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Corporate Taxation and Firm Location in Germany

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Corporate Taxation and Firm Location in Germany

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Abstract

German Fiscal Federalism is characterized by a high degree of fiscal equalization which lowers the efficiency of local tax administration. Currently, a reform of the fiscal equalization scheme is on the political agenda. One option is to grant federal states the right to raise surtaxes on statutory tax rates set by the central government in order to reduce the equalization rate. In such an environment, especially those federal states with lower economic performance would have to raise comparatively high surtaxes. With capital mobility, this could further lower economic performance and thus tax revenues. Although statutory tax rates are so far identical across German federal states, corporate tax burden differs for several reasons. This paper tries to identify the impact of such differences on firm location. As can be shown, effective corporate taxation did seemingly not have a significant impact on firm location across German federal states.

Keywords: fiscal equalization, corporate taxation, surtaxes, firm location

JEL Classification: H25, H32, H71, H77

Steuerbelastung und Unternehmensansiedlungen in Deutschland

Zusammenfassung

Der deutsche Länderfinanzausgleich ist durch eine starke Nivellierung der Finanzkraft der Bundesländer gekennzeichnet. Dies geht mit negativen Anreizen für die Finanzverwaltungen der Bundesländer einher. Mit Blick auf das Auslaufen des Länderfinanzausgleichs im Jahr 2019 werden derzeit Reformoptionen diskutiert, unter anderem eine Erhöhung der Steuerautonomie der Bundesländer, in deren Rahmen den Ländern ein Zuschlagsrecht bei der Einkommensteuer eingeräumt und im Gegenzug der Ausgleichstarif im Länderfinanzausgleich verringert werden könnte. Eine derartige Reform würde jedoch bedeuten, dass gerade die finanzschwachen Bundesländer relativ hohe Zuschlagssätze erheben müssten, um ähnlich hohe Einnahmen je Einwohner zu erzielen wie die finanzstarken Länder. Sofern sich dies negativ auf die Unternehmensansiedlungen in finanzschwachen Bundesländern auswirkt, würde deren Finanzkraft weiter geschwächt. Vor diesem Hintergrund untersucht der vorliegende Beitrag, ob bereits bestehende Unterschiede in der effektiven Steuerlast zwischen den Bundesländern die Unternehmensansiedlung beeinflussen. Im Ergebnis zeigt sich, dass ein solcher Einfluss in den vergangenen Jahren nicht bestand.

Schlagwörter: Länderfinanzausgleich, Besteuerung, Zuschlagsrechte, Standortwahl

JEL-Klassifikation: H25, H32, H71, H77

1. Introduction

As many other highly developed countries, Germany is characterized by fiscal federalism. The central government shares power with sub-national, regional jurisdictions, which, to a certain degree, are providing public goods and services. On the revenue side, such a federal system requires either the ability of sub-national governments to raise their own taxes or intergovernmental grants enabling regional jurisdictions to fulfill their tasks (Oates, 1999).

So far, in Germany, tax legislation is mainly the task of the central government, which sets statutory tax rates. The federal states collect taxes, but are neither authorized to introduce state specific taxes nor to increase statutory tax rates set by the federal government.¹ Differences in per capita-tax revenues between federal states, arising e.g. from divergent macroeconomic performance, are then equalized by intergovernmental grants. The fact that federal states do only collect taxes but are not authorized to raise taxes on their own and that differences in per capita revenues are equalized by intergovernmental grants lowers the incentives of federal states to collect taxes efficiently (Baretti et al., 2002, Boenke et al., 2011). Against this background, a modification of the German fiscal equalization scheme is on the political agenda. One discussed option is to grant federal states the right to raise surtaxes on statutory tax rates set by the central government. In return, the equalizing rate could be lowered. On the one hand, it is expected that this enables federal states to adopt the level of public expenditures and thus also revenues to state specific preferences. Moreover, incentives to enhance the efficiency of tax administration, budgetary discipline and to exploit tax bases should increase.² But on the other hand, such a system would be associated by interregional tax competition.

In order to achieve substantial additional revenues, surtaxes should be charged on shared taxes³, either on value added tax, which contributes around 40% of federal states' tax revenues, or income tax, contributing around 30% of federal states' tax revenues. However, state specific surtaxes on value added tax would impose administrative burdens on inter-jurisdictional trade with goods and services, as is the case with cross-border transactions within the European Union. As a consequence, direct taxes are better suited for state specific surtaxes (Buettner/Schwager, 2000). However, provided that all federal states aim at reaching the same revenue per capita ratio, a higher fiscal autonomy for federal states would mean that especially those states with comparatively low economic performance and thus lower revenues would have to impose the highest surtax rates. With mobile capital, this could further lower economic performance, since firms would probably move to federal states with lower surtax rates, which would of course be counterproductive. In the following, this issue shall be investigated more closely.

¹ The only exception is real estate transfer tax ('Grunderwerbsteuer'), where since 2006 statutory tax rates are set by the German federal states.

