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Democracy and taxation

Pavlos Balamatsias

Abstract
In this paper, the author argues that democracies increase tax revenues, based on the hypothesis that democracies increase direct and indirect taxes due to increased taxpayers' compliance, diffusion of taxes between democracies and because voters in poor democracies are in favour of import taxes. The author tests this hypothesis using data on 74 countries from 1993 to 2012. His explanatory variable is a dichotomous democracy measure, but he alters his analysis from previous research by assuming that democracy is not an exogenous variable. Instead, he uses the theory of Huntington (*The third wave: Democratization in the late twentieth century*, 1991) and the methodology of Acemoglu et al. (*Democracy does cause growth*, 2014) about democratization waves. According to this theory, democratizations occur in regional waves; consequently, diffusion of demand for or discontent with a political system is easier to happen in neighbouring countries due to economic, political and historical similarities. This measure shows us that demand for or discontent with a given political system in a geographical area, influences a country's political system and its tax choices. Using a 2SLS fixed effects model the author finds that democratization waves positively affect democracy, and in turn democracy increases direct and indirect taxes. These results remain the same using several robustness tests.

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Keywords Democracy; political development; regional democratization waves; taxation

Authors
Pavlos Balamatsias, Department of Economics, University of Ioannina, Ioannina, Greece, pavlosbalamatsias@yahoo.com

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1 Introduction

The role of the political system in a country – with the extremes of democracy and autocracy – has an important implication for all economic decisions that a government makes including taxation and fiscal policy in general. Therefore it comes as no surprise, that the relationship between taxes and democracy has received considerable attention from researchers. Taxation, after all, is the transfer of income and recourses from the citizens to the state so the level and composition of tax revenues, as well as the sources of taxation and the methods used to impose and collect taxes, must be influenced by the political system. Looking back at history, we find a number of examples of revolutions and social uprisings which were caused because of the need for increased and more equal taxation and resulted in regime changes or at least shifts to more accountable forms of government. For example, Hibbert (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 (2014) explains how the Russian Revolution, as well as a number of other uprisings that took place in Tsarist Russia, had their roots on the unequal taxation of peasants and labourers and the exemption of the middle and upper classes from many taxes.

Despite the considerable attention that the link between taxation and democracy has received in the economics literature, authors have so far focused only on how taxation influences a country's political system, following the well-known hypothesis that "taxation causes democratization" (Bates and Lien, 1985; Baskaran, 2014) or on the way in which democracy affects tax rates and tax revenues (Acemoglu and Robinson, 2000, 2005). However, none of these authors has dealt with the possibility that taxation and democracy have a two-way causal relationship, where one variable influences the other and is in turn influenced by it; to the best of our knowledge, this possible two-way causality between democracy and taxation has not been the research subject of any other author in the past as well. It is this gap in the literature that we try to cover with this paper; more specifically we will alter our analysis from that of other authors by analyzing this possible two-way causality and trying to find how it influences tax policies.

In addition to examining the two-way causal relationship between democracy and taxation, this paper will also be contributing to existing theories about the determinants of democracy in a country. In the past authors (Helliwell, 1994; Rodrik, 1999; Persson and Tabellini, 2006; Aidt and Jensen, 2009; Mutascu, 2011) have always treated a country's political system as an exogenous variable, affected by domestic civil and political liberties and economic conditions, or only influenced by the regime of neighboring countries, (Persson and Tabellini, 2009). But we will alter our estimation strategy from that of previous authors by using the methodology of regional waves of democratization seen in Acemoglu et al. (2014) based on the theory of Huntington (1991). This approach differs from the ones mentioned before because we do not treat democracy as an exogenous index or as a variable affected only by democracy in neighbouring countries; instead, we examine how the political system in countries in the same geographical area can create regional waves of demand for or of discontent with a political system. We then use these regional democratization waves to examine how they affect democracy and consequently taxation in a country, using a 2SLS model.

First, this paper focuses on the relevant literature and tries to establish how taxation can lead to democratization and also examines the effect of democracy on taxation. Furthermore we examine some of the most common determinants of taxation and how they interact with the political regime to shape the form and level and sources of taxation.

In our econometric analysis, we examine the equation and the variables we use to find the impact that the political regime has on taxation. As our main reference variable, we employ a dichotomous measure of democracy; but we alter our analysis from that of previous authors by assuming that democracy or autocracy is not an exogenous variable. Instead, we assume that it is influenced by the political system in other countries in the same area. It is the political system in these countries that creates the regional waves of democratization or repression in a geographical area, as in Huntington (1991) and Acemoglu et al. (2014). These regional waves show us the demand for or discontent with a given political system in a geographical area, which in turn influence the power of a country's political regime and subsequently impact on taxation. In order to capture the endogeneity that regional political systems have on a country's own political system and consequently on taxation, we use a two-stage least square (2SLS) fixed effects estimation with data from 74 countries from 1993 to 2012, similar to the methodology seen in Acemoglu et al. (2014). The endogenous variable used is a country's democracy index, which is a single dichotomous variable constructed using data on civil and political liberties from Polity IV and Freedom House; the instrumental variable is an index created by using the jack-knifed average of the democracy index of countries in the same geographical area, which captures the effect that regional waves of democratization have on a country's political regime.

Our results show us 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 in the countries of our sample. This outcome can be explained by the voluntary compliance of taxpayers seen in democracies (Kenny and Winer, 2006), and also by the existence of regional diffusion waves regarding certain tax policies such as the implementation and increase of income taxes on individuals and firms which can be seen in democracies in the same geographical area (Berry and Berry, 1992; Aidt and Jensen, 2009). Democracy also seems to positively correlate with indirect taxes as poor democratic countries tend to rely more on taxes on imported and luxury goods (Moutos, 2001; Adam, 2009). These results remain the same when several robustness tests are used.

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

The link between taxation and democracy is the subject of a large literature in economics. However, authors have a narrow research focus with some of them simply choosing to study how taxation affects democracy, following the well-known hypothesis that "taxation causes democratization" while others only research the way in which democracy influences taxation. It is because of this narrow focus that most authors have not sufficiently studied the possibility that there exists a two-way causality between taxation and democracy where one variable influences the other and is in turn influenced by it. It is this gap in the theoretical and empirical literature that we try to cover with this paper; more specifically we vary our analysis from that of earlier authors by analyzing this two-way causality and trying to find how it influences tax policies. In this section, we look at the relationship between democracy and taxation by reviewing the relevant literature. We also briefly analyze the effect of some other economic variables in taxation.

