(0.562)			
Anti-/pro-Europe	0.372*	0.071	0.419**	0.086		
	(0.215)		(0.186)			
Left/right (party)					-0.057	-0.011
					(0.051)	
Taxes vs. spending (party)					-0.071*	-0.014
					(0.043)	
Further individual characteristics						
Age	0.004	0.001	0.005	0.001	-0.003	-0.001
	(0.009)		(0.010)		(0.010)	
Gender (male)	-0.513	-0.115	-0.567	-0.138	-0.529	-0.126
	(0.396)		(0.404)		(0.406)	
Years in EP	0.071***	0.014	0.065***	0.013	0.079***	0.016
	(0.024)		(0.021)		(0.023)	
Member of ECON committee	0.604***	0.141	0.617***	0.154	0.500***	0.119
	(0.153)		(0.215)		(0.182)	
Business / Economic studies	-0.483***	-0.083	-0.502**	-0.094	-0.423***	-0.079
	(0.179)		(0.223)		(0.153)	
Country characteristics						
CITR					9.517**	1.933
					(4.083)	
Preference for social equality	6.635***	1.263	5.348**	1.102	8.303***	1.687
	(1.550)		(2.312)		(1.558)	
Size	-0.205	-0.039			-0.370***	-0.075
	(0.129)				(0.106)	
GDP per capita	-0.009	-0.002			-0.002	-0.000
	(0.008)				(0.007)	
Accessibility	0.004*	0.001	-0.001	-0.000	-0.000	-0.000
	(0.003)		(0.002)		(0.005)	
GVA industry	-0.076***	-0.014	-0.065***	-0.013	-0.080***	-0.016
	(0.016)		(0.018)		(0.018)	
EU-15 member	0.473	0.077			-0.736*	-0.185
	(0.510)				(0.422)	
Other revenues	-4.731	-0.901			-4.295	-0.872
	(4.326)				(3.785)	
National support of EU tax responsibilities	1.851	0.352			1.570	0.319
	(1.937)				(1.959)	
Observations	156		156		153	
$Prob\ chi^2$	0.0000		0.0000		0.0000	
$PseudoR^2$	0.2108		0.1948		0.2100	

Marginal effects are calculated for answer class +4 (strongest support for an obligatory minimum tax rate).

of European integration. Interestingly enough, the marginal effects of the two ideology variables show pronounced quantitative differences. In most specifications, the marginal effect of the left/right dimension is more than 4 times higher than the marginal effect of the pro-/anti-EU dimension, which suggests that the former is of decisive importance for the MEP's attitude. The marginal effects can be interpreted as follows: a shift of 1 point on the left-right axis (which is approximately the gap between the German post-communist PDS and the British Conservatives) to the left increases the probability by around 40% of stating a high support for minimum tax rates. Correspondingly, a shift of 1 point upwards on the anti-/pro-Europe axis (which is about the difference between the EU-sceptic UEN group and the Social Democrats) increases the probability by around

8%.

Regarding the hypotheses on the individual characteristics, a robust finding can again be made: MEPs with an academic background in economics/business administration show less sympathy towards minimum tax rates. This indicates that among parliamentarians from these professions a more positive view towards tax competition prevails than among parliamentarians with other professions. Out of the other individual characteristics, there are two which deliver significant results: MEPs who have been longer in the EP and those who are members of the Committee on Economic and Monetary Affairs are more supportive of tax coordination. This indicates that those politicians with a longer individual history of political socialisation and assimilation in the European Parliament, as well as those who – as members of the ECON – are more exposed to a European perspective on economic policy have a supportive position.[17] This supports our assumption of a socialisation effect in the EP, which suggests that the length of membership in the Parliament and the membership in the ECON play a role in moving individual views away from national interests towards a European perspective. Interestingly enough, this result contrasts with Scully (2005) who doesn't find an impact of the length of membership in the EP on the general support for integration of a MEP.

With respect to the country characteristics, a robust significant impact of several variables can be found. In all specifications, the national corporate tax rate (measured as CITR) has a highly significant positive impact. This confirms our assumption that mainly representatives from high tax countries strive for mandatory minimum tax rates in order to protect themselves against competition with their European neighbours.

One of the main predictions from standard tax competition models, i.e., that national attitudes towards redistribution have an impact on the politicians' attitudes towards tax competition, can be confirmed. A positive significant impact can be observed for the national preferences for social equality, which is in line with our assumption that tax competition is feared in these countries because it puts pressure on the national welfare state.

However, some further assumptions derived from tax competition models cannot be corroborated, namely that smaller countries are more resistant against limiting tax competition, as well as the hypothesis that countries which benefit from agglomeration effects express more support for minimum tax rates. Size even shows a significant negative impact in many specifications. This might indicate that tax competition is not consistently regarded as beneficial in countries which are – following theoretical tax competition models – assumed to gain from it. However, since even the largest country in the EU only contains about 16 percent of the total population, one might argue that if one takes

[17]Note that this effect is converse to the effect of economic expertise proxied by a final degree in economics or business administration and that the coefficients are even similar in size. This might give rise to concerns about multicollinearity in case that committee membership was highly correlated with economic expertise. However, this correlation is only 13.9%, so that this concern is of minor importance.

these tax competition models literally, all countries should be regarded as "small", which would imply that all EU countries would benefit from harmonisation, regardless of size. For the agglomeration effects, measured by the *accessibility* variable which indicates potential market access, only in one case the expected positive sign appears significantly; this effect turns out to be insignificant in all other specifications.

Finally, the hypothesis that parliamentarians from countries which do not have to fear corporate tax competition to a high degree because of their higher share in real capital are less supportive of minimum tax rates can be affirmed; as expected, the impact is negative and significant for all specifications. The share of indirect taxes and other public revenues turns out to have a negative effect on the support for minimum tax rates as expected, but this is often not significant. Further national characteristics do not disclose a significant effect for almost all specifications. This holds true for the national support of assigning tax responsibilities to the EU level as well. Attempting to replace this variable with the results of a Eurobarometer survey asking for the general attitude towards the EU did not have a significant impact on the results, either.

2.5.4 Results for German politicians

In the following, we turn to a sample consisting exclusively out of German politicians. In Table 2.5, the results for the regressions of pooled answers from the German participants of our EP survey and those who participated in the Bundestag survey are presented. In addition to the individual characteristics introduced above, a further control variable is added: the origin of a parliamentarian from the Eastern (formerly communist) part of Germany is captured by a dummy. This is a standard procedure for analyses of German politicians' attitudes (see, e.g., Heinemann and Janeba, 2011), since differences in attitudes regarding the economic policy are still notable between Western and Eastern Germany as shown by Alesina and Fuchs-Schündeln (2007). However, this dummy turns out to be insignificant for all specifications. In contrast to the findings above for the EP data, the educational background shows the same sign, but slightly misses significance. The further individual characteristics display insignificant results as well. Interestingly enough, the sign for the committee membership becomes negative when the membership in the Bundestag's committee on financial affairs is regarded in addition to membership in the ECON. This supports the conjecture that the positive effect found in the EP regression is indeed due to a socialisation effect.

Table 2.5: Regression results for German politicians

	(1)		(2)		(3)		(4)	
Variable	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect	Coefficient	Marginal effect
left/right (party)	0.077	0.019	0.080	0.019			0.116	0.028
	(0.073)		(0.073)				(0.079)	
taxes vs. spending (party)	-0.232***	-0.057	-0.235***	-0.057			-0.068***	-0.064
	(0.051)		(0.052)				(-0.056)	
anti-/pro-Europe (party)	0.188**	0.046	0.190**	0.046			0.221***	0.053
	(0.079)		(0.079)				(0.085)	
ALDE/FDP					-2.385***	-0.286		
					(0.301)			
EPP-ED/CDU					-1.406***	-0.285		
					(0.260)			
GUE-NGL/Linke					0.514	0.146		
					(0.329)			
Greens-EFA/Die Grünen					-0.416	-0.083		
					(0.362)			
Age	0.010	0.002	0.009	0.002	0.012	0.003	0.012	0.003
	(0.008)		(0.008)		(0.009)		(0.008)	
Gender (male)	-0.061	-0.015	-0.052	-0.013	-0.057	-0.014	-0.058	-0.014
	(0.181)		(0.181)		(0.184)		(0.184)	
Business / Economic studies	-0.303	-0.068	-0.337	-0.074	-0.311	-0.068	-0.314	-0.069
	(0.202)		(0.205)		(0.204)		(0.203)	
Member of ECON committee /	-0.243	-0.055	-0.226	-0.051	-0.274	-0.060	-0.276	-0.061
Finanzausschuss	(0.202)		(0.203)		(0.205)		(0.205)	
Eastern Germany	-0.259	-0.058	-0.257	-0.058	-0.262	-0.058	-0.262	-0.058
	(0.228)		(0.228)		(0.232)		(0.232)	
EP Dummy	-0.068	-0.016						
	(0.197)							
EP years			-0.044	-0.011				
			(0.045)					
EP years^2			0.002	0.001				
			(0.002)					
EP Dummy* (ALDE / FDP)					0.875	0.288	0.889	0.293
					(0.590)		(0.584)	
EP Dummy* (EPP-ED / CDU)					-0.092	-0.021	-0.099	-0.023
					(0.276)		(0.273)	
EP Dummy* (GUE-NGL / Linke)					-0.189	-0.041	-0.190	-0.042
					(0.716)		(0.716)	
EP Dummy* (Greens-EFA / Grüne)					0.140	0.036	0.103	0.026
					(0.700)		(0.663)	
EP Dummy* (PES / SPD)					-0.500	-0.094	-0.484	-0.092
					(0.412)		(0.400)	
Observations	194		194		194		194	
$PseudoR^2$	0.1538		0.1548		0.1585		0.1585	

Marginal effects are calculated for answer class +4 (strongest support for an obligatory minimum tax rate); *PES / SPD set as reference category.

The results for the ideology characteristics are in line with the previous findings. Again, members of parties with a more positive attitude towards European integration tend to support minimum tax rates. However, the inclusion of the economic policy dimension renders the effect of the general left/right dimension insignificant. The *taxes vs. spending* dimension itself is highly significant in all specifications. This offers further support to the assumption that – among the many different aspects of the left/right dimension – it is primarily the politician's attitude towards public spending that shapes the support for tax harmonisation. Moreover, in specification (3) party dummies are used with the German social democratic SPD chosen as reference category. The results confirm our expectation, with the economic liberal FDP and the Christian Democrats (CDU) showing significantly less support. The strongest support for minimum tax rates comes from the former East German communist party (Die Linke), which holds the furthest left position in the German party spectrum; however, their coefficient does not differ significantly from that of the SPD.

Regarding the question whether attitudes differ between the EP and the Bundestag representatives, two approaches are applied in order to investigate whether German politicians on the European level differ in their attitudes: a dummy, which has the value of one for a German MEP and zero for a member of the Bundestag (specification (1)), and the number of years of membership in the EP, which is zero for parliamentarians of the Bundestag and which depicts the increasing socialisation of German politicians in the EP over time (plus a quadratic term in order to capture a possible nonlinear relationship, specification (2)). In order to allow for differences between the political groups, interaction terms of party dummies and an EP dummy are introduced in specifications (3) and (4).

The results of all approaches show no significant results indicating different attitudes of the German EP and the Bundestag representatives. Moreover, the inclusion of interaction terms (*party dummies * EP dummy*) does not provide significant results for any of the political groups, either. Therefore, the objection that European parliamentarians might have different attitudes towards EU-wide obligatory corporate tax rates than representatives at the national level cannot be confirmed by the data on German politicians. These results are similar to those of Scully (2005) who doesn't find pronounced differences in the attitudes towards European integration between MEPs and national delegates, either.

2.6 Conclusions

This chapter contributes to filling a serious gap in the tax competition literature. Instead of treating tax policy decision-making as a black box conducted by monolithic "countries", we focus on important individual policy actors in the Parliaments and their attitudes. Through this political-economic approach we are able to answer the positive

question which personal characteristics and interests are the relevant drivers of harmonisation processes.

We find that ideology is indeed important, as it was anticipated: our hypotheses of the driving motives being connected with ideology can be confirmed by the available data. Politicians on the left side of the political spectrum offer the strongest support for the introduction of minimum tax rates, whereas members from the right – and especially those with a market liberal position – as well as EU-sceptical politicians tend to oppose a harmonisation. The analysis based on the measures of individual ideology positions reveals that particularly the left-right dimension shapes the attitude towards tax harmonisation. Furthermore, a major influence on attitudes can be ascribed to individual characteristics, referring to the experience of the parliamentarians. It turns out that parliamentarians with an academic background in economics or business administration tend to have a more positive attitude towards tax competition. Politicians with a longer membership in the EP or those who belong to the committee which deals with economic affairs are more supportive of harmonisation, which confirms our expectation of a socialisation effect. However, in addition to individual characteristics, national interests proxied by country indicators play an important role, as well. This is most notably the case for the current national level of corporate taxation, which has a widespread influence. Politicians from countries with high corporate tax burdens are highly supportive of minimum tax rates, as this protects them against competition with other EU member states. Moreover, one important prediction of tax competition models transpires to have an impact on the politicians' attitude towards tax competition, which is the citizens' preference for social equality. This reflects the fear of politicians from countries with a strong support for social equality of tax competition indeed leading to a "race to the bottom" and putting pressure on the welfare state. However, some other predictions from tax competition models seem to play a minor role in the opinion formation process of politicians.

Regardless of this, our EP-Bundestag comparison reveals that, at least for Germany, the attitudes towards the issue follows very similar patterns when studying parliamentarians at the national level. It is not possible to detect divergent attitudes, neither on the aggregate level, nor for any of the German parties.

Overall, our results add an important aspect to the tax competition literature which is largely dominated by normative approaches based on welfare theory. We have been able to show that stated preferences of real life policy makers concerning tax harmonisation are shaped by a much wider spectrum of factors than theory would suggest, ranging from ideology and individual characteristics to specific national interests. This could help explain why the actual tax policy in Europe and elsewhere regularly follows very different avenues than what is recommended in the public finance literature.

2.7 Appendix

Table 2.6: Response rate by political group

Group	Indicative ideology	Number of seats	Responses	Response rate
ALDE	Liberal	104	18	17.31%
EPP-ED	Conservative, Christian democracy	278	55	19.78%
GUE-NGL	Socialism, communism	41	5	12.20%
IND/DEM	Euroscepticism	24	7	29.17%
ITS	Right-wing, nationalist; dissolved in November 2007	23	4	17.39%
NI	Non-attached members	13	3	23.08%
PES	Social democracy	216	50	23.15%
Greens-EFA	Green, regionalism	42	6	14.29%
UEN	National conservatism	44	10	22.73%
Total		785	158	20.13%

Table 2.7: Response rate by country

Country	Number of seats	Responses	Response rate
AT	18	7	38.89%
BE	24	6	25.00%
BG	18	1	5.56%
CY	6	1	16.67%
CZ	24	5	20.83%
DE	99	40	40.40%
DK	14	4	28.57%
EE	6	0	0.00%
ES	54	4	7.41%
FI	14	4	28.57%
FR	78	16	20.51%
UK	78	13	16.67%
GR	24	1	4.17%
HU	24	5	20.83%
IE	13	3	23.08%
IT	78	8	10.26%
LT	13	3	23.08%
LU	6	2	33.33%
LV	9	2	22.22%
MT	5	0	0.00%
NL	27	3	11.11%
PL	54	10	18.52%
PT	24	7	29.17%
RO	35	4	11.43%
SE	19	4	21.05%
SI	7	1	14.29%
SK	14	4	28.57%
Total	785	158	20.13%

Table 2.8: Descriptive Statistics for European Parliament dataset

Variable	Mean	Min	Max	Std. Dev.	Explanations
Ideology					
Left/right	0.09	-0.80	0.99	0.32	"left-right" dimension measured by Hix and Noury (2009) for individual MEPs; ranging from -1 (left) to +1 (right)
Anti-/pro-Europe	0.35	-0.72	0.99	0.47	"anti-/pro-Europe policy preferences" dimension measured by Hix and Noury (2009) for individual MEPs; ranging from -1 (anti-Europe) to +1 (pro-Europe)
Personal information					
Age	52.5	30	76	10.2	Calculated as 2007 minus year of birth
Gender	0.74	0	1	0.44	Male set at 1
Years in EP	6.82	0	28	5.86	Calculated as 2007 minus year of first EP entry, source: official statement on the EP homepage
Member of ECON committee	0.18	0	1	0.39	Set at 1 if member of committee on Economic and Monetary Affairs which deals with economic and monetary policies in the Union, as well as tax provisions; source: official statements on the EP homepage
Business/ Economic studies	0.25	0	1	0.44	Tertiary education in business administration or economics
Country characteristics					
CITR	0.29	0.10	0.39	0.08	2006 statutory corporate income tax rate, source: IBFD European Tax Handbook 2006 (IBFD, 2006)
National preference for social equality	0.37	0.23	0.54	0.07	Share of answers "Social equality and solidarity" as value which should be preserved and reinforced the most in our current society, source: Special Eurobarometer 278, European Commission (2007d)
Size	2.97	-0.92	4.41	1.42	Natural logarithm of number of inhabitants in million, source: Eurostat database
GDP per capita	94.71	35.70	267.80	30.87	In PPS with EU25=100 for the year 2006, source: Eurostat database
Accessibility	91.61	4.1	203.7	55.33	Indicator calculated as the population-weighted average of the potential accessibility by road of all regions within a country in 2006, EU27=100, source: ESPON (2007)
GVA industry	22.81	10.79	38.08	5.65	Gross value added of industry as share of all branches in 2006 (2000 prices), source: AMECO database
EU-15 member	0.73	0	1	0.45	Old members of EU (EU15) set at 1, others at 0
Other revenues	0.31	0.22	0.38	0.04	Total current revenue minus current taxes on income and wealth, share of GDP for 2006, source: European Commission (2007b)
National preference for taxation	0.28	0.09	0.45	0.08	Share of answers who think that decisions in the area of taxation should be made jointly within the European Union, Source: Eurobarometer 67, European Commission (2007a)

Number of observations: 156. Source: European Parliament if no other source is named.

Table 2.9: Descriptive Statistics for combined dataset

Variable	Mean	Min Max	Std. Dev.	Explanations
Ideology				
Left/right (party)	10.42	3.6	13.6	3.78 "left-right" dimension measured by Benoit and Laver (2006) for national parties; ranging from 0 (left) to 20 (right)
Anti-/pro-Europe (party)	9.74	6.9	10.8	1.36 "anti-/pro-Europe policy preferences" dimension measured by Benoit and Laver (2006) for national parties; ranging from 0 (anti-Europe) to 20 (pro-Europe)
Taxes vs. spending (party)	12.09	3.00	18.70	4.95 "taxes vs. spending" dimension; measured by Benoit and Laver (2006) for national parties ranging from 0 (high spending) to 20 (low taxes).
ALDE/FDP	0.18	0	1	0.39 Affiliation with ALDE or FDP set at 1, all other set at 0
EPP-ED/CDU	0.37	0	1	0.49 Affiliation with EPP-ED or CDU/CSU set at 1, all other set at 0
GUE-NGL/Linke	0.15	0	1	0.36 Affiliation with GUE-NGL or Die Linke set at 1, all other set at 0
Greens-EFA/Die Grünen	0.08	0	1	0.27 Affiliation with Greens-EFA or Bündnis 90/Die Grünen set at 1, all other set at 0
Personal information				
Age	49.7	23	69	9.8 Calculated as 2007 minus year of birth
Gender	0.68	0	1	0.47 Male set at 1
Business/ Economic studies	0.20	0	1	0.40 Tertiary education in business administration or economics
Member of ECON committee / Finanzausschuss	0.19	0	1	0.40 Set at 1 if MEP and member of committee on Economic and Monetary Affairs which deals with economic and monetary policies in the Union, as well as tax provisions, or if member of the Bundestag and member of the Finanzausschuss; source: official statements on the EP homepage
Eastern Germany	0.20	0	1	0.40 Set at 1 if elected in an eastern German constituency
Years in EP	1.73	0	28	4.42 Calculated as 2007 minus year of first EP entry, source: official statement on the EP homepage
EP Dummy	0.20	0	1	0.40 Set at 1 if MEP

Number of observations: 194; Source: European Parliament or Bundestag if no other source is named.

Chapter 3

Political Determinants of Corporate Taxation in Europe

3.1 Introduction

Over the last years, a number of empirical studies[1] have been published that have significantly improved our understanding of corporate tax competition in the wake of globalisation. These works mainly focus on the effects of globalisation and strategic interaction with neighbouring countries on the national level of corporate taxation. However, the effects of political factors on corporate taxation and in particular the impact of partisan politics have been widely neglected in the related literature. The purpose of this chapter is to extend this existing literature in two directions. First, we extend the theoretical and empirical literature on international corporate tax policy by emphasising the relevance of politics in explaining corporate taxation at the national level. Second, we propose the application of an innovative measure of political ideologies which allows for more elaborate analyses of partisan effects on public finance outcomes than the measures which are conventionally employed in the public economics literature.

The related empirical works do not offer much evidence concerning the role of national decision-making processes in the international tax competition game. Instead, the existing literature seems to insinuate that corporate tax policy is an almost automatic process in which governments inevitably lower their taxes due to the external pressure created by increasing capital mobility or tax cuts of neighbouring countries. This view also gets its support from the theoretical literature, which is dominated by the Downsian approach to policy convergence, reflected in the assumption that policy makers refer to the median voter's utility as determinant for their decisions. In this chapter, we extend the traditional tax competition model by assuming heterogeneous decision-makers who

[1] See, among several others: Slemrod (2004); Devereux et al. (2008); Haufler et al. (2009); Ghinamo et al. (2010); Overesch and Rincke (forthcoming).

are at the one hand driven by self-interest in the political outcome and at the other hand differ in their perceptions of capital mobility. Then, two channels can be identified which point to different tax reaction functions of left-wing and right-wing politicians: differences in public good preferences as well as ideological and individual biases in the perception of capital mobility. Both channels imply that right-wing incumbents set lower corporate tax rates.

The existing empirical studies hardly take account of such political factors, while only a few of these papers control for political aspects such as the composition of government; robust evidence is scarce. This is surprising given the bulk of evidence for partisan politics, especially in expenditure policies. Moreover, most recent elite survey-based evidence by Heinemann and Janeba (2011) and the evidence presented in Chapter 2 hints at the relevance of political ideologies concerning related aspects of corporate tax policies, such as the perception of the restrictions imposed by tax competition on national tax autonomy and preferences for corporate tax harmonisation in Europe. Moreover, further factors that might influence corporate taxation at the national level have been widely ignored in the related economic literature, e.g., the importance of fragmentation of national governments as well as the educational background of heads of government; the latter has only most recently attracted some attention in the literature on fiscal policy outcomes. Thus, the aim of the empirical part of the chapter is to unite these strands of literature in order to investigate the political determinants of corporate tax policies in Europe in the past 30 years, which exist beyond the widely analysed factors related to globalisation.

The methodological innovation of this chapter is to integrate an innovative measure of political ideologies in the empirical public finance literature. As we will show below, it is vital to pursue high standards of data sources, as both relevant variables, corporate tax burden, and especially political ideology cannot be expressed by one catch-all variable. In this regard, we make use of two data sets which overcome many drawbacks of earlier studies. First, we use forward looking measures of corporate tax burdens, which have become standard in the empirical analysis of strategic interaction in corporate tax competition, but did not find much application beyond this regard and none in the related works in political economics. Second, we apply data on ideological positions derived from the Comparative Manifesto Project (CMP) data set, which is based on the content analysis of party manifestos. This data enables much more sophisticated analyses of partisan politics than the data usually applied in public finance, which is almost exclusively built on the use of dummies reflecting party family classifications. Furthermore, the latter data has several disadvantages in panel analyses, which are resolved by our measure. In particular, our new data enables us to exploit international differences of party ideologies and their changes over time. Moreover, we are able to disaggregate positions concerning different policy areas, which allows us a more explicit analysis of partisan effects on fiscal policy.

The structure of the chapter is as follows: section 3.2 presents the theoretical background for our analysis. In addition, the related empirical literature is stated. In section 3.3, we present the used data and, in particular, we discuss the application of data on political ideologies in explaining fiscal policy outcomes. The fourth section presents and discusses the empirical findings. Section 3.5 concludes.

3.2 Ideology in corporate tax competition

3.2.1 Basic model

The early theoretical literature on corporate tax competition, originating from the seminal works by Zodrow and Mieszkowski (1986) and Wilson (1986), does not deliver clear predictions on potential influences of partisan politics. In this kind of model taxes are usually assumed to be determined by benevolent decision-makers who maximise the utility of a representative household or the median voter of the jurisdiction. Political ideologies are only relevant in the models of Persson and Tabellini (1992, 1994), which both claim that the median voter might have an interest to delegate tax policies to a politician with an ideological position different from his own one. Nevertheless, these models do not give leeway for partisan politics in corporate taxation either, as the decision-maker still implements the policy preferred by the median-voter, and delegation is only owed to commitment problems in their two-period game structure. Consequently, differences in the political couleur of the decision-maker should have no effect on the policy outcome in all of these models.

Many subsequent works consider the individuals acting as decision-maker as being non-benevolent. However, in this literature non-benevolence is not modelled by a political ideology of the decision-maker which differs from that of the median voter, but by a predefined self-interest of the decision-maker, which is reflected in his striving for political rents.[2] Only most recently models have emerged which consider politics in corporate taxation more explicitly. Janeba and Schjelderup (2009) show that political institutions are decisive in answering the question whether tax competition is welfare improving when politicians are rent-seeking or have exogenous benefits from holding office. Similarly, Eggert and Sørensen (2008) analyse the question in a probabilistic voting model under the premise that politicians seek reelection by distributing rents to employees of the public sector.

Beyond these approaches which link theoretical models of corporate tax competition to politics, the related theoretical literature is relatively scarce concerning the consideration of political distortions. However, the inclusion of a political bias in a standard

[2]Non-benevolence is integrated in the early models by considering that the maximisation of public revenue enters the decision maker's utility function (see Edwards and Keen (1996)).

tax competition model is straightforward, as will be demonstrated in the following. To illustrate this, we use a model with n jurisdictions all inhabited by the identical number of citizens normalised to unity[3] which compete for completely mobile capital. For illustrative reasons, we make some assumptions about the functional form, which have become standard in the literature (see, e.g., Bucovetsky, 2009, or Brueckner and Saavedra, 2001). Following these works, we assume a quadratic production function for each jurisdiction, so that the output per capita in jurisdiction i depends on the locally employed capital per capita (k_i) and is defined as $f_i(k_i) = ak_i - \frac{b}{2}k_i^2$. The constant-return to scale technology is assumed to be identical for all jurisdictions. Each individual is initially endowed with a capital amount of $\bar{k}$, so that in the capital market equilibrium it has to hold that

$$\sum_{i=1}^{n} k_i \leq n\bar{k}. \tag{3.1}$$

Capital is assumed to be completely mobile. This implies that the net return of capital ρ (which is assumed to be positive) has to be equal in all jurisdictions, so that

$$\rho = a - bk_i - t_i = a - bk_j - t_j \tag{3.2}$$

for each $j \neq i$. Finally, following the papers stated above we assume that the utility function of the representative citizen in jurisdiction i has a linear form:

$$u_i = c_i + \alpha g_i \tag{3.3}$$

with $\alpha > 1$ denoting the marginal utility of public consumption (g_i) over the consumption of a private numeraire good (c_i). Private consumption originates from the compensation of a fixed factor employed in local production (whose supply is fixed to unity), plus the interest payment received for the supply of the initial capital endowment, so that $c_i = f_i(k_i) - f_i'(k_i)k_i + \rho\bar{k} = ak_i - \frac{b}{2}k_i^2 - (a - bk_i)k_i + (a - bk_i - t_i)\bar{k}$. Public consumption is financed by a source tax on invested capital, so that the following public budget constraint has to hold: $g_i = t_i k_i$.
Using (1) and (2), we can derive the quantity of capital allocated to jurisdiction i subject to its own tax rate (t_i) and the vector of tax rates of the other jurisdictions, $j \neq i$, i.e. ($\{t_j\}$):

$$k_i = \bar{k} + \frac{1}{b}(\frac{1}{n}\sum_{j=1}^{n-1} t_j - (\frac{n-1}{n})t_i) \tag{3.4}$$

From this, we obtain the partial derivatives of the capital allocation in i and the interest rate with respect to the own tax rate, which are:

[3]The consideration of unequal sizes simply adds the standard result of higher corporate taxation in larger jurisdictions, which is well-known from Bucovetsky (1991), but does not affect the further results.

$$\frac{\partial k_i}{\partial t_i} = -(\frac{n-1}{n})(\frac{1}{b}) \tag{3.5}$$

and

$$\frac{\partial \rho}{\partial t_i} = -(\frac{1}{n}). \tag{3.6}$$

In the benchmark case, the decision-maker of each jurisdiction i takes the tax rates of his competitors as given and chooses his own tax rate in order to maximise the utility of his representative citizen. Differentiation of the utility function with respect to t_i and equating to zero gives us

$$(-b\frac{\partial k_i}{\partial t_i}k_i + \frac{\partial \rho}{\partial t_i}\bar{k}) + \alpha(k_i + t_i\frac{\partial k_i}{\partial t_i}) = 0. \tag{3.7}$$

Inserting the values of k_i, $\frac{\partial k_i}{\partial t_i}$ and $\frac{\partial \rho}{\partial t_i}$ as calculated above, we can now solve the expression for t_i. This delivers us the tax reaction curve as perceived by jurisdiction i, with its tax rate depending on the vector of all other tax rates $t = (t_1, ..., t_{n-1})$ as well as the total number of competing jurisdictions, n:

$$t_i = \frac{(1 - n + n\alpha)\sum_{j=1}^{n-1} t_j + b\bar{k}n^2(\alpha - 1)}{(n-1)(1 + n(2\alpha - 1))} \tag{3.8}$$

The resulting tax reaction function of i incorporates some stylised facts which are well-known from the related empirical literature on international corporate tax competition in Europe (which will be presented in the next subsection): the tax rate depends positively on the competitors' tax rates ($\frac{\partial t_i}{\partial t_j} > 0$), which accounts for the well-established finding of strategic interaction in tax setting; the tax reaction function shifts downward with an increase in the number of competitors n, ($\frac{\partial t_i}{\partial n} < 0$). Given all t_j are equal, t_i declines in n which reflects the negative impact of intensifying competition (e.g., due to globalisation or the appearance of new competitors after the fall of the iron curtain) on corporate taxes. Based on this reaction curve, the Nash solution for all tax rates can then be determined as the intersection of the tax reaction curves of all n jurisdictions, which implies a symmetric solution.

3.2.2 Integrating ideological bias

Up to this point, our model is dominated by the Downsian view of political competition, which assumes that politicians in power are only interested in maximising their chances of reelection. Then, they unambiguously choose the same tax rate t_i in order to maximise the median voter's utility (while taking the median's preference parameter α as given) without consideration of their own interests. In this framework, which is basically at the bottom of most theoretical contributions to the tax competition literature, the identity of

the decision-maker, such as ideological background which is reflected in party affiliation, has no effect on the tax level. The tax rate is then only determined by the external factors as shown above.

An explanation for the actual relevance of partisan politics can be found in the model by Calvert (1985).[4] His model assumes a self-interest of the candidates concerning the political outcome in combination with the assumption that candidates are uncertain about the reaction of the voters (i.e., a probabilistic voting model).[5] For simplicity, assume that outcomes can be ordered in a one dimensional issue space, and citizens' (i.e., voters and candidates) preferences on the outcome are single-peaked. Then, two candidates with preferred outcomes at opposite sides of the median voter's preferred outcome face a trade-off when moving towards the median voter's position: at the one hand it increases their probability of winning which allows them the implementation of policy; at the other other hand, any move away from their optimal policy outcome reduces the utility which they derive from the implementation of policy. In the Nash equilibrium, partial convergence takes place, but the chosen platforms still differ from that of the median voter. The introduction of this kind of policy divergence into our simple tax competition model is straightforward, and leads to two different explanations for a political bias in corporate tax policy, (i) due to diverging preferences of incumbents, and (ii) due to diverging perceptions of capital mobility.

Concerning diverging preferences, we assume that the candidates' platforms reflect their preferences for public goods. In this regard, the ideological continuum which is consistently regarded as the most relevant in European national politics is the dichotomy of left and right: leftist politicians feel more committed to an electorate which is poorer than the average, so that they have a stronger interest in redistributive spending and a higher level of public expenditure (see, e.g., Benoit and Laver (2006)), and the right vice versa. This divergence of preferences for public goods spending enters our model via the variable α, which was in our basic model assumed to be the representative citizen's (or median voter's) preference for public goods. Due to the assumption of convergence to the median based on the Downsian model, this variable was assumed to be identical for every decision-maker notwithstanding his identity, e.g. his political affiliation. However, assuming a preference-motivated partisan effect on tax setting, we therefore have to insert a diverging preference parameter α^d for decision-maker d, with α^d defined over the ideological continuum. Due to the partial convergence assumption it has to hold that $1 < \hat{\alpha^r} \leq \alpha^r < \alpha^m < \alpha^l \leq \hat{\alpha^l}$, for m=median, r=right and l=left; the values with "hat"

[4]Some further explanations for deviations from the Downsian prediction of policy convergence exist, such as citizen-candidate models with entry costs (Osborne and Slivinski (1996)), or models of strategic extremism which emerges due to information imperfection (Carrillo and Castanheira (2008)) or due to abstention of voters (Glaeser et al. (2005)). See Fiorina (1999) for an extensive survey on further approaches.

[5]Note that the models by Persson and Tabellini (2002, 2004) also assume that candidates are interested in the policy outcome, but the deterministic voting procedure still leads to policy convergence to the median voter's preferred outcome.

denote the most preferred parameters for the two parties, respectively. Consequently, the platform chosen by the leftist decision-maker yields a value for the parameter α which is between his optimal point $\hat{\alpha^l}$ and the median voter's preferred value α^m, and strictly higher than the value at the platform of the right-wing candidate, which is α^r.

The decision-maker's position is thus determined by two elements: the preferences of the (median) voter and by his own ideology. This is related to the prominent question whether voters elect or select policies. However, this question is beyond the scope of this chapter, and it needs a completely different research design (see, e.g., Lee et al., 2004). It cannot answered based on our data, since in reality only the party's actual position in a certain policy area is observable (see subsection 3.3.2), and neither the party's nor the median voter's optimal position.

Comparative statics of the tax reaction function (3.8) yields $\frac{\partial t_i}{\partial \alpha^d} > 0$, which leads to our first testable hypothesis.

Hypothesis 3.1. *We expect a more leftist politician to impose a higher tax on capital, as he has a higher preference for public goods.*

However, it is important to point out that this kind of hypothesised ideological bias on corporate tax setting is exclusively driven by diverging partisan attitudes towards public expenditure. Any left-right discrepancies in other political areas, such as societal policies, should not have an impact on corporate taxes via this channel.

We then determine the cross derivative of the capital tax rate with respect to the preference parameter α^d and n. The latter represents the number of competitors in our model and, thus, the intensity of competition a country is facing. We then find that $\frac{\partial^2 t_i}{\partial n \partial \alpha^d} < 0$, which indicates that the effect of the preference parameter on the tax level – which was found before – is mitigated by an increasing number of competitors. This leads to our second hypothesis.

Hypothesis 3.2. *An increasing intensity of competition reduces the partisan effect on corporate tax setting.*

Secondly, politics can also have an impact on fiscal policy outcomes through different perceptions of the environment. In this regard, the mobility of capital ($\frac{\partial k_i}{\partial t_i}$) plays a crucial role in the model presented above. As is customary in standard tax competition models, it is assumed that the decision-maker has complete knowledge of this elasticity. Such a strong assumption, however, is problematic, as in reality the elasticity is unobservable. Therefore, we assume that capital mobility enters the tax reaction function with a subjective error ϵ^d of the policy-maker d[6], so that the perceived elasticity which underlies the tax reaction function (3.8) becomes $\widetilde{(\frac{\partial k_i}{\partial t_i})}^d = \frac{\partial k_i}{\partial t_i} + \epsilon^d$. Inserting this

[6]With $\epsilon^d > -(\frac{n-1}{n})(\frac{1}{b})$, so that the reaction of capital on increasing taxes is in any case negative.

expression into the tax reaction function gives us the new expression:

$$t_i^d = t_i - \frac{bn^2(n\sum_{j=1}^{n-1} t_j\alpha^2 + b\bar{k}(-1+n(1+\alpha(n\alpha-1))))\epsilon^d}{(n-1)(1+n(2\alpha-1))((n-1)(n-1-2n\alpha)+bn(1+n(\alpha-1))\epsilon^d)} \tag{3.9}$$

Partial derivation yields $\frac{\partial t_i^d}{\partial \epsilon^d} < 0$, thus a perception of higher mobility induces the choice of a lower corporate tax rate.
In the literature, two different sources of biased perceptions are discussed. First, in case biased perceptions of capital mobility are systematically linked to political platforms, a partisan bias in corporate tax setting would emerge. This claim can be confirmed by most recent evidence from Heinemann and Janeba (2011). In a survey directed at parliamentarians of the German parliament (Bundestag), they disclose that left-wing and right-wing politicians differ significantly in their perceptions of capital mobility, with left ones assuming real capital to be less mobile and investing decisions to be less dependent on taxation than right-wing politicians perceive it.[7] This leads to our next testable hypothesis.

Hypothesis 3.3. *Biased perceptions of capital mobility again imply that left-wing decision-makers tend to levy higher corporate taxes than their right-wing counterparts.*

Second, Heinemann and Janeba (2011) discuss that systematically biased perceptions might also be caused by the individual background of politicians. In particular, they argue that the educational specialisation should contribute to the degree of information about globalisation restrictions which directly impacts the mobility of capital. Most recent evidence from Dreher et al. (2009) shows that the educational backgrounds of heads of government indeed have a significant impact on policy outcomes, such as the implementation of market-liberalising reforms.

Hypothesis 3.4. *Biased perceptions of capital mobility that are induced by individual characteristics of the decision-maker, such as his educational background, also affect the level of corporate taxation.*

However, other strands of literature suggest that the partisan effect on corporate taxation might even be quite the opposite from our execrations sketched above. This view can be justified by the argument from Cukierman and Tommasi (1998) that unpopular but necessary political decisions (such as which cuts in corporate taxation are to be regarded) are more easily implemented by "unusual characters".[8] In the same vein, Garrett (1995) claims that left-wing governments have to pay a "political premium" in form of lower

[7] The mechanism behind the finding, however, remains unclear, but it may be conjectured that politicians' perceptions on these matters are at least partly shaped by the direct contact with interest groups (e.g., entrepreneurs in the case of right-wing politicians), so that the bias could be attributed to different preferences of related interest groups.

