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# Democracy and taxation

*Balamatsias Pavlos*

## **Abstract**

In this paper we argue that democracies tend to positively affect the size and composition of tax revenues. Our argument is based on the hypothesis that democracies can increase direct taxation, such as income taxes and capital taxes, due to increased compliance of taxpayers and also because there is a diffusion of tax measures between neighboring democratic/autocratic countries. The main theoretical hypothesis is then tested on a dataset that consists of 74 countries over the period 1993-2012. Our main explanatory variable will be a dichotomous measure of democracy; but we alter our analysis from previous research by assuming that democracy or autocracy is not an exogenous variable. Instead we follow the theory of Huntington (1991) and the methodology of Acemoglu, Naidu, Restrepo and Robinson (2014) about regional democratization waves. According to this theory, democratizations occur in regional waves; consequently diffusion of demand or discontent for a political system is easier to happen in neighboring countries due to socio-political and historical similarities. This measure shows us that demand or discontent for a given political system in a geographical area, can in turn influence the power of a country's political regime and subsequently that regime's effect on taxation. We then use a two stage least square (2SLS) fixed effects to test our hypothesis. The empirical findings suggest that regional waves of democratization have a positive and statistically significant correlation with democracy, and in turn democracy also has a positive effect on direct taxation as well as the ratio of direct to indirect taxation in the countries of our sample. This result remains the same when several robustness tests are used. Finally when examining the long-run effect of regional waves, we do not find any evidence of a significant relationship between regional waves of democratization and a country's own regime; however democracy still has a positive effect on direct taxes and tax ratio.

## **JEL P16, H2**

**Keywords** Democracy, Political development, Regional democratization waves, Taxation

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## 1. Introduction

The role of the political system in a country, whether that is democratic or autocratic in nature, seems to play a major role in all policy decisions that a state makes but also on the ways and methods that a state uses in order to implement these decisions. Therefore it comes as no surprise that taxation and fiscal policy in general will also be greatly influenced by the political system in place. It is also not surprising that this relationship has received considerable attention by researchers. Taxation after all is the transfer of income and/or resources from the citizens to the state so both the level and composition of tax revenues as well as the sources of taxation and the methods used to impose and collect taxes from tax sources must be influenced by the political system. Looking back at history we find a number of examples of revolutions and social uprisings that lead to regime changes or at least to shifts to more accountable forms of government. For example Hibert (1981) argues that one of the reasons that led to the French Revolution was the country's regressive tax system which exempted the clergy and the nobility. Also Moon (1999) explains how the Russian Revolution as well as a number of other uprisings that took part in Tsarist Russia had their roots on the heavy taxation of peasants and laborers and the exemption from it of the upper classes.

Initially this paper will focus on the relevant literature and try to find the underlying reasons which influence both the political system in a country but most importantly by examining the effect of democracy on tax revenue and taxation in general. We will also examine some of the most common determinants of taxation and how they interact with the political regime to shape the form and size and sources of taxation.

In our econometric analysis we analyze the econometric equation and the variables we will use to examine the impact of the political regime on tax revenues. As our main reference variable we employ a dichotomous measure of democracy like the one used in previous research. We will alter our analysis from previous research by assuming that democracy or autocracy is not an exogenous variable. Instead we assume that it is influenced by the political system in other neighboring countries. It is the political system in these countries that captures the regional wave of democratization or repression in a geographical area, following the theory of Huntington (1991) and the methodology of Acemoglu, Naidu, Restrepo and Robinson (2014). This measure shows us the demand or discontent for a given political system in a geographical area, which in turn influences the power of a country's political regime and subsequently that regime's effect on taxation. In order to capture the endogeneity that regional political systems have on a country's own political system and consequently on its tax revenues, we use a two stage least square (2SLS) fixed effects regression with data from 74 countries from 1993 to 2012, similar to the methodology seen in Persson and Tabellini (2006) and Acemoglu, Naidu, Restrepo and Robinson (2014). The endogenous variable used will be a country's democracy index taken from Polity IV and Freedom House and the instrumental variable will be an index created by using the jack knifed average of the democracy index of countries in the same geographical area which will capture the effect that regional waves of democratization have on a country's political regime.

Our results seem to suggest that regional waves of democratization have a positive and statistically significant correlation with democracy, and in turn democracy also has a positive effect on direct taxation as well as the ratio of direct to indirect taxation in the countries of our sample because of two factors. The first one is the greater voluntary compliance of taxpayers in democracies as in Kenny and Winer (2006); the

second is the creation of regional waves of diffusion of certain type of tax policies such as the implementation or increase of income taxes of individuals and corporations in democracies in the same geographical area as we see in Berry and Berry (1992) and Aidt and Jensen (2009). This result remains the same when several robustness tests are used. Finally when examining the long-run effect of these regional waves, by using their lagged values, we do not find any evidence of a significant relationship between regional waves of democratization and a country's own regime; however democracy still has a positive influence on direct taxes and tax ratio as it did before.

The rest of the paper is organized as follows: In section 2 we present the literature related to our subject, section 3 has an analysis on the data that we use, descriptive statistics on our variables and a detailed method of construction of our regional democratization index and of the equations we use. In section 4 we present our regression results and Section 5 concludes.

## **2. Literature Review**

### **2.1 Taxation and Democratization**

In order to determine the meaning of democratization we use the definition of Samuels (2012) who defines democratization as “A change in political regime within a sovereign state from nondemocracy to democracy”. The question about the right type of political regime has been in the centre of political philosophy in the western world since antiquity (Plato's *Republic* and Aristotle's *Politics*) and there have been many societies that operated with some degree of democracy during these times, like ancient Athens or republican Rome.

But it wasn't until the 17<sup>th</sup> and 18<sup>th</sup> centuries during the age of Enlightenment and the subsequent industrial revolution, when the ideas of individual human rights were spread throughout Europe, when traditional political regimes began to give way to representative democracy and the first “modern” states were created. It was during this time that the works of John Locke (1689), Charles de Montesquieu (1748) and Jean Jacques Rousseau (1755, 1762) set the bases of modern liberal or “western” democracies. According to this line of thought, it is the rule of law and not simply the will of an individual or even of the majority that should govern a nation. Governments should exercise authority according to the rule of the law and after having the consent of the people they rule which is expressed by open elections, while checks and balances to a government's power should always be imposed to prevent the government from having supreme power.

The works of Karl Marx (1867) and Max Weber (1922) also influenced political science, both in theory and in practice, by criticising the negative consequences of this economic and political modernization, and it was these works alongside economic and socio-political factors that led many countries during the early 20<sup>th</sup> century to adopt non-democratic regimes, communist or fascist ones. According to Huntington (1991) it was these causes that put a stop to what was defined as a first wave of “mass democratization” that began in 1820, initiating a “reverse wave” that caused many democracies to revert to dictatorships, especially in Europe. A “second wave of democratization” lasted from the end of WWII until 1962 when a small scale reversal took place, and finally a “third wave” started in 1972 when many authoritarian regimes particularly communist ones were replaced by democracies.

The following sections present some of the major causes of democratization and the effect that democratization has on the structure of taxation.

## **2.2 Causes of Democratization**

There are a number of factors which are believed to be responsible for the political transition of a country towards a democratic regime. These factors can have economic, political and also cultural or social origins. The following paragraphs illustrate some of the main reasons which can lead a country towards democratization.

Social equality and a country's tax policy can influence the political system in it, mainly due to issues related to taxation and redistribution. Bates and Lien (1985) examine how revenue seeking governments end up striking bargains with taxpayers and how this leads to more democratic governments, by drawing on the experience of Western European countries like France and England. The writers use a simple model where the ruling elite and the taxpayers have to maximize their utilities. Both parties' utility depends on taxes, the total product of the economy, and by the difference between each party's desired policy and the policy in place. As it is expected the elite want to maximize tax revenues while taxpayers want fewer taxes, and both sides want production to be as big as possible and the policies in place to be as close to their preferred ones as possible. Maximizing both utility functions with respect to taxes, the writers conclude that in order for a rational government to gather more funds in order to maximize its utility it has to offer policy concessions to its taxpayers. These concessions take the form of greater control by taxpayers to government choices. Therefore the outcome of this process is that increased taxation by a ruler leads to greater democratic representation of the citizens.

However the relationship between taxation and democratization is not a one way causal relationship as democratization also leads to increased taxation. For example, Acemoglu and Robinson (2000, 2005) examine what leads to the establishment and consolidation of democracy by analyzing the causes behind popular movements that lead towards democracy or dictatorship. They define three paths of political development: 1) where democracy is established and remains stable, 2) where democracy is established but quickly collapses and non-democratic regimes follow only to be again replaced by democracy in a repeating cycle and 3) where we have strong autocratic regimes and democracy is never established. The causes underlying these cases have their roots to the social conditions within each country. Egalitarian and prosperous countries do not experience regime changes because people are satisfied with the conditions. Oppressive and highly unequal societies also do not experience changes because elites in these countries use all means possible to protect their position so the consequences for the disfranchised will be severe if they try to change the status-quo. Consequently in countries plagued by high inequality but where the elite does not have the power to punish the majority of the population in case of social unrest we can see transitions to full democracy, which in turn increase taxation in favor of the majority. Finally Baskaran (2014) studies the effect of taxation on democracy, using a sample of 122 countries from 1981 to 2008. He uses the implementation of the value added tax (VAT) and the creation of autonomous revenues authorities (ARA) as measures that may increase tax revenues and then checks whether this increase in revenues affects a country's political system. In order to ensure that there will be no endogeneity problem due to the two way causality between tax revenues and democracy, in addition to an OLS, a 2SLS regression is

used where the endogenous variable is tax revenues as percentage of GDP and the instrumental variable is interchangeably VAT and ARA. Then he uses tax revenues as the main explanatory variable, as well as additional control variables, in the second stage regression to see the effect tax revenues have on a country's democracy index. The results in the OLS and in the 2SLS estimations show that both tax measures have a positive effect on tax revenues. But when checking for the result of tax revenues on taxation the writer concludes that only the adoption of VAT taxes has a positive and statistically significant effect on a country's democracy. The result remains the same when additional variables like random economic shocks are used, reinforcing the idea of a positive two way causal relationship between tax revenues and democracy.