The "taxation causes democratization" hypothesis has been well established in economics. According to this theory, governments in need of more taxes are forced to make democratic concessions to their citizens. Bates and Lien (1985) use a theoretical model where the elite and taxpayers try to maximize their utility. In this model, governments seeking to collect more funds must offer policy concessions to taxpayers; as a result, increased taxation forces autocracies to make concessions to taxpayers, leading to democratic transitions and to greater democratic representation. Baskaran (2014) empirically studies the effect of taxation on democracy by using the implementation of value added taxes (VAT) and the creation of autonomous revenue authorities (ARA) as measures that increase tax revenues and examines if increased revenues affect a country's political system. Results indicate that both tax measures positively affect tax revenues but only adopting VAT leads to democratic transitions.

According to a number of authors, social unrest caused by widespread poverty leads to democratic transitions, which subsequently increase taxation in order to produce public goods and redistribute wealth. Acemoglu and Robinson (2000, 2005) examine what leads to the establishment and consolidation of democracies. Based on their analysis, political changes are the result of a country's socio-economic conditions. Egalitarian and prosperous countries do not experience regime changes because people are satisfied with the conditions. Additionally, oppressive and unequal societies do not experience changes because elites in these countries can protect their position so the consequences for the poor will be severe if they try to revolt and fail. Only in countries plagued by high inequality where the elite is powerless to punish the population in case of revolt can we see transitions to full democracy which in turn increase taxation in favour of the majority. However, democracy by itself is not enough to ensure increased taxes. Aidt and Jensen (2009) study the history of the adoption of direct income taxation and how it relates to democracy. The authors conclude that direct income taxes increase in a country only if democracy is strong enough and represents the majority of the population through universal suffrage but are reduced in elections years. Furthermore, they find evidence of existence of regional diffusion waves of certain types of taxes such as direct income taxes between democracies in the same geographical area, due to the similarities between these countries. Mutascu (2011) examines the influence that the power of a political regime has on tax revenues and finds that significant tax revenues can only be collected in countries with very

strong democratic (or autocratic) regimes and that countries were the political regime is not very strong, collect fewer tax revenues. On the other hand, Profeta et al. (2013) examine whether democracy affects government choices with regards to taxation and spending in developing countries using a variety of different econometric specifications and their results indicate that politics do not have a significant impact on either taxation or spending.

When it comes to the effect that the political regime has on the type of tax sources governments choose to rely on, the literature suggests that democracy increases both direct and indirect taxes. For instance, Berry and Berry (1992) empirically prove that the adoption and increase of income taxation is more likely to happen in democracies and this possibility becomes greater if neighbouring democratic countries also adopt similar policies. Kenny and Winer (2006) specify what influences the structure and size of tax revenues and find that autocracies rely on indirect taxation, while democracies make greater use of direct taxes because their progressive nature helps governments gain the majority's support and also because direct taxes require cooperation from taxpayers which is easier to achieve in a democracy. Additionally, rich oil reserve countries rely more on indirect taxes on oil production and revenue from nationalized oil operations than on direct taxes. Moutos (2001) and Adam (2009) examine why developing countries levy high indirect taxes on trade. Both authors indicate that poorer democracies choose to impose indirect taxes on international trade because poor people do not buy luxury and imported goods and vote in favour of such taxes.

Government spending also plays an important part on taxation choices because individuals and firms demand public goods and investments. Meltzer and Richard (1981, 1983) examine the way majority rule voting and redistributive needs affect taxation and public spending. Their results using a general equilibrium model indicate that in democracies, the need for redistribution, in order to lower inequality and increase per capita incomes, raises taxes and spending. Additionally, extensions of the political franchise, in the form of increased democratization or population growth also raise taxes and spending. Boix (2001) using both a theoretical model as well as empirical specifications concludes that direct taxation increases as the economy grows in order to redistribute funds as well as provide public goods which can increase output; however these results are only possible in democracies where large segments of the population belong in the middle class and vote in favor of such policies.

There is also substantial literature investigating how economic integration interacts with democracy. Theoretically, the relationship is ambiguous. Schulze and Ursprung (1999) conduct a survey of the literature studying how globalization and political regimes affect fiscal policy. According to the survey, globalization has two possible effects: The first is the efficiency effect which states that increased economic integration lowers government expenditures, particularly welfare spending, and taxation because these policies tend to erode a country's capital base. The second is the compensation effect which states that globalization and the risks associated with it, increase demand for welfare programs and taxes. Empirical results show that high capital taxes are still levied worldwide; however, a downward trend has been observed. In addition, labour taxes, or at least their contribution to revenues, have increased. Finally, political regimes and ideology still influence fiscal policies due to risks associated with capital mobility and the subsequent loss of jobs which require increased taxes in order to minimize these negative effects.

Finally, several studies have established a link between certain social indicators such as a country's educational attainment, and taxes. Mutascu and Danuletiu (2013) empirically prove that increased educational attainment and literacy positively influence taxation because more educated individuals demand greater quantities of public goods and are willing to pay higher taxes for them. Also, Hennighausen and Heinemann (2015) empirically analyze what determines tax preferences. Findings indicate that people with high incomes prefer more progressive tax systems because they do not simply care about their financial situation but also about social fairness. This fairness preference is positively affected by factors such as education and beliefs on social mobility and inequalities.

3 Data and methodology

3.1 Data

The dependent variable that we 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 et al. (2013):

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

Personal income taxes are 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 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.

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

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:

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

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 we first need to clarify exactly how we measure this variable. Previous research (Helliwell, 1994; Rodrik, 1999; Persson and Tabellini, 2006;, Aidt and Jensen, 2009; Mutascu, 2011) treats a country's political system as an exogenous variable which is only affected by civil and political liberties as well as economic conditions (such as wealth and inequality) within a single country and unaffected by the conditions in other countries. Among the few authors who have examined how political regimes in other countries can affect a country's own political system, Persson and Tabellini (2009) use neighbours' inverse distance-weighted democracy indexes to control for transitions in and out of democracy.