[8] One anecdotal example for this view is the tax reform in Germany in 2000, which was implemented by a left-wing coalition of social democrats and the green party after many years of inaction under a right-wing led coalition.

corporate tax rates in order to attract investors.

The objective of the following empirical section is to disclose whether the effects outlined above did in fact play a significant role in the explanation of European corporate tax policies in the last decades.

3.2.3 Empirical findings of partisan effects

The impact of partisanship on fiscal policy has frequently been analysed in the empirical public finance literature. However, the lion's share of empirical studies focuses on the expenditure side of the public budgets. The most recent panel-analysis for OECD countries in the 1980s and 90s by Potrafke (2009) reveals that left-wing governments spent more on social expenditures than their right-wing counterparts in times when globalisation was proceeding faster; however, generally speaking, partisan effects weakened in the 1990s. The work by Cusack (1997) using earlier data on OECD countries identifies the presence of partisan policies in expenditure policies as well.[9] Interestingly enough, with regard to expenditure policies, both works find evidence in support of the hypothesis that the effect of partisan politics has declined over time. From the studies on public expenditures, only Bräuninger (2005) uses data based on party manifestos similar to ours (see next section); he shows that only ideological differences defined as programmatic preferences have an impact on the level and mix of expenditure.

In contrast to the literature concerning expenditure policies, taxation in general and corporate taxation in particular, have scarcely been analysed directly in the economic literature on partisan politics.[10] This is remarkable, since a large number of papers with the objective of explaining the evolution of corporate taxation in the past decades has been published most recently. These papers, however, primarily focus on the impact of globalisation on corporate taxation (by using different measures such as trade and financial openness, or sophisticated composite indicators), or they concentrate on the direct interaction of countries in the tax-setting game for mobile capital by applying sophisticated empirical techniques borrowed from spatial econometrics.

Some of these papers make use of political control variables (see Table 3.1 for an overview of recent works including political variables) – but by no means all of them, as even one of the most cited studies, Slemrod (2004), dismisses a possible partisan impact in its empirical model. The results concerning partisan effects are mixed: most do not discover any significant effect at all, and for those studies which do uncover an effect, the direction of the partisan effect is ambiguous. In these works, both left-wing and right-wing governments are found to provide a higher taxation of companies.

[9] For earlier evidence in the same direction, see, e.g., de Haan and Sturm (1994).

[10] Few works focus on partisan effects on taxation at the subnational level. Reed (2006) finds evidence for partisan effects for US state legislatures on the personal tax burden, and Allers et al. (2001) for property taxation of Dutch municipalities.

Table 3.1: Literature overview

	Tax data	Ideology variable	Time span	Countries	Result
		Economic journals			
Gérard et al. (2010)	statutory rate	dummy: right or centre (DPI data)	1997-2008	53 (93) countries	no significant impact
Heinemann et al. (2010)	dummy: annual change in statutory rate	dummies: left, right, centre, other (DPI data)	1980-2007	32 European countries	no significant impact
Ghinamo et al. (2010)	statutory rate	number of government changes	1983-2003	114 countries	no significant impact
Devereux et al. (2008)	statutory rate, EATR, EMTR (Devereux and Griffith (2003))	dummy: right of the centre; right-wing and left-wing dummies interacted with majority in parliament (DPI data)	1982-1999	21 OECD countries	no significant impact
Redoano (2007)	statutory rate	percentage of cabinet posts held by left parties (CPD)	1970-1999	17 western European countries	no significant impact
Schwarz (2007)	effective rates (*MRT*), microeconomic tax rate (BACH Database), EATR (Devereux and Griffith (2003))	share of social democratic ministers; effective number of parties (ENP)	1979-2000	20 OECD countries	in few specification effect of social democratic majority, direction ambiguous; ENP ambiguous
Adam and Kammas (2007)	effective rates (*MRT*)	centre of government cabinet gravity (based on the 5-step scale by Castles and Mair (1984))	1970-1997	17 OECD countries	no significant impact
Dreher (2006)	effective rates (*MRT*), EATR, EMTR (Devereux and Griffith (2003))	dummy: left governments (DPI data)	1970-2007	30 OECD countries	no significant impact
Hansson and Olofsdotter (2005)	statutory rate, effective rates (MRT), EATR (Devereux and Griffith (2003)	share of conservative party of legislative seats	1980-1997	OECD countries	conservative party effect mainly insignificant
Bretschger and Hettich (2002)	effective rates (*MRT*)	centre of political gravity for electorate, legislature and cabinet (based on the 5-step scale by Castles and Mair (1984))	1967-1996	14 OECD countries	more conservative governments have lower tax rates
		Political science journals			
Plümper et al. (2009)	effective rates (*MRT*)	percentage of cabinet portfolios held by left and Christian Democratic parties, respectively	1975-2004	23 OECD countries	positive effect of social democratic majority
Basinger and Hallerberg (2004)	annual change in marginal rate, effective rate (*MRT*)	government position and ideological distance between veto players (based on expert placements, Laver and Hunt (1992))	1980-1997	OECD countries	no significant impact of own partisanship, some effect of ideological distance and competitors' partisanship
Hays (2003)	effective rates (*MRT*)	percentage of cabinet portfolios held by left parties interacted with globalisation	1965-1996	17 OECD countries	no significant impact
Swank and Steinmo (2002)	statutory rate, effective rates (*MRT*)	percentage of cabinet portfolios held by left and Christian Democratic parties, respectively	1981-1995	13 developed countries	Christian democrat effect positive in some specifications
Garrett and Mitchell (2001)	effective rates (*MRT*)	percentage of cabinet portfolios held by left and Christian Democratic parties	1967-1992	18 countries	Christian democrat effect positive
Hallerberg and Basinger (1998)	change in top marginal rate, 1986 to 1990	government ideology based on expert judgements (Castles and Mair (1984)), dummy for more than one veto player	1986-1990	OECD countries	left governments more likely to cut tax rates, negative effect of number of veto players

Remarkable differences can be detected for works published in journals either with a focus on economics or political science. First, some articles of the latter group offer a much wider spectrum of variables concerning political ideology (such as government fragmentation) and a more sophisticated measurement of ideology as discussed below, while the papers from the economic literature almost exclusively rely on simple dummy variables which indicate the ideology of the government. Second, there is a tendency in the economic literature to apply a much wider spectrum of measures of corporate tax burdens than in political science, where usually the method proposed by Mendoza et al. (1994) (*MRT* in the table) is applied. Their method, however, has several drawbacks for the analysis of the question at hand, as will be discussed in the data section.

3.2.4 Effect of government fragmentation

A further political effect that has been widely neglected in the economic literature on corporate tax policy is the relevance of government fragmentation and the influences of veto power in decision-making. Only few related political science papers consider the inclusion of variables related to the fragmentation of governments in their regressions (Basinger and Hallerberg (2004) and Hallerberg and Basinger (1998)). This is remarkable, since the economic literature has for some time now confirmed the relevance of the so-called "weak government hypothesis" for fiscal policy (Roubini and Sachs (1989)), which claims in its original version that larger (in terms of the number of involved parties) and ideologically more heterogenous coalitions find it harder to balance their budgets after an external shock. In an application to taxation, Ashworth and Heyndels (2001) show that more fragmented governments need more time to realign their tax structures after an external shock has shifted it away from an ideal tax structure.

The recent findings by Le Maux et al. (2011) imply that highly fragmented governments generally find it hard to deviate from the status quo, even though for many policy areas (such as the public expenditure level) the direction of this deviation might be different since it depends on the political preferences of the government (e.g., cut or expansion of expenditure). The relevance of these arguments for corporate tax policy is evident: they point to a higher persistence of corporate taxes under weak governments irrespective of the ideological preferences. During the period of investigation, the competition intensity increased markedly and almost all countries reacted to this by decreasing their tax burdens and – even under left-leaning governments – virtually no tax cuts took place. As corporate tax cuts are usually a controversial undertaking, weak governments are expected to react less flexibly to a changing environment. The weak government hypothesis then implies that weak governments should have carried out less (or smaller) cuts of corporate taxation than more homogenous coalitions (inevitably leading to a – at least temporally – higher level of tax rates), which will be tested in the empirical section as well.

3.3 Data

Both tax burdens as well as political ideologies are multi-dimensional concepts which cannot be expressed by the "one and only" index number, so that several different measures of corporate tax burdens and ideologies have been applied in the related literature. In the following, we will present and discuss the most appropriate concepts for the empirical operationalisation of these two dimensions in our context.

3.3.1 Measuring tax burdens

The empirical literature analysing international corporate tax policy which has evolved in recent years (such as Devereux et al., 2008, or Overesch and Rincke, forthcoming), has come along with more elaborate methods of measuring corporate tax rates. In line with this literature, we employ statutory tax rates and effective tax rates as most appropriate tax measures for our analysis. It stands out from the earlier literature – especially that from political science – which mostly uses data on implicit tax rates calculated according to the method proposed by Mendoza et al. (1994). Their measure determines an average tax rate by dividing tax revenues of pretax corporate profits, both based on data from national accounts statistics. A first obvious drawback of such implicit rates is that they already reflect reactions to tax laws. Moreover, as discussed by Haufler et al. (2009) and Devereux et al. (2008), such implicit tax rates have the decisive disadvantage that changes in their values do not necessarily have to reflect changes in the underlying tax laws.[11] Hence, the Mendoza et al. indicator even fluctuates regularly during years in which the national tax system is not subject to any legal change. This, however, implies for our analysis that these measures are misleading, as it is our primary concern to explain the impact of political factors on corporate tax legislation.

In our analysis we will employ two different types of measures: statutory corporate income tax rates (CITR) and effective tax rates. The obvious drawback of the use of the former is its complete neglect of the definition of the tax base. However, statutory tax rates are probably the most visible element of the national corporate tax system and hence an important element of tax policy. Moreover, they constitute the relevant variable for profit-shifting of multinational firms. However, the more accurate measures of tax burdens as perceived by entrepreneurs are effective tax rates, which are usually calculated based on the approach by Devereux and Griffith (2003) for a hypothetical standardised investment project. Said measures do not only take the statutory tax rates into account, but also other taxes imposed on corporate income and the legal definition of the tax base, which is defined by national regulations concerning tax allowances or depreciation rights, for instance. The effective average tax rate (EATR) thus indicates the tax burden which

[11] These can also be caused by business cycle fluctuations or other factors which do not belong to the responsibility of the government, and for which it is empirically not entirely possible to control.

an investor faces for a profitable investment project. In addition, the effective marginal tax rate (EMTR) indicates the tax burden of a marginal investment.[12] Consequently, all of these measures are forward-looking in the sense that they reflect the tax burden which an investor faces for an investment decision in a particular year.[13] In brief, the relevance of these measures for our question at hand can be summarised as follows: variation of the CITR (which has fallen in almost all European countries in the observation period as discussed in the literature cited above) explicitly reflects differences in the level of the headline tax rate as set directly by the national tax legislature, whereas changes of EMTR reflect changes in the tax legislature either affecting the level of the CITR and other relevant taxes on capital, or the definition of the tax base, whereas the latter tends to counteract the former effect to a certain degree due to a tendency of broadening the tax bases (see Devereux and Griffith (2003)). A detailed descriptive overview of the tax data we apply can be found in Table 3.10 in the appendix.

3.3.2 Measuring ideology

The accurate measurement of political ideological is highly relevant for our empirical analysis – however, this aspect has until now not received much attention in the economic literature on partisan politics. Most studies measure the impact of a government's or legislature's ideological orientation on the policy output by including a dummy variable which indicates whether, e.g., a left-wing or Christian democrat party leads the (coalition) government or not. Almost all studies related to our work apply this kind of data, which is obtained either from the Worldbank Database of Political Institutions (DPI), or from the ordinal ranking of party governments from left-wing, centre-left, centre, centre-right and right-wing.

Known as the "party family approach", this is the dominant approach in political economic works which has been demonstrated to be successful in explaining partisan effects in many areas of public policy. However, it is regarded as highly undertheorised in political science. Moreover, the lack of evidence discussed in section 3.2.3 might suggest that some disadvantages of this data impair the panel analysis of tax rates: (i) the use of these categorisations does not allow for international differences within party families (e.g., the British New Labour can be assumed to be much more centrist than their French Socialist counterpart), (ii) these categorisations do not allow for changes of party positions over time (which are frequent as will be discussed below), (iii) they do not allow for differentiations between single policy areas (however, a liberal position in economic

[12] As Devereux and Griffith (2003) discuss, the EATR is equal to a weighted average of the EMTR and the CITR. The empirical results for the EATR are similar to those of EMTR and CITR and will therefore not be reported in the following.

[13] In particular, we resort to the data calculated by Overesch and Rincke (2009) and Overesch and Rincke (forthcoming). A more thorough description of the data and the assumptions underlying the calculation of EATR and EMTR can be found therein.

policy is certainly not equivalent to a right-wing position in immigration policy, and vice versa). Among the more elaborate methods which exist in political science in order to estimate programmatic positions of political actors beyond simple categorisation, we choose data based on the quantitative content analysis of party manifestos.

Further methods are as well quite common in political science, but exhibit marked disadvantages for our analysis. First, the analysis of the legislative voting behaviour of politicians allows one to locate political actors on at least one policy dimension. This indicator has been applied in the related economic literature in the analysis of the attitudes of European parliamentarians towards corporate tax harmonisation (see Chapter 2) and several studies of the U.S. congress originating from Poole and Rosenthal (1985). However, in parliamentary democracies with strongly disciplined parties, an analysis of roll call votes would sooner result in the extraction of a conflict line between the government and opposition camp than in an identification of policy dimensions within the parliament. Second, programmatic positions of parties can be derived from elite or mass surveys, as well as expert surveys. The latter have been conducted on an irregular basis, e.g., by Benoit and Laver (2006) and Laver and Hunt (1992). As already indicated, one important problem when referring to this approach is that expert surveys are temporally stable and can neither account for variations in the respective party policy positions nor for potential changes in the party-specific dimension saliencies. However, if we take the results of the two cited studies seriously, the programmatic orientation and issue saliency of parties did indeed change between the time periods in which both expert surveys were conducted.

Therefore, in this chapter we shall refer to data based on the content analysis of party policy documents. In comparison to the other alternatives mentioned, the main advantage of an analysis of policy documents can be seen in the high degree of their availability. Prior to an election, nearly every party or party alliance publishes a program for government, in which its goals for the next legislative period are outlined. Moreover, because election programs normally have to be passed by a party congress or at least by a wider group of party elites, they should more or less reflect the mean of all intra-party groups weighted by their importance. Another aspect is relevant: the programmatic statements inside such pre-election programmes can be used as a starting point for future coalition negotiations and as a point of reference for the policy assertiveness in a coalition government formed later.

While different types of computerised content analyses exist[14], the most prominent data source on party preferences for various policy areas is the dataset of the Manifesto Research Group (MRG), which has been known since 1989 as the Comparative Manifesto Project (CMP). The work of the MRG and the CMP, respectively, resulted in the largest

[14]One can distinguish between partly and completely computerised approaches. While the approaches mentioned first require the programming of a dictionary that contains some a priori defined signal words, fully computerised techniques like Wordscores or Wordfish require the full text of programmatic documents, which is not available for our country sample and time span.

and most complex database, which includes saliencies on 56 policy issues, i.e., the emphasis of these issues which is measured as the share of quasi-sentences that are devoted to the issues. The data covers 3,018 election manifestos from 54 countries since 1945.[15] We therefore use the manifesto dataset to quantify the policy preferences of each party represented in the legislature in the time span and country sample under consideration here. By doing so, we can account for changes in the general left-right placements and the explicit economic policy preference of political actors.

There is already empirical evidence which shows for some of the policy issues covered by the CMP data set that there is a strong link between issue saliences in party manifestos and actual subsequent policies. Concerning public expenditures, Bräuninger (2005) finds that an indicator for expenditure preferences, calculated as the ratio of emphasis given to social security issues to economic affairs categories, impacts on the expenditure mix as well as the overall level of expenditures. Other studies focus on a single policy issue of the CMP data and demonstrate the link to subsequent policy for several different policy areas: Knill et al. (2010) demonstrate that party preferences for "environmental protection" (per501)[16] and "anti-growth economy" (per416) positively affect the number of adopted environmental policies, Jensen and Spoon (2011) find that the issue "environmental protection" also has a link to progress towards the greenhouse gas emissions targets of the Kyoto Protocol, Duso and Seldeslachts (2010) find that the emphasis given to the issues "Market Regulation" (per403) and "Welfare state limitation" (per505) are determinants of liberalisation in the digital mobile telephony market, and Geys and Nuscheler (2010) show that the emphasis given to the category "Welfare State Expansion" (per504) is a significant determinant of public spending for health care. The link between political rhetoric and policy is also elaborated in Imbeau (2009), and it is summarised with respect to the CMP data that "in most countries there is a link between the electoral platform of a party and the policies adopted by that party when in government" (p.6). This evidence backs our view that the saliences of policy issues in the CMP data are a good predictor of party preferences.

From the raw data on issue saliencies, it is possible to determine indicators for ideology by ascribing issues to certain broader categories such as left-right dimensions. For instance, an emphasis on "social justice" in the manifestos characterises a more left-wing party, while an emphasis on "law and order" is characteristic for a more right-wing party. But while both enter the general left-right dimension, obviously only the former enters an economic specific left-right dimension.

The general left-right dimension is already provided by the CMP dataset (see Budge et al. (2001)). It is generated by adding up the share of sentences in the manifestos dedi-

[15] While a number of alternative methods for estimating the positions of political actors exist (e.g., Laver et al. (2003); Slapin and Proksch (2008)), the manifesto data of the CMP is the only one to cover the programmatic statements of all relevant parties in the OECD countries over a long time period.

[16] This is one of the 56 policy issues recorded in the CMP data set. The code refers to the category number as listed in Budge et al. (2001).

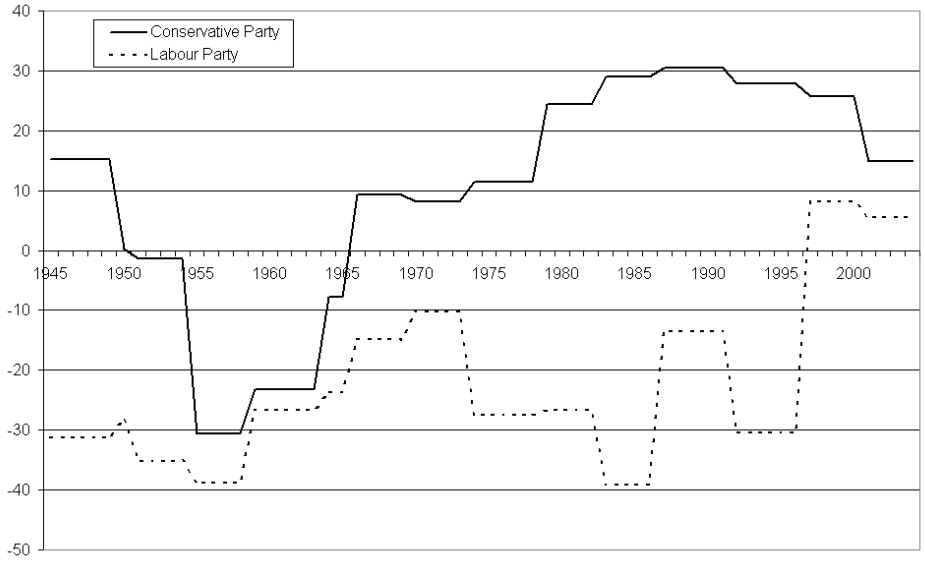

Figure 3.1: Ideological Positions in the UK

cated to categories which are consistently ascribed to right-wing parties, and subtracting those shares devoted to categories which are typical for left-wing parties. Exemplarily, this indicator is depicted in Figure 3.1 for the major parties in the UK, Labour Party and Conservative Party. A higher value indicates more right-wing positions taken by the party. As can be seen, the positions of both parties fluctuate over time, but the Conservatives are always "more rightist" than Labour. Interesting enough, the indicator reflects the shift of the position of Labour Party to the centre under Tony Blair at the election of 1997 very well.

Moreover, the manifesto data set allows for the determination of several more refined ideological indicators. We therefore refer to an operationalisation of the economic left-right policy dimension provided by Cusack and Engelhardt (2002) (called 'myrl3' therein). This variable explicitly includes CMP categories that only deal with economic and welfare policy.[17] Additionally, we test our empirical methods with various other measurements of the (economic) left-right position of political parties. For instance, the Cusack and Engelhardt (2002) dataset also provides a measure of the degree of economic liberalism ('markecon'), as well as welfare policies.[18] To test for the robustness of the effect of our variable on the ideological orientation, we further created an additional index that covers non-economic social policy only (covering issues such as family values or

[17]The relevant right-wing categories are (CMP codes in parentheses): Free Enterprise (per401), Economic Orthodoxy (per414), Governmental and Administrative Efficiency (per313). Left-wing categories: Market Regulation (per403), Economic Planning (per404), Keynesian Demand Management (per409), Controlled Economy (per412), Nationalisation (per413), Social Justice (per503), Welfare State Expansion (per504).

[18]Calculated as (per401 + per414)/2, and (per503 + per504)/2, respectively.

immigration).[19] From these measures for the party ideologies in advance of elections, we calculate the parliament's 'centre of gravity', i.e. the position of each party represented in the legislature is weighted by its relative seat share. This allows for estimating the overall position of a legislature for both the left-right and the other policy dimensions.[20]

Moreover, we will add the DPI data discussed above to the empirical analyses, for which the centre of gravity of the government is determined equivalently based on the seat shares of the governing parties. Thus, we are able to compare the results obtained by our measures with those which are obtained by that of one of the most frequently used data sources for ideology applied in the related literature.

3.3.3 Further variables

In our empirical analysis we investigate an unbalanced panel consisting of up to 32 European countries in the period from 1980 to 2006.[21] The coverage and the choice of control variables are comparable to the most recent empirical analyses of tax competition in Europe, such as Devereux et al. (2008) or Overesch and Rincke (forthcoming). These control variable comprise the top personal income tax rates ($PITR$) as well as several national socio-economic characteristics, which are depicted in Table 3.9 in the appendix.

Since we expect an effect of individual politicians' characteristics due to different perceptions of capital mobility as stated in our hypothesis 4, we include individual data on educational backgrounds of heads of government in our analysis. Here, we rely on the extensive data set collected by Dreher et al. (2009), who identify an impact of education on market liberalising reforms.[22] In our analysis, we restrict ourselves to the inclusion of dummies for a final degree in economics as well as in law. While the first group has been identified in Dreher et al. (2009) as being significantly different in their political outcomes, lawyers are of interest as they constitute the by far largest group of heads of government (with a share of about one third of all observations).[23]

[19] Right-wing categories: National Way of Life: Positive (per601), Traditional Morality: Positive (per603), Law and Order (per605), Social Harmony (per606), Multiculturalism: Negative (per608). Left-wing categories: Social Justice (per503), Way of Life: Negative (per602), Traditional Morality: Negative (per604), Multiculturalism: Positive (per607).

[20] Note that this approach is tailored for parliamentary systems with proportional representation, which constitute by far the majority in our sample. In subsection 3.4.3 we test the robustness of our results by considering that under plurality representation opposition parties might be marginalised.

[21] The scope of our panel is restricted by the availability of tax data, which starts at the earliest in 1980 for some western European countries and for most eastern European countries in the beginning of the 1990s, as well as the availability of CMP data which is missing for some countries in the most recent years. See Table 3.10 for a detailed overview on the covered period.

[22] We extend their data set by several countries missing in their analysis and also include Switzerland, which does not have a single head of government in the traditional sense but a Federal Council consisting of seven members with equal rights. We calculate the values as the share of members with the respective educational background in the given year.

[23] More disaggregate analyses of other educational backgrounds were tested, but did not deliver strong results, also partly due to low numbers of cases.

Finally, we include the absolute number of parties in a coalition government as the variable which captures the fragmentation of governments. This approach is in line with the seminal literature on veto players originating from Tsebelis (1995), which regards the number of parties in a coalition as a major time-varying factor for the capacity to produce policy changes.

3.4 Empirical model and results

In our empirical analysis, we test the hypotheses formulated above using two different empirical approaches. First, we follow the existing literature and apply panel data approaches using fixed effects in order to cope with unobservable time-invariant characteristics. In several robustness checks, we control for the strategic interactions of countries in the choice of the tax level, the omission of fixed effects and an alternative ideology indicator which takes account of the governments' centre of gravity in plurality systems. Second, we introduce a specification in first differences which allows the analysis of changes in taxation instead of the levels of it.

One further important aspect is the choice of the appropriate lag structure in the model. In tax policy, new tax legislature concerning corporate taxation almost always comes into effect at the 1st of January of a given year. Therefore, tax rates at point t can only be ascribed to political decisions made in year *t-1* which rest on the political environment at that point of time. Hence, for our benchmark model we consider the first lags of all exogenous variables with the exception of the *PITR*, whose next-year value is assumed to be set simultaneously with corporate taxation in the preceding year. In addition, we will examine the time structure of the effect of changes in legislature on changes in taxes more rigourously in the first difference specification.

Finally, a standard problem inherent in the related empirical literature is the serial correlation of tax rates, as these are usually infrequently adjusted. In the following, in those cases where the assumption is supported by the Wooldridge test, we follow Devereux et al. (2008) and present standard errors which are clustered by country.

3.4.1 Fixed effects estimation

In our benchmark specification we apply a fixed effects model; this approach is reasonable since several time invariant factors can hardly be controlled for and thus we run the risk that an omitted variable bias interferes with our results.[24] We introduce the following specification as our benchmark model, with α_t representing the time fixed effects, η_i representing the country fixed effects and $Z_{i,t-1}$ the vector of socio-economic control

[24]The Hausman test supports the use of a fixed effects model and rejects a random effects model in all cases.

variables:

$$\begin{aligned} Tax_{i,t} &= \beta_1 + \beta_2 Ideology_{i,t-1} + \beta_3 Ideology_{i,t-1} \times Trend + \beta_4 NumberParties_{i,t-1} \\ &\quad + \beta_5 EducEconomics_{i,t-1} + \beta_6 EducLaw_{i,t-1} + \beta_7 PITR_{i,t} + Z_{i,t-1}\theta \\ &\quad + \alpha_t + \eta_i + \epsilon_{i,t} \end{aligned} \tag{3.10}$$

We estimate the presented model with our three different measures for ideology (see Table 3.2), i.e. the general left-right dimension derived from the CMP manifesto data (*CMP*), the economic left-right dimension from the same source (*CMP econ*), and the general left-right dimension obtained from the DPI data (*DPI*) which represents the traditional party family approach. In all cases the ideology variable shows a negative sign, thus indicating a higher tax burden generated by left legislatures.[25] This finding is in line with our expectations of a partisan effect formulated in hypotheses 1 and 3. However, it can be seen that the impact of political ideology differs markedly depending on the choice of the variable. It is only statistically significant for the variables generated from the CMP data, i.e., the general left-right dimension as well as the economic left-right dimension, while the results for the DPI data are always insignificant. The finding reflects our expectation that only the CMP data allows a reasonable comparison across borders and over time, as it allows for differences in ideological positions of national parties despite that they belong to the same party family. Interestingly enough, the effect is for all indicators more pronounced when the statutory tax rate is applied and not the EMTR (this pattern is similar for the following approaches). This result is not surprising given that the statutory tax rate is the most visible component of the tax system, so that we would expect that partisan politics play the strongest role concerning this part of the tax system. Moreover, the statutory tax rate is the relevant factor shaping incentives for profit shifting activities of multi-nationals.

Moreover, a positive effect can be found for the interaction of ideology and the time trend which captures the intensification of tax competition over time, e.g. due to the integration of Eastern European countries (see Overesch and Rincke (2009)). This finding points to a diminishing impact of ideology with intensifying competition as stated in hypothesis 2, which is at least for the CITR highly significant. In Figure 3.2, this effect is illustrated exemplary for the first specification of Table 3.2. The marginal effects and the bounds for the 95% interval are depicted for all years which are included in our analysis. As can be seen, the initial highly negative effect of ideology on the CITR becomes smaller over time, and finally becomes insignificant at the end of the nineties. The development of the partisan effect over time is qualitatively the same for almost all of our regressions, indicating that the effect of ideology breaks down at some point in time.

[25]Note that the coefficient β_2 is evaluated at the point where the value of the trend is zero, which is set at the year 1990. The marginal effects for other years result from $\beta_2 + \beta_3 \times trend$. For a discussion of the interpretation of lower-order coefficients in interaction models, see, e.g., Brambor et al. (2006).

Table 3.2: Estimation results – fixed effects

Dependent variable	CITR			EMTR		
Ideology measure	CMP	CMP Econ	DPI	CMP	CMP Econ	DPI
Ideology_{t-1}	-0.177***	-0.070***	-1.094	-0.068*	-0.042**	-0.831
	(0.048)	(0.023)	(0.761)	(0.038)	(0.020)	(0.547)
$\text{Ideology}_{t-1} \times \text{trend}$	0.016***	0.006***	0.201**	0.001	0.002	0.187***
	(0.005)	(0.002)	(0.084)	(0.006)	(0.002)	(0.063)
$\text{Number parties}_{t-1}$	0.384	0.254	0.312	0.791*	0.731*	0.745
	(0.544)	(0.528)	(0.579)	(0.436)	(0.443)	(0.440)
$\text{Educ Economics}_{t-1}$	-0.029	-0.358	-0.270	0.969	0.740	0.561
	(1.571)	(1.584)	(1.770)	(1.712)	(1.633)	(1.642)
Educ Law_{t-1}	1.754	1.309	1.376	3.097*	2.740	2.392
	(1.615)	(1.679)	(1.857)	(1.815)	(1.699)	(1.856)
$\text{GDP per capita}_{t-1}$	0.000	0.000	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth_{t-1}	-0.200	-0.183	-0.194	-0.091	-0.092	-0.085
	(0.129)	(0.130)	(0.122)	(0.104)	(0.104)	(0.098)
$\text{Public consumption}_{t-1}$	-0.234	-0.234	-0.352	-0.350	-0.300	-0.340
	(0.441)	(0.430)	(0.450)	(0.357)	(0.353)	(0.368)
$\text{Population old}_{t-1}$	3.975***	3.544***	3.763***	0.983	1.104	0.944
	(0.839)	(0.881)	(0.909)	(0.746)	(0.813)	(0.681)
$\text{Population young}_{t-1}$	0.643	0.625	0.700	-0.781	-0.841	-0.718
	(0.774)	(0.788)	(0.808)	(0.687)	(0.664)	(0.687)
Population_{t-1}	-0.310	-0.412	-0.300	-0.081	-0.126	-0.103
	(0.719)	(0.661)	(0.548)	(0.787)	(0.749)	(0.725)
Integration_{t-1}	-0.421**	-0.304*	-0.337*	-0.230	-0.201	-0.161
	(0.170)	(0.174)	(0.169)	(0.162)	(0.175)	(0.156)
PITR_t	0.441**	0.562***	0.481**	0.407**	0.458**	0.435**
	(0.190)	(0.189)	(0.188)	(0.190)	(0.190)	(0.172)
Constant	-22.192	-24.850	-22.096	25.860	21.532	19.175
	(28.419)	(30.563)	(28.652)	(31.876)	(31.306)	(27.994)
Country FE	yes	yes	yes	yes	yes	yes
Period Dummies	yes	yes	yes	yes	yes	yes
Observations	500	500	500	500	500	500
R-squared	0.70	0.71	0.69	0.59	0.60	0.60

Standard errors robust to serial correlation and heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

The variable indicating the number of parties in the government has the expected positive effect on the tax measure: coalitions containing a larger number of political parties generate higher levels of corporate taxes. However, the observed effect is only statistically significant in two of the regressions on the EMTR. Moreover, we do not find an unambiguous result for the effect of the educational background in economics, while the coefficient for the lawyer dummy is positive throughout and significant in at least one case. However, the effects of these variables on the levels of taxation are not very robust, and a more short-term effect which has interfered with long-term influences cannot be dismissed. The short-term dynamics of tax setting will be examined more closely later on.

In the regressions presented in Table 3.3, we consider similarly to Devereux et al. (2008) in addition to our other control variables the direct interaction of European countries in their tax setting. Thus, for every year we include the average tax rate of the respective country's direct neighbours which is denoted as $NeighbourTax_{i,t} = \sum^{j} \omega_{ij} Tax_{j,t}$, with $j \neq i$ denoting the countries defined as neighbours of country i and ω_{ij} as the correspond-

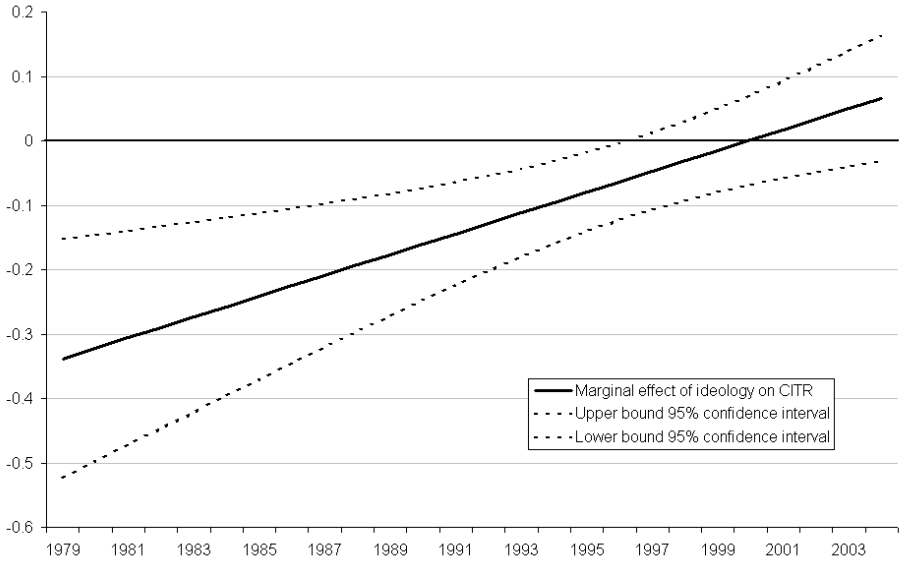

Figure 3.2: Marginal effects of ideology (CMP) on CITR

ing weighting matrix.[26] Due to the presence of spatial autocorrelation, we instrument this endogenous right-hand variable with the weighted average of the other control variables. It can be seen that this extension of the empirical model slightly drives down the significance of the "general left-right" ideology variable, but it stays significant at conventional levels for both specifications applying the "economic left-right" dimension.

In the following we analyse the effects of ideological positions with regard to few delimited policy areas. This procedure enables us to reveal which specific elements of the general (or economic) left-right dimension are the driving forces of the partisan effects detected above. In particular, it helps us to discriminate between hypothesis 1 and 3, i.e., whether the partisan bias observed above originates from differences in preferences or biased perceptions of the politicians. Based on the specifications which include the neighbouring countries' tax rates, we apply three disaggregated ideology variables: two of the main components of the economic left-right dimension, i.e. welfare state policies (*Welfare*) and the attitude towards free markets (*MarketEcon*), as well as non-economic social politics (*Society*), which capture elements of the general left-right dimension that do not encompass economic policies. The results, which are shown in Table 3.4, indicate that we only obtain consistent significant results for the attitude towards welfare policies (the *Welfare* dimension enters the left-right dimensions negatively, so that a high value indicates a more pro-welfare, i.e., left-wing position). This result reveals that parties which put more emphasis on the welfare state did indeed generate higher taxation, but, interestingly enough, the other economic dimension does not show coefficients deviating significantly from zero. This result gives strong support for hypothesis 1 formulated

[26]We assume a uniform weighting of all direct neighbours. For the definition of direct neighbourhood, we follow Altshuler and Goodspeed (2002).

Table 3.3: Estimation results – fixed effects and interaction

Dependent variable	CITR			EMTR		
Ideology measure	CMP	CMP Econ	DPI	CMP	CMP Econ	DPI
Ideology_{t-1}	-0.128**	-0.061***	-1.044	-0.014	-0.034**	-0.631
	(0.058)	(0.022)	(0.812)	(0.046)	(0.016)	(0.422)
$\text{Ideology}_{t-1} \times \text{trend}$	0.012**	0.004*	0.171*	-0.005	-0.001	0.159***
	(0.005)	(0.002)	(0.093)	(0.007)	(0.002)	(0.055)
$\text{Number parties}_{t-1}$	0.106	0.005	0.058	0.564	0.525	0.564
	(0.580)	(0.558)	(0.624)	(0.433)	(0.385)	(0.447)
$\text{Educ Economics}_{t-1}$	-0.827	-0.878	-1.017	0.722	0.763	0.358
	(1.811)	(1.805)	(1.974)	(1.710)	(1.569)	(1.582)
Educ Law_{t-1}	1.980	1.787	1.666	3.540*	3.444**	2.798
	(1.734)	(1.792)	(2.019)	(1.839)	(1.653)	(1.897)
NeighbourTax_t	0.475***	0.472***	0.517***	0.439***	0.449***	0.390***
	(0.140)	(0.151)	(0.127)	(0.096)	(0.095)	(0.075)
$\text{GDP per capita}_{t-1}$	0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth_{t-1}	-0.180	-0.179	-0.177	-0.027	-0.047	-0.027
	(0.126)	(0.127)	(0.124)	(0.095)	(0.091)	(0.092)
$\text{Public consumption}_{t-1}$	-0.070	-0.070	-0.117	-0.292	-0.228	-0.242
	(0.438)	(0.441)	(0.435)	(0.317)	(0.320)	(0.321)
$\text{Population old}_{t-1}$	3.862***	3.648***	3.692***	0.793	1.140	0.828
	(0.843)	(0.796)	(0.834)	(0.691)	(0.683)	(0.630)
$\text{Population young}_{t-1}$	1.089	1.007	1.162	-0.485	-0.616	-0.464
	(0.782)	(0.812)	(0.811)	(0.649)	(0.625)	(0.672)
Population_{t-1}	-0.704	-0.791	-0.752	-0.432	-0.469	-0.427
	(0.631)	(0.607)	(0.541)	(0.623)	(0.577)	(0.606)
Integration_{t-1}	-0.366**	-0.306*	-0.295*	-0.196	-0.238	-0.145
	(0.172)	(0.173)	(0.168)	(0.153)	(0.169)	(0.154)
PITR_t	0.467**	0.543***	0.496***	0.456**	0.455**	0.468***
	(0.181)	(0.191)	(0.178)	(0.180)	(0.187)	(0.163)
Constant	-56.423**	25.729	-44.181	18.396	60.620	16.690
	(21.244)	(54.337)	(27.721)	(28.043)	(53.372)	(24.055)
Country Dummies	yes	yes	yes	yes	yes	yes
Period Dummies	yes	yes	yes	yes	yes	yes
Observations	498	498	498	498	498	498
R-squared	0.84	0.84	0.84	0.82	0.82	0.83

NeighbourTax_t was instrumented with the weighted average of the other control variables.
Standard errors robust to serial correlation and heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

above. The indicator for social policies is at least significant in the specification applying the statutory tax rates, which indicates that the non-economic dimension has at least some explanatory content, although it is far lower than that of the economic indicator applied above.

