Tax Competition in the Eurozone
Capital Mobility, Agglomeration, and the Small Country Disadvantage

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Abstract

The increasing economic integration among OECD countries since the late 1970s has attracted much attention in tax policy research. Although several studies have tested whether capital mobility induces a race to the bottom in capital taxation, the two approaches – competition and compensation theory – provide diametrically opposed answers to this question. One theory predicts a reduction in taxation, the other a stagnation or increase in taxation. This paper examines the question once again. However, instead of aggregating all OECD countries into one sample, it compares EMU countries – with nearly perfect capital mobility – to non-EMU countries in a difference-in-differences regression. Controlling for market size, I found that the EMU led to a divergence in taxation for small and large countries. Although the reduction in small countries could be explained by competition theory, the increase in large countries is not in line with the conventional theories. I argue that agglomeration forces give large countries an advantage in terms of attracting foreign direct investment (FDI) because of beneficial supply and demand chains. Small countries are disadvantaged in terms of capital attraction, which they counter by reducing capital taxation.

Zusammenfassung

Die zunehmende wirtschaftliche Integration der OECD-Länder seit den späten 1970er-Jahren ist für die Steuerforschung von großem Interesse. In verschiedenen Studien wurde bereits untersucht, ob Kapitalmobilität zu einer Abwärtsspirale bei der Kapitalbesteuerung führt. Doch die Analysen der beiden Literaturstränge – Wettbewerbs- sowie Kompensationstheorie – kommen zu gegensätzlichen Ergebnissen. Während eine Theorie eine Senkung der Besteuerung prognostiziert, prophezeit die andere eine Stagnation oder einen Anstieg. Dieses Papier untersucht die Frage ein weiteres Mal, erstmalig allerdings auf der Basis eines Vergleichs von EWU-Ländern – mit fast perfekter Kapitalmobilität – und Nicht-EWU-Ländern. Die *Difference-in-Differences*-Regression zeigt, dass die EWU divergierende Entwicklungen in der Besteuerung kleiner und großer Länder befördert hat. Während die Reduzierung der Besteuerung in kleinen Staaten mit der Wettbewerbstheorie erklärt werden könnte, ist der Anstieg in großen Mitgliedsstaaten nicht mit den herkömmlichen Theorien vereinbar. Die Autorin argumentiert, dass Agglomerationskräfte den großen Mitgliedsstaaten durch günstige Liefer- und Nachfrageketten einen Vorteil im Hinblick auf ausländische Direktinvestitionen verschaffen. Kleine Staaten sind wegen ihrer geringeren Kapitalattraktivität benachteiligt, der sie mit einer Senkung der Kapitalbesteuerung entgegenwirken wollen.

Contents

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1   Introduction: Tax competition and the euro

The impact of globalization on national welfare states is one of the most pressing issues in contemporary political science. Over the last three decades, numerous studies have examined the effect of increasing economic integration on social policies. Central to this is the issue of whether states can tax capital. Many scholars have argued that high capital taxation leads to the relocation of production. As a consequence, they maintain that the mobility of capital leads governments to reduce capital tax rates, which in turn restricts welfare spending. Ultimately, this debate has culminated in a controversy about the highly integrated eurozone and the retrenchment of European welfare states.[1]

Despite its relevance, current research is divided on the question of tax competition. In fact, there are two different and controversial strands in the literature. On the one hand, the *tax competition literature* provides evidence that trade integration and capital mobility induce governments to engage in a "race to the bottom" in capital taxation.[2] On the other hand, the *compensation literature* provides data suggesting that capital taxation is fairly resistant to integration pressure, and that if anything, the association is positive.[3]

One reason for the contrary findings of these studies is the aggregation of data for many different countries. Recent studies claim that the relationship between integration and taxation differs for small and large countries. The *small country advantage thesis*, for instance, argues that small countries promote a relatively large inflow of capital in per capita terms if they reduce taxation. Thus, if small and large countries compete for capital, small countries will end up with lower tax burdens than large countries.

1   For a summary see Bolukbasi (2009).
2   See for example Tanzi (1995), Rodrik (1997), Bretschger/Hettich (2002), and Winner (2005).
3   Examples for this approach are Garrett (1995, 1998), Garrett/Mitchell (2001), Quinn (1997), Basinger/Hallerberg (1998).

Another possible explanation for different trends in tax policies can be derived from *New Economic Geography.* This theory argues that large countries have an advantage in attracting foreign direct investment (FDI) because multinational enterprises (MNEs) can take advantage of the well-developed demand and supply chains. Under increasing integration, production concentrates in these markets. If this holds true, small countries are at a *disadvantage* because to attract investment they have to lower production costs and thus taxation. Large countries, on the other hand, can tax the capital that becomes concentrated under their jurisdiction.

If it is true that integration affects taxation, the impact should be most visible within the eurozone. The European Economic and Monetary Union (EMU) initiated a massive liberalization of transnational capital among member countries. Income from foreign investments was made more secure due to the abolishment of capital controls, harmonized price levels and restrained sovereign debt. In addition, the introduction of the common currency eliminated any remaining exchange rate risks for investors. All of these factors significantly facilitated the calculation of MNE profits and reduced their transaction costs (see Petroulas 2007), which is why I decided to compare the development of taxation in the EMU with OECD countries outside the EMU.

In order to capture both the effect of EMU integration and country size, a specific regression model, the difference-in-differences regression, was applied. It compares the changes in tax burdens for a) EMU and non-EMU countries, for b) small and large countries, and c) before and after EMU integration. I found that capital taxation diverged between small and large EMU countries after FDI became highly mobile through the introduction of the euro. Small countries reduced taxation after 1996, whereas large countries increased it.

My findings reject the small country advantage theory, which predicts a reduced or stable taxation in large countries and increased revenues in small countries. Instead, the findings support the agglomeration approach of the New Economic Geography, which expects capital flows to large economies to lead to an increase in capital taxation in large countries.

The remainder of this paper is structured as follows: Section 2 summarizes the two main theories on tax research: tax competition theory and compensation theory. This is followed in Section 3 by an introduction to the theoretical explanation for the small country disadvantage. In addition, the relevance of the euro for the concentration of production is debated. Section 4 introduces the data and methodology applied in this paper. The analysis and findings are presented in Section 5, and Section 6 assesses the explanatory value of these findings in light of the theoretical assumptions.

2   The unresolved issue of globalization effects on tax policies

With the onset of liberalization and deregulation policies in developed countries, economists and political scientists have intensified their research on capital mobility and taxation. Most studies expected that the exit option of capital would force all countries to reduce the tax burden on capital income irrespective of other economic structures. Consequently, studies aggregated data for the 1970s to the early 2000s from all OECD countries.[4]

The first theory developed in this research field was the *competition theory*. This theory argues that countries enter a "race to the bottom" in capital taxation to attract investments.[5] Lindblom (1977) laid the foundations of this theory, arguing that governments depend on productive investments. Productive investments include setting up a business, increasing the size of production, and increasing employment. To incite growth, governments need policy strategies that will raise investments within their jurisdiction. For much of the post-war period, this strategy involved implementing strict capital controls in order to inhibit the outflow of capital.