The empirical strategy that we use is different from those used by other authors because of the assumptions we make about democracy. More specifically, we use the theory of Huntington (1991) and the methodology of Acemoglu et al. (2014) about regional waves of democratization. According to this theory, democratization or reversals to autocracy occur in regional waves because countries in the same region have common historical backgrounds, close economic, political and cultural ties, and face similar problems. Therefore the diffusion of demand for or discontent with a political system is much easier to happen in countries in the same geographical area. These regional patterns reflect the diffusion of a political regime across countries and have a clear impact on the strength of a political regime. Historical examples include the democratic transitions in Eastern Europe, Central Asia and Africa which happened after the fall of the Soviet Union in 1990 or the many dictatorships in Europe during the 1930s. Based on this theory, we construct a single dichotomous variable used to define a country as democratic or autocratic; we also construct a variable for each country based on the jack-knifed average of the democracy index of all other countries in the same geographical area which captures the effect that the political system of countries in the same area has on a country's political system. We then use this jack-knifed average as the instrumental variable in a 2SLS estimation and examine its impact on a country's political regime and consequently on taxation. This econometric technique has not been sufficiently used in examining the relationship between democracy and taxes before.

Following Acemoglu et al. (2014) we use data from the Polity IV project and Freedom House. We use these two datasets as they are the most complete in terms of the number of countries and timeline covered, but more importantly because they use a number of different components meant to illustrate the institutional variations in each country. The components which Polity IV uses 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. Freedom House uses an index related to the protection of civil and political rights in a country.

Next, we document the institutional variations which Polity IV and Freedom House use in order to define a country's political system as democratic or autocratic. The methodology used by these two datasets defines democracy as an institutional arrangement within every country that comprises several components. According to Polity IV, the institutional components which define a country's political system as democratic or autocratic are the following:

Free elections 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 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 in a country is. Constraints on the power of the executive are defined legal and political limitations on the executive power of a government and its chief executive. This index also takes scores from 1 to 8 where higher scores mean greater limitations to executive power. Finally, inclusive politics means 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.

Based on the scores which countries receive in these four different categories, countries are given a Polity score within the range of –0 to +10, with negative values given to autocracies and positive values given to democracies. Countries in the middle of political transitions or at war are given a score of 0.

Freedom House differentiates countries as democratic or autocratic based on an index of civil liberties and an index of political which take scores from 1 to 7. These indexes are based on scores which countries receive on political and electoral pluralism, government functions, freedom of expression, rule of law personal rights and associational rights. Countries with a score from 1–2 and 3–5 on both indexes are denoted as having a status of "Free" or "Partly Free" while countries with ratings of 6-7 are denoted as "Not Free".

Based on the datasets of Polity IV and Freedom House and on Acemoglu et al. (2014) we build a measure of the political regime $Dct \in \{0,1\}$ for a country c on time t. More specifically the political system in a country is defined as autocratic or democratic by employing a single dichotomous variable $Dct \in \{0,1\}$ 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 according to the following specification:

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

Finally, in order to test the robustness of our estimation technique we also employ a continuous rather than a dichotomous variable in order to denote a country as democratic or autocratic. For this reason, we simply employ the Polity IV scores as our democracy index. Using this dataset, we code a country c in year t as democratic if it has a value between 1 and 10 in Polity IV ($Dct \in \{1,10\}$). Countries given a value of -1 to -10 in the Polity IV dataset are coded as autocratic ($Dct \in \{-1, -10\}$).

3.3 Control variables

In order to ensure that we have robust econometric identification in our results we 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 effect on tax rates aside from the political regime. Data for the control variables we use come from the World Bank World Development

Indicators (WDI). We also use simple historical data based on election dates and the political history of our sample countries in order to construct two of our dummy control variables.

More specifically we use data on GDP per capita (*income*), expressed in constant 2010 US$ prices. This variable allows us to control for the overall productivity and wealth in an economy and how this affects tax rates. The expect the effect of this variable to be positive for *direct taxes*, and negative for *indirect taxes* because higher per capita income is associated with increased direct taxation and lower indirect taxes as percentage of GDP

In addition we use data on economic integration (*openness*) by using the sum of imports and exports as percentage of GDP. Moreover, to examine the effect of globalization under different political regimes we will use a combined variable made by the product of our democracy index and our *openness* variable (*democracy x openness*). The effect of these two variables on taxation is ambiguous, depending on whether the "efficiency effect" or the "compensation effect" prevails. In the first case we expect lower taxation so that governments can attract investments. However, if the compensation effect is dominant this will lead to increased government expenditure for social security expenses due to the risks associated with increased economic integration and therefore increased taxation.

An additional dataset which we make use of is that of government spending as percentage of GDP (*public spending*).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. We expect a positive relationship between this variable and 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 control for the population of a country (*population*). We expect that population will have a positive effect on taxation, particularly direct taxes since a part of them are social contributions and increases in population mean increased redistributive needs.

Furthermore, we use data on higher education enrolment as percentage of the whole population (*education*). We believe that this variable will have a statistically significant effect on our taxation variables since increased educational attainment makes people more accepting of increased taxes in order to provide redistribution for less affluent citizens.

Finally we make use of three dummy variables in our estimations: *Socialist* a dummy variable equal to 1 if a country was a former socialist state and 0 otherwise, *elections* which is equal to 1 in year t if a country holds elections in this year and equal to 0 otherwise and *oil exporter* which gives a value of 1 if a country collects revenues from oil equal to 30% of GDP or higher and 0 otherwise, (Fearon and Laitin, 2003). We expect that these three dummy variables will have a negative impact on our taxation variables.

3.4 Descriptive statistics and correlation matrix

Table 1 presents the descriptive statistics for our dependent and our independent control variables. Table 2 is the correlation matrix of our variables.

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)	1392	11.50	7.21	0	32.79	Calculations based on Profeta et al. (2013)	
Indirect taxes	Indirect tax revenues (%GDP)	1387	8.82	4.48	0.43	56.66	Calculations based on Profeta et al. (2013)	
Tax ratio	Direct/ indirect taxes	1376	1.82	3.35	0	37.22	Calculations based on Profeta et al. (2013)	
Democracy	Democracy index dummy	1480	0.864	0.341	0	1	Calculations based on Acemoglu et al. (2014)	Positive
$Democracy_{(polity)}$	Polity IV index	1400	6.52	5.56	-10	10	Polity IV dataset	Positive
Zct	Jack-knifed average of democracy index	1480	0.865	0.161	0.363	1	Calculations based on Acemoglu et al. (2014)	Positive
Zct_{polity}	Jack-knifed average of Polity IV index	1400	6.62	3.03	-1.2	9.51	Calculations based on Acemoglu et al. (2014)	Positive
Income	GDP per capita	1463	17435.13	18534.83	375.14	91593.63	World Bank development indicators	Positive
Openness	Exports plus imports(%GDP)	1468	51.61	27.88	13.75	204.58	World Bank development indicators	Ambiguous
Openess x Democracy	Product of Openness and Democracy	1468	51.61	27.88	0	204.58		Ambiguous
Public Spending	Public spending (%GDP)	1463	15.95	4.69	4.36	28.06	World Bank development indicators	Positive
Population	Total population	1480	4.88e+07	1.34e+08	41836	1.26e+09	World Bank development indicators	Positive
Education	Tertiary education enrolment (%gross)	1118	43.43	23.91	0	110.26	World Bank development indicators	Positive
Socialist	Socialist dummy	1480	0.206	0.404	0	1	Historical data	Negative
Election	Election year dummy	1480	0.239	0.426	0	1	Historical data	Negative
Oil exporter	Major oil exporter dummy	1480	0.999	0.027	0	1	World Bank development indicators	Negative

