The impact of tax rates on tax evasion:
A macroeconomic study

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Abstract

Research Question: What is the impact of high tax rates on the level of tax evasion in different economies? *Motivation:* after the occurrence of the famous panama papers and paradise papers scandal (Alstadsæte *et al.,* 2019) and seeing that tax burden has been incessantly increased due to higher tax burden (Slemrod, 2017). Many research papers focused on the impact of tax evasion on the equilibrium of economies (Fisman & Wei, 2004; Picur & Riahi-Belkaoui, 2006). That's why we tried in our research paper to insist on the growth of the income tax rate as a principal determinant of tax evasion by emphasizing the importance of the economic characteristics of different countries. *Idea:* We examine the impact of tax burden on the level of tax evasion by analyzing the relationship between tax rates and tax evasion in the developed and emerging countries while taking on consideration their economic characteristics. *Data:* First of all, we analyze a sample of 143 countries where we focus on the cited relationship, then we divide this sample into 33 developed countries and 110 emerging countries. The collected data are related to the period preceding the publication date of the panama papers. *Tools:* We use a cross section analysis based on univariate and multivariate regression model applied for the whole sample and the two cited subsample groups. *Findings:* We find a positive and significant relationship between tax rates and tax evasion. This relationship no longer remains significant in the first group of the study which is composed by 33 developed countries however the second group composed by 110 emerging countries indicates that there is a positive and significant relationship between the two studied variables. Hence, in the following research we will strive for highlighting the main discriminate variables between both of the two cited samples. *Contribution:* The empirical findings have

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economic and tax implications for governments and decision and policies makers especially in economies with high levels of tax evasion.

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1. Introduction

Tax evasion is an important phenomenon that has always had a significant impact on global economies and levels of their development. Non-compliance with tax obligations has a very significant impact on government revenue (Picur & Riahi-Belkaoui, 2006). As a result, several studies and research works have tried to analyze and dissect the various factors that encourage such a phenomenon. In addition, global organizations such as the World Bank or the International Monetary Fund as well as professionals and researchers, such as Fred Celimene *et al*. (2014), have always tried to reflect by descriptive statistics and relevant analyses the substantial burden on governments due to tax evasion and the evolution of illegal parallel economies.

Obviously, various factors influence the level of tax evasion, including the level of sustainable development that has been addressed by Khlif *et al*. (2016).These authors have shown that the level of social and cultural development as well as the level of infrastructure development in the presence of a low level of corruption coincides with a low level of tax evasion. Others, such as Grant Richardson (2006), have highlighted the complexity of the rules of law as well as the demographic characteristics of different countries to explain the main determinants of tax evasion.

Based on previous research, we can say that studies of the determinants of tax evasion as well as the different factors that influence this phenomenon have focused on the social, cultural and institutional characteristics. Therefore, it is important to study the impact of economic factors, essentially the increasing tax rates on the degree of tax evasion in different economies. Indeed, the objective of our research work is to focus on the phenomenon of tax evasion in relation to the increase of corporate tax rates while taking into account the presence of different economic factors at the macroeconomic level.

In this paper, we will try to operationalize what we have advanced through a cross-section analysis. The following of our paper is structured in four parts. In the first part we will try to outline the literature review to study the factors that may have a relationship with the phenomenon of tax evasion, namely the increase in corporate tax rates to reinforce our testing of the relationship predicted by the Laffer curve through the advancement of three hypotheses that consider the difference between the economic environments of the different countries in different economies. In the second part, we will present our research methodology where we will detail the path of sample selection and present variable used in our models. In the third part we will present our data processing and detail the result analysis by type of sample used during our empirical tests which allow us to find the detectable relationship between the degree of tax evasion and the variation in tax rates taking in account the different economic factors in a considerable number of developed as well as emerging and developing countries. Finally, we will present our conclusions.

2. Literature review and hypotheses development

Fraudulent tax evasion as an illegal attempt to minimize tax liabilities through fraudulent techniques to circumvent tax laws such as the fact of non-payment of taxes or the filing of income tax returns. understates the actual amount of taxes payable. Ttax evasion represents the illegal evasion of taxes by individuals, corporations and trusts. This type of Tax manipulation often leads taxpayers to deliberately distort the true state of their affairs to the tax authorities in order to reduce their tax debt through dishonest tax return filing, such as reporting less income, profits or earnings than amounts actually earned or as over-valuation of deductions.

At this level we can say that the reduction of tax liabilities in its two forms "tax evasion" and "tax avoidance" present a range of activity that reflects the intention to overturn a state's tax regime, but the difference is that tax evasion is illegal while tax avoidance is lawful and converges to the use of methods known as tax manipulation, which generally helps to manage the tax results down and subsequently reduce the amount of taxes to be paid.

In the same context, Feige and Cebula (2011) predict that tax evasion can defraud the government in terms of its tax revenues legally, this is will reduce its ability to provide public services, while increasing the heavy burden of the state debt. Non-compliance with tax obligations shifts real resources from honest taxpayers to dishonest ones and the tax burden of current generations to future generations.

These forms of inequality will cause citizen and corporate discontent with the government and further erode state fiscal revenues. Given these consequences, economists seek to estimate the scale, composition, growth and determinants of tax

evasion in the hope of implementing public policies that can improve tax compliance. Regarding tax rates and referring to different countries in the world, tax regimes are mainly based on direct taxes and indirect taxes.

In the different countries of the world, tax regimes are essentially based on direct and indirect taxes. In our research work, we studied the role direct taxes can play in the phenomenon of tax evasion, particularly with respect to corporate tax. Given the importance of tax evasion, several research articles have focused on the factors that may influence this scourge, essentially tax rates which is a very important factor in the study of tax evasion. In this sense, Pommerehne and Weck-Hannemann (1996) have conducted an empirical analysis of citizens' non-compliance with taxes in twenty-five regions of the Swiss state based on the standard model of tax evasion.

In their model, they assessed tax evasion as the difference between income measures collected from tax reporting and those derived from national income accounts. They found a positive and significant relationship between the increase in marginal tax rates and tax evasion and a slightly significant negative relationship between tax evasion and the probability of detecting tax overruns reflected through the probability of audit. However, they did not find a significant relationship between tax penalties and the degree of tax evasion.

These authors have conducted their research to indicate that in the presence of a very precise degree of satisfaction of the taxpayers, the relation between the marginal tax rate and the tax evasion can change because the level of tax evasion decreases with the transparency and the possibility of public budget monitoring by taxpayers.