² Furthermore, it is expected that in the modified system, not only tax revenues per capita, but also other indicators will form the basis for fiscal equalization, like for instance GDP per capita. This should also lower disincentives to collect taxes and should thereby increase the efficiency of tax administration.

³ Shared between the national government and regional jurisdictions.

With respect to the location of firms, a vast empirical literature analyzing the determinants of firm formation exists. From an international perspective, foreign direct investment (FDI) is, among others, driven by international differences in corporate taxation (see e.g. Benassy-Quere et al., 2005, Barrios et al., 2012). But also studies focusing on the regional level do support the hypothesis of a negative impact of corporate taxation on regional firm location within countries (see e.g. Brülhart et al., 2012). For Germany, due to the fact that statutory tax rates are the same in all federal states and surtaxes are not implemented so far, the impact of differing corporate tax burdens on firm location is difficult to determine. However, since a reform of the present system of fiscal equalization is on the political agenda and one discussed option is to introduce state-specific surtaxes, determining the consequences of a diverging tax burden on the real economy is of great interest. Against this background, the impact of federal states' average tax burden, which already differs from state to state, on firm location within Germany will be investigated. The paper is organized as follows: While section 2 gives an overview over the literature, section 3 describes the empirical model used to estimate the impact of average tax rates on firm formation. Subsequently, in section 4, the empirical results are discussed. Finally, section 5 summarizes the main findings.

2. Review of the Literature

With respect to the location of firms *across* countries, the increasing international mobility of capital supposedly forced governments to enhance the attractiveness of their countries as a location for business in order to attract FDI, e.g. by more flexible labor markets, investment into the local infrastructure or by lowering the taxation of mobile capital (Devereux/Griffith 2002). As a consequence, with internationally mobile capital, international tax competition could lead to a race to the bottom in tax rates in order to attract foreign direct investment (Baldwin/Krugman, 2004, Devereux et al., 2002, Barrios et al., 2012). Different empirical analyses show that corporate taxation has a significant negative impact on FDI inflows (see e.g. Benassy-Quere et al., 2005, Bellak/Leibrecht, 2009, Devereux/Griffith, 2002, Gordon/Hines, 2002) as well as on firm entry (e.g. Kneller/McGowan, 2012, Da Rin et al., 2011, Djankov et al., 2010). However, beside international differences in corporate taxation, FDI flows are determined by other variables. These are further cost related variables, like labor and transportation costs, market oriented variables, like for instance the size of the host market, and policy oriented variables, as political risks or inflation. Hence, disincentives for investors resulting from higher corporate taxation may be offset by such other factors, especially agglomeration effects (Ludema/Wooton, 2000, Baldwin/Krugman, 2004, Hansson/Olofsdotter, 2013).

For the regional level, empirical analyses of the determinants of new firm formation conclude that the former is largely determined by demand and supply factors, industrial restructuring, policy measures and also agglomeration effects (see e.g. Armington/Acs, 2002, Mocnik, 2010, Otsuka, 2008). First of all, firm formation should depend on local demand. Thus, a high expansion of local demand should foster local firm formation (Sutaria/Hicks, 2004). On the supply side, local production costs should lower firm density, since profits decrease with rising costs of production (Otsuka, 2008). As a consequence, capital and labor costs, but also

tax burden should have a negative impact on firm formation. Only with respect to labor cost, a positive impact on firm location is conceivable, since higher wages could also indicate a higher labor force qualification and/or a higher local purchasing power (Bellak/Leibrecht, 2009). In addition, the attractiveness of a region as a location for firms should depend on the rate of unemployment. However, as labor costs, the impact of unemployment on firm density and firm formation is twofold: On the one hand, increasing unemployment implies a higher local labor supply and more people are expected to found new firms for self-employment (Storey, 1991). On the other hand, higher unemployment may reduce local demand, which is rather harmful to the formation of new firms (Fritsch, 1992).

According to the literature, firm formation is also determined by the skill-level of the labor force. New firms do often act as pioneers developing and using innovations. Since the innovative potential of a region depends on its endowment with qualified labor, not only with respect to the development of innovations within single firms, but also with respect to knowledge spillovers (Harhoff, 1999), a high qualification of the local labor force should have a positive impact on the birth rate of new firms.

According to New Economic Geography, the formation of new firms is supported by agglomeration economies (Krugman, 1991). A higher regional concentration of firms is associated with a higher concentration of knowledge, skilled labor, suppliers of specialized inputs and spillover effects from other establishments in the same industry. Moreover, it is beneficial for new firms to establish close to suppliers and customers in order to minimize transportation costs. Furthermore, it is advantageous to share skills with other local producers by labor-pooling and to benefit from knowledge spillovers (Rosenthal/Strange, 2001). The birth of new firms is presumably also determined by industrial restructuring, which is mainly characterized by a shift from the industrial to the services sector. Since establishments in the services sector are usually smaller than industrial ones, firm formation should be lower in regions still dominated by large sized industrial enterprises (Audretsch, 1995, Mason, 1991). This link is also supported by the presumption that many founders of new firms had been working in smaller firms before, where they acquired entrepreneurial qualifications (Johnson/Cathcart, 1979).

