CORPORATE TAX COMPETITION AND CAPITAL ALLOCATION. OECD EVIDENCE

by

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Abstract

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The aim of this thesis is checking two hypothesis concerning corporate tax competition. The first one is positive relationship between corporate tax competition and marginal product of capital. The second one is capital misallocation that results from tax competition influence. For this purpose I used panel data for 21 OECD countries in the period 1989 – 2010. It was proven that expected relationship between tax competition and marginal product of capital is present for five non-European countries; moreover, it was shown that this connection results in more inefficient capital allocation.

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GLOSSARY

Tax competition. A form of regulatory competition: governments lower fiscal burdens to either encourage the inflow of productive resources or discourage the exodus of those resources. Often, this means a governmental strategy of attracting foreign direct investment, foreign indirect investment (financial investment), and high value human resources by minimizing the overall taxation level and/or special tax preferences[1].

Corporate tax competition. Tax competition that incorporates cuts in the corporate tax rates.

Efficient capital allocation. In the ideal world, it is situation when marginal product of capital is equalized across countries. For the purpose of this research, I interpret decrease in the variance of marginal product of capital across countries as increase in capital allocation efficiency.

[1] Definition from Wikipedia: http://en.wikipedia.org/wiki/Tax_competition

Chapter 1

INTRODUCTION

It has been under serious discussion in the academic literature that tax competition may lead to resource misallocation: attracted by low tax rate, investors get into countries where their resources are not used in the most productive way (OECD, 2000, Mitchell, 2004).

This statement is one of the two main arguments against tax competition (the other one is under provision of public goods due to decline in tax revenues Rohac, 2006). It is used by both OECD and EU officials to support tax harmonization cause. However, connection between tax competition and capital misallocation was not yet empirically tested. As a result, estimation of tax competition – misallocation causality would add new knowledge to both economic growth and tax competition literature. Moreover, results of this kind of research will be useful for international dialogue concerning tax harmonization.

The underlying theory asserts that tax competition is one of important determinants of the investment distribution across countries. In its turn foreign investment increases domestic capital, thus decreasing MPK. Consequently, tax competition affects MPK through the foreign investment. However, it is unclear whether connection between corporate tax competition and marginal product of capital leads to inefficient capital allocation. It is possible that countries with high MPK cut taxes to attract investment. As a result their marginal product of capital decreases and international allocation of capital improves. In my research I will firstly try to determine corporate tax competition – MPK connection and then check how this connection affects efficient capital allocation.

As a basis of my research, I will use augmented Solow model to control for international financial flows. Marginal product of capital will be calculated using standard Cobb-Douglas production function, taking into account the difference between natural and reproducible capital and cross-country differences in the consumption to the investment price ratio. As an estimate of tax competition, cross country differences in corporate tax rates will be used. There are two justifications for this choice. Firstly, any change in corporate tax rate affects foreign investment and thus can be regarded as a stage of the tax competition process. Secondly, opposite to tax competition is tax harmonization. The bigger is the difference in tax rates across countries the further they are from tax harmonization and the more intense is the tax competition.

The data required for estimating includes GDP, domestic and foreign investment, and many other variables. I use the sample of 21 OECD countries over the period of 1989 to 2010. The main data sources are OECD and World Bank databases, and Penn World Table 7.1 (Heston, Summers and Aten, 2012).

My analysis has partially confirmed hypotheses. Tax difference (estimate of tax competition) appears to have a positive effect on marginal product of capital for non-European countries. For those five countries it contributes to inefficient capital allocation.

The outline of the work is following: in Chapter 2 I will briefly discuss tax competition and economic growth literature dealing with capital misallocation. In Chapter 3 I will describe methodology and will mention some possible econometric issues. In Chapter 4, data is discussed. Chapter 5 concludes and paves the line for further research.

Chapter 2

LITERATURE REVIEW

For the purpose of this thesis, three streams of academic literature are of a particular interest. The first one investigates the problem of existence of the capital misallocation. The second one includes theoretical models connecting tax competition and capital misallocation. The third one considers impact of tax competition on foreign investment.

Lucas (1990) initiated the discussion of capital misallocation. He noted an huge difference in output per worker between poor and rich countries. He questioned if this fact contradicted the idea of economic efficiency (stated as equality of marginal products of factors). The respond of recent empirical studies is that there is no contradiction: marginal products do differ but not too much and, moreover, converge over time (Caselli and Feyrer, 2007; Mello, 2009; Chatterjee and Naknoi, 2010). These studies use three methods of calculating MPK. The first one uses interest rates as the estimate of MPK. It is imperfect because borrowing market is very often constrained by the government (Banerjee and Duflo, 2005). The second approach uses regression of total income on capital (Banerjee and Duflo, 2005). The drawback of this approach is the production function identification problem. The third one (designed by Caselli and Feyrer, 2007) employs calibration methods. It allows controlling for additional factors and does not impose assumptions about production function. The drawback of this method is the need to accurately measure all factors that may affect MPK (such as human capital and TFP).

The estimated behavior of marginal product of capital depends on a method used. Difference in MPK between developed and developing countriesis small and

decreases with time if we account for two factors: prices of investment and consumption goods, and the share of reproducible capital (Caselli and Feyrer, 2007).

There are two classes of models that describe a link between tax competition and capital misallocation. One group does not allow individual treatment of firms: countries compete with each other only through cuts in tax rates; they cannot arrange individual agreements with particular firms. As a result there might be optimal public good supply, but capital misallocation is always unavoidable (Hamada 1966, Wilson 1999). Another group of models incorporates individual firms into analysis. Capital misallocation is not confirmed within this class of models (Han and Leach, 2007). It can be concluded that tax competition – capital misallocation connection is not robust to model assumptions. Empirical analysis might help to establish the direction and strength of the effect.

The connection between tax competition and foreign direct investment was confirmed for EU countries (Razin and Sadka, 2004), Central European countries (Sedmihradsky and Klazar, 2002), OECD countries (Bénassy-Quéré, Fontagné, and Lahrèche-Révil, 2005) using cross-country data. The influence of tax competition on firms' decision making was also confirmed using firm-level data (Desai, Foley and Hines, 2002). What is common for these studies, is that they do not mention capital misallocation. Reflections about it can be found only in the theoretical tax competition literature.

