

# **Corporate Tax Rates and Regional Integration. Evidence from the Transition Countries**

Aleksandra Klofat

PhD Candidate

Department of Economics, University Witten/Herdecke, Germany

## **Contact Information:**

Aleksandra Klofat

Bultmannstr. 11a, 33330 Gütersloh

Germany

Phone: +49 1628975587

Aleksandra.Klofat@uni-wh.de

## **Abstract**

Corporate tax rates in the industrialized countries have been decreasing for many years. This decline has been attributed by many scholars to tax competition. In this context, however, less attention has been paid to the relation between regional economic integration and the development of the tax rates. This paper covers this issue concentrating on two integration initiatives in Europe and Eurasia: the European Union and the Eurasian Customs Union/Eurasian Economic Union. I find evidence that the declining corporate tax rates are to various degrees driven by the progressing regional integration within both the EU and the EEU. This paper also shows that the regional integration within the Eurasian Economic Union is, despite significant skepticism expressed from various sides, working in practice.

## **Keywords:**

Tax Competition, Regional Integration, Eurasian Economic Union, Corporate Tax Rates, Transition Countries

## **JEL Codes:**

H2, H25, F15

## 1. Introduction

Corporate tax rates in the industrialized countries have been declining for many years. The OECD average of corporate income tax rates fell from 33.6% in 2000 to 28.4% in 2006. The declining trend in corporate taxation is even more distinct in comparison to rates in 1982, when most of the OECD countries had rates around 50% (OECD, 2007). A similarly changing pattern in the corporate tax rates is also present in the developing countries and transition countries of Eastern Europe and Central Asia. Figure [1] shows the development of corporate tax rates in the transition countries.

*Insert figure [1] here*

The tendency of falling corporate tax rates, especially in the industrialized countries, has been addressed by many scholars. The mechanisms causing the decline in the statutory tax rates and the change in the actual tax burden have been examined frequently, especially in the area of fiscal studies. These works provided an impetus for a further research branch discussing the problem of tax competition between globally interconnected state economies, focusing on the question of whether tax competition intensifies with progressing economic openness and globalization.

In this paper I contribute to this discussion by identifying the ties between general corporate taxation levels and the degree of regional economic integration. The empirical focus of my research lies in the ongoing integration processes in former transformation countries, both within the European Union (EU) and within the Eurasian Economic Community (EurAsEC) and currently Eurasian Economic Union (EEU). The aim here is to answer the question as to what degree the observed changes in corporate taxation can be related to the participation in one of the examined integration initiatives. In other words, do countries that participate in a regional integration initiative experience more pressure to lower their corporate taxes than the countries in this region that are not integrated in any of those initiatives? The question is especially interesting with regard to the current integration process within the EurAsEC/EEU. The examination of the corporate taxes development within the EurAsEC/EEU allows me for at least partial assessment of the progress of these integration initiatives in the practice.

The study is conducted mainly through the application of the regression analysis with control for state and time fixed effects. It concerns a dataset of transition countries which, until now,

have been less explored in the context of fiscal studies and especially tax competition. I utilize the data available from the KPMG Corporate and Indirect Tax Survey, various state investment agencies and the World Bank Development Indicators. From those data I extract the benchmarks for the corporate taxation within the examined countries: statutory corporate tax rate and total tax rate. Additionally, in order to validate my results, I also perform a system generalized method of moments (GMM) analysis and implement a spatial autoregressive model (SAR).

My findings in general suggest that the negative trend in corporate taxation can be partially accounted to the progress of regional integration. These results are especially observable within the Central and Eastern Europe countries that accessed the EU. The results from the regressions with the countries participating in the EurAsEC/EEU integration transport similar conclusions. The results likewise confirm the impact of the integration within the EurAsEC/EEU on the fiscal policies of their Member States.

This paper is structured as follows: in the next section I outline the major findings of the academic literature tackling the issue of corporate taxation and integration. The third part is an empirical analysis of the problem. In the last section I summarize and discuss the results.

## **2. Economic openness and tax competition in the literature**

Basic argumentation within the fiscal studies on tax competition follows the lines of the Zodrow and Mieszkowski (1986) tax competition model, which projects a “race to the bottom” regarding the tax rates between local governments and, as a consequence, lower overall levels of provision of public services. The empirically observed trend in the declining statutory corporate tax rates, at least in the developed countries, seems to confirm this position.

The progressing economic openness and the course of globalization together are often seen as a major trigger for tax competition and in consequence for the declining trend in the statutory corporate tax levels. Despite increasing scientific literature, however, there is still no predominant opinion about the nexus between tax-setting policies and various measures of economic and political openness. Some studies indicate that increasing globalization does not have to influence a country’s public policy in a negative way (see, for example, Garrett 1995 and Swank 2001). On the other hand, Dani Rodrik (1997) points to the increasing pressure to lower taxes on capital going along with increasing openness. Genschel et al. (2011) reach a corresponding conclusion with regard to the relation between corporate tax rates and the

integration within the single market of the European Union. Various outcomes are obtained by Dreher (2006), among others, depending upon the specific estimation method of the tax rate on capital.

Less emphasis has been heretofore devoted to the more specific forms of the economic openness such as regional integration and its implications on the tax competition policies. Mendoza and Tesar (2005) approach the issue of the integration of the European financial markets and competition on capital tax from the perspective of game theory. Their results, however, are mixed depending on whether countries regulate labor taxes or consumption taxes in order to maintain fiscal solvency. One of the empirical studies that include the membership in regional integration initiatives within OECD countries<sup>1</sup> as a variable has been conducted by Hansson and Olofsdotter (2005). They come to the conclusion that the integration negatively influences the levels of corporate tax rate in the member states, i.e. results in decreasing levels of corporate tax rates. Similar results with regard to the integration within the European Union are achieved by the previously cited analysis of Genschel et al. (2011).

The general ambiguity of the research results with regard to the connection between the degree of the economic openness and the trend in corporate taxation levels can be attributed to various factors.