With respect to taxes, studies focusing on the impact of the tax burden on firm formation exist for different countries on the regional level (e.g. Davidsson et al., 1994, Brühlhart et al., 2012, Papke, 1991). Also for Germany, several analyses of the determinants of firm formation exist. However, all of these studies are based on data below the federal state level (either for planning regions (e.g. Audretsch and Fritsch, 1994) or municipalities (e.g. Nerlinger, 1996, Harhoff, 1999)). In these analyses, taxes are only partly significant with respect to firm formation or are even significant with an unexpected sign. So far, the impact of tax burden on the location of firms across German federal states is not analyzed at all. However, since there are considerations to introduce some tax autonomy for German federal states, information about the impact of state specific tax rates on firm location would be useful. Due to the fact that so far, statutory tax rates are the same in all federal states, the impact of differing statutory tax rates, which will probably result from fiscal autonomy, are difficult to

determine.⁴ This paper tries to overcome this difficulty by using federal states' average tax rates. Despite identical statutory corporate tax rates, average corporate tax rates should differ from state to state for the following reasons: First of all, tax revenues depend on the efficiency of tax administration, which is the task of the federal states. As already mentioned, in Germany, the incentives to collect taxes are reduced by the fiscal equalization system. Hence, it is conceivable that tax enforcement differs across federal states. Second, federal states' net revenues from corporate taxes are, beside the level of taxation, also determined by deductions, like employee refunds. Moreover, investment premiums are granted for specific investments in the East German federal states to corporations subject to corporate taxation, which might be seen as reductions of effective tax burden. Thus, it must be clarified whether gross (without deductions) or net tax revenues are taken for calculating average tax rates. Third, assessed income tax, the corporate tax with the highest revenue share, has a progressive tax scale. This means that average tax rates should depend on average firm sizes. The higher average firm size in a single federal state, the higher average corporate tax rate should be. The following section describes the model used to analyze whether differences in average tax rates between German federal states affect firm location.

3. The Model

3.1 A Panel Data Approach

For the empirical analyses, the following econometric panel data model will be applied:

$$X_{kt} = \alpha + \beta Y_{kt} + \mu_{kt} \tag{1}$$

While X_{kt} stands for the dependent variable, depicting firm formation in federal state k and period t , α is the model constant, Y_{kt} represents the set of explanatory variables, β the set of regression coefficients and μ_{kt} is the error term. Equation (1) depicts a pooled OLS estimator for the panel data, assuming that all cross-sectional units, in this case federal states, have a common intercept. But a problem of the simple OLS estimation could be individual, in this case state-specific effects leading to biased estimates. To eliminate this shortcoming, a fixed effects model is a suitable instrument, since it permits to consider unobserved heterogeneity of individuals. In the fixed effects model, the latter is assumed to be constant over time for each individual. In the empirical analysis at hand, the pooled OLS model of equation (1) would change to a fixed effects model of the following form:

⁴ While for German federal states, fiscal autonomy only exists for real estate transfer tax, on the municipal level, tax autonomy is higher. German municipalities have the legal right to charge surtaxes on property tax ('Grundsteuer') and business tax ('Gewerbesteuer'). Other than federal states' revenues from real estate tax, municipalities' revenues from property and business tax amount to more than 50% of total municipal tax revenues.

$$X_{kt} = \alpha + \beta Y_{kt} + \delta_k + \mu_{kt} \quad (2)$$

As in equation (1), X_{kt} represents the dependent variable. α is, as above, the model constant, β the set of regression coefficients, Y_{kt} the set of explanatory variables for federal states k and periods t , and μ_{kt} is the error term. Additionally, δ_k represents the state-specific fixed effects of each federal state k . Whether a fixed effects model is superior to the pooled OLS regression can be derived from an F-test. But in addition to fixed effects, another option should be tested, namely the application of a random effects model. Contrarily to the fixed effects approach, random effects models act on the assumption that heterogeneity of observations is not based on individual fixed effects, but is instead randomly distributed. In the random effects model presented in equation (3), ν_k represents the random effects, which should be normally distributed:

$$X_{kt} = \alpha + \beta Y_{kt} + \nu_k + \mu_{kt} \quad (3)$$

The assumption that individual differences are now considered as random disturbances requires that the regressors and the ν_k are uncorrelated. To control for this assumption, the Hausman-Test will be applied.