Intersection of economic growth and tax competition fields may add interesting discussion to the literature. In the tax competition studies, economic growth models (like Solow model) are not used. On the other hand, in the growth literature effect of fiscal policies interaction on economic development is not accounted for. I believe that combining methods from one literature stream with the data from another one may bring new knowledge to both.

Chapter 3

METHODOLOGY

The aim of my thesis is to test the relationship between tax competition and capital misallocation. For this purpose, a following function will be used:

$$MPK_{it} = f\left(Tax\ competition_{it-\eta}; Control\ variables\right), \qquad (1)$$

If there is no capital misallocation, marginal product of capital is equalized across countries. This is a σ convergence-method of measuring capital misallocation proposed by Caselli, Esquivel and Lefort (2006).

In order to find how tax competition affects capital allocation, I will first determine the sign of coefficient of the tax competition on marginal product of capital influence. Second, I will determine whether tax competition contributes to the convergence to the average level of capital. I will interpret movement towards average level as an increase in capital allocation efficiency.

3.1 Model specification

As a basis for the equation (1) Solow model (as described in Mankiw et al., 1992) will be used. The Solow model considers domestic factors. I will augment it with external factors following methodology introduced in Bondarenko and Nishioka (2011), which will make my work comparable to other studies on conditional convergence in economic growth.

In accordance with the model, capital per effective unit of labor will be used:

$$k_{it} = \frac{K_{it}}{A_{it}L_{it}}, \qquad (2)$$

Where K_{it} – stock of capital, A_{it} – labor augmenting productivity, L_{it} – labor force. Change in capital is equal to:

$$\Delta k_{it} = s_{i,t-\eta} y_{it} - (n_{it} + g_{it} + \delta) k_{it}, \quad (3)$$

Where $s_{i,t-\eta}$ is fraction of output that is saved and invested, y_{it} is output per effective unit of labor, n_{it} is average population growth between t–η and t, g_{it} is the growth rate of labor productivity from t–η and t, δ is depreciation rate. Using equations (3), MPK definition, and the steady-state condition, it is possible to derive MPK as:

$$MPK_{it} = \alpha_i \frac{n_{it} + g_{it} + \delta}{s_{i,t-\eta}}, \quad (4)$$

A share of capital in the total income α_i, population growth n_{it}, labor productivity growth g_{it}, and depreciation δ positively influence MPK, whereas initial saving rate $s_{i,t-\eta}$ negatively influence MPK. Caselli et al. (1996) use equation (4) to construct a growth model at the level of marginal product of capital:

$$\ln(MPK_{it}) = \beta_0 + \beta_1 \ln(MPK_{it-1}) + \beta_2 \ln(\alpha_i) + \beta_3 \ln(n_{it} + g_{it} + \delta), \quad (5)$$

Bondarenko and Nishioka (2011) augment equation (5) with international flows of financial assets:

$$\ln(MPK_{it}) = \beta_0 + \beta_1 \ln(MPK_{it-1}) + \beta_2 \ln(\alpha_i) + \beta_3 \ln(n_{it} + g_{it} + \delta) + \beta_4 ln(FDI_{it-1}), \quad (6)$$

$FDI_{it-\eta}$ stands for foreign direct investment. In Bondarenko and Nishioka (2011), financial flows enter equation (6) without logarithm operator. However, all other variables enter equation with logarithm operator, so I will use logarithm of FDI.

Bondarenko and Nishioka (2011) argue that FDI increases domestic capital and as a result decreases MPK. I also assume that tax competition affects MPK via foreign investment. To investigate this relationship, I will decompose the foreign direct investment into tax competition, gross domestic product and lagged foreign investment variable.

The final model is:

$$\ln(MPK_{it}) = \beta_0 + \beta_1 \ln(MPK_{it-1}) + \beta_2 \ln(TC_{it-2}) + \beta_3 \ln(FDI_{it-2}) + \beta_4 \ln(GDP_{it-1}) + \beta_5 \ln(\alpha_i) + \beta_6 \ln(s_{it-1}) + \beta_7 \ln(n_{it} + g_{it} + \delta), \quad (7)$$

3.2 Measure of MPK

Methodology of MPK calculation is taken from Caselli and Feyrer (2007). Authors start from a simple MPK measure:

$$MPK_{it} = \alpha_k \frac{Y_{it}}{K_{it}}, \quad (8)$$

Where α_k is the share of capital in total income and is equal to one minus labor share: $\alpha_k = (1 - \alpha_l)$. Caselli and Feyrer (2007) argue that this measure is inconsistent because it does not distinguish between reproducible and natural capital and does not take into account the difference in the price of capital relative to the price of consumption goods between rich and poor countries. Instead they propose an alternative measure:

$$MPK_{it} = \alpha_i \frac{P_y GDP_{it}}{P_k K_{it}}, \quad (9)$$

Where α_i is the share of reproducible capital in total income, P_yY is GDP at domestic prices, and P_kK is the capital stock at domestic prices. I will use MPK calculated using equation (9).

The stock of capital needed for MPK in (9) is calculated using a perpetual inventory method:

$$K_{it+1} = (1 - \sigma)K_{it} + I_{it}, \quad (10)$$

Where σ stands for depreciation rate, I_{it} stands for amount of investment.