A higher GDP per capita also seems to correlate positively with democracy, and generally with a country's political regime. However it is still unclear whether democracy is a consequence of economic growth, a prerequisite for it, or if both are unrelated. Yi Feng (1997) examined the interaction between democracy, economic growth and political stability. He used data from ninety six countries from 1960-1980 and employed a 3SLS method, in order to account for the potential endogeneity problem. The main explanatory variables included GDP growth, and index on a country's democracy and autocracy, and an index that signified whether change in government office happened peacefully or by force. Variables such as human capital, investment, inflation and international trade were also used as control variables. The results indicated that economic growth and democracy have a positive and bidirectional relationship, and that economic growth exerts a positive effect on a political regime's stability. However economic growth does not necessarily lead to democratization. According to Treisman (2015) who used data on countries with autocratic regimes from 1960 to 2004, growth is positively associated with democratization but only in the long-run, more specifically after 10-20 years, and in the short run economic growth actually helps a dictator entrench himself in power, helping him to deny democratic concessions to the population.

Several scholars have also argued that increased educational attainment contributes positively to democracy in a country. In his seminal paper, Lipset (1959) has shown how a number of social and economic factors like economic wealth, urbanization, and industrialization as well education on Western European and American countries affect the political regime. The results indicate that increases in literacy and generally in the number of educated people can lead to more democratic regimes that tend to be more stable and do not revert that easily to non-democracy, because people's outlooks are broadened through education which helps them make rational electoral and political choices and refrain from extremist political views and actions. Furthermore, Aleman and Kim (2015) empirically examined the link between education and democracy using a panel data model covering most of the post-WWII era, and more specifically from 1950 to 2010. The results indicated that increases in the educational attainment of the population have a positive effect in the levels of democracy in a country. When comparing the results between developing and developed countries, the writers find the democratizing effect is stronger the less economically developed a country is.

There is also a well noted correlation between international trade between countries and the process of democratization. For example Manger and Pickup (2014) examine the role preferential trade agreements (PTA) have on the democratization of countries. By using data from 1973 to 2004 on non-democratic countries which went through a process of political modernization they come to the conclusion that trade agreements have a significantly positive effect on democratizing a country and the more PTAs a

country has the more democratic it is likely to become. This positive result is strengthened by the level of democracy in the country with which the PTA is signed. Also the number of countries involved in these agreements positively affects the democracy process in non democratic countries but the distance between countries has a negative effect. A similar study by Mansfield, Milner and Rosendorff (2000) concludes that pairs of democratic countries have 20% higher levels of international trade than pairs of non democratic or mixed pairs of countries.

### **2.3 The effect of the political regime and other factors in taxation**

The previous section has illustrated that there exists a positive relationship between taxation and democracy. However this relationship is not a one way relationship where only taxation influences the political system in a country and not the other way around. Instead as we have seen in the previous section democracy also has a significant influence on taxation. The research results of Bates and Lien (1985), Acemoglu and Robinson (2000,2005) and Baskaran (2014) put forward the idea that taxation and democracy instead have a two way causal relationship between them, where one variable influences the other and is in turn influenced by it. Therefore research on the subject of taxation has not simply focused on economic conditions (domestic and international) but also on the effect of democracy or dictatorship on the structure of tax policy. The following paragraphs further illustrate this relationship by looking at the literature which examines the effect of democracy in taxation as well as the effect of democracy in conjunction with some other variables on taxes.

Berry and Berry (1992) try to assess what prompts a country to implement specific tax policies, such as imposing a new tax or increasing already established taxes. Five explanations are given. The first is economic development. This theory states that increased economic output increases the state's ability to collect taxes. Also demand for public goods and services increases in developed countries, not only because public goods are considered high quality, but also because some goods like healthcare are being provided by family in less developed economies, but this cannot happen in highly industrialized and urbanized developed economies. A second explanation is that of fiscal health. According to this theory governments increase taxation or set new taxes when facing an economic crisis. Therefore a reduction of a country's fiscal health helps adopting new tax policies. Another theory is the election cycle theory, where political parties set new taxes or increase existing ones a year immediately after elections in order to ensure that taxpayers forget about it more easily. For the same reason policy changes are never implemented in election years. The fourth theory is that of party control in government. More specifically ideology positively affects taxation, as left-leaning parties favor higher taxes and public spending. Also states with two legislative bodies, where one party controls both of them have greater chances of tax changes. However complete legislative control by one party can also decrease the chances of taxation changes as taxpayers may blame a single party for unpopular taxes. Consequently when two or more parties are in power, tax changes are easier as the blame for taxation spreads between more than one party. The last theory developed is that of regional diffusion. Following this hypothesis, countries emulate tax policies adopted by other countries before them. This happens because officials emulate measures in similar countries, and because taxpayers accept a tax more easily if it is adopted by surrounding countries. This way, a regional wave of adoption of tax policies can appear in a geographical area and this effect becomes

more profound if the countries in question have similar political systems or parties in power. The writers then try to empirically find support for these hypotheses by examining the possibility of adoption and increases of income and gasoline taxes using a dataset of 48 states of the USA. Their results show that regional diffusion can positively influence the adoption and increase of both tax types and this effect is stronger when similar ideologies exist between surrounding states verifying the hypothesis of regional waves of taxation. Finally the fiscal health and election year variables both have a negative effect on both types of taxes.

Aidt and Jensen (2009) study the history of the adoption of income taxation and how it is related to democracy by using a sample of 17 countries from Western Europe, North America, Oceania and Japan between 1815 and 1939. They use a logit model where the dependent variable is the adoption of income taxation and where a number of political variables are used, namely the level of political franchise or suffrage, whether there is a secret ballot procedure, the existence of left wing parties and the level of political competition. Also variables about tax collection costs and efficiency as well as a number of control factors are used. Finally the writers posit that geographical distance and linguistic closeness between democratic countries can create regional waves of diffusion of income taxation between countries through a process known as social learning. The results show that the social learning indexes as well as reductions in the costs of raising taxes and pressures for spending all play a positive role in the adoption of income taxes. When the issue of democracy is examined we see that the initial expansion of the franchise actually reduces the possibility of adopting an income tax. However when the franchise surpasses a certain threshold the effect is reversed and the adoption of an income tax becomes more likely. Also the existence of a secret ballot process increases the chances of the adoption of an income tax. The reason that this happens is because in democracies, where the voting right is limited to a smaller part of the population, the elite which will certainly be a part of the people who vote, will choose not to have an income tax due to its progressive nature, since they will have to bear the lion's share of the tax burden without benefiting from public spending as much as the lower segments of the population. This result explains that in order for an income tax to be implemented in a country the democratic regime in said country should become strong enough and represent the majority of the population.

Kenny and Winer (2006) study a sample of 100 countries and try to specify what influences the structure and size of tax revenues. Their theory is based on a political system where competition between political parties leads the government to choose taxation schemes in order to gather as much support as possible. Taxpayers differ when it comes to their income, which positively affects utility, in their ability to substitute taxable with non taxable activities and in their capacity to organize political opposition. Taxpayers also react positively to increases in the production of public goods by the government, but react negatively to tax increases as they lose part of their income. Additionally tax collection costs and costs related to the enforcement of tax schemes tend to increase taxation and discontent of the taxpayers. Therefore taxpayers' support for a government increases the greater their utility from their income and the public goods provided to them is, and decreases the higher taxation and its associated costs are. For that reason governments in democratic regimes facing strong competition rely more on direct taxes which help them have the biggest support possible due to their progressive and voluntary nature. Following this specification the writers run an OLS and a 2SLS model, investigating how a number of direct and indirect taxes, nontax revenues like profits from government owned



enterprises, and total tax revenue are affected by factors related to tax base size, administration costs, democracy and the translation of taxation into political opposition as well as the size of the public sector. The results show that as total government budget increases, all direct and indirect taxes increase as well. Additionally governments rely more on bigger tax bases, for example taxes on oil production and revenue from nationalized oil operations in rich oil reserve countries. Also widespread literacy positively affects individual taxes and negatively affects trade taxes by reducing administration costs. Finally when investigating the role of the political regime in taxation results show that non democratic regimes turn away from taxes that require greater compliance from the citizens, like direct taxation, while more democratic governments make greater use of direct taxes due to their progressive nature as it helps them gain support from the majority and also because such taxes require cooperation from the taxpayers which is easier to be achieved in a democracy.

Persson and Tabellini (1994) study a model of capital taxation and examine how differences in the shares of labor and capital between individuals can influence the taxation choices of a government under majority rule. They use a model of a two-period closed economy where individuals have differences between their labor and capital shares due to different endowments, and they choose between labor, leisure, consumption and also if and how much they invest in capital based on these endowments. The government raises revenue in order to fund government spending through distortionary taxation of labor and capital. People in this model want less capital taxes and more labor taxes if they are richly endowed and vice versa. The choice for the level of taxation is contingent upon the endowment of the representative voter – who has an endowment of zero – and the outcome is similar to that of the condition described by Ramsey (1927) which calls for lower tax rates on the more elastic tax base in order to equalize the distortionary effect of taxation between the two tax bases. If however the government does not commit to tax rates before the economic decisions of individuals regarding labor, leisure, consumption and investment are made then the government can choose to tax heavily the less elastic factor, in this case capital. Therefore when there is discretion in tax policy choices governments tend to excessively tax capital, since it is more inelastic than labor and also since the majority of the population has a zero endowment of capital (or close to zero) they prefer to tax capital heavily and labor lightly. Therefore if a form of commitment is not established over taxation of capital cannot be avoided. This kind of commitment however is generally imposed in most democracies through legislation or government institutions.

Moutos(2001) creates a theoretical model in order to find the reason for the reliance on import tariffs we see in many developed countries. His model consists of two countries, named North and South. Each country produces and consumes two goods. The first one is a homogeneous non traded good and the second is a quality differentiated good which is traded between countries. The cost of the differentiated product positively depends on its quality but the cost of every unit produced remains constant. Also increased quality requires more labor and skills. For these two reasons higher quality goods are more expensive. An additional assumption being made is that wages and the skill level of laborers in the North are much higher than those in the South. Therefore South produces lower quality varieties with lower cost; for the same reason North produces higher quality varieties. Households in both economies have identical preferences but due to skill differences they have different incomes. All households consume the homogeneous good in indivisible qualities but can only

consume one unit of the differentiated good, with wealthier individuals buying better qualities and poorer ones worse qualities. The majority of people in the South are poor when compared to the North where most people are rich but in both countries rich people consume high quality goods and poor people consume low quality goods, whether these are imported or made in their home country. When examining taxation, we assume that the South government chooses between trade taxes or income taxes. If an income tax is chosen this tax does not affect the level of quality which is produced in each country; it only decreases every individual's income and their consumption. But if a trade tax is used this increases the qualities produced in the South because the cost of imports from the North increases. And since only rich people in the South consume high quality imported goods a trade tariff is just like an income tax imposed only on rich people. Therefore poor people in the South prefer trade taxes while rich people prefer income taxes in order to pay less money on taxes. Since the majority of individuals in the South are low income people then the implication is that in democratic countries majority rule voting will lead to tariffs on imports. This implication remains the same when we alter the model by assuming that imported goods are also used as intermediate inputs. Finally when examining whether this result is also true for rich countries like the North we find that people there will be in favor of income taxes and not trade tariffs because they consume many high quality goods from many countries so trade taxes will hurt the majority of the population.