3.2 The Dependent Variable

The dependent variable is firm formation in federal states k and years t . In the so called ‘establishment register’, the absolute number of establishments in year t is available for each German federal state k . From these data, firm formation is calculated by the difference in the number of establishments in period t ($Firms_{k,t}$) and in period $t-1$ ($Firms_{k,t-1}$) divided by the number of establishments in period $t-1$, i.e. the change in the number of establishments in period t over $t-1$ in percent:

$$FirmEntry_{k,t} = \frac{Firms_{k,t} - Firms_{k,t-1}}{Firms_{k,t-1}} \quad (4)$$

Since data on the absolute number of establishments are only available from 2004 to 2011, firm birth rates can be calculated from 2005 to 2011.

3.3 The Explanatory Variables

As described in section 2, firm formation should be stimulated by growth in local demand. Therefore, the year-on-year change in gross domestic product (GDP) in federal states k acts as independent variable indicating the change in local demand. With respect to the supply side, average compensation per employee in each federal state k is chosen as explanatory variable for local labor cost. Hence, an increase in compensation per employee in state k should reduce birth rate of new firms. However, compensation per employee may also act as an indicator for purchasing power. As such, an increase should boost local demand. Another explanatory variable is the local rate of unemployment.⁵ Like compensation per employee, the impact of the local rate of unemployment on firm formation may, on the one hand, be positive, since the potential for new firm formation increases. But on the other hand, it could also be negative, since an increase in unemployment should reduce local demand. As mentioned in section 2, human capital should foster firm formation, since a high level of qualification increases the innovative potential of a region. The innovative potential of each federal state is depicted by the share of the number of students in federal state k 's total population.

The average number of employees per establishment acts as an indicator for industrial restructuring in federal states k . Since establishments in the services sector are usually smaller than industrial ones, in federal states with larger firms, new firm formation should be lower, since the process of industrial restructuring has not progressed as far as in others. According to New Economic Geography, it is beneficial for new firms to locate close to other producers and customers (Krugman, 1991). Thus, it should be advantageous for new firms to establish in federal states with economic centers. For depicting agglomeration effects within federal states, the share of households in densely populated areas acts as explanatory variable. Additionally, the year-on-year change in gross domestic product can also be seen as an indicator for the reinforcement of agglomeration, since production in economic centers should grow faster than in peripheral regions.

Finally, average corporate tax rates have to be considered more closely. Average tax rates can be calculated by the relation of tax charges to the tax base (Devereux et al., 2002). For corporate taxes, an appropriate tax base are corporate and investment incomes. According to the literature, average tax rates calculated in this way are the appropriate measure of tax burden for analyzing the decision of a firm whether to locate in a region or not (Devereux/Griffith, 2002, Bellak/Leibrecht, 2009).⁶ Average tax rates can either be backward looking or forward looking. According to Devereux and Griffith (2002), backward looking measures of tax burden are based on past tax payments and earnings. In contrast, forward looking measures focus on the expected impact of taxes on future earnings. While forward looking measures are calculated only on the basis of the actual legislation on the tax base and the tax rate, backward looking measures do also capture variations in tax rates which are not caused by changes in tax legislation, like for instance changes in the effectiveness of tax

⁵ measured by the number of unemployed persons in relation to total workforce

⁶ For analyzing the amount of investment, marginal tax rates should be used. Since in this study, the focus is on the question whether to invest or not, independent from the amount of investment, average tax rate is an appropriate measure (Devereux/Griffith, 2002).

administration. Hence, in the following analyses, backward looking average tax rates will be used.⁷ As already mentioned, German federal states' cash tax revenues are not only affected by the sum of taxes collected, but also by deductions lowering average tax burden. In Germany, corporate taxes⁸ are lowered mainly by refunds to assessed employees, but also by investment premiums.⁹ Investment premium was a subsidy granted in order to steer investments into assisted areas, in this case the Eastern federal states. Mainly due to investment premiums, in East German federal states, corporate tax revenues were for a long time much lower than in Western Germany. With the gradual reduction of investment premium, corporate tax revenues in Eastern Germany were gradually increasing. Investment premium was granted for investment commenced before 2014 in the Eastern federal states, but was gradually reduced over the last years. Homeowner allowance was granted for residential properties commenced before 2006. Both, investment premium and homeowner allowances are going to expire.

For analyzing the impact of corporate taxes on firm formation, it is questionable to what extent deductions and investment premiums should be taken into account. The most relevant one for investment decisions are probably investment premiums. This kind of deduction is presumably also most visible and tangible. Hence, in the following, beside average corporate tax rates without deductions, i.e. gross corporate taxes, also average corporate tax rates net of investment premium shall be regarded. With respect to refunds to assessed employees and homeowner allowances, it is assumed that these are not relevant for new firm formation.¹⁰ Average corporate tax rates are thus calculated by federal states' gross cash receipts from assessed income tax, corporate income tax, local business tax and taxes on profits not subject to assessment divided by corporate and investment income.¹¹

⁷ Moreover, since in Germany, tax legislation was so far the same in all federal states. Hence, also forward looking measures for tax burden based on current legislation should be identical for all federal states.