However, from the late 1970s, developed countries increasingly began liberalizing capital-account controls, and capital owners were free to invest in foreign markets. In addition, the deregulation of financial markets fostered the development of speculative financial instruments which offered highly profitable investment opportunities besides real capital investments. Many of the funds that had formerly been invested in plants and employment were now invested in financial instruments. The new government strategy to maintain a high level of investment, Steinmo (1994) and Scharpf (2000) argue, was to reduce production costs such as taxation.

In line with this thesis, Tanzi (1995), Bretschger and Hettich (2002), and Devereux et al. (2008) found that the integration of financial markets and the mobility of productive investments lead to tax competition in the OECD. Bretschger (2010) and Rodrik (1997) add that trade integration is another factor that reduces capital taxation. Although not every study reported a robust relationship between integration and taxation,[6] most

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4   The number of countries varied between 12 and 21 OECD countries depending on membership at the time when the respective study was undertaken.

5   The race-to-the-bottom thesis is applied in neoclassical economics by authors such as Tiebout (1956) and Zodrow and Mieszkowski (1986) and in structural dependence theory by, for example, Lindblom (1977), Scharpf (1991, 2000), Kurzer (1993), and Steinmo (1994). The two theories however have contradictory normative implications and offer different explanations of tax competition. While neoclassical theory focuses on the distortive effects of source-based taxes on the efficient allocation of resources, structural dependence theory argues that governments mainly try to attract productive investments with lower taxation. In this paper I will stick to the capital dependence approach to explain the race-to-the-bottom thesis.

6   For example, the findings in Rodrik (1997) are not significant in all models, and Genschel's (2002) descriptive statistics show a stable taxation of capital in aggregated averages.

scholars concluded that all governments have to follow the same pattern of tax reduction. They also inferred that the partisan orientation of governments would increasingly vanish as a significant determinant of capital tax rates.

During the 1980s and the early 1990s, most scholars agreed on the tax competition thesis. However, in the late 1990s, new findings contradicted the relationship between integration and taxation. Garrett (1995), Basinger and Hallerberg (1998), and Slemrod (2004) argued that capital mobility did not have any effect on capital taxation. Even more striking were findings by Quinn (1997) and Swank (1998). They reported that financial market integration and corporate taxes were positively related. Although those findings were used to counter the competition theory, the effects were not very strong and evidence of a positive relationship of integration and taxation was not robust.

In order to explain their findings, Garrett (1995, 1998) and Quinn (1997) derived the *compensation theory* based on the ideas of Cameron (1978) and Katzenstein (1985). Compensation theory argues that governments raise the level of capital taxation to compensate workers for integration risks. On the one hand, income and employment become more insecure as the domestic economy depends more on global markets. Increased interdependence of markets might help spread a recession easily from one country to another. On the other hand, more and more investment projects are being financed through international short-term capital, which puts corporations under great pressure to cut costs. This might lead to layoffs the government has to compensate for (Garrett 1998: 39).

Garrett (1995) and Garrett and Mitchell (2001) add another factor to explain the resilience of capital taxation in the OECD world: corporatism. They argue that the attractiveness of an economy for investment does not only consist of low taxes, but also of low wage expenses. Tripartite institutions are helpful in this area because the government can bargain with trade unions to accept moderate wage increases in exchange for higher capital taxation. The increase in tax revenue can then be used to redistribute income to workers or it could be invested in education, R&D, and infrastructure to enhance the domestic industry's competitiveness.[7] Since left-wing parties are the ones most capable of implementing and using such corporatist institutions, compensation theory expects that governments on the left will increase capital taxation.

The fact that the two literature strands, competition and compensation theory, report contradictory results on tax competition suggests that the aggregation of large data sets hides a more complex causal relation between integration and taxation. Recent attempts at disaggregating tax competition for different groups provide clues for de-

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7   This thesis is derived from New Growth Theory, which argues that public goods like education, infrastructure, and R&D are prerequisites for growth, but are not provided by business. Investing capital tax revenues in such public goods might increase the inflow of FDI. For theoretical details see Barro (1990), Romer (1990), and Lucas (1988).

tecting significant relationships. Bretschger and Hettich (2002), Winner (2005), and Genschel and Schwarz (2013) show that large countries reduce taxation less than small countries. The authors aligned those findings with the theory of asymmetric tax competition introduced by Bucovetsky (1991) and Wilson (1991).

The theory of asymmetric tax competition argues that large countries "compete less vigorously for capital through tax rate reductions" (Wilson 1999: 278) because the resulting inflow of capital is relatively small. This thesis is based on the idea that large countries demand a large share of capital in world markets and thereby affect interest rates. If production costs are reduced, capital owners demand a larger net return, i.e. higher interest rates. Thus, tax reductions are cancelled out by interest rate increases. The capital demand of small countries, however, is low and does not affect interest rates. Thus, small countries have an *advantage* because lower taxation helps promote a relatively large inflow of capital. In per capita terms, revenues increase through this procedure.[8]

3 The concentration of production in the eurozone

There is one newer theoretical approach to tax competition which has not yet been tested comprehensively – the theory of New Economic Geography (NEG). This literature strand argues that increased integration leads to a concentration of capital in large markets and that this *agglomeration process* causes higher capital taxation.

The NEG literature was established by Dixit and Stiglitz (1977) and then extended by Krugman (1991). It builds on the thesis of asymmetric or monopolistic competition and subsequent geographical concentration of production. Monopolistic competition emerges through increasing returns to scale, which means that large firms have low fixed costs per unit of production and are thus rewarded with relatively high profits (Devereux/Griffith 1998: 341). Thus, large industrialized countries that host large firms have an advantage in capital income. If in this situation trade costs are reduced – transportation costs or tariffs –, agglomeration rents will increase because companies can export more cheaply to nearby countries. Consequently, increased economic integration leads to a concentration of capital in large industrialized economies (Dixit/Stiglitz 1977 and Krugman 1991).

If, in addition, capital mobility increases, companies have little reason to source out production because they are "locked in" in a beneficial production environment. First, it is more efficient to produce in a large industrialized market because the demand for products is higher and the firm saves on transportation costs (Haufler/Wooton 1999).

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8   See Kanbur and Keen (1993) and Genschel and Schwarz (2013).

Second, the supply of inputs is more manifold in large economies. Firms can increase their productivity by employing skilled workers and utilizing the variety of intermediate products that are available in large markets. They also gain from technology and knowledge spill-overs (Krugman 1991: 486 and Andersson/Forslid 2003: 285). Not only do these beneficial supply and demand chains prevent the outflow of FDI, but they also encourage the inflow of FDI, which then accelerates the concentration of capital (Haufler/Wooton 1999).

The assumption that capital gets stuck in large markets under integration clashes with the idea of perfect capital mobility in tax competition theory. For this reason, several authors are currently testing the effect of agglomeration on taxation. These authors argue that FDI – the productive investment of multinational corporations in a foreign country to establish new affiliates, extending a branch or merging with another enterprise – is encouraged by a combination of tax reductions and agglomeration tendencies.

Brülhart et al. (2012) found that in municipalities in Switzerland, firms starting up in spatially concentrated sectors are much less responsive to capital taxation than firms in other sectors. Bénassy-Quéré et al. (2005) and Hansson and Olofsdotter (2008) show for the OECD countries that FDI moves where domestic demand and production linkages are beneficial. In addition, Hansson and Olofsdotter (2003) assume that agglomeration leads to an increase in capital taxation; however, they fail to prove this empirically.