3.3 Measure of corporate tax competition

By definition tax competition is decrease in fiscal burdens to either encourage the inflow of productive resources or discourage the exodus of those resources. Tax competition literature is mostly concentrated on cuts in corporate tax rates because data on them is available. It is shown that a corporate tax rate cut on average leads to an increase in FDI (Devereux and Loretz, 2012, Heinemann, Overesch and Rincke, 2010). It is important to mention that any cut in the corporate tax rate (even not motivated by tax competition) leads to an increase in investment. As a result any change in corporate tax rate can be considered as a part of tax competition. The opposite of tax competition is tax harmonization, a situation when all countries apply the same tax rates. The larger the difference between tax rates is the more active tax competition is. For each country I will calculate the difference between domestic corporate tax rate and the weighted average of other countries' tax rates. This difference will be used as an estimate of tax competition.

$$\text{Estimate of } TC_i = \tau_{it} - \tau_{-it}, \quad (11)$$

Since I will need a logarithm of estimate of TC, and it is often negative, I will transform it:

$$\text{Regression Estimate of } TC_i = 1 + \frac{\tau_{it} - \tau_{-it}}{100}, \quad (12)$$

Therefore, an increase in the logarithm of Regression Estimate of TC denotes greater difference in the tax rates between a country *i* and other OECD countries. In the equation above τ_{it} is domestic tax rate, τ_{-it} is weighted average of others countries' tax rates:

$$\tau_{-it} = \sum_{k \neq i} w_{ij} \tau_{jt}, \quad (13)$$

As weights, I will use the amount of trade between countries:

$$w_{ij} = \frac{IM_{ji} + EX_{ij}}{\sum_{k \neq i} IM_{ki} + EX_{ik}}, \quad (14)$$

Where IM_{ji} and EX_{ij} stand for import and export.

As a robustness check, I will use alternative weights:

$$w_{ij} = \frac{\ln(pop_j)/d_{ij}^2}{\sum_{k \neq i} \ln(pop_k)/d_{ik}^2}, \quad (15)$$

Where d_{ij} is the distance between the capitals of countries *i* and *j*; pop_j is the population of country j.This measure is proposed in Heinemann, Overesch and Rincke (2010). Amount of trade between countries is a preferred measure because it points at actual interactions between countries. On the other hand, population and distance is an indicator of implied interactions: we assume that countries pay more attention to fiscal systems of large countries (in terms of population) that are closer to their borders.

3.4 Measure of labor productivity

A measure of labor productivity is taken from Bondarenko and Nishioka (2011). It is derived from the Solow model production function:

$$\ln(A_{it}) = \frac{ln(Y_{it}) - \alpha_i ln(K_{it}) - (1-\alpha_i) ln(L_{it})}{(1-\alpha_i)}, \quad (16)$$

3.5 Econometric issues

Error term in the econometric model (7) consists of two components: country-specific individual effects and a usual error term. The model includes lagged dependent variable (marginal product of capital) which is correlated with individual effects from the error term. This may create a problem of endogeneity; ordinary least square estimates may become biased and inconsistent even if the error terms are not serially correlated (Roodman, 2006). Individual effects can be controlled for in the fixed effect regression; its estimates are biased but consistent in the big sample (Roodman, 2006). It is not a case of this research, since the main sample includes only 377 observations. Taking this into account, a preferred econometric method is the first difference generalized method of moments. This technique was designed by Arrelano and Bond (1991) specifically for panel data that includes small number of periods and large number of participants. I will employ a more advanced version of this method developed by Blundell and Bond (1998). Among other things it controls for panel-specific autocorrelation, different patterns of heteroskedasticity and cross-country correlation.

The main problem that can arise from usage of first difference generalized method of moments is an abundant number of instruments. In this technique, lagged values of variables are used as instruments. If the number of instruments is too big, the results of Hansen test (used for testing validity of instruments) may be weakened (Roodman, 2009). There is no definite way of choosing an optimal number of

instruments; the rule of thumb is keeping it equal to the number of groups. It is not possible in the case of this research: even if I use only one lag as an instrument, the number of instruments equals to 137 and the number of countries is 21. Thus we should remember that the result of Hansen test is probably overestimated. Roodman (2009) investigates this problem using simulations. He takes a sample with a big number of instruments and a Hansen test p-value equal to one (the same situation as in this research). With the decrease in the number of instruments, p-value drops to 0.3 (thus it signifies that instruments are still valid).

The other problem is related to the interpretation of the results of research. I am using a non-random sample of OECD countries that belong to the world's richest nations (in terms of GDP per capita). Thus my conclusions about a link between corporate tax competition and capital allocation may be applied only to the richest countries. It is possible that the effect for developing countries is opposite or even absent. The reason for choosing a sample of OECD countries is availability of OECD tax rates database. It includes a time period from 1981 to 2010 and controls for both federal and local tax rates. At the moment there are no similar datasets for the developing countries.

Chapter 4

DATA DESCRIPTION

Summary statistics is represented in the Table 1. It contains all variables that in the log form are used in the main regression (7). Corporate tax rate includes both federal and local tax rates. The lowest tax rate was observed in Ireland (in 2003-2010). In 1982 Finland, the tax rate was the highest. Tax difference is calculated using (11). As expected, an average difference is almost zero. The greatest negative deviation was observed in Portugal in 1985; the greatest positive deviation was found in Spain in 1992.

Table 1. Summary statistics

Variable	Mean	Std. Dev.	Min	Max
Corp. tax rate	36.888	9.109	12.500	61.750
Tax difference	-0.655	8.109	-22.738	24.012
MPK	0.080	0.018	0.036	0.124
GDP	1070	2 090	50	13 100
FDI	216 383	450 125	1 013	3 551 307
Population growth	0.006	0.005	-0.004	0.026
Labor productivity growth	0.001	0.003	-0.017	0.010
Depreciation	0.06	0	0.06	0.06
Capital share	0.191	0.32	0.120	0.250
Savings	0.231	0.0389	0.141	0.341

Number of observations is equal to 377.

Marginal product of capital is calculated using (9). Gross domestic product is measured in billions of US dollars (in 2005 constant process). In terms of total GDP, the richest country is USA, the country with the smallest GDP is Ireland. Foreign direct investment is measured at current prices and exchange rates in millions of US dollars. Population growth, labor productivity growth and depreciation enter the econometric model as a logarithm of sum (see equation (7)). Labor productivity is calculated using equation (16). Depreciation rate is assumed to be constant and equal for all countries. Its value is taken from Bondarenko and Nishioka (2011). Share of reproducible capital in the total output is available only for 1996. Thus it is country-specific and fixed over time (which is a standard assumption for the Cobb-Douglass model). Savings is the share of output that is saved and/or invested. Country with on average smallest share of savings is New Zealand, country with the greatest share of savings – Australia. Number of observations is 377, for the alternative tax difference measure (one that uses population and distance as weights) a large sample of 558 observations was used.