It is clear that the link between tax obligations and tax evasion presents a relevant relationship that needs to be investigated, introducing several factors, namely tax rates. Indeed, an increase in tax rates can lead to an increase in the level of tax evasion. Crane and Nourzad (1990) have made it clear that researchers in this field face problems in measuring the main variable especially tax evasion. They used three different measures, the most relevant of them is the difference between the amounts of declared taxes and the amount of taxes that must actually be declared. For this reason, they referred to data on the income of taxpayers in California collected through the "California amnesty data".

In their work, they introduced the probability of detection as a variable reflecting the level of audit and other demographic factors as a control variable. They found that when there is an increase in tax rates the degree of tax evasion increases. They also found that taxpayers with a high-income level tend to avoid paying their taxes. They also indicated that the study of the taxpayer's response to changes in tax rates may vary according to the change in the measure used to estimate the level of tax evasion.

In the same context, Alstadsæter and Jacob (2013) find that the behavior of taxpayers (corporate entity) to avoid or reduce the amount of tax payable varies from one taxpayer to another. However, the increase in tax rates remains a remarkable factor having a significant impact on tax evasion. To confirm this, they examined the impact of fiscal incentives as well as raising awareness of the importance of compliance with tax obligations on the level of tax evasion. To this end, they oriented their concentration towards the degree of tax evasion of Swedish business owners based on panel-type administrative data that covers the period from 2006 to 2009 containing information on income, tax rates and other socio-economic variables.

Moreover, they treated the impact of tax rates on the level of tax evasion through the amount of profits reclassified as dividends payable. In this context, they defined tax evasion as the difference between the amounts of dividends declared and the maximum allocation of profits allowed by the tax code. These authors have essentially relied on a model that treats the level of dividend allocation according to tax rates as well as the probability of detection and the indifference of taxpayers towards risk that is inspired by the tax evasion model of Allingham and Sandmo (1972). They found that between 2006 and 2009 about 5% of Swedish companies submit a tax return that overstates the amount of profits allocated as profits to be distributed, hence a positive relationship between tax evasion and the increase in tax rates.
Their investigations end to finding a positive relationship in the Swedish context between tax evasion and the complexity of tax rules and that raising awareness of the importance of aligning with tax obligations reduces the number of false tax returns.

In order to better analyze the phenomenon of tax evasion and its relationship with tax rates, Chiarini *et al*. (2008) have studied the phenomenon of tax evasion over a long period of time. To this end, they used time series taken from the database of the Ministry of Finance of Italy representing the amounts of value-added tax (VAT) evaded by taxpayers between 1980 and 2004. They empirically studied the long-term characteristics of tax evasion and its relation to the heavy tax burden in the Italian context.

These authors indicate that the heavy burden of taxes payable is an important factor that influences the degree of tax evasion and the growth of underground economies in the majority of countries in the world, including Italy which in 2006 presented an amount of 200 billion euros as added value generated by the shadow economy. Based on the undeclared VAT amounts, these authors have estimated the size of the parallel markets and subsequently the degree of tax evasion because evading the VAT declaration corresponds to the non-declaration of an activity existing outside the territories of the formal economic.

They found that Italian taxpayers adopt a tax evasion strategy that actually aims to maintain the gap between the effective tax rate and the apparent tax rate without exceeding a certain limit and that may have a relationship with the degree of risk aversion of taxpayers.

In addition, they found that long-term estimated parameters reflect a quick adjustment that seeks to regain balance, this contradicts the existence of a long-term strategy employed by taxpayers and confirms that in the short-run taxpayers will react quickly to any change using innovative techniques. This behavior is repetitive and passes from one generation to another in a remarkable way.

Finally, they found that, in the Italian context, there is no evidence of a vicious circle between tax evasion and tax pressure because these two variables always converge towards a stable equilibrium. In fact, these two variables are induced by a single stochastic trend. Most importantly, these authors have found that the average tax burden appears to be the main factor that drives the long-term trend of tax evasion. Based on the literature on the study of the relationship between tax rate and tax evasion or studies on the factors inciting tax evasion, we can present our first hypothesis:

H1: there is a positive and significant relationship between tax rate and tax evasion

Such a relationship is influenced by different economic factors that vary from one country to another, which is why identifying the difference between the economies of developed countries and emerging and developing countries remains important. In this context, Johannesen *et al*. (2016) used global data with information about 210,000 companies in 102 countries to examine whether the transfer of cross-border profits by multinational companies is less prevalent in developed countries. The originality of their work lies in proposing a new technique for studying income shifting in international markets. Most importantly, they found that the sensitivity of transferred benefits in order to benefit from tax incentives is negatively related to the level of economic and institutional development. This may explain why many developing countries opt for low corporate tax rates, despite urgent income needs and severe constraints on the use of other tax bases. Based on what has been advanced, it is necessary to add two other research hypotheses that would lead to distinguishing different economic environments.

H2: there is a positive and significant relationship between tax rate and tax evasion in developed countries
H3: there is a positive and significant relationship between tax rate and tax evasion in emerging and developing countries

3. Research methodology

3.1 Sample selection

Our study is essentially based on data that has been collected from the Global Competitiveness Report (GCR) which is published annually by the World Economic Forum Since 2004, this report has been based on a Global Competitiveness Index (GCI) (Sala-i-Martin *et al*., 2004). This index assesses the ability of countries to respond to citizens' needs which is directly related to governments' use of their resources. It takes into consideration several factors or sub-indices having an impact on the economies of the different countries. To identify the values that must be attributed to the main variable, which is tax evasion, we referred to the data and estimates of parallel or underground economies made by Friedrich Schneider *et al.* (2010).

In the present work, we used the average size of the parallel markets of each country among the 162 countries that were estimated over a period spanning 1999 and 2007 by Schneider *et al.* (2010). We then eliminated nine countries representing the tax havens that were indicated by Jaafar and Thornton (2015) and which coincide with the countries treated by Schneider *et al.* (2010), namely Bahamas, Bahrain, Belize, Cyprus, Liberia, Maldives, Malta, Mauritius and Panama. After the elimination of tax havens countries, we obtained a sample of 153 countries which was further reduced to143 countries.

The selection of the final sample is illustrated in the following table:

Table 1. The process of sample selection

Initial sample	162 countries treated by Schneider *et al.* (2010)
Tax havens that coincide with our sample	(9) countries selected refe rring to Aziz Jaafar & John THornton (2015): Bahamas, Bahrain, Belize, Cyprus, Liberia, Maldives, Malta, Marituis, Panama
Countries presenting deviant observations	(5) Countries: UAE, Vietnam, Yemen, Zambia, New Zealand
Countries presentingobservation with tax rate Greater than 35%	(3) Countries: USA, Suriname, Chad
Countries presenting heteroscedastic observation problem	(2) Countries: Georgia, Bolivia
Final sample	143 countries

3.2 Presentation and Measurement of Variables

3.2.1 The dependent variable (TEV)

The dependent variable which is tax evasion "TEV" is reflected in the estimation of the size of parallel economies (as a percentage of GDP) of 162 countries presenting the developed countries, the countries of Eastern Europe, countries of central Asia, high-income countries members of Organisation for Economic Co-operation and Development (OECD) and many more (Schneider *et al.*, 2010).