In line with those studies, I argue that under increased capital market and trade integration, MNEs force governments to adopt two different FDI attraction strategies. Large countries do not suffer from capital loss under increased capital taxation because investments are "locked in" through the beneficial demand and supply linkages. Additional FDI flows to large markets enable governments to raise capital taxation. Small countries, on the other hand, neither offer high demand nor big clusters of firms in their jurisdictions. Thus, the only way they can attract FDI is to decrease capital taxation until it is lower than the agglomeration rents in large economies. Small countries are at a *disadvantage* because revenues will not increase; if anything, they stay at a stable rate. The consequence is that capital taxation diverges in highly integrated regions.

This divergence in taxation is most likely in a region where trade and capital are mobile across borders and where market sizes deviate significantly between countries. Thus, the EMU is the perfect sample to test the thesis. Many scholars have argued that the common currency and monetary policy implemented by the European Central Bank (ECB) significantly increased capital mobility and that therefore capital taxation would fall to low rates.[9]

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9   See for example Scharpf (2000: 196) and Nölling (2001: 109–112).

Surprisingly, there has been little research on taxation in the EMU. Only one study, an Economic Paper of the European Commission, has been published so far. Alworth and Arachi (2008) found no significant association between the euro and taxation. However, the findings of their study are not fully convincing because they used data for the EU-12 and EU-15 and not the EMU countries. The authors also failed to distinguish between large and small economies and aggregate the effects for the entire sample.

In theory there are several factors that increase the mobility of productive capital and trade among EMU countries. Trade integration was accomplished in the EU Single Market project in 1992. Duties and trade-related taxation were abolished among all EU countries, and exports were freed from non-tariff barriers. It can thus be assumed that agglomeration has been ongoing since 1992 and that more and more capital has moved to the large industrialized countries.

Capital mobility increased especially during the three stages of EMU integration. Foreign direct investments became more flexible due to three factors: reduced legal restrictions to capital movements, increasing price stability, and price transparency. In the run-up to the EMU, all legal capital restrictions were eliminated and national central banks had to keep the exchange rate at a similar rate with the European Monetary System (EMS) (Görgens et al. 2004: 17). The convergence of exchange rates was important for capital mobility because devaluations of the currency vis-à-vis other EMU countries were restricted. Before this integration, devaluations in the FDI host country significantly reduced the profits from investments when they were transferred to the home country (Pain 2002: 103).

In the second stage of the EMU, governments had to adjust inflation, interest, and exchange rates to price stability levels in the period from 1996 to 1997. From 1996 onwards, devaluations were prohibited (Görgens et al. 2004: 17–18). This reduced exchange rate fluctuations to even lower levels and increased price stability. Another factor that increased capital mobility in the second stage of the EMU was the implementation of convergence criteria. The deficit levels of 3 percent GDP and 60 percent debt levels signaled to investors that future debt would not incite central banks to induce inflation to lower government debt, i.e., to pursue debt inflation (McDermott/Wescott 1996: 2). This again increased the willingness of MNEs to invest in other EMU countries. In the third stage, the common currency and common monetary policy were introduced in 1999, thus eliminating any form of exchange rate fluctuation. The common currency makes prices comparable among countries and facilitates planning for firms as input costs and product prices are more easily calculated (Pain 2002: 104).

The introduction of a common monetary policy and the enshrining of price stability in the Treaty on the Functioning of the European Union should therefore be expected to reassure investors that no exchange rate fluctuations will occur and that price stability will prevail. Thus, FDIs are highly mobile across borders. I will show that it also follows that this capital mobility will lead to the further concentration of production in large countries because the costs of outsourcing are reduced.

There is a strong relationship between trade and FDI. One could argue that within the EMU, FDIs become obsolete, as trade is also fully mobile. However, as NEG explains, large economies provide clusters of firms with advanced skills and technology. Thus, firms have the advantage of not only exporting to such countries but also investing in a plant there. In addition, it is also possible that the cost of FDI is lower than the transportation costs from one country to another, and that firms decide to invest in a large market which is not nearby. Moreover, Barrell and Pain (1998) expect that FDIs are used within Europe to serve specific consumer tastes in each country (Barrell/Pain 1998: 156).

Empirical evidence provided by Petroulas (2007) suggests that the introduction of the common currency led to a 16 percent increase in the level of FDI within the eurozone (Petroulas 2007: 1484). Petroulas also suggests that spatial agglomeration is apparent because a larger share of FDI flows to large countries than to small countries. This might mean that economic integration in the EMU concentrates production in large economies through within-EMU FDI (Petroulas 2007: 1482–1483). Although Haufler and Wooton (1999) argue that FDI from outside a region is also relevant, Petroulas (2007) shows that the effect of the euro on FDI from outside the EMU is only half as big as the effect on FDI from within the EMU. Therefore, I will concentrate only on the latter.

Comparing taxation in the EMU with non-EMU countries is ideal for testing whether large and small countries in highly integrated regions implement diverging tax rates. Before the introduction of the euro, trade costs were significantly reduced in the EU single market. Thus capital in large EMU countries received agglomeration rents and gained from economies of scale. With the introduction of the euro, capital mobility increased significantly. More capital moved from small markets to large agglomerated markets to serve local consumer demands and to benefit from inter-firm connections. NEG leads us to suspect that the level of taxation is increased in large countries and reduced in small countries.

4 Methodology, data, and operationalization

Most tax competition studies use aggregated tax policy data for the entire OECD sample and the entire integration period. Only a few recent studies have actually tested the changes in taxation for small and large countries separately. In line with those studies, I argue that the size of a country determines the way tax policy reacts to integration. Thus I want to examine the joint effect of integration and country size. To meet this requirement, I apply the difference-in-differences (DID) regression model, which enables more than one independent variable to interact. In my model the following explanatory dummy variables are used: a) EMU membership, b) the point in time in which the quality of integration changed, and c) the size of markets.

The panel contains data on 22 OECD countries, eleven EMU and eleven non-EMU countries.[10] The time period observed ranges from 1970 to 2009. The variable specifications and data sources are shown in Table 1.A in the Appendix. The formal model looks like this:[11]

$$Ctax_{i,t} = \alpha_i + \beta_t + cX'_{i,t} + \delta(EMU * year * small)_{i,t} + \varepsilon_{i,t}$$

The dependent variable $Ctax_{i,t}$ on the left-hand side of the equation is the "effective average tax rate" (EATR), which has a number of advantages over other tax measures. The statutory corporate tax rate, for instance, is strongly biased.[12] The amount of tax payments is composed of the tax rate and the tax base. The latter is determined by political decisions on tax brackets, tax exemptions, depreciation schedules, inventory allowances, deductions, and tax credits. Thus, examining tax rates alone does not show the full picture of tax policy decisions. For this reason, Quinn (1997) and Garrett (1998) use the overall tax revenues on capital income as a tax indicator. However, this measure is not precise either, as it fluctuates with the level of income.

