# Fiscal competition and public expenditure composition in the era of globalization: Panel data analysis

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**Abstract.** *Amidst the ongoing liberalization of international trade and transnational movement of capital, each nation-state's fiscal policies have gradually become more dependent on other countries. Developing countries, especially, are forced to make changes to taxation and public expenditure in this era of globalization. It is thus important to understand what kind of relationship exists between globalization and public spending. This study aims to clarify the effects of fiscal competition on public expenditure, from the perspective of the compensation and efficiency theses. These effects currently remain uncertain, despite the growing wave of academic interest in the field. To see how fiscal competition affects the structure of public expenditure, the determinants of public expenditures have been examined for 10 Organization for Economic Co-operation and Development (OECD) countries from 2006-2014. Eleven panel data models have been set up. Public expenditures, as the dependent variable, have been addressed in 10 sub-groups – based on their distribution both as a whole and per their socio-economic functions. Thus, we analyzed the relationship between fiscal competition and both total of public expenditures and the composition of public expenditures. The study thus contributes to the existing literature on fiscal competition. It is observed that corporate tax competition has decreasing effects on all public expenditures. Falling tax revenues due to fiscal competition have the effect of reducing overall public expenditures by decreasing the resources available for use by public policymakers. We can thus evaluate corporate tax competition as having an efficiency increasing effect, by decreasing the government's share of within the economy.*

**Keywords:** compensation thesis, economic globalization, efficiency thesis, fiscal competition, public expenditure composition, panel data.

**JEL Classification:** H2, H4, H7, C33.

## 1. Introduction

The gradual liberalization of the international movement of goods and services – and, especially, measures to lift restrictions or prohibitions on the transnational movement of capital – is successively internationalizing the goods, services and factor markets in most market economies. Nation-states' fiscal policies have thus become progressively more dependent on other countries. Naturally – in an environment where the integration of economies makes it impossible for any country to implement policies independent of other countries, particularly given the effects of technological developments – researchers are examining various aspects of the impact of globalization on taxation and public expenditures.

Amidst this accelerating process of globalization and interdependence, countries aim to maximize their welfare by implementing policies to attract direct foreign investments. They compete with other countries for these investments, hoping to manage the changing manufacturing and employment structures in alignment with their own interests. Besides competing for taxes collected on the revenues from capital factors, countries also compete by public expenditures as an additional benefit of foreign investment.

In the globalization process, closer economic integration amongst countries changes the amount and composition of total public expenditures. Tax competition has a major impact, among countries aiming to attract more direct foreign investment. It becomes harder to maintain total public expenditures at their previous levels, since such competition reduces countries' tax revenues. Yet, when we consider the challenges of financing through debt, a reduction in total public expenditures should be expected. Globalization may thus reduce total public expenditures – especially in developing countries. To shape a more feasible investment climate, countries desiring to attract more direct foreign investment may implement a public expenditure policy, along with a tax policy. Spending on education and health, for example, may be given larger share of total public expenditures. This concept is described, in the literature, as "efficiency thesis" (Hecock and Jepsen, 2014).

In countries with open economies, the internationalization of the manufacturing processes affects the manufacturing and employment structures. Changes in manufacturing processes determine each country's share in global revenue – as well as the shares of country's domestic product that is taken by its manufacturing sector – thus creating further income inequality, both globally and nationally. To reduce the negative effects of globalization on personal income distribution, countries can implement policies that increase the proportion of public expenditures in favor of social spending that benefits low-income people. This is known as the "compensation thesis" in the literature (Hecock and Jepsen, 2014).

In this study, we intend to analyze the effects of competition caused by globalization on the composition of public spending – from the perspectives of the compensation and efficiency theses. In the current literature, many studies have examined the relationship between globalization and total public spending for various groups of countries. As a contribution to the literature, this study uses the COFOG (Classification of the Functions of Government) public expenditure classification, which was revised in 2000. Separate models were created for 10 subgroups of public expenditures, as well as for total public

expenditures. We tested whether the changes in total public expenditures and public expenditure structures, in the selected countries, supported the compensation or efficiency hypotheses. We did this by examining the effect of tax competition separately on each category of public spending. In Section 2 of the study, we review international fiscal competition and its effects – in the light of the efficiency and compensation theses – in relation to the extant literature. Section 3 consists of two sub-sections, describing the data set and the estimation results. The model used is also presented in detail in this section, as are the results of the model and a discussion thereof. In Section 4 and Section 5, we describe our conclusions and their implications.