Table 2 contains all data sources used for the purpose of this research. Tax variables are taken from OECD tax database. Almost all macro variables are from Penn world table version 7.1.

Table 2. Sources of data

Variable	Source
Corporate tax rate	OECD tax database
Trade statistics (used in tax difference weights)	United Nations Commodity Trade Statistics Database
Population Price of consumption goods Price of investment goods Real GDP in 2005 prices Share of domestic investment in real GDP Labor quantity	Penn world table 7.1
Share of reproducible capital in total output	Bernanke and Gurkaynak (2001)
Foreign direct investment	United Nations Conference on Trade and Development

Data includes 21 countries in 1989-2010 (see Table 3). Among the sample countries are five non-European countries, four south-European, four north-European countries, and six central-European countries. Seven countries share English language as their official language.

Table 3. List of countries

Australia	Spain	Norway
Canada	Italy	Finland
Mexico	Portugal	Sweden
New Zealand	Greece	Denmark
United States	Belgium	Austria
United Kingdom	Switzerland	Germany
Ireland	France	Netherlands

Chapter 5

RESULTS

5.1 Estimation results

Before moving to regressions, it is useful to look for the patterns in the data. The distribution of marginal product of capital across countries is shown at the Figure 1. No extreme outliers are observed. Moreover, a difference in Marginal Product of Capital across the sample countries decreases over time.

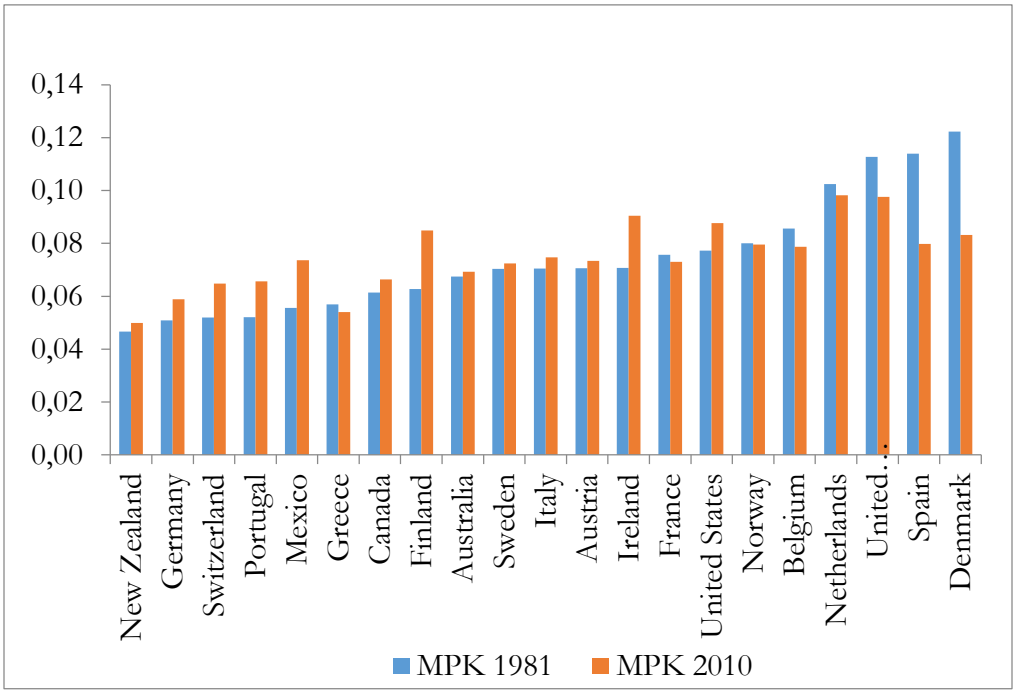

Figure 1. MPK distribution in the years 1981 and 2010

The same can be said about the difference in tax rates. Figure 2 shows that there are no obvious outliers, and tax rates become less differentiated over time.

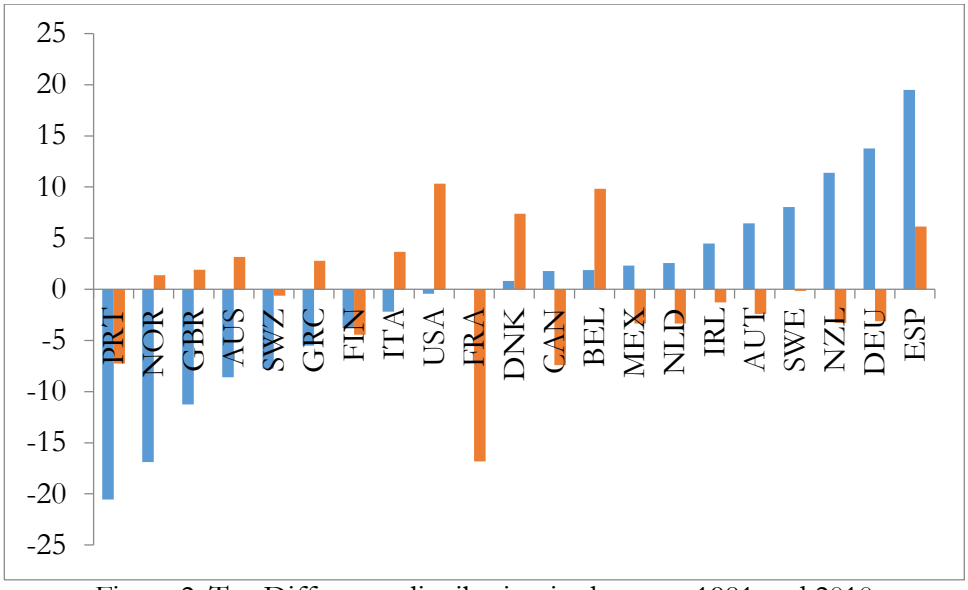

Figure 2. Tax Difference distribution in the years 1981 and 2010

An average level of MPK appears to be stable over the sample time period (Figure 3). A decrease in the variation of Marginal Product of Capital implies an increase in the efficiency of capital allocation.