For example, according to Baldwin & Krugman (2004), one of the reasons for the varying non-unanimous research outcomes might be the fact that the underlying tax competition model does not take into account the agglomeration rents existing in an interconnected economy. According to this argument, the taxation level of a country is not the most important criterion for investment decisions of corporations. Factors like geographical location, infrastructure, and a qualified work force also play an important role in this context. Therefore countries with strong agglomeration centers are also in a position to raise tax levels without increasing the danger of causing capital outflow. Hence the agglomeration forces affect the tax competition process, preventing an unconstrained race to the bottom between open economies.

Another possible explanation for the variance in research outcomes regarding tax competition lies in the diversity of the methodological approaches applied by the scholars. Major differences concern an adequate measure of economic openness or globalization. The bulk of

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<sup>1</sup> EU, EFTA and other PTA's within OECD.

empirical studies on tax competition employs various measures of trade liberalization and capital mobility as a measure for economic openness. Slemrod (2004) uses two such measures: trade volume (exports and imports of a country in relation to its GDP) together with the Sachs and Warner (1995) policy openness index (which values 1 if a country is open regarding its trade and 0 if it is not). Devereux et al. (2008) use the sum of inward and outward foreign direct investments in relation to GDP as a measure of openness. A further, widely used benchmark for openness is the Quinn (1997) index, which quantifies the degree of financial regulation varying from 0 to 14, with 14 as a most deregulated country.

Another important methodological issue is the choice of an indicator for the corporate tax burden. Statutory corporate tax rates alone are not a sufficient measure of the actual corporate tax burden in a country as they do not reflect changes in country's tax base. Therefore many other methods of measurement have been developed (for an overview see Devereux et al. 2002). In general, measurement methods of the corporate tax rates can be divided into two groups: the backward looking and the forward looking measures. Backward looking measures take the past as a calculation basis and are computed from existing data. One of the most popular methods in this category, developed by Mendoza et al. (1994), takes into account the ratio between tax base and tax revenue. In contrast, the forward looking measures are based on the tax legislation and on the future income of a corporation regarding a hypothetical investment project (for examples of such measures see i.e. Devereux and Griffith (2003)).

Another issue that also plays an important role in the assessment of fiscal competition is the selection of the appropriate econometric strategy. In order to capture fiscal competition as a process, many researchers implement a time dimension in their estimations by lagging the dependent variable. Another relatively new way to capture the tax competition effect is to estimate the fiscal reaction function, which basically means regressing a country's tax rate on the weighted average tax rates of other countries in competition. Devereux et al. (2008), for example, apply the fiscal reaction function to estimate the strategic interactions between countries regarding their corporate taxes. Their findings confirm the existence of tax competition with respect to statutory tax rates and also a (weaker) competition regarding effective marginal tax rates (EMTR). Klemm and van Parys (2012) report similar results for the strategic interaction between developing countries with regard to statutory corporate tax rates and tax holidays.

The aforementioned issues -- accounting for agglomeration forces, selecting the particular indicator for economic openness together with the choice of a specific research method -- are

important factors affecting the kinds of answers to the particular question regarding tax competition and its relation to regional integration. My strategy for addressing those problems is introduced in the empirical section of this paper.

This paper shall contribute to the tax competition research basically in two ways: (1) it covers the less explored question of the link between the regional integration, as a more specific form of economic openness and tax competition; (2) it works with a data set of transition countries, which until now has not found any particular attention in this context. Most of the research regarding tax competition concentrates on the OECD countries although there is also relatively recent research concerning tax competition in developing countries (see among others Keen and Simone (2004), Abbas and Klemm (2013)).

### **3. Empirical Analysis**

In the following analysis I focus on the transition countries in Eastern Europe, including the post-Soviet countries in Central Asia. All of these countries share the background of systemic transformation from socialist to market economy and therefore show some similarity in their sociological, economic and cultural traits. Furthermore, within transition countries I also make a clear distinction as to a particular country's participation in a regional integration initiative. A number of transition countries have become member states of the European Union. Some Eastern European and Eurasian countries are integrating within the Eurasian regional integration process. Although the post-Soviet countries have initiated many integration initiatives over the past twenty years<sup>2</sup>, I include in my analysis only the integration within the scope of the EurAsEC and the Customs Union/Eurasian Economic Union (CU/EEU). The reason for this limitation is the fact that until now these initiatives are the only ones that are functioning in practice. The EurAsEC provided an institutional basis for further integration of its Member States with aims to create a free trade area and a customs union among its members. In 2010 these aims were partially realized as the CU effectively came into force, albeit with only few members of the EurAsEC: Russia, Kazakhstan and Belarus. Subsequently, since the end of 2014 the EurAsEC has been dissolved and consolidated under the new form of the EEU. EurAsEC's and CU's organizational structure has been transferred into the EEU framework.<sup>3</sup>

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<sup>2</sup> For a review of integration initiatives in the post-Soviet region, see (among others) Libman and Vinokurov (2012), Valovaya (2012) and Eurasian Economic Commission (2013).

<sup>3</sup> With the exception of the Interparliamentary Assembly, which doesn't exist within the EEU.

### *Data and observation period*

The dataset consists of an unbalanced panel of 29 Eastern European and Eurasian countries which I divide into three groups: (1) countries that are members of the EU; (2) countries that are members of the EurAsEC and/or the CU<sup>4</sup>; and (3) countries that are not participating in any of the above-mentioned integration initiatives. This distinction allows me to differentiate between countries implementing basically two different forms of regional integration or none at all.

The observation period spans 13 years from 2000 to 2012 and hence embraces both the two extensions of the EU eastwards<sup>5</sup> and the foundation of the EurAsEC<sup>6</sup> in 2001 and the CU<sup>7</sup> in 2010.

### *Dependent variables: corporate tax variables*

Data on the corporate tax burden for many of the Eurasian and Eastern European countries are not readily available, and of the available datasets, many do not cover the required timespan for my study. Furthermore, many of the corporate tax measures such as the effective tax rate require additional data for calculation, which are either not obtainable or are not particularly reliable for many of the countries in Eurasia and Eastern Europe. Due to suspect reliability, calculations based on such data could seriously skew the outcomes. Therefore, in the following study I use two straightforward measures of corporate tax burden as dependent variables, which are also relatively reliable for the mentioned countries:

- statutory corporate tax rate;
- total tax rate.