⁸ In the following, 'corporate taxes' contain assessed income tax, corporate income tax, taxes on profits not subject to assessment and local business tax.

⁹ In the following, refunds to assessed employees, investment premium and homeowner allowances are summarized as 'deductions'. Of course, this is misleading, since investment premium and homeowner allowances are in fact a kind of subsidy granted to the private sector. However, since these are offset from gross assessed income tax and gross corporate income tax revenues, they are lowering federal states' net tax revenues.

¹⁰ Refunds to assessed employees are granted in every federal state and should thus have no influence on firm location.

¹¹ The fact that tax receipts are on a cash basis, but corporate and investment income on a national accounts basis, could theoretically be a problem, mainly due to lags in tax assessment. Furthermore, corporate and investment income may be quite volatile. However, the results of empirical studies analyzing lags for assessed taxes are ambiguous. Moreover, for the period from 2000 to 2011, variation coefficients for average corporate tax rates in German federal states calculated by cash tax receipts divided by corporate and investment income are quite low. For 6 of the 16 federal states, variation coefficient is below 0.15. For 6 other federal states, variation coefficient ranges between 0.15 and 0.2. Only for 4 of the 16 federal states, variation coefficient is slightly above 0.2. According to these figures, fluctuation in average corporate tax rates is rather limited. Thus, the above described method for calculating average corporate tax rates should not pose a serious problem.

4. Empirical Analyses

4.1 Some Stylized Facts

The following section describes the results of the empirical analyses. However, initially, some stylized facts on average corporate tax rates and firm formation shall be documented. Table 1 summarizes average corporate tax rates for German federal states net of all deductions, net of investment premium and without any deductions (average values from 2008 to 2011). As already mentioned in section 3, in the Eastern German

Table 1:
Average Corporate Tax Rates in German Federal States
- Average 2008-2011 -

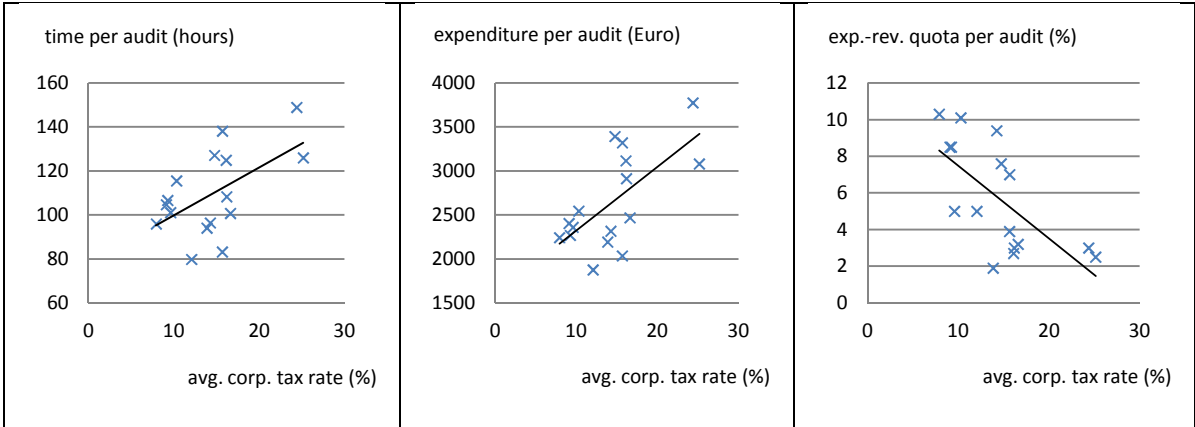
| | <i>Effective (average) Corporate Tax Rate net of all Deductions</i> | <i>Effective (average) Corporate Tax Rate net of Investment Premium</i> | <i>Effective (average) Corporate Tax Rate without Deductions</i> |
|-----------------------------------|---|---|--|
| <i>Baden-Wuerttemberg</i> | 16,4 | 20,1 | 20,1 |
| <i>Bavaria</i> | 17,3 | 20,9 | 20,9 |
| <i>Brandenburg</i> | 21,4 | 28,2 | 28,5 |
| <i>Hesse</i> | 25,7 | 29,2 | 29,2 |
| <i>Mecklenburg-West Pomerania</i> | 8,0 | 12,4 | 12,7 |
| <i>Lower Saxony</i> | 15,2 | 18,3 | 18,3 |
| <i>North Rhine-Westphalia</i> | 17,9 | 21,5 | 21,5 |
| <i>Rhineland-Palatinate</i> | 15,0 | 20,6 | 20,6 |
| <i>Saarland</i> | 16,3 | 20,6 | 20,6 |
| <i>Saxony</i> | 9,6 | 13,9 | 14,7 |
| <i>Saxony-Anhalt</i> | 10,2 | 16,1 | 16,3 |
| <i>Schleswig-Holstein</i> | 14,7 | 17,2 | 17,2 |
| <i>Thuringia</i> | 9,0 | 13,6 | 14,0 |
| <i>Berlin</i> | 18,7 | 21,7 | 21,9 |
| <i>Hamburg</i> | 24,7 | 29,1 | 29,1 |
| <i>Bremen</i> | 17,4 | 20,4 | 20,4 |