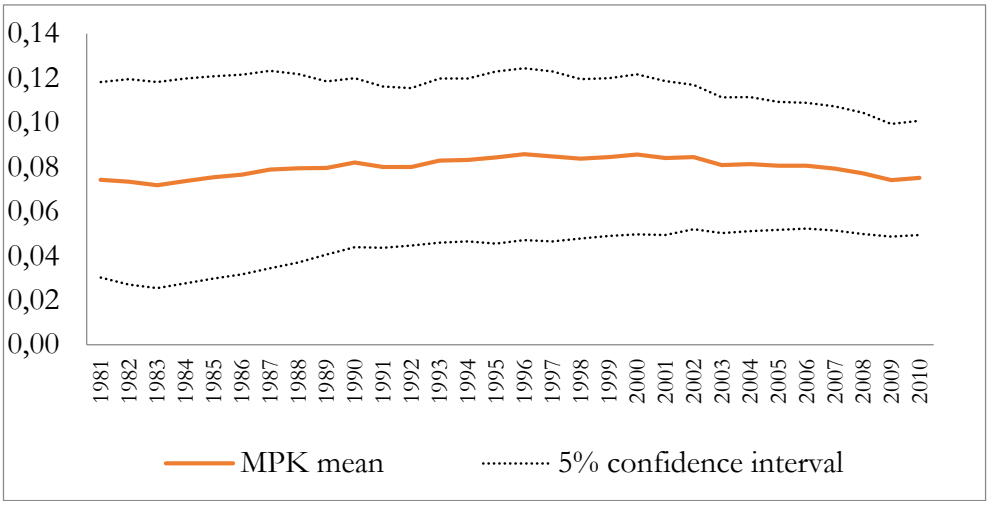

Figure 3. Mean and variance of MPK

The average corporate tax rate has significantly declined (see Figure 4). A decrease in the variance of tax rates implies less severe tax competition.

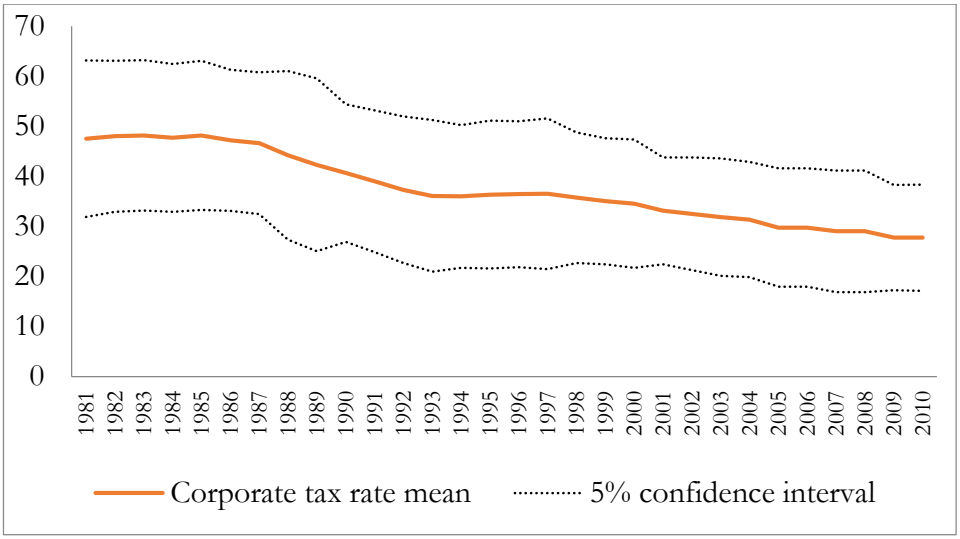

Figure 4. Mean and variance of Tax Difference

For the purpose of this research, variance of both marginal product of capital and difference in corporate tax rate are particularly interesting. As was explained in the methodology section, variance of marginal product of capital is a measure of capital misallocation, and variance of tax rates is a measure of tax competition. As Figure 5 demonstrates, both variances decrease over time. This indicates a reduction in tax competition intensity and more efficient capital allocation. However, a correlation between variables does not seem to be strong.

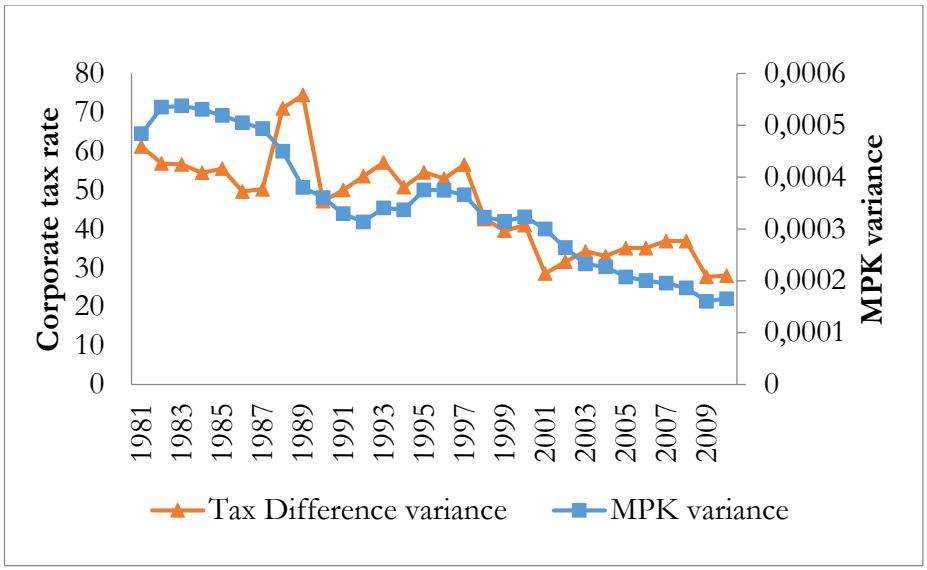

Figure 5. Dynamics of MPK and Tax Difference variance

In order to find out how tax competition affects capital misallocation, I start with the ordinary least squares and fixed effects models (see Table 4). A share of reproducible capital in the total output does not change over time and thus is not included in the fixed effect (and in the generalized method of moments) regression.