Adam (2009) examines why trade taxes are a considerable revenue source for developing countries. According to one explanation, lower collection and administration costs and underdeveloped taxation systems, make it difficult and costly to collect other taxes; therefore it is easier to collect trade taxes. This explanation however, known as the Administrative Capabilities Hypothesis (ACH), is not sufficient on its own as it can not explain some facts about trade taxes, like the exemption from taxes of a large part of imports, or why taxes which are easier to collect, like land taxes, are not used. Additionally the tax code of trade taxes is complex and administratively costly which goes against the ACH. These reasons makes us assume that ACH and fiscal issues in general are not the only reason leading to high trade tariffs and an additional explanation is needed to explain this fact. Following Moutos (2001), the writer uses a two-country model where two goods are produced; a homogeneous non-traded good and a vertically differentiated traded good. One country has a bigger number of skilled laborers and produces better and more expensive qualities of the differentiated good and the other country produces lesser qualities. People in both countries have income differences with rich people in both countries consuming high quality goods, domestic or imported, and low income people consuming low quality goods. Finally the amount of rich people in the country with skilled labor is much bigger than the one in the country with low skilled labor. Taxes on the poorer country are decided by the median voter who chooses between tariffs or income taxes. As the median voter is poor and does not consume imported goods he votes for tariffs and no income tax. This result is contingent on the international environment, like the existence of international trade agreements which may limit trade taxes, but the model's assumption is that the closer the politico-economic conditions are to the median voter the higher import taxes will be. To empirically prove this theory a dataset of 64 low income countries from 1982 to 1987 is used. The dependent variable is the share of revenues from trade taxes. The explanatory variable is a Democracy index taking values from 0 to 1 which is constructed by using data on political and civil rights. Additionally control variables such as the quality of bureaucracy, inequality and trade openness are used. The results

indicate that Democracy and inequality positively affect trade taxes verifying that political economy forces determine the level of import taxes. Additionally a country's openness and the quality of its bureaucracy also positively affect the share of import taxes implying that the ACH also influences trade taxes. This result remains the same when a number of robustness tests are being run.

Meltzer and Richard (1981, 1983) examine the way taxation and public spending for redistributive reasons are affected by the political process, and more specifically by majority rule voting. They use a general equilibrium model where a large number of individuals with different productivities consume a single good and divide their time between work and leisure. This choice is affected by the income they receive from work (income being positively affected by productivity), the income tax and by transfer payments. The government chooses the level of taxes in order to maximize the utility of people by redistributing income. Taxation creates disincentives to work and increases leisure, but also increases consumption because of income transfers. Voters anticipate how taxation affects the labor-leisure choices of individuals and take them into account when voting. Therefore the level of redistribution depends on the voting rule in the economy and on the productivity of individuals. In a model with universal suffrage people choose according to their position in the productivity, (and income) distribution. Individuals with lower productivity and incomes vote for more taxes and more redistribution and vice-versa. The choice is made by the voter with the median income, known as the decisive voter. When mean income increases compared to the decisive voter's income, in other words when inequality increases, taxes and redistribution also increase. This result explains how extensions of the political franchise and greater democratization can lead to expansions of redistributive programs and taxation by changing the position of the decisive voter in the income distribution.

Profeta, Puglisi and Scabrosetti (2013) examine whether democracy affects the choices of governments in developing countries regarding their tax and spending policies. They argue that, since in many places of the world the transition to a modern economy goes hand to hand with political transitions to democratic forms of government, then political transition may also imply changes in the composition and size of tax revenue and government spending. For this reason they use data from developing countries in South-East Asia Latin America and the EU that experienced transitions to democracy from 1990 to 2005. In order to capture the complexity of the democracy index they measure it using data about civil rights protection and the strength of democratic institutions. They perform three different estimates: Cross country pooled OLS estimation, country fixed effects and region specific estimation with country fixed effects. The first regression proves that civil liberties correlate negatively with corporate taxation and social contributions while they positively affect personal income and indirect taxes. In addition democratic institutions seem to positively influence social contributions and personal income taxes. However the results are different in the next two regressions: In country fixed effects regressions only indirect taxes like property and trade taxes are positively correlated with democratic indexes. The results of region specific regressions also show that there are differences between geographic areas after democratization: In Latin America democratization has a positive effect on corporate and trade taxes, while in the EU direct taxes and personal income taxes are positively affected by democratization.

Cheihub (1998) examines whether the regime in a country, democracy or dictatorship, influences a state's capacity to mobilize resources through taxation. According to the theoretical analysis government revenues are affected by four

variables. Lower transaction costs, associated with per capita income, trade as percentage of GDP and the GDP shares of agriculture and mining, have a positive effect since it becomes easier to collect taxes the more formal and modern the economy becomes the wealthier it becomes and the bigger international trade becomes as a share of GDP. In addition the government's discount rate of the future which is associated with how long a government will stay in power has a positive effect on taxation since it gives an incentive to governments to "plunder" if it is about to be removed from power. A government's bargaining power, which is related to free elections in a country, the existence of political and social forces that compete for political power and influence the population, and to frequent changes in office in a government take, can all negatively affect taxation. Finally the overall fiscal situation affects taxation because the expenditure needs of the government determine the tax rates, not the other way around. When empirically examining the theoretical assumptions by using an OLS model and a fixed-effects model of 108 countries from 1970 to 1990 the results show that all factors related with transaction cost positively affect taxes. The government discount rate also positively affects taxation. Among the factors associated with government bargaining power only the possibility of elections has a negative and significant effect. Finally a government's fiscal situation is not significant to taxation. When the issue of the impact of the political regime in taxation comes into question, even though data from the sample countries show that tax revenues are significantly higher in democracies than in dictatorships when the writer controls for identical countries which only differ in their regime the results show that there are no major differences in tax revenues between democratic and non-democratic countries. Even though increases in per capita income help democracies to increase their tax revenues more than non democracies do, for the most part this paper suggests that democracies and dictatorships collect the same amount of tax revenues.

Mutascu (2011) examines the influence of the political regime in taxation using a panel model approach with data from 51 countries that covers the period from 2002 to 2008. The amount of tax revenues as percentage of GDP is used as the main dependent variable and a polity index measuring democratization from Freedom House is the independent variable. Four different regressions are run; a "naïve" OLS with no usage of further control variables, an OLS regression with control variables such as per capita income and finally a cross section random effects model and a GMM model. All four regressions have the same results, that the relationship between democratization and taxation follows a U-shaped curve. This result suggests that significant tax revenues can only be gathered in countries with very strong democratic or autocratic regimes and that countries where the political regime is not very strong have fewer tax revenues. The study also suggests that a significant increase in taxation without any major negative reactions from the population can only be implemented in countries with strong political regimes, democratic or autocratic.

Adam, Kammas and Lapatinas (2014) analyze the effects of inequality on the structure of taxation. They use a model where individuals choose between consumption and leisure and are endowed with different amounts of wealth and time: Richer people have more wealth and work less, and vice versa and this creates income inequality between people. The government taxes labor and capital in order to finance the provision of public goods. The supply of labor in the economy is affected positively by the time endowment of individuals, negatively by capital supply and both are negatively affected by their respective tax rates. The level of capital and labor taxation is affected by the utility of the median voter and by the utility of certain groups that have political power, and these utilities are weighted differently according

to the degree of democracy in a country. Maximizing this social welfare function subject to the government budget constraint yields the Ramsey rule and the equilibrium tax rates. This result shows that higher inequality means higher capital and lower labor taxes. Also increased economic integration means that capital moves more easily between areas compared to labor, therefore capital taxes should decrease. Finally the degree of democracy in a country is important as more democratic countries will tax capital more. In order to empirically test their theory, the writers use a cross-section dataset of 75 developed and developing countries. The results show that income inequality affects capital tax rates positively and labor tax rates negatively. This result is unaffected by the quality of democracy or by the regime of the countries. However higher taxation of capital affects growth and investments negatively, meaning that countries with high inequality have lower growth rates and lower incomes especially for the poorer segments of the population.

Schulze and Ursprung (1999) conduct a survey of empirical and theoretical literature that explores the impact of globalization on taxation, especially tax competition of mobile factors like capital, both in different countries and in different states within the same country. In addition they explore the impact of globalization on public expenditure, and how different public spending policies affect tax competition. Also issues of political preferences and electoral competition and their effect on taxation and spending are explored. The survey focuses on the two effects of globalization on government policies: The efficiency effect and the compensation effect. The efficiency effect states that increased economic integration leads to a reduction of government expenditures, particularly welfare spending, because the increased taxes required tend to erode a country's capital base. On the other hand the compensation effect maintains that demand for government welfare programs increases due to the risks associated with the global economic environment. The results show that capital taxation has not dwindled significantly and high tax rates are still levied throughout the world even though labor taxes have increased, or at least their contribution to revenues. However tax rates on capital have followed a downwards trend and have converged somewhat over the years because they play an important role in locating decisions for firms. Regarding spending policies, while a reduction has not taken place, globalization may have influenced the financing of expenditures as labor taxation finances a greater percentage of spending, especially welfare. In addition productive government spending (construction, energy and manufacturing) has remained stable since it helps governments compete for foreign investment, as public capital increases productivity and firm profits. Finally while some researchers put forth the idea that ideological criteria do not apply in government decisions, most studies suggest that ideology and a country's political regime still influence fiscal policies, even more so in a globalized world, due to risks associated with capital mobility and the subsequent loss of jobs which require increased tax revenues in order to alleviate these negative effects.