Table 2: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1.00															
2	0.28	1.00														
3	0.19	-0.35	1.00													
4	0.29	0.06	0.03	1.00												
5	0.42	0.08	0.09	0.81	1.00											
6	0.44	0.32	0.10	0.31	0.43	1.00										
7	0.50	0.36	0.05	0.31	0.43	0.93	1.00									
8	0.47	0.13	0.24	0.23	0.36	0.30	0.37	1.00								
9	-0.09	0.24	-0.23	-0.24	-0.23	-0.01	0.02	-0.03	1.00							
10	0.18	0.21	-0.16	0.61	0.52	0.21	0.22	0.13	0.51	1.00						
11	0.62	0.29	0.01	0.27	0.34	0.36	0.42	0.42	-0.02	0.26	1.00					
12	-0.16	-0.31	0.21	0.01	0.02	-0.19	-0.14	-0.12	-0.26	-0.22	-0.23	1.00				
13	0.49	0.23	0.24	0.19	0.36	0.42	0.52	0.56	-0.04	0.12	0.46	-0.16	1.00			
14	0.06	0.13	-0.11	0.04	0.05	0.17	0.20	-0.36	0.14	0.19	0.14	-0.14	0.05	1.00		
15	0.04	-0.01	0.01	0.06	0.06	0.01	0.02	0.02	-0.02	0.03	0.04	-0.01	0.01	0.01	1.00	
16	-0.25	-0.26	0.09	-0.38	-0.35	-0.14	-0.15	-0.09	-0.03	-0.33	-0.20	0.28	-0.09	-0.09	-0.01	1.00

Notes: 1=Direct taxes, 2=Indirect taxes, 3=Tax ratio, 4= Democracy, 5=Democracy(polity), 6=Zct, 7=Zctpolity, 8=Income, 9=Openness, 10= Openness x Democracy, 11= Public spending, 12= Population 13,= Education, 14=Socialist, 15=Elections, 16= Oil exporter

3.5 Econometric model

In order to examine the impact of the political regime on democracy, we use a similar approach to Acemoglu et al. (2014). More specifically we use a two-stage least squares (2SLS) regression. In the first stage, we run an instrumental variables (IV) regression where the endogenous variable is the political regime (Democracy) in a country, and the instrumental variable is the jack-knifed average of democracy of countries in the same geographical area. In the second stage equation, we use the results of the first stage to estimate the effect of democracy on the tax revenues as a percentage of GDP by running a panel data regression. We construct a panel dataset that consists of 74 countries from 1993 to 2012. All data that we use are expressed in logarithmic form except for the dummy variables.

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 et al. (2015):

$$Taxrevenuect = \alpha o + \beta 1 Democracyct\text{-}1 + \beta it Controlsct\text{-}1 + \gamma c + \delta t + \varepsilon ct \quad (1)$$

where $Taxrevenue_{ct}$ represents interchangeably direct income tax revenue, indirect income tax revenue, and the ratio of direct to indirect tax revenues of country c for the time period t–1.

$Democracy_{ct\text{-}1}$ is the democracy index of country c time for the time period t–1. $Controls_{ct\text{-}1}$ stands for the set of control variables of country c for the time period t–1. We also control for country and time effects which are denoted respectively by γ_c and δ_t. Finally ε_{ct} is the error term and α_o our constant.

In order to properly capture the effect of democracy on tax revenues, we employ an instrumental variables (IV) estimation. The reason we are using this specific method is that, as we have seen in Bates and Lien (1985), Baskaran (2014) and also in Acemoglu and Robinson (2000, 2005) taxation can bring transitions to democracy and at the same time democratic transitions can bring increases in taxation. Therefore it is safe to assume that these two variables have a two-way causal relationship between them where both of them influence and can be influenced by the other.

For the reasons stated above, and in order to properly examine the impact of Democracy in taxation, which is our main explanatory variable, we make use of the methodology of Acemoglu et al. (2014). Following this methodology, we use the regional waves of democratization and the regional transitions to autocracies 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 the country's democracy index at the start of our sample, D_{ct0} to denote this country's political regime (democracy or autocracy). 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 define the regional influence to democratize that country c faces, Z_{ct} with the following equation:

$$Z_{ct} = \frac{1}{|I_c|} \sum_{c' \in Ic} D_{c't} \tag{2}$$

Where Zct 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 in the same geographical area by creating diffusion of demand for or discontent with a political system.

Using (2) time lagged by one period gives us our first stage equation we will use:

$$Democracy_{ct-1} = \phi_j Z_{ct-1} + u_{ct-1} \tag{3}$$

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

$$\begin{aligned} Taxrevenue_{ct} &= \alpha_o + \beta_1 Democracy_{ct\text{-}1} + \beta_{it} Controls_{ct\text{-}1} + \gamma_c + \delta_t + \varepsilon_{ct} \\ Democracy_{ct-1} &= \phi_j Z_{ct-1} + u_{ct-1} \end{aligned} \tag{4}$$

4 Results

The sample that we use consists of 74 countries from 1993 to 2012. All of our regressions have been made using robust 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 (F.E.) regression, a generalized method of moments (GMM) regression and a two stage least square (2SLS) fixed effects regression 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*.

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. Finally we want to ensure that our instrumental variables have not direct effect on our dependent variables, in other words we want to ensure that there exists no imperfect exogeneity. This can be easily tested if, Following Baum (2008) we simply include our instrumental variable as a repressor both in our OLS and in our fixed effects estimations. We find that $Z_{ct\text{-}1}$ does not affect any of our dependent variables in the OLS estimations and only affects Direct taxes at a 10% significance level in the fixed effects regressions but with a very small coefficient of 0.025; therefore we can safely conclude that imperfect exogeneity is not an important problem in our analysis.