## 2. Literature review

Countries' tax policies of are determined by various factors. In relatively closed economies, tax policies depend essentially on domestic factors. The influence of external factors increases depending on an economy's degrees of openness. Alongside the movement of goods and services, liberalization of movement of capital has changed countries' tax systems significantly. The rapidly accelerating movement of capital and goods, through globalized trade, has pushed those countries that need to attract more foreign direct investment into tax competition. Tax competition inevitably affects both total public expenditures and the composition of public expenditures.

Until the middle of the 20th century, the basic sources of tax revenue were individual income tax, corporate income tax, social security contributions and general consumption tax. In the following era of relatively closed economies, countries implemented tax policies and determined their total tax burdens and tax structures considering their own national needs and political priorities. With the liberalization of capital movements in the final phase of globalization, taxation differences between countries have gained importance. Meanwhile, challenges and restrictions have become prominent in national taxation – including those around the competitive power of countries, fiscal evasion, tax avoidance and taxable bases crossing countries' borders – within the context of international markets (Genschel, 2005, p. 55).

Tax reforms in the USA have reduced tax rates and expanded the tax base – and have been the underlying cause of the diffusion of neo-liberal tax policies in developed countries (Swank, 2006). We argue that the USA kicked off the tax competition among developed countries and that other developed countries' policymakers carried out tax reforms particularly to attract more capital. Their relatively lower capital over labor factor, in comparison to developed countries, may lead developing countries to implement tax and spending policies aimed at attracting foreign direct investments.

Given the weight of non-tax factors – such as political and economic stability, natural resources and cheap skilled labor – in the selection of investment destination, the sensitivity of direct foreign investment movements to tax burden differences would be lower than to short-term capital movements (Zee, 1998, p. 2). Globalization affects both tax revenues and tax structures. For instance, Heinemann's (2000) study of data related to 21 OECD countries concluded that globalization leads countries to tax those tax bases that show lower

degrees of international mobility and – among developed countries – the USA, Japan and Canada have more global economies than do others.

On the other hand, countries may be in serious competition not just around tax policies but also in terms of public expenditures, due to globalization. Countries' efforts to attract foreign capital, through both their taxation and their public expenditure, are called fiscal competition. In terms of fiscal competition, the relationship between, first, economic growth and public expenditures and, second, economic growth and amount of taxation are vital. For example, Machová and Kotlán (2013) show a positive relationship between economic growth and public expenditures – and that, on the contrary, there was a negative relationship between economic growth and the amount of taxation in OECD countries from 2005-2010.

Under certain special conditions within the neoclassical approach, where government policymakers try to maximize social welfare, fiscal competition leads to efficient output production. These conditions include: administrations being smaller than the capital market, strategic elements being relatively unimportant and the public sector having access to relevant fiscal instruments. Otherwise, it is possible to encounter various distortions and sub-optimal public programs – although the degree of these distortions and their quantitative impact on social welfare are not entirely obvious. According to the Leviathan approach, which regards the public sector as expanding and ineffective and argues that public output is dictated by powerful interest groups, fiscal competition is a discipline mechanism that limits unwanted expansion of the public sector. Yet even the Leviathan view agrees that fiscal competition may cause predictable and systematic deviations in resource allocation (Oates, 2001, p. 133).

The role of government spending in attracting foreign investments may be a determinant affecting the dominance of the efficiency thesis. Hecock and Jepsen (2014) have examined exactly this question in their study – which separately explored the subject of attracting foreign capital investments for the agriculture, industry and service sectors. The study empirically considered the determining factors in attracting direct foreign capital investments for different sectors, in 15 Latin American countries. It concluded that – even in the manufacturing industry – taxes are not decisive factors for direct foreign capital investment. Although they are not among the independent variables examined, the role of human capital and public infrastructure investments in direct investments to developing countries are cited as possible reasons for this. Hence, this indicates a result in favor of the efficiency thesis.

The issue of globalization's effect on income distribution is closely related to the assertion of the compensation thesis. There are numerous studies on this topic. Kollmeyer (2015), for instance, refers to 1970-2010 data from 16 developed countries – concluding that globalization leads to income inequality at low – public expenditure levels and that, as public expenditure increases, this positive relationship gradually disappears.

Globalization may affect not just tax revenues, but also public expenditure and its composition. Globalization directs countries from the taxation of mobile factors to the taxation of fixed factors. It also leads countries to adapt their spending structures and to

implement spending policies that decrease the share of total spending that benefits fixed tax payers, while increasing the shares that benefits mobile tax payers. In one respect, the regulation of spending structures towards increasing benefits for mobile tax payers has a substitutive aspect in adjusting the tax structure, within the process of globalization (Heinemann, 2000, p. 289).