3.4.2 Providing for level effects

The common reliance of the existing literature on the use of fixed effects estimation is well-founded for the questions analysed in these papers, as the application of fixed effects prevents unobserved time-invariant country-specific factors from interfering with the variable of interest.[27] However, the estimation with fixed effects may not be ap-

[27] Among the works reviewed above, Schwarz (2007) is the only paper that estimates a specification without fixed effects.

Table 3.4: Estimation results – disaggregated ideology measures

Dependent variable	CITR			EMTR		
Ideology measure	Welfare	MarketEcon	Society	Welfare	MarketEcon	Society
Ideology_{t-1}	0.910**	-0.002	-0.306**	0.587*	0.346	-0.193
	(0.340)	(0.470)	(0.123)	(0.306)	(0.461)	(0.132)
$\text{Ideology}_{t-1} \times \text{trend}$	-0.091**	-0.060	0.053***	-0.046	-0.091	0.035**
	(0.037)	(0.055)	(0.012)	(0.039)	(0.058)	(0.016)
NeighbourTax_t	0.337**	0.508***	0.554***	0.306***	0.409***	0.423***
	(0.150)	(0.156)	(0.127)	(0.104)	(0.085)	(0.094)
$\text{GDP per capita}_{t-1}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth_{t-1}	-0.202	-0.170	-0.159	-0.063	-0.022	-0.041
	(0.138)	(0.137)	(0.131)	(0.111)	(0.110)	(0.101)
$\text{Public consumption}_{t-1}$	-0.161	-0.275	-0.066	-0.283	-0.433	-0.233
	(0.390)	(0.398)	(0.444)	(0.332)	(0.326)	(0.338)
$\text{Population old}_{t-1}$	3.518***	2.425***	3.644***	1.039*	0.614	1.043*
	(0.767)	(0.922)	(0.804)	(0.608)	(0.503)	(0.589)
$\text{Population young}_{t-1}$	1.097	1.340*	1.199	-0.279	-0.089	-0.249
	(0.687)	(0.671)	(0.709)	(0.600)	(0.556)	(0.601)
Population_{t-1}	-0.600	-0.762	-0.410	-0.237	-0.420	-0.146
	(0.462)	(0.617)	(0.641)	(0.490)	(0.532)	(0.655)
Integration_{t-1}	-0.260	-0.265	-0.272*	-0.134	-0.126	-0.123
	(0.181)	(0.160)	(0.149)	(0.179)	(0.156)	(0.153)
PITR_t	0.513***	0.460**	0.498***	0.457**	0.363**	0.469**
	(0.172)	(0.190)	(0.178)	(0.187)	(0.176)	(0.183)
Constant	-37.430	-30.569	-50.061	24.156	59.380	6.951
	(22.429)	(60.187)	(21.678)	(19.412)	(50.033)	(18.270)
Country Dummies	yes	yes	yes	yes	yes	yes
Period Dummies	yes	yes	yes	yes	yes	yes
Observations	500	500	500	500	500	500
R-squared	0.85	0.83	0.84	0.82	0.81	0.81

NeighbourTax_t was instrumented with the weighted average of the other control variables.
Standard errors robust to serial correlation and heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

propriate in cases where theory predicts level effects of the independent variables on the dependent variable, as these effects would then be erased by the application of country-fixed effects (see the discussion in Plümper et al., 2005). In our data set, one prime example is the size of the countries which is largely time-invariant so that robust findings cannot be expected from fixed effects estimations. However, the theoretical literature (see Bucovetsky (1991)) predicts a level effect on corporate taxation which can be expected to be found in a cross-country comparison, but by no means in the marginal variation of the variable over the time period within countries. This assumption can be confirmed by the results shown in Table 3.5 where we omit the use of country fixed effects. There, we find the expected positive effect highly significant, in contrast to the regressions using fixed effects in the preceding subsection. Similarly, level effects are also of importance for our analyses of partisan effects. In this regard, our CMP data on party ideology has the advantage of capturing these level effects since its scales are comparable across countries, so that differences in levels reflect actual persistent differences in ideological positions between parties in different countries.

The coefficients of the ideology variable again point to a negative effect of right-wing

Table 3.5: Estimation results – no fixed effects

Dependent variable	CITR			EMTR		
Ideology measure	CMP	CMP Econ	DPI	CMP	CMP Econ	DPI
Ideology_{t-1}	-0.125**	-0.041*	-0.530	-0.212***	-0.076***	-1.506
	(0.048)	(0.022)	(1.176)	(0.070)	(0.022)	(1.040)
$\text{Ideology}_{t-1} \times \text{trend}$	0.015**	0.007**	0.117	0.002	0.003	0.141
	(0.006)	(0.003)	(0.116)	(0.010)	(0.002)	(0.096)
$\text{GDP per capita}_{t-1}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth_{t-1}	-0.128	-0.086	-0.106	-0.112	0.010	0.039
	(0.148)	(0.143)	(0.144)	(0.169)	(0.166)	(0.152)
$\text{Public consumption}_{t-1}$	0.296	0.330	0.264	0.077	0.052	0.060
	(0.226)	(0.224)	(0.234)	(0.217)	(0.245)	(0.232)
$\text{Population old}_{t-1}$	1.206**	1.124*	1.052*	0.043	-0.034	-0.121
	(0.575)	(0.554)	(0.609)	(0.559)	(0.634)	(0.604)
$\text{Population young}_{t-1}$	0.388	0.400	0.326	0.075	0.014	0.042
	(0.399)	(0.366)	(0.423)	(0.323)	(0.369)	(0.323)
Population_{t-1}	0.192***	0.188***	0.185***	0.155***	0.157***	0.149**
	(0.064)	(0.059)	(0.066)	(0.055)	(0.048)	(0.061)
Integration_{t-1}	-0.263**	-0.256**	-0.247**	-0.051	-0.092	-0.063
	(0.096)	(0.094)	(0.100)	(0.117)	(0.115)	(0.120)
PITR_t	0.231*	0.261**	0.243*	0.180	0.247*	0.202
	(0.124)	(0.117)	(0.120)	(0.137)	(0.139)	(0.131)
Presidential	-0.629	-1.645	-0.145	-3.945	-5.615	-5.574
	(3.635)	(3.550)	(3.901)	(5.510)	(6.034)	(6.823)
Plurality	-5.668	-5.723*	-5.501	-0.122	-0.663	-0.607
	(3.761)	(3.348)	(3.906)	(2.683)	(2.215)	(2.687)
Former Communist	-3.065	-1.655	-2.833	-0.429	-1.359	-0.519
	(3.570)	(3.486)	(3.556)	(3.159)	(3.500)	(3.767)
EU member	-1.497	-1.026	-1.123	-2.036	-1.760	-1.754
	(2.169)	(2.192)	(1.912)	(2.149)	(2.365)	(2.368)
Catholic	0.034	0.036	0.031	-0.003	0.014	-0.000
	(0.022)	(0.023)	(0.019)	(0.021)	(0.021)	(0.024)
Constant	8.165	5.708	10.531	8.938	10.512	10.693
	(13.844)	(12.535)	(14.387)	(15.027)	(15.997)	(16.975)
Country FE	no	no	no	no	no	no
Period Dummies	yes	yes	yes	yes	yes	yes
Observations	502	502	502	502	502	502
R-squared	0.69	0.70	0.68	0.58	0.58	0.55

Standard errors robust to serial correlation and heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

legislatures on corporate tax burdens in all specifications. Again, we cannot detect significant partisan effects by means of the DPI data, while the indicators derived from the CMP are significant in all specifications. Moreover, the estimation without fixed effects allows us to add some time-invariant variables to our analysis. These comprise dummies for the membership in the EU and a communist past of a country which might have an impact on corporate taxation. Moreover, constitutional factors which are known from the cross-country analyses of Persson and Tabellini (2003), such as dummies for the presidential and the plurality system, are added. However, the results which are reported in Table 3.5 show that none of these time-invariant variables has a significant impact on the level of taxation.

3.4.3 Correcting for plurality systems

Until now, we applied consistently our political measures capturing the relative party strengths in the legislature. These measures, however, might be inadequate for Westminster-style parliaments, in which strong one-party governments dominate the political agenda. For that reason, in the regressions depicted in Table 3.6 we consider the government centre of gravity instead of the parliament centre of gravity for those countries which are classified as plurality systems.[28] The results are qualitatively in line with those obtained with the original political measures in section 3.4.1. The main quantitative difference is that this data indicates a slower decline of the impact of the ideology variables over time.

Table 3.6: Estimation results – government positions for plurality systems

Dependent variable	CITR		EMTR	
Ideology measure	CMP	CMP Econ	CMP	CMP Econ
Ideology_{t-1}	-0.123**	-0.048**	-0.069*	-0.034**
	(0.046)	(0.019)	(0.035)	(0.016)
$\text{Ideology}_{t-1} \times \text{trend}$	0.008	0.003	0.003	0.002
	(0.005)	(0.002)	(0.006)	(0.002)
$\text{Number parties}_{t-1}$	0.440	0.374	0.848*	0.824*
	(0.537)	(0.501)	(0.422)	(0.422)
$\text{Educ Economics}_{t-1}$	-0.188	-0.464	0.770	0.551
	(1.739)	(1.670)	(1.697)	(1.604)
Educ Law_{t-1}	1.509	1.180	2.786	2.477
	(1.747)	(1.698)	(1.821)	(1.714)
$\text{GDP per capita}_{t-1}$	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth_{t-1}	-0.196	-0.187	-0.088	-0.086
	(0.131)	(0.133)	(0.105)	(0.105)
$\text{Public consumption}_{t-1}$	-0.281	-0.264	-0.323	-0.290
	(0.451)	(0.452)	(0.373)	(0.367)
$\text{Population old}_{t-1}$	4.039***	3.822***	1.105	1.088
	(0.860)	(0.923)	(0.729)	(0.781)
$\text{Population young}_{t-1}$	0.612	0.577	-0.786	-0.838
	(0.786)	(0.808)	(0.682)	(0.667))
Population_{t-1}	-0.344	-0.377	-0.106	-0.130
	(0.672)	(0.647)	(0.777)	(0.750)
Integration_{t-1}	-0.451**	-0.380**	-0.247	-0.221
	(0.170)	(0.170)	(0.154)	(0.161)
PITR_t	0.458**	0.543**	0.414**	0.465**
	(0.199)	(0.201)	(0.191)	(0.190)
Constant	-17.161	-21.174	24.631	21.413
	(28.947)	(30.210)	(31.321)	(30.575)
Country FE	yes	yes	yes	yes
Period Dummies	yes	yes	yes	yes
Observations	500	500	500	500
R-squared	0.70	0.70	0.59	0.60

Standard errors robust to serial correlation and heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

[28] We applied the classification introduced by the DPI.

3.4.4 First difference specification

One attractive solution to the problem of serial correlation stated above is the estimation of a model in differences (see Kittel and Winner (2005)). However, such a specification requires a completely different interpretation of the measured partisan effect: we no longer explain the effect of the decision-maker's ideological position on the level of taxation, but rather the *changes* in the level of taxation with *changes* in the ideological position of the legislature.[29]

This consideration clarifies why it is hard to achieve definite results using simple left-right dummies in such a specification. With these measures, the value for government ideology does not change frequently, since changes occur only in cases where power is passed over from the left to the right or vice versa, so that these may fail to explain variations in the level of taxation. Our data, however, overcomes the problem. As party ideologies measured by the CMP data change with every election, the centre of gravity shifts regularly. These changes can then also be caused by changes in the ideological positions of parties which stay in power or by changes in the strength of the coalition partners, even when the power stays in the hand of the left-wing or the right-wing of the political spectrum, respectively.

In this approach, we differentiate our left-hand side variable and our ideology variables, as well as all of our control variables which have been applied in the precedent analysis. Only two variables enter the regression in levels: first, we expect that a higher level of veto power within the governing coalition impacts the decision-making, so that *NumberParties* enters the equation in levels. Second, we rely on *TaxGap* as a measure which reflects the direct competitive pressure from neighbouring countries on the local tax setting in a given year. It is attained as the difference between a country's own level of taxation and the average of its direct neighbours for each of the two measures applied (i.e., CITR and EMTR), respectively: $TaxGap_{i,t} = Tax_{i,t} - \sum^{j} \omega_{ij} Tax_{j,t}$, for all $j \neq i$ which are defined as neighbours of i. Our estimations are then based on the following specification:

$$\begin{aligned} \Delta Tax_{i,t} &= \beta_1 + \beta_2 \Delta Ideology_{i,t} + \beta_3 \Delta Ideology_{i,t-1} + \beta_4 \Delta Ideology_{i,t-2} \\ &\quad + \beta_5 NumberParties_{i,t-1} + \beta_6 TaxGap_{i,t-1} + \beta_7 \Delta PITR_{i,t} \\ &\quad + \Delta Z_{i,t-1}\theta + \epsilon_{i,t} \end{aligned} \tag{3.11}$$

The results which are shown in Table 3.7 indicate that our measure of competitive pressure has the expected effect (tax cuts become larger in case the own tax level exceeds

[29] Despite the theoretical attractiveness of the approach, it has only been applied in Basinger and Hallerberg (2004) in the related empirical literature.

Table 3.7: Estimation results – specification in differences

Dependent variable	ΔCITR		ΔEMTR	
Ideology measure	CMP	DPI	CMP	DPI
Δ Ideology$_t$	-0.010	0.046	-0.026	0.155
	(0.023)	(0.441)	(0.026)	(0.398)
Δ Ideology$_{t-1}$	-0.034**	0.118	-0.055***	0.106
	(0.016)	(0.324)	(0.021)	(0.301)
Δ Ideology$_{t-2}$	-0.035	0.498	-0.011	0.512
	(0.023)	(0.347)	(0.022)	(0.396)
Number parties$_{t-1}$	0.205**	0.180**	0.112	0.084
	(0.091)	(0.092)	(0.139)	(0.142)
Tax Gap$_{t-1}$	-0.041***	-0.044***	-0.066***	-0.070***
	(0.015)	(0.015)	(0.024)	(0.024)
Educ Economics$_{t-1}$	0.267	0.274	0.060	0.085
	(0.375)	(0.380)	(0.434)	(0.429)
Educ Law$_{t-1}$	0.655**	0.653**	0.817***	0.814***
	(0.302)	(0.306)	(0.285)	(0.293)
GDP growth$_{t-1}$	0.004	0.014	0.044	0.063
	(0.048)	(0.050)	(0.039)	(0.041)
Δ Public consumption$_{t-1}$	-0.249	-0.276	-0.201	-0.225
	(0.199)	(0.167)	(0.149)	(0.142)
Δ Population old$_{t-1}$	-0.665	-0.277	-0.446	0.002
	(0.855)	(0.848)	(0.944)	(0.933)
Δ Population young$_{t-1}$	-0.214	-0.202	-0.508	-0.475
	(0.558)	(0.558)	(0.615)	(0.619)
Δ Population$_{t-1}$	0.135	0.250	0.529	0.616
	(0.652)	(0.657)	(0.582)	(0.610)
Δ Integration$_{t-1}$	0.095	0.102	0.011	0.014
	(0.091)	(0.090)	(0.090)	(0.089)
Δ PITR$_t$	0.338***	0.339***	0.241***	0.238***
	(0.108)	(0.109)	(0.087)	(0.088)
Constant	-1.648***	-1.661***	-1.418***	-1.467***
	(0.385)	(0.401)	(0.420)	(0.437)
Country FE	no	no	no	no
Period Dummies	no	no	no	no
Observations	467	461	467	461
R-squared	0.15	0.15	0.13	0.12

Standard errors robust to heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

the neighbours' level).[30] We include changes in ideology within the current year as well as in the two preceding years. The effect of concurrent changes is not significantly different from zero; this finding supports our assumption that taxes react with a delay to changes in the political environment. By contrast, the first lag is negative once again for the CMP data and highly significant for both tax measures, while the second lag of ideological changes also has a negative impact, but the coefficient is not significantly different from zero. This result again indicates the existence of a partisan effect on corporate taxation, reflected in the fact that a shift in ideology to the right – ceteris paribus – leads to a cut of the corporate tax rate in the following year. The DPI data does not deliver any robust results in these estimations.

[30]The differentiation eliminates the country fixed effects in the data. Hence, the null hypothesis of no fixed effects (i.e., the pooled model) cannot be rejected at standard significance levels anymore, so that the application of fixed effects will be dismissed in the following regressions.

In these regressions, we find the same qualitative effects of educational background as before, which now turn out to be highly significant for heads of state with a background in law. The finding corroborates our hypothesis 4 insofar as it indicates that individual characteristics of the decision-maker affect the amount and speed of changes in corporate taxes. Moreover, the coefficient for *NumberParties* has a positive sign and is significant at least in the specifications applying the CITR, which shows an adverse effect of larger coalitions on cuts of corporate taxes. These findings give at least some indication that large coalitions as well as the leadership of a lawyer averted tax cuts to a certain degree and, thus, counteracted the tendency of lowering corporate taxes which prevailed in the period under investigation.

3.4.5 Possible endogeneity of ideology

Empirical research on partisan effects on fiscal policy regularly treats political ideology as strictly exogenous. At first glance, however, this assumption is questionable, as the legislature's and government's ideology is the stringent result of elections. Consequently, it might be argued that changes in the external environment – in our case we might think of increasing pressure from tax competition as being relevant – impact policy outcomes through elections, which generate a new ideological position of the legislature. Thus, one could argue that in the case of corporate tax policy, the declining competitiveness of a country due to the tax cuts of its neighbours might cause a gain in votes of right-wing parties (or a shift of left-wing parties to the right), and that the domestic tax cut in the subsequent period (inevitable due to the decline in competitiveness) happens under a more rightist legislature than before. In this case, an interpretation of the actual partisan impact on the tax cut becomes difficult. However, these critiques can be mitigated by the fact that policy preferences which are revealed by voters at the ballot box encompass a wide field of programmatic aspects which go far beyond the scope of different positions in economic policy. From that perspective, it is highly unlikely that the national position in international tax competition has a strong impact on the voters' decisions, which would theoretically be expected as a right-shift of the median voter in case of intensifying pressure from other countries.

Nevertheless, we address these concerns by explicitly studying the impact of our variables of interest on changes of our ideology measures. In Table 3.8, we explain annual changes in the ideological position of the legislature by the *Tax gap* in the previous year complemented by changes in the other exogenous variables, proceeding as before. In these regressions, we cannot detect a major effect of *Tax gap* on changes in the ideological position. The only variable which has a strong effect on changes in ideology is the lagged *GDP growth*. Interestingly, this finding is in line with Markussen (2008) who demonstrates that higher economic growth causes a shift of policy sentiments to the left. However, growth has not been found to have a notable impact on corporate

taxation in any of the regressions presented above. Consequently, we conclude that the possible endogeneity of ideology cannot be regarded as a major problem in the empirical approaches presented above.

Table 3.8: Estimation results – explaining ideological changes

Dependent variable	Δ CMP		Δ CMP Econ		Δ DPI	
Tax measure	CITR	EMTR	CITR	EMTR	CITR	EMTR
Tax Gap_{t-1}	0.037	0.040	0.098	0.100	-0.000	0.002
	(0.027)	(0.029)	(0.069)	(0.067)	(0.003)	(0.003)
GDP growth_{t-1}	-0.247***	-0.248***	-0.725***	-0.730***	0.007	0.007
	(0.090)	(0.090)	(0.246)	(0.246)	(0.008)	(0.008)
Δ Public consumption_{t-1}	-0.443	-0.434	-1.257	-1.235	0.024	0.025
	(0.363)	(0.361)	(0.785)	(0.778)	(0.032)	(0.032)
Δ Population old_{t-1}	-2.940*	-2.615*	-1.881	-1.043	-0.120	-0.114
	(1.581)	(1.550)	(4.952)	(4.862)	(0.162)	(0.161)
Δ Population young_{t-1}	-0.368	-0.299	-7.306**	-7.135**	-0.009	-0.006
	(1.140)	(1.133)	(3.062)	(3.062)	(0.105)	(0.105)
Δ Population_{t-1}	-1.256	-1.256	-2.617	-2.580	0.085	0.071
	(1.230)	(1.244)	(2.304)	(2.258)	(0.082)	(0.075)
Δ Integration_{t-1}	-0.034	-0.017	-0.580*	-0.536	-0.004	-0.004
	(0.124)	(0.125)	(0.338)	(0.338)	(0.018)	(0.018)
Constant	1.139**	1.108**	1.959	1.871	-0.011	-0.009
	(0.514)	(0.512)	(1.309)	(1.287)	(0.044)	(0.043)
Country FE	no	no	no	no	no	no
Period Dummies	no	no	no	no	no	no
Observations	475	475	475	475	469	469
R-squared	0.02	0.02	0.04	0.04	0.02	0.01

Standard errors robust to heteroscedasticity in parentheses. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

3.5 Conclusions

The relevance of partisan politics has been widely neglected both in the theoretical as well as in the empirical corporate taxation literature for quite a while – but politics matter for corporate taxes, as our analysis has shown. Theoretically, we have shown that there are two channels which hint at an effect of partisanship on corporate tax policy: the former being differences in preferences towards the size of the public sector, and the latter being different perceptions of the economic environment. Empirically, we have shown that there is strong evidence that ideologies have indeed impacted corporate taxes in Europe. The partisan effect is generally more pronounced for the statutory tax rates than for the effective marginal tax rates, but for which we also find a partisan effect. This finding might be due to two different reasons: first, the statutory tax rate is the most visible component of national tax systems, so that partisan politics which aim at satisfying the own clientele should be the strongest there. Second, the statutory tax rates are relevant for profit-shift activities of multi-national corporations. Hence, if ideology is correlated with the perception of this phenomenon (i.e., leftist politicians assume a lower mobility of profits), then it can also explain why the partisan effect is stronger

for the statutory tax rates. Moreover, our results indicate that the general impact of national partisanship is diminishing with increasing intensity of competition in Europe. Beyond the impact of partisan politics, we have identified two further factors which have interfered with the general pressure on cutting tax rates: educational background of the respective head of government, as well as the fragmentation of government.

In a wider sense, the chapter has underlined the importance of the appropriate data choice for the overarching issue of analysing partisan politics in public finance. Our measure of political ideologies based on manifesto data delivers robust results, whereas the simple use of dummy variables for party families points to the same direction, but does not produce significant effects. In particular, it has been shown that for the question at hand, mainly one specific dimension of the complex left-right dimension is of importance: the attitude towards the welfare state. This effect is in line with our predictions from the theoretical part, which ascribe the partisan effect on corporate taxation to differences in preferences for public goods provision.

In this regard, our study is the first to analyse the ideological impact on fiscal policy in a more specific way than the general left-right dimension. The feasibility of an analysis in which the left-right divergence is disaggregated into political positions concerning single policy areas as provided by the CMP data might also be of interest for further applications in the literature of partisan effects on economic policy. Similar to our results, it might be suspected that it is also the welfare dimension which affects spending policies.[31] However, according to theory, it should change for other explanandums. Concerning the partisan effect on market liberalisation, for instance, theory predicts that other components of the left-right dimension, such as the attitude towards the free market, should be the better explanatory variables. Concerning other policy outcomes, such as the factors underlying the partisan effect on economic growth (studied in Bjørnskov (2005)), theory is ambiguous thus calling for more elaborate analyses.

[31] It has only recently be demonstrated for public health expenditures by Geys and Nuscheler (2010).

3.6 Appendix

Table 3.9: Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max	Source
CMP	Ideology measured for general left-right dimension	-0.09	11.04	-30.60	36.47	own calculations, based on CMP data and parliament compositions from Cusack and Engelhardt (2002) and Klingemann et al. (2008)
CMP econ	Ideology measured for economic left-right dimension	-4.61	30.86	-92.65	56.45	ibid.
Society	Ideology measured for societal left-right dimension	3.19	5.18	-12.65	20.99	ibid.
MarketEcon	Ideology measured for market liberalism	2.52	1.70	0	9.51	ibid.
Welfare	Ideology measured for welfare policies	5.93	2.35	1.27	13.49	ibid.
DPI	Ideology measured for general left-right dimension	0.06	0.78	-1	1	own calculations, based on database of Political Institutions, Beck et al. (2001)
Number Parties	Number of parties in coalition government	2.48	1.28	0	6	Database of Political Institutions, Beck et al. (2001)
PITR	Highest personal income tax rate	50.03	12.52	18.0	87.0	Overesch and Rincke (forthcoming)
Integration	Political and social integration; KOF globalisation index corrected by economics flow variables	75.26	12.51	29.95	93.11	Dreher (2006)
Educ Economics	Dummy = 1 if education in economics	0.23	0.41	0	1	Dreher et al. (2009) updated by various internet sources
Educ Law	Dummy = 1 if education in law	0.33	0.46	0	1	Dreher et al. (2009) updated by various internet sources
GDP cap	GDP per capita in US Dollar	22732.75	9844.59	2927.9	65807	World Bank, World Development Indicators
GDP growth	annual growth rate of real GDP	2.79	2.98	-11.89	12.7	World Bank, World Development Indicators
Population	Population in millions	20.22	23.84	0.25	82.54	IMF
Public consumption	Public consumption as share of GDP	19.58	4.54	5.69	29.94	World Bank, World Development Indicators
Population old	Share of population older than 65	14.11	2.28	4.53	19.50	World Bank, World Development Indicators
Population young	Share of population younger than 15	19.24	3.41	14.03	33.01	World Bank, World Development Indicators
Presidential	Dummy = 1 if presidential system	0.04	0.20	0	1	Database of Political Institutions, Beck et al. (2001)
Plurality	Dummy = 1 if election under plurality rule	0.15	0.36	0	1	Database of Political Institutions, Beck et al. (2001)
Catholic	Share of catholics	0.46	0.38	0	0.98	various sources

Table 3.10: Statistics tax data

		CITR				EATR				EMTR			
Country	Coverage	Min	Mean	Max	Std. Dev.	Min	Mean	Max	Std. Dev.	Min	Mean	Max	Std. Dev.
Austria	1981-2005	25	43.4	61.5	12.9	22.9	33.3	37.8	4.1	16.9	27.9	36.1	7.2
Belgium	1980-2002	39	42.3	48	3.0	32.5	36.0	41.8	3.3	17.5	22.9	30.7	5.2
Bulgaria	1993-2004	19.5	33.7	46	8.3	17.1	30.1	40.3	7.8	10.7	21.5	29.9	6.3
Czech Republic	1992-2005	26	36.4	55	7.8	22.8	29.2	52.8	8.7	15.3	22.9	50.7	10.1
Denmark	1980-2004	30	37.9	50	7.0	26.3	32.9	43.4	6.1	17.6	22.7	32.1	5.2
Estonia	1995-2006	23	25.6	26	1.0	19.9	22.2	22.5	0.9	12.1	13.8	14.1	0.7
Finland	1980-2006	25	36.4	52	10.4	23.0	33.3	47.4	9.3	18.3	27.9	41.1	8.5
France	1980-2006	33.3	40.0	50	6.3	32.3	38.6	46.5	5.1	30.3	38.6	41.9	3.9
Germany	1980-2005	39.2	55.8	63.2	8.7	35.8	42.6	47.1	4.2	29.2	39.9	49.1	7.4
Greece	1990-1999	35	38.3	46	5.3	30.6	33.7	41.1	5.1	21.0	24.6	32.9	5.7
Hungary	1992-2005	17.7	23.4	40	8.4	15.8	21.9	37.4	7.7	11.5	19.2	33.1	6.7
Ireland	1980-2006	12.5	36.0	50	13.3	14.0	32.3	43.4	10.3	12.0	24.2	32.2	7.1
Italy	1980-2005	36.3	44.7	53.2	5.7	22.1	37.7	48.4	7.4	4.9	25.9	41.9	10.8
Latvia	1995-2005	15	22.4	25	4.1	13.0	19.4	21.7	3.6	7.7	12.1	13.6	2.4
Lithuania	1995-1999	29	29	29	0	25.1	25.1	25.1	0	16.0	16.0	16.0	0
Luxembourg	1980-2003	30.4	41.0	46.9	4.8	26.2	37.7	43.6	5.3	16.2	31.7	39.0	7.6
Malta	1996-2002	35	35	35	0	32.4	32.4	32.4	0	27.5	27.5	27.5	0
Netherlands	1980-2006	29.6	37.9	47	5.4	27.3	35.0	44.0	5.1	22.4	29.8	39.9	5.3
Norway	1990-2004	28	30.7	48.4	7.2	26.4	28.8	44.8	6.5	22.8	25.2	39.6	5.8
Poland	1992-2004	19	33.8	40	6.8	17.0	30.7	36.5	6.4	12.0	24.0	30.3	5.7
Portugal	1990-2004	33	38.1	40.2	2.3	29.4	33.9	35.7	2.0	21.6	25.6	35.7	2.0
Romania	1996-2003	25	30.6	38	6.9	22.5	27.3	34.2	6.0	16.8	21.2	27.0	5.5
Slovenia	1995-2003	25	25.6	30	1.7	21.1	21.6	25.3	1.4	11.0	11.6	13.8	1.1
Spain	1990-2003	35	35	35	0	32.6	32.6	32.6	0	24.7	24.7	24.7	0
Sweden	1982-2005	28	16.6	65.9	16.6	23.0	35.8	59.1	15.5	16.8	29.3	53.2	15.4
Switzerland	1980-2006	21.3	25.1	26.8	1.5	18.9	22.8	24.4	1.5	13.0	17.5	19.1	1.6
United Kingdom	1980-2005	30	36.8	52	8.1	27.4	33.1	44.7	6.3	21.6	26.0	32.5	3.8
Croatia	1995-1999	25	31	35	5.5	16.9	20.9	23.6	3.7	-19.6	-16.31	-11.4	4.5
Iceland	1990-2002	18	33.5	45	6.9	16.3	30.7	42.1	6.6	11.8	25.2	37.9	6.8
Turkey	1996-2003	33	37.1	44	5.7	28.4	32.0	37.9	4.9	18.0	21.0	26.0	4.1
Albania	1995-2000	30	30	30	0	26.6	26.6	26.6	0	18.8	18.8	18.8	0
Macedonia	1997-2001	15	15	15	0	13.8	13.8	13.8	0	10.6	10.6	10.6	0

Chapter 4

Fiscal Interactions at the Local Level

4.1 Introduction

Whether at the national or local level, a government deciding public policies in one jurisdiction is likely to affect – and be affected by – decisions of governments in other jurisdictions (e.g., due to spillover effects or strategic decision-making). The resulting spatial policy interdependence has received significant attention from regional science scholars, urban and public economists and political scientists in recent years, both in terms of its measurement and its implications (for partial reviews, see Brueckner, 2003; Revelli, 2005). With respect to local corporate tax competition, the intensity of strategic interactions in business tax policy should be determined by the intensity of competition for mobile capital between jurisdictions. The intensity of competition between certain jurisdictions is then approximated by weighting matrices which either account for the direct neighbourhood or the distance of jurisdictions within a particular region or country. However, such weighting matrices are only a rough indicator for the competitive pressures which are actually perceived by decision-makers at the local level, and in particular they abstract from the "true" structure of competition which is not necessarily only determined by the location of jurisdictions. In this chapter, results from a survey conducted among mayors in the German state of Baden-Württemberg are used to show that the perceived intensity of competition varies considerably between jurisdictions, and can mainly be explained by the size and location of the jurisdiction. The findings have important implications for the literature on local competition, as will be discussed below in detail.

First, studies of spatial policy interdependence in (local) public policies usually concentrate on the relations between jurisdictions *within* a single analysed region, and disregard possible extra-regional effects. The first part of this chapter evaluates the validity of such restriction based on the survey results. It is found that location near a border significantly undermines politicians' perception that the fiercest competitive pressure derives

from jurisdictions *within* their own state. This effect sets in about 20km (12.5km) from a national (international) border. It can also be confirmed that intra-national borders are perceived as much less constraining for firms than international ones, even in a highly integrated area such as the European Union. Overall, these results indicate that nearest municipalities perceive each other as competitors regardless of the state or country where they are located. The practical implications of these findings for future studies on spatial policy interdependence are discussed.

Second, little is known about the actual spatial structure of inter-municipal competition. Assuming that competition takes place *only* among neighbours (as in the empirical literature) is at odds with the theoretical approaches where all jurisdictions compete simultaneously. In the second part of this chapter, a sequential tax competition model in which city centres compete with other city centres and their own surrounding jurisdictions is developed based on the survey findings. This model predicts that larger jurisdictions do not necessarily rely more on capital taxes when they face strong competition with more distant competitors. In addition, it is discussed how the model compares to a standard simultaneous approach and shown that the results from our sequential model are in line with trends in local taxation in Baden-Württemberg.

The remainder of the chapter is structured as follows. Section 4.2 critically reviews the types of spatial weights matrices commonly employed in the literature and derives testable hypotheses concerning the effect of (inter)national borders. Section 4.3 discusses our survey design and the empirical methodology employed to verify the existence and persistence of border-effects. It also describes the results and discusses the implications for future studies. In section 4.4 we present how the findings from our survey motivate our theoretical model. In section 4.5, we introduce a sequential model, present the results, and compare to a simultaneous model (shown in the appendix). Finally, we discuss the implications of the model for local tax setting and compare these with local business tax rates in Baden-Württemberg.

4.2 Defining the neighbourhood

A central concern for empirical analyses of spatial policy interactions relates to the specification of the neighbourhood matrix. As the components of this matrix – i.e., 'spatial weights' that define who is expected to compete with whom – generally cannot be directly estimated from the data (due to a lack of degrees of freedom; e.g., Anselin, 1988; Case et al., 1993), their specification is at the discretion of the researcher and critically depends on the underlying theoretical model (Brueckner, 2003; Revelli, 2005). In this chapter, we focus on the competition of public authorities to attract mobile capital, so that the spatial weights should ideally reflect the mobility of capital between these jurisdictions (Brueckner, 2003). However, most previous work either relies on a simple contiguity- or distance-based neighbourhood-specification, or augments the

latter with socio-demographic criteria such as relative population size. Additionally, and crucially, the spatial weights are generally defined with reference to only a limited group of countries in the literature on international competition (e.g., Devereux et al., 2008) or with reference to other jurisdictions *within* one particular region when studying local competition (the focus of this chapter).[1]

The latter operational choice is often due to the lack of comparable data from outside the analysed region; however, it is not innocuous. Since "spatial dependence may transcend the boundaries of the data set" (Anselin, 1988: 172), jurisdictions *within* the dataset may well be spatially autocorrelated with jurisdictions outside the observed data. Hence, "spatial interaction (...) may well extend beyond identified regional borders" (Griffith, 1983). This possibility – known as the 'boundary value problem' or 'edge effect' – has been discussed extensively in the early theoretical spatial econometrics literature, and was shown to "result in a biased estimate of spatial dependence when ignored" (Anselin, 1988: 173; see also Griffith and Amrhein, 1983; Griffith, 1983). Although various partial solutions to this problem have been proposed (e.g., Griffith, 1983, 1985), the boundary value problem has, quite surprisingly by and large been ignored in the applied literature. Admittedly, one could conceive of arguments to justify the disregard of extra-regional effects and implicitly assume that competitive forces are independent of the distance to surrounding regions (one of the 'solutions' proposed, see Griffith, 1983: 380).[2] However, in our view, the validity of such assumptions should be subject to direct empirical scrutiny, which allows establishing whether or not we should worry about the edge effect and the "considerable bias into parameter estimates for the region in question" it induces (Griffith, 1983: 377).

Although some indirect evidence does exist, it remains inconclusive. On the one hand, Gérard et al. (2010) fail to find significant interactions in the tax-setting of municipalities located in different Belgian regions. Sub-national borders in Belgium, however, are likely to constitute a significant barrier to mobility due to the predominant role of the regions in Belgian federalism as well as their concurrence with linguistic borders. On the other hand, Brügger and Parchet (2010) demonstrate that although linguistic borders in Switzerland weaken policy interdependence, fiscal interactions persist also between municipalities belonging to different regions. This suggests that jurisdictions' peer group need *not* consist exclusively of jurisdictions within their own region.

[1] Prominent examples in the local tax competition literature include, among several others, Brueckner and Saavedra (2001) on cities in the Boston metropolitan area, Brett and Pinkse (2000) on municipalities in the Canadian province of British Columbia, and Buettner (2003) on jurisdictions in the German state of Baden-Württemberg.

[2] Depending on the underlying theoretical model, several partial defences can be provided. First, from a tax competition perspective, mobile factors, such as capital or workers, may face a significant hurdle to move across a border. Second, from a yardstick competition perspective, firms and/or citizens may not believe that jurisdictions at the opposite side of an (inter)national border are a relevant 'yardstick' for their own incumbents' policies or they may be less likely to obtain and/or process information from 'the other side'. In both cases, the result is that politicians' need to mimic cross-border jurisdictions' policies is weakened, though it obviously need not disappear completely.

This chapter takes a first step to assess this issue – i.e., spatial dependence transcending identified borders – more directly by addressing two related questions. First, do jurisdictions near a border compete only with jurisdictions on their own side of the border (as implicitly assumed in most previous work), or do they have a broader reference group? This question regards what could be designated as a pure *border effect*; it evaluates the constraining strength of borders. Such border effects are well-known in the trade literature, and we will study whether they also matter in fiscal competition. Second, how far 'inland' do competitive pressures from beyond the borders reach? This question pertains to the radius within which the neighbourhood to another region is taken into account by local decision-makers (a *proximity effect*). The answers to both questions have important implications for the specification of contiguity- and distance-based neighbourhood matrices in future work, even for studies concerned with a single well-defined region. Specifically, when border-jurisdictions perceive themselves as having an inter-regional reference group (i.e., question 1), they should be treated differently from inland-jurisdictions when evaluating spatial dependence within any given jurisdiction (Griffith, 1983, 1985; Anselin, 1988). The revelation that such effects *either* materialise only in close proximity to the border *or* persist also at significant distances (i.e., question 2) indicates how broadly such re-operationalisation should be applied.