Sources: Federal Statistical office, Federal Ministry of Finance, own calculations.

federal states, average corporate tax rates were comparatively low in recent years, which was mainly due to deductions. However, by excluding deductions, inter-state differences in (gross) average corporate tax rates are much smaller. The remaining differences must be attributed to a combination of other factors. Two important factors are presumably differences in firms' profits and differences in tax enforcement. With respect to the former, the progressive tax scale of assessed income tax, the most important corporate tax in Germany, leads to differences in average tax rates if firms' profits differ between federal states. However, adjusting average tax rates to inter-state differences in firms' profits is unfeasible, since the effect of firms' profits on average tax rates depends on several factors, e.g. on the share of firms underlying assessed income tax, the distribution of single firms along the tax scale etc.¹²

With respect to tax collection, differences in tax enforcement may cause lower tax revenues and may thereby affect average tax rates. Indicators depicting tax enforcement in German federal states are available for the years 2004 to 2008. These data point to a link between tax enforcement and average corporate tax rates (figure 1).¹³ For instance, in 2008, the last year for which such data are available, there was a positive correlation between average corporate tax rates and time as well as expenditures per tax audit in state k on the one hand and a negative correlation between average corporate tax rates and the expenditure-revenue quota per tax audit, i.e. the efficiency of tax audits, on the other.

Figure 1:
Tax Enforcement and Effective Corporate Tax Rates in German Federal States in 2008



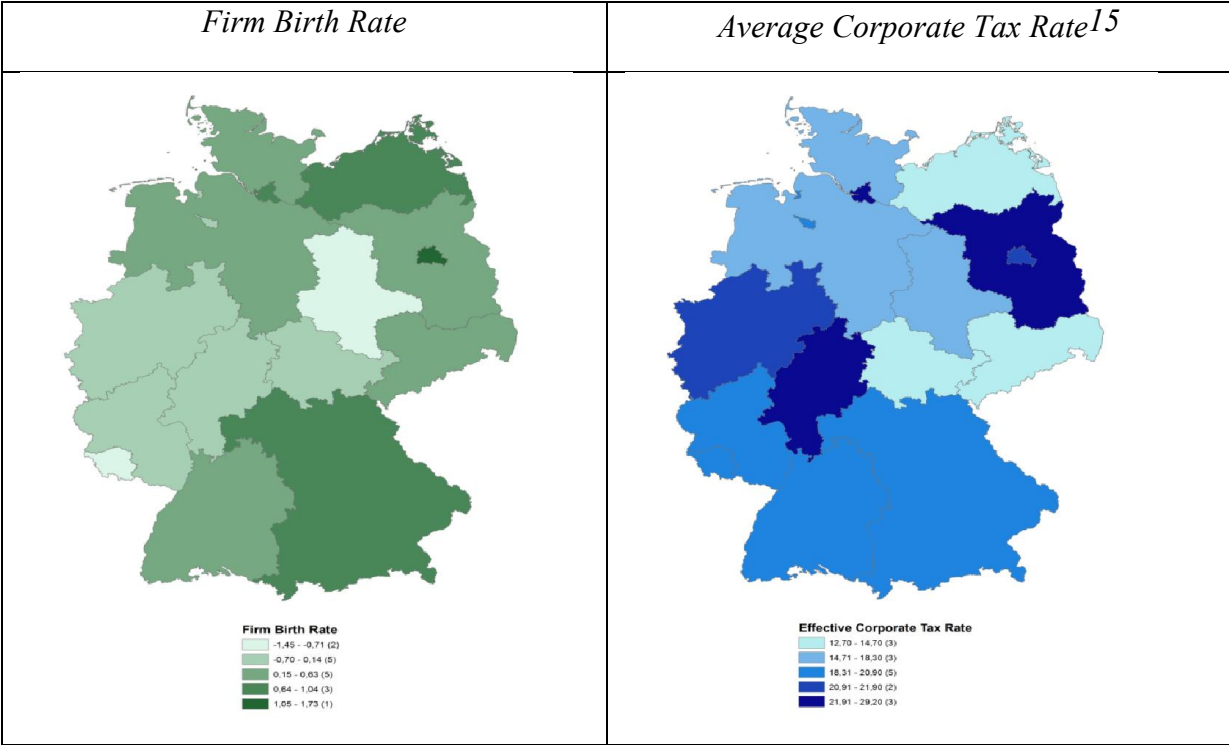
Sources: Free Hanseatic City of Bremen, Federal Ministry of Finance, own calculations.

¹² Due to this difficulty, we will refrain from adjusting tax revenues to differences in firm profits and/or firm sizes.