Behind the idea that globalization will decrease welfare spending, there is an assumption suggesting that – as a result of the liberalization of external trade and factor movements and due to the emerging depreciation of the income tax base and capital tax base – the welfare state would lose the ability to finance its operations. This idea, promoted by opponents of globalization, takes only the supply side into account, in terms of public policy, and ignores the demand side. The demand-side effects of globalization derive from governments' motives for maximizing political support and point to the compensation of victims of globalization by enhancing social welfare programs. The compensatory effect of globalization will abolish the efficiency effect and – according to the scope of national welfare programs – the overall effect of globalization will be mitigated (Dreher et al., 2008, p. 264).

Alongside considering the share of social spending in total public expenditure, it is also possible to consider the act of subsidizing those vulnerable sectors that may suffer from the economy's openness within the frame of the compensation thesis. Rickard (2012) emphasized that, in developing countries, these kinds of subsidies are actually used to for compensate for losses caused by unemployment, which may occur due to the economy's ever-increasing openness. Using data around developing countries' central administration expenditures, Rickard (2012) has concluded that subsidies are efficient tools against the cost of foreign expansion. It can also be suggested that the level of economic openness in developing countries will affect the measures to be taken. Nouruddin and Simmons (2009) argue that – since, in autarchic countries, there will be many serious results of increasing the economy's openness, such as unemployment and migration – representative democracies will increase their spending on security, education and health. In countries with highly open economies, social welfare cost expectations due to the increasing openness of the economy will be low. Thus, there may not be enough social demand to increase social security, education and health spending.

Gemmell et al. (2008) have inferred, from 1980-1997 data of 25 developed OECD countries, that the compensation thesis is also valid in the process of globalization. The authors concluded that the composition of public expenditure has shifted in the direction of the compensation thesis. Following the results that view the compensation thesis as the explanatory thesis for developed countries, Busemeyer (2009) has stated that it is necessary to observe globalization for longer periods of time to reveal all its effects. He has concluded – through observations over long periods – that, at first, globalization increases social welfare spending within the frame of the compensation thesis. But then, within the dynamics of economic integration, the efficiency thesis prevails and determines public expenditure.

In their study, Altay and Aysu (2013) conclude that foreign trade volume and an increase in direct foreign investments, which they take as globalization indicators, have a reducing effect on public expenditure and that efficiency thesis is valid.

Leibrecht et al.'s (2011) study examined how social expenditures' share of total public spending was affected by globalization in European countries. The study used, as indicators, not just an economy's openness to external trade and direct foreign investment, but also various KOF globalization indexes. The authors highlight the differences between Eastern and Western European countries and concluded that – while the compensation thesis prevails in Western European countries – efficiency thesis is valid in Eastern European countries.

It is important, for our subject, to note that Jiang's (2014) study of welfare spending in 21 transition economies did not find that these economies decreased welfare spending during the process of global economic integration. (The data Jiang (2014) analyzed excluded education and health spending).

Winner's (2012) pioneering study of the effects of fiscal competition on public expenditures – drawn from the 1980-2000 data of 18 OECD countries – found that globalization decreases public expenditure related to social security, welfare and housing, yet increases public spending related to transportation, communication, research and development, education and health. Hence, Winner concludes that the efficiency thesis is valid.

The question of whether the changing of composition of public expenditures is compatible with the efficiency or compensation thesis depends significantly on the degree of economic openness and tax competition. Thus, it is possible to argue that closer integration with other countries, via the trade of goods and the movement of factors like capital makes countries with a relatively closed economy raise their social, education and health expenditures – compatible with the compensation thesis – due to unemployment and relevant social problems. Yet changes in the composition of public expenditures, in a direction compatible with the efficiency thesis, may also occur due to fiscal competition for foreign direct investments. Inspired by Winner, we have chosen the dependent and independent variables in our study to test whether changes in total public expenditures and public expenditure structures support the compensation or efficiency hypotheses. Our models, data and variables are described in detail in Section 3.