In the following tables we present our estimation results. Each one of the columns presents the results when the dependent variable is respectively *Direct taxes*, *Indirect taxes* and *Tax ratio*. We begin our analysis by estimating the OLS and the fixed effects (F.E.) estimators for each one of our dependent variables interchangeably. Following that we run a GMM estimation. We then run a 2SLS fixed effects regression, which we present in two tables; the first table gives us the results of the first stage regression and the second table the results of our second stage regression. We begin with Table 3, which gives us the results of our OLS and fixed effects regressions.

Table 3: 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$_{-1}$	0.010 (0.020)	0.150*** (0.053)	-0.167*** (0.057)	0.023 (0.044)	0.146*** (0.053)	-0.156*** (0.058)
Z_{ct-1}	0.171 (0.136)	0.197 (0.162)	-0.021 (0.173)	0.025* (0.136)	0.268 (0.172)	0.007 (0.183)
Income$_{-1}$	0.286*** (0.021)	-0.210*** (0.020)	0.497*** (0.027)	0.280** (0.021)	-0.215*** (0.026)	0.496*** (0.028)
Openness$_{-1}$	0.127*** (0.042)	0.297*** (0.050)	-0.194*** (0.054)	0.142*** (0.043)	0.308*** (0.052)	-0.195*** (0.057)
Openness X Democracy$_{-1}$	-0.050* (0.025)	0.006 (0.030)	-0.037 (0.033)	-0.055** (0.025)	0.003 (0.031)	-0.043 (0.069)
Public spending$_{-1}$	0.618*** (0.060)	0.687*** (0.072)	-0.063 (0.077)	0.629*** (0.060)	0.691*** (0.073)	-0.055 (0.083)
Population$_{-1}$	0.090*** (0.011)	-0.098*** (0.014)	0.197*** (0.015)	0.092*** (0.011)	-0.096*** (0.014)	0.197*** (0.015)
Education$_{-1}$	-0.010 (0.312)	0.155*** (0.037)	-0.176*** (0.040)	-0.001 (0.035)	0.169*** (0.021)	-0.183*** (0.045)
Socialist$_{-1}$	0.146*** (0.017)	-0.055*** (0.031)	0.211*** (0.022)	0.142*** (0.017)	-0.059*** (0.021)	0.210*** (0.023)
Elections$_{-1}$	-0.005 (0.013)	0.002 (0.016)	-0.009 (0.017)	-0.006 (0.013)	0.001 (0.016)	-0.009 (0.017)
Oil exporter$_{-1}$	-0.205 (0.183)	0.078 (0.219)	-0.277 (0.232)	-0.195 (0.184)	0.083 (0.223)	-0.278 (0.236)
R squared	0.590	0.362	0.493	0.590	0.361	0.493
N	979	973	967	979	973	967
F-test	99.19	38.82	66.27	98.71	38.09	64.61
Wooldridge test				191.795	233.459	42.67

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

Table 4: GMM regressions

	GMM regression-Direct taxes	*GMM regression-Indirect taxes*	GMM regression-Tax ratio
$Taxes_{-1}$	0.501*** (0.041)	0.453*** (0.036)	0.394 (0.045)
$Taxes_{-2}$	0.049 (0.033)	0.013 (0.029)	0.064 (0.031)
$Democracy_{-1}$	0.073 (0.188)	0.129 (0.206)	0.144 (0.240)
$Democracy_{-2}$	0.066** (0.030)	0.043* (0.027)	-0.001 (0.031)
$Income_{-1}$	0.192*** (0.071)	-0.038 (0.059)	0.395 (0.066)
$Openness_{-1}$	0.113 (0.109)	0.079 (0.109)	0.140 (0.127)
Openness X $Democracy_{-1}$	-0.051 (0.113)	-0.065 (0.121)	-0.100 (0.140)
$Public\ spending_{-1}$	0.107** (0.065)	0.058 (0.056)	0.018 (0.062)
$Population_{-1}$	-0.254 (0.229)	-0.305 (0.213)	0.122 (0.239)
$Education_{-1}$	-0.013 (0.048)	0.070* (0.038)	-0.119*** (0.140)
$Socialist_{-1}$	-0.043 (0.035)	0.014 (0.032)	-0.059 (0.043)
$Elections_{-1}$	0.002 (0.003)	0.001 (0.003)	0.001 (0.003)
Oil $exporter_{-1}$	0.011 (0.054)	0.107** (0.045)	-0.100** (0.049)
N	752	753	745
Wald test	305.10	285.30	292.99
Arellano-bond AR(1) test	-13.14	-12.74	-9.982
Arellano-bond AR(2) test	-0.022	0.615	0.916

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

In Table 3 we see that *Democracy* positively affects *Indirect taxes* at a 1% significance level, while Direct taxes seem to be unaffected by this index. Also, *Democracy* has a negative effect on *Tax Ratio* which is again significant at a 1% level. The magnitude of the coefficients is also quite big, being 0.150 for *Indirect taxes* and 0.167 for *Tax ratio*. We also find evidence that regional democratization waves, presented here by our variable Zct_{-1} do not have a direct impact on tax policies; the only exception being the positive effect they have on *Direct taxes*. Still, the magnitude of this coefficient is very small, only 0.025 so their direct effect on taxation is not very important. Looking at the impact of our control variables, we find that they are mostly what we expected them to be, in line with the relevant literature

Table 4 gives us the results of our GMM estimation. We used two-period time lags for our democracy index and also for our tax index in order to deal with issues of autocorrelation. The main finding in this estimation is that our democracy index when time lagged for two periods ($Democracy_{-2}$) has a positive impact on Direct taxes at a 5% significance level, as well as on Indirect taxes at a 10% significance level; however the size of the coefficients is very small being 0.066 and 0.043 respectively. Furthermore, past taxation, presented here by the $Taxes_{-1}$ seems to have a significant impact on current tax policies. More specifically we can see that $Taxes_{-1}$ positively affects *Direct taxes*, as well as *Indirect taxes* both at a 1% significance level. The size of the coefficients is also very big being 0.501 for *Direct taxes* and 0.453 for *Indirect taxes* respectively. When it comes to our control variables we find that not many of them actually have an effect on our tax variables.

Our main findings are given in Tables 5a and 5b, where we present the results of our 2SLS estimation in which we used our regional waves of democratization index as our instrumental variable. We begin with our first stage estimation, given in Table 5a and then we move on to our second stage results in Table 5b.