Plümper, Troeger and Winner(2009) examine why we don't see a race to the bottom in capital taxation. They use a theoretical model of tax competition between homogeneous countries where governments provide a public good to both households and to firms which operate under perfect competition. Governments face budget rigidities and a fairness norm regarding the level of capital and labor taxation, which means that governments lose popular support the more they tax labor compared to capital. The model suggests that the more restraining the domestic political economy is in a country, the less competitive this government is in international tax competition. However this restriction also helps foreign governments to impose

higher tax rates on capital than those they normally would under a simple tax competition model. As a result budget constraints and fairness norms increase the level of capital taxation and the ratio of capital to labor tax ratio worldwide, but do not affect the level of labor taxation. Analyzing a model with data from 23 OECD countries between 1975 and 2004, and using an IV approach, the writers find empirical support for their theoretical results that budget constraints and prevalent societal fairness norms limit a government's ability to lower capital taxation in a globalized environment.

Jensen (2013) explores how democratic institutions in a country, alongside investment incentives related to taxation, and specific types of private investments affect capital taxation using a sample of developed and developing countries. He uses a dataset on firm tax payments of 22,000 foreign affiliates of US multinational corporations from the Bureau of Economic Analysis. In this sample, 8,258 firms (or 30%) paid no taxes; out of these 8,258 firms, 3,573 (or 43%) had profits. A logit model is used where the dependent variable is a dichotomous variable coded as 1 if the affiliate firm paid any taxes in the country where it is based. In order to count for a country's regime a dichotomous variable is used. This variable takes a value of 1 if the country is democratic and 0 otherwise. A number of control variables related to the parent firm are used. These include the size of the parent firm, the firm's R&D expenses, the average taxes paid by the parent firm's affiliates in other countries, the ratio of immovable to total investments, the number of employees and the exports as a share of the affiliate's total production. The writer first runs a regression without using the democracy index and the results show that firms which are exempt from taxes in one country are more likely to be exempt in other countries as well. Also R&D expenses and the ratio of immovable to total assets do not seem to affect the probability of zero taxes for an affiliate. However, when the political regime of a country is taken into account the results drastically change. More specifically democratic countries seem to reduce the probability that an affiliate will pay zero taxes due to pressure from constituencies and reelection concerns. Also the size of R&D expenses and the ratio of immovable to total assets now have a positive effect on the possibility of taxes. This last result seems to prove that democracies tend to increase the likelihood of taxation of firms whereas autocracies do not.

Lee (2004) studies the effects of the taxation of mobile factors under uncertainty. He uses a theoretical model of an economy with perfect competition in the product and labor markets, where the workers' wages are subject to uncertainty, because of random shocks. Standard results in the fiscal competition literature indicate that mobile factors should not be taxed when lump-sum taxes or taxation of immobile factors, such as labor, are available. However when there is uncertainty over income the model suggests that it is optimal to tax capital because it provides insurance under uncertainty even when lump sum taxes and taxes on labor are available. Therefore countries or jurisdictions in a country that are subject to random shocks have an incentive to increase capital taxation because it provides a beneficial insurance effect for workers by reducing the fluctuations in worker's income. As a result taxes on capital are bigger than what they would be under normal tax competition models under certainty.

Hennighausen and Heinermann (2014) empirically analyze what determines tax rates preferences by using data from a study conducted by the German General Social Survey (ALLBUS). Individuals in this study answered a series of questions about whether people with high incomes should pay a larger share of their income as taxes, a smaller share or the same share as those with low incomes. The answers provided

created a profile of the German taxpayer's attitude towards the level of taxation, about progressive and regressive taxation and some other variable such as the educational attainment of taxpayers. The response pattern suggests that individuals prefer progressive tax systems even when they have higher than average income and that more educated taxpayers are more open to higher taxes. These results are then used in a time series regression where the dependent variable is the level of redistribution, with data on the level of income and wages, the educational level the percentage of people over 65 years of age and the political parties in power and the general political system used as additional independent variables. The findings indicate that even people with high incomes prefer a tax system where they have to pay more in taxes than those with a lower income because they don't just care about their financial situation but also about social fairness. This fairness preference becomes more profound when additional data about the educational attainment of individuals the number of elderly people and the beliefs on social mobility and inequalities are used. These results suggests that education and the percentage of the elderly in a country as well as individual socio-political beliefs play a positive role on taxation and subsequently in redistribution.

Boix (2001) develops a model which describes the growth of the public sector, in terms of revenue and expenses, as a process related to economic development and the political institutions in place. First, he creates a theoretical model of an economy where people have different skill and capital endowments. Income is affected by these differences which create the income gap between richer and poorer individuals. Income is also positively affected by public investment and negatively by the taxes required to fund this investment. Taxes are used for public investment, the production of public goods and for redistributing income in the entire population. The choice for the level of taxation is made by the median voter who has lower income from the average voter and therefore demands more redistribution. The model concludes that the optimal tax rate is positively affected by the size of income inequality and is also positively affected by the size of public investment since public goods increase production and income in the economy. The optimal tax rate in the model is one that equates the income increases from investment and redistribution with the income decreases caused by taxes. Empirically examining data from 65 countries from 1950 to 1990 by using a panel data method the results suggest that economic development does lead to increases in taxation for two reasons: First because economic development increases the need for government intervention by producing public goods and infrastructure and second because of risks associated with economic modernization which require bigger redistributive programs. However economic development alone does not always lead to increases in tax revenues. In authoritarian regimes or democratic regimes with low electoral turnout tax revenues remain low. However in democratic regimes with significant turnout rates public revenues grow substantially due to the increase of public sector expenses which help deal with the risks associated with economic modernization.

Mooij, Van Sinderen and Gout (1998) examine the welfare effects of tax financed public spending. They use a growth model of a competitive market with perfect capital mobility and no public debt, where firms produce a single good using labor and an input which is the combination of public and private capital. The amount of capital needed to produce this input varies with the marginal productivity of public capital. Households choose between leisure and work and consume private and public goods; their budget consists of after tax income and lump sum transfers. The government produces public capital and consumption goods and conducts income

transfers. Fiscal policy has a benefit, namely increased consumption and production, and a cost, increased taxation. If lump sum taxes are used to finance the production of consumption goods, social welfare increases as long as the marginal increase in utility by consumption of public goods equals or exceeds the marginal cost associated with the crowding out of private consumption due to taxes. Production of public capital goods financed by lump sum taxes also increases social welfare if the productivity effect of public goods exceeds the costs of private capital. If distortionary taxation is used, marginal costs are bigger, due to disincentives in the labor and private capital markets. In the case of labor taxation, marginal benefits from increased production of public consumption goods or income transfers are the same but marginal costs are now bigger as labor supply is more expensive due to taxes, while leisure becomes cheaper. Increased public capital production financed by labor taxes increases social welfare if public capital productivity is higher than private capital costs as it stimulates production and incomes in the economy, and increases labor supply. Finally capital taxation reduces private capital demand and the capital base, due to capital mobility which reduces production, incomes and social welfare. If however public capital is a substitute for private capital the negative result is amended.

### 3. Data and methodology

#### 3.1 Data

The dependent variable that we will use in our regression analysis is interchangeably the direct tax revenues (*Direct taxes*) indirect tax revenues (*Indirect taxes*) and the ratio of direct to indirect taxes (*Tax ratio*). All our revenue variables are calculated as percentage of GDP.

The tax revenues variables are calculated according to the following methodology which is used by international organizations like the IMF and the World Bank and also by Profeta, Puglisi and Scabrosetti (2013):

$$\text{Direct taxes} = \text{personal income taxes} + \text{corporate income taxes} + \text{property taxes} + \text{Social contributions} \quad (1)$$

Personal income taxes denote all taxes paid on income, profits and capital gains paid by individuals while corporate income taxes are all taxes on income, profits and capital gains paid by firms. Property taxes are recurrent taxes on immovable property, like houses and buildings, paid both by firms and individuals. Finally social contributions are the sum of social security contributions paid by employers, employees and the self employed individuals as well as those contributions whose source is not identified. They also include contributions paid to social insurance schemes operated by the government.

$$\text{Indirect taxes} = \text{trade taxes} + \text{taxes on goods and services} \quad (2)$$

Trade taxes include all taxes on international transactions of goods and services and also on transactions of capital between countries. Taxes on goods and services include general sales taxes, value added taxes, excise duties on goods, selective taxes on



services, taxes on the use of goods or property, taxes on mineral extraction and production and the profits of fiscal monopolies.

Finally we calculate the ratio of direct taxation to indirect taxation:

$$\text{Tax ratio} = \text{Direct taxes}/\text{Indirect taxes} \quad (3)$$

Data to calculate our variables are taken from the IMF Government Finance Statistics database and also from the OECD public sector, taxation and market regulation database.

### 3.2 Construction of the regime measure

Since we are interested in examining the impact that the political regime has on taxation the first thing we need to do is to clarify exactly how we will measure this variable. For this reason we will use the methodology of Acemoglu, Naidu, Restpero and Robinson (2014) who utilize data from the Polity IV project and Freedom House. According to this methodology the political system in a country is defined as autocratic or democratic by employing a single dichotomous variable  $D_{ct} \in \{0,1\}$  where 0 means that the country in question has an autocratic regime and 1 means that the country has a democratic regime. The regime variable is calculated by using a number of different components meant to illustrate the institutional variations in a country. These components are comprised of data on free elections, the existence of limitations to the exercise of executive power by a government, inclusive participation and representation by political parties and finally an index related to the protection of civil rights in a country.

More specifically and following the methodology Acemoglu, Naidu, Restpero and Robinson (2014) our measure of the political regime  $D_{ct} \in \{0,1\}$  for a country  $c$  on time  $t$  is coded according to the following specification:

We code a country  $c$  as democratic ( $D_{ct}=1$ ) in year  $t$  if Polity IV gives it a positive score (The Polity IV index takes prices between -10 and +10) and if Freedom House categorizes the country as “Free” or “Partially Free”. Alternatively if a country receives a negative score on Polity IV and is categorized as “Not Free” in Freedom House then it is coded as autocratic ( $D_{ct}=0$ ).

Next we document the institutional variations which this democracy measure captures and which are used to define a country’s political system as democratic or autocratic. We follow the methodology used by Polity IV project, which defines democracy as an institutional arrangement within every country that comprises several components. According to this methodology the institutional components which define a country’s political system as democratic or autocratic are the following:

Free elections (*exec*), are defined by Polity IV as the process in which an executive is chosen by free elections which are open to all challengers or if he is chosen in a different, non-democratic way. This index takes scores from 1 to 8 and the higher the score is the more democratic the process of electing executives is in a country. Constraints on the power of the executive (*exconst*) are defined as substantial legal and political limitations on the executive power of a government and more specifically its chief executive. This index also takes scores from 1 to 8 where higher scores mean greater limitations to executive power.