## 3. Econometric analysis

### 3.1. Data set and model

This study examines the determinants of public expenditures from 2006-2014, for 10 OECD member countries: Austria, Germany, Italy, Spain, the Czech Republic, Iceland, Israel, Sweden, the USA and Turkey. Eleven panel data models were set up, and the public expenditures–as the dependent variable in the set panel data model – were addressed in 10 sub-groups, based on their distribution both as a whole and according to their socio-economic functions as defined by the National Calculations System (COFOG). COFOG

expenditure items were revised in the year of 2000, with a new classification system covering 10 expenditure items. It is thus impossible to access detailed data covering all 10 expenditure items uninterruptedly, before the year of 2005. Due to our preference to study the data of OECD member countries, the country group consists only of the 10 specified countries-the data of which can be full accessed.

The dependent variables being used in the models are: total public expenditures (EXP); general public service expenditures, covering expenditure items such as legislative and executive bodies, financial, fiscal and foreign affairs, foreign economic aids, general services, basic research and general public services (PUB); defense expenditures covering military defense, civil defense and foreign military aid expenditure items (DEF); public order and security expenditures consisting of expenditures made for police services, fire protection services, courts and prisons (SAFE); expenditures within the scope of economic affairs, made for the general economy, commerce and labor, agriculture, forestry, fishery and hunting, fuel and energy, mining, manufacture and construction, transportation, communication and other sectors (AFFAIR); environmental protection expenditures, such as for waste management, waste water management, reduction of contamination, protection of biodiversity and landscaping (ENV); expenditures made for lodging and social facilities, such as residential development, social development, water resources and street lighting (HOUSE); health expenditures, covering medicinal products, devices and equipment, outpatient treatment services, hospital services and public health services (HEALTH); entertainment, culture and religion expenditures, covering recreation and sports services, culture services, publication and release services, religious and other community services (CULT); educational expenditures made for pre-school and elementary education, secondary education, high school, higher education and other auxiliary services (EDUC); and social protection expenditures around illness, disability, senility, death, families and children and unemployment (SOC).

The model set up within the scope of the study may be written as follows, for the state in which the total public expenditures are the dependent variable.

$$EXP_{it} = \beta_0 + \beta_1 FISC_{it} + \beta_2 GDP_{it} + \beta_3 DEP_{it} + \beta_4 URB_{it} + \beta_5 CPM_{it} +$$

$$+ \beta_6 SIZE_{it} + \beta_7 TAX_{it} + \beta_8 UNMP_{it} + \beta_9 INF_{it} + \mu_i + u_{it} \qquad (1)$$

Other models, in which the sub-expenditure items exist as dependent variables, were set up in similar manner, using the same independent variables. The independent variables chosen were similar to those in Winner's (2012) study, due to the success of Winner's estimated models. Yet some of the dependent variables addressed in the models, since the COFOG public expenditure classification changed in 2000. The models established in our study thus have two purposes. The first is to contribute to the literature via the estimation results of models that apply, as dependent variables, expenditure items that have not been previously been explored. The second is to compare the existing literature with models applying public expenditure items, in the style of Winner and other researchers.

As noted, EXP specifies the total public expenditures. The data for the public expenditures, consisting of both total expenditures and sub-items, was collected from the IMF's GFS (International Monetary Fund Government Financial Statistics) database. As the public

expenditures are expressed in each country's own currency, they were first converted to USD; per capita expenditure was then calculated in proportion to each country's populations. To mitigate the effects of inflation, the figures also were deflated by each country's GDP deflator. The graphs were examined, and their logarithms were determined due to the indication of geometrical series features. Thus, the dependent variables used may be expressed as logarithmical real per capita public expenditures ($).

FISC, from among the independent variables used in the models, expresses fiscal competition. Fiscal competition includes only tax competition, and consists of the difference between the country's legal corporate tax rate and the weighted tax rate of competitor countries:

$$FISC_{it} = \tau_{it} - W\tau_{it} \tag{2}$$

here, $\tau$ is the corporation income tax rate; this data was obtained from OECD database. W is the spatial weight matrix normalized by row. Spatial weight matrix was calculated based on whether the countries have border neighborhood. $\omega_{ij}$ is the each element of W and its normalized version is as follows:

$$\omega_{ij} = \frac{1}{b_{ij}} \bigg/ \sum_{j=1}^{J} \frac{1}{b_{ij}} \quad (i{\neq}j) \tag{3}$$

$b_{ij}$ is a dummy variable. Its value is 1 if two countries (i and j) have a common border; otherwise, its value is 0. In the models, i and j stand for the countries, and t stands for the time.