The EATR overcomes the limitations of the revenue measure by dividing tax revenues by capital income. Thus the EATR cancels out the income effects in the revenue measure. What is left is a pure change in tax policy.[13] Effective tax rates are composed of corporate, property, and personal income taxation. Corporate income taxation (CIT) is paid on profits and capital gains from corporations selling assets. Added to this is personal income taxation (PIT), which is levied on interest, dividends, capital gains, entrepreneurial income of households, and income from unincorporated enterprises. Finally, corporate property income tax and taxes on financial transactions are included. The tax revenue is then divided by the overall profits from corporate and quasi-corporate enterprises.[14]

On the right-hand side of the equation, α_i and β_t denote country and time fixed-effect dummies, respectively. Multivariate regression models attempt to control for as many explanatory variables as possible to make sure that the effect of the independent variable is not disturbed by unobserved heterogeneity. Considering that it is unlikely that all the relevant control variables can be included in the model, fixed effects (FEs) control

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10 The EMU countries are the eleven founding member states of the EMU, except Luxembourg, for which there are no data, and Greece, which entered the union in 2001. The control group is made up of eleven OECD countries with comparable GDP levels.

11 The basic model specifications are derived from Angrist and Krueger (1999: 1299) and Bertrand et al. (2002: 2–3).

12 Slemrod (2004) applies this tax measure.

13 See Bretschger/Hettich (2002: 705) for the general debate on tax measures.

14 See Mendoza et al. (1994) for the specific composition of the EATR. Despite the superiority of the EATR to other tax measures, there are also disadvantages. De Haan and Volkering (2001: 19) mention that the EATR assumes that personal income is taxed by the same rate as capital income, which is not realistic. However, data on the actual share of capital income in PIT revenues is not yet available in cross-national data.

for any unobserved country-specific factors that are constant over time.[15] In addition, due to the dominance of time periods over individual observations, it is advisable to also include time fixed-effects. The time dummies β_t control for shocks that are common to all countries at a certain point in time (Cameron/Trivedi 2009: 266 and Garrett/Mitchell 2001: 164).

Another potential bias in the regression model is serial correlation or autocorrelation. Beck and Katz (1995) argue that data on long-time periods lead to correlation of each country's data points over time. Another problem arising from the data structure is heteroskedasticity. This appears if the error variance deviates strongly from country to country and hence standard errors are underestimated (see Beck/Katz 1995: 636). To control for both error biases, cluster-robust standard errors are included (Cameron/Trivedi 2009: 244 and Brüderl 2010: 977).

The variable of interest is the interaction of *EMU, year,* and *small*. The rationale behind the interaction of dummy variables is to find the differences in tax policy before and after integration for small and large countries. If taxation diverges among countries of different sizes, this methodology should show the divergence. The time dummies *year* are included for 1992, 1996, and 1999 to test which of the following had the strongest effect on taxation: the introduction of the Single Market in 1992, the Maastricht Criteria from 1996 onwards, or the introduction of the common currency in 1999. Time dummies are helpful to compare the average change in the dependent variable before and after an event. It is therefore not necessary to determine whether an effect occurs immediately or is delayed.

I used the country size variable *small* as a measure of agglomeration because current studies have not yet determined the perfect agglomeration measure. One cross-national study found taxation to be associated with the distance and size of other economies (Hansson/Olofsdotter 2003), another found an association of FDI with industry linkages and GDP per capita (Hansson/Olofsdotter 2008). Thus, using the size of GDP captures both factors of interest: the size of the demand in an economy and the size of other firms operating in this economy. The variable *small* is coded 1 for small countries with an average GDP below $500 billion in the period from 1990 to 2009. The small EMU countries include Austria, Belgium, Finland, Greece, Ireland, Netherlands, and Portugal, and the small non-EMU countries include Denmark, New Zealand, Norway, Sweden, and Switzerland. Large EMU countries include France, Germany, Italy, and Spain, and large non-EMU countries include Australia, Canada, Japan, Korea, the UK, and USA.[16]

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15 See Cameron and Trivedi (2009: 230–233). The Hausman test indicated that a correlation between country specific heterogeneity and the independent variable could not be ruled out and that FE should be applied.

16 GDP data are taken from OECD (2010b).

I used a dummy variable as a measure of size because fixed-effect regressions measure within-country changes in the independent variable and keep cross-country differences fixed (Genschel/Schwarz 2013: 75). Thus, with a continuous size variable, FE shows the development of GDP over time *for each* country, but not the effect of different GDP levels *among* countries. If market size is included as a dummy variable, FE contrasts the developments in small countries with the developments in large countries.

$X'_{i,t}$ is a vector of control variables that is likely to affect capital taxation. It includes the following variables: a lagged dependent variable, partisanship, wage levels, the rate of unemployment, the level of production, foreign direct investment mobility, financial investment mobility, and trade. The first control variable, the lagged dependent variable, is included in order to show how that the level of capital taxation is strongly oriented towards the previous level of taxation (Garrett/Mitchell 2001: 146). The variable partisanship comprises the cabinet shares of left-wing and centrist democratic parties.[17] Since compensation theory expects powerful leftist and centrist governments to increase the level of redistribution and capital taxation, this is of great interest for this study. In addition, wage levels are included to test whether compensation theory rightly assumes that leftist governments exchange higher capital taxation for low wages.

The level of unemployment and the size of GDP are included to show the effect of economic well-being on capital taxation. The thesis of small country disadvantage expects better economic conditions to attract FDI and thereby induce agglomeration. Thus, higher GDP and lower unemployment should be positively associated with the level of taxation. Finally, overall integration measures are included as control variables to show how mobility of capital, specifically FDI and portfolio capital, and trade affect taxation.
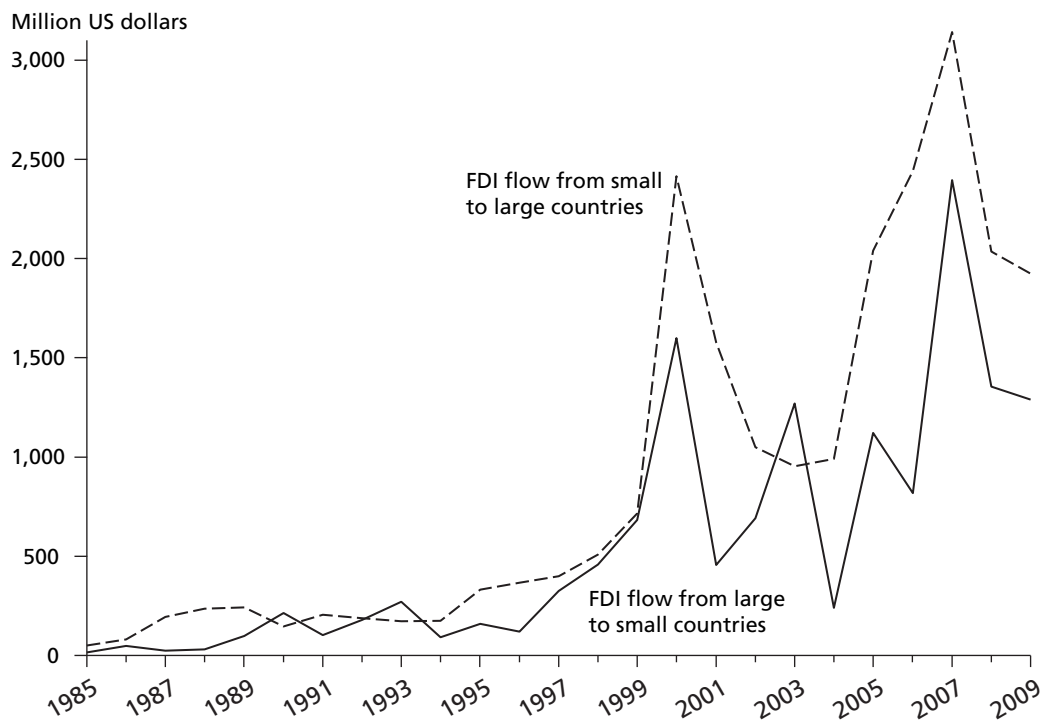
5 Analysis of euro effects on taxation

To present the results of my data analysis, I begin with a number of figures showing the concentration of capital in large countries and the development over time of capital taxation in EMU and non-EMU countries. Then I show the findings of the regression analysis. I conclude by contrasting the effect of integration on taxation for small and large countries.