Buehn and Schneider (2007) found that the shadow or underground economy is an excellent proxy for estimating the value of tax evasion. Schneider *et al.* (2010) based their work on the statistical theory of unobserved variables to achieve a reliable estimate of the size of underground economies. According to these authors such an estimate remains difficult and they provided the following: "Unfortunately, it is very difficult to get accurate information about shadow economy activities on the goods and labour market, because all individuals engaged in these activities do not wish to be identified. Hence, doing research in this area can be considered as a scientific passion for knowing the unknown".
This method considers several causes and multiple indicators of the phenomenon to be measured. To be more precise the authors used the multiple indicators multiple causes (MIMIC) model; a structural equation model (SEM) containing a single latent variable that is tax evasion. In order to measure the relationship between the observed variables and the non-observed variable, the authors used the structural equation model (SEM) to compare the covariance between these variables across the covariance matrix.

It is worth noting that the pioneers of this approach are Frey and Weck-Hannemann (1984). Subsequently, to calculate the size of parallel economies, the authors converted the indices obtained through the MIMIC model to reflect the reality of things more reliably. They adopted the percentage of GDP as a measure of these parallel economies. To this end, they used a procedure called calibration or "benchmarking" referring to Dell'Anno (2007) and Dell'Anno and Solomon (2008).

In our work, we will use the average size of parallel markets estimated between 1999 and 2007 to quantify the intensity of tax evasion in different countries. Based on previous works, we can say that an increase or a decrease in tax evasion in the economies of different countries cannot happen overnight. Such an interpretation was inspired from analyzing the descriptive statistics performed by Elgin *et al*. (2012). At the level of the multivariate analysis, we compared the averages of tax evasion with the corporate tax rates of the different countries that were updated to 2015.

3.2.2 The independent variable (TR) and control variables

In our research work we limited ourselves to the variable (TR) which will allow us to test the assumption that "rates cut down the totals". In order to test the association between the tax rate and the degree of tax evasion, we collected the tax rates of each country referring to the corporate tax rates provided by the web site of KPMG in 2015.

It should be noted that KPMG only presents the data of 148 countries, for this we were obliged to refer to data provided by the World Bank to supplement the rates of the 14 missing countries in order to have the corporate tax rates of 162 countries provided in the article of Schneider *et al.* (2010). Indeed, these rates are measured as the percentage of revenues earned by different companies in different countries of the world. The corporate tax rates for the 162 countries are presented in Appendix1.

Regarding the control variables we relied on the data collected from the GCR. In this sense it should be noted that we used the most relevant indicators that were used for the calculation of the GCI as well as those used by previous research. These include the size of the market, the degree of investor protection, strength of investor protection, the legal right index and the strength of auditing and reporting standards.

We also took into account the most problematic factors that can impact the productivity of countries while focusing on two factors that are corruption and bureaucracy. The detail of these control variables is presented in Appendix 2.

4. Data processing and research findings

In this section we will present how via the implementation of a univariate and multivariate analysis we tested for the relationship between tax rate and tax evasion using simple and partial correlation while focusing on a multivariate ordinary least squares (OLS) model. In our analysis we will focus on the difference between results found at the level of our two subsample which reflect the remarkable difference between developed and emerging economies.

4.1 Analysis and interpretation of results of the total sample (143 countries)

Here, we were interested in studying the phenomenon of tax evasion assuming that there is an interesting link between this scourge and the level of tax rates. We emphasized this link trying to consider the effect of the different economic factors.

For this reason and after carrying out the preliminary tests and the verification of the conditions necessary for the realization of the data analysis, we chose the

multiple linear regression which aims at explaining the variation of a phenomenon by one or more other phenomena. In what follows, we will present the descriptive statistics, the univariate analysis and the multivariate analysis for the 143 countries.

4.1.1 Descriptive statistics

The main characteristics of the variables used to obtain the linear regression are presented based on the table of the descriptive statistics.

Table 2. Descriptive statistics of the variables of 143 countries

		TEV	TR	COR	BUR	LRI	MSS	IP	ARS
N	Valid	143	143	123	123	123	123	123	123
	missing	0	0	20	20	20	20	20	20
Average		32.838	24.476	0.601	0.780	5.902	3.878	5.365	4.631
Median		33.600	25.000	1.000	1.000	6.000	3.796	5.300	4.600
Mode		34.90	30.00	1.00	1.00	3.00	1.296	5.00	2.204
Standard deviation		12.096	6.677	0.491	0.415	2.323	1.134	1.576	0.881
Variance		146.324	44.592	0.242	0.173	5.400	1.287	2.486	0.777
Minimum		8.50	10.00	0.00	0.00	1.00	1.296	1.70	2.204
Maximum		61.80	35.00	1.00	1.00	10.00	6.861	9.30	6.701

This table shows that our sample consists of 143 countries including 20 countries whose information regarding control variables is not available. It also shows that our dependent variable (TEV) which is the level of tax evasion has an average of 32.8385 and a mode (the most frequent value) of 34.90 with a maximum value of 61.8 corresponding to "Zimbabwe", which is an emerging country, and a minimum value equal to 8.5 corresponding to "Switzerland", which is a developed country.

Regarding the independent variable (TR), it has an average of 24.4764 with a mode of 30, a maximum value of 35 and a minimum value equal to 10. Regarding the control variables, we note that corruption (COR) has an average of 0.6016 and bureaucracy (BUR) has an average of 0.7805. The legal protection of rights index (LRI) has an average of 5.9024 with a value that varies between 1 and 10, the market size (MSS) has an average of 3.8789 with a minimum and a maximum size of 1.2969 and 6.8617, respectively. The degree of Investor protection (IP) has an average of 5.3650 and varies between 1.7 and 9.30. Finally, the quality of auditing and reporting standards (ARS) has an average of 4.6311 with a value that varies between a minimum of 2.2040 and a maximum of 6.7014.

For corruption and bureaucracy, the averages shown do not reflect the reality because these two variables were measured by the use of a Boolean variable [0, 1]

where the variable equals 1 if corruption or Bureaucracy is one of the top five most problematic factors predicted by the GCR. It should be noted that "Denmark", "Japan", "New Zealand" and "Switzerland" have the lowest levels of corruption, while "Burundi" and "Guyana" present the most corrupt countries. Regarding bureaucracy, we note that "Gambia" and "Singapore" present the countries with the lowest levels of bureaucracy, however "Costa Rica" presents the highest level of bureaucracy.