Per capita GDP was used as a control variable, relevant to fiscal competition. GDP expresses gross domestic product per capita. As noted, this was converted into real GDP by applying each country's GDP deflator; its logarithms were then determined. The data was obtained from OECD database. The dependency rate (DEP) and urbanization rate (URB) are other control variables used, following Winner's (2012) study, in terms of fiscal competition. The data for DEP was also obtained from the database of OECD. The ratio of people under age 15 and over age 65 to the population aged 15-65 is the dependency rate. URB data was obtained from the World Bank's WDI database, and expresses the share of urban population within the total population.

Winner's (2012) study treats CPM, SIZE, TAX, UNPM, and INF as dependent variables. These were included, in all models in our study, as independent variables determining the public expenditures. CPM is addressed as one of the most vital indicators of globalization. Unemployment and inflation rates were also included in the models as independent variables, amongst others, to enable us to consider other factors arising from the countries in the determination of capital tax rates (see Winner, 2012, p. 43). CPM expresses the capital mobility. The criterion of openness to foreign trade was used as an indicator of capital mobility. Within this frame, foreign trade volume was calculated via the formula of (import + export) / GDP. Import (million $), export (million $) and GDP (million $) data were obtained from the OECD statistics. SIZE, the size of the country, was used indicate the difference between outward-oriented small and large economies. To express this

variable, the countries' labor force was used as an instrumental variable. The data was obtained from the database of World Bank's WDI (World Development Indicator), and the logarithm of the variable was determined. TAX was calculated via the formula of (social security contributions + wage and labor taxes + taxes collected from goods and services)/GDP, and all data was obtained from the OECD statistics. The amounts found by adding the revenue of sales taxes to the revenue of taxes exclusively on income from labor were proportioned to the GDP. This variable is important in terms of indicating the degree to which each country engages in tax competition by reducing tax rates on capital. As noted, unemployment and inflation rates were included in the models, thus enabling us to consider factors arising from within the countries in the determination of capital tax rates. UNMP, the unemployment rate (%), was obtained from the OECD database. INF indicates the inflation rate (index, 2010 = 100), and was likewise collected from the OECD database.

### 3.2. Estimation of results and discussion

As described, 11 models in total were estimated in this study, and their dependent variables consisted of total public expenditures and sub-expenditure items. First, the existence of individual (country) effects in the panel data model was tested with the F test and the $H_0$ hypothesis ($H_0$: $\mu_i = 0$ (for all i's)) was rejected in all models. Next, the Hausman (1978) test was performed to determine whether the individual effects correlated with the independent variables. The $H_0$ hypothesis ($H_0$: $E(X_{it}, \mu_i) = 0$) of Hausman test is the difference between the coefficients of the fixed and random effect models is insignificant but that the random effects estimator is efficient. Therefore, it was found appropriate to use the fixed effect estimator, which is consistent under the alternative hypothesis. Since the study group concerned OECD countries, amongst which there is not a high degree of heterogeneity, we concluded that the fixed effect models were suitable. The fixed effect (within) estimator was then obtained for all models, and deviation from the hypothesis was tested before proceeding to interpret the results. The Wald test (Greene, 2000) was performed for heteroscedasticity, and the basic hypothesis ($H_0$: $\sigma_i^2 = \sigma^2$) was rejected in all models. It was determined that the variance changes according to units – in other words, heteroscedasticity exists. The Pesaran (2004) test was performed, to test the cross sectional dependence. The basic hypothesis that there would be no correlation among units was rejected in 6 of 11 models. Baltagi and Wu's (1999) locally best invariant (LBI) test and Bhargava, Franzini and Narendranathan's (1982) DW test were performed to test autocorrelation, and the basic hypothesis of "there is no autocorrelation" was rejected in 9 of 11 models. In the case of deviation from all three hypotheses, the parameters weren't efficient, despite the fact that they could be estimated without deviation. In this study, since the parameters were still consistent but not efficient, robust standard errors were used. According to deviation from the assumption, the estimations were repeated using robust estimators and the final results were obtained. Heteroscedasticity exists only in Models 5 and 7, and robust standard errors were obtained using Huber's (1967), White's (1980) and Eicker's (1967) robust estimator under heteroscedasticity. Both heteroscedasticity and autocorrelation exist in Models 2, 3 and 6, and the standard errors were corrected by using Roger's (1993) robust estimator. Autocorrelation, heteroscedasticity and cross sectional dependency exist in Models 1, 4, 8, 9, 10 and 11, and the standard errors were corrected by

Driscoll-Kraay's (1998) robust estimators. The endogeneity problem was checked, and – as there was a problem in the panel data model – the fixed effects model was preferred. The normality assumption of the error terms of all models was also tested, using the robust Jarque-Bera test (Brys et al., 2008), which relies on robust estimates of asymmetry and tail heaviness using medcouple. According to the test results, the error terms are normally distributed for all models.