Table 4. Regressions without interactions

Variables	OLS	FE	GMM
	MPK	MPK	MPK
L2 Tax Difference	-0.013	-0.055	-0.051
L2 FDI	-0.0134*	-0.0149	-0.025*
L MPK	0.839***	0.811***	0.878***
Capital Share	0.234***		
L Saving rate	0.103**	0.057	0.282***
Pop + A + Depr	0.860***	1.250***	0.831***
L GDP	0.161***	0.205***	0.144***
Observations	338	338	338
R-squared	0.991	0.714	

L means first lag, L2 – second lag

In OLS regression, all control variables except saving rate have expected signs. Increase in foreign investment leads to decrease in the MPK. Greater share of capital in the output or increase in the labor productivity leads to the rise of MPK. Greater MPK in the previous period or an increase in the GDP causes a positive change in MPK. All control variables are significant. Result of fixed effect regression is similar, though saving rate is now insignificant. Tax difference, a measure of tax competition, is insignificant in both regressions and has unexpected sign.

As was discussed in the methodology section, FE and OLS estimates are probably biased for this sample. First difference generalized method of moments is a more reliable method. In order to use it, all right hand side variables should be identified as endogenous or strictly exogenous variables. I treat lagged marginal product of capital, GDP, saving rate and FDI as endogenous variables.Tax difference and labor productivity measure are treated as strictly exogenous variables. Besides, I use

heteroscedasticity-robust standard errors correction. Heteroscedasticity is a problem that should be expected in the sample of countries that differ in terms of economy, geography and culture.

The result of GMM regression is also presented in Table 4. Hansen test p-value for this regression equals one, which indicates that instruments are valid (exogenous). Arellano-Bond test points to autocorrelation in the first lag and no autocorrelation in the second lag. To decrease a number of instruments only the first lag is used as an instrument.

Estimates are very similar to the OLS result. All control variables except saving rate have the same expected sign. The coefficient on tax difference has an unexpected negative sign and remains insignificant.

One of the possible reasons, why GMM regression does not capture the effect of tax competition on MPK is that this effect is present only for some countries. To check this hypothesis I divide the sample using geographical and legislative criteria. A geographical criterion is European or non-European country (Australia, New Zealand, USA, Mexico and Canada). A legislative criterion is civil law vs. common law (United Kingdom, Ireland, USA, Australia, New Zealand and Canada) countries.

Results of regressions with these two interactions are represented in Table 5. Hansen test results again imply validity of the instruments. To decrease the number of instruments (and because Arellano-Bond test indicates autocorrelation in the second difference), only the second lag difference is used as an instrument.

Table 5. Regressions with interactions

Variables	OLS	FE	GMM
	MPK	MPK	MPK
L2 Tax difference non EU/civil law	0.399	0.098	0.358*
L2 Tax difference EU/civil law	-0.342	0.249	-0.538***
L2 Tax difference common law	-0.595**	-0.849***	-0.147
L2 FDI	-0.014*	-0.018	-0.023*
L MPK	0.843***	0.818***	0.884***
Capital Share	0.077		
L Saving rate	0.057	0.005	0.236***
Pop + A + Depr	1.103***	1.279***	0.885***
L GDP	0.180***	0.216***	0.143***
Europe	0.092***		
Common law	-0.063**		
Observations	338	338	338
R-squared	0.992	0.724	

L means first lag, L2 – second lag

According to GMM regression results, there is expected positive relationship between tax difference and MPK for the non-European countries with civil law legislative system (Mexico). The effect of common law system is insignificant. Thus, effect of tax difference is the same for all non-European countries. There is a strong negative effect for all European countries regardless the legislative system.

To check robustness of this result I run a regression with an alternative tax difference measure. In this case all other countries tax rates are weighted using the distance between countries capitals and their population (15) rather than the volume of trade.

The results of regressions with alternative tax difference measure are represented in Table 5. Hansen test p-value for the GMM regressions is one; second lag is used as an instrument. The control variables in the GMM regression keep the same sign and significance level as in the previous GMM regression.

Table 5. Robustness check

Variables	OLS	FE	GMM
	MPK	MPK	MPK
L2 Tax difference non EU/civil law	0.399	0.0979	0.321
L2 Tax difference EU/civil law	-0.342	0.249	-0.483**
L2 Tax difference common law	-0.595**	-0.849***	-0.131
L2 FDI	-0.014*	-0.018	-0.027*
L MPK	0.843***	0.818***	0.875***
Capital Share	0.077		
L Saving rate	0.057	0.005	0.278***
Pop + A + Depr	1.103***	1.279***	0.851***
L GDP	0.180***	0.216***	0.153***
Europe	0.092***		
Common law	-0.063**		
Observations	338	338	338
R-squared	0.992	0.724	

L means first lag, L2 – second lag

Tax competition variables have the same sign and similar value but are now insignificant. A possible reason for this is that population-distance weights give too small weights to the fiscal system of countries that are actually important. For example consider the case of Australia and United Kingdom. As a former colony, Australia keeps strong connection with United Kingdom. However this is not

captured by the population-distance weights: England is far from Australia and has relatively moderate population of only 63 million people. On the other hand it is captured by the extensive trade connections between countries: by the amount of trade with Australia, United Kingdom is the third after USA and Germany.

5.2 Discussion of the results

It was found that there is expected positive effect of tax competition on MPK for the five non-European countries and negative effect for other countries in OECD sample. The two remaining questions are: why there is negative effect for European countries and how tax competition affects capital allocation in the non-European countries.

The reason for negative effect for the non-European countries is probably the effect of the European Union (EU). Fourteen out of sixteen countries are EU members (all except Norway and Switzerland). Two countries that are not in the EU are still heavily influenced by it: they share common borders and culture with EU members, and EU members are their main trading partners. According to Stability and Growth Pact (1998), Treaty of Lisbon (2007) and Sixpack (2011), tax policy coordination is one of the strategic goals of the EU. Thus it can be expected that there is no corporate tax competition in the EU and estimated negative effect just points that European countries have lower MPK than non-European members in our sample.