Finally according to Polity we define a country as having inclusive politics (*polcomp*) when there are organized political groups that regularly compete for political power and operate outside the government. This index ranges from 1 to 10 with higher scores meaning greater political representation in a country.

Regarding civil liberties we use the Freedom House index of civil liberties (*civil*) which takes prices from 1 to 7. Countries with a score from 1-2 and 3-5 are denoted as having a status of “Free” or “Partly Free” while countries with ratings of 6-7 are denoted as “Not Free” with regards to their civil rights

### 3.3 Control Variables

In order to ensure that will have robust econometric identification in our results we will make use of a number of different control variables in our estimated equations. These are some of the factors which the relative literature considers having some kind of effect on tax rates aside from the political regime. Data for all the control variables we will use come from the World Bank World Development Indicators (WDI).

More specifically we will use data on GDP per capita (*income*), expressed in constant 2010 US\$ prices. This variable will allow us to control for the overall productivity and wealth in an economy and how this affects tax rates. We expect the effect of this variable to be positive on at least one, if not on all our dependent variables because as we have seen in Cheihub(1998) and Mutascu (2012), higher per capita income is associated with increased tax revenue as percentage of GDP.

In addition we will use data on the integration of an economy (*openness*) by using the sum of imports and exports as percentage of GDP. The effect that this particular variable will have on taxation is ambiguous as we see in Schulze and Ursprung (1999), because it depends on whether the “efficiency hypothesis” effect or the “compensation hypothesis” effect prevails. In the first case we will expect lower taxation in order for governments to attract foreign investment. If the compensation effect is dominant however this will lead to increased government expenditure for social security expenses due to the risks associated with increased global integration of an economy and therefore increased taxation.

An additional dataset which we will make use of is that of government spending as percentage of GDP (*publicspending*). Government spending includes payments made by the government for the production of goods and services and for the compensation of employees and is expressed as percentage of GDP. As in Mooij, Van Sinderen and Gout (1998) and also in Boix(2001) we will possibly have a positive relationship between this variable and at least one if not all of our dependent variables because higher government expenditure is associated with increased taxation in order to provide bigger quantities of public goods in firms and individuals and also to protect individuals from risks related to economic uncertainty.

We also use data on gross capital formation as percentage of GDP in the economy (*investments*) which consists of additions to the fixed assets of the economy plus net changes in the level of inventories expressed as percentage of GDP. The result will be positive, because as we see in Jensen (2013), the effect of investment on taxation is positive when a country is democratic and this effect is more profound the bigger the immovable investments and the R&D expenses are.

We also control for the population of a country (*population*) and also for the percentage of people above 65 years old (*elderly*). We expect that population and the percentage of elderly people will have a positive effect on most of our tax rates

particularly direct taxes since a part of them are social contributions, mirroring the results of Meltzer and Richards (1981, 1983). Also according to Henninghausen and Heinermann (2014) increased percentages of people above the age of 65 increase taxation due to prevalent social fairness norms which dictate an increase of taxes in order to help the elderly.

Finally we use data on higher education enrollment as percentage of the whole population (*education*). We believe that this variable will have a statistically significant effect on most of our taxation variables as we have also seen on Henninghausen and Heinermann (2014).

### 3.4 Descriptive statistics

Table 1 presents the descriptive statistics for our dependent and our independent control variables:

[Table 1 here]

### 3.5 Econometric model

In order to examine the impact of the political regime on democracy we will use a similar approach to Acemoglu, Naidu, Restpero, and Robinson (2014). More specifically we will use a two-stage least squares (2SLS) regression. In the first stage we will use an instrumental variables (IV) method where the endogenous variable will be the political regime (*democracy*) in a country, and the instrumental variable will be a jack-knifed average of democracy of countries in the same geographical area as well as the lags of this average. In the second stage equation we will use the results of the first stage to estimate the effect of democracy on the tax revenues as percentage of GDP by doing a panel data regression. We construct a panel dataset that consists of 74 countries from 1993 to 2012. All data that we will use are expressed in logarithmic form.

In the following sections we analyze the two econometric specifications that we will use

### 3.6 Basic econometric specification

The baseline specification that we use in order to study the relationship between the political regime and tax rates on labor and capital is based on the relationship used by Adam, Kammass and Lapatinas (2014):

$$Taxrevenue_{ct} = \alpha_0 + \beta_1 Democracy_{ct} + \beta_{it} Controls_{ct} + \gamma_c + \delta_t + \epsilon_{ct} \quad (1)$$

Where  $Taxrevenue_{ct}$  is interchangeably the direct income tax revenue, indirect income tax revenue, and the ratio of direct to indirect tax revenues in country  $c$  at time  $t$ .  $Democracy_{ct}$  is our dichotomous measure of democracy in country  $c$  at time  $t$ ,  $\alpha_0$  is the constant and  $Controls_{ct}$  stands for the set of control variables in country  $c$  at time  $t$  that we have explained in the previous section. We will also control for country and time effects which are denoted respectively by  $\gamma_c$  and  $\delta_t$ . Finally  $\epsilon_{ct}$  is the error term.

In order to properly capture the effect of democracy on tax revenues we will employ instrumental variables (IV) estimation. The reason we are using this specific

method is because, as we have seen in the democratization literature like in Bates and Lien (1985), Acemoglu and Robinson (2000, 2005) and also in Baskaran (2014) taxation and democracy have a two way causal relationship where both of them influence and can be influenced by the other. Furthermore as we have seen in Kenny and Winer (2006) as well as in Berry and Berry (1992) and Aidt and Jensen (2009) democracy influences taxation due to the greater compliance of taxpayers in democracies, and by the creation of regional waves of diffusion of certain tax policies like the implementation or increase of income taxation on individuals and corporations in democracies in the same geographical area. Therefore it is safe to argue and indeed the aforementioned literature has done so, that these two variables have a two-way causal relationship between them.

For the reasons stated above, and in order to properly examine the impact of *Democracy* in taxation, which is our main explanatory variable, we will make use of the methodology of Acemoglu, Naidu, Restpero, and Robinson (2014). According to this methodology and also based on research such as that of Huntington (1991) and Persson and Tabellini (2006), democratizations occur in regional waves, for example the waves of democratization in Eastern Europe, Central Asia and Africa which happened after the fall of the Soviet Union in 1990. According to this theory of democratization waves, these regional patterns reflect the diffusion of a political regime across countries. Countries within the same region usually share similar histories, have close ties not just economic but also political and cultural, and have to face similar problems. Therefore the diffusion of demand for a given political system or discontent for a political system, happens much easier in countries which are in the same geographical area, than it does for countries which are not.

Following this methodology we will use the regional waves of democratization and the regional transitions to non-democracy as an instrumental variable that influences the endogenous variable, *Democracy*. We posit that democracy in country  $c$  is influenced by the political regime in other countries which are in the same geographical area as country  $c$ . To formally investigate these patterns we begin by defining the set of countries that influence demand for democracy in a given country. For every country  $c$  we use  $D_{ct0}$  to denote this country's political regime (democracy or autocracy) at the start of our sample. Then we use  $R_c$  to denote the geographical region in which country  $c$  lies. Democracy in country  $c$  is influenced by democracy in the set of countries  $I_c = \{c': c' \neq c, R_{c'} = R_c, D_{c't0} = D_{ct0}\}$ . This set includes all countries which are in the same region as country  $c$  that share a common political history.

Using these sets we will define the regional influence to democratize that country  $c$  faces,  $Z_{ct}$  with the following equation:

$$Z_{ct} = \frac{1}{|I_c|} \sum_{c' \in I_c} D_{c't} \quad (2)$$

$Z_{ct}$  is the jack-knifed average of democracy in a region times the initial regime cell, which leaves out the own country observation. This equation shows how the political system in a given country is affected by the regimes in countries which are in the same geographical area by creating diffusion of demand or discontent with a political regime.

Using (2), the first stage equation we will use is the following:

$$Democracy_{ct} = \phi_j Z_{ct} + \sum_{j=1}^q \pi_j Z_{ct-j} + u_{ct} \quad (3)$$

This way we will control for the long run effect of democracy by using the lags of  $Z_{ct}$  as endogenous variables of the *Democracy* variable and not just the immediate effect.

Combining (1) and (3) we have the two-stage least squares panel data model which we estimate:

$$Taxrevenue_{ct} = \alpha_o + \beta_1 Democracy_{ct} + \beta_{it} Controls_{ct} + \gamma_c + \delta_t + \varepsilon_{ct} \quad (4)$$

$$Democracy_{ct} = \phi_j Z_{ct} + \sum_{j=1}^q \pi_j Z_{ct-j} + u_{ct}$$

## 4. Results

The sample that we use consists of 74 countries from 1993 to 2012. All of our regressions have been made using clustered standard errors. We first run an ordinary least squares (OLS) model. However OLS does not control for unobserved individual effects in the countries we use in our sample nor does it control for the potential endogeneity of our main explanatory variable. For this reason we will also use a simple fixed effects regression and a two stage least square (2SLS) fixed effects regression both with country and time effects. This way we can control not only for individual unobservable effects in our sample of countries but also for the endogeneity of the main explanatory variable, *Democracy*. Finally in order to examine both the short run and the long run effect the political regime in neighboring countries has in a country's own regime and on tax revenues, we use time lags of the instrumental variable  $Z_{ct}$ .

Regarding our postestimation tests we run a Wooldridge test and a Crag Donald F-statistic test to check for serial correlation and to see if the instruments we use are valid i.e. not correlated with the error term respectively. The results show that there exists no serial correlation, that we have valid instruments and that the excluded instruments are correctly excluded from the estimated equations. We also run an endogeneity test to check if we need to use 2SLS regression or if a simple OLS model will suffice. The results indicate that a 2SLS model is in fact the model we need to use. Each of the three regressions is presented in two tables. The first table presents the results of the first stage regression and the second table the results of our second stage regression. Each one of the columns presents the results when the dependent variable is respectively *Direct taxes*, *Indirect taxes* and *Tax ratio*.

In the following tables we present our estimation results. We begin our analysis by estimating the OLS and the fixed effects estimators for each one of our dependent variables interchangeably. Following that we run a 2SLS fixed effects regression. The results of the first stage regression are presented in Table 2a. Table 2b presents OLS and fixed effects estimation and Table 2c has the second stage fixed effects regression results.