4.1.2 Univariate analysis

Before presenting the multivariate regression analysis, we discuss the correlation between the variables to be studied which presents the conceptual basis of the regression. In fact, the Pearson correlation is a statistic used to measure the importance of the relationship between the different metric variables. At this level we present our correlation matrix (Table 3) with 143 observations for the dependent and independent variable as well as 123 observations for the control variables due to missing data from 20 countries whose data were unavailable. It should be noted that in our analysis using Statistical Package for the Social Sciences (SPSS) and even for subsequent analyses during sample division all incomplete observations were excluded.

Table 3. The Pearson Correlations matrix of 143 Countries

	TEV	TR	COR	BUR	LRI	MSS	IP	ARS
TEV	1	0.202*	0.495**	-0.115	-0.113	-0.446**	-0.235**	-0.516**
TR	0.202*	1	0.009	-0.164	-0.168	0.087	-0.248**	-0.050
COR	0.495**	0.009	1	-0.231*	-0.013	-0.239**	-0.152	-0.469**
BUR	-0.115	-0.164	-0.231*	1	0.139	0.253**	0.118	0.253**
LRI	-0.113	-0.168	-0.013	0.139	1	0.126	0.421**	0.349**
MSS	-0.446**	0.087	-0.239**	0.253**	0.126	1	0.326**	0.380**
IP	-0.235**	-0.248**	-0.152	0.118	0.421**	0.326**	1	0.396**
ARS	-0.516**	-0.050	-0.469**	0.253**	0.349**	0.380**	0.396**	1

*. The correlation is significant at 0.05 level (bilateral).

**. The correlation is significant at 0.01 level (bilateral).

Note: the number of observations for the dependent and independent variable corresponds to 143 countries and that for control variables corresponds to 123 countries.

In fact, the Pearson correlation coefficient is a measure of association that makes it possible to know whether two variables vary in a similar way or not. In the course of our research work, we targeted from the beginning the potential relationship between the level of tax evasion and the variation in tax rates. Indeed, based on the results found in the Pearson correlation matrix, we find that the level of tax

evasion, already measured by reference to black or underground markets, shows a positive and significant relationship at 5% level with tax rates applied in a mandatory manner according to the tax laws of different countries. This relationship has already been envisaged in the literature on tax evasion.

In addition, we note that our dependent variable tax evasion, is positively and significantly correlated at the 1% level with corruption, a negative and significant correlation at 5% level with market size, the degree of protection of investors and the quality of reporting and auditing standards.

Regarding the independent variable (TR), we note that it has a negative and significant correlation with the level of protection of investors at the 5% level. Furthermore, we note that bureaucracy has a negative and significant correlation at the 5% level with corruption in these countries. The market size has a negative and significant correlation at the 1% level with the degree of corruption but a positive and significant correlation at the 1% level with bureaucracy. Investor protection is also positively and significantly correlated at the 1% level with the level of legal protection of rights and market size.

Finally, we note that the quality of reporting and auditing standards is negatively and significantly correlated at the 1% level with corruption but positively and significantly correlated at the 1% level with bureaucracy, the level of legal protection of rights, market size and level of investor protection. Moreover, we used the partial correlation matrix to verify the significance of the relationship between the dependent variable and the independent variable, taking into consideration the impact of the control variables (Table 4).

Table 4. Partial Correlation Matrix for 143 Countries

Control variables			TEV	TR
COR,BUR, LRI, MSS, IP and ARS	TEV	Correlation	1.000	0.257
		Significance (bilateral)	-	0.005
		ddl	0	115
	TR	Correlation	0.257	1.000
		Significance (bilateral)	0.005	-
		ddl	115	0

These results indicate that even when the relationship between tax evasion and the tax rates of different countries is controlled by the use of 6 control variables, we always get a positive and significant correlation at the 5% level which presents an evolution from 20.2 to 25.7%. At this point, we found a relationship between the variable to be explained and the explanatory variable but we could not determine the meaning of this relationship.

4.1.3 The multivariate analysis

At this level, we make use of the multiple linear regression which will enable us to explain our dependent variable (TEV) by the quantitative independent variable (TR) taking into consideration the effect of the six control variables which are COR, BUR, LRI, MSS, IP and ARS. The results obtained using the SPSS software are as follows:

The summary data of the model are presented in Table 5.

Table 5. The summary table of the model for the 143 countries

R	R-two	R-two ajusted	Standard error of the estimate
0.677	0.459	0.426	9.42716

As can be seen from this table, the multiple correlation (R) is equal to 0.677. This correlation reflects the degree of dependence between the dependent and the independent variables under the control of the six control variables. It is worth noting that if we have a multiple correlation coefficient that exceeds 0.8 then we have a strong dependency between the variables being analyzed.

Indeed, as we have an R <0.8, we can proceed to the analysis of the multiple coefficient of determination R-two which is equal to 0.459. This indicates that 45.9% of the variance of the tax evasion (TEV) is explained by the independent variable taking account of the effect of control variables. This value of R^2 can be biased, for that we resorted to the real effect that is given by adjusted R^2 which has a value of 0.426. These coefficients provide important information on the degree of explanation provided by the model; however, and in order to evaluate the overall explanatory power of the model we will refer to the Fisher test which is presented in table 6.

Table 6. ANOVA table for the 143 countries

	the sum of squares	ddl	mean squares	D	Sig.
Regression	8661.897	7	1237.414	13.924	0.000
Residue	10220.213	115	88.871	-	-
Total	18882.110	122	-	-	-

As can be seen from this table, Fisher F is equal to 13.924. The null hypothesis of Fisher's test is as follows: H0 = no variable explains the dependent variable (TEV). As can be seen from the ANOVA table we find that we have a significance that is 0.00 <0.05 so the risk of rejecting H0 is low. Thus, we can reject H0. This indicates that there is at least one variable that explains the dependent variable and therefore our model is globally significant. Then and for the presentation of our model we focus on the results which appear at the level of the following table of coefficients:

Table 7. Table of coefficients for 143 countries

	Non-standardised coefficients		standardised coefficients		
	A	Standard error	Beta	t	Sig.
(Constant)	44.883	7.224		6.213	0.000
TR	0.401	0.141	0.210	2.851	0.005
COR	7.949	2.024	0.314	3.927	0.000
BUR	4.252	2.220	0.142	1.915	0.058
LRI	0.141	0.425	0.026	0.332	0.741
MSS	-3.679	0.867	-0.335	-4.244	0.000
IP	0.519	0.662	0.066	0.783	0.435
ARS	-4.264	1.269	-0.302	-3.360	0.001

The model studying the relationship between the level of tax evasion and tax rates considering the effect of control variables can be developed based on table 8. It can be summarized through the use of a model summary diagram which is given as follows:

$$TEV=44.883+0.401TR+7.949COR+4.252BUR+0.141\ LRI-3.679MSS+0.519IP-4.264ARS+\varepsilon$$

We notice that the independent variable (TR) has a Student t-test equal to 2.851> 1.96 and a p-value of 0.5% <5%. This result allows us to reject the null hypothesis of the student test which is as follows: H0 = "TR" has no effect on (TEV). Therefore, we can conclude that (TR) has a positive effect on (TEV) and as these two variables have a significant correlation, we can confirm our hypothesis H1 which predicts that there is a positive and significant relationship between tax rate and the degree of tax evasion.