After finding expected positive effect of tax competition, I can determine how tax competition affects capital allocation. At Figure 6, the blue line denotes average sample MPK, orange line is Canadian MPK. Canadian MPK is lower than average during the entire period. Gray line is the Canadian tax difference; straight line denotes tax difference linear trend. As can be seen from the graph, tax difference decreases over time. Due to positive relationship between tax competition and

marginal product of capital, it leads to a decrease in MPK. As a result, Canadian MPK is moved from average level. Inefficiency of capital allocation increases.

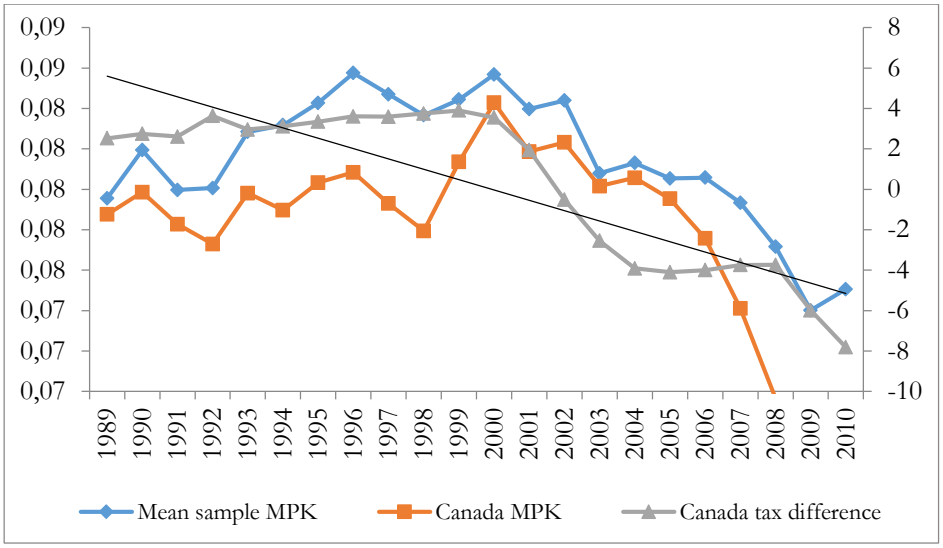

Figure 6. Effect of tax competition on the capital allocation. Case of Canada

The same tendency: lower than average MPK and decrease in the tax difference is present in the case of Australia, Canada, New Zealand and Mexico (see Figures 7, 8 and 9).

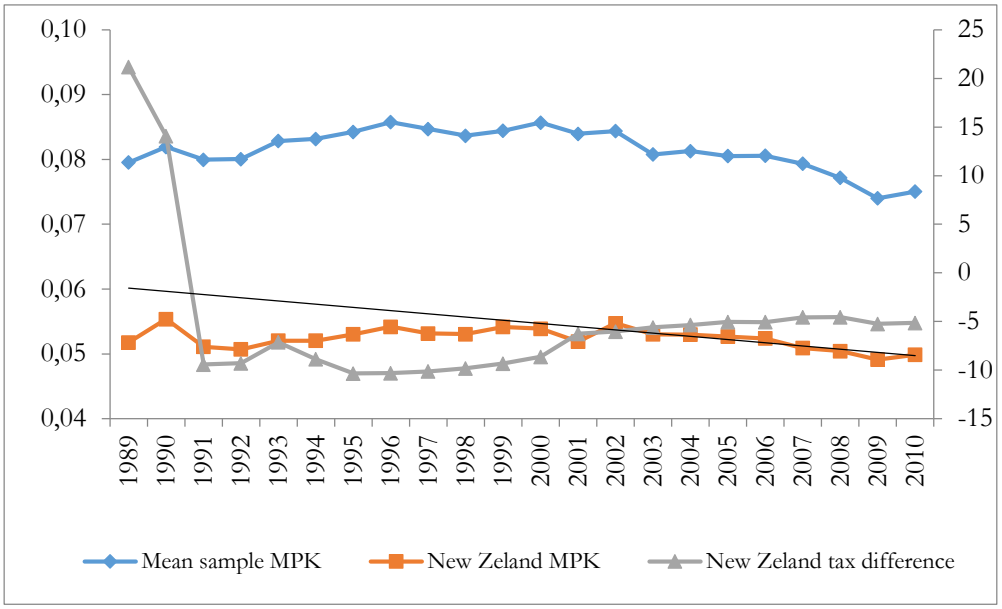

Figure 7. Effect of tax competition on the capital allocation. Case of New Zealand