*Insert table [1] here*

Statutory corporate tax rate is primarily based on the data from the KPMG Corporate and Indirect Tax Survey (2011). The survey collected the data on statutory corporate tax rates for the years from 2000 to 2011. For the year 2012 I used the KPMG's Corporate tax rates table. For the countries where the data in the survey are missing, other data sources are used if

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<sup>4</sup> All three countries of the CU are also Member States of the EurAsEC.

<sup>5</sup> 2004: Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Lithuania, Latvia (plus Malta and Cyprus); 2007: Romania and Bulgaria.

<sup>6</sup> Member states: Belarus, Russia Kazakhstan, Kyrgyzstan, Tajikistan (Uzbekistan till 2008).

<sup>7</sup> Member states: Belarus, Russia and Kazakhstan.

available, such as data from national investment agencies or data compiled by the international law firm Baker & McKenzie.

One of the problems with using statutory tax data is the fact that these data do not account for the changes in the country's overall tax base. It could be, for example, that a country has a fairly low corporate taxation level but, due to a broad tax base, the country could still collect the same or greater tax revenue than a country with higher statutory corporate taxation levels. Therefore I also introduce a second tax variable, which information is available for the most of examined countries: the total tax rate. It measures the tax burden of businesses as a share of commercial profits after all permitted deductions and exemptions are taken and therefore provides a more specific view of the actual tax burden on the companies. The data for the total tax rate were collected from the World Development Indicators (World Bank). The total tax rate is available for the years from 2005 onwards.

Figures 2 and 3 provide a graphical exemplification of the general trend in the development of the tax variables in the part of the sample including 12 countries of the former Soviet Union<sup>8</sup>.

*Insert figure [2] and [3] here*

The above figures display general declining trend in the tax variables. The figure 2 shows that the declining trend in statutory tax rates is present not only in the EurAsEC countries but also in the other countries of the post-Soviet space. However the figure also displays a stronger decline in the tax rates of Russia and Belarus after 2001, which could suggest an adjustment of the tax rates after the foundation of the EurAsEC.<sup>9</sup> Another sharp drop in the tax rates is visible around the year 2010, which also implies that the statutory corporate tax rates have been adjusted due to the foundation of the Customs Union.

Similar adjustment, although not so sharp, is also visible in the figure 3. The graph indicates that Belarus is primarily responsible for the large drop of the total tax rate within the Customs Union from 137% in 2005 to 58% in 2012. Russia's total tax rate value remains rather stable, whereas Kazakhstan's drops only slightly. Overall it appears that the total tax rates of Customs Union countries converge over time as the spread of the total tax rate values decrease significantly.

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<sup>8</sup> Baltic states: Estonia, Lithuania and Latvia not included.

<sup>9</sup> Around the 2001 many of the former Soviet countries introduced major tax reforms. See Stepanyan (2003) for an overview.



### *Regional integration variables*

As previously explained, the regional integration variable is a dummy variable indicating whether a country belongs to the EU, EurAsEC, CU or none of the mentioned integration initiative.

### *Other control variables*

Based on the above cited theoretical and empirical literature on this topic, I include the following variables as controls in the estimation: government expenditure, trade, GDP per capita, dependency ratio, and the real GDP.

General government expenditure as a share of GDP is expected to have a positive correlation with corporate tax rates. With rising fiscal needs of a country the corporate tax rates are also likely to rise (Hansson and Olofsdotter 2005).

The trade variable is defined as the sum of exports and imports of goods as well as services, divided by the GDP. It serves as an indicator of a country's openness to international trade. It is assumed that trade should be negatively correlated with the tax variables due to possible pressure to lower taxes with increasing capital mobility.

I use GDP per capita as a proxy for the income of the population. It is estimated to be positively correlated with the tax rates due to Wagner's Law, which with rising income expects an increased demand for public goods (Krogstrup 2006).

Dependency ratio controls for demographic development of the population. It is defined as the ratio of dependent people (younger than 15 and older than 64) to the working age population. It is assumed that with a rising dependency ratio corporate taxes in a country would also rise (Dreher 2006).

The GDP in constant US dollars controls for the size of economy of a country and therefore indirectly for the agglomeration forces. This is important due to the assumption that a large economy has less pressure to lower its taxation rates in comparison to relatively small economies (Slemrod 2004).

For further details on each variable see the table [5] in the Appendix.

### *Estimation*

In order to answer the research question whether and to what extent there is a nexus between regional integration and corporate tax levels, I estimate the following fixed effects regression model:

$$\text{Corporate Taxation}_{it} = \alpha_0 + \beta_1 \text{Integration}_{it} + \beta_2 X_{it} + \mu_i + \tau_t + v_{it}$$

*Corporate Taxation* represents the two above-identified tax measures: the statutory corporate tax rate and the total tax rate.

*Integration* is a dummy variable indicating whether a country belongs to one of the mentioned integration initiatives.

*X* represents the set of control variables,  $\mu_i$  are country fixed effects,  $\tau_t$  are period fixed effects and  $v_{it}$  is the error term.

In the basic specification I examine the relation between all the above-mentioned integration initiatives taken together and each of the two corporate tax rate variables.

With regard to the total tax rate, due to the fact that the data are only available for the years 2005 onwards, the estimation does not include all of the integration memberships. Specifically: it does not include the EurAsEC integration, since this integration initiative came into effect in 2001; it also does not take into account the 2004 expansion of the EU eastwards.

In subsequent specifications I calculate the estimation for each of the integration initiatives and tax variables separately.

### *Results*

Table [2] presents results of the two way fixed effects regressions with the corporate tax rate and the total tax rate as dependent variables.

*Insert table [2] here*

The results of the basic specifications are represented in rows (1) for corporate tax rate and (5) for total tax rate.

In the first specification (1), with the statutory corporate tax rate as dependent variable, there is a negative and significant correlation between the corporate tax rate and the examined

integration initiatives, which seems to confirm the assumption that regional integration contributes to the negative trend of corporate taxation, at least at the statutory level. In the basic specification (5), with the total tax rate as a dependent variable, the correlation is also negative and statistically significant. Both estimations suggest that corporate taxation tends to fall with an increased level of regional integration.