We tackle both questions by surveying politicians about their perceptions of their jurisdictions' most important competitors. While politicians' opinions have until now not been explicitly exploited to define jurisdictions' peer groups, the processes analysed in the literature (i.e., intergovernmental interactions) are real-world phenomena whereby politicians take behaviour elsewhere into account. Hence, and especially since the underlying competitive forces are hard to measure objectively, politicians' *beliefs* are particularly likely to become of crucial importance. In line with this idea, Revelli and Tovmo (2007) illustrate that spatial policy dependence is particularly strong between jurisdictions where politicians *believe* that voters engage in benchmarking of their performance against other jurisdictions (for a related finding, see Brülhart and Parchet, 2010). This suggests that since politicians' opinions about the importance of competitive pressures and the extent of tax base mobility have important implications for their policy decisions, empirical analyses of tax competition for mobile capital would do well to use such information to create sensible definitions of competing/reference groups (rather than impose ad hoc criteria that might have little relevance in practice). As demonstrated by Heinemann and Janeba (2011), the opinions of politicians can exhibit considerable variation also within the same institutional environment.[3]

[3]Alternatively, we could obtain estimates for the empirical relevance of the 'border' and 'proximity' effects by setting up a spatial econometric model that directly addresses the boundary value problem, and run it for various operationalisations of what defines being 'near' a border. As detailed in the main text, we think our use of politicians' opinions has distinct benefits for addressing our research questions and is certainly less cumbersome in its approach to the proximity effect. Moreover, the practical relevance of this alternative approach may be limited since no generally accepted solution to the boundary value problem exists (Griffith, 1985; Anselin, 1988) – and making inferences based on

Our empirical results are based on both OLS and natural spline regressions using survey data from over 700 German municipal leaders in the state of Baden-Württemberg. The state is located in the south-west of Germany; it is surrounded by three German states to the north and east, as well as France to the west and Switzerland to the south. The results show that most politicians perceive other municipalities within their own state as the strongest competitors. Yet, in municipalities 'near' a border, politicians also perceive a strong competitive threat from across the border. This finding corroborates the idea that municipalities near a border have a broader reference group than is commonly assumed. Moreover, the importance of borders as a dividing line varies depending on the type of border. First, ceteris paribus, their effect is weaker (i.e., less constraining) for national than international borders. Decision-makers in municipalities up to roughly 20km from a national, inter-regional border (or about 10% of the maximum possible distance to such a border in our sample) take competition with jurisdictions beyond the border into consideration, while the equivalent effect of an international border ceases after approximately 12.5km (or about 6% of the maximum possible distance). Although these distances appear relatively small, it comprises 21% and 9.5% of all municipalities in the state, respectively. Second, the French-German border is in our sample shown to have a stronger dividing effect than the Swiss-German border. One tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU). Alternatively, it could reflect Switzerland's more aggressive corporate tax policy, which might make German local politicians feel as if they are facing a vigorous fiscal competitor. Overall, our findings suggest that geographically close municipalities perceive each other as competitors for mobile capital regardless of the state or country where they are located. This, in turn, implies a need for more careful treatment of potential 'edge effects' in empirical analyses of spatial fiscal interactions to avoid biased inferences on parameters of spatial dependence (Griffith, 1983, 1985; Anselin, 1988).

4.2.1 A critical view of existing approaches

Independent of the underlying theoretical framework, operationalisations of a jurisdiction's 'neighbourhood' in studies of spatial policy interdependence most often rely on a simple contiguity- or distance-based criterion. Neighbours are thereby defined as two jurisdictions which share a border (e.g., Heyndels and Vuchelen, 1998; Geys, 2006; Rincke, 2007) or are within a certain Euclidian or travel distance from each other (e.g., Buettner, 2001, 2003; Bosch and Solé-Ollé, 2007; Brett and Tardiff, 2008). In a similar vein, the inverse of the distance between jurisdictions is often invoked to approximate the strength of the assumed competitive relation between them (e.g., Brueckner and Saavedra, 2001; Charlot and Paty, 2007; Koh and Riedel, 2010). Such distance-based criteria can be

imperfect solutions would certainly be less than ideal.

justified by the fact that proximity is important for the dissemination of information – certainly at the local government level (Allers and Elhorst, 2005) – and is significantly linked to relocation decisions, both for individuals (e.g., Day, 1992) and firms (e.g., van Dijk and Pellenbarg, 2000).[4]

Interestingly, and somewhat surprisingly, the delineation of jurisdictions' peer groups in most studies relies exclusively on 'objective' data and never accounts for politicians' perceptions about who they *believe* to be competing with. Such beliefs, however, are likely to play a critical role. Revelli and Tovmo (2007), for example, indicate that the spatial parameter estimated for local government efficiency patterns in Norway is significantly larger for jurisdictions whose politicians *believe* that voters employ other jurisdictions' performance as a yardstick, suggesting the importance of politicians' perceptions for observed policy interactions.

More generally, politicians' beliefs are likely to matter for their decisions independent of whether they are correct (i.e., accurately reflecting reality) or biased. On the one hand, if one assumes that rational politicians have unbiased beliefs, their observable decisions will reflect the underlying reality. Even then, however, politicians' subjective opinions will continue to play a crucial role in settings where the underlying reality is hard to measure objectively (such as, for example, concerning inter-jurisdictional competitive forces). In such a setting, objective data are arguably 'unavailable', and subjective perceptions – which in this case are assumed unbiased – become central to the decision-making process. On the other hand, if one allows for biased beliefs, the actual truth (e.g., mobility of firms) might become less relevant than politicians' perceptions thereof, since it is these perceptions that shape their decisions. This idea rests on a substantial academic literature indicating that individuals' actions in a wide variety of situations are more often driven by subjective perceptions rather than objective facts.[5] Politicians are unlikely to be immune to such effects. Evidence in this direction is provided by Brülhart and Parchet (2010) who find that Swiss municipalities strategically interact in their inheritance tax decisions *in the belief that tax competition takes place*. However, the authors do not find any tax base effects induced by tax differentials. Hence, politicians apparently base their decisions on wrong assumptions about the mobility of the taxable

[4]In order to define peers more specifically, some scholars move beyond a merely geographical neighbourhood criterion by including information on, for example, relative population sizes, migration patterns between jurisdictions (e.g., Case et al., 1993; Baicker, 2005; Rincke, 2010) or, in studies of international tax competition, the level of trade integration between countries (e.g., Prakash and Potoski, 2006; Exbrayat, 2009).

[5]Voter turnout in elections and participation in rebellious collective action, for example, have been linked to the individuals' overestimation of their personal influence on such actions' outcomes (e.g., Muller and Opp, 1986; Opp, 2001). Similarly, "subjective interpretations of recurrence risks are better predictors of reproductive intentions [of people with genetic disorders] than the 'objective' risks" (e.g., Shiloh and Saxe, 1989, 45). With respect to US tax policy, Birney et al. (2006), Krupnikov et al. (2006), Slemrod (2006) and Sides (2010) analyse the critical role of voter misconceptions and ignorance in explaining voters' views on, for example, the repeal of estate taxation and the replacement of income taxes by flat or retail sales taxes.

object (referred to as "alleged tax competition" by Brülhart and Parchet, 2010: 1). It is then only a small step to exploit politicians' subjective perceptions about the *identity* of their most important competitors in order to construct the neighbourhood matrix, rather than their view on the mere existence of such competitors (as studied in, e.g., Ashworth and Heyndels, 1997, 2000; Hendrick et al., 2007; Heinemann and Janeba, 2011).

Moreover, applying contiguity- or distance-based specifications of the neighbourhood matrix only *within* one analysed region, as most studies do, implicitly assumes that the world ends at the region's border. This clearly does not need to be the case, as Brügger and Parchet (2010) demonstrate for culturally defined regions in Switzerland. They find that local income tax burdens in Swiss municipalities do not change discretely at the language border dividing the regions, but exhibit smooth spatial gradients. Although 'cross-border' interactions are found to be weaker than 'within-region' interactions, the mere presence of such interregional interdependence indicates that municipalities along a (language) border are *not only* competing with neighbours in their own region. Indeed, it demonstrates that decision-making processes in at least some jurisdictions *are* influenced by what happens beyond a border.[6] Importantly, ignoring such cross-border effects when they are present is likely to generate biased inferences on the central spatial parameters – known as the 'boundary value problem' or 'edge effect' in the spatial statistics literature (e.g., Griffith, 1983, 1985; Anselin, 1988). While different procedures have been developed to deal with such edge effects (for a thorough discussion, see Griffith, 1983, 1985), most scholars take the standard solution of "ignoring them" (Griffith, 1983: 380). Clearly, however, the validity of such assumption should be subject to direct empirical scrutiny.

4.2.2 Hypotheses on the effect of (proximity to) borders

In what follows, we take up both criticisms by empirically evaluating whether the inclusion of politicians' opinions (criticism 1) can help to disclose the validity of ignoring the edge effect (criticism 2). The central idea is that decision-makers in jurisdictions near a border may well perceive themselves to have a peer group that extends beyond the own region. This allows for potential cross-border interactions because in such setting borders are not always perceived by politicians to be insurmountable obstacles for, for example, mobile capital. In some sense, the state or country border represents an "artificial border" (Griffith, 1983: 378) that has little relevance in practice. Moreover, one could argue that such effects need not be constrained to jurisdictions located physically at the border (e.g., effects of cross-border trade and smuggling often persist at considerable distances from the border; see Asplund et al., 2007; Lovenheim, 2008; Beatty et al.,

[6] The same inference can obviously be drawn from the vast literature on cross-border shopping (for reviews, see Chiou and Muehlegger, 2008; Lovenheim, 2008).

2009). Such a proposition indeed follows naturally from the commonly acknowledged central importance of distance (see above); however, while the existing literature has consistently assumed that distance is crucial *within a given region*, the same logic can easily be transferred to jurisdictions *outside that region*. Doing so implies that proximity to jurisdictions outside the analysed region (i.e., on the other side of the border) defines the extent to which local decision-makers perceive the intensity of competition with these jurisdictions (relative to those within the own state). This leads to a first testable hypothesis:

Hypothesis 4.1. *Proximity to competing jurisdictions beyond subnational or international borders shifts politicians' perceptions on the relative importance of 'internal' and 'external' competitors: they perceive a stronger competitive pressure from 'external' competitors; a* proximity effect.

Clearly, however, the mere existence of borders is likely to retain at least some 'closing-off' effect. Indeed, although Basile et al. (2009) demonstrate that location choices for multinationals in Europe are becoming increasingly uncoupled from national borders due to increased integration, significant evidence indicates that borders continue to impede trade (e.g., McCallum, 1995; Anderson and van Wincoop, 2003), even in highly integrated areas such as NAFTA and the European Union. Some authors explain this persistence by the existence of technical barriers (e.g., Chen, 2004), while others suggest that cultural factors may drive these results (e.g., Guiso et al., 2009).

While this suggests a perceptible effect of international borders, a similar effect could also be expected from subnational borders in a federal state, such as Germany. In our German setting, the effect might be driven by cultural factors since state borders in Germany largely coincide with historical and/or cultural borders, and the latter have been shown to still matter for economic decisions such as migration (e.g., Falck et al., 2010). It may also be caused by institutional factors as firms need to register at chambers of commerce (IHK), whose authority coincides with state borders. Furthermore, employment conditions (including wages) are often defined in so-called "master contracts" arranged at the state level. Such administrative requirements increase the cost of firm mobility across state borders. Finally, German municipalities are geographically arranged in districts (Landkreis) and represented in state-level organisations (Gemeindetag), both of which have an advisory and coordination function and lead to information exchange. Moreover, their statistical and accounting systems are coordinated at the state level. As a result, local decision-makers are likely to be much better informed about the policies of municipalities in the same state, thus becoming more likely to focus on municipalities in the same state as their reference group. Moreover, Turrini and van Ypersele (2010) identify asymmetries in judicial systems as driving forces of the border effect in trade, both at the national level (due to international differences in the judicial system) and the subnational level (due to the competency of different courts of appeal, which is also

a relevant dividing line between German states).

Taken together, state borders are likely to have a relatively weaker 'closing-off' effect than national borders since mobility as well as information costs are arguably lower across the former. This discussion leads to our second hypothesis:

Hypothesis 4.2. *Both national and international borders are perceived as real barriers; a* border effect*. International borders are likely to exert a stronger influence than national ones.*

Given the institutional setting analysed below (i.e., municipalities in the German state of Baden-Württemberg), the latter hypothesis can be specified a bit further. As Baden-Württemberg shares a direct border with both France and Switzerland, it provides the possibility to test for diverging effects of different types of international borders. On the one hand, the border with France has a much stronger cultural dimension than the one with Switzerland as Swiss municipalities near the Swiss-German border are German-speaking. On the other hand, France is a member of the EU, while Switzerland is not (although many of the economic freedoms provided by the EU apply to transactions with Switzerland) and has its own currency. Hence, there might be a larger institutional hurdle for firms to move from Germany to Switzerland than from Germany to France as they effectively leave the EU-area in the former case. Analysing how politicians' perceptions of their jurisdictions' main competitors varies along the French and Swiss borders provides an opportunity to gain some (preliminary) insight into the relative importance of these two effects. This is reflected in our third and final proposition:

Hypothesis 4.3. *The effect of international borders varies with the cultural and institutional dimensions of such borders. The exact nature (and strength) of such mediating effects is theoretically open and thus constitutes an empirical question.*

4.3 Empirical analysis of reference points near a border

4.3.1 Survey description

We employ data from a survey that asked local decision-makers in the German state of Baden-Württemberg about their perceptions of the competitive pressures between various jurisdictions to empirically test the hypotheses derived in the previous section. We selected this setting for two main reasons. First, local business tax revenues (i.e., the 'Gewerbesteuer') make up roughly 48% of municipal tax revenue (or 21% of total revenues; figures for 2004), and constitute the main source of tax revenues for local gov-

ernments in Baden-Württemberg (e.g., Geys et al., 2010; Kalb et al., 2010). Moreover, previous research found evidence of strong competition between municipalities in this state (Buettner, 2001, 2003; Hauptmeier et al., 2009). It not only indicates the relevance of business tax revenues and competition for such revenues within our setting, but also allows us to relate our findings to existing work. Second, there exists a quasi-presidential system in the municipalities of Baden-Württemberg, with a strong mayor and a rather weak council. This is important since it implies that the decision-makers we surveyed (i.e., the mayors, see below) have real decision-making power regarding fiscal policies.[7]

Specifically, the survey was conducted in May 2008 among the mayors of all 1108 municipalities in Baden-Württemberg. It obtained a response rate of 64.3%, thus providing a sizeable sample (N=712). Both the sample size and response rate are exceptionally high compared to the few previous economic studies of politicians' opinions (e.g., Ashworth and Heyndels, 1997, 2000; Hendrick et al., 2007; Heinemann and Janeba, 2011). Also, and importantly, this sample is representative of the entire population in terms of the geographical distribution of the municipalities (see Table 4.5 in the appendix). There are some quantitatively minor, but statistically significant, differences with respect to population size, unemployment rate, fiscal capacity and political make-up. Hence, we directly control for the influence of these variables in the analysis below.

The central question of interest for our purposes is the following: "With which cities and municipalities do you perceive yourself to be particularly in competition for businesses?" Respondents were thereby asked to assess the strength of competitive pressures on a discrete scale from -4 (not at all regarded as competitors) to +4 (very strongly regarded as competitors) regarding three types of jurisdictions: (Q1) cities and municipalities in Baden-Württemberg, (Q2) cities and municipalities in other German states, and (Q3) cities and municipalities in other countries.[8]

The distribution of responses is illustrated in Figure 4.1. Clearly, and unsurprisingly, most respondents regard internal competitors (i.e., those from the state of Baden-Württemberg) as their most important competitors. Still, significant variation exists across respondents, especially when they are asked about external competitors (i.e., those from other states or countries). Moreover, and crucially, respondents often strongly vary their responses across the three types of competitors mentioned. This not only indicates that answers to the survey were taken seriously, but also that mayors indeed perceive and report differences in the extent of competitive pressures across the three groups mentioned. It is this variation we exploit in our analysis.

[7]Mayors are elected directly by the citizens for eight year periods and lead the administration of the municipality. Moreover, they preside over the local council and have full voting rights there. This generates a unique combination of executive authority and agenda-setting power.

[8]The original wording in German is: "Mit welchen anderen Städten und Gemeinden sehen Sie sich besonders im Wettbewerb um Unternehmensansiedlungen?" Note that we did not ask respondents about specific municipalities, but requested an opinion concerning the three general municipality types outlined.

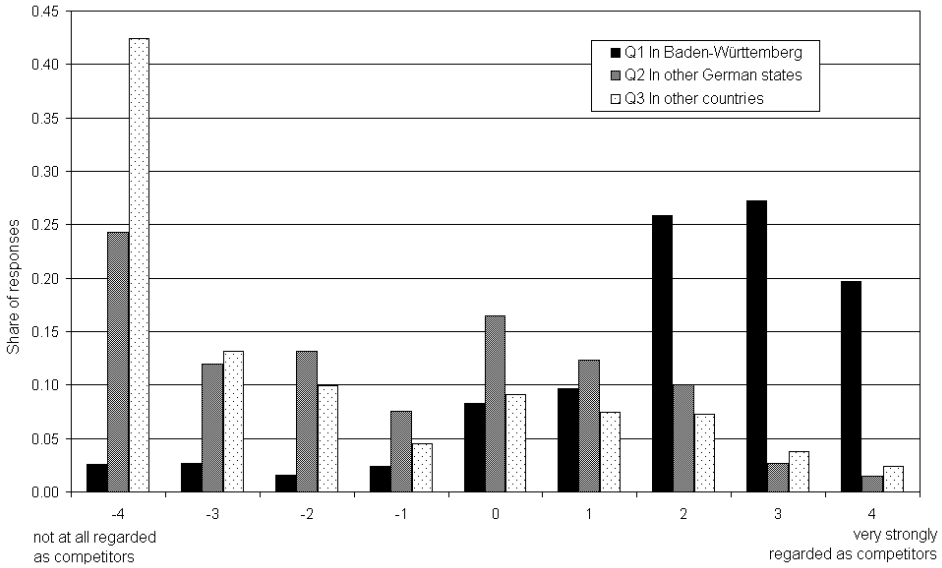

Figure 4.1: Survey results, perceived competitive pressures (N=712). For each of the three questions, the percentages add up to 100%.

4.3.2 Specification and methodology

Our baseline specification takes the following form:

$$RPC_i = a + b_1 Border_i + X_i b_2 + e_i$$

The left-hand-side variable *Relative Perceived Competition* (RPC) is constructed as the difference of the perceived intensity of competition between two types of competitors: those inside and those outside the state. This effectively leads to two dependent variables:

a) RPC^{state}, which is calculated as the perceived intensity of competition with municipalities in other German states (Q2) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1),

b) $RPC^{country}$, which measures the perceived intensity of competition with municipalities in other countries (Q3) minus the perceived intensity of competition with municipalities in Baden-Württemberg (Q1).

A value of zero in either case denotes that a given respondent regards municipalities in other German states (or other countries) as equally important competitors compared to municipalities in their own state. A negative (positive) value denotes that municipalities in the same (other) state or country are more important competitors.

The central explanatory variables relate to the geographical placement of municipalities. We introduce a number of different operationalisations to address our various hypotheses

(see section 4.2.3). First, to study the impact of direct neighbourhood to a state border (see H2), we introduce a dummy variable equal to 1 for municipalities directly located on one of Baden-Württemberg's borders to its three surrounding German states (i.e., Bavaria, Hessen and Rhineland-Palatinate), and 0 otherwise. Such an indicator variable is appropriate since there are no major institutional differences between these three neighbouring states. Altogether, 54 municipalities in our sample (7.6%) are located adjacent to a state border. Second, to study the impact of direct neighbourhood to a country border (see H2), we introduce an indicator variable equal to 1 for municipalities bordering France (18 municipalities) or Switzerland (likewise 18 municipalities), and 0 otherwise. Given the institutional and cultural differences between these neighbours, we also differentiate between the effect of the Swiss and the French border (see H3). Third, to estimate the spatial reach of borders' effects (i.e., see H1), we replace the dummies for adjacent municipalities with distances to the closest municipality beyond a state or country border (and its squared value to capture non-linearities).[9]

Finally, in the vector X_i, we introduce a number of socio-economic control variables, which are summarised in Table 4.6 in the appendix. They first of all comprise the municipal unemployment rate and the population of working age. Then, we include two political variables reflecting the share of seats in the local council held by left-wing parties and independents (so-called "Freie Wählervereinigungen", see Geys et al., 2010), respectively. They capture the influence of the ideological position of a given jurisdiction, which is included because political ideology has been shown to significantly affect politicians' perception of business tax competition (Heinemann and Janeba, 2011). Thirdly, we introduce dummies identifying those municipalities which are the main beneficiaries of transfers in the local system of fiscal equalisation. Since these municipalities are arguably partially protected from competition (i.e., the system compensates for losses in municipalities' tax bases; e.g., Buettner, 2006), their decision-makers might have different perceptions of competitive pressures.[10] Fourth, we insert a dummy indicating that survey responses were given directly by the mayor (rather than delegated by him to a member of his bureaucracy). Finally, municipal size and dummies for highly agglomerated cities intend to capture that urban centres are generally more exposed to external competition, as will be examined in greater detail in section 4.4.

Before we turn to our estimation results, it is important to mention three aspects regarding our estimation methodology. First, we centre all control variables by subtracting their means. Hence, all right-hand side variables – except the neighbourhood dummies and the distance measures – are rescaled to have an average of 0. This transformation facilitates the interpretation of our results, especially for the coefficient on the constant,

[9]Distances are thereby defined as the minimum land distance between the centres of the relevant jurisdictions.

[10]We exploit a discontinuity in the local system of fiscal equalisation, which categorises municipalities according to their "fiscal capacity" and gives those with a low fiscal capacity the highest contribution rate, i.e., compensates them most extensively for reductions in their tax base (see Buettner, 2006).

which cannot be clearly interpreted without this transformation. Second, given the non-continuous nature of the dependent variables, we initially estimated all models using an ordered probit approach; however, as there is a relatively large number of values those variables can take (i.e., 17 options ranging from -8 to 8), we also ran all estimations using OLS. Both sets of results provide qualitatively very similar results. As the OLS results are easier to interpret, we present those in the following. Finally, as the effect of proximity to borders is likely to be highly non-linear, we complement the OLS regressions, which include distance and distance squared as discussed above, with natural spline regressions. This particularly accounts for nonlinear effects and allows a much more detailed analysis of the proximity effect (see Beatty et al., 2009, and Brülhart et al., 2010, for recent applications of this estimator to the analysis of border effects).

4.3.3 Empirical results: effect of state borders

Table 4.1 reports our results regarding the impact of subnational borders on mayors' perceptions of inter-jurisdictional competitive pressures. In column (1), we focus on the impact of direct neighbourhood to a state border. The coefficient estimate for the constant equals -3.155 and is statistically significant beyond the 1% level. This indicates that mayors on average regard municipalities in their own state as much closer competitors than those beyond the state borders (remember that a value of 0 would set both competitors at the same level), which suggests a relatively important 'closing-off' potential of state borders. Yet, in line with our hypothesis H2, this effect is strongly and statistically significantly counteracted by direct neighbourhood to state borders (see the top row of Table 4.1). This result indicates that a decision-maker from a border-municipality perceives, *ceteris paribus*, much higher competitive pressure from other German states than decision-makers from municipalities in the interior of the state. Nevertheless, even a border-municipality perceives significantly higher competition intensity from municipalities within their own state (-3.155+1.953=-1.202; p=0.002). However, this disaggregation of the constant demonstrates that the apparent strength of the 'closing-off' effect of state borders is predominantly driven by the distance of most municipalities to state borders (i.e., the adverse *proximity effect*, see below), and not by the *border effect* itself.

Replacing the dummies for adjacent municipalities with the distance to the closest municipality beyond a state border (and its squared value) in column (2), two things are worth emphasising. First, the value of the constant term, which now represents the perceptions of mayors on the state border (or, technically, for municipalities where the distance to this border is 0km), is still significantly negative. This finding re-confirms that, although mayors of municipalities on the border still regard municipalities in their own state as closer competitors than those beyond the state borders, the strength of their perception is much weaker than the estimated average value (which is -3.155, see column (1)). Second, we find a significant non-linear effect of proximity to borders.

Table 4.1: Effect of subnational borders, OLS regressions

	Relative Perceived Competition with municipalities in other states (RPC^{state})	
	(1)	(2)
Neighbour state border	1.953***	
	(0.335)	
State Border Distance		-0.0490***
		(0.00899)
State Border Distance^2		0.000302***
		(6.88e-05)
Unemployment rate$_{t-1}$	-2.706	0.822
	(17.98)	(17.97)
Population Working-age$_{t-1}$	-5.423	-7.706*
	(4.397)	(4.407)
Left-wing$_t$	0.870	0.286
	(0.964)	(0.964)
Free Voters$_t$	-0.147	-0.0518
	(0.470)	(0.474)
Fiscal capacity$_t$: low	-0.766**	-0.877***
	(0.329)	(0.330)
Fiscal capacity$_t$: medium	-0.527*	-0.465
	(0.317)	(0.317)
Mayor	0.120	0.141
	(0.187)	(0.187)
Log(Population)$_{t-1}$	-0.172	-0.073
	(0.160)	(0.165)
Regional centre	1.567**	1.392*
	(0.748)	(0.758)
Secondary centre	0.710*	0.651*
	(0.365)	(0.368)
Constant	-3.155***	-1.684***
	(0.212)	(0.310)
Observations	712	712
R-squared	0.067	0.071

Standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

In order to evaluate the implied persistence of the border's effects in more detail, it is instructive to switch to the results from the natural spline regressions, which are visualised in Figure 4.2. These results first of all confirm that the null hypothesis of "no border effect", i.e., municipalities regard internal and external competitors as equally important, can be rejected even for municipalities with a very low distance to other states (i.e., the 95%-confidence interval around the point estimate never encompass 0). Second, the lower bound of the confidence interval around the estimated effect intersects with the mean value of the dependent variable, which is represented by the horizontal line in Figure 4.2, at a distance of 20.3 kilometres. This result indicates a significant and strong (but declining) proximity effect in the perceptions of the mayors of municipalities up to 20.3 kilometres from the state border (in line with H1). Beyond this point, the estimated value is no longer statistically significantly different from the average of all jurisdictions. Consequently, our results indicate that politicians' perceptions become

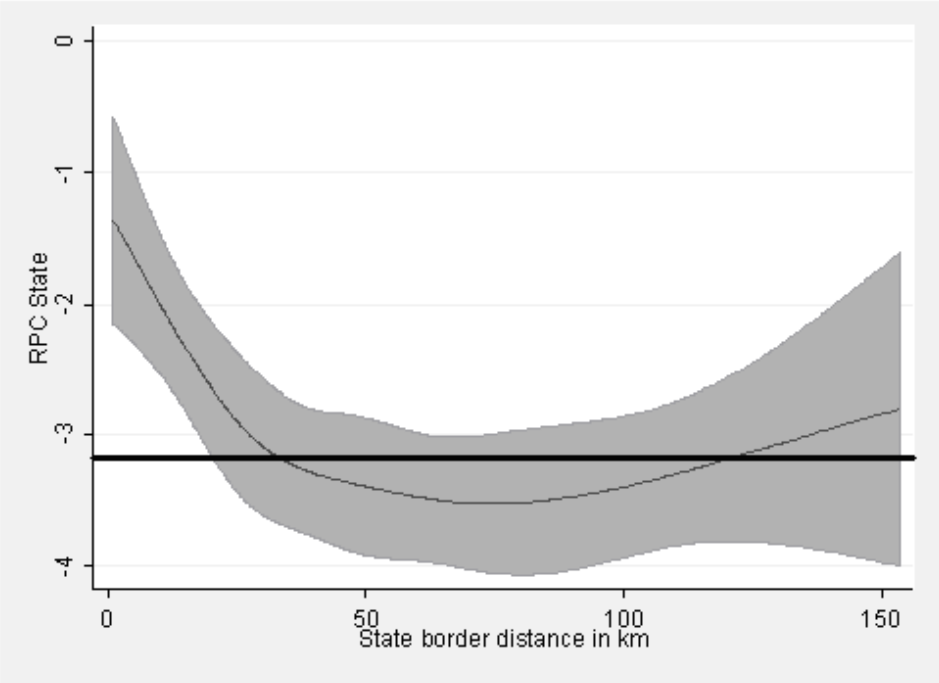

Figure 4.2: Subnational borders, natural spline regressions. Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area. Straight line represents mean value of RPC^{state} = -3.17.

'immune' to extra-regional competitive forces at distances beyond 20km from the border. Altogether, 233 out of the 1108 municipalities of the state are located within this critical distance (21.0%).

4.3.4 Empirical results: effect of international borders

Turning to the analysis of international borders, our results are summarised in Table 4.2. In column (1), we do not differentiate between the French and Swiss border and focus on direct adjacency to one of these countries. The estimated coefficient of the constant is again negative and even larger than in the previous section. Although we once again find that this effect is counteracted by direct neighbourhood to the border (see the top row of Table 4.2), this reductive effect is both substantively and statistically ($p<0.10$) weaker than in the sub-national case. Both these results imply that international borders are indeed perceived by local mayors as 'stronger' borders than regional ones (supportive of H2). Interestingly, this finding helps illuminate recent failures to find cross-border interactions by means of traditional spatial econometrics techniques in the tax setting of French and German municipalities (Cassette et al., 2010). Indeed, our findings suggest that politicians generally perceive country borders to be relatively strong, and therefore focus predominantly on the decisions of neighbours on their own side of the border. The

only exceptions are those in charge of a municipality in very close proximity to this border, as we will see below.

In order to evaluate H3, we differentiate in column (2) between the effect of the Swiss and the French border. The results indicate that the effect of the Swiss border is about twice the size of that of the French one. It also is significantly different from zero at the 10% significance level, whereas the effect of adjacency to France remains statistically insignificant. Given the different nature of both borders, one tentative explanation is that politicians perceive the cultural dimension of these respective borders (i.e., language) to be more important than the institutional dimension (EU versus non-EU).[11] Hence, our results appear supportive of the idea that the effect of international borders varies with the cultural and institutional dimensions of such borders (as proposed in H3). Still, an alternative explanation may lie in Switzerland's aggressive corporate tax policy. The average effective tax rates of the adjacent cantons' capitals ranged from 13.9 to 20.9% in 2009, compared to 34.2% in the French city of Strasbourg and between 21.9 and 26.8% in the state of Baden-Württemberg (see BAK Basel 2009).

We obtain the results in columns (3) and (4) by replacing the border dummies with the minimum distance to the closest foreign municipality. As before, the value of the constant term rises above the average value, indicating that mayors' perception of municipalities in their own state as closer competitors than those beyond the country's borders is weaker in municipalities *on* the border than in municipalities away from the border.[12] The difference, however, is much weaker than in the regional-border case, reinforcing our earlier finding that local mayors perceive international borders as 'stronger' borders than regional ones. As before, we also find a significant non-linear effect of proximity to the border. This finding is replicated when separating France, Switzerland and Austria, although the results for Austria remain statistically insignificant.[13] The associated natural spline regressions, depicted in Figure 4.3, differ from those for the state borders in two central respects. First, we observe that the border effect is much stronger in the case of country borders (as could also be gathered from a comparison of Tables 4.1 and 4.2). Second, the proximity effect is much weaker than in the regional-border case and ceases after a much shorter distance. Already at a distance of 12.5 km, the lower bound of the confidence interval intersects the abscissa indicating the mean value. In other words, for municipalities more than 12.5 kilometres away from the neighbouring country, 'prox-

[11] A potential problem here is that many direct neighbours to France have a sizeable distance to the next French city because the river Rhine runs between them. Restricting the sample to those municipalities with a direct connection to France via a bridge or ferry (13 observations), however, does not affect our results in terms of both coefficient estimate and statistical significance (available upon request).

[12] Note that the intercept in column (4) obviously becomes meaningless since no municipality can at once be at 0km distance from France, Switzerland *and* Austria. Hence, this interpretation is only valid for column (3).

[13] Although Baden-Württemberg does not share a border with Austria, we pick it up here as it is the nearest country for a small number of municipalities.

Table 4.2: International borders, OLS regressions

	Relative Perceived Competition with municipalities in other countries ($RPC^{country}$)			
	(1)	(2)	(3)	(4)
Neighbour International Border	0.942*			
	(0.484)			
Neighbour Int. Border: FRA		0.652		
		(0.677)		
Neighbour Int. Border: SUI		1.226*		
		(0.672)		
Int. Border Distance			-0.0215**	
			(0.0106)	
Int. Border Distance^2			0.000132*	
			(7.48e-05)	
Int. Border Distance: FRA				-0.0391*
				(0.0227)
Int. Border Distance^2: FRA				0.000159**
				(7.24e-05)
Int. Border Distance: SUI				-0.0175*
				(0.0106)
Int. Border Distance^2: SUI				0.000149
				(0.000115)
Int. Border Distance: AUT				-7.55e-05
				(0.0140)
Int. Border Distance^2: AUT				-7.23e-05
				(7.71e-05)
Unemployment rate$_{t-1}$	0.882	1.097	7.020	13.52
	(21.40)	(21.41)	(21.76)	(22.67)
Population Working-age$_{t-1}$	-4.494	-4.188	-3.894	-3.972
	(5.209)	(5.235)	(5.211)	(5.322)
Left-wing$_t$	-0.108	-0.129	0.0623	0.272
	(1.138)	(1.139)	(1.143)	(1.164)
Free Voters$_t$	-0.971*	-0.981*	-0.775	-0.714
	(0.559)	(0.559)	(0.575)	(0.587)
Fiscal capacity$_t$: low	-1.049***	-1.048***	-1.069***	-1.084***
	(0.390)	(0.391)	(0.391)	(0.396)
Fiscal capacity$_t$: medium	-0.609	-0.612	-0.606	-0.605
	(0.376)	(0.377)	(0.376)	(0.376)
Mayor	0.193	0.187	0.193	0.189
	(0.222)	(0.222)	(0.222)	(0.222)
Log(Population)$_{t-1}$	-0.207	-0.211	-0.164	-0.156
	(0.190)	(0.190)	(0.192)	(0.198)
Regional centre	1.770**	1.753**	1.553*	1.354
	(0.887)	(0.887)	(0.894)	(0.911)
Secondary centre	0.814*	0.820*	0.757*	0.681
	(0.431)	(0.431)	(0.433)	(0.443)
Constant	-3.757***	-3.748***	-3.041***	-0.464
	(0.251)	(0.252)	(0.403)	(2.606)
Observations	712	712	712	712
R-squared	0.034	0.035	0.035	0.040

Standard errors in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

imity' to the border no longer affects decision-makers' perceptions of the intensity of

international competition.[14] Even so, 105 municipalities (9.5% of all municipalities in the state) are located within this critical distance. The geographical location of municipalities within the critical distance to a state or country border is visualised in Figure 4.4.

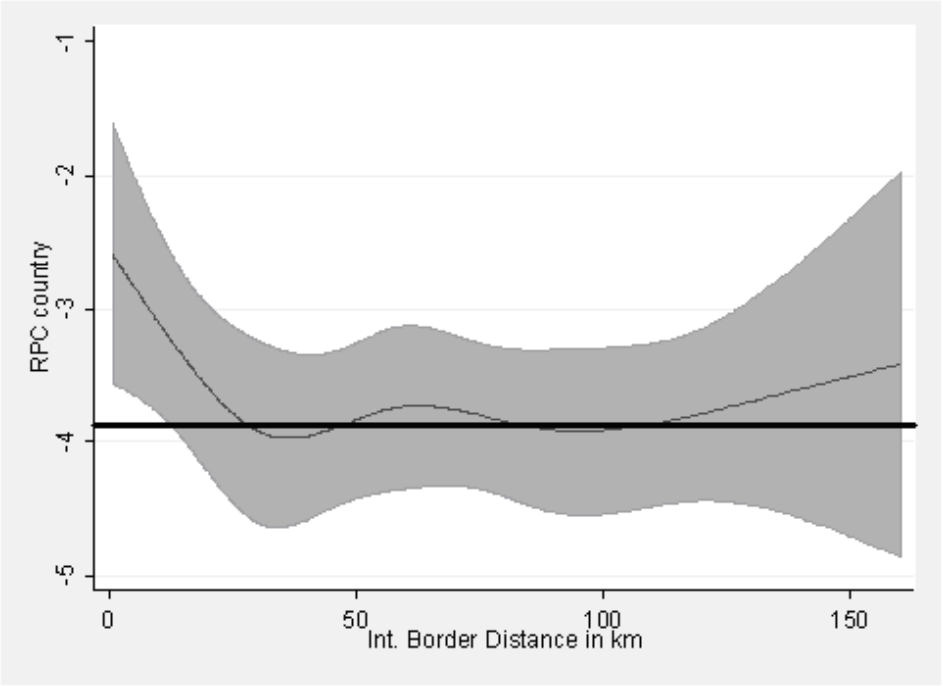

Figure 4.3: International borders, natural spline regression. Smooth line is obtained by cubic spline with five knots. 95% confidence interval indicated by shaded area. Straight line represents mean value of $RPC^{country}$ = -3.88.

Before we conclude, we should say a few words about the results of our control variables, which perform fairly consistently across Tables 4.1 and 4.2. Most significantly, we find that the local system of fiscal equalisation indeed appears to affect the competition perceptions of decision-makers in municipalities with low (and, to a lesser extent, medium) fiscal capacity. In line with the idea that this system compensates such municipalities for losses in their tax bases relative to other municipalities in the state, their mayors perceive that competition is rather a local issue. We also confirm that decision-makers of highly agglomerated cities, as they are generally more exposed to external competition, perceive competitive pressures to come relatively more from extra-regional municipalities (see section 4.3 for more the detailed analysis of this issue). Neither the local unemployment rate nor the population of working age plays a significant role in politicians' perceptions. Furthermore, political variables play no consistent role in our estimations either.

[14]This might in part explain the non-significant effects for Austria discussed above. Indeed, since there are only few municipalities with a rather low distance to Austria in the sample, the fact that the effect of proximity to other countries ceases quickly implies we cannot expect a strong effect for Austria.