The significances of all models were tested via the F test, and the $H_0$ hypothesis ($H_0: \beta_i = 0$, $i = 1, 2, \ldots$) – expressing that the parameters are equal to 0; in other words, that the model is insignificant – was rejected. All models are statistically significant. In the main model, $R^2$ is about 74% and 6 of the remaining 10 models are over 70%. It is possible to say that the explanatory power of all models is sufficiently.

When the findings obtained from all the models are considered, as seen in Table 1 (Model 1), it is first observed that tax competition has the effect of reducing total public expenditures. The increased differences among the countries' tax rates have the effect of reducing total public expenditures. The decreased tax revenues, due to fiscal competition, cause a reduction of total public spending by reducing the resources available for such expenditures. This may be interpreted as an expected development in the globalization process. This result also conforms to Winner's (2012) conclusion. Yet the coefficient values estimated in this study indicate a weaker result.

Exploring the effects of tax competition on public expenditures for different purposes allows us to carry out a more detailed evaluation. In the ten different expenditure groups (from Models 2-11), it is observed that tax competition has the effect of decreasing per capita expenditures. The results of empirical research show that tax competition also has been effect of reducing the different public expenditures for other purposes – along with decreasing total public expenditure per capita.

This study has concluded that general public service expenditures per capita decrease, due to fiscal competition (Model 2). Reduced general public service expenditures, due to tax competition, may be interpreted as a result conforming to the efficiency thesis. The decrease in defense expenditures (DEF), public order and security expenditures (SAFE), environmental protection expenditures (ENV) and public expenditures for lodging and social facilities (HOUSE) – again due to tax competition – are also the results conforming with the efficiency thesis (Models 3, 4, 6 and 7). On the other hand, decreased public expenditures within the scope of economic affairs (AFFAIR), along with tax competition, do not conform with the efficiency thesis (Model 5). Yet it is clear that the effects of globalization cannot be seen as limited only to fiscal competition. In fact, tax competition is a significant result of globalization. The degree of economic openness will enable us to observe the effects of globalization more clearly. The increase of public expenditures for economic affairs (AFFAIR), along with the ratio of foreign trade volume to GDP, indicates the validity of the efficiency thesis. Notably, the estimation coefficient on this subject is 0.567.

Education and health expenditures may also be assessed within this frame. Winner's (2012) study concluded that the tax competition creates a decrease in social security expenditures

and expenditures for lodgings, and an increase in public expenditures for education, health and economic services. In our study (Models 8 and 10), the negative relationships between tax competition and public health and education expenditures may – at first glance – be viewed as results conforming with the efficiency thesis, and this point of view may be deemed reasonable in the short term. Yet in the long term, as education and health expenditures have a positive effect on productivity, the rise in these expenditures conforms to the efficiency thesis. Naturally, it should be considered that tax competition is not a cause of globalization, but a significant result of it. As we have specified before, the basic indicators of globalization is the openness of an economy – and the extent of openness of an economy is indicated by the ratio of foreign trade volume to GDP. The increase of education (0.656) and health (0.582) expenditures, along with this ratio, indicates that globalization's effects on these expenditures conform to the efficiency thesis. Naturally, in the case of a positive relationship of the ratio of foreign trade volume to GDP with general economic (AFFAIR), public education (EDUC) and health (HEALTH) expenditures – and in the case of a negative relationships with other expenditure types – it would be possible to interpret this as the existence of a competition in the field of public expenditures (Models 5, 8 and 10). Yet, since all expenditure types have positive relationships with the ratio of foreign trade volume to GDP, such an interpretation is not possible. The positive relationship (0.711) of social protection expenditures (Model 11) with the increase in the ratio of foreign trade volume to GDP allows us to interpret the compensation thesis as valid. On the other hand, it is possible to view the increased of public expenditures per capita, along with the increase of GDP per capita (Model 1), as a normal result of Wagner's law. Within the frame of Wagner's law of increasing state activity, it is observed that increased GDP per capita has positive relationships with all the sub-expenditure items, excluding public expenditures for social facilities (HOUSE). In terms of the HOUSE expenditure type, this relationship is negative. The decrease of expenditures for lodging and social facilities (HOUSE), as income per capita increases, may be interpreted as shifting such expenditures to private expenditures (see Winner 2012). Here, especially, the positive relationships of health (1.059) and education (0.817) expenditures with GDP per capita – and the coefficients of these relationships – draw attention (Models 8 and 10). In this respect, the positive relationships of GDP per capita with education and health expenditures, and the negative relationships with expenditures for lodging and social facilities are similar to Winner's (2012) results. Again, the positive relationships of GDP per capita with social (SOC) and education (EDU) expenditures – and its negative relationships with public expenditures for lodging and social facilities (HOUSE) – are in alignment with Sanz' and Velasquez' (2002) study.