Similar results are also obtained when each of the integration initiatives is accounted for individually. Each of the integration areas is negatively correlated both with the corporate tax rate and total tax rate with varying significance levels, exception of the CU, which is negative but not significant with respect to the statutory corporate tax rate and the EU which is also negative but insignificant in the specification (6). The most likely reason for no significance in the case of EU is the fact that the total tax rate specification does not include the large 2004 EU enlargement.

Notable is the fact that the CU coefficient in the estimation with the total tax rate as a dependent variable is much larger than with the statutory corporate tax rate. This *de facto* means that the founding of the CU was paralleled by a strong declining trend in the tax burden for companies in the member states. The large coefficient of the CU in the estimation (7) transfers to the overall estimation (5) and increases the coefficient there as well. Figure 3 showed that the large decline in the total tax rates within CU can be primarily attributed to Belarus.

Another partially significant variable in the estimations is the real GDP indicating the size of an economy. It is negative in the specifications with the statutory corporate tax rate as a dependent variable, which in this case means (contrary to the agglomeration thesis) that the countries with larger GDPs tend to have lower statutory tax rates on corporate income. The outcome is however opposite in the case of the total tax rate (specifications 5-7), where the connection between those two variables is positive (although significant only at 10% level). It therefore seems that the countries with higher GDP do tend to have higher actual tax rates. The result seems plausible especially for the CU, where Russia as a very large economy can afford to have higher tax rates.

Government expenditure is in all specifications positively related to corporate taxation levels. This result, although not significant, suggests that the assumption about the positive relation between government expenditure and tax rates is accurate.

The variable trade, a proxy for a country's general openness to a global economy, also has no significant correlation in either specification. However, the trade variable remains negative in all specifications, suggesting a similar relationship as in the specifications with regional integration variables: increasing trade openness goes together with decreasing corporate tax levels.

Another interesting, although insignificant, negative relation is the correlation between statutory corporate tax rate and GDP per capita in Eurasian integration initiatives. A similar link is also present in the total tax rate specification. This relation would indicate, contrary to Wagner's Law, that increasing population income is accompanied by decreasing statutory corporate taxes, at least in case of the Eurasian integration.

Demographic factors represented by the age dependency ratio proxy appear to have a positive but not significant connection with corporate taxation levels. This corresponds with the expected direction of the correlation anticipating that a growing number of dependents in a country's population contributes to rising corporate tax rates.

The overall results indicate a moderately strong relationship between corporate taxation levels and integration processes in the Eastern European and post-Soviet countries. The results provided by the estimations suggest that the regional integration processes developing in Eastern Europe and Eurasia have a significant negative effect on the statutory corporate tax rates.

The correlation between corporate taxation and other factors principally supports the assumptions made in the beginning of this section. The exceptions are the relation between GDP and statutory corporate tax rate and the relation between the GDP per capita in the specifications with Customs Union and in the specifications for the total tax rate.

### *System GMM*

In order to verify the results from the fixed effects estimation, as a second approach I introduce the time dimension in my calculation. This methodology enables me to address the problem of autocorrelation of the dependent variable over time. It is plausible to assume that, for example, the current corporate tax rate levels are dependent upon their own values in the previous year. By lagging the dependent variable I am able to introduce the time dimension to the equation and to some degree account for the gradual adjustment of tax rates in the observed countries.

Fixed effects estimation produces biased results when lagging the dependent variable (Nickell 1981). Therefore I use the GMM estimations as generally specified by Arellano and Bond (1991) and augmented by Arellano and Bover (1995)/Blundell and Bond (1998).

The basic GMM equation looks as follows:

$$\text{Corporate Taxation}_{it} = \beta_1 \text{Corporate Taxation}_{i,t-1} + \beta_2 \text{Integration}_{it} + \beta_3 X_{it} + \varepsilon_{it}$$

*Corporate Taxation* on the right side of the equation represents the lagged dependent variable. Similar to the fixed effects equation, the *Integration* variable indicates whether a country belongs to one of the integration initiatives;  $X_{it}$  represents the set of control variables and  $\varepsilon_{it}$  the error term.

I use the system GMM estimator in accordance with Arellano and Bover (1995)/Blundell and Bond (1998). The estimation method applies Generalized Methods of Moments as specified by Hansen (1982).

The suggested system GMM method has many advantages but also many requirements which must be fulfilled in order to achieve reliable results. In general it has been designed for relatively short panel datasets (a small number of time periods and large numbers of individuals). The most important caveat to applying GMM methods is, however, the danger of instrument proliferation, which renders the outcomes of estimations unreliable.<sup>10</sup> Clearly my dataset of countries does not exactly fulfil those requirements. I address those issues in my analysis by, amongst other, estimating the system GMM instead of difference GMM. As Soto (2009) pointed out, in small samples the system GMM estimator delivers better results than the difference GMM. Furthermore, I adjust the number of lags and calculate the Hansen test for my estimations.

Another problem arises through lagging of the dependent variable with the EurAsEC integration in the corporate tax rate estimation. Due to the early start of the EurAsEC integration in 2001, I cannot include it in the GMM estimation with the statutory corporate tax rate. As was also the case with fixed effects estimation, owing to data unavailability, I am not able to include the EurAsEC integration and the 2004 EU enlargement in the estimations with the total tax rate.

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<sup>10</sup> For an overview of requirements and possible caveats see: Roodman (2009).

## *Results*

The abovementioned constraints make the results of the GMM estimation much less reliable than those of the fixed effects estimations. The relatively high p-values of the Hansen test point toward the danger of instrument proliferation. It is therefore advisable to see the GMM estimations rather as an addition to the fixed effects model, which is more consistent in this constellation.

*Insert table [3] here*

The most noticeable observation is that the lagged corporate tax variables are significant in all of the specifications. The significant presence of autocorrelation in tax variables confirms the assumption that both tax variables are dependent upon their previous values in the past. Also noteworthy is the fact that in the case of the GMM estimations the number of observations is lower than in the case of the fixed effects estimations. The cause of this observation loss is the implementation of the lagged dependent variable.