Accordingly, we can confirm that in countries with relatively high tax rates we can find a tendency to avoid paying taxes or a tendency to move towards black markets in order to escape heavy burden of taxes to be borne by businesses and taxpayers, which explains the growth in the level of tax evasion. This result is in line with the results in the literature and converges with the principle inspired by the Laffer curve which predicts that "rates cut down the totals".

Finding such a positive and significant relationship between tax rates and the level of tax evasion leads us to further analyze this phenomenon in the different countries of our sample. Indeed, and to test hypotheses H2 and H3, we had to divide our sample of 143 countries into two sub-groups inspired from the IMF country classification. This classification enables us to test the relationship between tax rates and the level of tax evasion in developed countries as well as emerging and developing countries.

4.2 Analysis and interpretation of results of 33 developed countries subsample

By dividing the sample of 143 countries, we obtain the first group of 33 developed countries. In fact, to test the relationship between tax evasion and tax rates in these countries, we used the SPSS software results.

4.2.1 Descriptive statistics of developed countries subsample

First, we will focus on the characteristics of the variables used to study the relationship between tax rates and the level of tax evasion in developed countries. The descriptive statistics of this group of countries are given in Table 8:

Table 8. Descriptive Statistics of Variables of 33 Developed Countries

		TEV	TR	COR	BUR	LRI	MSS	IP	ARS
N	Valid	33	33	32	32	32	32	32	32
	Missing	0	0	1	1	1	1	1	1
Average		18.842	23.008	0.187	0.937	7.031	4.584	6.196	5.436
Median		17.700	22.000	0.000	1.000	7.000	4.588	6.000	5.527
Mode		16.00	20.00	0.00	1.00	7.00	2.441	5.70	4.188
Standard deviation		6.495	6.214	0.396	0.245	2.071	0.915	1.455	0.643
Variance		42.189	38.614	0.157	0.060	4.289	0.839	2.118	0.414
Minimum		8.50	12.00	0.00	0.00	3.00	2.441	3.00	4.188
Maximum		32.00	33.99	1.00	1.00	10.00	6.142	9.30	6.424

As can be seen from this table our sample consists of 33 developed countries including one country whose information regarding control variables could not be obtained. The dependent variable (TEV) has an average of 18.8424 and a mode of 16 with a maximum value of 32 corresponding to "Lithuania" and a minimum value equal to 8.5 corresponding to "Switzerland". The independent variable (TR) has an average of 23.0082 with a mode equal to 20, a maximum value of 33.99 and a minimum value equal to 12. Regarding control variables, we note that corruption (COR) has an average of 0.1875. Bureaucracy (BUR) has an average of 0.9375 but it must be reminded that these two variables were measured by converting them to a Boolean variable [1,0]. The legal protection of rights index (LRI) has an average of 7.0313. Thus, it presents as maximum value equal to 10 and a minimum value of 3. The market size (MSS) has an average of 4.5841 and a value that ranges from 2.441 to 6.142.

The investor protection level (IP) has an average of 6.196 with a minimum of 3 and a maximum of 9.3. Finally, the quality of reporting and auditing standards (ARS)

presents an average of 5.436 and has a value that varies between 4.188and 6.424. Having had a clear idea about the values and descriptive statistics of the different factors that can affect the phenomenon of tax evasion in developed countries, we proceed to the following level of univariate analysis based on the correlation matrix and then to the multivariate analysis.

4.2.2 The univariate analysis of developed countries subsample

For more precision and in order to test the correlation between the two main variables that are the subject of our research work, we relied on the partial correlation matrix which takes account of the effect of the 6 control variables. The SPSS software provided the results displayed in (Table 9).

Table 9. The partial correlation matrix for the 33 developed countries

Control variables			TEV	TR
COR,BUR, LRI, MSS, IP and ARS	TEV	Correlation	1.000	-0.028
		Significance (bilaterale)	-	0.893
		ddl	0	24
	TR	Correlation	-0.028	1.000
		Significance (bilateral)	0.893	-
		ddl	24	0

This partial correlation table shows that there is no correlation between the level of tax evasion and the value of tax rates in developed countries even after considering the effect of the control variables which reflect the impact of the characteristics of the economic environment on such a relationship. Despite the failure to obtain a significant correlation between the level of tax evasion and the variation of tax rates in developed countries, we referred to the linear regression based on the OLS method in order to develop the representative model of the relationship between the different variables used in our research. To this end, we turned to the multivariate analysis presented in the following section.

4.2.3 The multivariate analysis of developed countries subsample

First, we will discuss the variables used to perform the data analysis with respect to the developed countries. Subsequently, to verify the degree of explanation of the information provided by the multiple linear regression analysis, we used the summary table of the model (table10):

Table 10. Summary table of the model for the 33 developed countries

R	R-deux	R-two ajusted	Standard error of the estimate
0.693	0.481	0.330	5.317

As can be seen from this table, the multiple correlation R is equal to 0.693. This correlation reflects the degree of dependence between the dependent variable and the other variables of the model. With R <0.8, we proceed to the analysis of the multiple coefficients of determination R^2 which is equal to 0.481. This coefficient indicates that 48.1% of the variance of the tax evasion is explained by the other variables. For more precision and in order to get closer to the actual effects between the variables, we notice that the R^2 adjusted is equal to 0.330. These coefficients show the degree of explanation provided by the model. To evaluate the overall significance of the model we will refer to Fisher's test which is presented in the following ANOVA table:

Table 11. ANOVA table for the 33 developed countries

	Sum of the squares	ddl	mean squares	D	Sig.
Regression	628.703	7	89.815	3.177	0.016
Residue	678.555	24	28.273	-	-
Total	1307.259	31	-	-	-

As can be seen from the table, the F of Fisher is equal to 3.177 and the p-value is less than 0.05. This ensures that there is at least one variable that can explain the phenomenon of tax evasion and shows the overall significance of the model studying the relationship of tax evasion with tax rates in developed countries taking account of the effect of the economic characteristics of these countries. After testing the global characteristics of the model, we used the partial analysis to elaborate our model and to draw the appropriate conclusions about the relation between tax evasion and tax rates in developed countries.