Looking at the results in Table 5a we see that the impact of regional democratization waves is statistically significant at a 1% level in all three of our specifications, being 0.061 for *Direct taxes*, 0.062 for *Indirect taxes* and 0.065 for *Tax ratio*. This result indicates that regional waves of democratization have a positive and highly significant effect on a country's political system; a result which appears to be in accordance with the theory of Huntington (1991) as well as the methodology used by Acemoglu et al. (2014) about the positive impact of regional waves of democratization on a country's political regime.

In Table 5b we present our second stage results. The most important finding is that *Democracy* has a positive effect in the case of *Direct taxes* at a 1% significance level, having a very big coefficient of 4.121. *Indirect taxes* are also positively affected by *Democracy* at a 1% significance level with the coefficient being even bigger, at 4.855. These results are in line with the theory, as well as previous empirical studies which conclude that direct taxes are higher in democracies for reasons such as the increased voluntary compliance of taxpayers (Berry and Berry, 1992) and because of regional waves of diffusion of direct taxation between neighbouring democracies (Kenny and Winer, 2006; Aidt and Jensen, 2009). Furthermore our results are line with the theories about the importance of indirect taxes in poorer democracies (Moutos, 2001; Adam, 2009).

Table 5a: 2SLS first stage regression

	First stage regression-Direct taxes	*First stage regression-Indirect taxes*	First stage regression-Tax ratio
Z_{ct-1}	0.061*** (0.111)	0.062*** (0.107)	0.065*** (0.106)
$Income_{-1}$	-0.011** (0.004)	-0.008* (0.004)	-0.006 (0.004)
$Openness_{-1}$	-0.450*** (0.008)	-0.460*** (0.008)	-0.461*** (0.008)
Openness X $Democracy_{-1}$	0.574*** (0.002)	0.571*** (0.002)	0.570*** (0.002)
$Public\ spending_{-1}$	-0.025* (0.013)	-0.027*** (0.012)	-0.029** (0.012)
$Population_{-1}$	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)
$Education_{-1}$	0.022*** (0.007)	0.010 (0.007)	0.006 (0.007)
$Socialist_{-1}$	-0.018** (0.003)	-0.015*** (0.003)	-0.014*** (0.003)
$Elections_{-1}$	0.001 (0.003)	0.001 (0.002)	0.001 (0.002)
$Oil\ exporter_{-1}$	0.023 (0.041)	0.019 (0.039)	0.018 (0.039)
N	982	976	970
F-test	30.78	34.42	37.83

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

Table 5b: 2SLS second stage regression

	Second stage regression-Direct taxes	*Second stage regression-Indirect taxes*	*Second stage regression-Tax ratio*
Democracy$_{-1}$	4.121*** (1.057)	4.855*** (1.210)	-0.511 (0.980)
Income$_{-1}$	0.326*** (0.029)	-0.167*** (0.033)	0.483*** (0.027)
Openness$_{-1}$	1.988*** (0.484)	2.477*** (0.566)	-0.355 (0.460)
Openness X Democracy$_{-1}$	-2.412*** (0.610)	-2.700*** (0.694)	0.171 (0.047)
Public spending$_{-1}$	0.737*** (0.085)	0.812*** (1.004)	-0.053 (0.085)
Population$_{-1}$	0.048*** (0.017)	-0.147*** (0.020)	0.204*** (0.016)
Education$_{-1}$	-0.091 (0.056)	0.114** (0.075)	-0.171*** (0.562)
Socialist$_{-1}$	0.214*** (0.026)	0.016 (0.029)	0.200*** (0.024)
Elections$_{-1}$	-0.011 (0.017)	-0.005 (0.020)	-0.009 (0.017)
Oil exporter$_{-1}$	-0.293 (0.243)	-0.014 (0.281)	-0.264 (0.236)
N	982	976	970
F-test	79.82	33.22	89.64
R-squared	0.291	0.172	0.484
Endogeneity test	22.07	19.55	4.50
Cragg-Donald test	30.77	34.24	37.82
Woolridge test	191.795	233.459	42.67

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

Concerning the rest of our independent variables, we observe that they affect taxation as predicted by the relevant literature. More specifically, *Income* positively affects *Direct taxes* and *Tax ratio*, while it decreases *Indirect taxes* all at a 1% significance level indicating that countries with wealthier individuals rely more on direct taxes. Also, trade integration increases taxes; but when controlling for both trade openness and democracy, (*OpennessxDemocracy*), we find that they have a negative effect on both *Direct taxes* and *Indirect taxes* at a 1% level of statistical significance with coefficients of –2.412 and –2.700 respectively, in line with the theory that increased globalization reduces taxes. The variables of government spending, population, education also perform as we expected them to; however our dummies for elections and the size of oil exports do not seem to have any impact on tax variables while our dummy variable about a country's socialist origins has a positive and statistically significant effect at a 1% level on *Direct taxes* (0.214) and *Tax ratio* (0.200).

Next, we examine the robustness of our main result. For this reason, we will run three additional estimations. In the first one, we run a regression where instead of a dichotomous democracy index we use a continuous one, in this case, the Polity IV scores for our sample countries. In the second regression, we exclude all countries from Africa and the Middle East. Finally, in the third regression, we use a much smaller sample consisting only of non-OECD countries.

Tables 6a and 6b present the estimates when using our continuous index for the regional waves of democratization. The first stage results in Table 6a shows that the effect of regional waves of democratization remains statistically significant at a 1% level as in our baseline estimations. Additionally we see that the magnitude is now bigger, being 0.197 for *Direct taxes*, 0.200 for *Indirect taxes* and 0.203 for *Tax ratio* first stage estimations.

Looking at the results of our second stage regressions in Table 6b we find some considerable differences from our main results. Although *Democracy* still positively affects *Direct taxes* and *Indirect taxes* at a 1% level of statistical significance we also see that it has an impact on *Tax ratio*. Furthermore, the coefficient size on all estimations is much smaller now, being 0.077 for *Direct taxes*, 0.126 for *Indirect taxes* and 0.046 for *Tax ratio*. Despite these differences, these results further substantiate the theory that regional waves of democratization have a positive effect on a country's political system as Huntington (1991) and in Acemoglu et al. (2014). They also verify our hypothesis that regional waves of democratization do not simply affect democracy in a country but through it also have an indirect and positive influence on tax revenues. The size of our coefficients on Table 6b also verifies the hypothesis of Kenny and Winer (2006) about taxpayer's voluntary compliance in democracies, Berry and Berry (1992) and Aidt and Jensen (2009) about regional waves of diffusion of direct taxes between democracies as well as the theory that poorer democratic countries use more indirect taxes, as seen in Moutos (2001) and Adam (2009).