[Table 2a here]

[Table 2b here]

[Table 2c here]

In Table 2a we see that regional democratization waves, represented by the term  $Z_{ct}$  in our results, have a positive effect which is statistically significant at a 1% level on a country's political regime in all estimations. This means that the demand or discontent for a political regime in a country is positively influenced by the political systems in place in neighbouring countries. The magnitude of the coefficients is also quite big, being 0.476 for *Direct taxes* 0.484 for *Indirect taxes* and 0.486 for *Tax ratio*. This result seems to confirm the theory that regional waves of democratization developed by Huntington (1991) and used by Persson and Tabellini (2006) and Acemoglu, Naidu, Restrepo and Robinson (2014) seem to have a positive and numerically important effect on a country's political regime.

Table 2b shows the impact of our main explanatory variable on taxation for the OLS and fixed effects regression, while Table 2c has the results of the 2SLS fixed effects regression. The main finding in both tables is that *Democracy* has a positive and statistically significant effect on taxes in all three estimations. Our main finding in the 2SLS fixed effects regression is that *Democracy* positively influences *Direct taxes* at a 1% significance level, a result which we do not see in the OLS or the fixed effects estimations. This coefficient also has a considerable magnitude of 0.339 which shows that there is a positive and strong relationship between *Democracy* and *Direct taxes*. We also see in both the OLS and the 2SLS fixed effects estimation a positive relationship at a 1% significance level between *Democracy* and *Tax ratio* but with a much bigger impact of 0.566 in the 2SLS fixed effects regression compared to 0.120 in the OLS. This coefficient however is negative and very small at -0.049 in the fixed effects regression and only with a 10% statistical significance. Finally we see that *Indirect taxes* are affected positively by *Democracy* in the OLS and fixed effects regression (0.062 in both cases) with 1% statistical significance, but we do not see this result in the 2SLS fixed effects estimation. These findings are consistent with Kenny and Winer (2006) who find that democracy and civil rights protection is positively correlated with direct taxes and tax revenues because such political systems rely on individual self-compliance and do not to use repressive measures in order to tax their citizens. Therefore democracies collect much more tax revenue through direct taxation of individuals and corporations. Also Berry and Berry (1992) and Aidt and Jensen (2009) have shown that when neighbouring countries have democratic regimes with sufficient suffrage this leads to regional diffusion waves that help establish or increase certain tax measures, particularly direct taxes like income taxation of individuals and corporations.

Examining our control variables we see that *Income* affects all taxes at a 1% significance level in all estimations. More specifically, *Direct taxes* are positively affected in the OLS and fixed effects regressions but with a small impact (0.061 and 0.042 respectively). Also *Indirect taxes* are negatively affected in the fixed effects regression at -0.211 and in the 2SLS fixed effects regression at -0.197; only in the OLS estimation we find a positive coefficient of 0.204. Finally the coefficient of *Tax ratio* is positive on all estimations (0.156 in OLS, 0.247 in fixed effect 0.211 in 2SLS fixed effects regression). These results are in line with Mutascu (2011) and Cheihub (1998), where higher GDP per capita increases tax revenues and tax rates, as it is easier for governments to gather funds with less cost due to greater taxpayer compliance and increased economic output both of which increase the tax base. *Openness* also positively affects *Direct taxes* at a 1% significance level in all

estimations with the coefficients being quite big, and nearly double in the 2SLS fixed effects estimation (0.239 in OLS, 0.266 in fixed effects 0.404 in 2SLS fixed effects). The coefficient of *Indirect taxes* is also positive in all three estimations (0.381, 0.418 and 0.311 respectively). *Openness* also negatively affects *Tax ratio* in the OLS model (-0.716) and fixed effects models (-0.142), at a 1% and 5% significance level respectively; however we see no significant effect in the 2SLS fixed effects model. These results suggest that the compensation hypothesis, seen in Schulze and Ursprung (1999), is the dominant effect of globalization in taxation and results in increased taxation in order to provide revenues for social protection.

Considering the impact of *Investment* we find that *Direct taxes* are positively affected at a 1% significance level and the effect is nearly equal in the OLS and fixed effects models at 0.182 and 0.188 respectively, being somewhat bigger in the 2SLS fixed effects model at 0.206. *Investment* also negatively affects *Indirect taxes* in the 2SLS fixed effects regression at -0.157 and in the fixed effects model at -0.140 with a 1% and 5% significance level respectively; this result however is positive in the OLS estimation at a 1% significance level with a coefficient of 0.151. *Tax ratio* is unaffected in the OLS estimation while it is positively affected at a 1% significance level in the fixed effects and 2SLS fixed effects estimation with the magnitude being a little bigger in the second case (0.327 to 0.375). These results seem to verify the findings of Jensen (2013) where increased investment increases taxation of capital in democracies. Additionally, *Public spending* affects all taxes positively at a 1% significance level the only exception being *Indirect taxes* which is significant at a 10% level. The quantitative effect is much bigger in the case of *Direct taxes* in all three estimations and somewhat bigger in the OLS and simple fixed effects regressions compared to the 2SLS fixed effects regression (0.756, 0.730 and 0.631 respectively). The coefficients for *Indirect taxes* are also positive, but much smaller, being 0.156 in the OLS, 0.154 in the fixed effects and 0.228 in the 2SLS fixed effects regressions. Finally the magnitude in *Tax ratio* is significant and bigger in the last two estimations (0.165 in OLS, 0.591 in fixed effects and 0.410 in 2SLS fixed effects). These results are similar to Mooij, Van Sinderen and Gout (1998) and Boix(2001) who have shown that public spending positively influences taxation and in this case direct taxation.

*Population* appears to positively impact *Direct taxes* and *Tax ratio* at a 1% significance level. The effect on *Direct taxes* has a magnitude of 0.135 in the OLS and fixed effects regression while it is slightly bigger at 0.153 in the 2SLS fixed effects estimation. The impact on *Tax ratio* is very small in the OLS estimation at 0.049, being bigger in the fixed effects and 2SLS fixed effects regression at 0.230 and 0.265 respectively. When examining the effect on *Indirect taxes* we find a small positive effect of 0.093 in the OLS estimation but in the other two models the effect is negative (-0.090 in the fixed effects and -0.104 in the 2SLS fixed effects). These results are similar to Meltzer and Richards (1981, 1983) where capital taxation, which is a part of *Direct taxes*, increases in democracies. *Elderly* also positively affects *Direct taxes* and *Indirect taxes* at a 1% significance level, but we find no similar effect on *Tax ratio*. Examining the magnitude of the coefficients we see that it is considerable and nearly the same in the OLS (0.618 for *Direct taxes*, 0.628 for *Indirect taxes*) and fixed effects regression (0.609 for *Direct taxes*, 0.624 for *Indirect taxes*), being smaller for *Direct taxes* and bigger for *Indirect taxes* in the 2SLS fixed effects model (0.552 and 0.665 respectively). The same result appears in Henninghausen and Heinermann (2014) where the number of elderly people leads to higher taxes due to taxpayer's notions about social fairness. Finally *Education*

positively affects *Direct taxes* and *Indirect taxes* at a 1% significance level on all estimations. *Tax ratio* on the other hand is only affected at a 5% significance level in the OLS regression and the magnitude is very small at 0.093. The impact of *Education* in the other two dependent variables is somewhat bigger: 0.086 in the OLS and 0.145 in the fixed effects and 2SLS fixed effects estimations for *Direct taxes*; 0.110 in OLS, 0.141 in fixed effects and 0.139 in the 2SLS fixed effects regressions for *Indirect taxes*. This effect is also seen in Henninghausen and Heinermann (2014) where education positively affects taxation by influencing social equality norms and leading taxpayers to believe that higher taxes are needed to help less affluent people.

Next we examine the robustness of our main result. For this reason we will run two additional estimations. In the first one we run a regression where we exclude all countries from Africa and the Middle East. In our second regression we use a much smaller sample consisting only of non-OECD countries.

[Table 3a here]

[Table 3b here]

Tables 3a and 3b present the results of our estimations when we exclude countries from Africa and the Middle East. In Table 3a we see that the impact of regional democratization waves which we denote as  $Z_{ct}$  remain statistically significant at a 1% level of in all specifications. Additionally the quantitative effect remains basically the same with our main results in Table 2a with only marginal differences. This result once again verifies the theory of regional waves of democratization developed by Huntington (1991) and the methodology used by Persson and Tabellini (2006) and Acemoglu, Naidu, Restrepo and Robinson (2014).

In Table 3b we see the second stage results for this smaller sample. We find that *Democracy* retains its positive effect in the case of *Direct taxes* and *Tax ratio* at a 1% significance level. When examining the magnitude of the effects we see that it is now bigger in the case of *Direct taxes* being now 0.491 compared to 0.339 in the baseline sample. In the case of *Tax ratio* the difference in the coefficients is much smaller: 0.584 when it was 0.566 in our first regression.

The impact of the control variables remains mostly the same both in the statistical significance level and the magnitude of the coefficients. The only differences we see are that the coefficient of *Public spending* is now positive and statistically significant at a 1% level only in the case of *Direct taxes* and its impact is now greatly reduced at 0.394; much smaller than the 0.631 we see in the main estimation. Also *Elderly* and *Education* now have a positive effect at a 1% significance level in *Tax ratio* and the magnitude of these variables is quite considerable at 0.381 and 0.153 respectively. Finally *Population* no longer has a positive and statistically significant effect on *Tax ratio* like we one we saw in the main results.

[Table 4a here]

[Table 4b here]

Tables 4a and 4b present the estimates for our non OECD regressions. The first stage results in Table shows that the effect of regional waves of democratization remains statistically significant however this time it is statistically significant at a 10% level and not at a 1% level as in our baseline estimations. Additionally we see that the



magnitude is now smaller being 0.229 for *Direct taxes*, 0.211 for *Indirect taxes* and 0.215 for the *Tax ratio* first stage estimations.

Looking at the results of our second stage regressions in Table 4b we find some considerable differences from our main results. *Democracy* now positively affects only *Direct taxes* at a 10% level of statistical significance and additionally we see that it no longer has an impact on *Tax ratio*. However the magnitude of the effect on *Direct taxes* is now nearly three times bigger at 1.227. These results as well as those in Tables 3a and 3b further substantiate the findings of Kenny and Winer (2006) about taxpayer's voluntary compliance in democracies as well as Berry and Berry (1992) and Aidt and Jensen (2009) about regional waves of diffusion of certain tax measures in democracies; both these theories indicate that democratic regimes lead to increases of income taxes on businesses and individuals and in direct taxation in general.