Table 12. Table of coefficients for the 33 developed countries

	Unstandardized coefficients		Standardized coefficients		
	A	Standard error	Bêta	t	Sig.
(Constant)	49.230	13.711		3.590	0.001
TR	-0.029	0.213	-0.027	-0.136	0.893
COR	2.266	3.010	0.138	0.753	0.459
BUR	1.160	4.097	0.044	0.283	0.780
LRI	-0.406	0.576	-0.129	-0.704	0.488
MSS	-1.270	1.295	-0.179	-0.980	0.337
IP	1.012	0.748	0.227	1.353	0.189
ARS	-5.264	1.865	-0.521	-2.823	0.009

Based on these findings, we can present the following model:

$$TEV=49.230-0.029TR+2.266COR+1.160BUR-0.406LRI-1.270MSS+1.012IP-5.264ARS+\varepsilon$$

Based on this model we find that the variable (TR) has a negative sign indicating that if tax rates increase then the level of tax evasion will decrease in developed countries. In addition, this explanatory variable has a p-value of 0.893, which is well above 0.05, and has a t Student with an absolute value of 0.13 <1.96 (or P-value <0.05). Thus, the null hypothesis of the Student test is accepted: H0 = TR has no effect on TEV. In the same context, and since we did not find a significant correlation between the variable to be explained and the explanatory variable, we can reject our second hypothesis H2 that predicts that there is a positive and significant relationship between the tax rate and the degree of tax evasion in developed countries

This result shows that despite finding a meaningful relationship in our sample of 143 countries, we did not find the same result with regards to developed countries. This can be explained by the level of development of the economic environment in which the tax system of these countries operates.

Moreover, the non-existence of a relationship between tax rates and the level of tax evasion in developed countries can be explained by the respect of the taxpayers of these countries for ethical principles. We believe that these results remain reasonable because the taxpayers of the developed countries declare themselves aware of the importance of taxes in the funding of public projects and especially of sharing co-citizenship values. In the same vein and in the light of these results, we expect that the implementation strategies encouraging compliance of taxpayers with taxes and the use of information technologies in developed countries can be very important factors in reducing the level of tax evasion and eliminating underground markets which usually emerge from high tax rates.

Finally, in view of the fact that we rejected the second hypothesis, it must be said that in the developed countries there are other factors that can have a remarkable effect on the phenomenon of tax evasion. To be more explicit, we can say that the level of confidence in governments and tax administrations as well as the level of trust shared among different stakeholders are considered to be the most influential factors in reducing the level of tax evasion in developed economies.

These factors have been addressed by Wintrobe and Gërxhani (2004) who have argued that the standard theory of tax evasion cannot explain adequately the difference between different countries with respect to the phenomenon of tax evasion. These authors have tried to complement the contributions of public choice theory, which describes the role of the government and the behavior of voters, politicians and public officials, based on an overview of the institutional economy.

In fact, they support the idea that the level of tax evasion is higher in some countries (e.g., countries in transition) than in others (e.g., institutionally advanced countries). For this reason, they explain the difference between the developed and developing countries by the level of confidence of taxpayers in government as well as the level of confidence in the willingness of others to pay taxes. They elucidate that developed countries have a lower level of tax evasion compared to countries in transition and developing countries by the fact that taxpayers in developed countries generally trust governments that have been elected democratically. As a conclusion, we can say that the institutional factors, the quality of the applied standards as well as the level of consciousness of the taxpayers can influence the degree of tax evasion in the developed countries. However, the interest to know the factors that significantly impact the level of tax evasion in emerging countries urges us to focus on the second group of our sample, which consists of 110 emerging and developing countries.

4.3 Analysis and interpretation of results of 110 emerging and developing countries subsample

After analyzing the relationship of tax rate and tax evasion in the developed countries we will focus on the case of emerging countries which are presented in our research paper by 110 countries.

4.3.1 Descriptive statistics of emerging countries subsample

Table 13 shows the descriptive statistics of the different variables used in the study of the relationship between increasing tax rates and the degree of tax evasion in emerging and developing countries.

Table 13. Table of Descriptive Statistics of the variables of 110 Emerging and Developing Countries

		TEV	TR	COR	BUR	LRI	MSS	IP	ARS
N	Valid	110	110	91	91	91	91	91	91
	missing	0	0	19	19	19	19	19	19
Average		37.037	24.916	0.747	0.725	5.505	3.630	5.072	4.347
Median		36.950	25.000	1.000	1.000	6.000	3.582	5.3000	4.333
Mode		34.90	30.00	1.00	1.00	3.00	1.296	6.70	2.204
Standard deviation		10.056	6.775	0.436	0.448	2.287	1.102	1.51914	0.773
Variance		101.141	45.907	0.191	0.201	5.231	1.216	2.308	0.599
Minimum		12.70	10.00	0.00	0.00	1.00	1.296	1.70	2.204
Maximum		61.80	35.00	1.00	1.00	10.00	6.861	8.70	6.7014

As can be seen from this table, our sample is composed of 110 emerging and developing countries including 19 countries whose information regarding the control variables could not be obtained. As a reminder we have indicated that in terms of data analysis we opted for the option of eliminating missing observations.

The dependent variable (TEV), has an average of 37.0373 which is remarkably higher than that of developed countries which have an average of 18.8424 and a mode of 34.90 with a maximum value equal to 61.80 corresponding to "Zimbabwe" and a minimum value equal to 12.7 corresponding to "China". Regarding the independent variable "TR", we find that it has an average of 24.9169 with a mode of 30, a maximum value of 35 and a minimum value equal to 10.

For the control variables, we note that corruption (COR) has an average of 0.747 which is higher than the level of corruption in developed countries (0.187), bureaucracy (BUR) has an average of 0.725 which is lower than that in developed countries (0.937). The legal protection index (LRI), presents a value that varies between 1 and 10 and has an average of 5.505 which is lower than that in developed countries (7.031). The market size (MSS) has a minimum value of 1.296 and a maximum value of 6.861. It has an average of 3.631 which is smaller than the size of the markets in the developed countries (4.584) and the investor protection degree (IP) has an average of 5.0725 which is lower than that of developed countries (6.196). Finally, we notice that the variable reflecting the quality of reporting and auditing standards (ARS) has a minimum and a maximum value of respectively 2.204 and 6.701 with an average of 4.347 which is lower than that in developed countries (5.436).