Figure 1 shows the development of foreign direct investment flows in two different country groups from 1985 to 2009 by contrasting the average FDI flow from small to large EMU countries with the flow from large to small countries. The FDI levels were relatively low and equal during the 1970s, 1980s, and 1990s. In 1996 FDI increased significantly in both directions. The increase can be ascribed to the mobility of capital

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17   Which is also applied in Garrett and Mitchell (2001).

Figure 1   Average FDI flows among EMU country groups

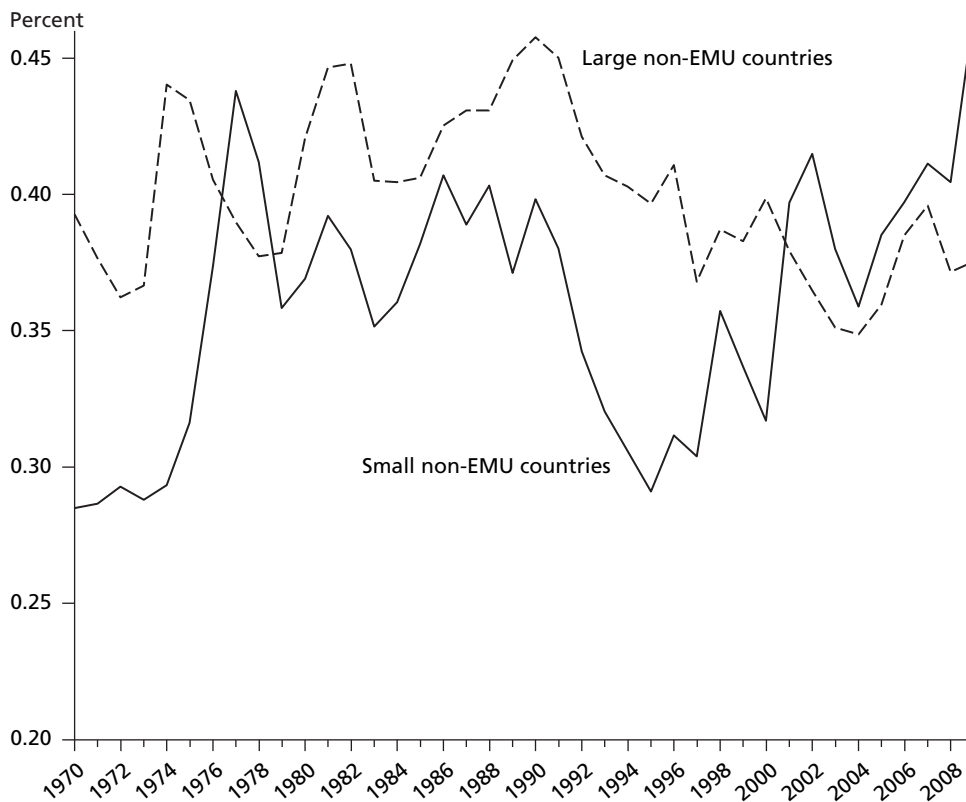Source: Author's calculations, data from OECD (2010c).

within EMU countries encouraged by stable price levels and reduced debt levels. The acceleration of this process from 1999 indicates that the introduction of the euro influenced FDI as well.

Interestingly, the flow of FDI from small to large countries increased to much higher levels than the FDI flow from large to small countries. Although the firms and domestic production are tiny compared to large countries, it seems that many firms must have decided to establish or increase production plants in large countries. Those investments were probably intended to exploit the beneficial demand and supply structures in large economies. Firms might have invested in large markets to save on transportation costs and to make use of skills and technologies offered in successful clusters. Consequently, Figure 1 implies an agglomeration of capital in large markets after the introduction of the EMU.

Figure 2 shows the average development of capital taxation in small and large countries outside the eurozone from 1970 to 2009.[18] Capital taxation fluctuates significantly in both country groups. The small-country EATR rose in the early 1970s, dropped there-

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18   Data are missing for some years for Denmark, New Zealand, and Korea.

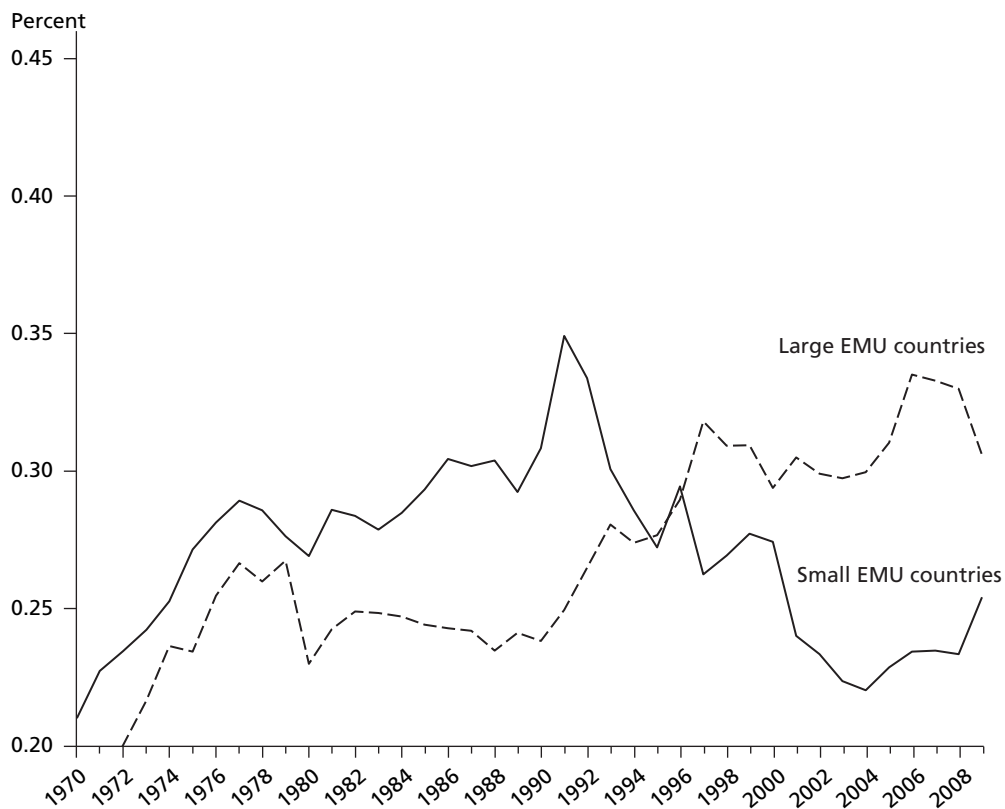Figure 2   Effective capital taxation in non-EMU countries

Source: Author's calculations, data from OECD (2010a) and OECD (2010b).

after and reached about 40 percent taxation in 1986. It then dropped again over the following nine years. Between 1995 and 2009 it increased until it reached a maximum of 46 percent. Taxation in the large-country group follows a similar pattern, but taxation is on average at a much higher level and fluctuations are not as pronounced as for small-country taxation. From 1970 to 1989, there was an increase in large-country capital taxation from 40 percent to 46 percent. This was followed by a drop in taxation from 1990 to 2004. It then increased again and reached a maximum of 46 percent in 2007.