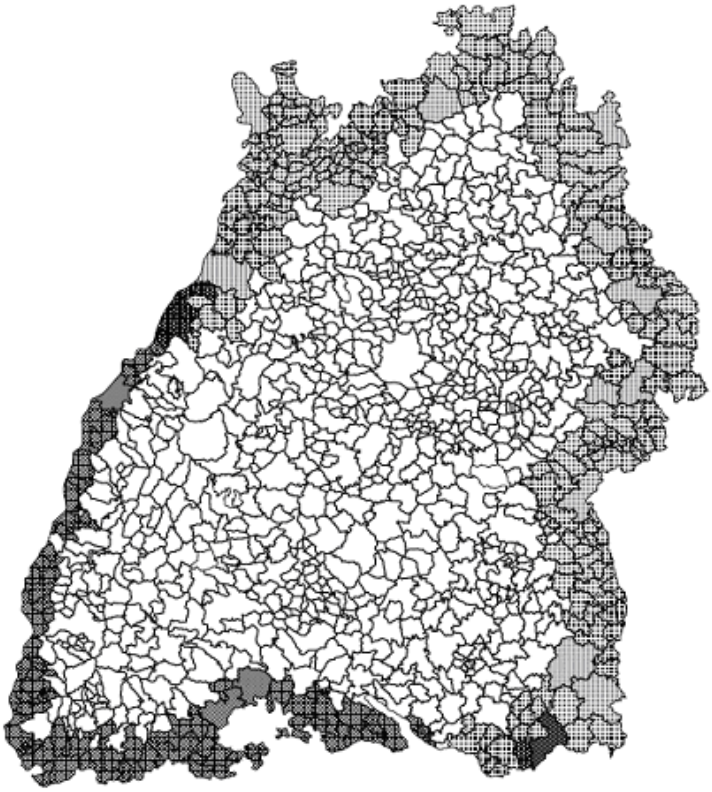

Figure 4.4: Location of municipalities within critical distances. *Light-coloured*: distance to closest municipality in other German state $<$ 20.3km; *Intermediate-coloured*: distance to closest municipality in other country $<$ 12.5km; *Dark-coloured*: distance to closest municipality in other German state $<$ 20.3km and distance to closest municipality in other country $<$ 12.5km

4.3.5 Implications

A common characteristic of existing work on local-level spatial policy interactions is that the specification of the neighbourhood matrix, which defines who is expected to compete with whom, occurs solely with respect to other jurisdictions *within* the region under study. Consequently, it ignores the potential influence of jurisdictions in neighbouring regions. Similarly, studies of international tax competition generally define the neighbourhood matrix with respect to a limited number of countries (often due to data limitation). To the extent that spatial dependence transcends the boundaries thus imposed by the researcher and/or the dataset, such restriction may induce biased inferences on the spatial parameter (Griffith, 1983, 1985; Griffith and Amrhein, 1985; Anselin, 1988).

Analysing German local politicians' perceptions about their municipality's main competitors in the struggle for business investments (i.e., other jurisdictions *a)* in their own region, *b)* in other regions in the same country, or *c)* in other countries), this article evaluated how worried we should be about the potential threat to empirical findings by

this boundary value problem or edge effect. Our results show that local decision-makers on average regard municipalities in their own state as much closer competitors than those beyond the state borders. Crucially, however, we also find that location close to a border significantly undermines the perception that the fiercest competitive pressure derives from jurisdictions *within* their own state. Moreover, this effect is stronger for, and is felt at further distances from, subnational than inter-national borders. Overall, nearest municipalities appear keenly aware of each other as competitors for mobile capital. This effect is independent of the state or country where they are located.

These results have two important practical implications. First, they provide a parsimonious explanation for the presence of cross-regional local-level strategic interactions (e.g., Brügger and Parchet, 2010) and the difficulties to identify equivalent cross-country interactions (Cassette et al., 2010). Indeed, our findings suggest that it is politicians' perceptions about the relative constraints imposed by these different types of borders that defines the (absence of) reaction to extra-regional jurisdictions' actions. Moreover, our empirical approach allows us to quantify the spatial extent of such border-related effects. In particular, whereas the proximity to international borders ceases to affect local decision-makers' opinions at a distance of about 12.5km, the proximity to subnational borders plays a role up to about 20km. Interestingly, the latter finding is in close accordance with recent findings by Brügger and Parchet (2010) using a sample of Swiss municipalities separated by a cultural border. They show that jurisdictions' tax choices are constrained by tax competition at a distance of up to 20 kilometres. Our results suggest that it may well result from the fact that decision-makers do not consider municipalities beyond this critical distance as their rivals in the competition for mobile capital. This finding also corroborates van Dijk and Pellenbarg's (2000) finding that firm migration is mostly short distance; short distance moves allow firms to keep most of their workforce since it is within a reasonable commuting distance. Moreover, within the identified critical distance firms can still maintain relations with local suppliers or selling markets as well as local networks.

Second, our results imply that the likelihood of obtaining biased estimates – if one refrains from taking these inter-border links into account and specifies an inappropriately constrained reference group of competing jurisdictions (Griffith, 1983, 1985; Griffith and Amrhein, 1985; Anselin, 1988) – is substantial; indeed, no less than 21% of all municipalities in our sample are located within the critical distance to a state border, and 9.5% within the critical distance to another country. Moreover, based on our finding that different types of borders can have different effects (e.g., regional versus national borders, France versus Switzerland), the specific context of the jurisdiction should ideally be taken into account as it reflects the extent to which two jurisdictions separated by a border are close or distant substitutes.

Our results in general thus emphasise the need to take the 'edge effect' seriously in analyses of spatial fiscal interactions. At the very least, robustness analyses should be

presented indicating whether or not it is likely to affect the inferences from the analysis. In this respect, it is interesting to observe that the various potential solutions to the boundary problem discussed in the theoretical literature include constructing a buffer zone along the regional boundary (i.e. dropping the border jurisdictions), using dummy variables for differentiating jurisdictions at the boundary, or employing statistical techniques that cast the boundary problem as one of missing data along the periphery of the study area (see Griffith, 1983, who discusses nine different solution concepts). While the relative (de)merits of these various correction concepts lie credibly beyond the scope of this chapter (for such discussion, see Griffith, 1985; Anselin, 1988) and the choice between them is finally up to the researcher, almost all of the discussed methods require the designation of 'border jurisdictions' or 'buffer zones'. As such designation should, ideally, not proceed on an ad hoc basis, but rather be guided by the data at hand, our analysis hints to the fact that corrections may be required on a different 'scale' depending on the type of border one faces in the sample analysed: i.e., whereas for international borders it appears appropriate to restrict the correction to jurisdictions immediately adjacent to the border, national borders appear to require a (considerably) wider correction.

4.4 The spatial structure of local tax competition

4.4.1 Overview

The past two decades have seen a great interest in the study of (local) capital tax competition. The empirical literature has focused on the analysis of spatial interactions. When these interactions originate from inter-municipal tax competition for mobile capital the literature typically assumes that the competitors of a local community are mainly those jurisdictions in its close neighbourhood. Thus intensity of competition is approximated by neighbourhood matrices (see Brueckner, 2003 and Revelli, 2005, for surveys). If true, this assumption implies for theoretical modelling that the tax reaction function of a community depends directly only on the tax rates of its neighbouring jurisdictions. This is, however, incompatible with standard models of capital tax competition where complete capital mobility is assumed and *all* jurisdictions compete with each other in a simultaneous game (see, Wilson, 1999, for a survey; exceptions discussed below). Note that the two sets of assumptions generate different implications when more and more jurisdictions become part of an integrated capital market. According to the theoretical literature this should lead to very small or even zero capital tax rates (assuming other tax instruments with finite supply elasticities are available), while in the context of the empirical model at most a rather small indirect effect should be found.

In this second part of the chapter we make two novel contributions, one empirical and one theoretical, that relate to the above discrepancy between theoretical and empirical

models. First, based on survey evidence from more than 700 mayors in the German state of Baden-Württemberg, we study the "true" spatial structure of local tax competition by asking local politicians who they actually consider to be their main competitors for mobile capital. This allows us to identify empirically the reference group for local business tax policy decisions. The size of the jurisdiction and in particular its economic function (based on categories from spatial planning) turn out to be the important determinants of the decision-maker's perception of the intensity of competition. Compared to non-urban municipalities, respondents from urban centres (up to population of 600,000) perceive a much higher intensity of competition for firms in general, and especially with respect to competing jurisdictions which are distant or even located in other countries. By contrast, mayors from smaller municipalities (usually with populations of between 1,000 and 10,000 inhabitants) regularly state that they don't compete with distant jurisdictions for mobile firms. Moreover, we find evidence that jurisdictions in the direct neighbourhood are generally regarded as especially important competitors. On the one hand these findings confirm the assumption of the empirical literature about the importance of neighbourhood competition, but on the other hand it also shows that an important effect is left out.

Second, based on these empirical findings we build a multi-stage tax competition model with a rich competition structure. Our model assumes n metropolitan regions, each of which consists of one city centre and m surrounding jurisdictions called *hinterlands*. There are two levels of competition for mobile capital. First, cities simultaneously compete for mobile capital by setting their tax policies, followed by capital movements to a particular city. This represents the level of competition between non-neighbouring communities identified in our survey. Second and after the cities' tax choices, hinterlands compete simultaneously for capital within its metropolitan area taking the city centre's tax rate and the total metropolitan capital supply as given (which is their own supply plus the capital attracted by the city beforehand). This approximates the neighbourhood competition effect described above.[15] One way to think about our sequential structure is to view large cities as the primary competitors for large-scale investments, such as headquarters, which are often accompanied by smaller investments (for example from suppliers or subcontractors). After the large-scale investment has been located in a city, the associated suppliers and subcontractors have strong incentives to settle in a reasonable distance to their client, i.e., in the same metropolitan region.[16]

[15]Therefore two commitment assumptions are built into our model: i) A city's capital tax is fixed once its hinterlands compete (but the city rationally anticipates competition from hinterlands), and ii) after the cities' tax competition game capital is mobile only within the city's metropolitan region but not beyond.

[16]This finding gets further empirical support from van Dijk and Pellenbarg (2000) who show that the vast majority of firm relocations in the Netherlands occurs in form of short distance moves. Brueckner and Saavedra (2001) argue why capital – although theoretically completely mobile at least within a country – is supplied inelastically within a region and thus remains in the respective metropolitan region. For instance, investments in specialised industries are strongly tied to a region. Moreover, closeness to suppliers or selling markets as well as existing local networks are further reasons why firms

We then compare the outcome of the fiscal competition game from this model, called the *sequential model*, to a traditional tax competition model in which all governments decide simultaneously in an otherwise identical setup, called the *simultaneous model*. We are particulary interested in the effects of a rise in the number of metropolitan regions n, which approximates the increase in competition through globalisation (or in Germany's context the effects from Eastern enlargement of the EU and German unification; more on this below). Our first result is a limit result and demonstrates that in both types of models for a very large number of metropolitan regions ($n \to \infty$) capital tax rates in cities converge to zero, while for hinterlands the capital tax rate goes to zero in the simultaneous model, but stays bounded above zero in the sequential model. Secondly, in the sequential model an increase in n affects cities more than hinterlands in two ways: i) cities reduce capital tax rates more than hinterlands lower theirs, and ii) cities shift more from mobile capital taxation to immobile labour taxation than hinterlands. Result i) does not hold in the simultaneous model, where in cities the effect can be larger or smaller than in hinterlands and is typically close to zero when evaluated numerically.

Our sequential model thus predicts that hinterlands are less affected than cities by increasing competition from entry of metropolitan regions. As empirically hinterlands are typically much smaller than urban centres, our model is in contrast to research that has shown that smaller countries and countries on the periphery have lower corporate tax rates than large countries or regions in the core (Baldwin and Krugman, 2004; Haufler et al., 2009; Haufler and Wooton, 2010). We then show, however, that several of our predictions coming from the sequential model are in line with stylised facts about local business tax rates in the German state of Baden-Württemberg, the same state on which our survey draws. Local business tax rates in small jurisdictions are clearly not small and sometimes even higher than in city centres. In addition, in recent years tax rates in small jurisdictions in Baden-Württemberg have increased, while being stagnant in city centres. Cities in turn have shifted tax burden much more to a less distortionary property tax than small communities did. Our preferred explanation for the difference in predictions and stylised facts is that competition between geographically close jurisdictions at the local level is qualitatively different from competition among countries or states. At the local level, but not at the country or state level, it is relatively easy for a firm to benefit from the agglomeration benefits and infrastructure of a city centre, while enjoying the same legal and cultural context, and yet for tax reasons to be located just outside that jurisdiction.

Our theoretical approach is related to several strands of literature. Few of the empirical contributions on local tax competition (e.g., Buettner, 2001; Brueckner and Saavedra, 2001; Hauptmeier et al., 2009) enrich the empirical analyses with explicit theoretical considerations. These are based on standard tax competition models in the tradition of the workhorse model by Zodrow and Mieszkowski (1986), and are modified by restricting

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may not respond elastically after they are locked in in a location.

the number of competing jurisdictions. Capital is then completely mobile within one region, so that jurisdictions only compete with jurisdictions from the same region for capital, but capital is not at all mobile with respect to jurisdictions in other regions. This assumption, however, is refuted by our survey results at least for larger cities.

A comparable finding to ours – not all jurisdictions compete for capital to the same degree – is found in few theoretical papers which endogenise the number of jurisdictions that compete for mobile capital. The approaches by Jayet and Paty (2006) and Matsumoto (2010) assume that local jurisdictions have to pay a development cost before entering the competition for a mobile firm, and therefore in equilibrium not all jurisdictions enter competition for outside investment. The main focus of these papers is thus on the overall number and not the type of jurisdictions that compete for an investment.

The theoretical tax competition literature has identified size differences (expressed as differences in labour endowments) as a factor for explaining why different jurisdictions are affected asymmetrically by tax competition (see Bucovetsky, 1991, and Wilson, 1991). In these two-jurisdiction models, the small jurisdiction suffers a bigger outflow of capital after an increase of its capital tax rate than the bigger competitor, so that the smaller jurisdiction sets the lower tax rates than the bigger one.[17] However, these works focus only on the pure size effects and do not consider that larger urban centres might compete with a different set of competitors for mobile capital, so that they are faced with a different competitive pressure than smaller rural areas.

Concerning the model structure, Gordon (1992) and Wang (1999) assume similar to us a sequential timing in which the bigger region moves first. They justify the structure with the reasoning that in the real world the large region is likely to move first and the small region moves second. This assumption gets support from empirical evidence on international corporate tax reforms (see e.g., Altshuler and Goodspeed (2002) and Redoano (2007)). Sequential game structures are also common in new economic geography models to tax competition, such as Baldwin and Krugman (2004) and Borck and Pflüger (2006). A new approach has been presented by Kempf and Rota-Graziosi (2010) who endogenise the moves in a simple two-region tax competition model and find that in their model the smaller region might have incentives to move first.

4.4.2 Perceptions of local decision-makers

The existing empirical literature on spatial interactions suggests that capital mobility is highest between neighbouring jurisdictions. Spatial tax interaction is, for instance, demonstrated for the local business tax for cities and municipalities in the German state of Baden-Württemberg by Buettner (2001). Similar evidence for inter-municipal interactions has been found for local business property taxes in the metropolitan area of

[17] Most recently, Bucovetsky (2009) shows that this result can be generalised for federations consisting of more than two jurisdictions.

Boston (Brueckner and Saavedra, 2001) and the Canadian province of British Columbia (Brett and Pinkse, 2000). However, evidence for spatial fiscal interaction is by itself not a sufficient proof for the existence of capital tax competition that is induced by high capital mobility between neighbouring jurisdictions. The observed patterns may also have other causes such as yardstick competition (see Revelli (2005) for different explanations of spatial interactions). In fact, the direct evidence for tax base mobility is mixed. Brett and Pinkse (2000) as well as Brett and Tardif (2008) do not find any effect of neighbours' levels of business property tax rates on the tax base for a sample of municipalities in the Canadian province of British Columbia. Some positive evidence comes from Buettner (2003) who studies the tax base effect for the local business tax in the state of Baden-Württemberg. He finds only evidence for relatively small municipalities whose tax base is positively affected by the tax rates of its neighbours.

A survey therefore helps in finding out whether capital mobility between jurisdictions is high. Decision-makers can only be expected to be responsive to taxes in other jurisdictions if they believe that capital is mobile to these jurisdictions. We assume that these beliefs can be regarded as proxies for the true mobility of firms as decision-makers are likely to be well-informed about one of their most important revenue sources.[18] Our survey approach is similar to that of Heinemann and Janeba (2011) by focusing on political decision makers. They study individual perceptions of members of German parliament (Bundestag) with respect to the intensity of international tax competition, and find, inter alia, a strong ideological bias.[19] In this work, we will shift the focus to the study of the municipality characteristics to explain differences in the competitive pressures which are perceived by politicians. We control for a possible ideological bias in the regressions.

We examine the determinants of the competitive pressures which are actually perceived by real world decision-makers at the local level. We again focus on German cities and municipalities in the state of Baden-Württemberg and use the data of the survey which was described in section 4.3.1 in greater detail. Our survey question of interest is again the following: "With which cities and municipalities do you perceive yourself to be in competition for businesses?"[20] However, in contrast to section 4.3, we now do not refer to the *Relative Perceived Competition*, but to the straight answers given to the question, which asked the respondents to assess the strength of competitive pressures on a discrete scale from -4 (not at all regarded as competitors) to +4 (very strongly regarded

[18]We realise that beliefs about mobility do not necessarily have to be identical with real mobility, and therefore decision-makers might build their decisions on wrong perceptions of the reality. Evidence for this view comes from Brülhart and Parchet (2010) who demonstrate what they call "alleged" tax competition for inheritance taxes in Swiss municipalities.

[19]A survey-based approach with respect to lower-tier decision-makers has until now only be applied by Ashworth and Heyndels for Belgium municipalities. In contrast to our work, however, they focus on the stated preferences for tax reforms (see Ashworth and Heyndels 1997, 2000), and not on the perceptions and spatial structure of competitive pressures.

[20]The exact wording of this question in German is: "Mit welchen anderen Städten und Gemeinden sehen Sie sich besonders im Wettbewerb um Unternehmensansiedlungen?".

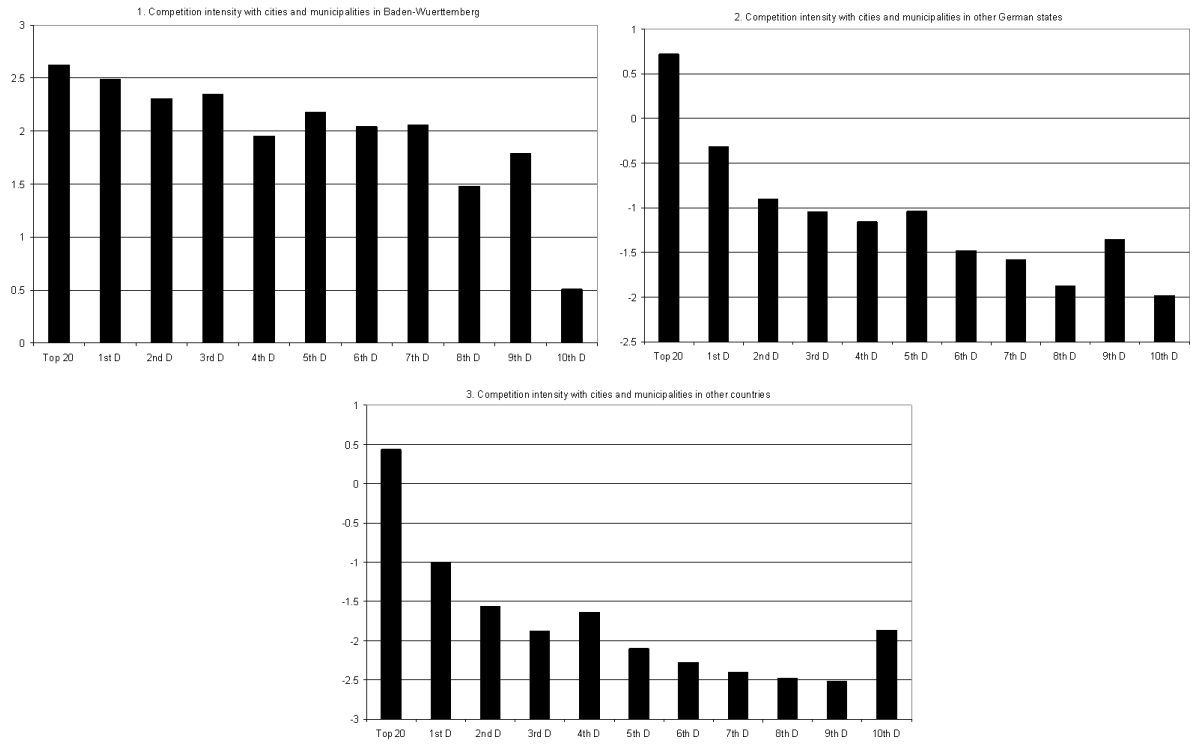

Figure 4.5: Survey: distribution of responses

as competitors) regarding three types of jurisdictions: (Q1) cities and municipalities in Baden-Württemberg, (Q2) cities and municipalities in other German states, and (Q3) cities and municipalities in other countries. Unfortunately, the survey questions do not allow us to disentangle the perceived intensity of competition with urban centres and with rural areas within the state of Baden-Württemberg. The responses given to the first question confound the two channels discussed above, i.e., competition with neighbouring municipalities as well as with more distant jurisdictions within the same state.[21]

First, we are interested in the effect of the jurisdiction size on the perceived competitive pressure. The illustrations in Figure 4.5 show the distributions of the responses to the three survey questions conditional on the size of the jurisdictions. Jurisdiction sizes are partitioned into deciles plus the twenty biggest jurisdictions of the state. All three diagrams indicate that larger cities perceive the highest degree of competitive pressures. However, this effect varies strongly depending on the reference group. Whereas the perception of the intensity of competition with local competitors (within the state of Baden-Württemberg) does not differ strongly for all size deciles, it depends strongly on size when competition with more distant competitors is considered, that is, jurisdictions located in other German states or different countries (Q2 and Q3).

[21]We would have liked to ask for the exact identity of a jurisdiction's competitors rather than using this indirect question. In order to obtain a high response rate, however, we enlisted the support of the cities' joint representation organisation who did not allow us to ask such a direct question.

We proceed by studying the statistical significance of our descriptive findings in a SUR (seemingly unrelated regressions) ordered probit model. The responses to the three survey questions presented above serve as dependent variables. We choose a system estimator because the individual error terms for all three questions are expected to be correlated with each other. Control variables are included for the same municipal characteristics as in section 4.3 which can be found in Table 4.6 in the appendix. We apply two different measures to highlight the differences between urban and rural areas. First, we insert the logarithm of a jurisdiction's number of inhabitants as explanatory variable. Second, we insert dummies for district types, which are provided by the spatial planning programme of the state of Baden-Württemberg (see LEP 2002, Wirtschaftsministerium Baden-Württemberg (2002)). This categorisation classifies jurisdictions into three categories according to a number of specific characteristics and the functions they provide, such as infrastructure or education institutions. We insert dummies for the two highest groups of urban jurisdictions, i.e. regional centres ("Oberzentrum": the highest level, 16 cities) and secondary centres ("Mittelzentrum": intermediate level, 95 cities); the baseline category is rural area.

For the identification of neighbourhood effects we use the proximity to subnational (and international) borders as reference points (for the detailed analysis of the scope and extension of such neighbourhood effects, see the analysis in section 4.3). We insert dummies for those municipalities which share a border with another German state (Bavaria, Hesse or Rhineland-Palatinate) or another country (France or Switzerland). We are especially interested in the former group since there are no formal barriers to capital mobility between German states. We are now in position to investigate whether border municipalities take neighbourhood (to competitors in other states) into account in their perceptions of competitive pressures.

The results are presented in Table 4.3. First, the size effect which is apparent from Figure 4.5 turns out to be statistically significant. Decision-makers in larger jurisdictions assess the competition with more distant jurisdictions as much more intense than decision-makers from smaller ones. This becomes even more evident in the second system of regressions in which the district type dummies are used. Decision-makers in regional and secondary centres perceive a much higher intensity of competition with respect to more distant competitors (in other states or countries) than decision-makers in rural areas. Second, we note that the perceived intensity of competition with municipalities from other German states is significantly higher for those municipalities located adjacent to a state border – and consequently for those jurisdictions that are direct neighbours of jurisdictions in other states – than for non-border municipalities. With respect to international competition a neighbourhood effect can also be observed for those jurisdictions adjacent to a country border, but this effect is much lower. This confirms that nearest municipalities perceive each other as very important competitors and is in line with the results from section 4.3, using a different research design.

Table 4.3: Results: perception of competition intensity – Seemingly unrelated ordered probit regressions

	Perception of competition intensity with jurisdictions: (a) in Baden-Württemberg, (b) in other states, (c) in other countries					
	System (1)			System (2)		
	(a)	(b)	(c)	(a)	(b)	(c)
Log(Population)$_{t-1}$	0.280***	0.264***	0.237***			
	(4.52)	(4.51)	(3.77)			
Regional centre				0.050	0.547***	0.569***
("Oberzentrum")				(0.26)	(2.71)	(2.98)
Secondary centre				0.253*	0.468***	0.414***
("Mittelzentrum")				(1.90)	(3.64)	(2.98)
State border	-0.021	1.016***	0.205	0.003	1.013***	0.208
	(-0.14)	(5.61)	(1.43)	(0.02)	(5.58)	(1.43)
Country border	-0.187	-0.050	0.400**	-0.189	-0.061	0.389**
	(-1.29)	(-0.31)	(2.17)	(-1.28)	(-0.37)	(2.09)
Mayor	0.097	0.133	0.124	0.026	0.093	0.093
	(1.14)	(1.61)	(1.37)	(0.32)	(1.16)	(1.06)
Left-wing$_t$	-0.594	0.002	-0.331	-0.152	0.355	-0.023
	(-1.34)	(0.00)	(-0.77)	(-0.35)	(0.88)	(-0.06)
Free voters$_t$	0.125	0.133	-0.266	-0.038	-0.011	-0.395*
	(0.56)	(0.61)	(-1.16)	(-0.17)	(-0.05)	(-1.75)
Fiscal capacity$_t$: low	0.058	-0.367***	-0.479***	-0.040	-0.447***	-0.549***
	(0.39)	(-2.63)	(-3.00)	(-0.28)	(-3.27)	(-3.48)
Fiscal capacity$_t$: medium	0.100	-0.176	-0.155	0.067	-0.207	-0.185
	(0.72)	(-1.33)	(-1.05)	(0.48)	(-1.60)	(-1.26)
Population working age$_{t-1}$	-1.826*	-0.486	-0.873*	-1.348	-0.123	-0.592
	(-1.79)	(-0.56)	(-1.84)	(-1.23)	(-0.13)	(-1.20)
Unemployment rate$_{t-1}$	2.589	5.129	5.224	13.946*	9.930	9.153
	(0.34)	(0.67)	(0.62)	(1.83)	(1.36)	(1.12)
Observations	716	715	716	716	715	716
Pseudo R-squared	0.013	0.034	0.028	0.006	0.032	0.027

z-values in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Out of the control variables, the only variables which show a strong impact are the dummies which reflect the impact of the fiscal equalisation system. This reflects that municipalities which benefit from fiscal equalisation transfers are less concerned about competition. The political variables, however, fail to show significant effects.

4.5 A model of local tax competition

In this section we develop a multi-stage model of fiscal competition between many metropolitan regions, each consisting of a city and several surrounding jurisdictions called hinterlands. Several important features of the model are consistent with the survey results reported above: First, the findings for border regions give support to the assumption that capital has to be regarded as particularly mobile between directly neighbouring jurisdictions. Second, larger cities, and in particular regional and secondary centres, also perceive a high intensity of competition with more distant jurisdictions. This corroborates with recent empirical evidence from the literature on competition for headquarters (see Strauss-Kahn and Vives (2009) on the US and Becker et al. (2009) on Germany). While it is shown for Germany that the vast majority of municipalities does not attract any headquarters, the literature also finds that headquarters are very mobile and that reallocating headquarters are, inter alia, attracted by low corporate taxes at the local level.[22]

We therefore assume two levels of competition: (1) Competition among urban city centres for investments, and (2) competition within a metropolitan region. We choose a sequential structure of the tax-setting game. Initially all urban areas or 'cities' – superscripted by c – decide simultaneously on their tax rates, and the capital is allocated among cities. Capital is thereafter bound to a city's metropolitan region. Then, the hinterlands – superscripted by h – follow in their tax setting, and the fixed supply of capital stock in a metropolitan region i is allocated between the city in i and the hinterlands in i.

One way to think about our sequential structure is as follows: large cities are the primary competitors for large-scale investments, such as headquarters, which are often accompanied by smaller investments, such as those from suppliers or subcontractors. After the large-scale investment has been located in a city and has thus committed to a certain metropolitan region, the associated suppliers and subcontractors have strong incentives to settle in a reasonable distance to their client, i.e., in the same metropolitan region.[23]

[22]Similar evidence exists for different kinds of foreign investments. Evidence that mainly highly agglomerated centres compete for foreign investments comes, e.g., from Guimarães et al. (2000) and is summarised by Dembour (2008).

[23]And even the headquarter itself is sometimes mobile within a metropolitan region, perhaps due to tax advantages. One example for such a behaviour is the German stock exchange (Deutsche Börse AG) which outsourced in 2008 half of its staff to the small town of Eschborn (20,000 inhabitants), which is only 7 kilometers away from its traditional headquarter in the financial centre of Frankfurt, due to low

4.5.1 Model structure

The model builds on Borck (2003), but we extend his work in a substantial way by considering the interaction between different types of jurisdictions in a multi-stage game. The economy consists of n symmetric metropolitan regions indexed by i, each comprising one city and m symmetric hinterland municipalities indexed by j. Hence there are $n(1+m)$ jurisdictions in the economy. Our main interest is in determining how increases in n, interpreted as globalisation (for example via German unification or integration of Eastern Europe into the European union), affect equilibrium tax policy.

Output of a numeraire consumption good is produced using interjurisdictionally mobile capital and immobile labour. In section 4.5.5 we apply our model in the context of Germany's localities and with some adjustments reinterpret the factor labour as land. For now, it is easier to follow the standard tax competition approach and label the factors as capital and labour. In each region i the population share of all hinterlands together is denoted as s, so that the population share of a city is $1-s$. Each hinterland thus has a population share of s/m. Capital (expressed in per capita terms) is equally distributed between all jurisdictions in the sense that cities and hinterlands in all regions have the same capital-labour endowment $\bar{k}^{c,i} = \bar{k}^{h,ij} = \bar{k}$. Capital use k in any particular jurisdiction may differ from this value due to fiscal policy differences. We assume that the production function is quadratic in order to keep the analysis tractable, which in intensive form reads (we leave out city and hinterland subscripts when no confusion is possible):

$$f(k) = ak - b\frac{k^2}{2}. \tag{4.1}$$

Each jurisdiction is populated by many consumers who differ in their capital and labour endowment (which is explained in more detail below). Each individual consumes the numeraire consumption good and a public good which is provided by its local government. Preferences are assumed to be quasi-linear:

$$U(c, g) = c + u(g) \tag{4.2}$$

where c is the private consumption good, g the publicly provided private good – called the public good in the following – and the partial derivatives obey $u' > 0$ and $u'' < 0$. We assume that one unit of the private good can be transformed into one unit of the public good. The public good is provided by the government and financed through two taxes: (i) a distortionary tax per unit of capital levied at source t, and (ii) a non-distortionary labour tax τ. Given that labour is immobile and fixed in supply the labour tax is effectively an efficient lump sum tax.

Finally, we introduce an unequal endowment of labour and capital among individuals.

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local business tax.

In every region the factor e determines the individual per capita endowment of labour, $(1+e)$, and capital, $(1-e)\bar{k}$. The factor e has a mean of zero, while a non-zero median. The heterogenous distribution of endowments ensures – equivalently to Borck (2003) – that both tax instruments are used in equilibrium.[24]

We are now in a position to pin down an individual's private consumption c, which is financed from the return to the fixed factor labour plus the profits from the capital endowment. The return to labour equals the residual output after payment for capital use minus the labour tax:

$$c = (1+e)[f(k) - (\rho + t)k - \tau] + (1-e)\rho\bar{k}, \tag{4.3}$$

where $\rho = f'(k) - t$ is the net return to capital.

The public good is financed from taxing capital and labour:

$$g = tk + \tau, \tag{4.4}$$

which represents the government budget constraint.

The game structure can be summarised as follows:

In the *first stage*, all n cities determine simultaneously their capital and labour tax rates $\{t^{c,i}, \tau^{c,i}\}_{i=1,\ldots,n}$. Each city takes the tax rates in all other cities as given. In addition, in each city the tax policy tuple must be the outcome of a majority rule voting process where voters take into account how the city's tax policy affects subsequent play.

In the *second stage*, capital is completely mobile between cities. A city i obtains a per capita capital stock of $\tilde{k}^i$, which depends on the tax policy vector from stage 1. Together with the capital endowments of the hinterlands this determines the overall capital stock available in a metropolitan region in stages 3 and 4.

In the *third stage*, all hinterlands of metropolitan region i choose simultaneously their tax policies, $\{t^{h,ij}, \tau^{h,ij}\}_{j=1,\ldots,m}$. Each hinterland takes the city's tax rates $\{t^{c,i}, \tau^{c,i}\}$ and the tax policy of all other hinterlands in the *same* metropolitan region as given. In each hinterland tax policy forms a majority rule voting equilibrium, taking subsequent choices into account.

In the *fourth and final stage*, capital within a metropolitan region i is allocated between the city and its hinterlands, so that $k^{c,i}$ and $k^{h,ij}$ result, based on $t^{c,i}$ and $t^{h,ij}$. At this stage, capital can only flow within a metropolitan area by assumption. Since labour taxes do not distort the capital allocation, their levels are determined by the difference between the public good demand and the funds provided from the taxation of capital via (4.4). Production and consumption take place, and the government provides the public

[24] This intentionally contrasts with much of the earlier literature (such as Bucovetsky and Wilson (1991)) which predicts the complete disuse of the distortionary tax in small jurisdictions as soon as a non-distortionary tax becomes available.

good in all jurisdictions.

In the following, the model is solved via backward induction, starting with the final stage of the game.

4.5.2 Solving the model

Stage 4

We now solve the final stage for a typical metropolitan region i and drop the index whenever possible to simplify notation. In the final stage, capital used in a city and its hinterland areas depend on the respective capital tax rates of those jurisdictions $(t^c, t^{h,j})$. The overall supply of capital which is available in any given metropolitan region consists of the initial endowment of the hinterlands, which is $\bar{k}$ per jurisdiction, and the capital stock that is available in the city, $\tilde{k}^i$ (which comes out of stage 2). The capital market equilibrium condition can be written

$$(1-s)k^c + \frac{s}{m}\sum_{j=1}^{m} k^{h,j} = (1-s)\tilde{k} + s\bar{k}. \tag{4.5}$$

Recall that s is the population share of all hinterlands in a metro region.

In equilibrium the net return to capital, $\rho = f'(k) - t$, has to be identical in city and every municipality in the hinterland:

$$\rho = a - bk^c - t^c = a - bk^{h,j} - t^{h,j} \tag{4.6}$$

Combining (4.5) and (4.6) gives the capital stock in a city

$$k^c(\{t^{h,j}\}_j, t^c, \tilde{k}) = s\bar{k} + (1-s)\tilde{k} + \frac{s}{b}\left(\frac{\sum_{j=1}^{m} t^{h,j}}{m} - t^c\right), \tag{4.7}$$

and its hinterlands

$$k^{h,j}(\{t^{h,j}\}_j, t^c, \tilde{k}) = s\bar{k} + (1-s)\tilde{k} + \frac{(1-s)t^c}{b} + \frac{s\sum_{l\neq j} t^{h,l} - (m-s)t^{h,j}}{mb}, \tag{4.8}$$

as functions of capital tax rates, the capital supply in the metro area, and exogenous parameters. Note that in both expressions the first two terms denote the overall capital stock available within the metropolitan region, and the last two terms capture the adjustment due to tax differentials between the city and the municipalities in the hinterland. For both (4.7) and (4.8), an increase in the own tax rate lowers the amount of capital employed, while an increase in another jurisdiction's tax rate increases capital

use; in particular, we obtain

$$\frac{\partial k^{h,j}}{\partial t^{h,j}} = \frac{s-m}{mb} < 0.$$

It is easy to see that after inserting (4.7) and (4.8) into (4.6) the net return to capital is declining in any jurisdiction's tax rate. For example, we get

$$\frac{\partial \rho}{\partial t^{h,j}} = -s/m < 0.$$

Stage 3

We now solve for the tax policy equilibrium within a metropolitan region, given the tax policy of the city and capital stocks determined in stage 2 for that city (t^c and $\tilde{k}$, omitting city index i). Since fiscal policy in each hinterland must be a political equilibrium, we follow Persson and Tabellini (2000) and (omitting hinterland indices) rewrite the utility function of a voter with endowment e after substituting (4.3) and (4.4) into (4.2) as

$$U((t,\tau);e) = J(t,\tau) + eH(t,\tau),$$

where

$$\begin{aligned} J(t,\tau) &= f(k) - (\rho+t)k - \tau + \rho\bar{k} + u(tk+\tau) \\ H(t,\tau) &= f(k) - (\rho+t)k - \tau - \rho\bar{k}, \end{aligned}$$

and k is the capital stock of hinterland community, as given by (4.8), and which in turn depends on t and τ. Since e is monotonic and $J(t,\tau)$ and $H(t,\tau)$ are common to all voters, the intermediate preferences condition (see Grandmont (1978)) is fulfilled. Consequently, the equilibrium tax rates depend on the capital endowment of the median voter, $\hat{e}$. In the standard case of equal endowments of all citizens within each jurisdiction, i.e. $\hat{e} = 0$, the median voter would only use the non-distortionary labour tax, and set the rate of the distortionary capital tax to zero. In order to obtain an equilibrium with positive tax rates for both tax instruments, we have to assume that the distribution of the capital endowment is skewed to the right, so that $\hat{e} > 0$. This seems empirically reasonable. Furthermore it is assumed that $\hat{e}$ is identical in all cities and hinterlands.

The preferred policy of the median person in hinterland j of metropolitan region i is derived by maximising utility function (4.2) with respect to $t^{h,ij}$ and $\tau^{h,ij}$ subject to individual budget constraint (4.3), government budget constraint (4.4), and the capital stock functions (4.7) and (4.8), where (4.8) is substituted into (4.3) and (4.4). The two first order conditions are (index i is omitted):

$$-(1+\hat{e})f''(k^{h,j})\frac{\partial k^{h,j}}{\partial t^{h,j}}k^{h,j} + (1-\hat{e})\frac{\partial \rho}{\partial t^{h,j}}\bar{k} + u'(g^{h,j})\cdot\left(k^{h,j} + t^{h,j}\frac{\partial k^{h,j}}{\partial t^{h,j}}\right) = 0 \qquad (4.9)$$

and

$$u'(g^{h,j}) - (1 + \hat{e}) = 0. \tag{4.10}$$

Note that (4.10), the first order condition from optimising over the labour tax, fixes the supply of the public good as function of the median's endowment parameter $\hat{e}$. The number of hinterlands or their joint population share s does not matter. The provision is efficient when the distribution of capital-labour endowments is not skewed (i.e., $\hat{e} = 0$).