Looking at our control variables we see that *Income* no longer affects *Indirect taxes*, while it affects *Tax ratio* with a much bigger coefficient of 0.579 at a 10% significance level. *Openness* now only affects *Direct taxes* and *Tax ratio* with the coefficients being significant at a 5% and 1% level and with a magnitude of 1.085 and 1.267 respectively. *Investment* has the same effect with our main results but the level of significance is smaller now; 10% for *Direct taxes* and 5% for *Indirect taxes* and *Tax ratio*. *Public spending* now only affects *Direct taxes* at a 10% level of significance and the coefficient is now smaller at 0.416. *Population* still has the same positive effect on *Direct taxes* and *Tax ratio* at a 1% level of significance and the coefficients are now somewhat bigger; 0.323 and 0.471 respectively. Considering the impact of *Elderly* on our tax variables we can see that only *Direct taxes* and *Indirect taxes* are positively impacted with the coefficient in the first case being smaller than the main result (0.441 compared to 0.552) but nearly the same in the second case (0.635 compared to 0.665). Finally *Education* only influences *Indirect taxes* with a coefficient of 0.142 and a 1% level of statistical significance which is almost the same with our main results in Table 2b.

[Table 5a here]

[Table 5b here]

Finally we will examine the consistency of the effect that regional democratization waves have on democracy and consequently on taxation. For this reason we will use, as we see in Acemoglu, Naidu, Restrepo and Robinson (2014), the time lags of the instrumental variable  $Z_{ct}$ . According to this methodology we will first use one and then four time lags and we will examine how persistent the effects of regional democratization waves are.

Tables 5a and 5b show us the results of the 2SLS regression when we use the first lag of the instrumental variable,  $Z_{ct-1}$ . We see that neither  $Z_{ct}$  nor the first lag  $Z_{ct-1}$ , have any statistically significant effect on *Democracy* in all our estimations. Examining the results of the second stage regression we see that the coefficients of *Democracy* as well as our control variables have the same sign and the same statistical significance as in our main estimation in Table 2b, When we look at the magnitude of the coefficients we find that it is basically the same although *Democracy* has a slightly bigger in both *Direct taxes* (0.344 compared to 0.339) as well as in *Tax ratio* (0.587 compared to 0.566).

[Table 6a here]

[Table 6b here]

Finally we want to examine the long run of *Democracy* in taxation by using four time lags of the instrumental variable. The results of our two stage regressions are seen at Tables 6a and 6b. More specifically the first period time lag  $Z_{ct-1}$  as well as the three following time lags  $Z_{ct-2}$ ,  $Z_{ct-3}$  and  $Z_{ct-4}$  do not seem to have any effect on any of our first stage regressions. Concerning the impact of  $Z_{ct}$  we see that it also has no effect in our estimations. This implies that the long run effect of regional waves of democratization is not important for a country's political regime. In Table 6b we present the results of the second stage regression and it appears that our results are the same with those in our main specification as well as the regression where we use one period lag. The only difference is that now *Democracy* affects *Direct taxes* at a 5% statistical significance level instead of 1% like our main regression. The magnitude of the coefficients remains practically the same although it is now slightly smaller for *Direct taxes* and *Tax ratio* at 0.315 and 0.545 respectively. Finally the effect of our control variables remains the same as the one in Table 3b both when it comes to the sign as well as the significance level of the coefficients. These results and the results of Tables 5a and 5b show us that the long-run effect of *Democracy* remains exactly the same as that in the basic estimations and it leads to an increase in *Direct taxes* and *Tax ratio* exactly as we see in the relevant literature such as Kenny and Winer (2006) Berry and Berry (1992) and Aidt and Jensen (2009). However regional waves of democratization do not seem to have a long run effect on a country's political regime.

## 5. Conclusion

To sum up, in order to investigate the relationship between democracy and tax revenues we use the information on the regime of neighboring countries in a geographical area in order to create a measure of regional waves of democratization like the one used by Persson and Tabellini (2006) and Acemoglu, Naidu, Restpero and Robinson (2014) and based on the theory of Huntington (1991). These waves represent the demand or discontent with a given political system in countries which are in the same geographical area. We then use these measure in a two stage fixed effects regression where the democracy index of every country is used as the endogenous variable and the regional index we created as the instrumental variable and try to find the impact of democracy on taxation. Our first stage estimation shows that regional waves of democratization positively affect the demand or discontent for a political regime in a geographical area and consequently positively affect a country's political regime as in Huntington (1991) and Acemoglu, Naidu, Restpero and Robinson (2014). The results of the main estimation also seem to verify the findings of previous research like Kenny and Winer (2006) where direct taxation and the ratio of direct to indirect taxes is positively influenced by democracy in a country due to taxpayers' voluntary compliance observed in democracies. The findings are also similar with Berry and Berry (1992) and Aidt and Jensen (2009) who have shown that when neighbouring countries or states have similar democratic regimes with sufficient suffrage, this leads to regional diffusion waves that help establish or increase certain taxes like income taxation of individuals and corporations. Our results remain the same when using two additional estimations, first by excluding African and Middle Eastern countries and by using a sample comprised by non-OECD

countries only. Finally when examining the long run impact of democracy in taxes we find the same results as in our main regression; however the impact of regional regimes in a country's own political system does not have a statistically significant effect as it did before.

## 6. Appendix

**Table 1: Summary statistics for the main variables**

Variable	Description	Obs.	Mean	Std.Dev.	Min	Max	Source	Expected sign
Direct taxes	Direct tax revenues (%GDP)	1044	11.50	7.21	0	32.79	Calculations based on Profeta, Puglisi and Scabrosetti (2013)	
Indirect taxes	Indirect tax revenues (%GDP)	1036	8.82	4.48	0.43	56.62	Calculations based on Profeta, Puglisi and Scabrosetti (2013)	
Tax Ratio	Ratio of direct to indirect tax revenues(%GDP)	1036	1.82	3.35	0	37.22	Calculations based on Profeta, Puglisi and Scabrosetti (2013)	
Income	GDP per capita	17435.13	17435.13	18534.83	375.14	91593.63	World Bank development indicators	Positive
Openness	Exports plus imports (%GDP)	51.61	51.61	27.88	13.75	204.58	World Bank development indicators	Ambiguous
Investment	Gross capital formation (%GDP)	23.98	23.98	7.19	0.29	67.91	World Bank development indicators	Positive
Public Spending	Public spending (%GDP)	15.95	15.95	4.69	4.36	28.06	World Bank development indicators	Positive
Population	Total population	4.88e+07	4.88e+07	1.34e+08	41836	1.26e+09	World Bank development indicators	Positive
Elderly	Percentage of population above 65 years	10.15	10.15	5.21	2.04	24.28	World Bank development indicators	Positive
Education	Tertiary education enrolment (%gross)	43.43	43.43	23.91	0	110.26	World Bank development indicators	Positive

**Table 2a: 2SLS first stage regression**

	First stage regression- Direct taxes	First stage regression- Indirect taxes	First stage regression- Tax ratio
Z <sub>ct</sub>	0.476*** (0.084)	0.484*** (0.084)	0.486*** (0.085)
Income	0.076*** (0.028)	0.077*** (0.029)	0.077*** (0.028)
Openness	-0.398*** (0.061)	-0.420*** (0.061)	-0.425*** (0.061)
Investment	-0.023 (0.075)	-0.042 (0.075)	-0.048 (0.076)
Public Spending	0.361*** (0.091)	0.372*** (0.090)	0.362*** (0.090)
Population	-0.033* (0.017)	-0.031* (0.017)	-0.031* (0.018)
Elderly	-0.003 (0.074)	0.011 (0.075)	-0.006 (0.074)
Education	-0.052 (0.047)	-0.065 (0.047)	-0.073 (0.047)
<b>R squared</b>	0.187	0.190	0.189
<b>N</b>	1044	1036	1036
<b>F-test</b>	32.02	33.09	33.47

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 2b: OLS and fixed effects regressions**

	OLS- direct taxes	OLS- indirect taxes	OLS- tax ratio	F.E- direct taxes	F.E- indirect taxes	F.E- tax ratio
Democracy	0.011 (0.020)	0.062*** (0.022)	0.120*** (0.031)	0.010 (0.020)	0.062*** (0.022)	-0.049* (0.028)
Income	0.061*** (0.018)	0.204*** (0.020)	0.156*** (0.027)	0.042** (0.018)	-0.211*** (0.020)	0.247*** (0.025)
Openness	0.239*** (0.409)	0.381*** (0.043)	-0.716*** (0.044)	0.266*** (0.041)	0.418*** (0.045)	-0.142** (0.057)
Investment	0.182*** (0.049)	0.151*** (0.053)	-0.006 (0.070)	0.188*** (0.050)	-0.140** (0.054)	0.327*** (0.069)
Public spending	0.756*** (0.060)	0.156** (0.064)	0.165* (0.085)	0.730*** (0.060)	0.154** (0.065)	0.591*** (0.083)
Population	0.135*** (0.011)	0.093*** (0.012)	0.049*** (0.105)	0.135*** (0.011)	-0.090*** (0.012)	0.230*** (0.015)
Elderly	0.618*** (0.045)	0.628*** (0.048)	0.084 (0.068)	0.609*** (0.045)	0.624*** (0.049)	-0.081 (0.062)
Education	0.086*** (0.030)	0.110*** (0.031)	0.093** (0.044)	0.145*** (0.052)	0.141*** (0.033)	0.011 (0.043)
R squared	0.648	0.416	0.365	0.650	0.421	0.448
N	1044	1036	1036	1044	1036	1036
F-test	241.55	93.34	73.66	225.00	83.43	91.10
Wooldridge test				196.77	270.22	183.49

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 2c: 2SLS second stage regression**