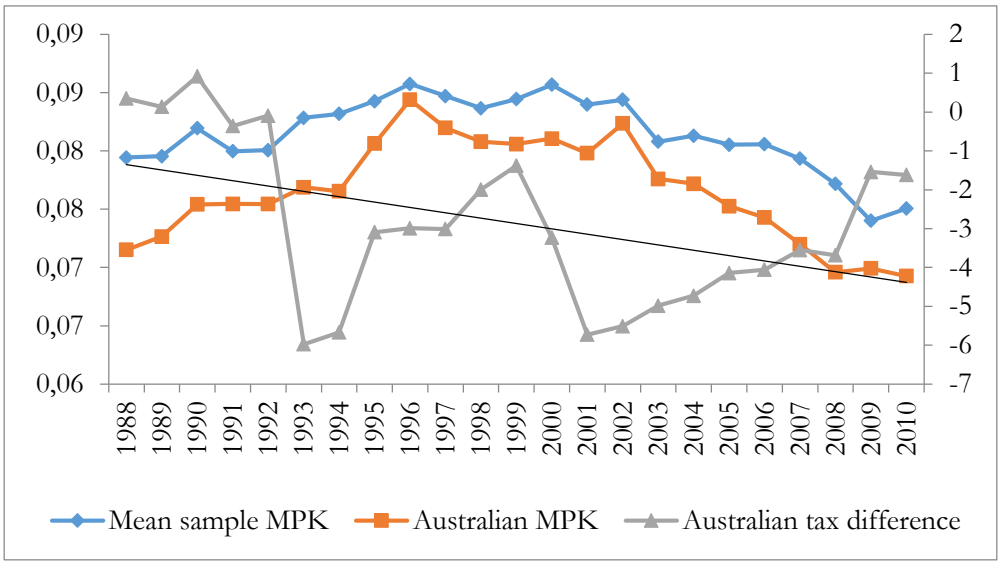

Figure 8. Effect of tax competition on the capital allocation. Case of Australia

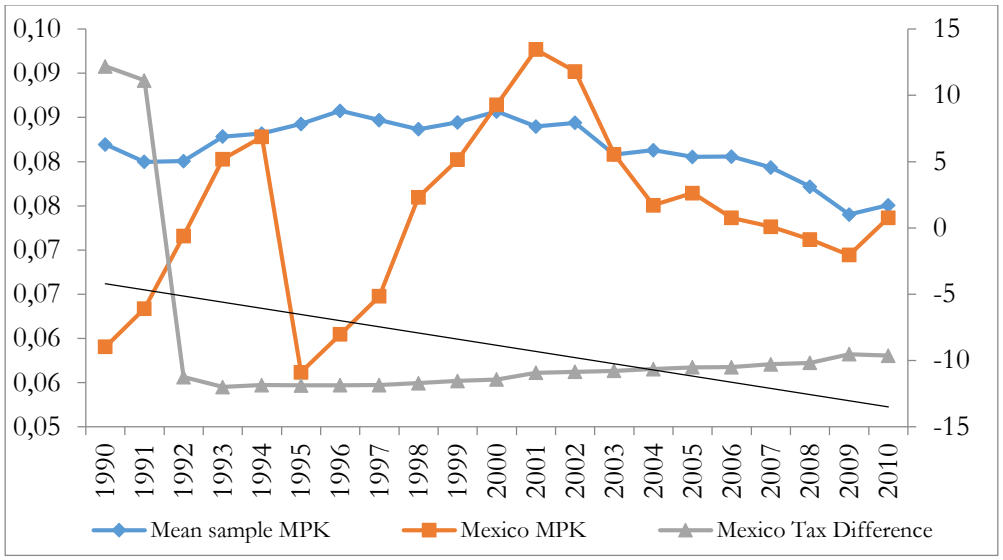

Figure 9. Effect of tax competition on the capital allocation. Case of Mexico

The situation is different for the United States (see Figure 10). Here US marginal product of capital is higher than the average level. However tax difference increases which leads to even greater increase in the MPK. As a result US marginal product of capital moves further from average level and inefficiency increases.

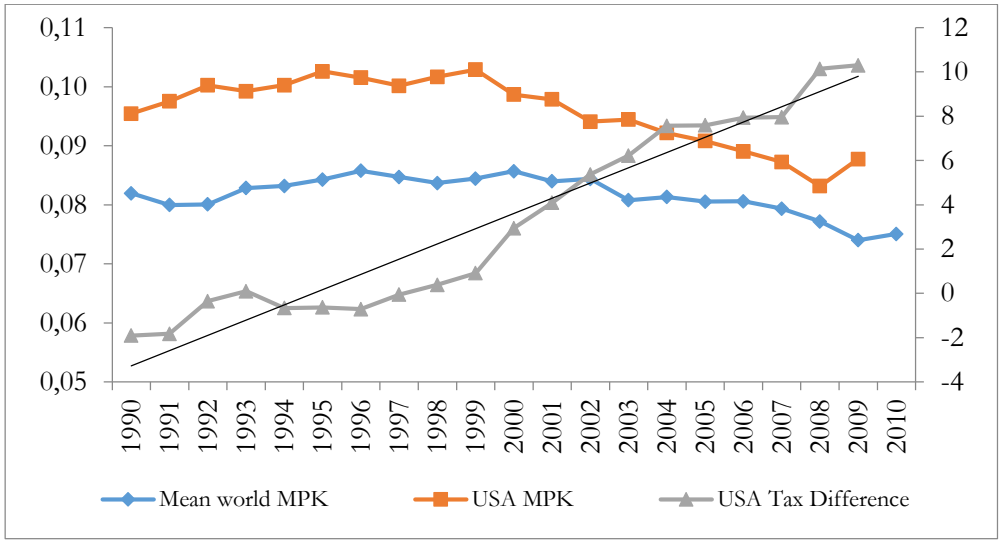

Figure 10. Effect of tax competition on the capital allocation. Case of USA

Effect of tax competition on capital allocation for the five non-European countries is summarized in Table 6.Corporate tax competition contributed to increase in the inefficient allocation during the entire period for each of the five countries.

Table 6. Effect of tax competition on capital allocation

Country	Marginal product of capital	Tax difference trend	Effect of tax competition on capital allocation
Australia	Smaller than sample average	Negative	Inefficiency increases
NewZeland	Smaller than sample average	Negative	Inefficiency increases
Canada	Smaller than sample average	Negative	Inefficiency increases
Mexico	Smaller than sample average	Negative	Inefficiency increases
USA	Greater than sample average	Positive	Inefficiency increases

Chapter 6

CONCLUSIONS

Competition across countries has always been in the center of public attention. It causes both political and economic discussions. One of the aspects of this phenomenon is tax competition, changes in fiscal policy aimed at attracting foreign investments. Both OECD and EU officials constantly condemn this competition. One of the two main arguments used by them is that unreasonably low tax rates distort investor's decisions, which results in capital misallocation (the other one is under provision of public goods due to decline in tax revenues). Currently there are no empirical papers that evaluate misallocation argument. My work is designed to fill this gap.

I used the sample of 21 OECD countries over 1989-2010. Decrease in both capital misallocation and tax competition intensity coincides in period of the study. However statistical analysis didn`t revealed significant connection between tax competition and capital misallocation for all countries in the sample. The expected positive relationship between tax competition and marginal product of capital is present only in non-European countries. Effect of legislative system is not statistically significant.

Using this result I have shown that tax competition contributes to inefficient capital allocation in all five non-European countries. This finding is consistent with existing tax competition literature. An interesting issue for further study is usage of methodology from this thesis to the sample of developing countries.

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