The results of Tables 7a and 7b are extracted when we exclude North African and Middle-Eastern countries from our sample. The results of Table 7a show us that even in this smaller sample, regional democratization waves, ($Z_{ct\text{-}1}$) still have a positive and statistically significant effect on our democracy index. However, when looking at the impact of *Democracy* on tax revenues it seems that the political system no longer has any effect on taxation. Furthermore,

Table 6a: 2SLS first stage regression- Alternative Z_{ct} variable

	First stage regression-Direct taxes	*First stage regression-Indirect taxes*	*First stage regression-Tax ratio*
$Zct\text{-}1_{polity}$	0.197*** (0.040)	0.200*** (0.040)	0.203*** (0.040)
$Income_{-1}$	2.423** (0.330)	2.341*** (0.329)	2.353*** (0.331)
$Openness_{-1}$	-6.564*** (0.566)	--6.345*** (0.565)	-6.326*** (0.570)
Openness X $Democracy_{-1}$	6.329*** (0.186)	6.349*** (0.185)	6.381*** (0.186)
$Public\ spending_{-1}$	-1.846** (0.892)	-1.672* (0.885)	-1.792** (0.894)
$Population_{-1}$	0.123 (0.174)	0.207 (0.174)	0.205 (0.174)
$Education_{-1}$	0.414 (0.531)	0.661 (0.531)	0.690 (0.538)
$Socialist_{-1}$	0.646** (0.271)	0.646** (0.271)	0.655** (0.272)
$Elections_{-1}$	0.242 (0.200)	0.187 (0.198)	0.195 (0.199)
$Oil\ exporter_{-1}$	0.231 (2.734)	0.358 (2.705)	0.378 (2.710)
N	967	961	955
F-test	23.86	24.96	25.43

OpennessxDemocracy seems to have a negative effect only on *Indirect taxes* at a 1% level of statistical significance with a coefficient of –1.847, while the impact of the rest of our explanatory variables is the same as before. These results seem to indicate that taxation in countries with more mature and older politico-economic systems is not influenced by democracy or autocracy but rather by economic and social indicators, casting doubt on the main theoretical assumption we make about the influence of democracy on taxation, yet at the same time our hypothesis about the impact of regional waves of democratization on a country's regime still remains valid.

Table 6b: 2SLS second stage regression - alternative Z_{ct} variable

	Second stage regression-Direct taxes	*Second stage regression-Indirect taxes*	*Second stage regression-Tax ratio*
Democracy$_{-1polity}$	0.077*** (0.019)	0.126*** (0.028)	-0.046** (0.019)
Income$_{-1}$	0.062*** (0.061)	-0.552*** (0.087)	0.611*** (0.058)
Openness$_{-1}$	0.653*** (0.141)	1.049*** (0.199)	-0.402*** (0.133)
Openness X Democracy$_{-1}$	-0.528*** (0.129)	-0.728*** (0.188)	0.174 (0.126)
Public spending$_{-1}$	0.741*** (0.095)	0.898*** (0.138)	-0.053 (0.085)
Population$_{-1}$	0.083*** (0.016)	-0.123*** (0.025)	0.157* (0.094)
Education$_{-1}$	-0.007 (0.053)	0.085 (0.082)	-0.120** (0.056)
Socialist$_{-1}$	0.066** (0.031)	-0.182*** (0.047)	0.255*** (0.031)
Elections$_{-1}$	-0.025 (0.019)	-0.020 (0.028)	-0.002 (0.019)
Oil exporter$_{-1}$	-0.196 (0.263)	0.044 (0.385)	-0.247 (0.261)
N	967	961	951
F-test	60.66	18.45	71.45
R-squared	0.098	0.097	0.365
Endogeneity test	27.04	50.64	6.10
Cragg-Donald test	23.85	24.95	25.42
Woolridge test	219.008	208.274	45.64

Table 7a: First stage regression - excluding African countries

	First stage regression-Direct taxes	*First stage regression-Indirect taxes*	*First stage regression-Tax ratio*
Z_{ct-1}	0.025*** (0.009)	0.025*** (0.009)	0.025*** (0.009)
$Income_{-1}$	-0.006** (0.003)	-0.006** (0.003)	-0.006** (0.003)
$Openness_{-1}$	-0.494*** (0.005)	-0.494*** (0.005)	-0.494*** (0.005)
Openness X $Democracy_{-1}$	0.542*** (0.002)	0.542*** (0.002)	0.542*** (0.002)
Public $spending_{-1}$	-0.027*** (0.009)	-0.027*** (0.009)	-0.027*** (0.009)
$Population_{-1}$	0.004** (0.001)	0.003* (0.001)	0.003** (0.001)
$Education_{-1}$	0.007 (0.005)	0.007 (0.005)	0.007 (0.006)
$Socialist_{-1}$	-0.012*** (0.002)	-0.012*** (0.002)	-0.012*** (0.002)
$Elections_{-1}$	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Oil $exporter_{-1}$	0.004 (0.025)	0.004 (0.025)	0.004 (0.026)
N	854	850	848
F-test	7.08	6.70	6.67

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

Finally, we make use of a much smaller sample, comprised of non-OECD countries, the results of which are given in Tables 8a and 8b. The first stage results in Table 6a shows that the effect of regional waves of democratization remains statistically significant at a 1% level as in our baseline estimations. Additionally, we see that the magnitude is somewhat bigger compared to our baseline estimation, being 0.084 for *Direct taxes*, 0.084 for *Indirect taxes* and 0.083 for *Tax ratio* first stage estimations.