	2SLS- Direct taxes	2SLS - Indirect taxes	2SLS - Tax ratio
Democracy	0.339*** (0.132)	-0.180 (0.133)	0.566*** (0.193)
Income	0.230 (0.022)	-0.197*** (0.022)	0.211*** (0.033)
Openness	0.404*** (0.071)	0.311*** (0.075)	0.133 (0.110)
Investment	0.206*** (0.056)	-0.157*** (0.058)	0.375*** (0.085)
Public spending	0.631*** (0.078)	0.228*** (0.079)	0.410*** (0.115)
Population	0.153*** (0.014)	-0.104*** (0.014)	0.265*** (0.021)
Elderly	0.552*** (0.055)	0.665*** (0.056)	-0.116 (0.082)
Education	0.145*** (0.034)	0.139*** (0.035)	0.021 (0.052)
<b>R squared</b>	0.579	0.361	0.275
<b>N</b>	1044	1036	1036
<b>F-test</b>	201.79	83.25	70.24
<b>Wooldridge test</b>	293.64	260.81	185.17
<b>Cragg Donald test</b>	32.02	33.09	33.47
<b>Endogeneity test</b>	8.18	3.88	15.55

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 3a: First stage regression-Excluding African countries**

	First stage regression- Direct taxes	First stage regression- Indirect taxes	First stage regression- Tax ratio
Z <sub>ct</sub>	0.433*** (0.089)	0.447*** (0.090)	0.448*** (0.090)
Income	0.075*** (0.024)	0.077*** (0.024)	0.077*** (0.024)
Openness	-0.449*** (0.051)	-0.453*** (0.051)	-0.453*** (0.051)
Investment	-0.015 (0.066)	-0.020 (0.067)	-0.020 (0.067)
Public Spending	0.581*** (0.080)	0.591*** (0.081)	0.592*** (0.081)
Population	-0.021 (0.014)	-0.019 (0.014)	-0.019 (0.014)
Elderly	-0.322*** (0.068)	-0.322*** (0.069)	-0.332*** (0.069)
Education	0.054 (0.044)	0.051 (0.044)	0.051 (0.044)
<b>R squared</b>	0.238	0.240	0.240
<b>N</b>	894	890	888
<b>F-test</b>	23.54	24.76	24.72

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01



**Table 3b: Second stage regression-Excluding African countries**

	2SLS- Direct taxes	2SLS - Indirect taxes	2SLS - Tax ratio
Democracy	0.491*** (0.164)	-0.018 (0.161)	0.584*** (0.221)
Income	0.031 (0.021)	-0.141*** (0.022)	0.159*** (0.030)
Openness	0.524*** (0.028)	0.384*** (0.088)	0.183 (0.121)
Investment	0.179*** (0.053)	-0.108** (0.054)	0.290*** (0.074)
Public spending	0.394*** (0.116)	0.156 (0.116)	0.211 (0.159)
Population	0.151*** (0.013)	-0.121*** (0.013)	0.282*** (0.018)
Elderly	0.743*** (0.065)	0.387*** (0.065)	0.381*** (0.090)
Education	0.028 (0.037)	0.186*** (0.037)	-0.153*** (0.051)
<b>R squared</b>	0.582	0.439	0.429
<b>N</b>	984	890	888
<b>F-test</b>	166.03	84.45	93.28
<b>Wooldridge test</b>	145.59	321.32	59.64
<b>Cragg Donald test</b>	23.53	24.76	24.72
<b>Endogeneity test</b>	4.88	4.22	3.89

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 4a: First stage regression- Non OECD countries**

	First stage regression- Direct taxes	First stage regression- Indirect taxes	First stage regression- Tax ratio
Z <sub>ct</sub>	0.229* (0.121)	0.211* (0.122)	0.215* (0.122)
Income	-0.247*** (0.071)	-0.246*** (0.071)	-0.244*** (0.071)
Openness	-0.576*** (0.110)	-0.614*** (0.110)	-0.623*** (0.110)
Investment	-0.170 (0.123)	-0.208* (0.124)	-0.212* (0.124)
Public Spending	0.359** (0.159)	0.352** (0.159)	0.337** (0.160)
Population	-0.139*** (0.033)	-0.140*** (0.034)	-0.138 (0.034)
Elderly	0.051 (0.110)	0.050 (0.110)	0.056 (0.110)
Education	0.080 (0.082)	0.063 (0.082)	0.053 (0.082)
<b>R squared</b>	0.135	0.142	0.144
<b>N</b>	498	488	486
<b>F-test</b>	13.58	9.51	13.07

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 4b: Second stage regression-Non OECD countries**

	2SLS- Direct taxes	2SLS - Indirect taxes	2SLS - Tax ratio
Democracy	1.227* (0.718)	-0.047 (0.309)	1.675 (1.052)
Income	0.332 (0.208)	-0.125 (0.098)	0.579* (0.299)
Openness	1.085** (0.476)	0.152 (0.213)	1.267* (0.736)
Investment	0.359* (0.218)	-0.131** (0.097)	0.681** (0.339)
Public spending	0.416 (0.299)	-0.095 (0.121)	0.478 (0.404)
Population	0.323*** (0.122)	-0.071 (0.052)	0.471*** (0.177)
Elderly	0.441*** (0.162)	0.635*** (0.064)	-0.218 (0.223)
Education	0.025 (0.140)	0.142*** (0.053)	-0.124 (0.177)
<b>R squared</b>	0.190	0.109	0.108
<b>N</b>	498	488	486
<b>F-test</b>	11.34	40.04	93.28
<b>Wooldridge test</b>	264.62	211.80	125.62
<b>Cragg Donald test</b>	13.57	9.51	13.07
<b>Endogeneity test</b>	13.99	11.01	17.06

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 5a: 2SLS first stage regression with 1 Lag**

	First stage regression-Direct taxes	stage First stage regression-Indirect taxes	First stage regression-Tax ratio
$Z_{ct}$	0.278 (0.227)	0.294 (0.225)	0.283 (0.226)
$Z_{ct-1}$	0.210 (0.225)	0.202 (0.222)	0.216 (0.223)
Income	0.076*** (0.028)	0.077*** (0.028)	0.078*** (0.028)
Openness	-0.398*** (0.061)	-0.419*** (0.061)	-0.424*** (0.061)
Investment	-0.020 (0.075)	-0.039 (0.075)	-0.045 (0.075)
Public Spending	0.358*** (0.091)	0.370*** (0.090)	0.359*** (0.090)
Population	-0.031** (0.017)	-0.030* (0.017)	-0.029* (0.017)
Elderly	-0.005 (0.074)	-0.013 (0.075)	-0.007 (0.074)
Education	-0.055 (0.047)	-0.069 (0.047)	-0.076 (0.047)
<b>R squared</b>	0.187	0.190	0.189
<b>N</b>	1043	1035	1035
<b>F-test</b>	16.45	16.96	17.21

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5b: 2SLS second stage regression with 1 lag**

	2SLS- Direct taxes	2SLS - Indirect taxes	2SLS - Tax ratio
Democracy	0.344*** (0.131)	-0.196 (0.133)	0.587*** (0.193)
Income	0.022 (0.022)	-0.196*** (0.023)	0.209*** (0.033)
Openness	0.406*** (0.071)	0.304*** (0.075)	0.142 (0.110)
Investment	0.205*** (0.057)	-0.158*** (0.059)	0.375*** (0.086)
Public spending	0.630*** (0.078)	0.232*** (0.080)	0.404*** (0.116)
Population	0.154*** (0.014)	-0.104*** (0.015)	0.226*** (0.021)
Elderly	0.551*** (0.055)	0.668*** (0.056)	-0.120 (0.083)
Education	0.145*** (0.034)	0.139*** (0.035)	0.022 (0.052)
<b>R squared</b>	0.577	0.354	0.268
<b>N</b>	1043	1035	1035
<b>F-test</b>	200.13	82.02	68.74
<b>Wooldridge test</b>	296.40	264.50	189.77
<b>Cragg Donald test</b>	16.45	16.96	17.21
<b>Endogeneity test</b>	8.68	4.54	17.10

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 6a: 2SLS first stage regression with 4 Lags**

	First stage regression-Direct taxes	First stage regression-Indirect taxes	First stage regression-Tax ratio
Z <sub>ct</sub>	0.245 (0.230)	0.260 (0.227)	0.257 (0.229)
Z <sub>ct-1</sub>	0.304 (0.300)	0.286 (0.298)	0.292 (0.298)
Z <sub>ct-2</sub>	-0.157 (0.301)	-0.141 (0.303)	-0.114 (0.303)
Z <sub>ct-3</sub>	-0.219 (0.312)	-0.189 (0.314)	-0.184 (0.314)
Z <sub>ct-4</sub>	0.328 (0.229)	0.290 (0.227)	0.255 (0.227)
Income	0.076* (0.028)	0.077*** (0.028)	0.078*** (0.028)
Openness	-0.398*** (0.061)	-0.419*** (0.061)	-0.424*** (0.061)
Investment	-0.021 (0.076)	-0.040 (0.076)	-0.046 (0.076)
Public Spending	0.356*** (0.091)	0.376*** (0.090)	0.358*** (0.091)
Population	-0.031 (0.017)	-0.029* (0.175)	-0.029* (0.017)
Elderly	-0.007 (0.075)	-0.015 (0.074)	-0.009 (0.075)
Education	-0.054 (0.047)	-0.068 (0.047)	-0.076 (0.047)
<b>R squared</b>	0.188	0.190	0.190
<b>N</b>	1040	1032	1032
<b>F-test</b>	7.05	7.15	7.15

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

**Table 6b: 2SLS second stage regression with 4 Lags**

	2SLS - Direct taxes	2SLS - Indirect taxes	2SLS - Tax ratio
Democracy	0.315** (0.124)	-0.176 (0.128)	0.545*** (0.185)
Income	0.023 (0.021)	-0.198*** (0.022)	0.212*** (0.032)
Openness	0.395*** (0.069)	0.313*** (0.073)	0.124 (0.106)
Investment	0.202*** (0.056)	-0.158*** (0.058)	0.372*** (0.084)
Public spending	0.639*** (0.076)	0.226*** (0.078)	0.417*** (0.113)
Population	0.152*** (0.014)	-0.103*** (0.014)	0.264*** (0.021)
Elderly	0.555*** (0.054)	0.664*** (0.056)	-0.113 (0.081)
Education	0.145*** (0.034)	0.139*** (0.035)	0.021 (0.051)
<b>R squared</b>	0.587	0.363	0.282
<b>N</b>	1040	1032	1032
<b>F-test</b>	205.80	83.08	71.20
<b>Wooldridge test</b>	295.83	266.80	190.27
<b>Cragg Donald test</b>	7.05	7.15	7.15
<b>Endogeneity test</b>	7.81	4.10	15.63

Note: The table presents estimated coefficients with clustered standard errors in parentheses. All estimations are regressed using clustered standard errors. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

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