Thus, there was no clear trend in small and large non-EMU taxation over the period observed. However, it seems that after the onset of increased capital market integration, i.e., in the late 1980s and early 1990s, small countries raised the level of capital taxation, whereas large countries lowered it. At first sight, this development seems to counter NEG assumptions. It is important to remember, however, that capital mobility in non-EMU countries is significantly lower than in EMU countries (Petroulas 2007).

Figure 3   Effective capital taxation in EMU countries

Note: Most individual country data fit the trend depicted in the line, acknowledging however that France has a very large EATR at the end of the period, which might drive the line to a certain extent.
Source: Author's calculations, data from OECD (2010a) and OECD (2010b).

EMU taxation data show a more clear-cut difference between small and large countries (Figure 3).[19] The overall level of EMU capital taxation is significantly lower than the capital taxation in non-EMU countries. Even the small EMU country line does not exceed an average value of 35 percent. The 1970s data show that small and large EMU countries had similar capital tax burdens which increased in the decade from 20 percent to 28 percent and 27 percent, respectively. From 1979 onwards, the EATR of small and large countries diverged. Values for small countries were significantly higher than for large countries. This divergence was then reversed from the early 1990s onwards. Small EMU country capital taxation peaked in 1991 by 35 percent and fell steadily from then on. Capital taxation in large EMU countries on the other hand has been increasing since 1989.

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19   The difference between small and large countries is not as great as shown here because some
      data are missing for Italy, Spain, Greece, Ireland, and Portugal. The actual small country average
      lies slightly above the line here.

Overall, Figure 3 shows that since the early 1990s, small countries have reduced capital taxation and large countries have increased it. This might indicate that the reduced trade barriers in the European Single Market led to increased capital income in large countries and thus higher economies of scale. Whether the introduction of the EMU had a distinct effect on capital taxation can only be tested through an acceleration of the diverging process. For the small-country group, two points in time show a steeper drop in taxation, one in 1996 and one in 1999. For the large countries, the increase in capital taxation became steeper from 1996 onwards.

In summary, these statistics show a rising level of tax competition in small EMU countries after the convergence of price levels and debt reduction in the EMU from 1996 onwards and full price stability after the introduction of the euro in 1999. These two points in time, 1996 and 1999, are also the moments in which FDI flows among small and large EMU countries accelerated. This finding strongly supports the thesis that small countries have difficulties in attracting production to their markets when they integrate with large markets and subsequently reduce capital taxation.

Table 1 reports the outcome of the difference-in-differences regression. Of the independent variables, the first five are control variables, followed by the explanatory variables of interest. Of the control variables, the strongest effect was found for the lagged dependent variable $CapT_{t-1}$. The coefficient depicts the relationship between the capital taxation in one year with the level of capital taxation in the previous year. The positive association thus indicates that the level of capital taxation is amended gradually over a longer time period. Slow changes in taxation are probably intentionally implemented by policy makers due to the severe effect tax amendments have on the level of corporate profits and thus on the business cycle.

The levels of wages and partisanship in governments and parliaments are useful variables to test the assumptions of the compensation theory. The theory argues that leftist and centrist governments engage in tripartite bargaining in order to increase competitiveness. This is accomplished by an exchange of low wages for high capital taxation.[20] If this theory was correct, capital taxation would have an inverse relationship with wage levels and a positive association with the left's partisanship. However, both coefficients are not significant and the coefficient of partisanship is close to zero. This indicates that the change in party influence and tripartite bargaining did not affect the change in capital taxation.

Not only does the latter finding contradict the compensation theory, but it also supports the thesis of small country disadvantage. Governments of any ideological orientation have to make the same tax-policy decisions depending on the size of the market, i.e., lower taxation for small markets and higher taxation for large markets.

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20   In fact they argue that this is mostly true for leftist governments, but Garrett and Mitchell (2001: 173) found that capital taxation increases under Christian Democratic governments as well.

Table 1   Difference-in-differences regression for capital taxation

	(1)	(2)	(3)	(4)
CapT$_{t-1}$	0.89*** (0.02)	0.89*** (0.02)	0.89*** (0.02)	0.89*** (0.02)
Partisanship	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Wages	−0.04 (0.04)	−0.03 (0.03)	−0.04 (0.03)	−0.03 (0.04)
Unemployment	−0.17+ (0.09)	−0.17+ (0.09)	−0.16 (0.10)	−0.17+ (0.09)
Production level	0.05 (0.04)	0.06 (0.04)	0.06 (0.04)	0.06 (0.04)
Small	−0.97 (0.65)	−0.56 (0.40)	−0.32 (0.34)	−1.35 (0.80)
EU	0.97 (0.65)			
Post1992	6.46+ (3.13)			
Small*post1992	−0.11 (1.87)			
EU*post1992	0.83 (1.03)			
Small*EU*post1992	−0.86 (2.09)			
EMU		−0.20 (0.89)	−0.21 (0.82)	−0.39 (1.06)
Post1996		5.50+ (2.92)		4.63 (3.39)
Small*post1996		1.49+ (0.86)		1.46 (0.88)
EMU*post1996		1.40 (0.92)		1.25 (0.97)
Small*EMU*post1996		−3.22* (1.29)		−3.27* (1.23)
Post1999			5.80+ (3.00)	
Small*post1999			1.19 (1.00)	
EMU*post1999			1.30* (0.52)	
Small*EMU*post1999			−2.40* (1.14)	
FDI				−0.00 (0.01)
Portfolio Investment				−0.00 (0.00)
Trade				0.02 (0.03)
Constant	0.38 (2.77)	−0.47 (3.22)	−0.22 (3.02)	−0.87 (3.16)
R²	0.97	0.97	0.97	0.97
N	707	707	707	707