¹³ Average corporate tax rates without deductions.

Finally, some stylized facts about average corporate tax rates and firm births in German federal states shall be regarded. These are shown in figure 2 for all of the 16 German federal states. For both, average values from 2008 to 2011 were calculated in order to compensate for possible effects of business cycle variations.¹⁴ According to figure 2, average tax rates differ considerably between federal states. During the period of observation, especially in the East German federal states, average corporate tax rates were much lower than in Western Germany. In contrast, in the economically and financially stronger Southern federal states, also average corporate tax rates were higher. Compared to firm formation, at first sight, a connection between average corporate tax rates and the establishment of new firms is hard to identify. On the one hand, in federal states with higher average corporate tax rates, firm birth rates were partially above average, as for instance in Baden-Wuerttemberg and Bavaria. However, among them are also states with a quite low firm formation, like North Rhine-Westphalia or Hesse. On the other hand, in federal states with comparatively low average corporate tax rates, new firm formation was only in some above average (e.g. Mecklenburg-Pomerania and Saxony), but below average in others (e.g. Saxony-Anhalt, Thuringia and Lower Saxony). In the following, the results of the empirical analyses will be discussed.

Figure 2:
 Effective Corporate Tax Rates and Firm Birth Rates in German Federal States
 - Average Values 2008 to 2011 -



Sources: Free Hanseatic City of Bremen, Federal Ministry of Finance, own calculations.

¹⁴ While firm birth rates are calculated by equation (4), average corporate tax rates are, as in figure 1, calculated without any deductions.

¹⁵ Without deductions

4.2 Results of the Regression Analyses

As already mentioned, in the empirical analyses, the rate of entry of new firms over the previous year in federal state k acts as dependent variable ($FirmEntry_{k,t}$). The explanatory variables are, as explained in section 3, GDP growth ($\Delta GDP_{k,t-1}$), compensation per employee ($CompEmpl_{k,t}$), the rate of unemployment ($Unempl_{k,t}$), the share of human capital in total population ($HumanCap_{k,t}$), the change in average corporate tax rate ($\Delta CorpTax_{k,t-1}$) in the previous year, whereby the latter are calculated by corporate tax revenues without deductions divided by corporate and investment incomes, the logarithm of average firm size measured by employment per establishment ($FirmSize_{k,t}$), and the share of inhabitants living in densely populated areas as an indicator for agglomeration effects ($Aggl_{k,t}$). With the exception of GDP growth and the change in average corporate tax rates, for all variables, logarithms were taken. Since there could be an endogeneity problem with GDP as explanatory variable for firm entries, GDP enters into the equation with a one-period lag. The panel dataset ranges from 2005 to 2011 and contains data on all of the 16 German federal states. With respect to the estimation technique, the F test on the hypothesis that all units share the same intercept (fixed effects test) indicates with a value of 2.59 that a fixed effects estimation is superior to the pooled OLS regression. The Hausman test statistic takes a value of 18.82, implying that the heterogeneity of observations is not randomly distributed. Hence, the test statistics suggest the superiority of the fixed effects model. The results of the fixed effects estimation are presented in table 2.

Table 2:
Fixed Effects Estimation Results

| Variable | Coefficient | t-statistic | Standard Error |
|--|-------------|-------------|----------------|
| $\Delta GDP_{k,t-1}$ | 0.072* | 1.893 | 0.034 |
| $\log(CompEmpl_{k,t})$ | 20.960** | 2.350 | 8.920 |
| $\log(Unempl)_{k,t}$ | 4.241*** | 2.859 | 1.483 |
| $\log(HumanCap)_{k,t}$ | 15.655** | 2.003 | 0.048 |
| $\Delta CorpTax_{k,t-1}$ | -0.061 | -1.047 | 0.058 |
| $\log(FirmSize_{k,t})$ | -35.210*** | -3.707 | 9.499 |
| $\log(Aggl)_{k,t}$ | 2.313 | 1.026 | 2.255 |
| Adjusted R ² : 0.47 | | | |
| No. of obs.: 112 | | | |
| F test that all units share the same intercept: F (15,89) = 2.59, Prob. > F = 0.0029 | | | |
| Hausman Test: Chi-Sq. = 18.82, Prob. > Chi-Sq. = 0.0088 | | | |

***: significant at the 1%-level, **: significant at the 5%-level, *: significant at the 10%-level

As the regression results show, GDP growth in German federal states is fostering local firm formation. The same holds for compensation per employee. As far as GDP growth is concerned, this result has been anticipated, since an increase in demand should c.p. lead to more firm births. Moreover, since GDP growth in agglomerations is often higher than in peripheral regions, this result does also underpin the importance of economic agglomeration on firm formation. With respect to compensation per employee, the significantly positive impact on local firm formation might be interpreted in the way that gross wages are not only a cost factor, but do involve also a higher purchasing power and thus also higher local demand. Seemingly, the cost factor of higher wages is offset by the demand factor. The positive impact of unemployment on firm births corresponds to the hypothesis that higher unemployment affects people to go into business for themselves if they are unemployed or if there is a high risk of becoming unemployed. Also the formation of human capital, measured by the share of students in total population, does have a significant impact on local firm formation. With respect to changes in average corporate tax rates (without any deductions) in German federal states, there is no significant effect on the establishment of new firms.¹⁶ In contrast, firm sizes are highly significant with the expected sign. Average firm size in federal state k can be seen as an indicator for the proportion of employment in small firms, and small firms are often considered as a source for new entrepreneurs. Interestingly, the agglomeration indicator, defined by the share of households in densely populated areas in federal state k , does not have a significant impact on firm formation.