Table 7b: Second stage regression-Excluding African countries

	Second stage regression-Direct taxes	*Second stage regression-Indirect taxes*	*Second stage regression-Tax ratio*
Democracy$_{-1}$	0.104 (2.481)	3.333 (2.948)	-1.782 (3.361)
Income$_{-1}$	0.365*** (0.025)	-0.098*** (0.029)	0.463*** (0.033)
Openness$_{-1}$	1.921 (1.234)	1.900 (1.466)	-0.980 (1.672)
Openness X Democracy$_{-1}$	-0.116 (1.345)	-1.847*** (1.598)	0.951 (1.823)
Public spending$_{-1}$	0.536*** (0.089)	0.812*** (1.004)	-0.184 (0.122)
Population$_{-1}$	0.059*** (0.012)	0.787*** (0.106)	0.248*** (0.017)
Education$_{-1}$	-0.114*** (0.043)	0.012 (0.050)	-0.126** (0.057)
Socialist$_{-1}$	0.171*** (0.032)	-0.012 (0.039)	0.205*** (0.044)
Elections$_{-1}$	-0.011 (0.013)	-0.007 (0.016)	-0.008 (0.018)
Oil exporter$_{-1}$	-0.201 (0.171)	0.012 (0.198)	-0.210 (0.226)
N	854	850	848
F-test	126.87	33.22	85.17
R-squared	0.606	0.386	0.495
Endogeneity test	7.50	11.33	4.46
Cragg-Donald test	7.075	6.700	6.675
Wooldridge test	192.60	266.860	57.95

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

Table 8a: First stage regression - non OECD countries

	First stage regression-Direct taxes	*First stage regression-Indirect taxes*	*First stage regression-Tax ratio*
Z_{ct-1}	0.083*** (0.016)	0.084*** (0.016)	0.083*** (0.016)
Income$_{-1}$	-0.044*** (0.011)	-0.045*** (0.011)	-0.044*** (0.011)
Openness$_{-1}$	-0.363*** (0.015)	-0.379*** (0.014)	-0.363*** (0.015)
Openness X Democracy$_{-1}$	0.581*** (0.003)	0.578*** (0.003)	0.581*** (0.003)
Public spending$_{-1}$	-0.005 (0.025)	-0.012 (0.024)	-0.005 (0.025)
Population$_{-1}$	0.010** (0.005)	0.007 (0.005)	0.010** (0.005)
Education$_{-1}$	0.182 (0.134)	0.002 (0.013)	0.182 (0.134)
Socialist$_{-1}$	-0.018** (0.007)	-0.012* (0.007)	-0.018** (0.007)
Elections$_{-1}$	0.001 (0.006)	0.001 (0.006)	0.001 (0.006)
Oil exporter$_{-1}$	0.039 (0.056)	0.032 (0.054)	0.039 (0.056)
N	439	431	427
F-test	25.32	27.08	29.29

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

The results of our second stage regression, given in Table 8b, remain almost identical with our main results. More specifically, *Democracy* has a positive effect on *Direct taxes*, with a coefficient of 2.308; however, it is now significant at a 5% level of statistical significance. *Democracy* also has a positive impact on *Indirect taxes* at a 1% significance level and with a coefficient of 3.089. Also, *OpennessxDemocracy* still has a negative effect on both *Direct taxes* and *Indirect taxes* at a 1% level of statistical significance and with coefficients of –1.378 and

Table 8b: Second stage regression-Non OECD countries

	Second stage regression-Direct taxes	*Second stage regression-Indirect taxes*	*Second stage regression-Tax ratio*
Democracy$_{-1}$	2.308** (0.907)	3.089*** (0.922)	-0.309 (0.778)
Income$_{-1}$	0.257*** (0.065)	-0.163** (0.067)	0.469*** (0.058)
Openness$_{-1}$	1.005*** (0.354)	1.245*** (0.375)	-0.029 (0.319)
Openness X Democracy$_{-1}$	-1.378*** (0.528)	-1.727*** (0.534)	0.083 (0.449)
Public spending$_{-1}$	0.498*** (0.116)	0.396*** (1.200)	0.157 (0.106)
Population$_{-1}$	0.010 (0.022)	-0.129*** (0.023)	0.162*** (0.020)
Education$_{-1}$	-0.019 (0.068)	0.157** (0.063)	-0.171*** (0.054)
Socialist$_{-1}$	0.194*** (0.039)	0.064* (0.037)	0.137*** (0.032)
Elections$_{-1}$	-0.015 (0.028)	-0.015 (0.029)	-0.006 (0.025)
Oil exporter$_{-1}$	-0.310 (0.261)	-0.078 (0.262)	-0.228 (0.227)
N	439	431	427
F-test	15.76	12.91	19.94
R-squared	0.119	0.102	0.344
Endogeneity test	7.98	7.694	0.451
Cragg-Donald test	25.31	27.08	29.28
Wooldridge test	192.62	192.83	12.77

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

–1.727 respectively. The effect of the rest of our control variables remains the same as in our main estimation in Table 5b.

To sum up, our empirical results using a number of different specifications and robustness tests, seem to verify our main assumption that regional waves of democratization in a geographical area increase discontent with autocracy and demand for democracy within a country, in line with the theory of Huntington (1991) and the methodology used Acemoglu et al. (2014) about regional democratization waves. In addition, our findings in the second stage estimation show us that democratic regimes seem to increase direct taxation due to greater voluntary taxation of taxpayers (Kenny and Winer, 2006) and because of regional waves of diffusion of certain tax measures between neighbouring democratic countries (Kenny and Winer, 2006; Aidt and Jensen, 2009). Finally indirect taxation is also positively influenced by democracy, in line with the theory that poorer democratic countries rely more on indirect taxes (Moutos, 2001; Adam, 2009).

5 Conclusion

In this paper, we investigate the effect of regional waves of democratization in a country's democracy and also the effect of democracy on taxation. The analysis is carried out using a dataset of 74 developed and developing countries from 1993 to 2012. We use the information on the political regime of countries in the same geographical area in order to construct an index of regional waves of democratization like the one used by Acemoglu et al. (2014), based on the theory of Huntington (1991). These waves represent the demand for or discontent with a given political system in countries in the same geographical area. We then use this regional democratization index as an instrumental variable in a two-stage fixed effects regression with democracy used as the endogenous variable and try to find the impact of democracy on taxation. Our first stage estimation shows that regional waves of democratization positively affect a country's political regime as in Huntington (1991) and Acemoglu et al. (2014). The results of the main estimation also seem to verify that democracy exerts a positive influence on direct taxes due to taxpayers' voluntary compliance observed in democracies (Kenny and Winer, 2006) and because of regional diffusion waves of direct taxes between neighbouring democracies (Berry and Berry, 1992; Aidt and Jensen, 2009). Democracy also seems to increase indirect taxes, because poorer countries rely more on trade and indirect taxes and voters are in favour of them. Our results remain the same after using several robustness tests,

To the best of our knowledge, this is the first study that examines the two-way causal relationship between taxation and democracy, most authors in the past focusing only on how taxation affects political regimes, or simply on how democracy affects taxation. In addition, our paper is the first one, which uses regional waves of democratization and examines their effect on a country's political regime and on taxation. Therefore, our findings contribute to the well-established literature about the relationship between taxation and democracy and on the determinants of taxation. The methodology used in this model can also be used in future research, for example, the effect of democracy on government spending and on public finance in general.

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