After inserting the comparative-static results reported at the end of stage 4, as well as (4.8) into (4.9), and assuming a symmetric equilibrium for all hinterlands, we obtain a reaction function $t^{h,j}(t^c, \tilde{k})$ for a typical hinterland jurisdiction with respect to the city's capital tax:

$$t^h(t^c, \tilde{k}) = \left(\frac{s}{m - s^2}\right)\left[(1 - s)\left(b\tilde{k} + t^c\right) + \frac{b\bar{k}[\hat{e} - 1 + s(1 + \hat{e})]}{(1 + \hat{e})}\right]. \tag{4.11}$$

Note that a hinterland's capital tax is increasing in the city's tax rate and capital stock: $\frac{\partial t^h}{\partial t^c} > 0$ and $\frac{\partial t^h}{\partial \tilde{k}} > 0$. In addition, for given $\tilde{k}$ and t^c the hinterland's capital tax rate goes to zero as the number of hinterland communities m converges to infinity. In that situation hinterlands use only the nondistortionary labour tax.

Next, we insert the reaction function (4.11) into $k^c(\{t^{h,j}\}, t^c, \tilde{k})$ and $k^{h,j}(\{t^{h,j}\}, t^c, \tilde{k})$ from stage 4, to obtain the capital allocations k^c and k^h (now the same in all hinterlands):

$$k^h(t^c, \tilde{k}) = \frac{(1 - s)(m - s)}{(m - s^2)}\left[\frac{t^c}{b} + \tilde{k}\right] + \frac{\bar{k}s\left[m(1 + \hat{e}) - 2s + 1 - \hat{e}\right]}{(1 + \hat{e})(m - s^2)}, \tag{4.12}$$

with $\frac{\partial k^h}{\partial t^c} > 0$ and $\frac{\partial k^h}{\partial \tilde{k}} > 0$, and

$$k^c(t^c, \tilde{k}) = \frac{m(1 - s)}{(m - s^2)}\tilde{k} - \frac{s(m - s)}{b(m - s^2)}t^c + \frac{\bar{k}s[m(1 + \hat{e}) + (\hat{e} - 1)s]}{(1 + \hat{e})(m - s^2)}, \tag{4.13}$$

with $\frac{\partial k^c}{\partial t^c} < 0$ and $\frac{\partial k^c}{\partial \tilde{k}} > 0$.

The labour tax follows from the government budget constraint $\tau^h = g^h - t^h k^h$, where g^h is determined by (4.10), as argued above. The net return to capital in metropolitan region i can be determined by substituting (4.11) and (4.12) into (4.6):

$$\rho(t^{c,i}, \tilde{k}) = a - \frac{m(1 - s)[b\tilde{k}^i + t^{c,i}]}{(m - s^2)} - \frac{\bar{k}sb[m(\hat{e} + 1) + s(\hat{e} - 1)]}{(1 + \hat{e})(m - s^2)} \tag{4.14}$$

Stage 2

We now consider the interaction of tax setting and investment decisions across metropolitan regions. In stage 2 equilibrium in the capital market across cities is considered for a given vector of cities' tax policies. Since capital is perfectly mobile between all cities,

the capital allocation has to entail the equalisation of the net returns to capital

$$\rho(t^{c,i}, \tilde{k^i}) = a - bk^{c,i} - t^{c,i} = a - bk^{c,v} - t^{c,v} = \rho(t^{c,v}, \tilde{k^v}) \tag{4.15}$$

for any pair of cities $v \neq i$, which implies

$$\tilde{k}^v = \frac{b\tilde{k}^i + t^{c,i} - t^{c,v}}{b}. \tag{4.16}$$

In addition, the capital market of the cities has to be in equilibrium:

$$\tilde{k}^i + \sum_{v \neq i} \tilde{k}^v = n\bar{k} \tag{4.17}$$

Inserting (4.16) into (4.17) and solving for $\tilde{k}^i$ gives:

$$\tilde{k}^i(t^{c,1}, ..., t^{c,n}) = \bar{k} - \left(\frac{n-1}{nb}\right) t^{c,i} + \frac{1}{nb} \sum_{v \neq i} t^{c,v} \tag{4.18}$$

We may now determine the capital stocks in cities and hinterlands as function of cities' capital tax rates only, by inserting (4.18) into (4.11)-(4.13):

$$k^{c,i} = -\frac{[m(n-1) + s(m-ns)]t^{c,i}}{bn(m-s^2)} + \frac{(1-s)mT^{-i}}{bn(m-s^2)} + \frac{\bar{k}[m(1+\hat{e}) + (\hat{e}-1)s^2]}{(1+\hat{e})(m-s^2)}, \tag{4.19}$$

$$k^h = \frac{(m-s)(1-s)T}{bn(m-s^2)} + \frac{\bar{k}[m(1+\hat{e}) + s^2(\hat{e}-1) - 2\hat{e}s]}{(m-s^2)(1+\hat{e})}, \tag{4.20}$$

$$t^h = \frac{s(1-s)T}{n(m-s^2)} + \frac{2b\hat{e}\bar{k}s}{(1+\hat{e})(m-s^2)}, \tag{4.21}$$

where $T = \sum_{i=1}^{n} t^{c,i}$ is the sum of all cities' capital tax rates and $T^{-i} = \sum_{v \neq i} t^{c,v}$ is the sum of all cities' tax rates without city i. In addition, the net return to capital is found by substituting (4.18) into (4.14) and rearranging terms:

$$\rho(t^{c,1}, ..., t^{c,n}) = a - \frac{m(1-s)T}{n(m-s^2)} - \frac{b\bar{k}[m(1+\hat{e}) + (\hat{e}-1)s^2]}{(1+\hat{e})(m-s^2)} \tag{4.22}$$

Note that hinterland variables and the net return to capital depend only on the sum of the cities' tax rates (and exogenous parameters). A city's capital stock is negatively affected by a raise in its capital tax but increases with tax increases in other cities.

Stage 1

In the first stage, all n cities determine simultaneously their tax policies $\{t^{c,i}, \tau^{c,i}\}_i$. Each city takes in its decision the tax policy of all other cities as given, but rationally anticipates the effects of its tax policy on its capital stock and hinterland policies in subsequent stages. A city's tax policy must also be a majority voting equilibrium. We use the same approach as under stage 3 to argue that the preferred policy of the median endowment person prevails. To find this, we maximise the utility of the median voter with respect to tax rates, given the vector of all other cities' tax rates. Therefore we have to solve

$$\max_{t^{c,i},\tau^{c,i}} (1+\hat{e}) \left[f(k^{c,i}) - f'(k^{c,i})k^{c,i}) - \tau^{c,i} \right] + (1-\hat{e})\rho\bar{k} + u((t^{c,i}k^{c,i}) + \tau^{c,i}), \tag{4.23}$$

where $k^{c,i} = k(t^{c,i}, \{t^{c,v}\})$ and $\rho = \rho(t^{c,i}, \{t^{c,v}\})$ come from (4.19) and (4.22), respectively. Similar to (4.10), the derivative with respect to $\tau^{c,i}$, after setting equal to zero, delivers $u'(g^{c,i}) - (1+\hat{e}) = 0$ and thus determines the public good level g. The public good level in cities and hinterlands is the same when the endowment distribution is the same, which we assume.

We then differentiate the utility function with respect to $t^{c,i}$, replace u' by $(1+\hat{e})$, and make use of the symmetric equilibrium property $t^{c,i} = t^c$ for all i. This gives us the equilibrium capital tax rate in a symmetric city equilibrium

$$t^c = \frac{2m^2\hat{e}b\bar{k}(1-s)}{(1+\hat{e})\left[n(m-s^2)^2 - m^2(1-s)^2\right]} \geq 0, \tag{4.24}$$

and after inserting into (4.21) the equilibrium capital tax rate for each hinterland

$$t^h = \frac{2\hat{e}b\bar{k}sn(m-s^2)}{(1+\hat{e})\left[n(m-s^2)^2 - m^2(1-s)^2\right]} \geq 0. \tag{4.25}$$

To see that capital tax rates are nonnegative, it is sufficient to show that the denominators are positive, that is, $n(m-s^2)^2 > m^2(1-s)^2$. This condition holds for $m = 1$ regardless of the value of n (assuming $n > 1$). Moreover the left hand side of the inequality is rising in m faster than the right hand side because $2n(m-s^2) > 2m(1-s)^2$, thus showing the claim.

Conditions (4.24) and (4.25) are the key expressions for our further analysis, as they capture the equilibrium capital tax rates as function of exogenous parameters, in particular the number of hinterlands m and metropolitan regions n. All other equilibrium variables now follow from simple substitution. In particular, the equilibrium capital stocks are found by inserting the equilibrium capital tax rates into (4.19) and (4.20) (omitted here). In a symmetric city equilibrium the overall capital stock is identical in all metropolitan regions, so that $\tilde{k}^i = \bar{k}$. This completes the solution of the multi-stage

game. We now turn to further characterising the equilibrium.

4.5.3 Equilibrium properties

We are particularly interested in how capital tax rates in cities and hinterlands, and the difference of the two, change with n. We also examine the extent of shifting taxation from mobile to immobile factors in both types of jurisdictions. A change in n can be interpreted as globalisation or market integration such as the fall of communism that brought Eastern European countries into the European Union or German unification which extended the number of metro regions that compete for similar investments under the same political and legal system. In addition we compare those findings to a model where all tax policy decisions both by cities and hinterlands are made simultaneously while maintaining all other assumptions. This is called the simultaneous model and is summarised in the appendix.

We start with a limit result to demonstrate the difference between our sequential model and a standard tax competition model in which all governments make simultaneous choices.

Proposition 4.1. The equilibrium capital tax rate of a city t^c converges to zero for $n \to \infty$, while the tax rate of a hinterland jurisdiction converges to $\frac{2\hat{e}b\bar{k}s}{(1+\hat{e})(m-s^2)} > 0$.

Proof: The convergence to zero of the city tax rate follows immediately from (4.24). Using l'Hôpital's rule the hinterland's tax rate converges to the value provided in the Proposition.

In the appendix, by contrast, we show that in the simultaneous model all capital tax rates converge to zero when the number of metropolitan regions becomes very large, which is very intuitive, as the number of competitors for both types of jurisdiction grows without limits. The limit result should not be interpreted literally, because in practice the number of metropolitan areas is not even close to infinity. Still, local business tax rates even in small localities in Germany are clearly positive, even if the number of potential competitors is fairly large (evidence on local tax rates is provided in section 4.5.5). This points to the usefulness of the sequential model in which hinterland communities compete only in the geographic neighbourhood.

In addition to the limit result we study whether capital tax rates are monotonic in the number of metropolitan regions. Our result show that an increase in n affects cities and hinterlands differentially.

Proposition 4.2. All capital tax rates fall when the number of metropolitan regions n rises, but the hinterland's capital tax falls less in n than the city's capital tax, that is, $0 > dt^h/dn > dt^c/dn$.

The proof for falling capital tax rates follows from differentiation of (4.24) and (4.25).

To see that the city's tax rate falls more, combine (4.24) and (4.25) to obtain

$$t^c - t^h = \frac{2\hat{e}b\bar{k}[m^2(1-s) - sn(m-s^2)]}{(1+\hat{e})\left[n(m-s^2)^2 - m^2(1-s)^2\right]}, \tag{4.26}$$

which is decreasing in n as the numerator falls and the denominator rises in n. The tax differential (4.26) also shows that it is not a priori determined whether a city or hinterland has the higher tax. For small m and high n a hinterland has the higher capital tax, while the reverse is true when n is small relative to m and s takes on a low value.

In the appendix we show that in the simultaneous model the derivative $d(t^c - t^h)/dn$ can be positive or negative, and with the help of numerical simulations often close to zero in absolute value and small in comparison to the derivative in the sequential model with the same parameter values. In other words, an increase in n has a similar effect on capital tax rates in cities and hinterlands in the simultaneous model, while hinterlands are somewhat more sheltered than cities in the sequential model. In section 4.5.5 we will argue on the basis of actual tax data that the sequential model seems a better fit for the trend in local business tax rates in Germany.

We now consider the shift in taxation from mobile to immobile factors, that is, the difference between the capital and labour tax rate $\Delta = t - \tau$, both for a typical city and a hinterland.

Proposition 4.3. For both cities and hinterlands the tax rate gap between the tax on mobile capital and immobile labour, $\Delta^r = t^r - \tau^r, r = c, h$, is falling in the number of metropolitan areas n.

Proof: Consider first the tax gap in a hinterland jurisdiction

$$\Delta^h = t^h - \tau^h = t^h - (g^h - t^h k^h) = t^h(1 + k^h) - g^h, \tag{4.27}$$

where we made use of the government budget constraint to substitute for the labor tax. Recall that the public good level is independent of the number of jurisdictions and depends only on the median's endowment position. Because t^h falls, Δ^h is decreasing in n if k^h is declining in n. Condition (4.20) shows that k^h equals a constant plus a term that is proportional in the sum of cities' capital tax rates. The direct effect of n in the first term of (4.20) vanishes after realising that in a symmetric city equilibrium $T = nt^c$. As the city tax rate falls in n, and k^h depends positively on t^c, the capital use in hinterlands must fall with competition. Hence $d\Delta^h/dn < 0$.

Next consider a city's tax gap $\Delta^c = t^c - \tau^c = t^c(1 + k^c) - g^c$. Because g is not changing with n, we get

$$\frac{d\Delta^c}{dn} = \left[1 + k^c + t^c \frac{dk^c}{dt^c}\right] \frac{dt^c}{dn} + t^c \frac{\partial k^c}{\partial n}. \tag{4.28}$$

Note first that t^c is falling in n, hence the tax difference in cities is declining if the term in square brackets is positive and the last term in (4.28) is non-positive. Consider first the direct effect of n on a city's capital stock. Imposing symmetry among cities the capital stock of a city (4.19) can be written

$$k^c = \frac{s(s-m)t^c}{b(m-s^2)} + \frac{\bar{k}(m(1+\hat{e}) + (\hat{e}-1)s^2)}{(1+\hat{e})(m-s^2)},$$

which does not depend on n directly, i.e., $\partial k^c/\partial n = 0$. We are thus left with the first term in (4.28). The square bracket is positive for n toward infinity as t^c converges to zero (Prop. 4.1), as long as the derivative dk^c/dt^c is finite. The latter derivative represents the total change of a city's capital stock to *all* cities changing their capital tax rates.

To examine the square bracket more generally, consider the sum of the second and third term in square brackets, $k^c + t^c dk^c/dt^c$, which looks like the slope of a government revenue curve. The difference to the typical Laffer curve of a city is that here the total effect of a change in capital tax rates of all cities is considered, when n increases. If we assume for now that each city is on the left side of its Laffer curve, so that $k^{c,i} + t^{c,i}(\partial k^{c,i}/\partial t^{c,i}) > 0$, then the sum of the second and third term of the square bracket in (4.28) must be positive as well when all cities change their tax rate ($dk^c/dt^c = \sum_i \partial k^{c,i}/\partial t^{c,i}$), as now the loss in tax base for an individual city is smaller if all cities increase their taxes. This becomes evident from (4.19), where the derivative of the city's capital stock with respect to all other cities' capital tax rates is positive, i.e. $dk^{c,i}/dT^{-i} = \sum_{\upsilon \neq i} \partial k^{c,i}/\partial t^{c,\upsilon} > 0$ and hence $k^{c,i} + t^{c,i}\frac{dk^c}{dt^c} = k^{c,i} + t^{c,i}(\frac{dk^{c,i}}{dT^{-i}} + \partial k^{c,i}/\partial t^{c,i}) > k^{c,i} + t^{c,i}(\partial k^{c,i}/\partial t^{c,i}) > 0$.

We assumed above that a city is on the left-hand side of its Laffer curve, which must hold because otherwise the city could choose a lower tax rate that would generate the same public good level, lead to a higher net return to capital and higher private consumption. This completes the proof.

Proposition 4.3 demonstrates that both cities and hinterlands shift from capital tax rates to land tax rates when external competition increases. In the next section 4.5.4 we go beyond this and analyse numerically for whom the shift is larger. We now ask whether governments also rely more on labour taxes in terms of revenues. We therefore define the following revenue gap

$$\Gamma^r = t^r k^r - \tau^r, r = c, h \tag{4.29}$$

and notice that τ is both the labour tax rate as well as labour tax revenue in per capita terms. Using again the government budget constraint, we can write $\Gamma^r = 2t^r k^r - g$. For a city this term is declining in n as

$$\frac{d\Gamma^c}{dn} = 2\left(k^c + t^c \frac{dk^c}{dt^c}\right)\frac{dt^c}{dn} < 0,$$

based on the arguments provided in the proof of Proposition 4.3. For hinterlands the result is less straightforward. Notice that we can write the hinterland's capital stock based on (4.20) in a symmetric equilibrium as

$$k^h = \frac{(m-s)(1-s)t^c}{b(m-s^2)} + \frac{\bar{k}[m(1+\hat{e}) + s^2(\hat{e}-1) - 2\hat{e}s]}{(m-s^2)(1+\hat{e})},$$

where t^c is given by (4.24). Hence k^h increases with the cities' capital tax rates ($dk^h/dt^c > 0$) and we can write the derivative with respect to n as follows:

$$\frac{d\Gamma^h}{dn} = 2\left(k^h \frac{dt^h}{dn} + t^c \frac{dk^h}{dt^c}\frac{dt^c}{dn}\right) < 0,$$

because all capital tax rates decline in n. We summarise in

Proposition 4.4. An increase in n leads to more tax revenue collected from the immobile factor (labour) and less from the mobile factor (capital) in both cities and hinterlands.

Propositions 4.3 and 4.4 are consistent with results from standard tax competition models. Yet, the mechanism differs due to the sequential structure, which gives rise to indirect effects as in the proof of Proposition 4.4.

4.5.4 Numerical example

In the following we present a numerical example to illustrate and complement some of our analytical results. We assign a specific subutility function for the public good, $u(g) = ln(g)$, in order to calculate the public good provision level and the tax rates on labour, τ^c and τ^h. From a hinterland's first order condition (4.10), and similar for a city from stage 2, we obtain the per capita provision level of the public good in c and h: $g = \frac{1}{1+\hat{e}}$. Substituting this value back into the government budget constraint, the labour tax rates are found to be: $\tau^c = \frac{1}{1+\hat{e}} - t^c k^c$ and $\tau^h = \frac{1}{1+\hat{e}} - t^h k^h$, where the capital tax rates are taken from (4.24) and (4.25), respectively, and the capital stocks follow from (4.19) and (4.20) after appropriate substitutions. Together these values allow us to calculate the tax rate gap between the capital and labour tax rate, $\Delta = t - \tau$.

We now go beyond Proposition 4.3 by analysing how the tax rate gap changes in cities *relative* to hinterlands, that is, $d\Delta^c/dn$ and $d\Delta^h/dn$. In addition we also compare the absolute level of capital tax rates in the two types of jurisdictions, that is, we evaluate the sign of (4.26) as function of n. We vary the values for the overall population size of the hinterlands relative to the city, s, the number of hinterlands in a metropolitan area, m, and the number of metropolitan regions, n. All other parameter values are held constant and chosen as reported in the table below. Table 4.4 shows that the tax rate

gap in a city Δ^c can be higher or lower than the gap in a hinterland Δ^h. The gap in the city is smaller (higher in absolute terms) when s and n are sufficiently high (lines 3 and 5), and/or m is sufficiently low (line 4). Furthermore, a decrease in the size of each hinterland relative to the city – either through a smaller overall population size of the hinterlands s for a given number of hinterlands, or an increasing number of hinterlands m for given population size – leads in the hinterland to a shift from distortionary capital taxation to non-distortionary labour taxation. The corresponding effect for cities differs however (the city's capital tax decreases for increasing m, compare lines 4 and 3, while for decreasing s the city's tax may increase, see lines 3 and 2).

Obviously, doing the reverse exercise, namely making a city smaller in population size (i.e., s increases) leads to the same qualitative outcome, that is, a shift from capital taxation to non-distortionary labour taxation in a city. However, this does not imply that the smaller jurisdiction *always* makes less use of capital taxation than the bigger ones, as lines 3 to 5 in Table 4.4 demonstrate. This result contrasts with the finding of the model by Bucovetsky (2009) in which smaller jurisdictions always make less use of the distortionary taxation than larger ones.

Table 4.4: Numerical example

	t^c	t^h	τ^c	τ^h	Δ^c	Δ^h
1. s=0.05, m=10, n=2	0.5776	0.0061	0.1056	0.6573	0.4720	-0.6512
2. s=0.05, m=10, n=50	0.0129	0.0034	0.6538	0.6632	-0.6409	-0.6598
3. s=0.3, m=10, n=50	0.0096	0.0204	0.6570	0.6464	-0.6474	-0.6261
4. s=0.05, m=2, n=50	0.0129	0.01700	0.6537	0.6497	-0.6408	-0.6327
5. s=0.3, m=2, n=50	0.0103	0.1058	0.6560	0.5679	-0.6457	-0.4620

Other parameters: $\bar{k}$=1, b=1, $\hat{e}$=0.5

The dependency of capital tax rates and tax rate gaps in cities and hinterlands on the number of metropolitan regions n is visualised in Figure 4.6. After making use of the same parameter values as before in the table notes, we plot the capital tax rates and the tax rate gaps in city and hinterland as function of the number of metropolitan regions, n. The steeper line belongs to a city and is in all of our simulations steeper than the one for the hinterland. Moreover, the two lines intersect which means that for a low number of external competitors, the cities have the higher capital tax rate and the higher tax rate gap than the hinterlands, while the opposite is true for a high number of n, as then hinterlands rely more strongly on capital taxation.

4.5.5 Discussion and conclusion

In our theoretical analysis we have demonstrated that two different effects interact in our model of local tax competition. The first is the pure size effect which is well-known from the literature of asymmetric tax competition. This suggests that the smaller jurisdictions rely less on capital taxation than bigger ones. Second, this effect is offset

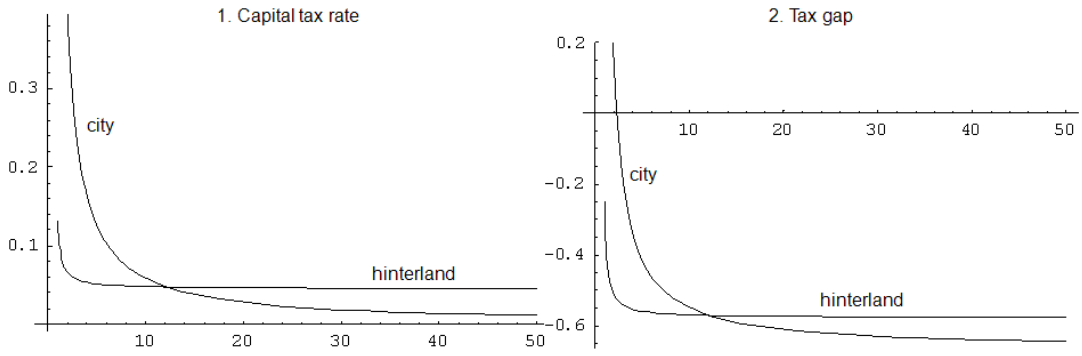

Figure 4.6: Simulation results. Parameters: $\bar{k}$=1, b=1, $\hat{e}$=0.5, s=0.2, m=3

through external competition from cities in other metropolitan regions. Since cities react stronger to external competition than hinterlands, an increase in the number of competitors, as indicated by an increasing n, implies a stronger shift to the use of immobile tax bases in the cities than in the hinterlands. Consequently, given a sufficient large number of competitors, the cities might make actually less use of capital taxation than their hinterlands.

We now check the plausibility of our theoretical predictions by describing actual taxes set in the state of Baden-Württemberg, the state on which our survey in section 4.4.2 was based. This requires a slight reinterpretation of our theoretical model, as the most important autonomous tax instruments (and revenue sources) for jurisdictions in Baden-Württemberg are the local business tax rate ("Gewerbesteuer") and a land tax ("Grundsteuer B"). The former matches well the capital tax rate in our theoretical model.[25] The latter, however, differs obviously from the labour tax that we assumed in section 4.5.1 (local jurisdictions in Baden-Württemberg do not control an own income or labour tax). The land tax is qualitatively similar to the labour tax though in that it is likely to be less distortionary than the local business tax.[26] To sustain the applicability of the model, and in particular the nature of the political equilibrium, we would also need to assume a monotonic relationship between the size of land and its population. While this may be considered unrealistic in a narrow sense, we feel that our theoretical model captures the qualitative setting in Baden-Württemberg well: There are two tax instruments available, one on a mobile factor and another less distortionary tax on a fixed factor.

The upper graph in Figure 4.7 presents the development of the collection rates ("Hebesätze") of the local business tax for jurisdictions of different size (groups). We view the period from 1990 to 2008 as one where external competition increased due to global-

[25]Buettner (2003) argues that the business tax can be regarded as a capital income tax since the definition of taxable business earnings does not only include profits but also a major part of interest payments.

[26]Note that in real world the German land tax is also levied on business land so that it theoretically also affects the capital allocation. But quantitatively the land tax mainly affects private land owners so that it is much less relevant for location decisions of firms than the local business tax.

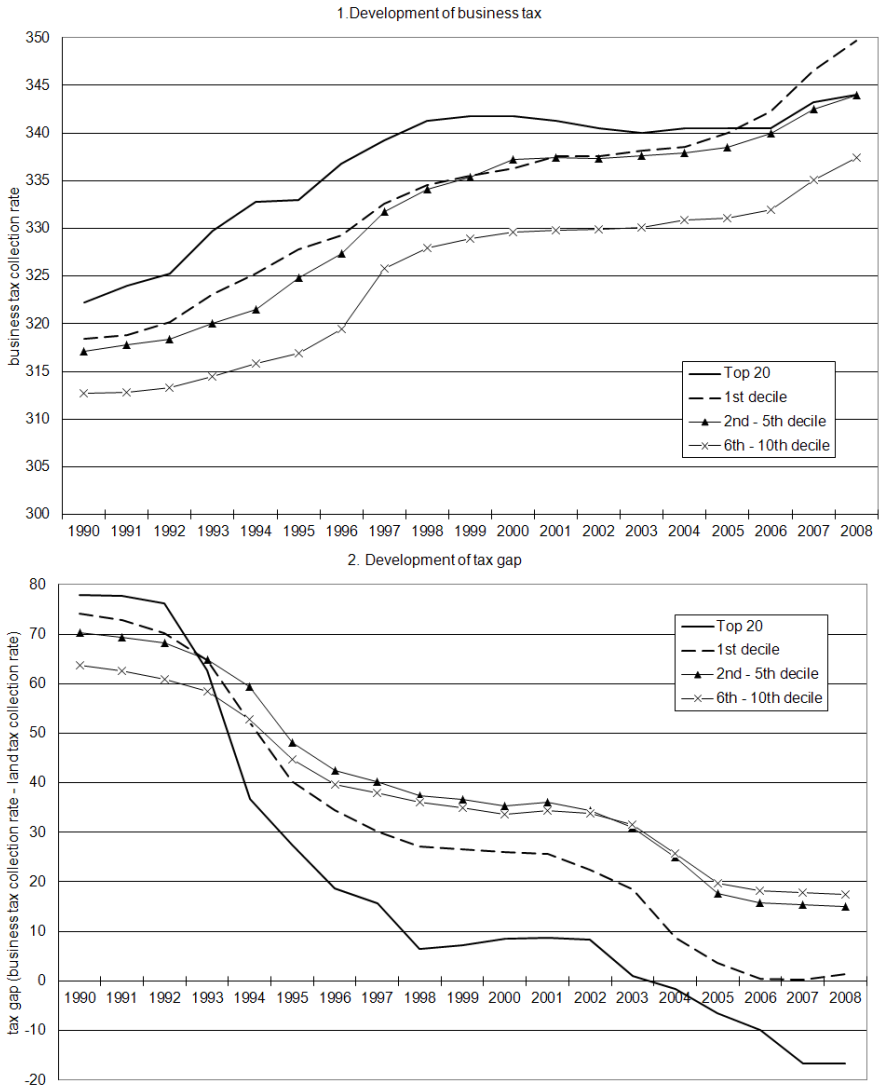

Figure 4.7: Development of taxes in Baden-Württemberg

isation in general and the Eastern enlargement of the EU and German unification in particular. Figure 4.7 shows that local business tax rates in small communities grew over the last twelve years, while they were fairly stable in the top 20 largest cities. The finding of rising business taxes is neither consistent with our Proposition 2 which shows that capital tax rates are monotonically decreasing in n, nor with the empirical literature cited above which suggests a race to the bottom of capital tax rates due to increasing competition and spatial interactions. However, we believe that other reasons, such as mandated shifts of responsibilities from higher level governments to local communities for social welfare policies or an offset for lower corporate tax rates at the national level, is the reason for an increasing need of financial resources (and, hence, an increase of all types of taxes). Consequently, we believe that the tax rate gap – expressed as the collection rate of the business tax minus the collection rate of the land tax – is the more

meaningful measure for comparison.

In the lower graph of Figure 4.7, the trends for the tax rate gaps are depicted. Over the observation period, the tax gap decreased in all size classes, that is, the business tax rates were lowered in relation to the land taxes.[27] This drop is in line with reductions in corporate tax rates at national levels which arises from increasing external competition (see, e.g., Slemrod, 2004). In the light of our model, globalisation-related changes – such as reduction in transport costs and institutional openings of markets to other countries such as the Eastern enlargement of the EU – allowed for the entry of more-distant jurisdictions in the competition for capital. Consequently, competitive pressures on cities in Germany increased and forced local decision-makers to resort more to non-distortionary land taxes.[28] Most notably, the development of the tax gaps in the beginning and mid-1990s is remarkable. At that time, German cities were confronted with the emergence of a huge number of new competitors after the fall of the iron curtain and German reunification (the negative impact of the former on international corporate tax levels is documented by Overesch and Rincke, 2009). Consequently, the sharp drop in local tax gaps coincides with the view that the competition with external competitors – expressed as the number of regions in our model – increased especially in the 1990s.

However, different types of jurisdictions were unequally affected by this development. Initially the tax gaps were rather similar in urban centres and rural areas. Yet in the course of time this pattern changed markedly. In particular the biggest cities – as well as urban centres from the first size decile – tended to decrease their business tax rates relative to the land tax rates much stronger than the smaller jurisdictions. This graph is well in line with the theoretical predictions made above (see Figure 4.6): the increasing pressure from external competition pushes down the ratio of capital to land taxes in all jurisdictions, but this effect is much stronger for urban centres.

These findings give support to our theoretical predictions – big cities might actually rely less on corporate taxation – which are in contrast to research that has shown that smaller countries and countries on the periphery have lower corporate tax rates than large countries or regions in the core (Baldwin and Krugman, 2004; Haufler et al., 2009; Haufler and Wooton, 2010). This discrepancy to the earlier literature has to be explained with some special characteristics of local tax competition, which in our view is that competition between geographically close jurisdictions is qualitatively different from competition among countries or states. At the local level, but not the country or state level, it is relatively easy for a firm to benefit from the agglomeration benefits and

[27]The interpretation of the levels of the measure needs to be done with care as the two tax bases are not directly comparable. Rather we view this gap as a qualitative measure for shifts from one tax base to the other.

[28]Part of the common drop can also be explained by institutional characteristics of the two taxes, since the tax base of the land tax is levied on predetermined land prices which are adjusted very little over time. Since the revenues of the business tax tend to increase in nominal terms over time, the rate of the land tax has to be raised regularly in order to keep the revenue ratio constant.

infrastructure of a city centre even in smaller jurisdictions, as long as they are located within a reasonable distance to the urban centre.

We conclude by emphasising the importance of considering asymmetries, in particular concerning the structure of competition in local tax competition. Not all jurisdictions are identical, and consequently the perceived pressures from competition differ between jurisdictions, as we have demonstrated. This has important implications for the theoretical modelling of tax competition. We believe that accounting for differences in a jurisdiction's involvement in levels of competition is an important innovation compared to the existing theoretical literature on local tax competition. Clearly, much work needs to be done to understand better the structure of local tax competition.

4.6 Appendix

4.6.1 Data

Table 4.5: Means of respondents and non-respondents

Variable	Mean: Respondents	Mean: Non-respondents	t-test for equal mean (p-value)
Neighbour State Border	0.076	0.066	0.576
State Border Distance	50.871	52.938	0.378
Neighbour International Border	0.051	0.072	0.165
Neighbour Int. Border: FRA	0.025	0.035	0.405
Neighbour Int. Border: SUI	0.025	0.041	0.176
Int. Border Distance	61.268	61.074	0.940
Int. Border Distance: FRA	80.708	86.778	0.044
Int. Border Distance: SUI	101.664	92.393	0.013
Int. Border Distance: AUT	138.882	129.812	0.006
Log(Population)	8.710	8.357	0.000
Unemployment rate	0.019	0.018	0.010
Population working-age	0.655	0.657	0.284
Left-wing	0.185	0.158	0.008
Free voters	0.465	0.534	0.001
Fiscal Capacity: low	0.389	0.465	0.022
Fiscal Capacity: medium	0.518	0.475	0.198
Regional centre	0.020	0.006	0.109
Secondary centre	0.103	0.069	0.088

Table 4.6: Variable definitions

Variable	Description	Mean	Std. Dev.	Min	Max	Source
Perception: competition within state	Survey response, question 1	1.98	1.88	-4	4	own survey
Perception: competition with other states	Survey response, question 2	-1.20	2.27	-4	4	own survey
Perception: competition with other countries	Survey response, question 3	-1.91	2.42	-4	4	own survey
Log(Population)	Logarithm of total population	8.710	0.978	5.814	13.296	Statistical Office of Baden-Württemberg (SOBW)
Unemployment rate	Share of registered unemployed in total population	0.019	0.006	0.006	0.040	SOBW
Population working-age	Share of population aged between 15 and 65 years	0.655	0.021	0.571	0.742	SOBW
Left-wing	Seat share of left-wing parties in local council	0.185	0.150	0	0.571	SOBW
Free voters	Seat share of free voter unions ("Freie Wählervereinigungen") in local council	0.465	0.297	0	1	SOBW
Fiscal Capacity: low	Dummy = 1 if fiscal capacity is smaller than 0.6; highest transfers from the local system of fiscal equalisation	0.389	0.488	0	1	SOBW
Fiscal Capacity: medium	Dummy = 1 if fiscal capacity is between 0.6 and 1.0; moderate transfers from the local system of fiscal equalisation	0.518	0.500	0	1	SOBW
Regional centre	Dummy = 1 if classified as regional centre ('Oberzentrum'), highest category of centrality in German spatial planning policy	0.020	0.139	0	1	Wirtschaftsministerium Baden-Württemberg
Secondary centre	Dummy = 1 if classified as secondary centre ('Mittelzentrum'), second highest category of centrality in German spatial planning policy	0.103	0.304	0	1	Wirtschaftsministerium Baden-Württemberg
Mayor	Dummy = 1 if response directly from mayor	0.475	0.500	0	1	own survey
State border	Dummy = 1 if municipality shares border with another German state	0.07	0.26	0	1	own calculations
Country border	Dummy = 1 if municipality shares border with another country	0.05	0.21	0	1	own calculations

4.6.2 The simultaneous game

The simultaneous game consists of two stages only. In the first stage governments from cities and hinterlands simultaneously choose their tax policy, where in each jurisdiction tax policy must be a majority voting equilibrium for a given fiscal policy in all other regions. In the second stage, capital is allocated between all cities and all hinterlands depending on the respective capital tax rates of all jurisdictions $\{t^{c,i}, t^{h,ij}\}$. We use the same notation as in section 4.5. The capital market equilibrium condition is

$$(1-s)\sum_i k^{c,i} + \frac{s}{m}\sum_i\sum_j k^{h,ij} = n\bar{k} \tag{A1}$$

In equilibrium the net return to capital, $\rho = f'(k) - t$, has to be the same across all cities, and across any city and its hinterlands:

$$\rho = a - bk^{c,i} - t^{c,i} = a - bk^{c,l} - t^{c,l} = a - bk^{h,ij} - t^{h,ij}, \tag{A2}$$

for all $i, l = 1, ..., n$ and $j = 1, ..., m$. Solving (A2) for $k^{c,l}$ and $k^{h,ij}$, respectively, and then substituting in the capital market equilibrium condition (A1) gives

$$\begin{aligned} k^{c,i} &= \bar{k} - \frac{(n-1+s)t^{ci}}{nb} + \frac{(1-s)T^{-i}}{nb} + \frac{s}{nmb}\left(\sum_{j=1}^{m} t^{hi_j}\right) \\ k^{h,ij} &= \bar{k} + \frac{(1-s)T}{nb} + \frac{s\sum_{l=1}^{n}\sum_{v=1}^{m} t^{h,lv}}{nmb} - \frac{t^{h,ij}}{b}, \end{aligned} \tag{A3}$$

where T is the sum of all cities' capital tax rates and $T^{-i} = T - t^{c,i}$. It is easy to see that a jurisdiction's capital stock is declining in its own tax rate

$$\frac{dk^{c,i}}{dt^{c,i}} = -\frac{(n-1+s)}{nb} < 0 \tag{A4}$$

$$\frac{dk^{h,ij}}{dt^{h,ij}} = \frac{(s-nm)}{bnm} < 0. \tag{A5}$$

Furthermore $d\rho/dt^{c,i} = -b \cdot dk^{c,i}/dt^{c,i} - 1$, and similar for a change in a hinterland's capital tax rate.

In a symmetric equilibrium where all hinterlands choose the same tax, and all cities choose the same tax, (A4) and (A5) simplify to

$$k^c = \bar{k} + \frac{s(t^h - t^c)}{b} \tag{A6}$$

$$k^h = \bar{k} + \frac{(1-s)(t^c - t^h)}{b}. \tag{A7}$$

We now move to the analysis of the first stage. The reaction function of a typical hinterland jurisdiction and a typical city can be determined in a similar fashion as in stages 1 and 3 of the sequential game. For example, the two first order conditions for the utility maximisation of the median voter in hinterland j in region i are:

$$(1+\widehat{e})\left(-f''(k^{h,ij})\frac{\partial k^{h,ij}}{\partial t^{h,ij}}k^{h,ij}\right)+(1-\widehat{e})\left(\frac{\partial \rho}{\partial t^{h,ij}}\bar{k}\right)+u'(g^{h,ij})\cdot\left(k^{h,ij}+t^{h,ij}\frac{\partial k^{h,ij}}{\partial t^{h,ij}}\right)=0 \tag{A8}$$

$$u'(g^{h,ij})-(1+\widehat{e})=0$$

The same qualitative conditions hold for a city.