**Table 1.** *Estimation results*

| | Model 1<br>EXP | Model 2<br>PUB | Model 3<br>DEF | Model 4<br>SAFE | Model 5<br>AFFAIR | Model 6<br>ENV | Model 7<br>HOUSE | Model 8<br>HEALTH | Model 9<br>CULT | Model 10<br>EDUC | Model 11<br>SOC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **FISC** | -0.026*** | -0.011 | -0.034*** | -0.017*** | -0.052** | -0.032*** | -0.0001 | -0.023*** | -0.043*** | -0.026*** | -0.021*** |
| **GDP** | 0.829*** | 0.662*** | 1.027*** | 0.672*** | 0.970 | 0.394 | -1.638 | 1.059*** | 0.009 | 0.817*** | 0.508 |
| **DEP** | -0.017** | 0.006 | -0.053*** | -0.213*** | -0.049*** | -0.028** | 0.012 | -0.007 | -0.038*** | -0.030*** | -0.016** |
| **URB** | -0.009 | 0.012 | 0.133*** | 0.052*** | 0.026*** | -0.035 | -0.150 | -0.113 | -0.019* | 0.002 | -0.017* |
| **CPM** | 0.614*** | 0.544*** | 0.825*** | 0.703*** | 0.567 | 0.644** | 0.191 | 0.582*** | 0.769*** | 0.656*** | 0.711*** |
| **SIZE** | 0.844*** | -0.345 | 1.517*** | 1.299*** | 1.681** | 1.154** | 2.176** | 1.001*** | 1.859*** | 1.334*** | 1.001*** |
| **TAX** | 0.003 | 0.052*** | 0.036* | 0.0164** | 0.007 | 0.059*** | -0.051 | 0.004 | 0.032*** | 0.021** | 0.014* |
| **UNEMP** | 0.007*** | 0.008** | 0.007 | -0.003 | 0.001 | -0.003 | -0.016 | 0.002 | -0.016** | -0.002 | 0.016*** |
| **INF** | -0.005** | -0.002 | -0.027*** | -0.011*** | -0.011*** | -0.004 | -0.019* | -0.006*** | -0.008*** | -0.005*** | -0.001 |
| F test ($H_0$: $\beta_i$=0) | 14930.23*** | 11664.02*** | 423.64*** | 3308.96*** | 98.98*** | 10370.08*** | 918.96* | 746.51*** | 286.41*** | 4486.98*** | 5927.68*** |
| $R^2$ | 0.7399 | 0.7021 | 0.8240 | 0.7870 | 0.5156 | 0.4644 | 0.3368 | 0.6849 | 0.7379 | 0.7855 | 0.5942 |
| F test ($H_0$: $\mu_i$=0) | 25.44*** | 100.43*** | 288.62*** | 19.68*** | 4.74*** | 415.65*** | 4.35*** | 28.84*** | 83.71*** | 39.24*** | 48.89*** |
| Hausman test<br>($H_0$: $E(X_{it}, \mu_i) \neq 0$) | 61.06*** | 32.49*** | 22.56*** | 53.70*** | 28.35*** | 55.30*** | 26.99*** | 25.74*** | 72.63*** | 51.74*** | 67.41*** |
| Wald test<br>($H_0$: $\sigma_i^2 = \sigma^2$) | 208.26*** | 387.8*** | 227.9*** | 202.9*** | 500.1*** | 526.6*** | 1093.4*** | 127.4*** | 175.4*** | 169.8*** | 213.6*** |
| Pesaran test<br>($H_0$: $r_{ij}$=0) | 3.816*** | 0.633 | 0.172 | 2.802*** | 1.673 | 0.439 | 0.863 | 2.665*** | 2.483** | 3.325*** | 3.969*** |
| DW test ($H_0$: $\rho$=0) | 1.38 | 1.60 | 1.65 | 1.11 | 2.17 | 1.52 | 2.39 | 0.96 | 1.34 | 1.17 | 1.36 |
| LBI test ($H_0$: $\rho$=0) | 1.63 | 1.93 | 1.88 | 1.33 | 2.34 | 1.76 | 2.51 | 1.24 | 1.51 | 1.39* | 1.68 |
| JB test ($H_0$: S=0, K=3) | 2.69 | 2.80 | 6.435 | 1.41 | 2.97 | 4.15 | 1.92 | 3.19 | 5.95 | 0.58 | 5.73 |