Indeed, for the control variables, we notice that the factors representing the economic environment in the emerging and developing countries are less sophisticated compared to developed countries, which is quite logical. We can therefore say that the evolution and development are factors that can create a prosperous working and commercial environment that significantly influence the size of parallel markets and consequently the level of tax evasion. This is confirmed by the level of tax evasion in emerging and developing countries, which is twice the value of tax evasion in developed countries.

After having interpreted the descriptive statistics of the economic factors of emerging and developing countries, we turn to the interpretation of the relation between the phenomenon of tax evasion and the legal tax rates applied in these countries. For this we need to interpret the correlation between the different variables and to analyze data by the use of a multiple linear regression model.

4.3.2 The univariate analysis of emerging countries subsample

At this stage, we need to use the partial correlation matrix to deduce the possible relations existing between the phenomenon of tax evasion and the other studied

variables, particularly for emerging and developing countries. Based on Table 14, we note that the correlation between tax rates and tax evasion leads to affirm the relationship between them taking into consideration the impact of the characteristics of the economic environment.

Table 14. The Partial Correlation Matrix for the 110 Emerging and Developing Countries

Control variables			TEV	TR
COR,BUR , LRI , MSS , IP & ARS	TEV	Correlation	1.000	0.275
		Significance (bilateral)	-	0.011
		ddl	0	83
	TR	Correlation	0.275	1.000
		Significance (bilateral)	0.011	-
		ddl	83	0

This table indicates that taking account of the effect of the six control variables does not hinder finding a positive and significant correlation between the level of tax evasion in emerging and developing countries and the increase in tax rates. This result is taken into account because this test gives us a p-value equal to 0.011 <0.05. After having verified the existence of a significant relationship between the endogenous variable and the exogenous variable, we proceeded to the verification of the meaning of this relation which is reflected from the use of the linear regression based on the OLS model.

4.3.3 The multivariate analysis of emerging countries subsample

In what follows, we will test the overall significance of the model, which is essentially based on the variables given in the Table of Appendix 2. Indeed, the summary table of the model (table 15) gives the following results:

Table 15. The model summary table for the 110 emerging and developing countries

R	R-two	R-two ajusted	Standard error of the estimate
0.505	0.255	0.193	9.47417

This table indicates that the dependence between the dependent variable and the variables used in our model has a value of 0.505 which is the value of the multiple correlation "R". The multiple coefficients of multiple determination R^2 equals 0.255 indicating that the independent variable and the control variables can explain 25.5% of the variance of the phenomenon of tax evasion. For the R^2 adjusted we find that the independent variable and control variables can explain the studied phenomenon at the 19.3% level, which is considered as a weakness in our model.

For this reason, we used the Fisher's test to decide on the overall significance of the model. Hence, the use of the ANOVA table which is as follows:

Table 16. ANOVA table for the 110 emerging and developing countries

	Sum of squares	Ddl	Average squares	D	Sig.
Regression	2556.649	7	365.236	4.069	0.001
Residue	7450.073	83	89.760	-	-
Total	10006.722	90	-	-	-

This table shows an F of Fisher equal to 4.069 and a p-value equal to 0.01 <0.05. This result leads to the rejection of hypothesis H0 of Fisher's test which predicts that no variable can explain the dependent variable. Thus, the model contains at least one variable capable of explaining the dependent variable (TEV) and is therefore globally significant.

The development and interpretation of the model to explain the significant relationship between tax evasion and tax rate in the emerging and developing countries is based essentially on the table of coefficients (table 17) which is used to elaborate the model allowing to accept or reject our third hypothesis H3.

Table 17. Table of coefficients for the 110 emerging and developing countries

	Unstandardized coefficients		Standardized coefficients		
	A	Standard error	Beta	t	Sig.
(Constant)	35.257	7.954		4.432	0.000
TR	0.413	0.159	0.262	2.601	0.011
COR	4.694	2.498	0.195	1.879	0.064
BUR	4.665	2.435	0.199	1.916	0.059
LRI	0.653	0.495	0.142	1.321	0.190
MSS	-3.195	1.001	-0.334	-3.191	0.002
IP	0.363	0.780	0.052	0.466	0.643
ARS	-2.106	1.465	-0.155	-1.438	0.154

The model related to the previewed table can be presented as follows:

$$TEV=35.257+0.413TR+4.694COR+4.665BUR+0.653LRI-3.195MSS+0.363IP-2.106ARS+\varepsilon$$

From the results obtained, the tax rate in emerging and developing countries shows a positive and significant relationship with the level of tax evasion since the p-value is equal to 0.011 <0.05 and t Student is 2.601> 1.96. This indicates that (TR)

has an effect on (TEV). Consequently, we can confirm our third hypothesis H3 the existence of a positive and significant relationship between the tax rate and the degree of evasion in emerging and developing countries. These results demonstrate that emerging and developing countries suffer from a high level of tax evasion compared to developed ones. Even worse, we notice that an increase in tax rates significantly influences the level of tax evasion in emerging and developing countries. Such a result confirms the principle that "rates cut down the totals" can be adapted to this group of countries.

In addition, we note that this phenomenon becomes more intense because of the non-development of the economic environment of the emerging and developing countries. Finally, it is worth noting that this phenomenon will have a remarkable impact on the revenues of the government of the emerging countries as they will be threatened by a continuous increase in tax rates aiming at improving their resources. However, such an increase will have a totally different effect as taxpayers and businesses will move to parallel markets to avoid tax burdens.

Such findings lead us to think of the importance of tax regime reforms that further promote tax fairness.

This was affirmed by Aim *et al.* (1991) who considered that developing countries suffer from the fiscal erosion that is due to the different types of tax evasion. These authors find based on the study of Jamaica's tax data, that the difference in taxation between the different sectors of activity as well as the different social classes may be among the causes of tax evasion in emerging and developing countries. Furthermore, they emphasize the importance of tax reforms that should improve the efficiency of the tax administration in terms of taxpayers' data collection as well as the training of its staff.