Substituting (A3) into (A8), imposing symmetry among hinterlands, as well as symmetry among cities (so that (A6) and (A7) apply), and using comparative statics reported in (A4) and (A5), we obtain the equilibrium tax rate for the city and hinterland as

$$t^c=\frac{2nm\widehat{e}b\bar{k}(1-s)}{(1+\widehat{e})\left[(nm-s^2)(n-1+s(2-s))-(1-s^2)^2\right]} \tag{A9}$$

$$t^h=\left(\frac{1}{nm-s^2}\right)\left[\frac{2\widehat{e}b\bar{k}s}{(1+\widehat{e})}+s(1-s)t^c\right], \tag{A10}$$

where t^h contains t^c to write the hinterland's tax more compactly.

We now characterise properties of the equilibrium tax policy in the simultaneous game, similar in nature to the results presented for the sequential model in section 4.5. First, the city tax rate converges towards zero when n goes to infinity because the numerator in (A9) is linear in n, while the denominator is quadratic in n. This is in line with Prop. 4.1. A difference arises for hinterland communities. When n goes to infinity, t^h converges to zero because t^c goes to zero and the denominator in round brackets goes to infinity.

We next consider how the difference in capital tax rates, t^c-t^h, responds to changes in n. In the sequential game we know from Prop. 4.2 that this derivative is negative. In the simultaneous game, however, this derivative can be positive or negative. To obtain more insights, write the city and hinterland capital tax rates more compactly as $t^c=A_1\geq 0$ and $t^h=A_2+A_3t^c\geq 0$, where $A_2\equiv 2\widehat{e}b\bar{k}s/((1+\widehat{e})(nm-s^2)\geq 0$ and $A_3\equiv s(1-s)/(nm-s^2)\geq 0$. From here follows $t^c-t^h=A_1(1-A_3)-A_2$ and thus

$$\frac{d(t^c-t^h)}{dn}=(1-A_3)\frac{dA_1}{dn}-A_1\frac{dA_3}{dn}-\frac{dA_2}{dn}. \tag{A11}$$

Note that the derivatives in the second and third term of (A11) are negative, so that

the sum of these two effects is positive. By contrast, the city's tax rate is typically declining in n, and $1 - A_3 = (nm - s)/(nm - s^2) > 0$, so that the first effect is negative. Numerical simulations (not reported) show that the net effect can be positive or negative. The case of a positive derivative is most easily seen when s converges towards 1, as then dA_1/dn and dA_3/dn go to zero, while dA_2/dn is bounded above zero. While such a high value of the hinterlands' population share may seem unrealistic, it nevertheless points to an important difference to the sequential model. Moreover, numerical simulations (not reported) show also that regardless of the sign of (A11) the derivative is small in absolute value and small in comparison to the sequential model. This becomes clear when examining the terms A_1, A_2, A_3 and their derivatives with respect to n, which both have a higher order of n (or a product of n and m) in the denominator than in the numerator, so that even for "reasonable" parameter values of m and n the derivative (A11) becomes small in absolute value.

Chapter 5

Regional Transfers and Public Support for the EU

5.1 Introduction

Can politicians 'buy' the support of citizens by means of regional transfers? This is an important question when it comes to the relevance of many theoretical models focusing on the interaction of electoral incentives and public spending. The related theoretical literature implies that upper-tier governments might have an incentive to strategically allocate regional transfers in order to manipulate the electorate's opinion. But an essential element of this literature is the assumption that citizens in targeted regions automatically become aware of this intended benefit and that they reward the benefactor for it. Until now, the reaction of the citizens has not found much consideration in the empirical literature. In this chapter, we focus on the regional policy of the European Union (EU) as a special case of a regional transfer policy with targeted benefits. In this policy area the European institutions, in particular the Commission, act as benefactor. In addition to reducing the economic disparities between European regions, which is the main objective of this policy, these institutions apparently also intend to make the benefitted citizens aware of this preferential treatment in order to increase the public support for European integration. Consequently, Begg (2008: 297) says "that the visibility of cohesion policy plays a valuable role in fostering support for EU regional policy and, indeed, the EU generally." In this chapter, we study the effect of targeted transfers in the EU on the public support for the EU by combining a rich data set on the regional allocation of structural funds payments with opinion survey data. Our results confirm that regional transfers show the expected effect, and that it is sizeable: an increase of transfers by 100 Euros per capita increases the citizens' probability of being supportive of the EU by approximately 5% to 15%.

For several reasons, EU regional policy is a particularly interesting issue for the analysis

of a popularity effect of regional transfers. Primarily, its scope is immense and much larger than the scope of most national programmes. In 2009, its budget amounted to almost 50 billion Euros, which was more than 0.4 % of the overall European GDP, and which was mainly dedicated to the poorest European regions. In addition to its pure size, it meets many requirements to be highly visible to the citizens. Many projects are financed that benefit a wide range of citizens, such as infrastructure, and since the European institutions are highly concerned with their public image, they actively promote the visibility of their regional activities. Concerning this objective, European institutions are not that different from upper-layer governments at the national level which act as benefactors of regional transfers in order to obtain an electoral advantage. European institutions are the benefactors of EU structural funds and intend to get the citizens on their side in order to overcome obstacles for deeper integration and to solidify their position in the European federal system against national actors.

The study of this institutionally special case of regional transfers offers empirical advantages over the study of national systems of regional transfers. In particular, it alleviates methodological problems inherent to the analysis of the popularity effect of regional transfers in national federal systems. There, the allocation of transfers usually has to be regarded as endogenous since the benefactor has incentives to strategically favour certain regions. Contrary to this, the allocation of EU regional transfers can be regarded as exogenous as will be shown in this chapter. In brief, most of the funds are allocated according to transparent criteria, such as a GDP per capita below the threshold of 75% of the EU average which determines those regions which receive the highest aid intensity. For this reason, no relation between regional allocations and electoral motives can be expected. Consequently, we have an interesting situation: the structural funds are allocated to the regions independently from strategic considerations, yet the European institutions have strong incentives to make these predetermined transfers visible to the citizens in order to improve the public opinion of the EU.

Moreover, in this chapter we use an innovative strategy for the measurement of the opinion of the citizens. In related works it is standard to measure the public support by means of voting equations, i.e., election results at the regional level. Obviously, for the EU this is hardly possible, since the EU is only irregularly the subject of elections, such as the referendums concerning the Constitution for Europe. In contrast, we refer to the direct statement of support for the EU in opinion surveys. This data source offers the advantage that it allows us to control for many further influences on the opinion at the individual level. In this regard, we can resort to a broad literature provided by political science which studies the determinants of the public opinion towards the EU.

Our empirical evidence will have important implications for the literature on vote buying: as the EU structural funds are larger in size and more visible to the citizens than most kinds of intergovernmental grants at the national level, we should expect a sizeable impact on the attitudes of the citizens in benefited European regions. Moreover, we

are the first to be able to study the whole chain of causation which leads from regional transfers to public opinion in a more detailed way. In particular, we scrutinise the relevance of public awareness in this process. As will be shown in detail, it is too simplified to assume a simple and homogenous effect of local transfers on public support. In particular, the awareness of being a recipient of transfers is highly dependent on individual characteristics, such as education, and the information source that causes awareness has a major effect on the individual assessment.

The chapter is structured as follows. In section 5.2, the theoretical literature and related empirical works focusing on vote purchasing at the national level are presented. In section 5.3, we motivate the application to EU regional policy and present institutional characteristics of EU regional policy. The data sources and our empirical approach are presented in section 5.4. In section 5.5, the results are presented and discussed, and the final section 5.6 concludes.

5.2 Theoretical background and related empirical work

A number of theoretical political economic models predict that in situations where upper-layer governments have leeway in the distribution of funds, a politically biased allocation to jurisdictions or social groups should take place, which comes under the term of 'vote purchasing'. One prediction is based on the theoretical framework originating from the seminal models by Lindbeck and Weibull (1987, 1993) and Dixit and Londregan (1996, 1998). Their main insights can be summarised as follows: office-seeking parties which are in power at the central level tend to use their leeway in the allocation of regional grants to benefit those jurisdictions in which the number of swing voters is relatively high. This strategy increases the benefactor's share of votes, since the money spent in these regions yields a higher return of votes than money spent in other regions. Even more so, this kind of economic vote buying is assumed to play an important role in plurality voting systems. There, incumbents have an incentive to increase their probability of re-election by concentrating funds to those jurisdictions where a close election result can be expected (e.g., 'swing states' in US politics; see Wright, 1974). Recent evidence that politicians at higher tiers of government invest excessively in those municipalities with a higher electoral benefit, e.g., because of the occurrence of many swing voters, comes from Dahlberg and Johansson (2002) and Johansson (2003) for intergovernmental grants in Sweden and Castells and Solé-Ollé (2005) for infrastructure investments in Spain, as well as Helland and Sørensen (2009) for Norwegian road investments.

An alternative prediction originates from the model of Cox and McCubbins (1986). Under the assumption that politicians are risk-averse, the model derives the expectation that incumbents excessively target funds towards their core supporters. Similarly, benefiting the core voters might also be vote maximising since it improves turnout among the incumbent's core supporters (see Nichter, 2008). In a similar vein, Solé-Ollé

and Sorribas-Navarro (2008) argue that upper-layer decision-makers have an interest in favouring jurisdictions which are governed by the same government, since only then the benefactor is able to gain the whole credit for the grant. Recent research finds some empirical evidence for these predictions: Leigh (2008) shows for Australia that jurisdictions held by the governing coalition received a larger share of discretionary funding, and Ansolabehere and Snyder (2006) provide similar evidence for transfers of U.S. states to counties. Solé-Ollé and Sorribas-Navarro (2008) show for Spanish municipalities that aligned municipalities receive more intergovernmental grants. Finally, Arulampalam et al. (2009) find evidence that for transfers from the Indian central government to states both mechanisms are at work: transfers increase both with alignment and with being a swing state.

However, while this empirical evidence confirms the expectations of a link existing between the allocation of regional transfers and the expected political gains for the incumbent, it is not sufficient evidence for the effectiveness of vote purchasing since it does not consider the reaction of the voters. As Stein and Bickers (1994) note, three conditions have to be fulfilled to establish a causal chain which runs from the expected gains from strategically targeting funds to an actual increase in the incumbent's vote share at the ballot box: (i) legislators can impact the distribution of funds, (ii) constituents in the districts become aware of these benefits, and (iii) constituents reward the benefactor for the benefits. Consequently, in order to complete the story, the reaction of the voters has to be considered. However, in this regard the existing literature is limited, and the very few existing works only rely on studying the overall effect of spending allocations on election results. Hence, these papers abstract from public awareness of the transfers and study the effect of fund allocation on public awareness and support jointly. Evidence comes from Levitt and Snyder (1997) who show for the members of US Congress that an increase in spending at the district level by 100 Dollar per capita increases the incumbents' votes by 2%. Moreover, Solé-Ollé and Sorribas-Navarro (2008) show for Spanish municipalities that only grants to jurisdictions held by the same party as the central level can generate a positive effect at elections. They estimate a quantitatively similar effect. Only the early work by Stein and Bickers (1994) refers explicitly to the public awareness of fund allocation and shows that the awareness of being funded impacts on public support in elections of the U.S. Congress.

Such analyses of the voters' reaction at the ballot box confronts the researcher with a number of serious empirical problems: as discussed above, theory and evidence suggest that politicians have strong incentives to bias the distribution of funds due to electoral motives, so that the allocation to jurisdictions cannot be regarded as exogenous. Moreover, it can be assumed that incumbents also influence the opinions of the electorate in the benefited regions in other ways due to the high electoral returns they can expect from these jurisdictions. This might be more intensive campaigning in pivotal jurisdictions, which would lead to an omitted variable bias in the regressions and, consequently to an

overestimation of the impact of regional transfers. In the related works, these severe endogeneity problems are therefore tackled with more sophisticated empirical approaches. In the works by Levitt and Snyder (1997) and Solé-Ollé and Sorribas-Navarro (2008), it is done by applying an instrumental variable estimation, in which the intensity of transfers to municipalities is instrumented with the transfers to neighbouring municipalities.

However, in light of this rather scarce evidence in favour of an effect of regional spending on the popularity of the benefactor, it can be concluded that there are good reasons to challenge the claim that targeted transfers necessarily impact public support. One decisive necessity for generating a positive effect is public awareness, so that voters know whether their municipality has or has not been granted. As these targeted transfers usually come about in the form of public investments, a low visibility towards the citizens might marginalise the impact on the electorate's opinion if the benefactor fails to make the citizens aware of being funded. Moreover, as Solé-Ollé and Sorribas-Navarro (2008) emphasise, a positive effect can only be expected in cases where the citizens can attribute the additional spending to the incumbent party, which is in federal states usually only the case when central government and the executing local government are ruled by the same party. Finally, an intended preferential treatment of a specific region might not be recognised as such by the respective electorate and instead perceived as a general extension of public activity for which the local voters have to pay with their tax spending. This could even have an adverse effect on the citizens' support. Consequently, it is of interest not only to study whether targeted spending affects the opinion of the citizens, but also scrutinise the components of the transmission process, i.e., to study the determinants of the awareness of the citizens, and to identify how the awareness of being funded actually translates into the individual's opinion. Since the existence of these two effects is a necessary condition for the working of the mechanism sketched above, this analysis is required to confirm the causality between regional transfers and the public opinion.

5.3 Background European Union

5.3.1 Political implications

In this contribution, we transfer the analysis of the popularity effect of regional transfers from the national level to the supranational level, in particular to the EU regional policy. Our claim is that EU regional policy has – despite obvious institutional differences – very similar implications with respect to the theory as presented above. This needs some clarifications.

Of major importance is the observation that the European institutions in Brussels, in particular the Commission, are highly interested in increasing the public support for

European integration. In this regard, they resemble national upper-layer governments that intend to increase their public support in order to increase their votes at the ballot box. This claim is at the bottom of neofunctionalism, the most enduring grand theory of European integration (see Hix, 2005), which suggests that these European institutions are a major driving force for European integration and the expansion of power of European supranational institutions. Following this objective, European institutions have a major interest in striving for an increase of the public acceptance of European integration. Opposition by the general public has been one of the major drawbacks for the integration process in the past. This became manifest only recently in a number of negative referendums such as those concerning the the Constitution for Europe or the Treaty of Lisbon. Moreover, public support for the EU is an important prerequisite for a further centralisation of policies at the European level. As Lubbers and Scheepers (2005) state, "(t)hough few countries have held referenda over which policies should be decided at the European level, it is easy to imagine that legitimating the European Union in the long run stands or falls on the extent to which the European population supports decision-making processes at this supranational level." Hence, increasing the European citizens' support for integration can be regarded as a crucial goal for the European institutions which should guide their actions to a certain degree, and which is, inter alia, promoted by the regional policy as will be discussed below.

In the related works discussed in section 5.2, public support is studied by means of vote equations. This means that the incumbents' vote shares at the subnational level are explained with the transfers of intergovernmental funds plus a number of region-specific control variables. Obviously, such an approach is not feasible in our setting, since the EU itself and the European integration process are only sporadically subject of elections, such as the constitution referendums. These are of minor usefulness for our purpose since they were only conducted in a limited number of countries and their outcomes were regularly overshadowed by political issues of the national level. Consequently, we choose a different path and measure public approval by means of opinion survey data.

As will become clear in the following subsections, our research design offers some major advantages over earlier approaches. First, the main problem of related studies – the endogeneity of the funds allocation – is not much of a problem in the case of the EU structural policies. EU funds are allocated according to principles which are presented in the following. This allocation of European funds is exogenous in the sense that there is no relationship between the level of regional transfers and the European institutions' intention to manipulate the public support. Second, the quantity of EU structural spending is immense and the European institutions promote it actively, so that its analysis seems to be promising concerning the visibility by the people. Third, the use of survey data allows us to control for a multiplicity of further determinants of public opinion.

5.3.2 EU regional policy

The structural funds of the European Union (EU) constitute a large-scale regional policy. From 2007 until 2013, a total amount of about 350 billion Euro, corresponding to approximately 0.4% of the total EU GDP, will be allocated. Its purpose is to enhance cohesion and to reduce welfare disparities among the EU regions. Consequently, the bulk of the spending, about 80% of it, is allocated to the poorest European regions in order to promote their social or economic convergence.

The EU regional policy in its current form was founded in 1988, when most of the principles which have since then determined this policy area were defined, in particular the geographical concentration of the funds.[1] Before this, European regional policy was limited to single projects, and its scope was rather small. In 1988, the overall amount available to regional policy was for the first time defined in a multi-annual Community budget for the years 1989-1993. Since then, it has become custom to conduct regional policy over multi-annual programming periods, with the subsequent ones covering the periods 1994-1999 and 2000-2006. At the beginning of each programming period, the maximum funds available to each region (*allocations*) are defined for the whole period according to specified criteria. Moreover, the spending priorities are stipulated for later concretion in regional programmes.[2]

For the purpose of structural policies, regions are defined according to the Nomenclature of Territorial Units for Statistics (NUTS) of Eurostat, the statistical office of the EU. The NUTS 2 level which comprises regions with a size of usually between 800,000 and 3 million inhabitants is of highest relevance for the conduct of regional policy.[3] In some cases the relevant regions match national administrative boundaries (such as the Länder in Germany or Comunidades Autónomas in Spain), whereas in other member states artificial regions are used, e.g., in the UK. Actual payments to regions are then made within the ceilings of the multi-annual framework, i.e., the commitments can be called up by the regions within a certain period. Regions can become eligible for transfers from different "objectives". In quantitative terms, the transfers to the Objective 1 regions (after 2007 renamed as *Convergence* objective) has always been the dominating objective.

Objective 1 is dedicated to promote the development of regions whose development is lagging behind; these are NUTS 2 regions with a GDP per capita of less than 75% of the EU average[4]. Such a region receives transfers which are approximately 10 times higher than the support a region receives which exceeds this threshold only marginally.

[1] More details on the history of EU regional policy can be found e.g. in European Commission (2008) or Allen (2005).

[2] Detailed information on accepted programmes are available from the web page of DG Regio: http://ec.europa.eu/regional_policy/atlas2007/index_en.htm.

[3] An exception is Germany, where EU regional policy is conducted at the NUTS 1 level.

[4] The eligibility of a region for an objective is decided prior to the start of a programme period and stays constant over the whole period.

Moreover, further objectives which target regions that are not eligible for objective 1 have always existed; eligibility is then determined based on several different indicators. These objectives address regions that suffer from other structural problems, such as industrial decline, high unemployment or a location in the periphery, and also involved considerable transfers to many richer regions.[5] This set of instruments contributes to a high variation in the per capita level of transfers which is allocated to the European regions, hence creating differences between and within countries. The resulting map of eligible regions for the programme period 1994-1999 can be found in Figure 5.2 in the appendix.

The large scale of EU regional policy has already motivated a lot of economic research, especially concerning the impact of structural spending on national and regional GDP growth performance. The results of these studies have sometimes been inconclusive in the past (see Mohl and Hagen (2011) for an overview), but most recent evidence by Becker et al. (2009) and Mohl and Hagen (2010) suggests that a significantly positive growth effect exists, in particular for Objective 1 spending. Their finding is of high importance for our analysis, since it confirms that EU structural policy is indeed a *regional* policy with perceptible benefits for selected European regions, and it is not designed as a national transfer programme.

Another important aspect of EU regional policy for our purpose is the fact that it meets all demands to be very visible to the European citizens, probably much more than comparable national programmes. First, as mentioned above, the amounts allocated to the main beneficiary regions are very high and a major share contributes to the financing of large-scale projects within these regions such as infrastructure projects (like motorways or public transport) through the European Regional Development Fund (ERDF); further activities are environmental projects, direct aid to enterprises and human resources through the European Social Fund (ESF). Second, the Commission is aware of the capability of this policy area to improve the public opinion towards the European institutions and the citizens' support for European integration (see Begg, 2008), and therefore the responsible institutions actively promote the visibility of these funds. This activity is particularly motivated by the fact that structural spending is the only major spending category of the European budget which can reach broad levels of the population, while most other policies, such as agriculture policy, are focused on small groups only.

This intended promotion of regional policy is fixed in the Commission's regulations and takes different forms. One important channel is the media. It is explicitly stated in the Council regulations that the managing authorities have to actively resort to the media in order to make the citizens aware of the transfers they receive.[6] Moreover,

[5]There existed 5 further objectives in the period 1994-1999, and 2 from 2000-2006. For more details, see European Commission (2008).

[6]In Regulation No 1159/2000, it is stated that "in order to make the public more aware of the part played by the European Union in the assistance packages concerned and the results they achieve, the designated managing authority shall inform the media in the most appropriate way about the structural

Figure 5.1: Information signs. Sources: own material; DG Regio

regulations demand that investments which are funded by EU structural funds have to be labelled extensively with the symbols of the EU, both on construction signs (such as those shown in Figure 5.1) as well as with emblems on the finished projects (see, e.g., European Commission, 2000; 2006). Consequently, the EU is omnipresent in the benefiting regions, with the symbol of the flag of Europe visible in all supported regions, ranging from public buses in Athens to wastebaskets in Santiago de Compostela.

5.3.3 Support for European integration

For the measurement of public opinion, we will resort to the support for the EU and its institutions at the individual level as expressed in public opinion surveys. Our approach differs from most of the related literature that measures aggregate public support at the subnational level by using election results. To our knowledge, Manacorda et al. (2011) is the only related paper that applies a similar survey-based approach for Uruguay, but their work has its focus on personal transfers instead of regional transfers.[7] Similarly, Chen (2008) and Pop-Eleches and Pop-Eleches (2009) show that targeted personal transfers can buy political support.

The use of survey data offers several advantages over the use of vote equations. Election results only give a crude picture of the public opinion since votes are only available for individual electoral districts at an aggregate level. In vote equations many further determinants of electoral outcomes are unobservable or have to be appraised, such as the ideological positions or other socio-economic characteristics of the inhabitants of a

assistance part-financed by the Union. [...] Steps shall be taken, at the time of the original launch of assistance following approval by the Commission and of the main phases of implementation, to alert the national and regional media (press, radio and television) as appropriate; such steps may include press releases, the placing of articles, supplements in the most suitable newspapers and site visits."

[7] In particular, approval for the current government (surveyed in the Latinobarómetro public opinion) is explained by transfers within a large anti-poverty program.

municipality. In contrast, survey data allows to control for many of these variables by means of the individual characteristics that are available from the respondents. Moreover, the usually higher availability of public opinion polls provides more observations than votes which are only conducted irregularly and may be influenced by campaigning activities. Finally, direct statements of public support in surveys exclude the possibility that strategic voting motives might interfere with the "true" opinion of the citizens.

Concerning the public support for the European Union, a voluminous literature from political science already exists which has mainly been published on the basis of Eurobarometer survey data. From these studies, much is known about further determinants of citizens' attitudes towards European integration. These will enter our analysis as control variables and will be presented in the following section. This facilitates us to isolate the pure effect of the intensity of structural funds spending on the citizens' support from a variety of other influences.

5.4 Data and empirical approach

5.4.1 Data

The data for EU structural funds payments at the regional level has been generated from the *Annual Report on the Structural Funds* reports published by the European Commission. In these reports, spending is recorded according to regional programmes, which allows the calculation of overall transfers at the regional level. However, the data available is very limited, which restricts the scope of our analysis to the programme period 1994-1999. Since 2000, payments are not published in Commission publications anymore, so that it is the only period where the amount of funds spent in the regions is reliably available on an annual basis. For the period at hand we can use a detailed annual data base.[8] This goes far beyond the data which is usually applied in the growth literature, which is often only the overall payments in the whole programme period. Moreover, many works apply the amount of commitments to the regions instead of the payment figures. Commitments are the maximum amount available which can be called up by the national authorities. These are, however, inappropriate for our analysis, since they are usually only spent in the region at a indeterminate point in time some years after they have been committed. Moreover, in many cases commitments are not paid at all, since they are only available for a period of 2 years and expire after that period (N+2 rule).

We apply the data in form of the annual regional transfers at a per capita base; the descriptive statistics are presented in Table 5.5 in the appendix. As can be expected from the allocation principles presented above, these per capita transfers vary a lot

[8]More detailed information on the data can be found in Mohl and Hagen (2010).

between, but also within countries. The highest average per capita levels can be found for the countries which are entirely eligible for Objective 1, i.e., Ireland, Portugal and Greece. These are up to 10 times higher than those of countries without any Objective 1 regions. The highest within variation can be found for Spain, Germany and Italy. These are countries that consist of both rather poor and very rich regions. Note that even single regions in many rich countries, such as Austria or the Netherlands, exhibit a very high level of transfers. In detail, the average per capita transfer for Objective 1 regions amounts to 148.24 Euros, for the other regions this average only amounts to 16.75 Euros.

The public attitude towards the EU is measured with survey data from the Eurobarometer opinion survey. It has been conducted since 1973 on behalf of the European Commission for a representative sample in all member states (usually about 1,000 participants per country and edition) and performed at least twice a year. Although the composition of questions changes continuously over time, some questions appear regularly in the questionnaires. In particular, we refer to the following question as indicator for public support of the EU: *"Generally speaking, do you think that your country's membership of the European Union is a good thing, bad thing or neither good nor bad?"*. The possible answers are coded as follows: 1 for a 'good thing', 2 for 'neither good nor bad', 3 for a 'bad thing'. The scale is, thus, ordinal, and for illustrative reasons we rescale it so that the values increase with increasing support for the EU (consequently, 1 denotes 'a bad thing', and 3 'a good thing'). For our estimations, we refer to all editions of the Eurobarometer survey between 1995 (EB 43.0) and 1999 (EB 52.1) which contain this question.[9] The graphic representation in Figure 5.3 in the appendix shows that the respondents tended to have a positive attitude towards the EU, with a mean of 2.4. For each respondent, his regional origin is recorded in the data sample at a subnational level, which can in most cases be traced back to NUTS 2 level or an even lower level. After merging the data on structural funds transfers and the Eurobarometer surveys at the same geographical level, it is possible to attribute each individual participant's stated opinion to the transfers spent in his region (expressed in Euros per capita).

In addition to that, we will later refer supplementary to the Eurobarometer issue 43.1bis from 1995. This was a special issue of Eurobarometer which additionally contained some further questions related to the regional policy of the EU. By means of these questions which will be presented at the respective position of the empirical section, we are able to extend the analyses that are conducted based on the large sample by adding further questions focusing on the respondents' awareness of regional policy.

Finally, a number of control variables are used which are listed in Table 5.6 in the appendix. These follow closely the existing political science literature which study the determinants of the public opinion towards the EU. Hooghe and Marks (2005) give an overview of the different theoretical approaches and empirical findings which they classify

[9]The data has been obtained from the Mannheim Eurobarometer Trendfile.

into three groups: (i) economic models, (ii) identity and (iii) political cues. Obviously, our approach has to be classified into the group of *economic models* which explain the people's support by the benefits they derive from European integration. Important examples for further related factors are education, occupation and personal income, since mainly citizens with a high level of human capital can be regarded as beneficiaries from market integration in Europe. These socio-economic controls are also provided by the Eurobarometer survey. National benefits from integration mainly accrue from a high degree of intra-EU openness. Moreover, some papers add national net positions as regressor to control for budgetary benefits from the EU budget. However, this data is not very illustrative for our purpose, since the national net position is inter alia determined by the average of structural funds transfers and the data itself is usually regarded as a bad proxy for economic benefits in the literature (see LeCacheux (2005) for a criticism of this indicator). The other main determinant of net positions is the amount of agricultural subsidies which, however, only benefit farmers. We control for this effect in our regressions. The financing of these gross transfers does not impact the net positions (which are commonly expressed as national share of GDP) significantly. Financing takes place from the pool of EU revenues which are raised from the national budgets in form of contributions. These are roughly proportional to their overall GNI and VAT revenues, so that all countries contribute according to the size of their economy (see Heinemann et al. (2008) for an overview). Consequently, the economic implication at the aggregate level is similar to that of a tax on GDP, but the individual incidence additionally depends on the characteristics of the national tax system which finances the contributions to the EU.[10] *Identity* comprises aspects related to group loyalty (such as nationalism or multiculturalism). It is relevant since European integration interferes with national sovereignty. One important aspect is the socialisation of citizens with the EU, which is usually found to increase with the length of membership. Finally, *cue theory* emphasises the importance of individual interests and values. These comprise, inter alia, the ideological position of the individuals. In the Eurobarometer survey, individuals are asked to locate themselves on an ideology scale ranging from +1 (left) to +10 (right). In order to account for extreme positions, we added the variable *Ideology Extreme*, which yields the absolute deviation of the *Ideology* value from a centrist position (5.5). Moreover, the literature emphasises the relevance of individual post-materialist attitudes, which are usually proxied by their age (see Hix (2005) for a more detailed overview of the literature).

Most of the existing empirical literature focuses on determinants of EU support at the individual and the national level. We extend these existing approaches by adding a number of regional control variables to our variable of main interest which is also measured at the regional level. Lubbers and Scheepers (2005) show that EU support varies significantly across the regions within the European countries. Consequently, controls

[10]This impact on the individual cost-benefit analysis is captured in our regressions as far as possible by the inclusion of individual income as well as other economic control variables.

at the regional level are necessary since we have to rule out that other region-specific factors interfere with the impact of the regional intensity of support. These are derived from the three different approaches given above and follow the variables that are usually applied in the related political science literature as far as possible.[11] Several of these variables capture the industrial structure of a region or account for the economic situation, such as the unemployment rate. The variable *rural* is measured at the individual level since it is based on the self-assessment of the respondents concerning their home town and takes the value of 1 if it is characterised as rural. The dummy for regions that share a border with another member state (*border*) and the *centrality* index address region-specific benefits from European integration through trade. The latter is based on the regional typology of the ESPON (European Spatial Planning Observation Network) data set (ESPON (2005)) which characterises the regions from 0 (very peripheral) to +5 (very central).[12]

5.4.2 Empirical method

The data subsection has shown that the data which is used has a hierarchical structure, since it comprises information from three different levels. Consequently, individuals i from the same region r or country c share common influences when the individual level of EU support is explained in our regressions. This can be seen from equation 1 which represents the basic model as a latent response model.

$$y^*_{irc,t} = \beta_1 + \beta_2 RegionalPayments_{rc,t} + X^1_{irc,t}\beta_3 + X^2_{rc,t}\beta_4 + X^3_{c,t}\beta_5 + \mu_t + \eta_c + \epsilon_{irc,t} \quad (5.1)$$

$X^1_{irc,t}$, $X^2_{rc,t}$ and $X^3_{c,t}$ are sets of covariates that are available at the individual, regional and national level, respectively. The variable of our main interest is $RegionalPayments_{rc,t}$, which is the intensity of regional policy payments a region r of country c receives in year t. Hence, an individual i who was surveyed in year t gets the value of the per capita payments in his region of that year.[13] Moreover, since the respondents were surveyed at different points of time, the model contains a set of year dummies, μ_t, which capture time trends in EU support. A set of location dummies η_c is added in some regressions that control for country-specific influences which can not be captured by the region and country-specific controls, but we will later also present an alternative model that allows

[11] Note that some variables, mainly concerning identity, cannot be included due to lack of availability for our sample.

[12] In particular, it is based on a time based, multimodal accessibility-indicator, calculated for the year 2001. It can be regarded as an indicator of the size of market areas for suppliers of high-level business services. See Vickerman et al. (1999) for the methodology.

[13] Note that this structure implicitly allows for a lag in the effect of transfers on public support, since the payments in our data are recorded towards the completion of a project. There is a lag in the EU statistics to the commitments which are already recorded some time (usually several years) earlier at the point of time when the project is decided and the implementation starts. Consequently, even before t the projects are visible to the citizens.

us to study within-country and between-country effects more explicitly.[14] $\epsilon_{irc,t}$ is the individual error component.

The simple estimation of the given model with the dependent variable measured at the individual level and explanatory variables mainly available at a higher level would suffer from econometric problems, since the assumption of independent observations (and independent errors) is violated because observations are "duplicated" (see, e.g., Steenbergen and Jones (2002)). As a consequence, the application of OLS or probit without a correction underestimates the standard errors and inflates the test statistics. In the following, we will compute clustered standard errors which correct for potential correlation of the error term across observations that are contained within the same cross-sectional unit (i.e., the same NUTS 2 region).[15]

Depending on the survey question which is examined, the model is either estimated by probit analysis (for questions with bivariate answer categories) or by ordered probit analysis (for questions with ranked answer options).

5.4.3 Discussion of potential endogeneity

The study of the causal effect of regional transfers on elections generally suffers from severe methodological problems which we discussed in the literature overview in greater detail. The allocation of funds to regions cannot be regarded as exogenous in cases where politicians use them in order to manipulate the electorate's opinion. In the case of EU regional policy, this problem is of minor importance. Although the European institutions are highly interested in increasing the overall public support of the citizens, it does not imply that they are interested in excessively benefiting single regions. Moreover, this would not even be possible, since the bulk of the funds is allocated according to rules based on objective figures, such as the 75% threshold, a high level of unemployment or a low population density. The distribution of funds within countries is furthermore partly managed by national authorities, which can neither be assumed to be biased by the support of the citizens for the EU in their decisions. The exogeneity of funds allocation with respect to the attitude of the citizens towards the EU is moreover documented by Bouvet and Dall'erba (2010), who study the determinants of the structural funds allocation. According to their work, EU scepticism is not found to significantly affect the national allocation of funds. Concerning the regional allocation, the distribution of Objective 1 spending, and thus the bulk of structural funds, as well as the distribution of Objective 5 spending are neither found to be affected by the attitude of the

[14] Since the annual regional aid intensity is largely constant during a programme period, the use of region dummies is not meaningful in this context.

[15] See Arceneaux and Nickerson (2009) for an overview on the different methods that allow for clustering of error terms. They show analytically and empirically that if the number of clusters is above 20 (as it is in our case), clustered standard errors are equally adequate for precision estimates of group-level effects than hierarchical linear models or random effects models.

citizens' towards the EU. The effects for the further smaller categories, Objective 2 and 3&4 spending, are significant but contradictory, since they point to different directions. However, in both cases the quantitative effect on the funds allocation is negligible, and other economic and political factors are found to have a much stronger effect on the allocation.[16] Consequently, our research design offers the advantage that we can treat the allocation of funds to regions as exogenous with respect to the level of EU support.

However, the dominance of the allocation criteria gives rise to concerns that an omitted variable problem might be existent, since structural funds are to a large extent allocated based on data on the regional prosperity, which is measured as GDP per capita. Although the existing theoretical and empirical literature on EU support does not consider a direct causal impact of regional prosperity on the public opinion, we take this problem seriously in our empirical approach. First, we control for personal income, as well as for the personal economic situation (profession, unemployment status) of the respondents. Second, we control for regional characteristics which affect prosperity and might be assumed to affect public opinion directly (e.g., unemployment rate, industrial structure or peripheral location).

Nevertheless, there are arguments which militate against the existence of a major problem due to omitted variables. Annual regional policy payments are not as highly correlated with regional prosperity as it appears at first glance. The allocation of funds is determined several years before the beginning of the multi-annual programme period, and based on regional GDP figures which are also only available with the delay of several years. Consequently, the regional GDP figures which underly the regional allocation of funds at a given point of time can have an age of up to 15 years (see Mohl and Hagen (2011)). This procedure has regularly led to perverse outcomes, most notably in the case of Ireland. Ireland was the biggest recipient of transfers in per capita terms in the time which is considered (as demonstrated in Table 5.5) although in 1999 it already belonged to the richest countries in Europe, with a GDP per capita at level of 110% of the EU-15 average.

Finally, even if there was an omitted-variable bias, it would rather bias downward the estimates for the effect of regional policy spending. The political science literature cited above stresses that mainly richer and well-educated citizens benefit from integration and, thus, tend to support the EU. Moreover, mainly citizens from regions with higher openness perceive a benefit from European integration. These regions are, however, almost exclusively located in Europe's core and belong to the richest regions, and thus do not receive high transfers from Brussels. Consequently, a potential omitted-variable bias would lead to an underestimation of the effect of transfers on public support, so

[16] Bouvet and Dall'erba (2010) as well as Bodenstein and Kemmerling (2008) find that the economic criteria explain most of the variation in allocated funds, but they also find weak evidence that political factors, such as electoral competition in the regions, impact the distribution at the subnational level. This finding, however, mainly affects the distribution of the small fraction of Objective 2 funds, and does not have a relation to the EU support in the regions.

that our results have to be regarded as rather conservative.

Likewise important is to discuss a potential bias which could arise if the perceived or expected national gains generated by different aspects of European integration were correlated with the national prosperity. At the stage of integration that will be regarded, which is the end of the 1990s, it mainly affected economic integration. Consequently, a first glance at the national attitudes towards liberalisation in general should be helpful. Figure 5.4 in the appendix shows the correlation of the member states level of GDP per capita and the impact of liberalisation on the personal financial situation that is expected by the citizens.[17] This correlation is slightly positive, which indicates that the citizens in the richer countries tended to have a more positive attitude towards the effect of liberalisation than those in poorer countries.

This finding is also in line with the political science literature that discusses a "compensatory" function of the EU budget (see, e.g., Carrubba (1997) and Axt (2000)). Accordingly, the major expansions of the EU regional and cohesion funds in the 1990s can be explained by the intention to compensate the "losers" of integration, as which the poorer member states at that time were considered, in order to abstain from a veto against further integration steps such as the Internal market or EMU which were propagated by the pro-integrationist central European (and richer) member states.[18] This again indicates that a possible omitted variable problem would rather deflate our results, and we will return to this issue after presenting the results in section 5.5.1.

5.5 Empirical results

In this section the empirical results will be presented. In the first subsection, we study the overall impact of the regional transfers on public support for the EU by using the complete data sample presented above. In the second subsection, we restrict to a fraction of the data sample that comprises a special issue of the Euobarometer survey. It provides more detailed information, and we can carry out more detailed analyses. These allow us to study the different steps of our chain of causality individually so that we can study the causality of the relationship between transfers and public opinion.

[17] We use data from Eurobarometer 55.1 from 2001 which is shortly after the end of our period of study. Unfortunately, attitudes towards liberalisation and related issues were not inserted in the Eurobarometer survey before that issue.

[18] For instance, Molle (2007):142 states that in 1993 "(t)he fear of the southern member states to lose out under the influence of the creation of the Monetary Union has been taken away by a package deal that increased the size of the SF [structural funds]".