The overall results also show, similar to the fixed effects estimations, a largely negative but in most cases insignificant relation between the integration variables and corporate tax variables. The only significant outcomes in the specifications (2) with the EU and (6) with the CU are both similar to those of the fixed effects estimation. These outcomes can be partially explained by the dynamic structure of the estimation, i.e. lagging of the dependent variable, which reduced the number of observations, particularly with respect to the CU. With regard to the EU, the positive relation in specification (5) could originate from the fact that the data set excludes the major part of the eastward expansion. The cause for the mixed outcomes with regard to the GMM estimations with CU can also be seen in the figures 2 and 3: whereas the total tax rates especially of Belarus have been drastically adjusted around the time of the CU foundation, the statutory corporate tax rates had their sharpest decline after the EurAsEC foundation between 2001 and 2003. This decline, similar to the EU enlargement in 2004, could not be captured by the GMM estimation.

## *Spatial Autoregressive Model*

As a further enhancement of the above analysis it is likewise helpful to examine the spatial interaction between the countries' tax rates. The presence of spatial interaction within an integration area could meaningfully reinforce the assumption about the presence of tax competition in the region. Therefore, in order to see whether the tax rates of the examined

countries are spatially correlated, I additionally would like to estimate a spatial lag model also known as spatial autoregressive model (SAR). Due to the small sample size in the case of the EEU I estimate the spatial lag model only for the Eastern European countries integrating within the EU framework.

Following the literature on such models by Cliff and Ord (1973), Anselin (1988), Elhorst (2003) and Lesage and Pace (2009) I suggest the following equation:

$$y_{it} = \gamma y_{i,t-1} + \rho W y_{it} + \beta_1 EU_{it} + \beta_2 X_{it} + \mu_i + \tau_t + \varepsilon_{it}$$

where:

$y_{it}$  represents the dependent corporate taxation variable (corporate tax rate or the total tax rate).

$y_{i,t-1}$  on the right side of the equation represents (similar to the GMM model) the lagged dependent variable. By including it in the model I account for the autocorrelation of the corporate tax variables.

$\rho W y_{it}$  is the spatial lag variable describing the actual spatial interaction outcome.  $W$  is the spatial-weighting matrix based on the inverse distance between countries' capitals. The parameter  $\rho$  basically describes the strength of the spatial relationship.

Similar to the fixed effects equation, the  $EU$  variable indicates whether a country belongs to the EU integration or not.

$X$  represents the set of control variables  $\mu_i$  are country fixed effects,  $\tau_t$  are period fixed effects and  $\varepsilon_{it}$  the error term.

In order to get optimal results I modify the dataset in the following way: (1) I remove countries with missing values in the tax but also in the control variables<sup>11</sup>; (2) I confine the timespan for the corporate tax rate to years 2002-2012. These changes enable me to produce a fully balanced dataset of countries which is advantageous in order to receive reliable results with the above equation.

It is well known that due to the endogeneity of the spatial lag variable the standard estimator OLS produces biased results (Anselin 1988). Therefore many other estimation strategies have

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<sup>11</sup> Countries removed from corporate tax rate dataset: Kosovo, Turkmenistan, Tajikistan, Kyrgyzstan, Moldova, Azerbaijan, and Uzbekistan. Countries removed from the total tax rate dataset: Kosovo and Turkmenistan.

been applied to the spatial models, the most known are the maximum likelihood estimation (Ord 1975, Lee 2004, Lee and You 2010) and the GMM and GS2SLS estimation (Kelejian and Prucha 1999, 2010, Arraiz et al. 2010).

For the purposes of this paper a standard ML estimation as suggested by Lee (2004) will be sufficient. According to LeSage and Pace (2009), by comparison, the ML estimation is fairly easy to compute and is low risk from specification errors in the model.

## *Results*

*Insert table [4] here*

The results are, with regard to the EU variable and the lagged dependent variable, similar to those of the GMM estimation. The lagged dependent variable remains strongly significant. The EU variable is not significant but remains negative in the statutory corporate tax rate estimation and positive in the total tax rate estimation. The reason for the positive correlation is probably the same as in the case of GMM estimation: the data does not include the 2004 EU enlargement.

The spatial lag variable on the other hand is strongly significant in the case of the total tax rate specification and therefore implies the presence of spatial spillover effects at least in the case of the total tax rates of EU countries.

Overall the results suggest that the spatial interactions at least with regard to the EU countries are present in the case of the total tax rate which attempts to more accurately measure the actual tax burden of a country but not so in the case of the statutory tax rate.

## **4. Conclusions**

In general, the above results confirm the assumption that there is a negative relation between corporate taxation levels and regional integration. In practice this suggests that the negative trend in corporate taxation can be partially attributed to the progressing regional integration initiatives (EU and Eurasian integration). Hence the pressure to lower corporate tax burdens among the member states of those integration initiatives seems to be real. The GMM and the spatial lag estimations also confirm that the corporate tax rates depend strongly on their previous values. The spatial spillovers between the EU countries seem at least partially to be real.



Some critics assert that the integration initiatives in the post-Soviet sphere are not actually being implemented (Libman 2007, Valovaya 2012). However, the presence of the linkage between corporate taxation and integration within the EurAsEC and CU/EEU confirms not only that these integration initiatives are being implemented, but that they also work effectively in practice. The adjustment of the total tax rates levels within the CU/EEU (figure 3) falls into ranks with other fiscal policy measures that were introduced in the last few years, such as for example recent changes in civil legislation in Kazakhstan and Russia aimed at constraining the power of offshore investors.<sup>12</sup>