*** significant at 1%, ** significant at 5%, and * significant at 10%.

The positive relationships of the dependency rate (DEP) with social (SOC), education (EDUC) and health (HEALTH) expenditures should be deemed as the expected results of the compensation thesis. When the results of all models are considered, the relationships between the dependency rate and the relevant expenditures are negative but not strong. In Winner's (2012) study, the relationships of the dependency rate with health and education expenditures are positive, but the relationships of the dependency rate with social expenditures and public expenditures for lodging and social facilities are negative. The result we obtained, in terms of social expenditures, is similar to Winner's (2012) study.

In all study's models, negative relationships are observed between the inflation rate and public expenditures. The small size of the coefficients indicates that the negative relationships are not strong. Since these negative relationships are not strong, we can conclude that inflation rates have not had any important effects on public expenditures. When the relationships between unemployment rate and public expenditures are considered, positive relationships are observed in most of the study's models. In the models where negative relationships are observed, it is noteworthy that the coefficient values are very low. It seems that only the positive relationship of the unemployment rate with social expenditures (SOC) is meaningful for the compensation thesis. It is possible to argue that increases in the share of indirect taxes and of taxes on labor, within total tax revenue, are another indicator of tax competition – or that they are significant result of tax competition. Yet, we can argue that it is not possible to interpret the result of this study as having a high degree of importance, in terms of their effect on increasing the share of indirect taxes and taxes on labor within total tax revenue on public expenditures. Finally, it is necessary to evaluate the relationships relevant to the independent variable of SIZE, consisting of the labor force (indicator of the size of the country), per the results obtained in all models. In all the study's models, we observed that – as the working population increases – total public expenditures (EXP) rise, as do all other public expenditure types except general public services (PUB). These positive relationships are in alignment with compensation thesis.

## 4. Conclusion

It is observed that competition in the field of corporate taxation negatively affects not just total public expenditures, but also individual categories of public spending. The decreasing total tax revenue caused by fiscal competition also reduces total public expenditures – meaning that tax competition reduces the resources to be used for public needs. It can be argued that this is an expected development in the globalization process. In fact, we may interpret corporate tax competition as having an efficiency increasing effect on countries' economies, by decreasing the government's share.

Another vital question is that how tax competition affects the categories of public expenditure under consideration. It has been observed that this competition reduces spending per capita, in terms of 10 different expenditure groups. The decrease of general public service expenditures (PUB), defense expenditures (DEF), public order and security expenditures (SAFE), environmental protection expenditures (ENV) and public expenditures for lodging and social facilities, due to tax competition – as seen in this study

– conforms to the efficiency thesis. As for education and health spending, the negative relationships between tax competition and spending may seem, at the first glance, to conform to the efficiency thesis. Yet this is only reasonable in the short term – we must forget that the education and health expenditures have a positive effect on productivity in the long term. The fact that social protection expenditure (SOC) has positive relationships with the unemployment rate and the foreign trade volume to GDP, on the other hand, seems to show the effects of the compensation thesis. As we have observed, the working population also increases – as do both total public expenditures and all public expenditure types, excluding general public services. It may be argued that these positive relationships are a result of the compensation thesis.

Yet the effects of globalization are not limited just to fiscal competition; tax competition is also a significant result. In this respect, each economy's degree of openness makes it possible to see globalization's effects more clearly. Increased public expenditures for economic affairs (AFFAIR), along with the ratio of foreign trade volume to GDP, indicate the validity of the efficiency thesis. Naturally, the increased education and expenditures, along with this ratio, indicates that globalization's effects on these expenditures conform to the efficiency thesis. The positive relationships of all expenditure types with the ratio of foreign trade volume to GDP do not indicate the existence of competition in the field of public expenditures. The current model is likewise not suitable for such an interpretation, based on the difference in the rates of increase of different expenditure types. We must thus emphasize that the model and data used do not indicate the existence of public spending competition.

It is clear that empirical studies – covering longer periods and using more countries' data, depending on the availability of the required data sets – may more fruitful for the decision-makers. We must thus note the need for more comprehensive empirical studies to analyze the effects of tax and public expenditure competition within the frame of globalization.

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