5.5.1 Effect of transfers on EU support

We start with the presentation of the estimation of equation (5.1) as a pooled model that contains all control variables presented in section 5.3 (column 1 of Table 5.1) as well as year dummies. The variable of main interest is the per capita level of regional policy payments spent in a certain region. This variable shows a positive effect on the individual support for the EU, which is statistically significant and quantitatively sizeable as indicated by the marginal effects: an increase of per capita transfers by 100 Euro increases the probability of being supportive of the EU to the extent of 11% (the marginal effects are in all cases reported for the highest answer category which is 3, and which represents a positive opinion on the EU). Moreover, a number of control variables are highly significant in our model – as well as in the subsequent regressions. These results are well in line with the predictions of the existing political science literature stated above. In particular, a higher degree of education as well as higher income exhibit a positive impact on EU support. Ideology shows an inverse U-curve effect, with the strongest support given by people who locate themselves at the centre of the political spectrum. The coefficients for the dummies for professions also show the expected directions, but one effect is of particular interest in our context: farmers show a significantly lower support for the EU. However, this population group is the main recipient of EU transfers through the Common Agriculture Policy, but obviously it is not possible to disentangle the transfer effect from personal characteristics specific to farmers, as well as their negative attitude towards a perceived overregulation of agricultural markets. Finally, the location (measured by the centrality index) seems to be important, and people from countries with a longer membership are more supportive.

In column 2, we add country dummies to the regression. Their inclusion has an effect on the impact of regional policy transfers: the variable still exhibits a significant positive effect on the public opinion, but the quantitative impact declines a lot compared to the previous approach. This observation deserves further investigation: in Figure 5.5 in the appendix we plot the estimated coefficients for the country dummies against the averaged national transfers. Visual inspection indicates that great proportion of the size of the country fixed effects can be explained by the national differences in received transfers. This effect of the national support level is partially absorbed by the use of country dummies, in particular in those countries which only consist of one region (such as Ireland or Luxembourg). Consequently, this approach doesn't seem to be meaningful when we want to inspect the overall effects of EU regional transfers.

In the following, we propose a different approach which allows us to disentangle the between-country from the within-country effect of the regional policy transfer variable. In column 3, the per capita structural funds payments at the regional level ($RegionalPayments_{rc,t}$ in column 1 & 2) are decomposed into the average national transfers $NationalPayments_{c,t}$ (which is the population-weighted average per capita transfer to all regions within a country) and the deviation of the regional per capita level

Table 5.1: Regression results: support for EU membership – ordered probit

	(1)		(2)		(3)	
Variable	Coeff.	Marg. eff.	Coeff.	Marg. eff.	Coeff.	Marg. eff.
Regional Payments$_{rc,t}$	0.0029***	0.0011	0.0006**	0.0003		
	(0.0004)		(0.0003)			
Regional Payments$_{rc,t}$					0.0014***	0.0005
-National Payments$_{c,t}$					(0.0004)	
National Payments$_{c,t}$					0.0038***	0.0015
					(0.0004)	
Male	0.098***	0.038	0.092***	0.036	0.098***	0.038
	(0.011)		(0.012)		(0.012)	
Age	-0.006	-0.002	-0.006	-0.002	-0.005	-0.002
	(0.004)		(0.004)		(0.004)	
Ideology	-0.029***	-0.011	-0.028**	-0.011	-0.028***	-0.011
	(0.006)		(0.006)		(0.006)	
Ideology extreme	-0.028***	-0.011	-0.038***	-0.015	-0.029***	-0.011
	(0.006)		(0.005)		(0.006)	
Income	0.085***	0.033	0.076***	0.030	0.081***	0.032
	(0.007)		(0.006)		(0.007)	
Education: high	0.353***	0.135	0.401***	0.152	0.378***	0.144
	(0.030)		(0.022)		(0.026)	
Education: medium	0.101***	0.039	0.157***	0.061	0.124***	0.048
	(0.020)		(0.015)		(0.017)	
Education: study	0.457***	0.169	0.472***	0.173	0.478***	0.176
	(0.036)		(0.034)		(0.033)	
Profession: farmer	-0.194***	-0.077	-0.160***	-0.063	-0.209***	-0.083
	(0.055)		(0.056)		0.054	
Profession: manual	-0.131***	-0.053	-0.093***	-0.037	-0.130***	-0.051
	(0.018)		(0.018)		(0.017)	
Profession: professional	0.202***	0.077	0.178***	0.068	0.203***	0.078
	(0.035)		(0.038)		(0.035)	
Profession: executive	0.137***	0.053	0.207***	0.079	0.149***	0.058
	(0.051)		(0.048)		(0.050)	
Profession: unemployed	-0.105***	-0.042	-0.092***	-0.036	-0.095***	-0.038
	(0.024)		(0.022)		(0.024)	
Profession: retired	-0.028*	-0.011	-0.014	-0.006	-0.021	-0.008
	(0.016)		(0.015)		(0.016)	
Rural	-0.020	-0.008	-0.028*	-0.011	-0.012	-0.005
	(0.025)		(0.016)		(0.025)	
Unemployment rate	0.002	0.001	-0.003	-0.001	0.005	0.002
	(0.004)		(0.002)		(0.004)	
Share agriculture	1.501***	0.588	0.541	0.212	1.233***	0.483
	(0.389)		(0.355)		(0.400)	
Share services	-0.068	-0.027	0.089	0.035	-0.252	-0.099
	(0.323)		(0.261)		(0.331)	
Density	-0.010	-0.004	0.011	0.004	0.002	0.001
	(0.037)		(0.017)		(0.035)	
Border	0.062	0.024	0.031	0.012	0.026	0.010
	(0.055)		(0.037)		(0.052)	
Centrality	0.122***	0.048	0.045**	0.017	0.105***	0.041
	(0.041)		(0.021)		(0.038)	
Intra-EU Trade	0.249	0.098	0.036	0.014	0.365	0.143
	(0.316)		(0.733)		(0.291)	
Years of Membership	0.015***	0.006	0.003	0.001	0.016***	0.006
	(0.002)		(0.002)		(0.002)	
year dummies	yes		yes		yes	
country dummies	no		yes		no	
N	141,356		141,356		141,356	
Prob > chi2	0.000		0.000		0.000	

Robust standard errors allowing for clustering at the regional level in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level. Marginal effects are calculated for answer class 3 (membership in the EU is a good think). Sample weights were applied to produce representative estimates.

from the average per capita level of transfers to the country, $RegionalPayments_{rc,t} - NationalPayments_{c,t}$. The latter term is greater than zero for regions which receive higher per capita payments than the national average, and smaller otherwise. Consequently, the first term represents the between-country effect of structural funds payments, and the second term the within country-effect. These two effects are due to their construction practically uncorrelated. If it is assumed that both effects are equal (which is usually done in fixed effects analysis), both coefficients should have the same value (see Rabe-Hesketh and Skrondal (2008) for this approach). This decomposition leads to the following new representation of equation (5.1):

$$\begin{aligned} y^*_{irc,t} &= \beta_1 + \beta_2 NationalPayments_{c,t} + \beta_3(RegionalPayments_{rc,t} \\ &\quad - NationalPayments_{c,t}) + X^1_{irc,t}\beta_4 + X^2_{rc,t}\beta_5 + X^3_{c,t}\beta_6 + \mu_t + \epsilon_{irc,t} \quad (5.2) \end{aligned}$$

The results in column 3 indicate that the between-country effect is significantly higher than the within-country effect (p-value: 0.000). An extra (per capita) Euro paid to each region of a country (between-country effect) generates a higher popularity effect than one extra (per capita) Euro paid only to the respondent's home region (within-country effect). The smaller within effect relative to the between effect corresponds to the lower impact of transfer intensity in the regression that applies country dummies. This observation allows two different explanations. Empirically, one might argue that the initial regression suffers from an omitted variables problem, since an unobservable effect interferes with the average national level of transfers, and which also impacts average national support for the EU directly. However, given the battery of control variables as well as the fact that the related political science literature dismisses such an effect (and usually estimates without using country dummies), we prefer an economic explanation. It it very plausible that the impact of transfers on public opinion does not only depend on the level of transfers that a particular region receives, but the level of transfers that the other regions of the home country receive seems to play a role as well. Such an effect can be explained by the fact that nationwide media or politicians tend to focus on national benefits, and these figures are reported widely when discussing EU policies. Consequently, one may conjecture that structural funds spent in other regions of a country spill over on the public opinion. However, the results also confirm that the regional differences in transfer levels within a country are still important to explain the EU support of the individual citizens. This is demonstrated by the positive coefficient of the within effect. Quantitatively this result indicates that a citizen who lives in a region that receives per capita transfers that are 100 Euro higher than the national average has a higher probability of being supportive of the EU which amounts to 5%.

Coming back to the discussion of potential omitted variable problems in section 5.4.2, some further conclusions can be made based on the results. The variables that proxy further benefits from European integration, such as central location and years of membership, both indicate that, ceteris paribus, citizens in the old and already well inte-

grated countries tended to have a higher opinion of the EU. Moreover, the fact that the within-country effect is significant and sizeable also contradicts the presumption that the positive effect of regional transfers on the citizens' attitudes is mainly driven by further unobservable national benefits from integration.

In the following subsection, we will focus on the causality which is implied by the assumed mechanism. If differences in the individual levels of EU support are in fact caused by different intensities of regional transfers, the two following effects have to measurable: (i) a positive effect of the regional level of transfers on the individual probability of being aware of being a beneficiary, and (ii) a positive effect of being aware of being a beneficiary on the individual support for the EU.

5.5.2 Studying the awareness of the citizens

Until now, we have only studied the overall impact of targeted funds on public support in the EU and abstracted from the role of public awareness of being a beneficiary in this process. In contrast to earlier papers, our data allows us to scrutinise the relevance of the awareness of the European citizens concerning the impact of regional transfers on public support. In the Eurobarometer edition 43.1bis from 1995, some additional questions concerning the degree of information with respect to regional policy were asked. In particular, we refer to the following question (Q41): *"The European Union has, among others, a regional development fund (the ERDF) to give aid to less favoured regions in the European Union. Have you become aware of the activities of this European Union Regional Fund (the ERDF) in (OUR COUNTRY) ?"*, which offered the answer options of yes (1 in the following) and no (0). A positive answer was given by 32.6% of the respondents, a negative one by 67.4%.[19]

First, we study the individual determinants of being aware of being a beneficiary of EU funds. In Table 5.2, we show the regression results for this question, applying the same empirical model as used in the preceding subsection. Of particular interest is again the regional transfer intensity (column 1), which is also decomposed in between-country and within-country effect as before (column 2). Both effects are significant, and the t-test for equal coefficients cannot be rejected at conventional significance levels (p-value: 0.72). The quantitative effects are quite substantial: an increase of the per capita spending of structural funds by an amount of 100 Euros increases the probability of being aware of being benefited by regional policy by about 13%. This indicates that the visibility of EU regional policy indeed increases with the amount which is spent within a region. However, a number of further socio-economic characteristics seem to impact the visibility as well, and these particularly refer to the educational background. This is not a very surprising result, as it may be assumed that higher educated people are better informed about EU policies, notwithstanding the amount spent in the respective jurisdiction.

[19]Note that these values are unweighted for country sizes, and thus not representative averages.

Table 5.2: Regression results: awareness of EU transfers – probit

	(1)		(2)		(3)		(4)	
Variable	Coeff.	Marg.eff.	Coeff.	Marg.eff.	Coeff.	Marg.eff.	Coeff.	Marg.eff.
Regional Payments$_{rc,t}$	0.0037***	0.0013			0.0024***	0.0086	-0.0009	-0.0003
	(0.0005)				(0.00067)		(0.00116)	
Regional Payments$_{rc,t}$			0.0041***	0.0015				
-National Payments$_{c,t}$			(0.0011)					
National Payments$_{c,t}$			0.0037***	0.0013				
			(0.0006)					
Regional Payments$_{rc,t}$					0.0036***	0.0013	0.0038***	0.0014
× Education: high					(0.0006)		(0.0006)	
Regional Payments$_{rc,t}$					0.0015**	0.0005	0.0017***	0.0006
× Education: medium					(0.0007)		(0.0006)	
Regional Payments$_{rc,t}$					0.0021**	0.0007	0.0022**	0.0008
× Education: study					(0.0010)		(0.0010)	
Male	0.326***	0.116	0.326***	0.116	0.327***	0.116	0.341***	0.120
	(0.036)		(0.036)		(0.036)		(0.035)	
Age	0.067***	0.024	0.067***	0.024	0.068***	0.024	0.070***	0.025
	(0.013)		(0.013)		(0.013)		(0.013)	
Ideology	-0.009	-0.003	-0.009	-0.003	-0.008	-0.003	-0.011	-0.004
	(0.008)		(0.008)		(0.008)		(0.008)	
Ideology extreme	0.009	0.003	0.009	0.003	0.010	0.004	0.019	0.007
	(0.013)		(0.013)		(0.013)		(0.014)	
Income	0.105***	0.038	0.106***	0.038	0.104***	0.037	0.105***	0.037
	(0.015)		(0.015)		(0.015)		(0.015)	
Education: high	0.394***	0.145	0.391***	0.144	0.216***	0.079	0.247***	0.090
	(0.054)		(0.053)		(0.062)		(0.053)	
Education: medium	0.197***	0.071	0.195***	0.070	0.093*	0.033	0.090*	0.032
	(0.045)		(0.044)		(0.049)		(0.049)	
Education: study	0.248***	0.092	0.246***	0.091	0.117	0.043	0.148*	0.054
	(0.067)		(0.066)		(0.082)		(0.087)	
Profession: farmer	0.061	0.022	0.062	0.022	0.086	0.031	0.111	0.040
	(0.111)		(0.109)		(0.109)		(0.100)	
Profession: manual	-0.051	-0.018	-0.052	-0.018	-0.051	-0.018	-0.078	-0.027
	(0.049)		(0.049)		(0.049)		(0.048)	
Profession: professional	0.047	0.017	0.047	0.017	0.037	0.013	0.028	0.010
	(0.089)		(0.089)		(0.091)		(0.099)	
Profession: executive	0.173*	0.064	0.173*	0.064	0.177**	0.066	0.226**	0.084
	(0.089)		(0.089)		(0.090)		(0.091)	
Profession: unemployed	0.030	0.011	0.028	0.010	0.031	0.011	0.015	0.005
	(0.066)		(0.065)		(0.066)		(0.065)	
Profession: retired	-0.109**	-0.038	-0.109**	-0.038	-0.122**	-0.043	-0.150***	-0.052
	(0.051)		(0.051)		(0.052)		(0.050)	
Rural	-0.056	-0.020	-0.057	-0.020	-0.060	-0.021	-0.079**	-0.028
	(0.041)		(0.040)		(0.041)		(0.038)	
Unemployment rate	-0.018***	-0.006	-0.018***	-0.006	-0.019***	-0.007	0.002	0.001
	(0.004)		(0.004)		(0.004)		(0.004)	
Share agriculture	-1.570***	-0.560	-1.548***	-0.553	-1.646***	-0.588	1.030	0.366
	(0.444)		(0.462)		(0.469)		(0.782)	
Share services	0.726*	0.259	0.746*	0.266	0.805*	0.287	1.142**	0.406
	(0.441)		(0.442)		(0.443)		(0.447)	
Density	0.093***	0.033	0.093***	0.033	0.097***	0.035	0.008	0.003
	(0.026)		(0.026)		(0.026)		(0.008)	
Border	0.053	0.019	0.054	0.019	0.069	0.025	-0.078	-0.028
	(0.055)		(0.054)		(0.054)		(0.063)	
Centrality	-0.083	-0.030	-0.083	-0.030	-0.089*	-0.032	-0.057	-0.020
	(0.054)		(0.054)		(0.054)		(0.051)	
Years of Membership	-0.002	-0.001	-0.002	-0.001	-0.002	-0.001	-0.003	-0.001
	(0.002)		(0.002)		(0.002)		(0.003)	
Constant	-1.260***		-1.263***		-1.172***		-1.909***	
	(0.279)		(0.278)		(0.280)		(0.295)	
country dummies	no		no		no		yes	
N	10,266		10,266		10,266		10,266	
Prob > chi2	0.000		0.000		0.000		0.000	

Robust standard errors allowing for clustering at the regional level in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

In column 3, we take a closer look at the effect of education on the awareness of being a beneficiary of EU funds. We interact the education dummies with the regional aid intensity and find that the responsiveness of the individual's awareness to the aid intensity increases with the level of education (it is highest for the group of highly educated people, and lowest for the least educated which serve as the baseline category). From this finding an interesting conclusion can be drawn: the individual's awareness of being a beneficiary of EU structural funds generally increases with the aid intensity, but this effect is highly heterogenous and crucially depends on his education level. This finding is also robust to the inclusion of a full set of country dummies (column 4); however, in this regression the overall positive effect of transfers on awareness disappears for the low-educated citizens, whereas it stays robust for the highly educated.

In the second step, we want to study whether the stated awareness of the citizen of being a beneficiary of transfers actually leads to an increase of his EU support. In column 1 of Table 5.3, we build on the baseline estimation from section 5.5.1 and replace the regional payments with the survey data for the individual's awareness of being a beneficiary of EU regional funds. The dummy takes the value of one in cases where the respondent is aware of EU regional policy transfers in his country. The dummy shows the predicted positive sign at the 5% significance level: the awareness of being funded by EU regional policy increases the probability of a positive attitude towards the EU by about 4%. This result is also robust to the inclusion of the full set of country dummies (column 2). This finding verifies the existence of the mechanism sketched above: the regional aid intensity positively affects the citizens awareness' of being benefited, which in turn positively affects their attitude towards the EU.

Then, we study the information channels underlying this effect. We are able to decompose the awareness variable with respect to the information source which made the respondent aware of being benefited. This decomposition is available from a further question of the survey. Participants were asked how they became aware of receiving transfers from regional policy, and five different sources were offered in the questionnaire (see Table 5.4 for descriptive statistics): (i) have read about it in press, (ii) have heard about it on television or radio, (iii) have seen information on signs, (iv) have personally received help, employment or advice, (v) know someone who received help, employment or advice. These different channels impacted very differently on public awareness: the strongest impact came from media, whereas very few citizens encountered regional policy by personally receiving transfers. The information signs also turn out to have a rather small effect on public awareness, despite their high visibility which is assumed by the European institutions.

In column 3 of Table 5.3, we replace the awareness dummy with its components (the dummies have the value of one in cases where the respondent became aware by means of the respective information source). These results show very different impacts on EU support depending on the sources of information. A highly significant positive impact

Table 5.3: Regression results: support for EU membership – ordered probit (EB 43.1 only)

	(1)		(2)		(3)		(4)	
Variable	Coeff.	Marg.eff.	Coeff.	Marg.eff.	Coeff.	Marg.eff.	Coeff.	Marg.eff.
Informed	0.101**	0.039	0.080**	0.031				
	(0.044)		(0.032)					
Informed: press					0.043	0.017		
					(0.050)			
Informed: tv					0.097**	0.037		
					(0.043)			
Informed: signs					0.098	0.038		
					(0.073)			
Informed: ownexp					0.363***	0.131		
					(0.135)			
Informed: othexp					-0.135*	-0.053		
					(0.074)			
Regional Payments$_{rc,t}$							0.0036***	0.0014
-National Payments $_{c,t}$							(0.0012)	
National Payments$_{c,t}$							0.0025***	0.0010
							(0.0006)	
Male	0.110***	0.043	0.117***	0.045	0.105***	0.041	0.114**	0.044
	(0.039)		(0.042)		(0.040)		(0.046)	
Age	-0.020*	-0.008	-0.016	-0.006	0.021*	0.008	0.020	0.008
	(0.011)		(0.011)		(0.011)		(0.015)	
Ideology	0.043**	0.017	0.044**	0.017	0.043**	0.017	0.033	0.013
	(0.022)		(0.022)		(0.022)		(0.021)	
Ideology extreme	-0.038***	-0.015	-0.036***	-0.014	-0.038***	-0.015	-0.039***	-0.015
	(0.011)		(0.011)		(0.011)		(0.013)	
Income	0.075***	0.029	0.064***	0.025	0.073***	0.028	0.077***	0.030
	(0.015)		(0.013)		(0.014)		(0.015)	
Education: high	0.210***	0.080	0.301***	0.113	0.208***	0.079	0.253***	0.097
	(0.079)		(0.043)		(0.077)		(0.061)	
Education: medium	0.081*	0.031	0.106***	0.040	0.082*	0.031	0.074	0.027
	(0.045)		(0.036)		(0.044)		(0.045)	
Education: study	0.268***	0.100	0.338***	0.124	0.267***	0.099	0.305***	0.115
	(0.084)		(0.061)		(0.082)		(0.084)	
Profession: farmer	-0.263**	-0.104	-0.280**	-0.110	-0.262**	-0.104	-0.235	-0.093
	(0.123)		(0.126)		(0.125)		(0.145)	
Profession: manual	-0.135***	-0.053	-0.102**	-0.040	-0.132***	-0.051	-0.171***	-0.067
	(0.037)		(0.045)		(0.037)		(0.048)	
Profession: professional	0.089	0.034	0.025	0.010	0.086	0.033	0.067	0.026
	(0.096)		(0.099)		(0.097)		(0.122)	
Profession: executive	0.111	0.042	0.054	0.021	0.102	0.039	0.138	0.053
	(0.152)		(0.155)		(0.154)		(0.167)	
Profession: unemployed	-0.073	-0.028	-0.105*	-0.041	-0.074	-0.029	-0.087	-0.034
	(0.066)		(0.059)		(0.067)		(0.065)	
Profession: retired	-0.033	-0.013	-0.024	-0.009	-0.032	-0.012	-0.044	-0.017
	(0.038)		(0.037)		(0.037)		(0.052)	
Rural	0.060	0.023	-0.070*	-0.027	0.059	0.023	0.072	0.028
	(0.040)		(0.037)		(0.040)		(0.045)	
Unemployment rate	-0.003	-0.001	-0.010**	-0.004	-0.003	-0.001	-0.008	-0.003
	(0.005)		(0.005)		(0.005)		(0.005)	
Share agriculture	1.657***	0.640	0.178	-0.069	1.662***	0.642	0.653	0.255
	(0.522)		(0.610)		(0.523)		(0.510)	
Share services	-0.965	-0.373	0.226	0.087	-0.949	-0.367	-0.474	-0.185
	(0.651)		(0.466)		(0.647)		(0.654)	
Density	0.039	0.015	0.014	0.005	0.042	0.016	0.064	0.025
	(0.039)		(0.023)		(0.038)		(0.042)	
Border	-0.076	-0.029	0.022	0.009	-0.075	-0.029	-0.024	-0.010
	(0.106)		(0.054)		(0.106)		(0.107)	
Centrality	0.110	0.042	0.037	0.014	0.108	0.042	0.108	0.042
	(0.074)		(0.037)		(0.074)		(0.084)	
Years of Membership	0.018***	0.007	-0.003	-0.001	0.019***	0.007	0.020***	0.008
	(0.003)		(0.004)		(0.003)		(0.003)	
country dummies	no		yes		no		no	
N	9,831		9,831		10,266		6,553	
Prob > chi2	0.000		0.000		0.000		0.000	

Robust standard errors allowing for clustering at the regional level in parentheses: * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level. Marginal effects are calculated for answer class 3 (membership in the EU is a good thing).

Table 5.4: Information sources

	Press	TV or radio	Information signs	Recipient	Knows recipient
Share of responses	0.21	0.23	0.05	0.02	0.04

Total: 13,607 observations.

can be detected for citizens who directly received EU funds, and the quantitative impact is very strong: being a direct recipient of structural funds increases the probability of supporting the EU by 13.2%. A significant positive impact can besides only be measured for TV, but the marginal effect is much smaller in size (3.7%). Information by local press or through information signs, which are both very transparent indicators of a local benefit, show a positive impact on EU support which, however, does not turn out to be significantly different from zero. Interestingly enough, the knowledge that other people received structural funds even has a negative impact on the respondents' support. One might speculate that in these cases the non-recipients evaluate regional transfers just like personal transfers from which they do not benefit, which inevitably leads to a negative cost-benefit analysis from their point of view.

Summing up, it can be concluded that the final link of our argumentation chain presented above can be confirmed, which implies that the awareness of being benefited by EU regional policy positively impacts on the opinion towards the EU. However, just like the awareness itself, this effect is also highly heterogenous and crucially depends on the source of information which makes the citizen aware of being a beneficiary.

Finally, we study whether the positive effect of transfers on EU support is limited to those citizens who state that they are aware of ERDF. The relative small share of those who affirm this (less than one third) suggests that much of the effect might be transmitted indirectly. Possible indirect channels are social interactions with people who are aware of EU transfers (and, consequently, more EU-friendly), more positive media coverage of the EU in benefited regions or a more EU-friendly sentiment of local politics.[20] In column 4 of Table 5.3, the sample is limited to those respondents who negate the awareness of being supported. The results again indicate a positive impact of transfers on EU support, thus implying that transfers also might affect public support indirectly.

[20]Moreover, it cannot be excluded that some people who were actually aware of EU regional policy spending did not understand the rather technical survey question, which explicitly referred to the ERDF, correctly.

5.6 Conclusions

The European institutions have a high interest in increasing the public opinion towards European integration. As we have shown, the transfers targeted to the European regions in the framework of the structural policy indeed show a positive impact on the public support of the EU. The impact of these transfers over the period 1995-1999 turned out to be significant and sizeable. However, this positive effect on the public opinion was not restricted to benefited regions, since spill-over within the countries seem to be at work. The results indicate that citizens mainly take transfers to their own region into account, but to a smaller extent also transfers to other regions of their home country.

This chapter also provides more general evidence concerning the relevance of vote purchasing approaches. As we presented above, it is important to disentangle two aspects when studying the impact of regional transfers on public opinion. First, citizens have to be aware of being benefited, and second, their knowledge has to be reflected in higher support by the citizens, i.e., the benefactor has to get a reward for the transfers. In this regard, our contribution is the first to present evidence for this complete transmission process. We found evidence that both steps tend to work as predicted. However, these processes are far from having homogenous effects across all citizens. First, the awareness of being a beneficiary of transfers is conditional on a number of further socio-economic characteristics. Primarily, education seems to play an important role, since higher educated people do not only show the higher unconditional awareness of being benefited, but they also react stronger to regional transfers than lower educated people. Second, the awareness of being benefited is generally reflected in higher public support of the EU, but this effect is also heterogenous. In particular, it is the channel of information which is important. As demonstrated, a positive awareness can even lead to a negative assessment of regional policy in cases where other people are direct recipients of funds.

The chapter has demonstrated that some predictions which underlie the vote purchasing literature can be confirmed for EU regional policy. However, one should be reluctant to generalise the implications to all kinds of national transfer policies that are conducted by higher-tier governments of national federal systems. In particular, the observed effects require a high level of transfers and a high visibility to the citizens, two preconditions which are apparently met by EU regional policy, but not necessarily for short-term programs issued by the incumbents at the national level prior to elections. Even more so, personal transfers turned out to have a much higher impact on the individual's opinion. Consequently, it should be the more relevant instrument concerning the purchasing of votes, which is also supported by the study of Manacorda et al. (2011) for electoral effects of personal transfer policies.

5.7 Appendix

Table 5.5: Regional Policy: Payments per capita

Country	Mean	Std. Dev.	Min.	Max
France	21.25	14.60	5.44	126.93
Belgium	21.62	27.14	4.78	133.13
Netherlands	15.89	13.13	3.07	166.40
Germany	63.42	63.24	1.66	243.58
Italy	36.52	46.01	0.00	296.93
Luxembourg	14.66	6.06	9.42	24.08
Denmark	13.37	3.57	9.97	18.60
Ireland	244.65	18.76	214.20	289.29
United Kingdom	20.47	17.71	0.00	93.14
Greece	162.58	43.76	116.62	306.33
Spain	121.56	72.37	16.42	365.71
Portugal	207.07	33.76	152.94	283.62
Finland	33.07	17.45	12.30	68.02
Sweden	15.45	11.05	3.07	48.87
Austria	20.78	15.24	4.04	160.59

Table 5.6: Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min	Max	Source
	Individual level data					
EU Support	Answer to the survey question: "Generally speaking, do you think that your country's membership of the European Union is a good thing, bad thing or neither good nor bad?"; good: 1, neither good or bad: 2, bad: 3	1.61	0.76	1	3	Mannheim Eurobarometer Trend File (METF)
Male	Dummy variable for male	0.51	0.50	0	1	METF
Age	Age groups: 1 for age $<$ 25, 2 for $<$ 35, 3 for $<$ 45, 4 for $<$ 55, 5 for $<$ 65, 6 for $>=$ 65	3.61	1.70	1	6	METF
Ideology	Ideological position stated by the survey respondent, ranging from 1 (left) to 10 (right)	5.23	2.02	1	10	METF
Ideology extreme	Absolute difference of stated ideology from center	1.64	1.21	0.5	4.5	own calculations based on METF
Income	Personal income based on income quartiles	2.40	1.10	1	4	own calculations based on METF
Education: high	Dummy variable for respondents who stopped full-time education at the age of 20 or older	0.28	0.45	0	1	METF
Education: medium	Dummy variable for respondents who stopped full-time education between the age of 16 and 19	0.37	0.48	0	1	METF
Education: study	Dummy variable for respondents who are still studying	0.08	0.29	0	1	METF
Profession: farmer	Dummy variable for farmers	0.02	0.13	0	1	METF
Profession: manual	Dummy variable for manual workers	0.14	0.34	0	1	METF
Profession: professional	Dummy variable for professionals	0.03	0.18	0	1	METF
Profession: executive	Dummy variable for executive positions	0.02	0.12	0	1	METF
Profession: unemployed	Dummy variable for unemployed people	0.06	0.24	0	1	METF
Profession: retired	Dummy variable for retired people	0.21	0.41	0	1	METF
Rural	Dummy variable for rural communities	0.27	0.45	0	1	own calculations based on METF
	Regional level data					
Regional payments	Regional policy payments in Euros per capita	61.41	76.53	0	365.71	own calculations based on various issues of the Annual Report on the Structural Funds by the European Commission
Unemployment	Unemployment rate	8.91	5.98	2.29	39.1	European Regional Database, Cambridge Econometrics

Table 5.6: Descriptive Statistics (continued)

Variable	Description	Mean	Std. Dev.	Min	Max	Source
Share agriculture	Share of agriculture in total employment	0.07	0.08	0.00	0.61	own calculations based on European Regional Database, Cambridge Econometrics
Share services	Share of services in total GVA	0.45	0.08	0.28	0.70	own calculations based on European Regional Database, Cambridge Econometrics
Density	Population in 1,000 per km^2	0.34	0.73	0.00	5.94	own calculations based on European Regional Database, Cambridge Econometrics
Border	Dummy for regions sharing a border with other member state	0.39	0.40	0	1	own calculations
Centrality	Index for the accessibility of regions, ranging from 1 (very peripheral) to 5 (very central)	2.98	0.87	1	5	ESPON (2005)
	National level data					
Intra-EU Trade	Share of intra-EU trade in GDP	0.21	0.11	0.09	0.51	own calculations based on Eurostat
Years of Membership	Years of membership in the EU	20.62	14.97	0	41	own calculations

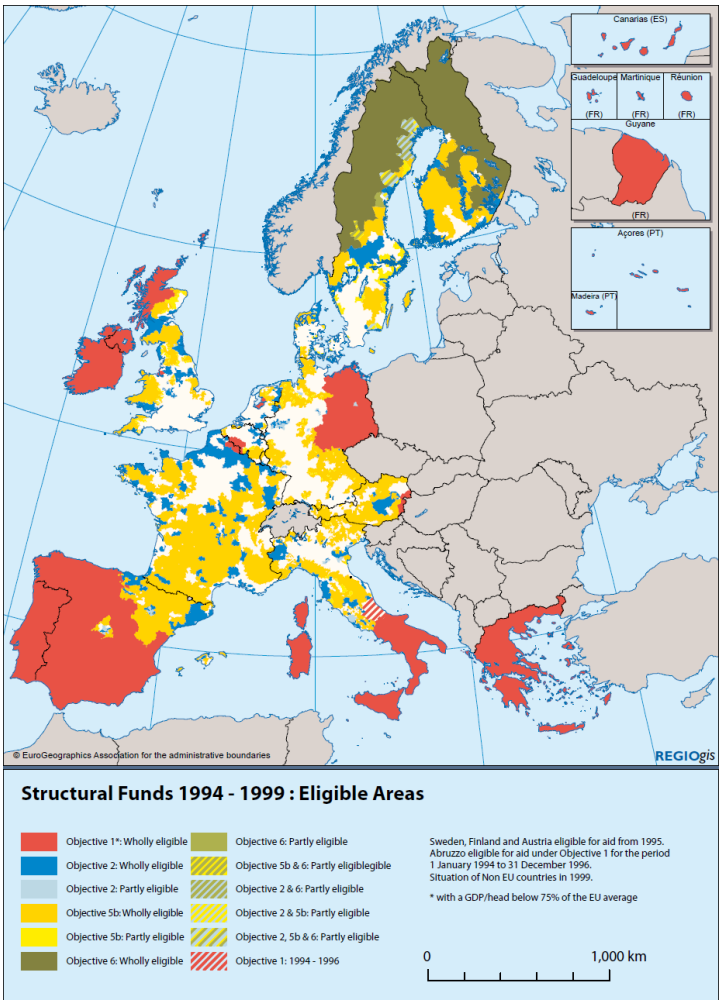

Figure 5.2: Map of eligible regions. Source: DG Regio

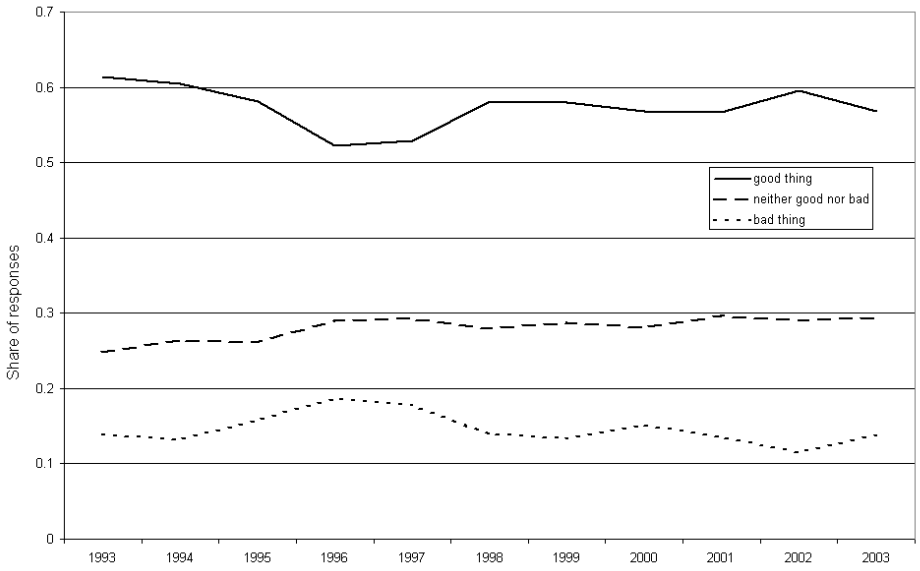

Figure 5.3: Development of EU support

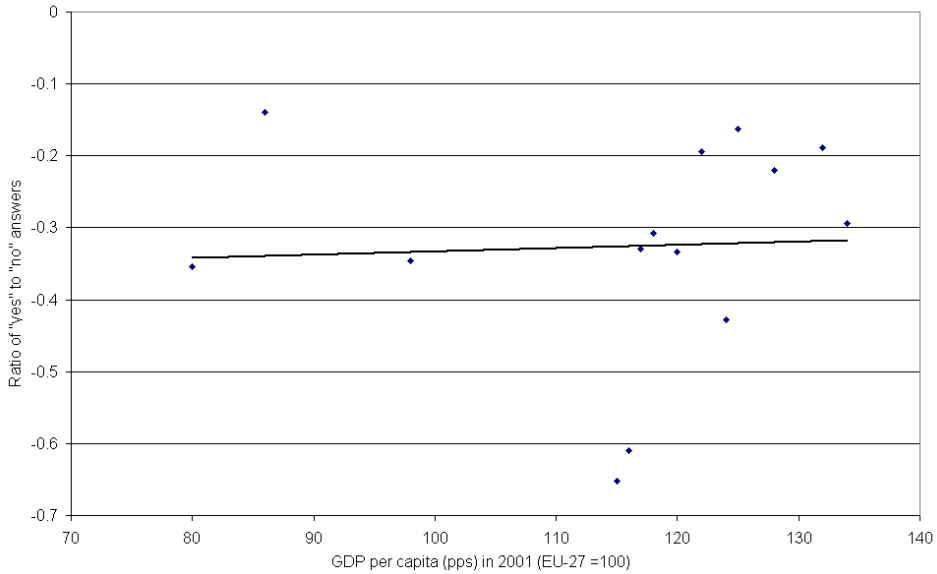

Figure 5.4: Correlation of national prosperity and expected benefits from trade liberalisation. The reported question is Q35 from Eurobarometer 55.1: "Do you think that your personal financial situation will benefit from this liberalisation?"

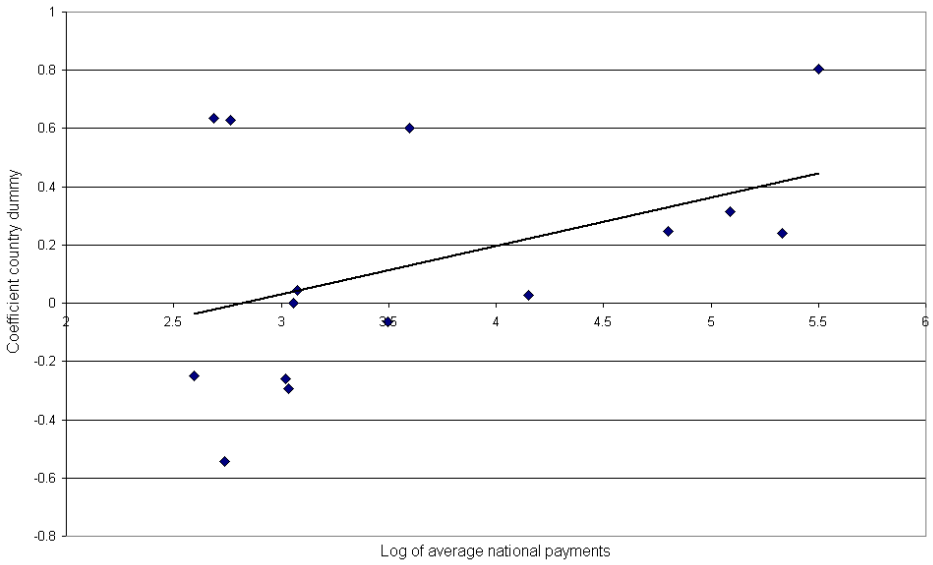

Figure 5.5: Correlation of country dummies and par capita transfers

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Eidesstattliche Erklärung

Hiermit erkläre ich, die vorliegende Dissertation selbständig angefertigt und mich keiner anderen als der in ihr angegebenen Hilfsmittel bedient zu haben. Insbesondere sind sämtliche Zitate aus anderen Quellen als solche gekennzeichnet und mit Quellenangaben versehen.

Mannheim, 12.07.2011

Steffen Osterloh