Overall, firm location across German federal states does seemingly depend essentially on demand factors and agglomeration effects (GDP growth, compensation per employee) and structural conditions (unemployment, firm sizes, level of qualification). As far as average corporate tax rates are concerned, the insignificant impact on firm births might, on first sight, be astonishing. However, the results have to be interpreted carefully, since currently, *statutory* tax rates are identical in all German federal states. Differences in average corporate tax rates between federal states are presumably only due to differences in firm sizes, differences in tax enforcement and probably further unspecified factors. It is questionable to what extent such factors are perceived by investors at all. Probably only information on premiums, and maybe also on allowances and refunds is accessible to the public. However, if tax autonomy of German federal states would be enhanced, also statutory tax rates would differ. Since the latter are fully transparent to investors, it is conceivable that, under such conditions, differences in statutory corporate tax rates on firm location would, other than differences in average corporate tax rates, be significant.

5. Conclusions

German fiscal federalism is characterized by negative incentives for tax administration. While statutory tax rates are largely set by the central government, tax administration is the task of

¹⁶ With respect to effective corporate tax rates, the estimation results are quite similar if investment premium is deducted from corporate tax revenues and the change in effective corporate tax rates net of investment premium is considered. The estimation results with this modified tax variable can be seen in table A-1 in the appendix.

the federal states. Against this background, the quite generous German fiscal equalization scheme is supposed to reduce incentives for tax enforcement of federal states' tax administrations. To overcome this shortcoming, there are considerations to enhance federal states' tax autonomy and to reduce fiscal equalization. One discussed option is to introduce surtaxes on shared taxes, especially on corporate taxes. However, critics claim that this would be detrimental to financially weaker states, since these would have to raise higher surtaxes than financially stronger ones. If this would reduce the attractiveness of financially weaker states for investors, also tax bases and local tax revenues would further decline.

As the analyses have shown, so far, there is no significant impact of average corporate tax rates on firm formation in German federal states. In contrast, firm establishment is largely determined by demand factors and structural conditions. Consequently, from an economic perspective, this finding would on first sight support the introduction of surtaxes. However, currently, *statutory* tax rates are the same in all German federal states. Thus, it is questionable to what extent differences in average corporate tax rates between federal states are really perceived by investors. For several countries, empirical analyses on the municipal level, where statutory tax rates differ, show that tax burden does have an impact on firm formation (e.g. Harhoff, 1999, Brühlhart et al., 2012). Since it is conceivable that with differing statutory tax rates between German federal states the impact of taxation on investment decisions would be stronger (Altemeyer-Bartscher 2014), surtaxes and a reduction in fiscal equalization between federal states should be introduced very carefully. This is supported by the fact that already the concentration of demand and agglomeration effects promote the location of firms in economically stronger regions.

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APPENDIX

Table A-1: Fixed Effects Estimation Results with modified tax variable¹⁷

| Variable | Coefficient | t-statistic | Standard Error |
|--|-------------|-------------|----------------|
| $\Delta GDP_{k,t-1}$ | 0.072* | 1.904 | 0.038 |
| $\log(CompEmpl_{k,t})$ | 20.823** | 2.338 | 8.905 |
| $\log(Unempl)_{k,t}$ | 4.213*** | 2.848 | 1.479 |
| $\log(HumanCap)_{k,t}$ | 15.705** | 2.011 | 7.810 |
| $\Delta CorpTax_{k,t-1}$ | -0.066 | -1.129 | 0.058 |
| $\log(FirmSize_{k,t})$ | -35.360*** | -3.727 | 9.487 |
| $\log(Aggl)_{k,t}$ | 2.333 | 1.037 | 0.038 |
| Adjusted R ² : 0.47 | | | |
| No. of obs.: 112 | | | |
| F test that all units share the same intercept: F (15,89) = 2.60, Prob. > F = 0.0028 | | | |
| Hausman Test: Chi-Sq. = 18.94, Prob. > Chi-Sq. = 0.0084 | | | |

***: significant at the 1%-level, **: significant at the 5%-level, *: significant at the 10%-level

¹⁷ Effective (average) tax rate calculated by corporate tax revenues net of investment premium divided by corporate and investment incomes.