5. Conclusion

The present work aimed at studying the different factors that may affect the phenomenon of tax evasion. Indeed, the idea of our research was inspired essentially from the famous postulate in the field of research in taxation which states that "rates cut down the totals" explained by the Laffer curve. Which is why we were interested in studying the relationship between tax evasion and tax rates.
Then, through a study based on the economic characteristics of several countries, we found that the increase in corporate tax rates remains a decisive factor in the phenomenon of tax evasion, mainly in emerging and developing countries; however, for developed countries we found no significant results justifying the link between tax evasion and high corporate tax rates. For this reason and through the presentation of previous research works, we have emphasized the importance of corporate tax rates which have been considered as the main source of the tax

burden and therefore as the essential reason for tax evasion. We found that the increase in tax rates in most cases represented a positive and significant relationship with the level of tax evasion. It must be said that based on the literature review on the relationship between tax rates and tax evasion we were able to present and test three research hypotheses, which was dealing with this relationship in different countries while taking on consideration the two other assumptions which take into consideration the specific characteristics of developed countries and those of emerging and developing countries.

Our findings confirm the first and the third hypotheses of our research but do not confirm the second one. In fact, these results indicated that for a sample of 143 countries there is a positive and significant relationship between the level of tax evasion and the increase in corporate tax rates. This relationship was confirmed for emerging and developing countries, reflecting the difficulties facing the tax administrations of these countries. However, we did not find a significant relationship for developed countries, which indicates the importance of focusing on other factors to determine the sources of tax evasion in this type of economies. Like any research work, our work has some limitations, of which we can essentially cite the difference between the years in which data were collected. In addition, we can mention the missing observations during the introduction of the control variables. Our results highlight the need for a future work to study the importance of information technologies in tax administrations as well as the possible strategic orientations that can be used to fight the phenomenon of tax evasion.

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Appendix1: Corporate tax rate of 162 countries

No	Countries	Tax rate	No	Countries	Tax rate
1	Albania	15	82	Kyrgyz Republic	10
2	Algeria	23	83	Lao PDR	24
3	Angola	30	84	Latvia	15
4	Argentina	35	85	Lebanon	15
5	Armenia	20	86	Lesotho	10
6	Australia	30	87	Liberia	25
7	Austria	25	88	Libya	20
8	Azerbaijan	20	89	Lithuania	15
9	Bahamas,	0	90	Luxembourg	29,22
10	Bahrain	0	91	Macao,China	12
11	Bangladesh	27,5	92	Macedonia	10
12	Belarus	18	93	Madagascar	20
13	Belgium	33,99	94	Malawi	30
14	Belize	25	95	Malaysia	25
15	Benin	30	96	Maldives	15
16	Bhutan	30	97	Mali	30
17	Bolivia	25	98	Malta	35
18	Bosnia & Herzgovina	10	99	Mauritania	25
19	Botswana	22	100	Mauritius	15
20	Brazil	34	101	Mexico	30
21	Brunei Darussalam	18,5	102	Moldova	12
22	Bulgaria	10	103	Mongolia	17,5
23	Burkina Faso	27,5	104	Morocco	30
24	Burundi	30	105	Mozambique	32
25	Cambodia	20	106	Myanmar	25
26	Cameroon	33	107	Namibia	33
27	Canada	26,5	108	Nepal	20
28	Cape Verde	25	109	Netherlands	25
29	Central African Republic	30	110	New Zealand	28
30	Chad	40	111	Nicaragua	30
31	Chile	22,5	112	Niger	30
32	China	25	113	Nigeria	30
33	Colombia	25	114	Norway	27
34	Comoros	35	115	Oman	12

No	Countries	Tax rate	No	Countries	Tax rate
35	Congo,Dem,Rep,	35	116	Pakistan	33
36	Congo,Rep,	30	117	Panama	25
37	Costa Rica	30	118	Papua New Guinea	30
38	Côte d'Ivoire	25	119	Paraguay	10
39	Croatia	20	120	Peru	28
40	Cyprus	12,5	121	Philippines	30
41	Czech Republic	19	122	Poland	19
42	Denmark	23,5	123	Portugal	21
43	Dominican Republic	27	124	Quatar	10
44	Ecuador	22	125	Romania	16
45	Egypt,Arab Rep,	22,5	126	Russian Federation	20
46	El Salvador	30	127	Rwanda	30
47	Equatorial Guinea	35	128	Saudi Arabia	20
48	Eritrea	30	129	Senegal	30
49	Estonia	20	130	Sierra Leone	30
50	Ethiopia	30	131	Singapore	17
51	Fiji	20	132	Slovak Republic	22
52	Finland	20	133	Slovenia	17
53	France	33,33	134	Solomon Islands	30
54	Gabon	30	135	South Africa	28
55	Gambia,The	31	136	Spain	28
56	Georgia	15	137	Sri Lanka	28
57	Germany	29,65	138	Sudan	35
58	Ghana	25	139	Suriname	36
59	Greece	29	140	Swaziland	27,5
60	Guatemala	25	141	Sweden	22
61	Guinea	35	142	Switzerland	17,92
62	Guinea-Bissau	25	143	Syrian Arab Republic	22
63	Guyana	30	144	Taiwan	17
64	Haiti	30	145	Tajikistan	15
65	Honduras	30	146	Tanzania	30
66	Hong Kong,China	16,5	147	Thailand	20
67	Hungary	19	148	Togo	29
68	Iceland	20	149	Trinidad and Tobago	25
69	India	34,61	150	Tunisia	25

No	Countries	Tax rate	No	Countries	Tax rate
70	Indonesia	25	151	Turkey	20
71	Iran,Islamic Rep,	25	152	Uganda	30
72	Ireland	12,5	153	Ukraine	18
73	Israel	26,5	154	United Arab Emirates	55
74	Italy	31,4	155	United Kingdom	20
75	Jamaica	25	156	United States	40
76	Japan	33,06	157	Uruguay	25
77	Jordan	20	158	Venezuela,RB	34
78	Kazakhstan	20	159	Vietnam	22
79	Kenya	30	160	Yemen,Rep,	20
80	Korea,Rep,	24,2	161	Zambia	35
81	Kuwait	15	162	Zimbabwe	25,75

Appendix 2: Description and measures of variables

Variables	Description	Measures
TEV	The intensity of tax evasion according to Shneider *et al* (2010)	Average size of parallel markets estimated between 1999 and 2007 as a percentage of GDP
TR	Tax rate in 2015 according to KPMG and the World Bank	Percentage
COR	Importance of corruption in a country	= 1 if it has one of the top 5 problem factors according to GCR of the WEF & = 0 if no
BUR	Importance of bureaucracy in a country	= 1 if it has one of the top 5 problem factors according to GCR of the WEF & = 0 if no
IP	The level of investor protection in 2013	scale from 0 to 10
LRI (legal right index)	the level of legal protection of the rights of stakeholders	scale from 0 to 10
MSS (market size score)	the size of the markets (local / foreign /% export to GDP)	scale from 1 to 7
ARS	the quality of auditing and reporting standards	scale from 1 to 7