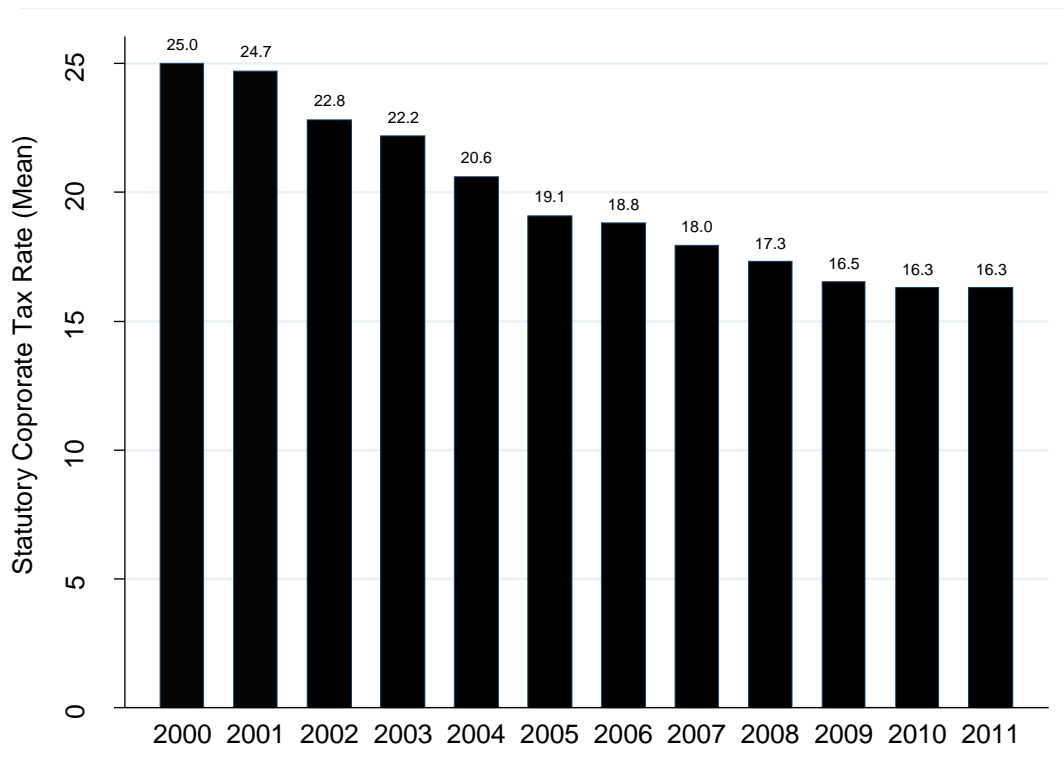
One of the unresolved issues with regard to my analysis is the question of an adequate measure of corporate taxation for transition countries. The lack of sufficient and reliable data reflecting the tax base development in all of the transition countries remains problematic, and access to those data would contribute immensely to calculating the real tax burden for companies. Further research is also required as to the effective and marginal corporate tax rates in those countries. Establishing a database containing this information would yield clearer results for any further analysis of the relation between taxes and regional integration in those countries.

I have also examined the Eurasian integration process and its consequences for the fiscal policies of the member states. However, because this integration project is still relatively new and its long-term effects untested, only with the passing of time a broader assessment of the implications of the integration of these fiscal policies will be possible.

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<sup>12</sup> For Kazakhstan see the overview in Bregonje and Bezborodov (2010). For Russia see the The Moscow Times from Dec. 20 2013: Putin's 'Deoffshorization' Brings Major Firms Back to Taxman. Newest changes in the legislation promoting "deoffshorization" in Russia have been introduced by the Federal Law in 2014: <http://publication.pravo.gov.ru/Document/View/0001201411250003>.

**Figure 1: Corporate tax rate development in transition countries**



Source: Statutory corporate tax rate data (Source: own calculations based on the KPMG data; see Table 1)

**Table 1: Taxation variables**

Dependent Variable	Definition	Source
Corporate Tax Rate	Statutory Corporate Tax Rate	KPMG Corporate and Indirect Tax Survey 2011; Ministry of Taxes Republic of Azerbaijan, National Investment Agency in Georgia and Uzbekistan, Doing Business Series Baker & McKenzie
Total Tax Rate	“Total tax rate measures the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits. Taxes withheld (such as personal income tax) or collected and remitted to tax authorities (such as value added taxes, sales taxes or goods and service taxes) are excluded.”	World Development Indicators; Doing Business project (World Bank)