Note: Standard errors in parentheses; country and time fixed effects not reported; + p<0.1, *p<0.05, **p<0.01, ***p<0.001.
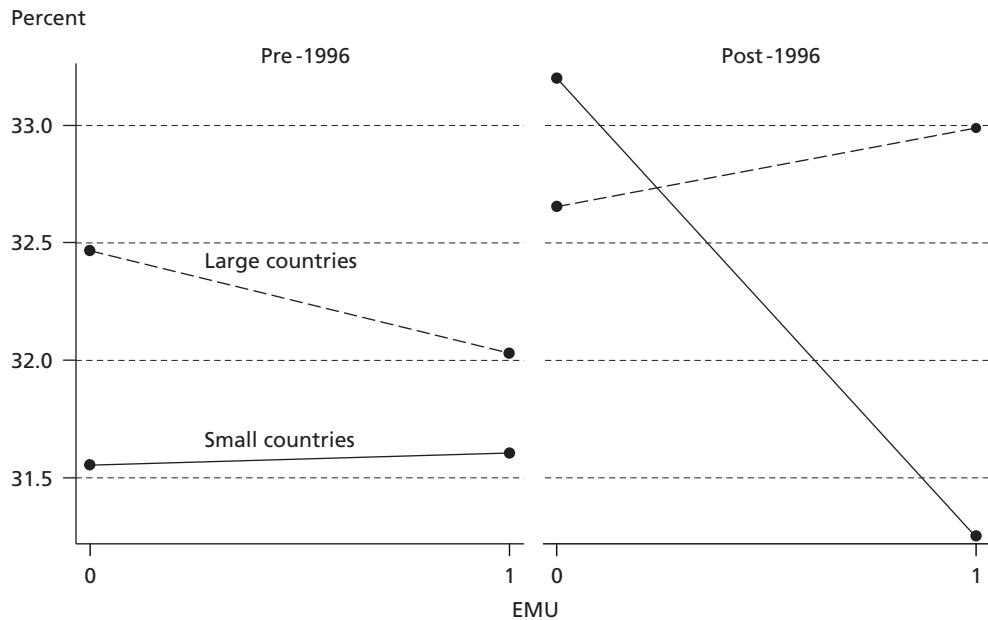
The unemployment and production level variables were included because they are closely aligned to the effect of agglomeration on taxation. The regression shows that the reaction of policy makers to a one percentage point increase in unemployment is to reduce taxation on average by about 0.17 percentage points. In addition, although not significant, there is a positive effect of the production level on capital taxation. Taken together, the coefficients indicate that prosperous economies have higher capital taxation than poorly developing countries do. A flourishing market incites investment and production because the demand for products is high as is the supply of firms. Thus, governments can raise the level of taxation. If the economy finds itself in a recession, on the other hand, governments have to attract investments with lower taxation.

The most important factor in testing the small country disadvantage thesis is the combined effect of market size and integration on capital taxation. When it comes to European integration, the data show that the introduction of the Single Market in 1992, represented by the interaction term Small*EU*post1992 in Table 1, had no significant effect on taxation (see Model 1 in Table 1). Models 2 and 3 depict the effect of EMU integration on taxation and indicate a strong and significant negative effect of the EMU on the tax policies of small countries vis-à-vis large countries. Interestingly, the coefficient for the interaction with the post-1996 dummy is much stronger than the coefficient for the interaction with the post-1999 dummy. Thus, the introduction of the convergence criteria in 1996 had the strongest effect on capital taxation in EMU countries. It led to a divergence of taxation among EMU countries which was 3.22 percentage points larger than the difference of taxation in non-EMU countries. The actual introduction of the common currency in 1999, however, led to a divergence of capital taxation between small and large countries by only 2.40 percentage points vis-à-vis non-EMU countries. Thus, it can be concluded that the introduction of the euro had no additional effects on capital taxation, as this would have required a coefficient that was even stronger than the post-1996 coefficient.

Thus, the adjustment of interest rates, exchange rates, and inflation to price stability levels as well as the reduction of debt in EMU countries led to a strong increase in FDI mobility. As shown in Figure 1, this attracted productive investments to large economies, which had been accumulating capital income through trade cost reductions since 1992. The concentration of capital then forced governments of small countries to lower capital taxation in order to attract FDI to their jurisdiction. However, large countries did not have to lower capital taxation, as production was already "locked-in" in their economy and it increasingly flowed into their markets. This finding is thus very much in line with the agglomeration theory.

Finally, in Model 4 three integration measures were added to Model 2 to test whether this changed the findings of the other models. FDI, trade, and portfolio capital mobility did not significantly change the results of Model 2. The coefficients for the integration variables are very small and none of them are significant, which is a good sign as integration has already been included in the model via the EMU interaction term.

Figure 4   Predictive change of effective capital taxation before and after 1996
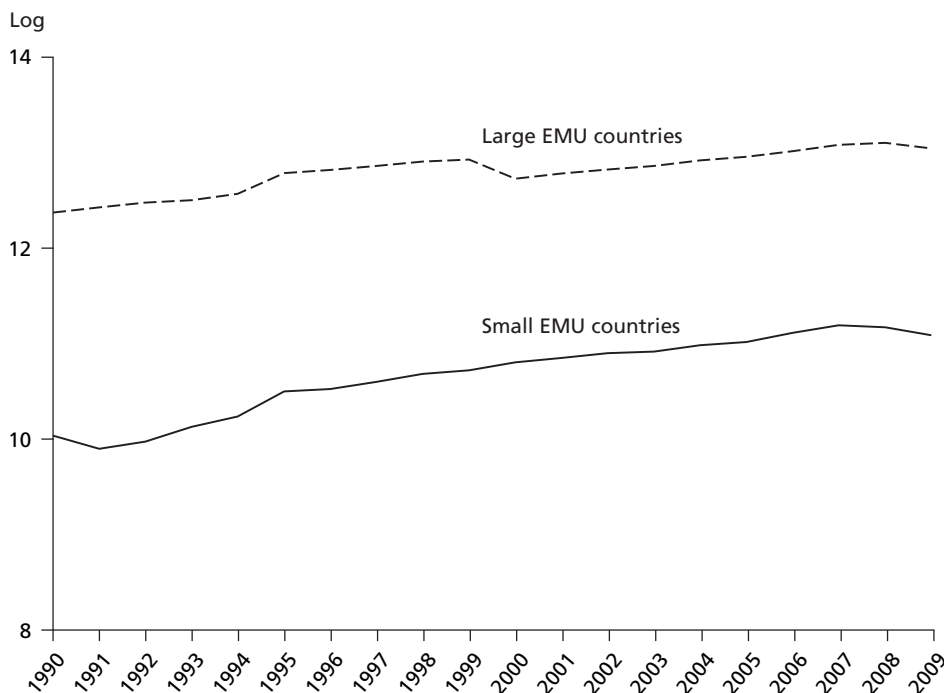
Percent

Although the regression coefficient clearly shows a diverging trend in capital taxation for small and large countries in the EMU, it cannot depict whether the distance is mostly comprised of a tax increase in large countries or a decrease in small countries. Therefore, in a second step, Figure 4 separates the regression model's predictive effects of EMU and size, while controlling for intervening factors.[21] In Figure 4, the left side compares tax rates in small and large countries prior to 1996 and the right side depicts taxation after 1996. Using values of 1 and 0, the x-axis of each diagram reports whether a country respectively is or is not a member of the EMU.

Figure 4 shows that prior to 1996, the taxation of small countries was on average the same in EMU and non-EMU countries, as the almost horizontal location of the solid line indicates. In addition, the broken line reports that large non-EMU countries taxed capital at a much lower rate than large EMU countries. Thus, prior to EMU integration, large non-EMU countries had the highest rate of taxation, followed by large EMU countries. Small countries in general had by far the lowest rate.

The figure demonstrates that the formation of tax burdens changed significantly after 1996, as is indicated by the distance between the dots at the right end of each of the small-country lines. In small EMU countries capital taxation was reduced by 0.7 percentage points. Considering that several control variables were included, this is still a strong change. Large EMU taxation increased by one percentage point, which is a

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21   This margin plot shows the predictive difference between average tax rates for the different country groups before and after the introduction of the euro. It is calculated with the overall regression model, but excludes the fixed effects.