**Figure 2: Corporate tax rate developments in the post-Soviet countries**

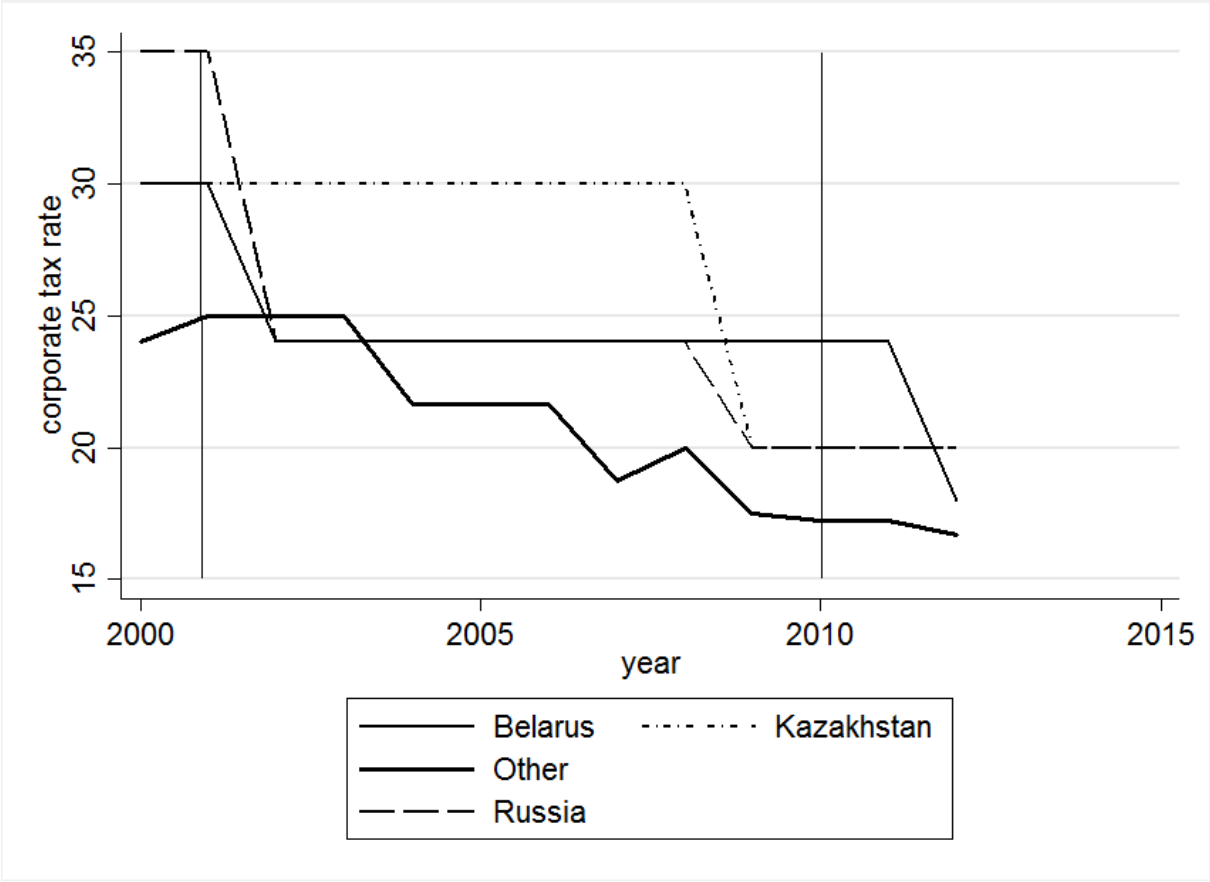


Figure 2 displays statutory corporate tax rates of the Member States of the Customs Union plus an average corporate tax rate of other post-Soviet countries (without Baltic States). Source: KPMG Corporate and Indirect Tax Survey (See Table 1)

**Figure 3: Total tax rate developments in the post-Soviet countries**

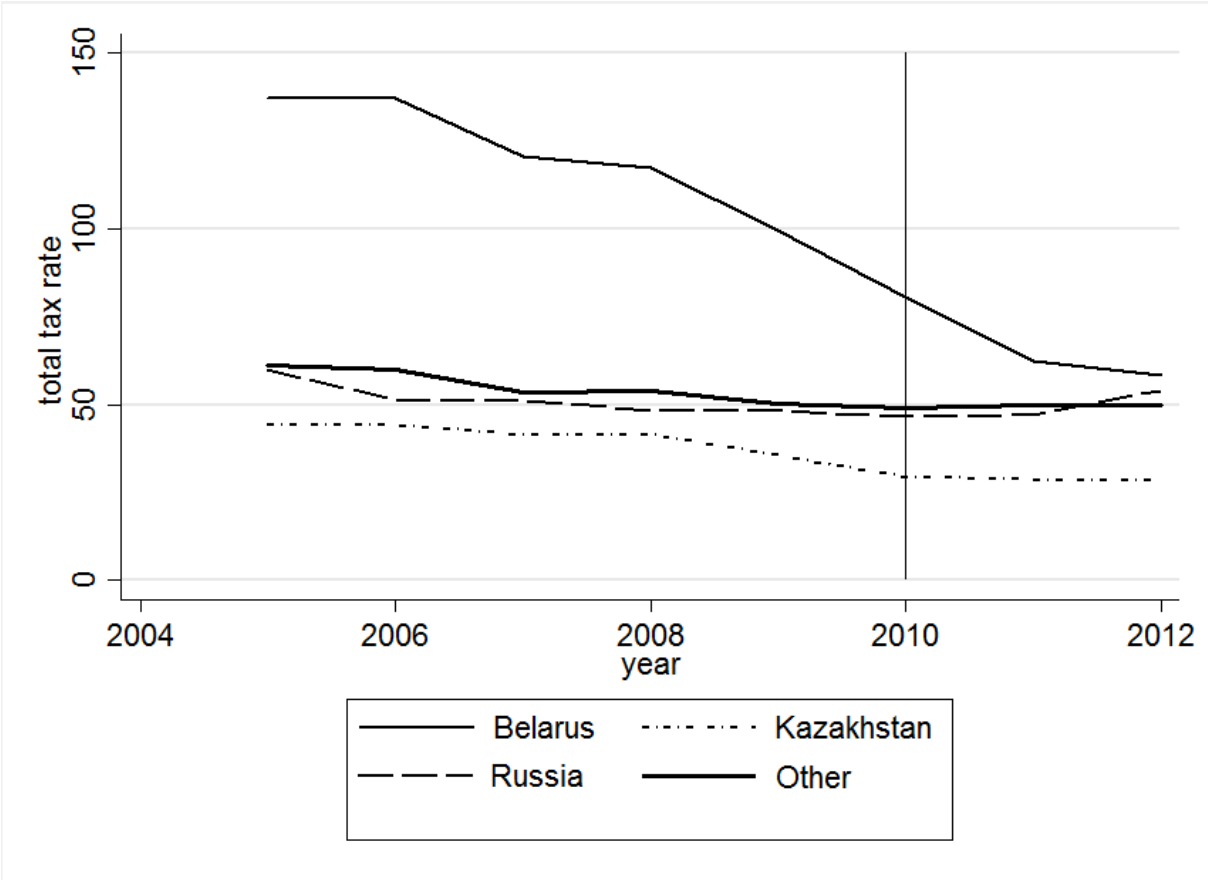


Figure 3 displays total tax rates of the Member States of the Customs Union plus an average total tax rate of other post-Soviet countries (without Baltic States). Source: World Bank Development Indicators (See Table 1).

**Table 2: The impact of integration on corporate taxation levels**

Fixed Effects Estimation							
	Corporate Tax Rate				Total Tax Rate (since 2005)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Integration	-3.025** (1.122)						
Integration (no EurAsEc)					-14.492* (7.684)		
EU		-2.544* (1.277)				-2.577 (3.206)	
CU			-2.013 (2.113)				-20.824* (11.577)
EurAsEC				-3.487** (1.480)			
Government expenditure	0.057 (0.069)	0.023 (0.074)	0.005 (0.073)	0.049 (0.080)	0.571 (0.631)	0.800 (0.845)	0.485 (0.556)
Trade	-0.01 (0.028)	-0.014 (0.029)	-0.028 (0.26)	-0.021 (0.031)	-0.078 (0.113)	-0.060 (0.116)	-0.082 (0.110)
GDP/Capita	0.0004 (0.0006)	0.0003 (0.0006)	-0.0003 (0.0005)	-0.0003 (0.0005)	-0.0007 (0.002)	-0.001 (0.002)	-0.0008 (0.002)
Dependency ratio	0.445 (0.300)	0.415 (0.301)	0.313 (0.314)	0.335 (0.304)	0.628 (0.702)	0.329 (0.678)	0.439 (0.650)
GDP	-0.012*** (0.004)	-0.014*** (0.004)	-0.008 (0.006)	-0.008 (0.005)	0.066* (0.037)	0.015 (0.030)	0.097* (0.052)
Number of countries	25/29	25/29	25/29	25/29	28/29	28/29	28/29
Number of observations	263	263	263	263	210	210	210
R <sup>2</sup> (within)	0.62	0.61	0.60	0.60	0.41	0.31	0.44

(Note: Robust standard errors are reported in parentheses. Stars indicate levels of significance: \*\*\*: 1 percent, \*\*: 5 percent, \*: 10 percent.)

**Table 3: The impact of integration on corporate taxation levels**

System GMM Estimation						
	Corporate Tax Rate			Total Tax Rate (since 2005)		
	(1)	(2)	(3)	(4)	(5)	(6)
Integration (no EurAsEC)	-1.420 (1.047)			-12.962 (11.980)		
EU		-3.200** (1.307)			5.041 (19.947)	
CU			2.644 (2.429)			-13.000* (7.112)
Government expenditure	-0.053 (0.078)	-0.038 (0.081)	-0.054 (0.075)	-0.148 (0.964)	-0.444 (0.302)	0.008 (0.711)
Trade	0.005 (0.017)	0.011 (0.025)	-0.006 (0.021)	0.160 (0.355)	0.015 (0.114)	0.226 (0.238)
GDP/Capita	0.0003 (0.0002)	0.0005** (0.0002)	0.0003 (0.0002)	-0.003 (0.009)	-0.0007 (0.003)	-0.004 (0.008)
Dependency ratio	0.041 (0.069)	-0.008 (0.084)	0.016 (0.082)	0.186 (1.234)	0.468 (0.464)	-0.065 (0.971)
GDP	0.003 (0.002)	0.0008 (0.003)	-0.0007 (0.005)	0.083 (0.162)	0.037 (0.080)	0.086 (0.130)
Lagged dependent variable	0.860*** (0.070)	0.875*** (0.065)	0.975*** (0.082)	0.701** (0.256)	0.790*** (0.159)	0.736*** (0.265)
Number of countries	24	24	24	28	28	28
Number of observations	240	240	240	183	183	183
Number of instruments	21	21	21	12	12	12
Arellano-Bond test AR (1)	0.005	0.007	0.003	0.056	0.018	0.078
Arellano-Bond test AR (2)	0.518	0.998	0.074	0.717	0.283	0.647
Hansen test (p-value)	0.320	0.232	0.312	0.206	0.238	0.263

(Note: Robust standard errors are reported in parentheses. Stars indicate levels of significance: \*\*\*: 1 percent, \*\*: 5 percent, \*: 10 percent.)

**Table 4: Spatial Autocorrelation Model**

Spatial Autocorrelation Model		
	Corporate Tax Rate (since 2002)	Total Tax Rate (since 2005)
Lagged dependent variable	0.667*** (0.048)	0.863*** (0.105)
Spatial Lag $W_y$	-0.203 (0.127)	-0.647*** (0.14)
EU	-0.25 (0.563)	3.679 (2.381)
Government expenditure	0.108 (0.07)	0.40** (0.193)
Trade	-0.009 (0.014)	0.026 (0.038)
GDP/Capita	0.0004 (0.0003)	-0.0004 (0.0009)
Dependency ratio	0.079 (0.120)	0.086 (0.171)
GDP	0.002 (0.004)	0.042** (0.017)
Number of countries	22	27
Number of observations	220	189
Log-Likelihood	-411.84	-536.46
R <sup>2</sup> (within)	0.71	0.72

(Note: Robust standard errors are reported in parentheses. Stars indicate levels of significance: \*\*\*: 1 percent, \*\*: 5 percent, \*: 10 percent.)



**Table 5: Variables**

Variable	Description	Mean	Std. Dev.	Min	Max	Source
Corporate tax rate	Statutory corporate tax rate	19.5621	6.23835	9	35	KPMG Corporate and Indirect Tax Survey 2011; KPMG Corporate Tax Rate Table; Ministry of Taxes Republic of Azerbaijan, National Investment Agency in Georgia and Uzbekistan, Doing Business Series Baker & McKenzie
Total tax rate	“Total tax rate measures the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits. Taxes withheld (such as personal income tax) or collected and remitted to tax authorities (such as value added taxes, sales taxes or goods and service taxes) are excluded.”	47.8058	21.1258	9.7	137.5	World Development Indicators; Doing Business project (World Bank)
Government expenditure	General government total expenditure as a percent of GDP	35.5086	9.48611	8.46	59.599	IMF, World Economic Outlook Database
Trade	“The sum of exports and imports of goods and services measured as a share of gross domestic product”	103.5558	30.8437	46.11	199.68	World Development Indicators (World Bank)
GDP per capita	Gross domestic product divided by midyear population. In constant 2000 USD	3000.131	2724.61	139.4	13836.2	World Development Indicators (World Bank)

Dependency ratio	“Age dependency ratio is the ratio of dependents--people younger than 15 or older than 64--to the working-age population--those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population.”	48.0178	8.12805	37	85	World Bank (World Development Indicators)
GDP	Real Gross Domestic Product in constant 2000 USD (divided by Million)  GDP/1000000	36501.6	73393.3	860.5503	433192.1	World Bank (World Development Indicators)

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