Figure 5   Aggregate gross operating surplus of the total economy

Note: I use the log to linearize the time line function. The slope of the line approximates the rate of growth of enterprise surplus.
Source: Author's calculations, data from OECD (2010b).

noticeable change. At the same time, for the non-EMU world, taxation increased massively in small countries, while it remained more or less stable in large countries. Thus, after 1996 all countries outside the EMU and large countries within the EMU increased capital taxation. Only the small EMU group reduced the level of taxation.

So far the analysis has shown that the EMU induced a diverging trend in capital taxation in large and small countries. Authors such as Genschel and Schwarz (2013) and Winner (2005) argue that the tax reduction might be due to the small country advantage in revenue collection. According to their thesis, lower taxation leads to a relatively large inflow of investments and profits. In Figure 5 I test this thesis and contrast it with small country disadvantage reasoning. The figure depicts the growth in the tax base, i.e., profits from corporate and quasi-corporate production, for the different country groups.[22]

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22   This measure consists of the surpluses from the production of incorporated and unincorporated enterprises after payment of employee compensation and intermediate goods and services. It does not deduct liabilities on financial assets or land or natural resources. See European Commission et al. (2009: 418) for details. The diagram tests the neoclassical thesis of production and income moving to small countries. This test would be more reliable if the data did not include the income of unincorporated enterprises, which are less likely to engage in the relocation of production. Another shortcoming of the data is that it does not deduct interest payments,

In the OECD National Accounts surplus data are available either as a share of GDP or in national currencies. Due to the fact that GDP develops differently in small and large countries and thus distorts the surplus data, the GDP ratio is not applicable. I therefore use the average growth rate of capital income in national currencies in Figure 5.

As Figure 5 shows, profit growth increased over the entire period in both small and large countries. In contrast to the predictions of small country advantage thesis, the post-1996 reduction in the capital taxation of small countries did not increase the surpluses to higher rates. And despite the massive increase in capital taxation in large countries, the growth of enterprise income was not lowered after 1996. There was only one drop to a lower value in 1999, but it increased to a new and higher level of growth again afterwards. At least after the year 2000, there was a parallel development. Thus, the data do not support the thesis that small countries have an advantage of a larger FDI and profit inflow in the course of tax reduction. On the contrary, small and large countries show a similar development of taxable profits.

6   Concluding remarks

It is still contested whether increased economic integration induces tax competition. According to the tax competition literature, there is a negative relationship between integration and capital taxation. However, studies from the compensation literature have not found a race to the bottom in capital taxation. This paper has argued that the opposing findings in the two literature strands are due to the aggregation of OECD data. The separation of different country groups into small and large countries and highly integrated and less integrated regions shows that tax competition applies for small countries only, and that large countries even raise the level of taxation under high capital mobility. This diverging trend in capital taxation had been canceled out in compensation studies through the pooling of data.

I chose to focus on the eurozone as it provides a sample of countries with a massive increase in capital mobility in the course of EMU integration. Both descriptive statistics and the difference-in-differences regression showed that there was a diverging trend in capital taxation from 1996 onwards. Capital tax burdens in large EMU countries rose to much higher levels, whereas taxation in small countries was reduced. In 1996, in fact, the share of FDI flowing from small to large countries increased by a much higher rate than the share flowing from large to small countries. Thus, the implementation of the

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which MNEs use to reduce the profits reported in high-tax countries. See Genschel and Schwarz (2011: 346). This form of profit shifting is not reported in the surplus data.

Maastricht Criteria in 1996, i.e., the adjustment of exchange rates, interest rates, and inflation to stable price levels, and the reduction in sovereign debt, led to a concentration of capital in large economies.

The theory of agglomeration explains why large countries raised the level of capital taxation. Large firms have an advantage over small firms due to increasing returns to scale. When trade became integrated in the Single Market project of the EU, these firms gained agglomeration rents because exporting to nearby countries became cheaper. Thus, large industrialized markets had an advantage over small markets when the euro was introduced and capital mobility increased. Firms had no reason to source production out to countries with lower capital taxation because the agglomeration rents exceeded the potential capital tax reduction. In addition, firms from small countries decided to invest in large EMU countries because they wanted to benefit from the large demand for products in those countries and the respective transportation cost reduction. The productivity increase they expected when producing in clusters of highly productive firms was a second incentive to move capital to large markets. This was the reason why governments in large EMU countries massively increased capital tax burdens and small countries had to reduce the rate of taxation.

In addition to the fact that small countries did not experience higher revenue growth, there is another factor that does not support the small country advantage theory. The theory argues that under tax competition, large countries will lower taxation *less* than small countries, but it does not explain why large countries might *increase* taxation. It can therefore be concluded that in fact there is a small country disadvantage in FDI attraction and revenue collection.

Although the findings point to an agglomeration effect on taxation, future studies should include more sophisticated agglomeration measures. The size of a country does not necessarily indicate a high level of technology and skill formation, which firms seek. Moreover, this study cannot explain why taxation in small non-EMU countries increased, despite capital being mobile among other OECD countries as well.

The most important questions stemming from the findings of this study are: how big was the actual loss of capital tax revenue in government budgets and how did small countries compensate for it? Did they increase the tax burden on labor income and consumption? Or did they finance the reduction through higher sovereign debt levels? If the latter is true, this might partially explain why small EMU countries such as Greece, Ireland, and Portugal were the first to enter the European debt crisis and suffered the most heavily. However, to explain the consequences of the small country disadvantage in terms of a country's fiscal policies, further research is required.

Appendix

Table A.1   Variable specifications

Variable name	Source and description
CapT	The EATR is partially taken from Mendoza (1997) and partially calculated from OECD (2010a), Revenue Statistics and OECD (2010b), Detailed National Accounts.
CapT$_{t-1}$	Lagged dependent variable.
Partisanship	Swank (2006), The Comparative Parties Data Set defines left-wing parties as "communist; socialist, social democratic, and labor; and other various left-wing parties" (Swank 2006: 5) and centrist parties as "non-conservative Catholic parties, …, non-Catholic parties of the center" (ibid.).
Wages	OECD (2012), Main Economic Indicators, unit labor costs: compensation of employees per unit labor input divided by total hours worked by employees, Index OECD base year 2005 = 100.
Unemployment	Armingeon et al. (2012), Comparative Political Dataset III, unemployment rates.
Production level	Heston et al. (2012), Penn World Table 7.1, GDP PPP converted, presented in relative terms to US GDP.
EMU	Dummy variable defined as 1 for countries that are EMU members and 0 for countries that are not EMU members.
EU	Dummy variable defined as 1 for countries that are EU members and 0 for countries that are not EU members.
Post1992	Dummy variable defined as 0 for the time before 1992 and 1 for the period from 1992 on.
Post1996	Dummy variable defined as 0 for the time before 1996 and 1 for the period from 1996 on.
Post1999	Dummy variable defined as 0 for the time before 1999 and 1 for the period from 1999 on.
FDI	OECD (2010c), International Direct Investment Statistics, in- and outflows of direct investment of the respective EMU country with other EMU countries or of the respective non-EMU country with other non-EMU countries.
Portfolio Capital	International Monetary Fund (2011), International Portfolio Investment Survey, assets and liabilities of portfolio investment of the country with the other EMU countries.
Trade	Heston et al. (2012), Penn World Table 7.1., level of exports and imports to GDP at current prices.

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